



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2025 Standard Performance Evaluation Corporation

ASRock Rack Inc.

1U4LW-B650/2L2T
AMD EPYC 4345P

SPECrate®2017_fp_base = 115

SPECrate®2017_fp_peak = 126

CPU2017 License: 5416

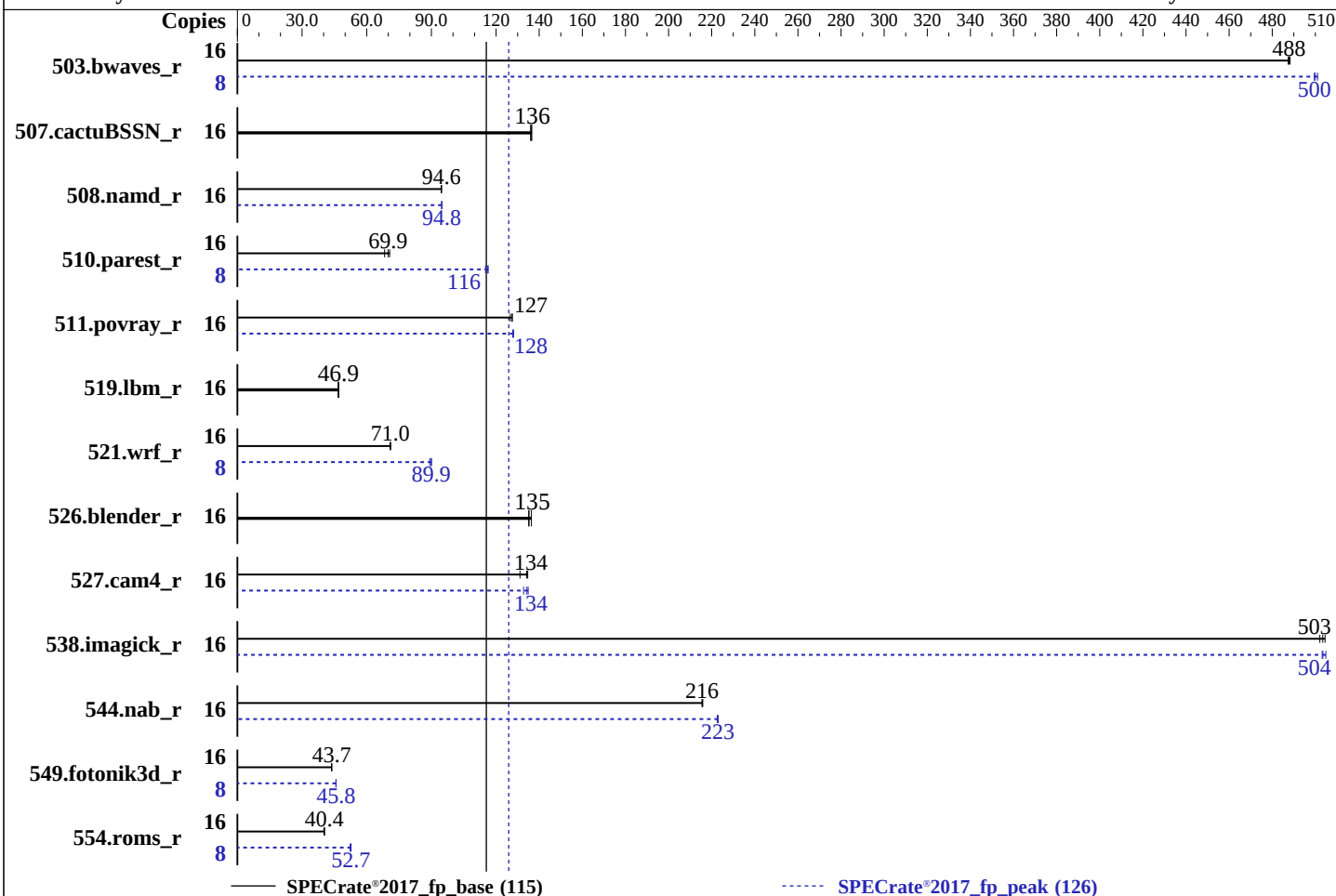
Test Sponsor: ASRock Rack Inc.

Tested by: ASRock Rack Inc.

Test Date: Apr-2025

Hardware Availability: Feb-2025

Software Availability: Feb-2025



Hardware

CPU Name: AMD EPYC 4345P
Max MHz: 5500
Nominal: 3800
Enabled: 8 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 930 GB NVMe M.2
Other: CPU Cooling: Air

Software

OS: Ubuntu 24.04.2 LTS
kernel version 6.8.0-56-generic
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
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: 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
503.bwaves_r	16	329	487	329	488	<u>329</u>	<u>488</u>	8	160	501	161	499	<u>160</u>	<u>500</u>
507.cactuBSSN_r	16	148	137	<u>148</u>	<u>136</u>	149	136	16	148	137	<u>148</u>	<u>136</u>	149	136
508.namd_r	16	<u>161</u>	<u>94.6</u>	161	94.7	161	94.6	16	160	94.8	160	94.8	<u>160</u>	<u>94.8</u>
510.parest_r	16	<u>599</u>	<u>69.9</u>	592	70.6	613	68.3	8	180	116	<u>180</u>	<u>116</u>	182	115
511.povray_r	16	<u>293</u>	<u>127</u>	293	127	295	127	16	292	128	<u>292</u>	<u>128</u>	293	128
519.lbm_r	16	361	46.8	<u>360</u>	<u>46.9</u>	359	46.9	16	361	46.8	<u>360</u>	<u>46.9</u>	359	46.9
521.wrf_r	16	<u>505</u>	<u>71.0</u>	505	70.9	504	71.1	8	<u>199</u>	<u>89.9</u>	201	89.2	199	90.0
526.blender_r	16	180	135	<u>180</u>	<u>135</u>	179	136	16	180	135	<u>180</u>	<u>135</u>	179	136
527.cam4_r	16	213	131	208	135	<u>209</u>	<u>134</u>	16	211	133	207	135	<u>208</u>	<u>134</u>
538.imagick_r	16	<u>79.0</u>	<u>503</u>	78.9	505	79.3	502	16	<u>79.0</u>	<u>504</u>	78.8	505	79.1	503
544.nab_r	16	125	216	125	216	<u>125</u>	<u>216</u>	16	121	223	121	223	<u>121</u>	<u>223</u>
549.fotonik3d_r	16	1428	43.7	1424	43.8	<u>1426</u>	<u>43.7</u>	8	682	45.7	681	45.8	<u>681</u>	<u>45.8</u>
554.roms_r	16	629	40.4	633	40.2	<u>630</u>	<u>40.4</u>	8	<u>241</u>	<u>52.7</u>	243	52.3	241	52.7

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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

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Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

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

```
LD_LIBRARY_PATH =  
    "/home/amd/CPU2017/amd_rate_aocc500_znver5_A_lib/lib:/home/amd/CPU2017/amd_rate_aocc500_znver5_A_lib/lib:  
    ib32:"  
MALLOCONF = "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/CPU2017/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on ryzen-grado-1 Wed Apr 2 03:27:50 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 255 (255.4-1ubuntu8.6)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

1. uname -a

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Platform Notes (Continued)

Linux ryzen-grado-1 6.8.0-56-generic #58-Ubuntu SMP PREEMPT_DYNAMIC Fri Feb 14 15:33:28 UTC 2025 x86_64
x86_64 x86_64 GNU/Linux

```
-----
2. w
03:27:50 up 3:51, 1 user, load average: 12.80, 15.21, 15.68
USER      TTY      FROM      LOGIN@   IDLE   JCPU   PCPU   WHAT
```

```
-----
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            247270
nofiles            1024
vmemory(kbytes)    unlimited
locks              unlimited
rtprio             0
```

```
-----
5. sysinfo process ancestry
/sbin/init
tmux
-bash
sudo ./run_amd_rate_aocc500_znver5_A1.py
sudo ./run_amd_rate_aocc500_znver5_A1.py
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 fprate
runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/temlogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/amd/CPU2017
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 4345P 8-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      : 8
siblings       : 16
1 physical ids (chips)
16 processors (hardware threads)
physical id 0: core ids 0-7
physical id 0: apicids 0-15
```

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Platform Notes (Continued)

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 2.39.3:

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):	16
On-line CPU(s) list:	0-15
Vendor ID:	AuthenticAMD
BIOS Vendor ID:	Advanced Micro Devices, Inc.
Model name:	AMD EPYC 4345P 8-Core Processor
BIOS Model name:	AMD EPYC 4345P 8-Core Processor
BIOS CPU family:	107
CPU family:	26
Model:	68
Thread(s) per core:	2
Core(s) per socket:	8
Socket(s):	1
Stepping:	0
CPU(s) scaling MHz:	57%
CPU max MHz:	5581.0000
CPU min MHz:	600.0000
BogoMIPS:	7585.33
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 amd_ibpb_ret 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 rdpid bus_lock_detect movdiri movdir64b overflow_recov succor smca fsrm avx512_vp2intersect flush_lld
Virtualization:	AMD-V
L1d cache:	384 KiB (8 instances)
L1i cache:	256 KiB (8 instances)
L2 cache:	8 MiB (8 instances)
L3 cache:	32 MiB (1 instance)
NUMA node(s):	1
NUMA node0 CPU(s):	0-15
Vulnerability Gather data sampling:	Not affected
Vulnerability Itlb multihit:	Not affected
Vulnerability L1tf:	Not affected
Vulnerability Mds:	Not affected
Vulnerability Meltdown:	Not affected

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Platform Notes (Continued)

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
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	384K	12	Data	1	64	1	64
L1i	32K	256K	8	Instruction	1	64	1	64
L2	1M	8M	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: 0-15
node 0 size: 61891 MB
node 0 free: 61092 MB
node distances:
node 0
0: 10

9. /proc/meminfo

MemTotal: 63377352 kB

10. who -r

run-level 5 Apr 1 23:36

11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.6)

Default Target Status
graphical running

12. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	ModemManager apparmor appport 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 sysstat systemd-networkd systemd-networkd-wait-online systemd-pstore systemd-resolved systemd-timesyncd thermald ua-reboot-cmds ubuntu-advantage udisks2 ufw unattended-upgrades vgauth
enabled-runtime	netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
disabled	console-getty debug-shell iscsid nftables rsync serial-getty@ ssh 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
indirect	systemd-sysupdate systemd-sysupdate-reboot uidd

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Platform Notes (Continued)

masked cryptdisks cryptdisks-early hwclock multipath-tools-boot screen-cleanup sudo x11-common

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

```
BOOT_IMAGE=/boot/vmlinuz-6.8.0-56-generic  
root=UUID=d1c61924-c235-452d-89ab-0173748185ce  
ro
```

14. cpupower frequency-info

```
analyzing CPU 15:  
current policy: frequency should be within 600 MHz and 5.58 GHz.  
The governor "powersave" 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
```

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Platform Notes (Continued)

os-release Ubuntu 24.04.2 LTS

19. Disk information

SPEC is set to: /home/amd/CPU2017

Filesystem	Type	Size	Used	Avail	Use% Mounted on
/dev/nvme0n1p2	ext4	915G	17G	852G	2% /

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 | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_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++ | 508.namd_r(base, peak) 510.parest_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++, C | 511.povray_r(base, peak) 526.blender_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

AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)

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Compiler Version Notes (Continued)

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin

=====
C++, C, Fortran | 507.cactuBSSN_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
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_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, C | 521.wrf_r(base, peak) 527.cam4_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
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

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

(Continued on next page)



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1U4LW-B650/2L2T
AMD EPYC 4345P

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SPECrate®2017_fp_peak = 126

CPU2017 License: 5416

Test Sponsor: ASRock Rack Inc.

Tested by: ASRock Rack Inc.

Test Date: Apr-2025

Hardware Availability: Feb-2025

Software Availability: Feb-2025

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_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 -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 -lamdalloc
-lflang -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,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -flto

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Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000  
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc  
-lflang -ldl
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-aggressive-gather=true  
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -O3 -march=znver5  
-fveclib=AMDLIBM -ffast-math -flto -Mrecursive -funroll-loops  
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3  
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc  
-lflang -ldl
```

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-aggressive-gather=true  
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -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 -Mrecursive -funroll-loops  
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions  
-lamdlibm -lamdalloc -lflang -ldl
```

Benchmarks using both C and C++:

```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner  
-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 -mllvm -unroll-threshold=100  
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang  
-ldl
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner  
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie  
-flto -fstruct-layout=7 -mllvm -unroll-threshold=50
```

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang -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

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

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Peak Compiler Invocation (Continued)

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

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

544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Ofast -march=znver5
-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 -lamdlibm
-lamdalloc -ldl

C++ benchmarks:

508.namd_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm

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Peak Optimization Flags (Continued)

508.namd_r (continued):

-lamdalloc -ldl

510.parest_r: -m64 -std=c++14 -flto -Wl,-mllvm -Wl,-suppress-fmas

-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast

-march=znver5 -fveclib=AMDLIBM -ffast-math

-mllvm -unroll-threshold=100

-mllvm -reduce-array-computations=3 -zopt -lamdlibm

-lamdalloc -ldl

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast

-march=znver5 -fveclib=AMDLIBM -ffast-math -flto

-Mrecursive -mllvm -reduce-array-computations=3

-fepilog-vectorization-of-inductions -zopt -lamdlibm

-lamdalloc -ldl -lflang

549.fotonik3d_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast

-march=znver5 -fveclib=AMDLIBM -ffast-math -flto

-Mrecursive -mllvm -reduce-array-computations=3

-fepilog-vectorization-of-inductions -fvector-transform

-fscalar-transform -lamdlibm -lamdalloc -ldl -lflang

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast

-march=znver5 -fveclib=AMDLIBM -ffast-math -flto

-fstruct-layout=7 -mllvm -unroll-threshold=50

-fremap-arrays -fstrip-mining

-mllvm -inline-threshold=1000

-mllvm -reduce-array-computations=3 -zopt -Mrecursive

-funroll-loops -mllvm -lsr-in-nested-loop

-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc

-ldl -lflang

527.cam4_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3

-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast

-march=znver5 -fveclib=AMDLIBM -ffast-math -flto

-fstruct-layout=7 -mllvm -unroll-threshold=50

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Peak Optimization Flags (Continued)

527.cam4_r (continued):

```
-mllvm -inline-threshold=1000 -fremap-arrays  
-mllvm -reduce-array-computations=3 -zopt -Mrecursive  
-funroll-loops -mllvm -lsr-in-nested-loop  
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc  
-ldl -lflang
```

Benchmarks using both C and C++:

```
511.povray_r: -m64 -std=c++14  
-Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6  
-Wl, -mllvm -Wl, -reduce-array-computations=3  
-Wl, -mllvm -Wl, -x86-use-vzeroupper=false  
-Wl, -mllvm -Wl, -extra-inliner -Ofast -march=znver5  
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt  
-mllvm -unroll-threshold=100  
-mllvm -loop-unswitch-threshold=2000000 -lamdlibm  
-lamdalloc -ldl
```

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

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Peak Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

-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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