



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Tyrone Systems

(Test Sponsor: Netweb Technologies India Ltd)
(Tyrone Camarero SDA200A2N-212)
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_fp_base = 240

SPECspeed®2017_fp_peak = 261

CPU2017 License: 6802

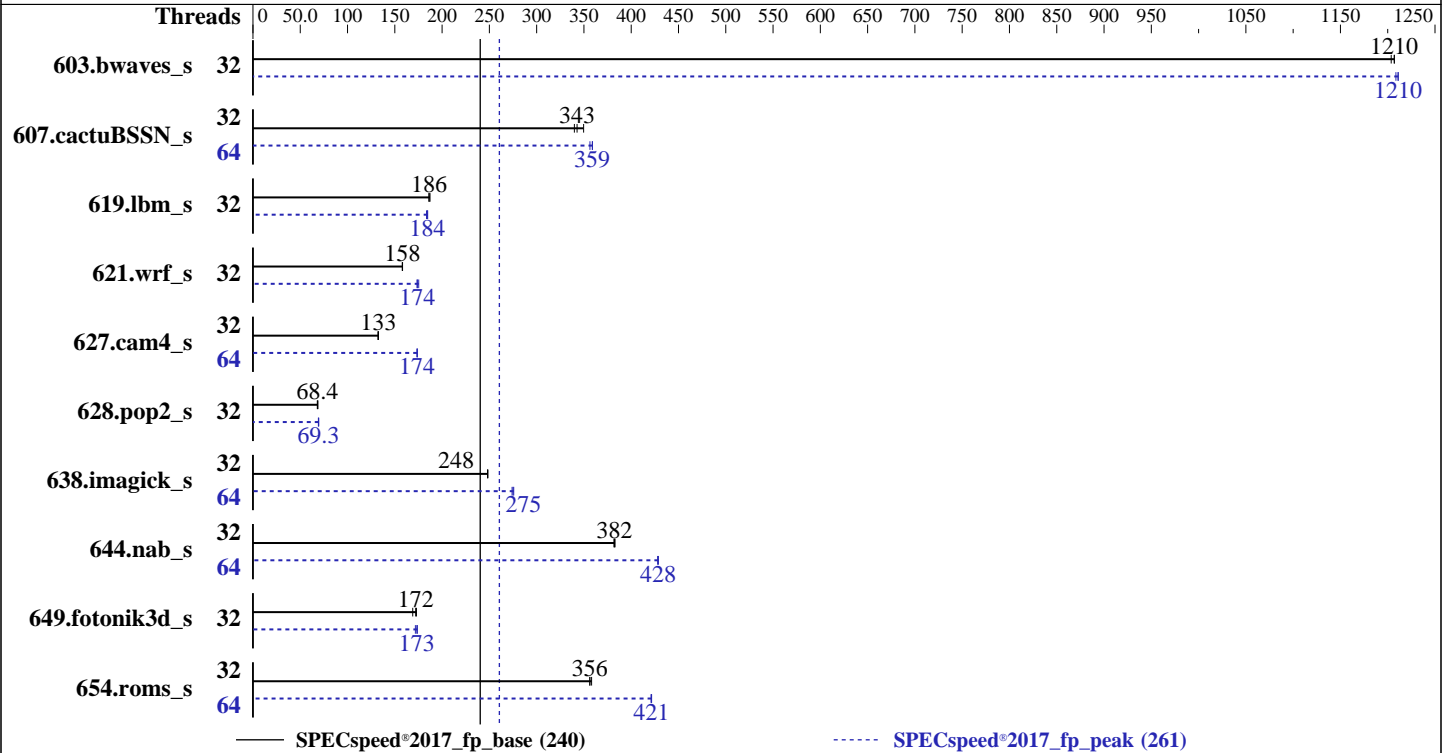
Test Sponsor: Netweb Technologies India Ltd

Tested by: Tyrone Systems

Test Date: Sep-2024

Hardware Availability: Jun-2023

Software Availability: Aug-2024



Hardware

CPU Name: AMD EPYC 9174F
 Max MHz: 4400
 Nominal: 4100
 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: 256 MB I+D on chip per chip, 32 MB shared / 2 cores
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
 Storage: 1 x 1 TB NVMe
 Other: CPU Cooling: Air

Software

OS: Ubuntu 20.04.4 LTS
 kernel version 5.15.0-119-generic
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: Yes
 Firmware: Version 1.9a released Jun-2024
 File System: ext4
 System State: Run level 3 (multi-user)
 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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	32	48.9	1210	48.9	1210	49.0	1200	32	48.8	1210	48.7	1210	48.7	1210
607.cactuBSSN_s	32	49.0	340	47.7	350	48.6	343	64	46.4	359	46.8	356	46.5	359
619.lbm_s	32	28.0	187	28.1	186	28.2	186	32	28.4	184	28.5	184	28.4	185
621.wrf_s	32	83.6	158	83.6	158	83.8	158	32	76.1	174	76.2	174	75.5	175
627.cam4_s	32	66.8	133	67.0	132	66.8	133	64	51.0	174	51.0	174	51.0	174
628.pop2_s	32	173	68.6	174	68.0	174	68.4	32	171	69.6	171	69.3	172	69.2
638.imagick_s	32	58.2	248	58.1	248	58.1	248	64	52.6	274	52.5	275	52.3	276
644.nab_s	32	45.7	382	45.6	383	45.8	382	64	40.8	428	40.8	428	40.8	429
649.fotonik3d_s	32	52.7	173	54.0	169	53.0	172	32	53.1	172	52.6	173	52.4	174
654.roms_s	32	44.2	356	44.2	356	44.0	358	64	37.4	421	37.4	421	37.4	422

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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) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'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/cpu2017/amd_speed_aocc400_znver4_A_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,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"
```

```
PGHPF_ZMEM = "yes"
```

Environment variables set by runcpu during the 654.roms_s peak run:

```
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42 11 43 12 44 13 45 14 46 15 47
16 48 17 49 18 50 19 51 20 52 21 53 22 54 23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"
```

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.



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Platform Notes

BIOS Settings:

cTDP: 400
Determinism Slider set to Power
Package Power: 400
EDC: 400
ACPI SRAT L3 Cache as NUMA Domain: enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on amd2-Super-Server Sat Sep 7 08:55:39 2024

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 245 (245.4-4ubuntu3.20)
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. 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 amd2-Super-Server 5.15.0-119-generic #129~20.04.1-Ubuntu SMP Wed Aug 7 13:07:13 UTC 2024 x86_64
x86_64 x86_64 GNU/Linux
```

```
2. w
08:55:39 up 18:36, 2 users, load average: 5.71, 5.18, 3.16
USER      TTY      FROM          LOGIN@      IDLE        JCPU      PCPU      WHAT
root      tty1    -             Fri13      2:55m      3.07s     0.72s    /bin/bash ./amd_speed_aocc400_znver4_A1.sh
root      tty2    -             Fri14      18:31m     0.07s     0.02s    -bash
```

```
3. Username
From environment variable $USER: root
```

```
4. ulimit -a
time(seconds)      unlimited
file(blocks)       unlimited
```

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Platform Notes (Continued)

```

data(kbytes)          unlimited
stack(kbytes)         unlimited
coredump(blocks)     0
memory(kbytes)       unlimited
locked memory(kbytes) 2097152
process              4126754
nofiles              1024
vmemory(kbytes)     unlimited
locks                unlimited
rtprio               0

```

5. sysinfo process ancestry

```

/sbin/init splash
/bin/login -p --
-bash
python3 ./run_amd_speed_aocc400_znver4_A1.py
/bin/bash ./amd_speed_aocc400_znver4_A1.sh
runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fpspeed
runcpu --configfile amd_speed_aocc400_znver4_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/templogs/preenv.fpspeed.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

```

6. /proc/cpuinfo

```

model name      : AMD EPYC 9174F 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 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
physical id 1: core ids 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
physical id 0: apicids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
physical id 1: apicids 128-131,144-147,160-163,176-179,192-195,208-211,224-227,240-243

```

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 2.34:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
Address sizes:          52 bits physical, 57 bits virtual
CPU(s):                 64
On-line CPU(s) list:   0-63
Thread(s) per core:    2
Core(s) per socket:    16
Socket(s):              2
NUMA node(s):          2

```

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Platform Notes (Continued)

```

Vendor ID: AuthenticAMD
CPU family: 25
Model: 17
Model name: AMD EPYC 9174F 16-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1412.490
CPU max MHz: 4408.2998
CPU min MHz: 1500.0000
BogoMIPS: 8187.37
Virtualization: AMD-V
L1d cache: 1 MiB
L1i cache: 1 MiB
L2 cache: 32 MiB
L3 cache: 512 MiB
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
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: Mitigation; safe RET
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
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; PBR SB-eIBRS Not affected; BHI Not affected
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
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 nopl nonstop_tsc cpuid extd_apicid
aperfperf rapl pni pclmulqdq monitor sse3 fma cx16 pcid sse4_1
sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm
cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd
mba 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
xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd
amd_ppin cppc arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
flushbyasid decodeassists pausefilter pftreshold avic
v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL
L1d	32K	1M	8	Data	1
L1i	32K	1M	8	Instruction	1
L2	1M	32M	8	Unified	2
L3	32M	512M	16	Unified	3

8. numactl --hardware

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Platform Notes (Continued)

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: 515783 MB
node 0 free: 514374 MB
node 1 cpus: 16-31,48-63
node 1 size: 515992 MB
node 1 free: 514749 MB
node distances:
node 0 1
  0: 10 32
  1: 32 10
```

```
9. /proc/meminfo
   MemTotal:      1056538912 kB
```

```
10. who -r
    run-level 3 Sep 6 13:57
```

```
11. Systemd service manager version: systemd 245 (245.4-4ubuntu3.20)
    Default Target   Status
    multi-user       degraded
```

```
12. Failed units, from systemctl list-units --state=failed
UNIT                                LOAD    ACTIVE SUB    DESCRIPTION
* fwupd-refresh.service             loaded failed failed Refresh fwupd metadata and update motd
* NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online
```

```
13. Services, from systemctl list-unit-files
STATE      UNIT FILES
enabled    ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
accounts-daemon anacron apparmor autovt@ avahi-daemon bluetooth console-setup cron cups
cups-browsed dmesg e2scrub_reap getty@ gpu-manager grub-common grub-initrd-fallback
irqbalance kerneloops keyboard-setup network-manager networkd-dispatcher ondemand openvpn
pppd-dns rsync rsyslog secureboot-db setvtrgb snapd ssh sshd switcheroo-control syslog
systemd-pstore systemd-resolved systemd-timesyncd thermald ua-reboot-cmds udisks2 ufw
unattended-upgrades whoopsie wpa_supplicant
enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
disabled    acpid brltty console-getty debug-shell ipmievd openvpn-client@ openvpn-server@ openvpn@
rtkit-daemon serial-getty@ speech-dispatcher speech-dispatcherd
systemd-boot-check-no-failures systemd-network-generator systemd-networkd
systemd-networkd-wait-online systemd-time-wait-sync upower wpa_supplicant-nl80211@
wpa_supplicant-wired@ wpa_supplicant@
generated  apport ipmidrv openipmi
indirect    display-manager lightdm saned@ spice-vdagent spice-vdagentd uuid
masked     alsa-utils cryptdisks cryptdisks-early hwclock pulseaudio-enable-autospawn rc rcS saned
sudo x11-common
```

```
14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.15.0-119-generic
root=UUID=1ae71a13-cac0-48f6-b6e6-e15e5e687f57
ro
quiet
splash
```

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Platform Notes (Continued)

vt.handoff=7

15. 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

```

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 20.04.4 LTS

```

19. Disk information

SPEC is set to: /home/cpu2017

```

Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p2 ext4 938G 21G 870G 3% /

```

20. /sys/devices/virtual/dmi/id

```

Vendor:      Tyrone Systems
Product:     Tyrone Camarero SDA200A2N-224
Product Family: SMC H13
Serial:      0123456789

```

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Platform Notes (Continued)

21. dmidecode

Additional information from dmidecode 3.2 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:

8x NO DIMM NO DIMM
16x Samsung M321R8GA0BB0-CQKZJ 64 GB 2 rank 4800

22. BIOS

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

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 1.9a
BIOS Date: 06/21/2024
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 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
=====

=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
=====

=====
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
=====

=====
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
=====

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SPEC CPU®2017 Floating Point Speed Result

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Tyrone Systems

(Test Sponsor: Netweb Technologies India Ltd)
(Tyrone Camarero SDA200A2N-212)
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_fp_base = 240

SPECspeed®2017_fp_peak = 261

CPU2017 License: 6802

Test Sponsor: Netweb Technologies India Ltd

Tested by: Tyrone Systems

Test Date: Sep-2024

Hardware Availability: Jun-2023

Software Availability: Aug-2024

Compiler Version Notes (Continued)

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

Base Compiler Invocation

C benchmarks:

clang

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=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

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=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -reduce-array-computations=3 -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=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -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
```

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Test Date: Sep-2024
Hardware Availability: Jun-2023
Software Availability: Aug-2024

Base Other Flags (Continued)

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

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=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

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Software Availability: Aug-2024

Peak Optimization Flags (Continued)

638.imagick_s: Same as 619.lbm_s

```
644.nab_s: -m64 -Wl,-mllvm -Wl,-region-vectorize -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-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=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -Mrecursive -mllvm -reduce-array-computations=3
-fvector-transform -fscalar-transform -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=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -flto -Mrecursive
-mllvm -reduce-array-computations=3 -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=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-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
```

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Peak Optimization Flags (Continued)

627.cam4_s (continued):

```
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -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=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=9
-mllvm -unroll-threshold=50 -freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -finline-aggressive -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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The flags files that were used to format this result can be browsed at

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

<http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-Genoa-revD.html>

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

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

<http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-Genoa-revD.xml>

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