SPEC CPU®2017 Floating Point Speed Result

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Tyrone Systems

(Test Sponsor: Netweb Pte Ltd)

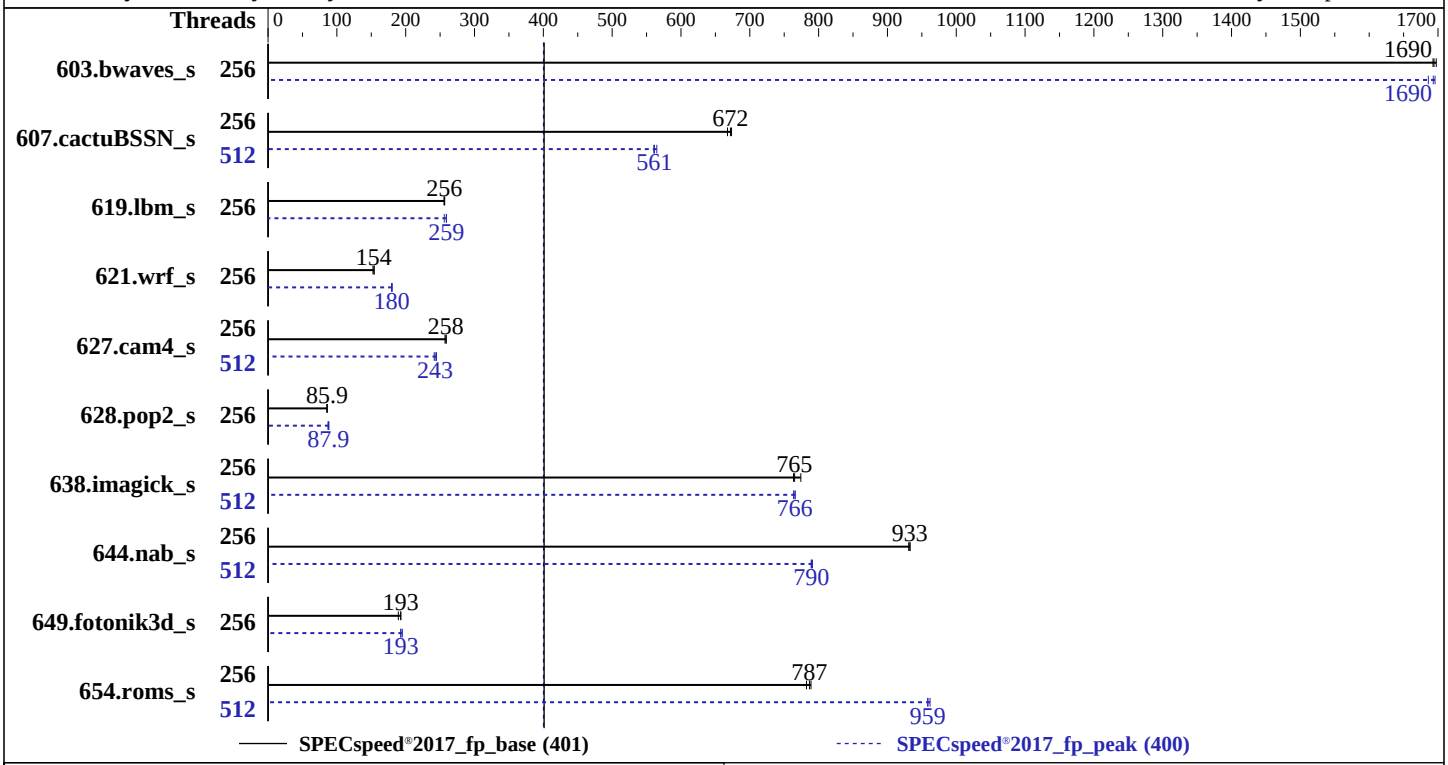
(Tyrone Camarero SDA200A2N-18)
(2.25 GHz, AMD EPYC 9754)

SPECspeed®2017_fp_base = 401

SPECspeed®2017_fp_peak = 400

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

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



Hardware

CPU Name:	AMD EPYC 9754
Max MHz:	3100
Nominal:	2250
Enabled:	256 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, 16 MB shared / 8 cores
Other:	None
Memory:	1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	1 x 960 GB NVMe
Other:	None

Software

OS:	Ubuntu 20.04.4 LTS kernel version 5.15.0-84-generic
Compiler:	C/C++/Fortran: Version 4.0.0 of AOCC
Parallel:	Yes
Firmware:	Version 1.4 released Apr-2023
File System:	ext4
System State:	Run level 5 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	none
Power Management:	OS is set to prefer performance at the cost of additional power usage.

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	256	**34.8**	**1690**	34.8	1700	34.9	1690	256	35.0	1690	**34.8**	**1690**	34.8	1700
607.cactuBSSN_s	256	25.0	668	24.8	673	**24.8**	**672**	512	**29.7**	**561**	29.5	565	29.7	561
619.lbm_s	256	**20.4**	**256**	20.5	256	20.4	257	256	20.2	259	**20.2**	**259**	20.5	256
621.wrf_s	256	**85.9**	**154**	85.8	154	86.7	152	256	**73.5**	**180**	73.7	180	73.4	180
627.cam4_s	256	**34.3**	**258**	34.2	259	34.5	257	512	36.2	245	**36.5**	**243**	36.7	241
628.pop2_s	256	138	86.0	**138**	**85.9**	139	85.6	256	136	87.0	134	88.4	**135**	**87.9**
638.imagick_s	256	**18.9**	**765**	18.6	774	18.9	764	512	**18.8**	**766**	18.8	766	18.9	764
644.nab_s	256	18.8	931	18.7	933	**18.7**	**933**	512	22.1	791	22.1	789	**22.1**	**790**
649.fotonik3d_s	256	**47.3**	**193**	47.2	193	48.2	189	256	**47.2**	**193**	46.7	195	47.3	193
654.roms_s	256	20.0	789	**20.0**	**787**	20.1	782	512	16.4	962	16.4	958	**16.4**	**959**

SPECspeed®2017_fp_base = 401

SPECspeed®2017_fp_peak = 400

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.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-511"
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 = "512"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-255"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-511"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-255"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-255"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-511"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-255"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-511"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0-511"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-255"
PGHPF_ZMEM = "yes"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 256 1 257 2 258 3 259 4 260 5 261 6 262 7 263 8 264 9 265 10 266 11 267 12 268 13
     269 14 270 15 271 16 272 17 273 18 274 19 275 20 276 21 277 22 278 23 279 24 280 25 281 26 282 27 283
     28 284 29 285 30 286 31 287 32 288 33 289 34 290 35 291 36 292 37 293 38 294 39 295 40 296 41 297 42
     298 43 299 44 300 45 301 46 302 47 303 48 304 49 305 50 306 51 307 52 308 53 309 54 310 55 311 56 312
     57 313 58 314 59 315 60 316 61 317 62 318 63 319 64 320 65 321 66 322 67 323 68 324 69 325 70 326 71
     327 72 328 73 329 74 330 75 331 76 332 77 333 78 334 79 335 80 336 81 337 82 338 83 339 84 340 85 341
     86 342 87 343 88 344 89 345 90 346 91 347 92 348 93 349 94 350 95 351 96 352 97 353 98 354 99 355 100
     356 101 357 102 358 103 359 104 360 105 361 106 362 107 363 108 364 109 365 110 366 111 367 112 368
     113 369 114 370 115 371 116 372 117 373 118 374 119 375 120 376 121 377 122 378 123 379 124 380 125
     381 126 382 127 383 128 384 129 385 130 386 131 387 132 388 133 389 134 390 135 391 136 392 137 393
     138 394 139 395 140 396 141 397 142 398 143 399 144 400 145 401 146 402 147 403 148 404 149 405 150
     406 151 407 152 408 153 409 154 410 155 411 156 412 157 413 158 414 159 415 160 416 161 417 162 418
     163 419 164 420 165 421 166 422 167 423 168 424 169 425 170 426 171 427 172 428 173 429 174 430 175
     431 176 432 177 433 178 434 179 435 180 436 181 437 182 438 183 439 184 440 185 441 186 442 187 443
     188 444 189 445 190 446 191 447 192 448 193 449 194 450 195 451 196 452 197 453 198 454 199 455 200
     456 201 457 202 458 203 459 204 460 205 461 206 462 207 463 208 464 209 465 210 466 211 467 212 468
     213 469 214 470 215 471 216 472 217 473 218 474 219 475 220 476 221 477 222 478 223 479 224 480 225
     481 226 482 227 483 228 484 229 485 230 486 231 487 232 488 233 489 234 490 235 491 236 492 237 493
     238 494 239 495 240 496 241 497 242 498 243 499 244 500 245 501 246 502 247 503 248 504 249 505 250
     506 251 507 252 508 253 509 254 510 255 511"
```

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

```
BIOS Settings:
cTDP: 360
Determinism Slider set to Power
Package Power: 360
EDC: 400
ACPI SRAT L3 Cache as NUMA Domain: enabled
Memory interleaving: Disabled
4-link xGMI max speed: 16Gbps
Fan Speed: Maximum

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on amd2-Super-Server Thu Sep 28 23:03:40 2023

 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 5.15.0-84-generic #93~20.04.1-Ubuntu SMP Wed Sep 6 16:15:40 UTC 2023 x86_64 x86_64
   x86_64 GNU/Linux
```

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
2. w
   23:03:41 up 1 day,  5:55,  1 user,  load average: 5.45, 7.90, 4.75
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  amd2     tty2     -                Wed17    4:09m  1.99s  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              6190793
  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_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 9754 128-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 160
    stepping        : 2
    microcode       : 0xaa00212
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size        : 3584 4K pages
    cpu cores       : 128
    siblings        : 256
    2 physical ids (chips)
    512 processors (hardware threads)
    physical id 0: core ids 0-127
    physical id 1: core ids 0-127
```

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Platform Notes (Continued)

```
    physical id 0: apicids 0-255
    physical id 1: apicids 256-511
  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):                          512
  On-line CPU(s) list:             0-511
  Thread(s) per core:              2
  Core(s) per socket:              128
  Socket(s):                       2
  NUMA node(s):                    2
  Vendor ID:                       AuthenticAMD
  CPU family:                      25
  Model:                           160
  Model name:                      AMD EPYC 9754 128-Core Processor
  Stepping:                        2
  Frequency boost:                 enabled
  CPU MHz:                         1500.000
  CPU max MHz:                     3100.3411
  CPU min MHz:                     1500.0000
  BogoMIPS:                        4500.15
  Virtualization:                  AMD-V
  L1d cache:                       8 MiB
  L1i cache:                       8 MiB
  L2 cache:                        256 MiB
  L3 cache:                        512 MiB
  NUMA node0 CPU(s):               0-127,256-383
  NUMA node1 CPU(s):               128-255,384-511
  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 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
                                   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
```

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Platform Notes (Continued)

```
                    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       8M    8 Data            1
     L1i       32K       8M    8 Instruction     1
     L2         1M     256M    8 Unified         2
     L3        16M     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: 0-127,256-383
  node 0 size: 773814 MB
  node 0 free: 770177 MB
  node 1 cpus: 128-255,384-511
  node 1 size: 773958 MB
  node 1 free: 770762 MB
  node distances:
  node   0   1
    0:  10  32
    1:  32  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1584920120 kB

------------------------------------------------------------
10. who -r
  run-level 5 Sep 27 17:08

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

------------------------------------------------------------
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 openvpn-client@ openvpn-server@ openvpn@
                   rtkit-daemon serial-getty@ speech-dispatcher speech-dispatcherd
```

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Platform Notes (Continued)

```
                  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
  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

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.15.0-84-generic
  root=UUID=1ae71a13-cac0-48f6-b6e6-e15e5e687f57
  ro
  quiet
  splash
  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
```

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Platform Notes (Continued)

```
------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/nvme1n1p2 ext4  938G   19G  872G   3% /

------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Tyrone Systems
    Product:        Tyrone Camarero SDA200A2N-18
    Product Family: SMC H13
    Serial:         A509928X3712360

------------------------------------------------------------
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:
    24x 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:      1.4
   BIOS Date:         04/19/2023
   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
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```

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Compiler Version Notes (Continued)

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

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Base Portability Flags (Continued)

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
-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

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Base Optimization Flags (Continued)

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

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 -fremap-arrays -fstrip-mining -mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang`

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 -fremap-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`

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Peak Optimization Flags (Continued)

621.wrf_s (continued):
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-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
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-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
-fremap-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 -fremap-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`

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-revC.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-revC.xml`

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