



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2025 Standard Performance Evaluation Corporation

ASRock Rack Inc.

1U4LW-B650/2L2T
AMD EPYC 4245P

SPECrate®2017_int_base = 96.7

SPECrate®2017_int_peak = Not Run

CPU2017 License: 5416

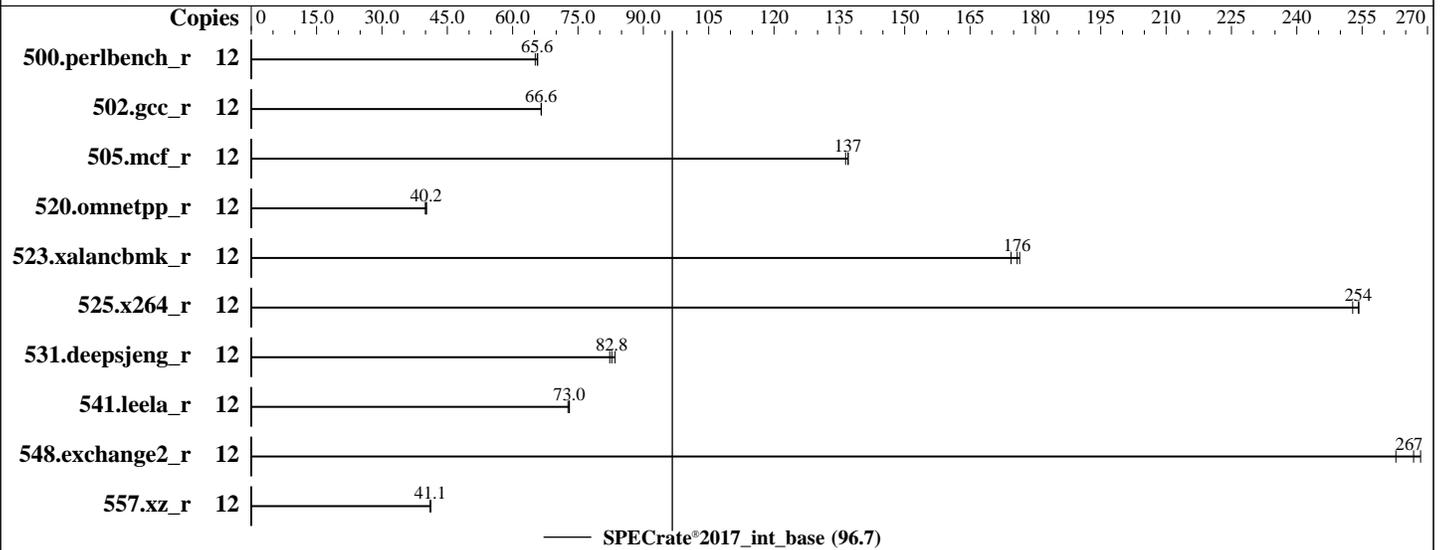
Test Sponsor: ASRock Rack Inc.

Tested by: ASRock Rack Inc.

Test Date: Mar-2025

Hardware Availability: Feb-2025

Software Availability: Feb-2025



Hardware

CPU Name: AMD EPYC 4245P
 Max MHz: 5400
 Nominal: 3900
 Enabled: 6 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: 32 MB I+D on chip per chip
 Other: None
 Memory: 64 GB (2 x 32 GB 2Rx8 PC5-5600B-R)
 Storage: 1 x 465.8 GB NVMe M.2
 Other: CPU Cooling: Air

Software

OS: Ubuntu 24.04.2 LTS
 kernel version 6.8.0-55-generic
 C/C++/Fortran: Version 5.0.0 of AOCC
 Compiler: No
 Parallel: No
 Firmware: Version 21.06 released Mar-2025
 File System: ext4
 System State: Run level 5 (multi-user graphical)
 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	12	291	65.6	291	65.8	293	65.2							
502.gcc_r	12	255	66.6	255	66.6	255	66.6							
505.mcf_r	12	142	136	142	137	142	137							
520.omnetpp_r	12	392	40.2	394	39.9	391	40.2							
523.xalancbmk_r	12	72.1	176	71.8	176	72.7	174							
525.x264_r	12	82.7	254	82.6	254	83.1	253							
531.deepsjeng_r	12	166	82.8	167	82.3	165	83.5							
541.leela_r	12	273	72.7	272	73.0	272	73.0							
548.exchange2_r	12	120	263	117	268	118	267							
557.xz_r	12	316	41.1	314	41.2	315	41.1							

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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/amd/speccpu/amd_rate_aocc500_znver5_A_lib/lib:/home/amd/speccpu/amd_rate_aocc500_znver5_A_lib/1
  ib32:"
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

Platform Notes

BIOS setting:

SoC/Uncore OC Mode : Enabled

```
Sysinfo program /home/amd/speccpu/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on ryzen-grado-2 Fri Mar 21 21:20:07 2025
```

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

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1. uname -a
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3. Username
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11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.5)
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14. cpupower frequency-info
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17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
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21. dmidecode
22. BIOS

1. uname -a
Linux ryzen-grado-2 6.8.0-55-generic #57-Ubuntu SMP PREEMPT_DYNAMIC Wed Feb 12 23:42:21 UTC 2025 x86_64
x86_64 x86_64 GNU/Linux

2. w
21:20:07 up 20 min, 3 users, load average: 0.00, 0.00, 0.00
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT

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Platform Notes (Continued)

```

amd      tty1      -          21:12    7:19    0.03s   ?      -bash
amd      -              10.254.62.240  21:18    20:07    0.00s   ?      sshd: amd [priv]
amd      -              10.254.62.240  21:18    20:07    0.00s   ?      sshd: amd [priv]

```

3. Username

```

From environment variable $USER:  root
From the command 'logname':      amd

```

4. ulimit -a

```

time(seconds)      unlimited
file(blocks)       unlimited
data(kbytes)       unlimited
stack(kbytes)      unlimited
coredump(blocks)   0
memory(kbytes)     unlimited
locked memory(kbytes) 2097152
process            247275
nofiles            1024
vmemory(kbytes)    unlimited
locks              unlimited
rtprio            0

```

5. sysinfo process ancestry

```

/sbin/init
tmux
-bash
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 base --reportable --iterations 3 intrate
runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune base --reportable --iterations 3 --nopower
--runmode rate --tune base --size test:train:refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/amd/speccpu

```

6. /proc/cpuinfo

```

model name      : AMD EPYC 4245P 6-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 26
model          : 68
stepping       : 0
microcode      : 0xb404023
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 192 4K pages
cpu cores     : 6
siblings      : 12
1 physical ids (chips)
12 processors (hardware threads)
physical id 0: core ids 0-5
physical id 0: apicids 0-11

```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

7. lscpu

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Platform Notes (Continued)

From lscpu from util-linux 2.39.3:

```

Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Address sizes:        48 bits physical, 48 bits virtual
Byte Order:           Little Endian
CPU(s):               12
On-line CPU(s) list: 0-11
Vendor ID:            AuthenticAMD
BIOS Vendor ID:      Advanced Micro Devices, Inc.
Model name:           AMD EPYC 4245P 6-Core Processor
BIOS Model name:     AMD EPYC 4245P 6-Core Processor
BIOS CPU family:     107
CPU family:          26
Model:               68
Thread(s) per core:  2
Core(s) per socket:  6
Socket(s):           1
Stepping:            0
CPU(s) scaling MHz:  62%
CPU max MHz:         5484.0000
CPU min MHz:         600.0000
BogoMIPS:            7785.80
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
                    sse4_1 sse4_2 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 user_shstk avx_vnni avx512_bf16 clzero irperf
                    xsaveerptr rdpru wbnoinvd 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 vmmi
                    avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
                    avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid bus_lock_detect
                    movdiri movdir64b overflow_recov succor smca fsrm avx512_vp2intersect
                    flush_lld
Virtualization:       AMD-V
L1d cache:           288 KiB (6 instances)
L1i cache:           192 KiB (6 instances)
L2 cache:            6 MiB (6 instances)
L3 cache:            32 MiB (1 instance)
NUMA node(s):        1
NUMA node0 CPU(s):  0-11
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 Reg file data sampling: 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

```

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Platform Notes (Continued)

Vulnerability Spectre v2:	Mitigation; Enhanced / Automatic IBRS; IBPB conditional; STIBP always-on; RSB filling; PBRSE-eIBRS Not affected; BHI 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	288K	12	Data	1	64	1	64
L1i	32K	192K	8	Instruction	1	64	1	64
L2	1M	6M	16	Unified	2	1024	1	64
L3	32M	32M	16	Unified	3	32768	1	64

8. numactl --hardware

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

```

available: 1 nodes (0)
node 0 cpus: 0-11
node 0 size: 61893 MB
node 0 free: 61168 MB
node distances:
node 0
0: 10

```

9. /proc/meminfo

MemTotal: 63378744 kB

10. who -r

run-level 5 Mar 21 21:00

11. Systemd service manager version: systemd 255 (255.4-lubuntu8.5)

```

Default Target Status
graphical      running

```

12. Services, from systemctl list-unit-files

```

STATE UNIT FILES
enabled apparmor apport blk-availability cloud-config cloud-final cloud-init cloud-init-local
console-setup cron dmesg e2scrub_reap finalrd getty@ gpu-manager grub-common
grub-initrd-fallback keyboard-setup lvm2-monitor multipathd networkd-dispatcher open-iscsi
open-vm-tools pollinate rsyslog secureboot-db setvtrgb snapd systemd-networkd
systemd-networkd-wait-online systemd-pstore systemd-resolved systemd-timesyncd thermald
ua-reboot-cmds ubuntu-advantage ufw unattended-upgrades vgauth
enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
disabled console-getty debug-shell ipmievd iscsid nftables rsync serial-getty@ ssh sysstat
systemd-boot-check-no-failures systemd-confext systemd-network-generator
systemd-networkd-wait-online@ systemd-PCRlock-file-system systemd-PCRlock-firmware-code
systemd-PCRlock-firmware-config systemd-PCRlock-machine-id systemd-PCRlock-make-policy
systemd-PCRlock-secureboot-authority systemd-PCRlock-secureboot-policy systemd-sysext
systemd-time-wait-sync upower
generated openipmi
indirect systemd-sysupdate systemd-sysupdate-reboot uidd
masked cryptdisks cryptdisks-early hwclock multipath-tools-boot screen-cleanup sudo x11-common

```

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

```

BOOT_IMAGE=/vmlinuz-6.8.0-55-generic
root=/dev/mapper/ubuntu--vg-ubuntu--lv

```

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Platform Notes (Continued)

ro

14. cpupower frequency-info

analyzing CPU 5:

current policy: frequency should be within 600 MHz and 5.48 GHz.

The governor "performance" may decide which speed to use within this range.

boost state support:

Supported: yes

Active: yes

15. sysctl

kernel.numa_balancing	0
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

16. /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

17. /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

18. OS release

From /etc/*-release /etc/*-version
os-release Ubuntu 24.04.2 LTS

19. Disk information

SPEC is set to: /home/amd/speccpu

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
------------	------	------	------	-------	------	------------

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Platform Notes (Continued)

```
/dev/mapper/ubuntu--vg-ubuntu--lv ext4 357G 252G 90G 74% /
```

```
-----
20. /sys/devices/virtual/dmi/id
Vendor:      AsrockRack
Product:     1U4LW-B650/2L2T
-----
```

```
21. 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:
  2x Micron Technology MTC20C2085S1EC56BD1 NC 32 GB 2 rank 5600
-----
```

```
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      American Megatrends International, LLC.
BIOS Version:     21.06
BIOS Date:        03/17/2025
BIOS Revision:    5.35
-----
```

Compiler Version Notes

```
=====
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
-----
```

```
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) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
-----
```

```
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)
-----
```

```
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
-----
```



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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 -fltto
-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
```

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

http://www.spec.org/cpu2017/flags/ASRockRack-platform_AMD_setting_v1.1.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/ASRockRack-platform_AMD_setting_v1.1.xml

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