



SPEC CPU®2017 Floating Point Speed Result

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FusionStor

(Test Sponsor: Meganet)

Invento i6000 EPYC (AMD EPYC 9124)

AMD EPYC 9124

SPECspeed®2017_fp_base = 174

SPECspeed®2017_fp_peak = 139

CPU2017 License: 6621

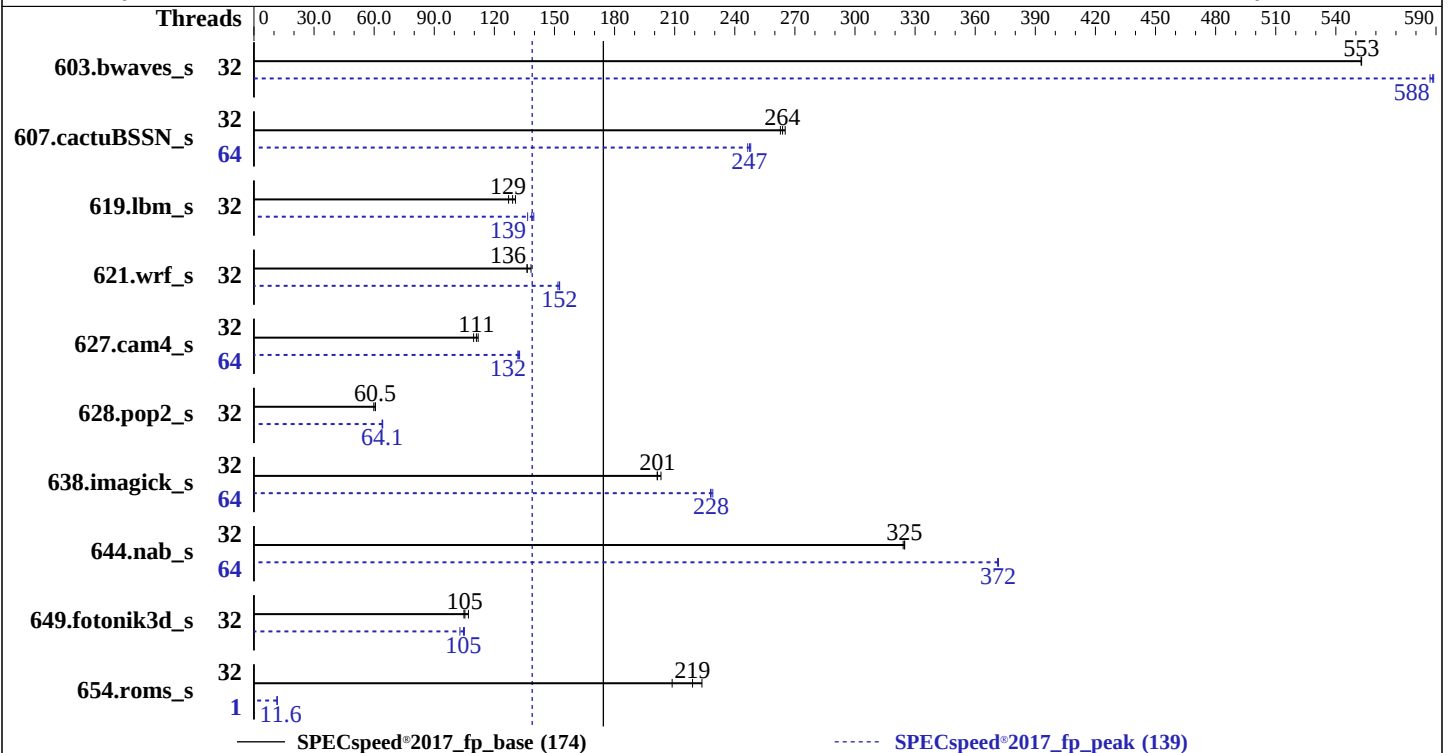
Test Sponsor: Meganet

Tested by: FusionStor

Test Date: Mar-2025

Hardware Availability: Oct-2024

Software Availability: Oct-2024



Hardware

CPU Name: AMD EPYC 9124
Max MHz: 3700
Nominal: 3000
Enabled: 32 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: 64 MB I+D on chip per chip, 16 MB shared / 4 cores
Other: None
Memory: 960 GB (15 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 960 GB SATA SSD
Other: CPU Cooling: Air

Software

OS: Ubuntu 22.04.5 LTS
kernel version 6.8.0-52-generic
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
Parallel: Yes
Firmware: Version 5.27 released Nov-2024
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: OS set to prefer performance at the expense of additional power usage



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	32	107	553	<u>107</u>	<u>553</u>	107	553	32	<u>100</u>	<u>588</u>	101	587	100	589
607.cactuBSSN_s	32	<u>63.2</u>	<u>264</u>	62.9	265	63.4	263	64	67.2	248	67.6	246	<u>67.4</u>	<u>247</u>
619.lbm_s	32	40.1	131	<u>40.6</u>	<u>129</u>	41.2	127	32	37.5	140	<u>37.8</u>	<u>139</u>	38.3	137
621.wrf_s	32	<u>97.0</u>	<u>136</u>	95.6	138	97.0	136	32	<u>86.8</u>	<u>152</u>	86.7	153	87.2	152
627.cam4_s	32	79.2	112	80.8	110	<u>79.8</u>	<u>111</u>	64	67.3	132	<u>67.1</u>	<u>132</u>	66.8	133
628.pop2_s	32	199	59.8	196	60.6	<u>196</u>	<u>60.5</u>	32	185	64.0	185	64.3	<u>185</u>	<u>64.1</u>
638.imagick_s	32	71.0	203	71.7	201	<u>71.6</u>	<u>201</u>	64	63.0	229	63.3	228	<u>63.2</u>	<u>228</u>
644.nab_s	32	<u>53.8</u>	<u>325</u>	53.8	325	53.9	324	64	47.0	372	<u>47.0</u>	<u>372</u>	47.1	371
649.fotonik3d_s	32	<u>86.6</u>	<u>105</u>	87.0	105	85.2	107	32	88.7	103	<u>87.2</u>	<u>105</u>	86.8	105
654.roms_s	32	75.4	209	<u>71.9</u>	<u>219</u>	70.4	224	1	<u>1362</u>	<u>11.6</u>	1361	11.6	1363	11.6

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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:

GOMP_CPU_AFFINITY = "0-63"

LD_LIBRARY_PATH =

"/home/speccpu/cpu2017/amd_speed_aocc500_znver5_A_lib/lib:/home/speccpu/cpu2017/amd_speed_aocc500_znver5_A_lib/lib32:"

LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"

MALLOC_CONF = "retain:true"

OMP_DYNAMIC = "false"

OMP_SCHEDULE = "static"

OMP_STACKSIZE = "128M"

OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 603.bwaves_s peak run:

GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:

GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 619.lbm_s peak run:

GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 621.wrf_s peak run:

GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 627.cam4_s peak run:

GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 628.pop2_s peak run:

GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 638.imagick_s peak run:

GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 644.nab_s peak run:

GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:

GOMP_CPU_AFFINITY = "0-31"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9D64 CPU + 500GiB Memory using Ubuntu 22.04

Platform Notes

Sysinfo program /home/speccpu/cpu2017/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on AMD Wed Mar 19 13:57:01 2025

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

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1. uname -a
2. w

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Platform Notes (Continued)

```
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 249 (249.11-0ubuntu3.12)
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
Linux AMD 6.8.0-52-generic #53-22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Wed Jan 15 19:18:46 UTC 2 x86_64 x86_64
x86_64 GNU/Linux
```

```
-----
2. w
13:57:01 up 19:51, 3 users, load average: 6.87, 7.02, 4.33
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU WHAT
test      :1              Tue17    ?xdm?   5:15m  0.00s  /usr/libexec/gdm-x-session --run-script env
GNOME_SHELL_SESSION_MODE=ubuntu /usr/bin/gnome-session --session=ubuntu
test      pts/1    -              Tue18     3:36m  2.21s  0.32s sudo -s
test      pts/3    -              Tue19    18:40m  0.01s  0.07s sudo -s
```

```
-----
3. Username
From environment variable $USER: root
From the command 'logname': test
```

```
-----
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            3868763
nofiles            1024
vmemory(kbytes)    unlimited
locks              unlimited
rtprio             0
```

```
-----
5. sysinfo process ancestry
/sbin/init splash
/lib/systemd/systemd --user
```

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Platform Notes (Continued)

```
/usr/libexec/gnome-terminal-server
bash
sudo -s
sudo -s
/bin/bash
python3 ./run_amd_speed_aocc500_znver5_A1.py
/bin/bash ./amd_speed_aocc500_znver5_A1.sh
runcpu --config amd_speed_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 fpspeed
runcpu --configfile amd_speed_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/templots/preenv.fpspeed.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu/cpu2017
```

6. /proc/cpuinfo

```
model name      : AMD EPYC 9124 16-Core Processor
vendor_id       : AuthenticAMD
cpu family      : 25
model           : 17
stepping        : 1
microcode       : 0xa101148
bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
TLB size        : 3584 4K pages
cpu cores       : 16
siblings        : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0:  core ids 0-3,8-11,16-19,24-27
physical id 1:  core ids 0-3,8-11,16-19,24-27
physical id 0:  apicids 0-7,16-23,32-39,48-55
physical id 1:  apicids 64-71,80-87,96-103,112-119
```

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 2.37.2:

```
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):                 64
On-line CPU(s) list:    0-63
Vendor ID:              AuthenticAMD
Model name:             AMD EPYC 9124 16-Core Processor
CPU family:             25
Model:                  17
Thread(s) per core:     2
Core(s) per socket:     16
Socket(s):              2
Stepping:               1
Frequency boost:        enabled
CPU max MHz:            3711.9141
CPU min MHz:            1500.0000
BogoMIPS:               6000.29
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
```

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Platform Notes (Continued)

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 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 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 gfnr vaes vpclmulqdq avx512_vnni avx512_bitalg
avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
debug_swap

Virtualization:

L1d cache:

L1i cache:

L2 cache:

L3 cache:

NUMA node(s):

NUMA node0 CPU(s):

NUMA node1 CPU(s):

Vulnerability Gather data sampling:

Vulnerability Itlb multihit:

Vulnerability L1tf:

Vulnerability Mds:

Vulnerability Meltdown:

Vulnerability Mmio stale data:

Vulnerability Reg file data sampling:

Vulnerability Retbleed:

Vulnerability Spec rstack overflow:

Vulnerability Spec store bypass:

Vulnerability Spectre v1:

Vulnerability Spectre v2:

Vulnerability Srbds:

Vulnerability Tsx async abort:

AMD-V

1 MiB (32 instances)

1 MiB (32 instances)

32 MiB (32 instances)

128 MiB (8 instances)

2

0-15,32-47

16-31,48-63

Not affected

Not affected

Not affected

Not affected

Not affected

Not affected

Not affected

Not affected

Mitigation; Safe RET

Mitigation; Speculative Store Bypass disabled via prctl

Mitigation; usercopy/swaps barriers and __user pointer sanitization

Mitigation; Enhanced / Automatic IBRS; IBPB conditional; STIBP

always-on; RSB filling; PBRSE-eIBRS Not affected; BHI Not affected

Not affected

Not affected

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	1M	8	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	1M	32M	8	Unified	2	2048	1	64
L3	16M	128M	16	Unified	3	16384	1	64

8. numactl --hardware

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

available: 2 nodes (0-1)

node 0 cpus: 0-15,32-47

node 0 size: 515739 MB

node 0 free: 513288 MB

node 1 cpus: 16-31,48-63

node 1 size: 451529 MB

node 1 free: 449833 MB

node distances:

node 0 1

0: 10 32

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Platform Notes (Continued)

1: 32 10

9. /proc/meminfo

MemTotal: 990482888 kB

10. who -r

run-level 5 Mar 18 17:22

11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)

Default Target Status
graphical running

12. Services, from systemctl list-unit-files

STATE UNIT FILES

enabled ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
accounts-daemon anacron anydesk apparmor avahi-daemon bluetooth console-setup cron cups
cups-browsed dmesg e2scrub_reap getty@ gpu-manager grub-common grub-initrd-fallback
irqbalance kerneloops keyboard-setup networkd-dispatcher openvpn power-profiles-daemon
rsyslog secureboot-db setvtrgb snapd ssh switcheroo-control systemd-oond systemd-pstore
systemd-resolved systemd-timesyncd thermald ua-reboot-cmds ubuntu-advantage udisks2 ufw
unattended-upgrades wpa_supplicant
enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
disabled acpid brltty console-getty debug-shell ipmievd nftables openvpn-client@ openvpn-server@
openvpn@ rsync rtkit-daemon serial-getty@ speech-dispatcherd
systemd-boot-check-no-failures systemd-network-generator systemd-networkd
systemd-networkd-wait-online systemd-sysext systemd-time-wait-sync upower
wpa_supplicant-nl80211@ wpa_supplicant-wired@ wpa_supplicant@
generated apport openipmi speech-dispatcher
indirect saned@ spice-vdagentd uidd
masked alsa-utils cryptdisks cryptdisks-early hwclock pulseaudio-enable-autospawn rc rcS saned
screen-cleanup sudo x11-common

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

BOOT_IMAGE=/boot/vmlinuz-6.8.0-52-generic
root=UUID=e953dd87-e49e-4230-a412-5a6320fe39a0
ro
quiet
splash
vt.handoff=7

14. cpupower frequency-info

analyzing CPU 53:

current policy: frequency should be within 1.50 GHz and 3.00 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: 3000MHz

15. sysctl

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Platform Notes (Continued)

```
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
```

```
-----
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 22.04.5 LTS
-----
```

```
-----
19. Disk information
SPEC is set to: /home/speccpu/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       ext4  879G   37G  798G   5% /
-----
```

```
-----
20. /sys/devices/virtual/dmi/id
Vendor:      FusionStor
Product:     Fusionstor_Invento_i6000_EPYC_Series
Product Family: Server
Serial:      GNG6PB312A0006
-----
```

```
-----
21. dmidecode
Additional information from dmidecode 3.3 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
```

(Continued on next page)



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Platform Notes (Continued)

"DMTF SMBIOS" standard.

Memory:

15x Samsung M321R8GA0BB0-CQKZJ 64 GB 2 rank 4800
9x Unknown Unknown

22. BIOS

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

BIOS Vendor: FUSIONSTOR
BIOS Version: F18
BIOS Date: 10/11/2024
BIOS Revision: 5.27

Compiler Version Notes

C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(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, Fortran | 607.cactuBSSN_s(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

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 | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(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 | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(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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Invento i6000 EPYC (AMD EPYC 9124)

AMD EPYC 9124

SPECspeed®2017_fp_base = 174

SPECspeed®2017_fp_peak = 139

CPU2017 License: 6621

Test Sponsor: Meganet

Tested by: FusionStor

Test Date: Mar-2025

Hardware Availability: Oct-2024

Software Availability: Oct-2024

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

Base Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Base Portability Flags

603.bwaves_s: -DSPEC_LP64

607.cactuBSSN_s: -DSPEC_LP64

619.lbm_s: -DSPEC_LP64

621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64

627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64

628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64

638.imagick_s: -DSPEC_LP64

644.nab_s: -DSPEC_LP64

649.fotonik3d_s: -DSPEC_LP64

654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver5

-fveclib=AMDLIBM -ffast-math -fopenmp -DSPEC_OPENMP -flto

-fremap-arrays -fstrip-mining -fstruct-layout=7

-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3

-mllvm -unroll-threshold=50 -zopt -mrecip=none -fopenmp=libomp -lomp

-lamdlibm -lamdalloc -lflang

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Tested by: FusionStor

Test Date: Mar-2025

Hardware Availability: Oct-2024

Software Availability: Oct-2024

Base Optimization Flags (Continued)

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver5  
-fveclib=AMDLIBM -ffast-math -fopenmp -fltto -funroll-loops  
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3  
-Mrecursive -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc  
-lflang
```

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 -O3 -march=znver5  
-fveclib=AMDLIBM -ffast-math -fopenmp -DSPEC_OPENMP -fltto  
-fremap-arrays -fstrip-mining -fstruct-layout=7  
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3  
-mllvm -unroll-threshold=50 -zopt -funroll-loops  
-mllvm -lsr-in-nested-loop -Mrecursive -mrecip=none -fopenmp=libomp  
-lomp -lamdlibm -lamdalloc -lflang
```

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 -O3 -march=znver5  
-fveclib=AMDLIBM -ffast-math -fopenmp -DSPEC_OPENMP -fltto  
-fremap-arrays -fstrip-mining -fstruct-layout=7  
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3  
-mllvm -unroll-threshold=50 -zopt  
-mllvm -loop-unswitch-threshold=2000000 -mllvm -unroll-threshold=100  
-funroll-loops -mllvm -lsr-in-nested-loop -Mrecursive -mrecip=none  
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Base Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

```
-Wno-return-type -Wno-unused-command-line-argument
```

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Invento i6000 EPYC (AMD EPYC 9124)

AMD EPYC 9124

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CPU2017 License: 6621

Test Sponsor: Meganet

Tested by: FusionStor

Test Date: Mar-2025

Hardware Availability: Oct-2024

Software Availability: Oct-2024

Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

`-Wno-return-type -Wno-unused-command-line-argument`

Peak Compiler Invocation

C benchmarks:

`clang`

Fortran benchmarks:

`flang`

Benchmarks using both Fortran and C:

`flang clang`

Benchmarks using Fortran, C, and C++:

`clang++ clang flang`

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

`619.lbm_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -DSPEC_OPENMP -fremap-arrays -fstrip-mining
-fstruct-layout=9 -mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=50 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang`

`638.imagick_s: Same as 619.lbm_s`

`644.nab_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`

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Software Availability: Oct-2024

Peak Optimization Flags (Continued)

644.nab_s (continued):

```
-march=znver5 -fveclib=AMDLIBM -ffast-math -fopenmp  
-flto -DSPEC_OPENMP -fremap-arrays -fstrip-mining  
-fstruct-layout=9 -mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3  
-mllvm -unroll-threshold=50 -zopt -mrecip=none  
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Fortran benchmarks:

```
603.bwaves_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP  
-Ofast -march=znver5 -fveclib=AMDLIBM -ffast-math  
-fopenmp -fscalar-transform -fvector-transform  
-mllvm -reduce-array-computations=3 -Mrecursive  
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

```
649.fotonik3d_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP  
-Ofast -march=znver5 -fveclib=AMDLIBM -ffast-math  
-fopenmp -flto -mllvm -reduce-array-computations=3  
-Mrecursive -zopt -fopenmp=libomp -lomp -lamdlibm  
-lamdalloc -lflang
```

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

```
621.wrf_s: -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 -fopenmp  
-flto -DSPEC_OPENMP -fremap-arrays -fstrip-mining  
-fstruct-layout=9 -mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3  
-mllvm -unroll-threshold=50 -zopt -funroll-loops  
-mllvm -lsr-in-nested-loop -Mrecursive -fopenmp=libomp  
-lomp -lamdlibm -lamdalloc -lflang
```

```
627.cam4_s: -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 -fopenmp  
-flto -DSPEC_OPENMP -fremap-arrays -fstrip-mining
```

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Test Date: Mar-2025

Hardware Availability: Oct-2024

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Peak Optimization Flags (Continued)

627.cam4_s (continued):

-fstruct-layout=9 -mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=50 -zopt -Mrecursive
-mrecip=none -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

628.pop2_s: -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 -fopenmp
-flto -DSPEC_OPENMP -fremap-arrays -fstrip-mining
-fstruct-layout=9 -mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=50 -zopt -fscalar-transform
-fvector-transform -Mrecursive -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang

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 -Ofast -march=znver5
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -DSPEC_OPENMP
-fremap-arrays -fstrip-mining -fstruct-layout=9
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=50 -zopt -mllvm -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Peak Other Flags

C benchmarks:

-Wno-return-type -Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-return-type -Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-return-type -Wno-unused-command-line-argument



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Test Date: Mar-2025

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Software Availability: Oct-2024

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

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

<http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-AMD-rev1.html>

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

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

<http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-AMD-rev1.xml>

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