SPEC CPU®2017 Integer Rate Result

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

(Tyrone Camarero SDA200A2N-424)
(2.4 GHz, AMD EPYC 9654)

SPECrate®2017_int_base = 1350
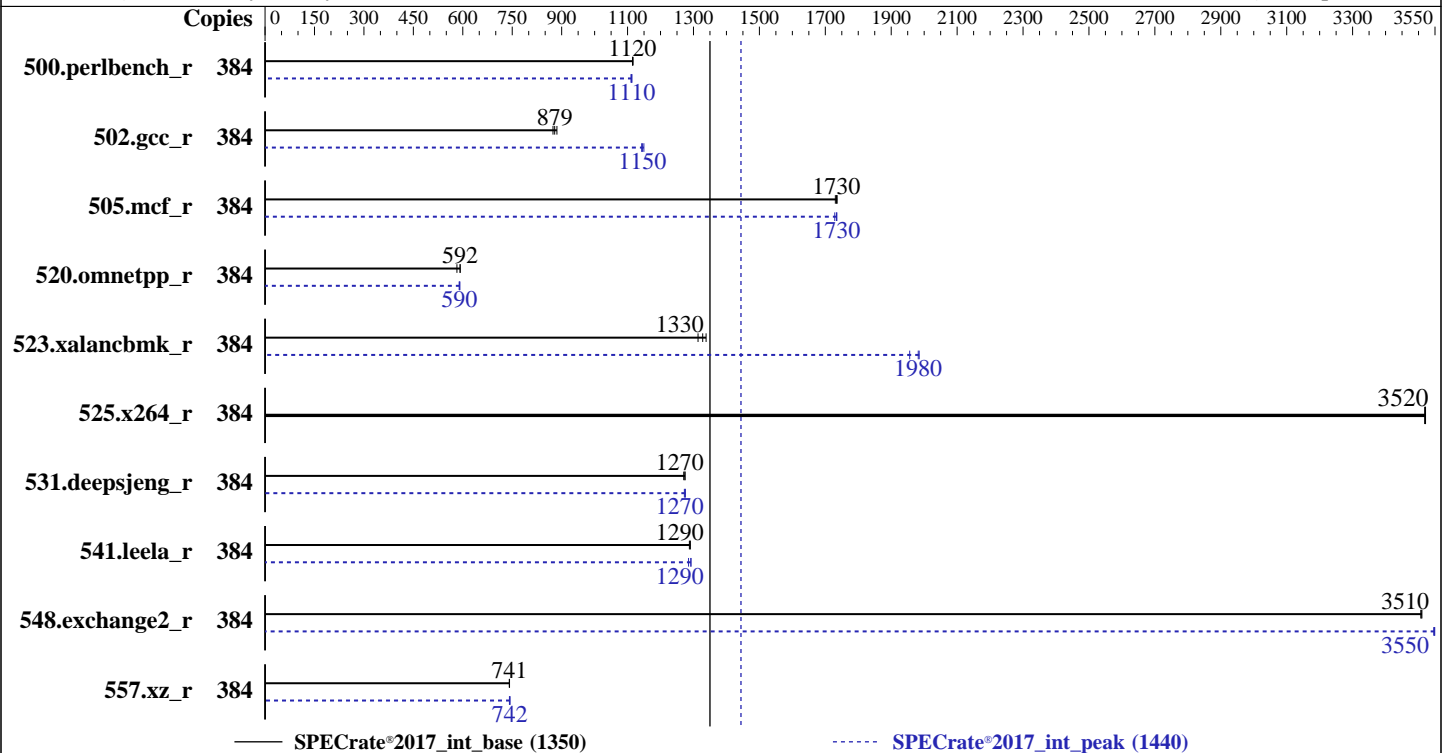
SPECrate®2017_int_peak = 1440

CPU2017 License: 6042   **Test Date:** Sep-2023

Test Sponsor: Netweb Pte Ltd   **Hardware Availability:** Jun-2023

Tested by: Tyrone Systems   **Software Availability:** Sep-2023

Benchmark	Copies	base	peak
500.perlbench_r	384	1120	1110
502.gcc_r	384	879	1150
505.mcf_r	384	1730	1730
520.omnetpp_r	384	592	590
523.xalancbmk_r	384	1330	1980
525.x264_r	384	3520	
531.deepsjeng_r	384	1270	1270
541.leela_r	384	1290	1290
548.exchange2_r	384	3510	3550
557.xz_r	384	741	742

SPECrate®2017_int_base (1350)   SPECrate®2017_int_peak (1440)

Hardware

CPU Name: AMD EPYC 9654
Max MHz: 3700
Nominal: 2400
Enabled: 192 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: 384 MB I+D on chip per chip, 32 MB shared / 8 cores
Other: None
Memory: 1 TB (16 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: No
Firmware: Version 1.4 released Apr-2023
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage.

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	384	548	1110	547	1120	**548**	**1120**	384	549	1110	551	1110	**550**	**1110**
502.gcc_r	384	614	886	**619**	**879**	622	874	384	473	1150	**475**	**1150**	476	1140
505.mcf_r	384	359	1730	**358**	**1730**	357	1740	384	359	1730	**358**	**1730**	358	1740
520.omnetpp_r	384	**851**	**592**	865	582	851	592	384	**853**	**590**	852	591	855	589
523.xalancbmk_r	384	**305**	**1330**	309	1310	303	1340	384	207	1960	204	1980	**205**	**1980**
525.x264_r	384	**191**	**3520**	191	3520	191	3520	384	**191**	**3520**	191	3520	191	3520
531.deepsjeng_r	384	345	1270	**345**	**1270**	346	1270	384	345	1280	**345**	**1270**	346	1270
541.leela_r	384	493	1290	**493**	**1290**	494	1290	384	495	1290	**492**	**1290**	492	1290
548.exchange2_r	384	287	3510	287	3510	**287**	**3510**	384	283	3550	284	3550	**283**	**3550**
557.xz_r	384	559	742	**559**	**741**	559	741	384	559	741	**559**	**742**	558	743
SPECrate®2017_int_base =	**1350**													
SPECrate®2017_int_peak =	**1440**													

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.
```

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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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"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:never"
```

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 Wed Sep 27 12:41:55 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. 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
```

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Platform Notes (Continued)

```
 17. OS release
 18. Disk information
 19. /sys/devices/virtual/dmi/id
 20. dmidecode
 21. 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


     ------------------------------------------------------------
 2. w
     12:41:55 up 1 min,  1 user,  load average: 2.66, 1.54, 0.60
    USER      TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    amd2      tty2     -                12:41   11.00s  1.80s  0.04s -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              4126356
    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 intrate
    runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
      --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
      $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
    specperl $SPEC/bin/sysinfo
    $SPEC = /home/cpu2017


     ------------------------------------------------------------
 6. /proc/cpuinfo
       model name      : AMD EPYC 9654 96-Core Processor
       vendor_id       : AuthenticAMD
       cpu family      : 25
```

(Continued on next page)

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Platform Notes (Continued)

```
      model           : 17
      stepping        : 1
      microcode       : 0xa10113e
      bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
      TLB size        : 3584 4K pages
      cpu cores       : 96
      siblings        : 192
      2 physical ids (chips)
      384 processors (hardware threads)
      physical id 0: core ids 0-95
      physical id 1: core ids 0-95
      physical id 0: apicids 0-191
      physical id 1: apicids 256-447
   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):                        384
    On-line CPU(s) list:           0-383
    Thread(s) per core:            2
    Core(s) per socket:            96
    Socket(s):                     2
    NUMA node(s):                  2
    Vendor ID:                     AuthenticAMD
    CPU family:                    25
    Model:                         17
    Model name:                    AMD EPYC 9654 96-Core Processor
    Stepping:                      1
    Frequency boost:               enabled
    CPU MHz:                       1900.000
    CPU max MHz:                   3707.8120
    CPU min MHz:                   1500.0000
    BogoMIPS:                      4800.33
    Virtualization:                AMD-V
    L1d cache:                     6 MiB
    L1i cache:                     6 MiB
    L2 cache:                      192 MiB
    L3 cache:                      768 MiB
    NUMA node0 CPU(s):             0-95,192-287
    NUMA node1 CPU(s):             96-191,288-383
    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
```

(Continued on next page)

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Platform Notes (Continued)

```
  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
                                  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       6M    8 Data            1
      L1i       32K       6M    8 Instruction     1
      L2         1M     192M    8 Unified         2
      L3        32M     768M   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: 0-95,192-287
    node 0 size: 515700 MB
    node 0 free: 512162 MB
    node 1 cpus: 96-191,288-383
    node 1 size: 515964 MB
    node 1 free: 512618 MB
    node distances:
    node   0   1
      0:  10  32
      1:  32  10

  -------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       1056424352 kB

  -------------------------------------------------------------
  10. who -r
    run-level 5 Sep 27 12:40

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

  -------------------------------------------------------------
  12. Services, from systemctl list-unit-files
    STATE           UNIT FILES
    enabled         ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
                    accounts-daemon anacron 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
```

(Continued on next page)

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Platform Notes (Continued)

```
                   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
                   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


   ----------------------------------------------------------
13. 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


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

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Platform Notes (Continued)

```
   scan_sleep_millisecs    10000


    ------------------------------------------------------------
 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   19G  872G   3% /


    ------------------------------------------------------------
 19. /sys/devices/virtual/dmi/id
     Vendor:          Tyrone Systems
     Product:         Tyrone Camarero SDA200A2R-424
     Product Family: SMC H13
     Serial:          A509935X3311011


    ------------------------------------------------------------
 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.



    ------------------------------------------------------------
 21. 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        | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------------------


==================================================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
         | 557.xz_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        | 502.gcc_r(peak)
```

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------------
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------


================================================================================
C++     | 523.xalancbmk_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------


================================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_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++     | 523.xalancbmk_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------


================================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_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 | 548.exchange2_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
```

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SPEC CPU®2017 Integer Rate Result

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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

(Tyrone Camarero SDA200A2N-424)
(2.4 GHz, AMD EPYC 9654)

SPECrate®2017_int_base = 1350

SPECrate®2017_int_peak = 1440

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

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

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_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
-z muldefs -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 -lflang
-lamdalloc
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
```

(Continued on next page)

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SPEC CPU®2017 Integer Rate Result

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

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Base Other Flags

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

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

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

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SPEC CPU®2017 Integer Rate Result

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

Peak Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Peak Optimization Flags

C benchmarks:

500.perlbench_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-fprofile-instr-generate`(pass 1)
`-fprofile-instr-use`(pass 2) `-Ofast -march=znver4`
`-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3`
`-faggressive-loop-transform -fvector-transform`
`-fscalar-transform -lamdlibm -lflang -lamdalloc`

502.gcc_r: `-m32 -flto -z muldefs -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 -fgnu89-inline`
`-lamdalloc`

505.mcf_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`
`-lflang -lamdalloc`

525.x264_r: basepeak = yes

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SPECrate®2017_int_base = 1350

SPECrate®2017_int_peak = 1440

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

Peak Optimization Flags (Continued)

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_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
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lamdalloc-ext

523.xalancbmk_r: -m32 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-fno-loop-reroll -Ofast -march=znver4 -fveclib=AMDLIBM
-ffast-math -finline-aggressive
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdalloc-ext

531.deepsjeng_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lamdalloc-ext

541.leela_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
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lflang -lamdalloc-ext

Fortran benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fepilog-vectorization-of-inductions

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

Peak Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Peak Other Flags

C benchmarks (except as noted below):
```
-Wno-unused-command-line-argument
```

```
502.gcc_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32
```

C++ benchmarks (except as noted below):
```
-Wno-unused-command-line-argument
```

```
523.xalancbmk_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32
```

Fortran benchmarks:
```
-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
```

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

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