SPEC CPU®2017 Floating Point Rate Result

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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

$SPECrate^{®}2017\_fp\_base = 1060$

$SPECrate^{®}2017\_fp\_peak = 1060$

CPU2017 License: 6042

Test Sponsor: Netweb Pte Ltd

Tested by: Tyrone Systems

Test Date: Mar-2024

Hardware Availability: Jun-2023

Software Availability: Feb-2024

Benchmark	Copies	base	peak
503.bwaves_r	192 / 48	1680	1680
507.cactuBSSN_r	192	1360	1350
508.namd_r	192	794	793
510.parest_r	192	814	819
511.povray_r	192	1170	1170
519.lbm_r	192	584	584
521.wrf_r	192	966	976
526.blender_r	192	1060	1060
527.cam4_r	192	1090	1080
538.imagick_r	192	4450	4360
544.nab_r	192	1740	1730
549.fotonik3d_r	192	555	556
554.roms_r	192	463	461

SPECrate®2017_fp_base (1060) —— SPECrate®2017_fp_peak (1060)

Hardware

CPU Name: AMD EPYC 9474F
  Max MHz: 4100
  Nominal: 3600
Enabled: 96 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 / 6 cores
  Other: None
Memory: 1536 GB (24 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
5.15.0-97-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version 1.6 released Nov-2023
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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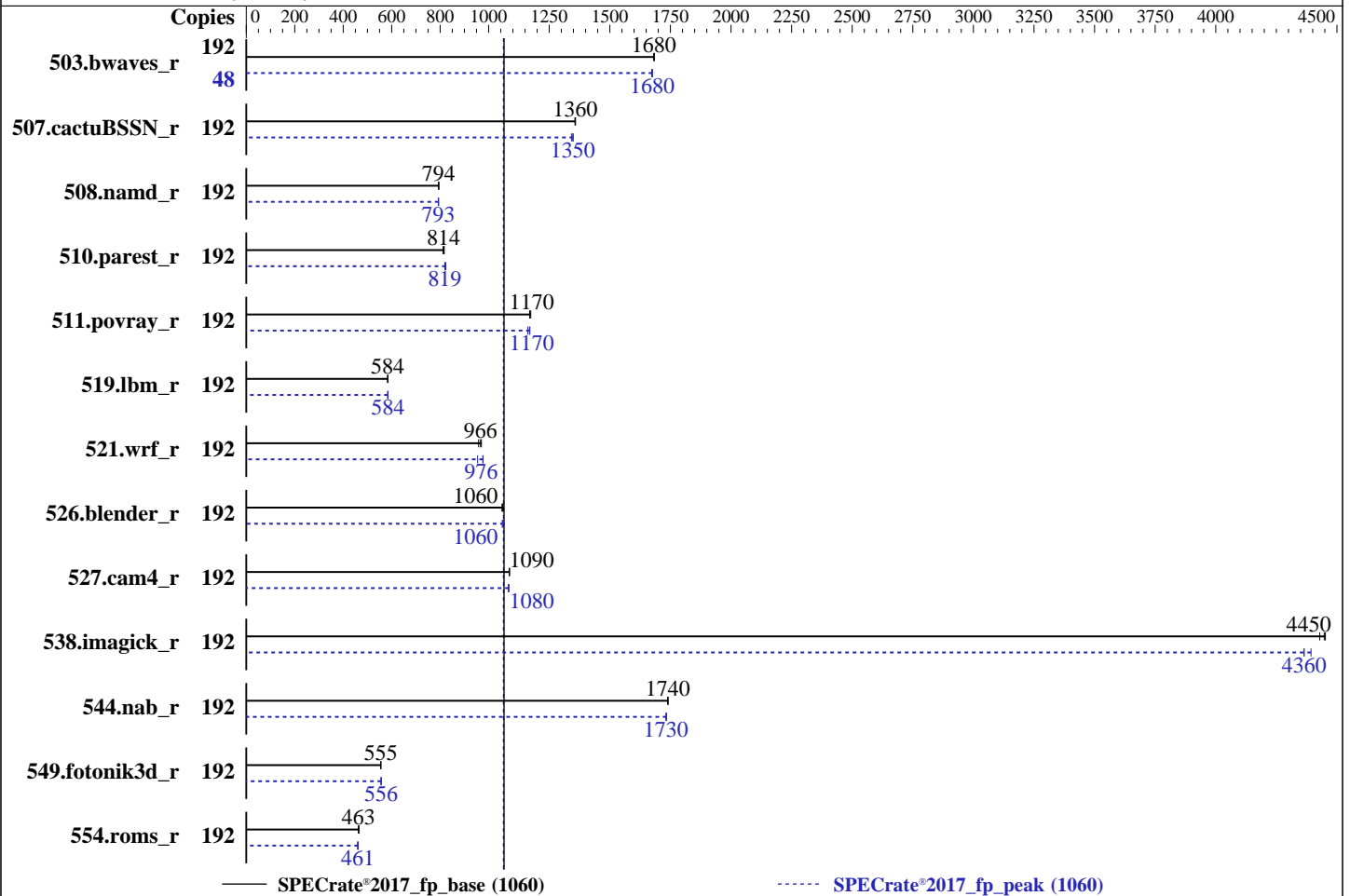
SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042	**Test Date:** Mar-2024
Test Sponsor: Netweb Pte Ltd	**Hardware Availability:** Jun-2023
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Results Table

Benchmark	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
				Base							**Peak**			
503.bwaves_r	192	1145	1680	1143	1680	**1145**	**1680**	48	288	1670	287	1680	**287**	**1680**
507.cactuBSSN_r	192	**179**	**1360**	179	1360	179	1360	192	181	1340	180	1350	**180**	**1350**
508.namd_r	192	230	793	**230**	**794**	230	794	192	**230**	**793**	230	792	230	794
510.parest_r	192	**617**	**814**	615	817	619	812	192	610	823	613	819	**613**	**819**
511.povray_r	192	383	1170	382	1170	**383**	**1170**	192	386	1160	383	1170	**384**	**1170**
519.lbm_r	192	**347**	**584**	347	584	347	584	192	346	584	**346**	**584**	347	584
521.wrf_r	192	449	959	**445**	**966**	443	970	192	451	954	440	977	**441**	**976**
526.blender_r	192	**276**	**1060**	277	1050	276	1060	192	275	1060	277	1060	**276**	**1060**
527.cam4_r	192	310	1080	**309**	**1090**	309	1090	192	310	1080	**310**	**1080**	310	1080
538.imagick_r	192	108	4430	107	4450	**107**	**4450**	192	109	4390	**109**	**4360**	109	4360
544.nab_r	192	**186**	**1740**	186	1740	186	1740	192	186	1730	187	1730	**187**	**1730**
549.fotonik3d_r	192	1347	556	1349	555	**1349**	**555**	192	**1345**	**556**	1344	557	1345	556
554.roms_r	192	**658**	**463**	656	465	658	463	192	661	461	**662**	**461**	664	459

SPECrate®2017_fp_base =	**1060**
SPECrate®2017_fp_peak =	**1060**

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,
```

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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Operating System Notes (Continued)

```
'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.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017/amd_rate_aocc400_znver4_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
```

Platform Notes

```
 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on amd2-Super-Server Wed Feb 28 23:30:59 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. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. sysctl
 15. /sys/kernel/mm/transparent_hugepage
 16. /sys/kernel/mm/transparent_hugepage/khugepaged
 17. OS release
 18. Disk information
```

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Platform Notes (Continued)

```
 19. /sys/devices/virtual/dmi/id
 20. dmidecode
 21. BIOS
    -----------------------------------------------------------

    -----------------------------------------------------------
 1. uname -a
   Linux amd2-Super-Server 5.15.0-97-generic #107~20.04.1-Ubuntu SMP Fri Feb 9 14:20:11 UTC 2024 x86_64 x86_64
   x86_64 GNU/Linux

    -----------------------------------------------------------
 2. w
    23:30:59 up  5:03,  1 user,  load average: 115.56, 172.09, 182.73
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   amd2     tty1     -                18:28    5:00m  1.66s  0.03s -bash

    -----------------------------------------------------------
 3. Username
   From environment variable $USER:  root
   From the command 'logname':       amd2

    -----------------------------------------------------------
 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               6191029
   nofiles               1024
   vmemory(kbytes)       unlimited
   locks                 unlimited
   rtprio                0

    -----------------------------------------------------------
 5. sysinfo process ancestry
 /sbin/init splash
 /bin/login -p --
 -bash
 sudo su
 su
 bash
 python3 ./run_amd_rate_aocc400_znver4_A1.py
 /bin/bash ./amd_rate_aocc400_znver4_A1.sh
 runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fprate
 runcpu --configfile amd_rate_aocc400_znver4_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/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017

    -----------------------------------------------------------
 6. /proc/cpuinfo
     model name      : AMD EPYC 9474F 48-Core Processor
     vendor_id       : AuthenticAMD
     cpu family      : 25
     model           : 17
     stepping        : 1
```

(Continued on next page)

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Platform Notes (Continued)

```
      microcode       : 0xa10113e
      bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
      TLB size        : 3584 4K pages
      cpu cores       : 48
      siblings        : 96
      2 physical ids (chips)
      192 processors (hardware threads)
      physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
      physical id 1: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
      physical id 0: apicids 0-11,16-27,32-43,48-59,64-75,80-91,96-107,112-123
      physical id 1: apicids 128-139,144-155,160-171,176-187,192-203,208-219,224-235,240-251
  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):                        192
    On-line CPU(s) list:           0-191
    Thread(s) per core:            2
    Core(s) per socket:            48
    Socket(s):                     2
    NUMA node(s):                  2
    Vendor ID:                     AuthenticAMD
    CPU family:                    25
    Model:                         17
    Model name:                    AMD EPYC 9474F 48-Core Processor
    Stepping:                      1
    Frequency boost:               enabled
    CPU MHz:                       1500.000
    CPU max MHz:                   4113.2808
    CPU min MHz:                   1500.0000
    BogoMIPS:                      7199.70
    Virtualization:                AMD-V
    L1d cache:                     3 MiB
    L1i cache:                     3 MiB
    L2 cache:                      96 MiB
    L3 cache:                      512 MiB
    NUMA node0 CPU(s):             0-47,96-143
    NUMA node1 CPU(s):             48-95,144-191
    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 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; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                   filling, PBRSB-eIBRS 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
```

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Platform Notes (Continued)

```
                 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
                 lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf
                 rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic
                 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic
                 cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce
                 topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3
                 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp 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 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 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       3M    8 Data              1
      L1i       32K       3M    8 Instruction       1
      L2         1M      96M    8 Unified           2
      L3        32M     512M   16 Unified           3


  --------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0-47,96-143
    node 0 size: 773810 MB
    node 0 free: 770761 MB
    node 1 cpus: 48-95,144-191
    node 1 size: 774022 MB
    node 1 free: 771315 MB
    node distances:
    node   0   1
      0:  10  32
      1:  32  10


  --------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:      1584980720 kB


  --------------------------------------------------------------
  10. who -r
    run-level 3 Feb 28 18:27


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


  --------------------------------------------------------------
  12. 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
```

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Platform Notes (Continued)

```
                  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 uuidd
  masked          alsa-utils cryptdisks cryptdisks-early hwclock pulseaudio-enable-autospawn rc rcS saned
                  sudo x11-common

  ----------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.15.0-97-generic
  root=UUID=1ae71a13-cac0-48f6-b6e6-e15e5e687f57
  ro
  quiet
  splash
  vt.handoff=7

  ----------------------------------------------------------
14. 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

  ----------------------------------------------------------
15. /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

  ----------------------------------------------------------
16. /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
```

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Platform Notes (Continued)

```
      --------------------------------------------------------------
      17. OS release
        From /etc/*-release /etc/*-version
        os-release Ubuntu 20.04.4 LTS


      --------------------------------------------------------------
      18. Disk information
      SPEC is set to: /home/cpu2017
        Filesystem      Type  Size  Used Avail Use% Mounted on
        /dev/nvme0n1p2 ext4  938G   20G  870G   3% /


      --------------------------------------------------------------
      19. /sys/devices/virtual/dmi/id
          Vendor:         Tyrone Systems
          Product:        Tyrone Camarero SDA200A2R-424
          Product Family: SMC H13
          Serial:         A509935X3C01325


      --------------------------------------------------------------
      20. 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:
          24x Samsung M321R8GA0BB0-CQKZJ 64 GB 2 rank 4800



      --------------------------------------------------------------
      21. BIOS
      (This section combines info from /sys/devices and dmidecode.)
        BIOS Vendor:      American Megatrends International, LLC.
        BIOS Version:     1.6
        BIOS Date:        11/16/2023
        BIOS Revision:    5.27
```

Compiler Version Notes

```
==============================================================================================
C              | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(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++            | 508.namd_r(base, peak) 510.parest_r(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         | 511.povray_r(base, peak) 526.blender_r(base, peak)
```

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------------
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
--------------------------------------------------------------------------------


================================================================================
C++, C, Fortran | 507.cactuBSSN_r(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         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(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      | 521.wrf_r(base, peak) 527.cam4_r(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
--------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:

```
clang
```

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SPEC CPU®2017 Floating Point Rate Result

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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042
Test Sponsor: Netweb Pte Ltd
Tested by: Tyrone Systems

Test Date: Mar-2024
Hardware Availability: Jun-2023
Software Availability: Feb-2024

Base Compiler Invocation (Continued)

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

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 -flto -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=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang
```

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Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042		**Test Date:**	Mar-2024
Test Sponsor:	Netweb Pte Ltd	**Hardware Availability:**	Jun-2023
Tested by:	Tyrone Systems	**Software Availability:**	Feb-2024

Base Optimization Flags (Continued)

C++ benchmarks:
```
-m64 -flto -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 -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang
```

Fortran benchmarks:
```
-m64 -flto -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 -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both Fortran and C:
```
-m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Benchmarks using both C and C++:
```
-m64 -flto -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 -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 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -flto -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 -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 -finline-aggressive
```

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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042

Test Sponsor: Netweb Pte Ltd

Tested by: Tyrone Systems

Test Date: Mar-2024

Hardware Availability: Jun-2023

Software Availability: Feb-2024

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

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
```

Benchmarks using both C and C++:
```
clang++ clang
```

(Continued on next page)

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042
Test Sponsor: Netweb Pte Ltd
Tested by: Tyrone Systems

Test Date: Mar-2024
Hardware Availability: Jun-2023
Software Availability: Feb-2024

Peak Compiler Invocation (Continued)

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: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -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
```

```
538.imagick_r: Same as 519.lbm_r
```

```
544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Ofast -march=znver4
-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
```

C++ benchmarks:

```
508.namd_r: -m64 -flto -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
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

```
510.parest_r: -m64 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
```

(Continued on next page)

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042
Test Sponsor: Netweb Pte Ltd
Tested by: Tyrone Systems

Test Date: Mar-2024
Hardware Availability: Jun-2023
Software Availability: Feb-2024

Peak Optimization Flags (Continued)

510.parest_r (continued):
```
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

Fortran benchmarks:

503.bwaves_r: `-m64 -flto -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 -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -lflang
```

549.fotonik3d_r: `-m64 -flto -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 -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang
```

554.roms_r: `Same as 503.bwaves_r`

Benchmarks using both Fortran and C:

521.wrf_r: `-m64 -flto -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
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

527.cam4_r: `-m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-Kieee -Mrecursive -funroll-loops
```

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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042		**Test Date:**	Mar-2024
Test Sponsor:	Netweb Pte Ltd	**Hardware Availability:**	Jun-2023
Tested by:	Tyrone Systems	**Software Availability:**	Feb-2024

Peak Optimization Flags (Continued)

527.cam4_r (continued):
```
-mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both C and C++:

511.povray_r: `-m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdalloc
```

526.blender_r: `-m64 -flto -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
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt
-finline-aggressive -mllvm -unroll-threshold=100 -lamdlibm
-lamdalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -faggressive-loop-transform -fvector-transform
-fscalar-transform -Mrecursive -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang
```

Peak Other Flags

C benchmarks:
```
-Wno-unused-command-line-argument
```

(Continued on next page)

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDA200A2N-18
(3.60 GHz, AMD EPYC 9474F)

SPECrate®2017_fp_base = 1060

SPECrate®2017_fp_peak = 1060

CPU2017 License: 6042		**Test Date:**	Mar-2024
Test Sponsor:	Netweb Pte Ltd	**Hardware Availability:**	Jun-2023
Tested by:	Tyrone Systems	**Software Availability:**	Feb-2024

Peak Other Flags (Continued)

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`

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`

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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