



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2025 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR635 V3  
(3.15 GHz, AMD EPYC 9455P)

SPECrate®2017\_int\_base = 630

SPECrate®2017\_int\_peak = 642

CPU2017 License: 9017

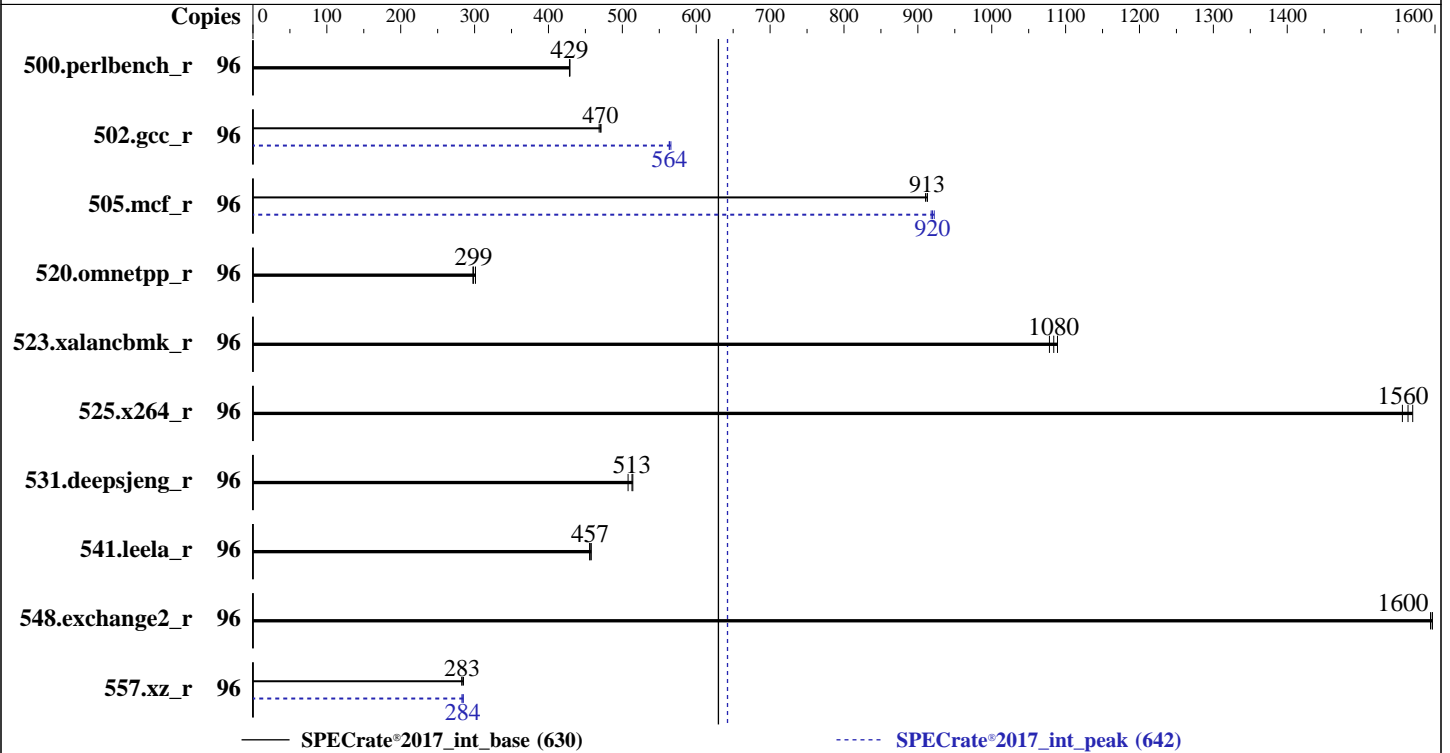
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2025

Hardware Availability: Feb-2025

Software Availability: Oct-2024



### Hardware

CPU Name: AMD EPYC 9455P  
 Max MHz: 4400  
 Nominal: 3150  
 Enabled: 48 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 256 MB I+D on chip per chip,  
 32 MB shared / 6 cores  
 Other: None  
 Memory: 384 GB (12 x 32 GB 2Rx8 PC5-6400B-R, running at 6000)  
 Storage: 1 x 480 GB SATA SSD  
 Other: CPU Cooling: Air

### Software

OS: Red Hat Enterprise Linux 9.4 (Plow)  
 Kernel 5.14.0-427.13.1.el9\_4.x86\_64  
 Compiler: C/C++/Fortran: Version 5.0.0 of AOCC  
 Parallel: No  
 Firmware: Lenovo BIOS Version KAE131I 5.30 released Dec-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 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	96	<b>357</b>	<b>429</b>	357	428	356	429	96	<b>357</b>	<b>429</b>	357	428	356	429
502.gcc_r	96	289	471	<b>289</b>	<b>470</b>	290	469	96	<b>241</b>	<b>564</b>	241	563	240	566
505.mcf_r	96	170	910	170	913	<b>170</b>	<b>913</b>	96	<b>169</b>	<b>920</b>	169	918	168	922
520.omnetpp_r	96	<b>422</b>	<b>299</b>	423	298	418	301	96	<b>422</b>	<b>299</b>	423	298	418	301
523.xalancbmk_r	96	94.0	1080	93.1	1090	<b>93.5</b>	<b>1080</b>	96	94.0	1080	93.1	1090	<b>93.5</b>	<b>1080</b>
525.x264_r	96	<b>108</b>	<b>1560</b>	107	1570	108	1560	96	<b>108</b>	<b>1560</b>	107	1570	108	1560
531.deepsjeng_r	96	217	508	214	514	<b>214</b>	<b>513</b>	96	217	508	214	514	<b>214</b>	<b>513</b>
541.leela_r	96	347	458	<b>348</b>	<b>457</b>	349	456	96	347	458	<b>348</b>	<b>457</b>	349	456
548.exchange2_r	96	158	1600	158	1590	<b>158</b>	<b>1600</b>	96	158	1600	158	1590	<b>158</b>	<b>1600</b>
557.xz_r	96	<b>366</b>	<b>283</b>	364	285	367	283	96	367	283	364	285	<b>365</b>	<b>284</b>

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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

runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <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/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017-1.1.9-amd
-aocc500_znver5_A1.2/amd_rate_aocc500_znver5_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

## 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 configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode  
NUMA Nodes per Socket set to NPS4

```
Sysinfo program /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Fri Jan 3 04:07:26 2025
```

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. Failed units, from systemctl list-units --state=failed
  13. Services, from systemctl list-unit-files
  14. Linux kernel boot-time arguments, from /proc/cmdline
  15. cpupower frequency-info
  16. 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
- 

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### Platform Notes (Continued)

-----  
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`  
04:07:26 up 3 min, 0 users, load average: 0.11, 0.15, 0.07  
USER TTY LOGIN@ IDLE JCPU PCPU WHAT

-----  
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) 1545972  
max locked memory (kbytes, -l) 2097152  
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) 1545972  
virtual memory (kbytes, -v) unlimited  
file locks (-x) unlimited

-----  
5. `sysinfo process ancestry`  
/usr/lib/systemd/systemd --switched-root --system --deserialize 31  
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups  
sshd: root [priv]  
sshd: root@notty  
/bin/bash ./02.remote\_local\_SPECCpu\_1.01.sh  
/bin/bash ./Run025-compliant-amd-rateint.sh  
python3 ./run\_amd\_rate\_aocc500\_znver5\_A1.py  
/bin/bash ./amd\_rate\_aocc500\_znver5\_A1.sh  
runcpu --config amd\_rate\_aocc500\_znver5\_A1.cfg --tune all --reportable --iterations 3 intrate  
runcpu --configfile amd\_rate\_aocc500\_znver5\_A1.cfg --tune all --reportable --iterations 3 --nopower  
--runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile  
\$SPEC/tmp/CPU2017.071/templogs/preenv.intrate.071.0.log --lognum 071.0 --from\_runcpu 2  
specperl \$SPEC/bin/sysinfo  
\$SPEC = /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1.2

-----  
6. `/proc/cpuinfo`  
model name : AMD EPYC 9455P 48-Core Processor  
vendor\_id : AuthenticAMD  
cpu family : 26  
model : 2  
stepping : 1  
microcode : 0xb00211a

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### Platform Notes (Continued)

```

bugs          : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size     : 192 4K pages
cpu cores    : 48
siblings     : 96
1 physical ids (chips)
96 processors (hardware threads)
physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
physical id 0: apicids 0-11,16-27,32-43,48-59,64-75,80-91,96-107,112-123
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):                 96
On-line CPU(s) list:   0-95
Vendor ID:              AuthenticAMD
BIOS Vendor ID:        Advanced Micro Devices, Inc.
Model name:             AMD EPYC 9455P 48-Core Processor
BIOS Model name:       AMD EPYC 9455P 48-Core Processor
CPU family:            26
Model:                  2
Thread(s) per core:    2
Core(s) per socket:    48
Socket(s):              1
Stepping:               1
BogoMIPS:               6290.41
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 hw_pstate ssbd mba perfmon_v2 ibrs ibpb stibp
                        ibrs_enhanced vmmcall fsgsbase tsc_adjust 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
                        avx_vnni 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 avx512_bitalg avx512_vpopcntdq la57 rdpid
                        bus_lock_detect movdiri movdir64b overflow_recov succor smca fsrm
                        avx512_vp2intersect flush_l1d debug_swap

Virtualization:        AMD-V
L1d cache:             2.3 MiB (48 instances)
L1i cache:             1.5 MiB (48 instances)
L2 cache:              48 MiB (48 instances)
L3 cache:              256 MiB (8 instances)
NUMA node(s):          4
NUMA node0 CPU(s):    0-11,48-59
NUMA node1 CPU(s):    12-23,60-71
NUMA node2 CPU(s):    24-35,72-83

```

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### Platform Notes (Continued)

```

NUMA node3 CPU(s):          36-47,84-95
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, 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	48K	2.3M	12	Data	1	64	1	64
L1i	32K	1.5M	8	Instruction	1	64	1	64
L2	1M	48M	16	Unified	2	1024	1	64
L3	32M	256M	16	Unified	3	32768	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: 0-11,48-59
node 0 size: 96344 MB
node 0 free: 95803 MB
node 1 cpus: 12-23,60-71
node 1 size: 96720 MB
node 1 free: 95896 MB
node 2 cpus: 24-35,72-83
node 2 size: 96761 MB
node 2 free: 96223 MB
node 3 cpus: 36-47,84-95
node 3 size: 96706 MB
node 3 free: 96207 MB
node distances:
node  0  1  2  3
0:  10  12  12  12
1:  12  10  12  12
2:  12  12  10  12
3:  12  12  12  10

```

9. /proc/meminfo

MemTotal: 395809020 kB

10. who -r

run-level 3 Jan 3 04:05

11. Systemd service manager version: systemd 252 (252-32.e19\_4)

Default Target Status  
multi-user degraded

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### Platform Notes (Continued)

12. Failed units, from systemctl list-units --state=failed

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION
* NetworkManager-wait-online.service	loaded	failed	failed	Network Manager Wait Online

13. Services, from systemctl list-unit-files

STATE	UNIT	FILES
enabled	NetworkManager	NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond dbus-broker firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor mdmonitor microcode nis-domainname rhsmcertd rsyslog rtkit-daemon selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2 upower
enabled-runtime	systemd	remount-fs
disabled	canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot chrony-wait chronyd-restricted console-getty cpupower debug-shell dnf-system-upgrade hwloc-dump-hwdata kvm_stat man-db-restart-cache-update nftables pesign 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	sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate systemd-sysupdate-reboot	

14. Linux kernel boot-time arguments, from /proc/cmdline

```
BOOT_IMAGE=(hd3,gpt3)/boot/vmlinuz-5.14.0-427.13.1.el9_4.x86_64
root=UUID=273c79f3-13a9-4ae6-9c36-e82799318ef8
ro
resume=UUID=19c8733f-555f-4142-8f61-7554d0dc64ae
```

15. cpupower frequency-info

```
analyzing CPU 60:
Unable to determine current policy
boost state support:
Supported: yes
Active: yes
Boost States: 0
Total States: 3
Pstate-P0: 11800MHz
```

16. sysctl

kernel.numa_balancing	1
kernel.randomize_va_space	0
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	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

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### Platform Notes (Continued)

```

-----
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

```

```

-----
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/cpu2017-1.1.9-amd-aocc500_znver5_A1.2
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   372G  105G  267G  29% /home

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:          Lenovo
Product:         ThinkSystem SR635V3
Product Family: ThinkSystem
Serial:          1234567890

```

```

-----
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 SK Hynix HMC88AHBRA290N 32 GB 2 rank 6400, configured at 6000

```

```

-----
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      Lenovo
BIOS Version:     KAE131I-5.30
BIOS Date:        12/17/2024
BIOS Revision:    5.30
Firmware Revision: 54.6

```





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### Compiler Version Notes

=====  
C | 502.gcc\_r(peak)  
=====

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/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 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
=====

=====  
C | 502.gcc\_r(peak)  
=====

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/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 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
=====

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

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
=====

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

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
=====



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2025 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR635 V3  
(3.15 GHz, AMD EPYC 9455P)

SPECrate®2017\_int\_base = 630

SPECrate®2017\_int\_peak = 642

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2025

Hardware Availability: Feb-2025

Software Availability: Oct-2024

## 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
```

## Base Optimization Flags

C benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-Wl,-mllvm -Wl,-extra-inliner -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdalloc-ext -ldl
```

C++ benchmarks:

```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=advanced -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -fno-PIE -no-pie
```

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## Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-fvirtual-function-elimination -fvisibility=hidden
-mllvm -do-block-reorder=advanced -lamdlibm -lflang -lamdalloc-ext
-ldl
```

Fortran benchmarks:

```
-m64 -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=znver5
-fveclib=AMDLIBM -ffast-math -flto
-fepilog-vectorization-of-inductions -mllvm -optimize-strided-mem-cost
-floop-transform -mllvm -unroll-aggressive -mllvm -unroll-threshold=500
-lamdlibm -lflang -lamdalloc -ldl
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

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

Fortran benchmarks:

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

## Peak Compiler Invocation

C benchmarks:

```
clang
```

C++ benchmarks:

```
clang++
```

Fortran benchmarks:

```
flang
```



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Hardware Availability: Feb-2025

Software Availability: Oct-2024

## 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 -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Wl,-mllvm -Wl,-extra-inliner
-z muldefs -Ofast -march=znver5 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -fgnu89-inline
-lamdalloc

```

```

505.mcf_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-extra-inliner -Ofast -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lflang -lamdalloc-ext -ldl

```

525.x264\_r: basepeak = yes

```

557.xz_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Wl,-mllvm -Wl,-extra-inliner
-Ofast -march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining

```

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## Peak Optimization Flags (Continued)

557.xz\_r (continued):

```
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lflang -lamdalloc-ext -ldl
```

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

523.xalancbmk\_r: basepeak = yes

531.deepsjeng\_r: basepeak = yes

541.leela\_r: basepeak = yes

Fortran benchmarks:

548.exchange2\_r: basepeak = yes

## 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/aocc5/1316/amd_rate_aocc500_znver5_A_lib/lib32
```

C++ benchmarks:

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

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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Turin-E.html>

<http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.html>

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

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Turin-E.xml>

<http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.xml>



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