SPEC CPU®2017 Floating Point Rate Result

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570
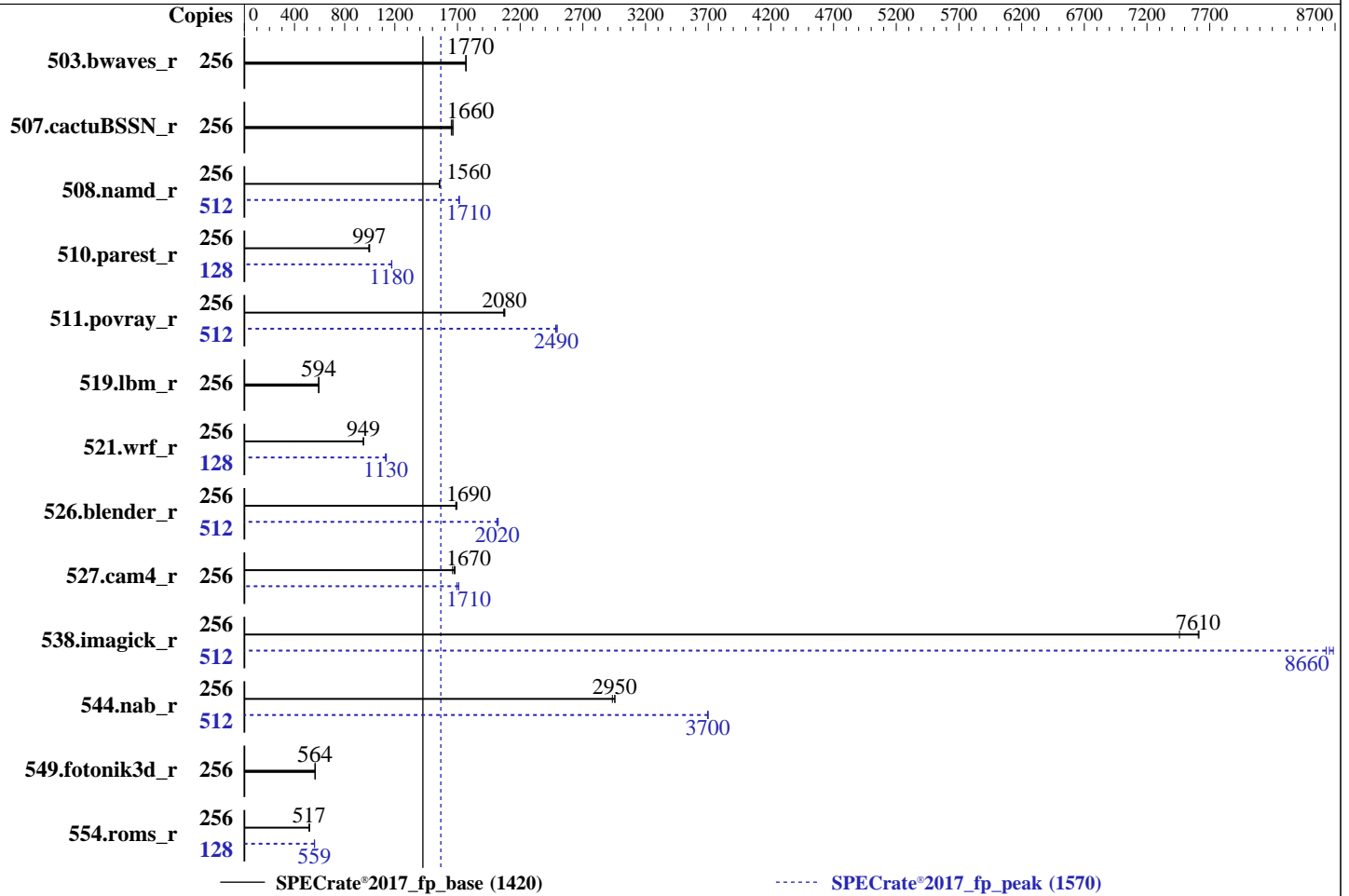
CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Benchmark	Copies	Result
503.bwaves_r	256	1770
507.cactuBSSN_r	256	1660
508.namd_r	256	1560
508.namd_r	512	1710
510.parest_r	256	997
510.parest_r	128	1180
511.povray_r	256	2080
511.povray_r	512	2490
519.lbm_r	256	594
521.wrf_r	256	949
521.wrf_r	128	1130
526.blender_r	256	1690
526.blender_r	512	2020
527.cam4_r	256	1670
527.cam4_r	256	1710
538.imagick_r	256	7610
538.imagick_r	512	8660
544.nab_r	256	2950
544.nab_r	512	3700
549.fotonik3d_r	256	564
554.roms_r	256	517
554.roms_r	128	559

SPECrate®2017_fp_base (1420)
SPECrate®2017_fp_peak (1570)

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 1 TB NVME SSD
Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux release 9 (Plow) 5.14.0-70.22.1.el9_0.x86_64
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version 4.02.28 released Jan-2024
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Results Table

Benchmark	Base Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	256	1454	1770	1451	1770	**1452**	**1770**	256	1454	1770	1451	1770	**1452**	**1770**
507.cactuBSSN_r	256	196	1650	195	1660	**195**	**1660**	256	196	1650	195	1660	**195**	**1660**
508.namd_r	256	156	1560	**156**	**1560**	156	1560	512	284	1710	284	1710	**284**	**1710**
510.parest_r	256	**672**	**997**	675	992	670	1000	128	285	1180	**285**	**1180**	285	1170
511.povray_r	256	289	2070	288	2080	**288**	**2080**	512	**480**	**2490**	479	2500	481	2480
519.lbm_r	256	454	594	455	593	**455**	**594**	256	454	594	455	593	**455**	**594**
521.wrf_r	256	**604**	**949**	604	949	603	951	128	**254**	**1130**	255	1130	253	1130
526.blender_r	256	**231**	**1690**	231	1690	230	1700	512	**386**	**2020**	387	2010	385	2020
527.cam4_r	256	266	1680	270	1660	**268**	**1670**	256	264	1690	**262**	**1710**	262	1710
538.imagick_r	256	85.4	7460	83.6	7620	**83.7**	**7610**	512	**147**	**8660**	147	8690	148	8630
544.nab_r	256	**146**	**2950**	146	2960	147	2940	512	233	3690	**233**	**3700**	233	3700
549.fotonik3d_r	256	1768	564	**1768**	**564**	1768	564	256	1768	564	**1768**	**564**	1768	564
554.roms_r	256	783	520	788	517	**786**	**517**	128	363	560	364	558	**364**	**559**

SPECrate®2017_fp_base =	1420
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

```
The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/
```

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations,
```

(Continued on next page)

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Operating System Notes (Continued)

```
'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_genoa_B_lib/lib:/home/CPU2017/amd_rate_aocc400_genoa_B_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

```
 BIOS configuration:
 SVM Mode set to Disable
 DRAM Scrub time set to Disable
 NUMA nodes per socket set to NPS4
 Determinism Slider set to Power
 cTDP set to 400
 Package Power Limit set to 400

 Sysinfo program /home/CPU2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Wed Mar 13 19:36:18 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 250 (250-6.el9_0)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
```

(Continued on next page)

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Hardware Availability: Feb-2023

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Platform Notes (Continued)

```
  14. Linux kernel boot-time arguments, from /proc/cmdline
  15. cpupower frequency-info
  16. tuned-adm active
  17. sysctl
  18. /sys/kernel/mm/transparent_hugepage
  19. /sys/kernel/mm/transparent_hugepage/khugepaged
  20. OS release
  21. Disk information
  22. /sys/devices/virtual/dmi/id
  23. dmidecode
  24. BIOS
  ------------------------------------------------------------

  ------------------------------------------------------------
  1. uname -a
    Linux localhost 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64 x86_64 x86_64
    GNU/Linux

  ------------------------------------------------------------
  2. w
     19:36:19 up  7:17,  1 user,  load average: 185.57, 414.34, 470.60
    USER     TTY         LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1        12:21    7:12m  1.82s  0.34s /bin/bash ./amd_rate_aocc400_genoa_B1.sh

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

  ------------------------------------------------------------
  4. ulimit -a
    real-time non-blocking time  (microseconds, -R) unlimited
    core file size              (blocks, -c) 0
    data seg size               (kbytes, -d) unlimited
    scheduling priority                 (-e) 0
    file size                   (blocks, -f) unlimited
    pending signals                     (-i) 6190844
    max locked memory           (kbytes, -l) 2097152
    max memory size             (kbytes, -m) unlimited
    open files                          (-n) 1024
    pipe size                (512 bytes, -p) 8
    POSIX message queues         (bytes, -q) 819200
    real-time priority                  (-r) 0
    stack size                  (kbytes, -s) unlimited
    cpu time                   (seconds, -t) unlimited
    max user processes                  (-u) 6190844
    virtual memory              (kbytes, -v) unlimited
    file locks                          (-x) unlimited

  ------------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 18
   login -- root
   -bash
   python3 ./run_amd_rate_aocc400_genoa_B1.py
   /bin/bash ./amd_rate_aocc400_genoa_B1.sh
   runcpu --config amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 fprate
   runcpu --configfile amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower --runmode
     rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.003/templogs/preenv.fprate.003.0.log --lognum 003.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
```

(Continued on next page)

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Platform Notes (Continued)

```
  $SPEC = /home/CPU2017


  -------------------------------------------------------------
  6. /proc/cpuinfo
     model name      : AMD EPYC 9754 128-Core Processor
     vendor_id       : AuthenticAMD
     cpu family      : 25
     model           : 160
     stepping        : 1
     microcode       : 0xaa00116
     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
     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 2.37.4:
   Architecture:           x86_64
   CPU op-mode(s):         32-bit, 64-bit
   Address sizes:          52 bits physical, 57 bits virtual
   Byte Order:             Little Endian
   CPU(s):                 512
   On-line CPU(s) list:    0-511
   Vendor ID:              AuthenticAMD
   BIOS Vendor ID:         Advanced Micro Devices, Inc.
   Model name:             AMD EPYC 9754 128-Core Processor
   BIOS Model name:        AMD EPYC 9754 128-Core Processor
   CPU family:             25
   Model:                  160
   Thread(s) per core:     2
   Core(s) per socket:     128
   Socket(s):              2
   Stepping:               1
   Frequency boost:        enabled
   CPU max MHz:            3100.3411
   CPU min MHz:            1500.0000
   BogoMIPS:               4493.49
   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 arat npt lbrv
                           svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
```

(Continued on next page)

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Platform Notes (Continued)

```
                          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
  Virtualization:         AMD-V
  L1d cache:              8 MiB (256 instances)
  L1i cache:              8 MiB (256 instances)
  L2 cache:               256 MiB (256 instances)
  L3 cache:               512 MiB (32 instances)
  NUMA node(s):           8
  NUMA node0 CPU(s):      0-31,256-287
  NUMA node1 CPU(s):      32-63,288-319
  NUMA node2 CPU(s):      64-95,320-351
  NUMA node3 CPU(s):      96-127,352-383
  NUMA node4 CPU(s):      128-159,384-415
  NUMA node5 CPU(s):      160-191,416-447
  NUMA node6 CPU(s):      192-223,448-479
  NUMA node7 CPU(s):      224-255,480-511
  Vulnerability Itlb multihit:   Not affected
  Vulnerability L1tf:            Not affected
  Vulnerability Mds:             Not affected
  Vulnerability Meltdown:        Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  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
  Vulnerability Srbds:           Not affected
  Vulnerability Tsx async abort: Not affected

From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL  SETS PHY-LINE COHERENCY-SIZE
    L1d       32K       8M  8 Data            1    64       1           64
    L1i       32K       8M  8 Instruction     1    64       1           64
    L2         1M     256M  8 Unified         2  2048       1           64
    L3        16M     512M 16 Unified         3 16384       1           64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0-31,256-287
  node 0 size: 193276 MB
  node 0 free: 191094 MB
  node 1 cpus: 32-63,288-319
  node 1 size: 193522 MB
  node 1 free: 191437 MB
  node 2 cpus: 64-95,320-351
  node 2 size: 193522 MB
  node 2 free: 191431 MB
  node 3 cpus: 96-127,352-383
  node 3 size: 193522 MB
  node 3 free: 191433 MB
  node 4 cpus: 128-159,384-415
  node 4 size: 193522 MB
  node 4 free: 191349 MB
  node 5 cpus: 160-191,416-447
  node 5 size: 193486 MB
  node 5 free: 191363 MB
  node 6 cpus: 192-223,448-479
  node 6 size: 193522 MB
  node 6 free: 191436 MB
```

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Platform Notes (Continued)

```
   node 7 cpus: 224-255,480-511
   node 7 size: 193440 MB
   node 7 free: 191360 MB
   node distances:
   node   0    1    2    3    4    5    6    7
     0:  10   12   12   12   32   32   32   32
     1:  12   10   12   12   32   32   32   32
     2:  12   12   10   12   32   32   32   32
     3:  12   12   12   10   32   32   32   32
     4:  32   32   32   32   10   12   12   12
     5:  32   32   32   32   12   10   12   12
     6:  32   32   32   32   12   12   10   12
     7:  32   32   32   32   12   12   12   10


  -------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1584963504 kB


  -------------------------------------------------------------
10. who -r
   run-level 3 Mar 13 12:19


  -------------------------------------------------------------
11. Systemd service manager version: systemd 250 (250-6.el9_0)
   Default Target  Status
   multi-user      degraded


  -------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
     UNIT                   LOAD   ACTIVE SUB    DESCRIPTION
   * dnf-makecache.service loaded failed failed dnf makecache


  -------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE            UNIT FILES
   enabled          dbus-broker getty@ tuned udisks2 upower
   enabled-runtime  systemd-remount-fs
   disabled         NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd
                    blk-availability canberra-system-bootup canberra-system-shutdown
                    canberra-system-shutdown-reboot chrony-wait chronyd console-getty cpupower crond
                    debug-shell firewalld irqbalance kdump kvm_stat lvm2-monitor man-db-restart-cache-update
                    mdmonitor microcode nftables nis-domainname rdisc rhsm rhsm-facts rhsmcertd rpmdb-rebuild
                    rsyslog selinux-autorelabel-mark sep5 serial-getty@ sshd sshd-keygen@ sssd
                    systemd-boot-check-no-failures systemd-network-generator systemd-pstore systemd-sysext
   indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo


  -------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.22.1.el9_0.x86_64
   root=/dev/mapper/rhel-root
   ro
   resume=/dev/mapper/rhel-swap
   rd.lvm.lv=rhel/root
   rd.lvm.lv=rhel/swap


  -------------------------------------------------------------
15. cpupower frequency-info
   analyzing CPU 0:
      current policy: frequency should be within 1.50 GHz and 2.25 GHz.
                      The governor "performance" may decide which speed to use
```

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Platform Notes (Continued)

```
                     within this range.
    boost state support:
      Supported: yes
      Active: yes
      Boost States: 0
      Total States: 3
      Pstate-P0:  2250MHz


  ----------------------------------------------------------
  16. tuned-adm active
    Current active profile: throughput-performance


  ----------------------------------------------------------
  17. 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


  ----------------------------------------------------------
  18. /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


  ----------------------------------------------------------
  19. /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


  ----------------------------------------------------------
  20. OS release
    From /etc/*-release /etc/*-version
    os-release     Red Hat Enterprise Linux 9.0 (Plow)
    redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
    system-release Red Hat Enterprise Linux release 9.0 (Plow)


  ----------------------------------------------------------
  21. Disk information
```

(Continued on next page)

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Test Sponsor:　　Kaytus Systems Pte. Ltd.　　　　　　　**Hardware Availability:** Feb-2023
Tested by:　　　　Kaytus Systems Pte. Ltd.　　　　　　　**Software Availability:**　Nov-2022

Platform Notes (Continued)

```
  SPEC is set to: /home/CPU2017
    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   819G   29G  790G   4% /home


  --------------------------------------------------------------
  22. /sys/devices/virtual/dmi/id
      Vendor:         KAYTUS
      Product:        KR2280-E2-A0-R0-00
      Product Family: Not specified
      Serial:         000000000


  --------------------------------------------------------------
  23. dmidecode
    Additional information from dmidecode 3.3 follows.  WARNING: Use caution when you interpret this section.
    The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
    determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
    "DMTF SMBIOS" standard.
    Memory:
      3x Hynix HMCG94MEBRA109N 64 GB 2 rank 4800
      6x Samsung M329R8GA0BB0-CQKDG 64 GB 2 rank 4800
      10x Samsung M329R8GA0BB0-CQKEG 64 GB 2 rank 4800
      5x Samsung M329R8GA0BB0-CQKVG 64 GB 2 rank 4800



  --------------------------------------------------------------
  24. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:      American Megatrends International, LLC.
    BIOS Version:     04.02.28
    BIOS Date:        01/04/2024
```

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#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------


==============================================================================
C++               | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------


==============================================================================
C++, C            | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
```

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Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865

Test Sponsor: Kaytus Systems Pte. Ltd.

Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024

Hardware Availability: Feb-2023

Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865   **Test Date:** Mar-2024
Test Sponsor: Kaytus Systems Pte. Ltd.   **Hardware Availability:** Feb-2023
Tested by: Kaytus Systems Pte. Ltd.   **Software Availability:** Nov-2022

Base Compiler Invocation (Continued)

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
```

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
```

(Continued on next page)

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865 **Test Date:** Mar-2024
Test Sponsor: Kaytus Systems Pte. Ltd. **Hardware Availability:** Feb-2023
Tested by: Kaytus Systems Pte. Ltd. **Software Availability:** Nov-2022

Base Optimization Flags (Continued)

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

SPEC CPU®2017 Floating Point Rate Result

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

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
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

Peak Portability Flags

```
Same as Base Portability Flags
```

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

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_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

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
-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: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3

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Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

554.roms_r (continued):
```
-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
```

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
-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
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

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Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

526.blender_r (continued):
```
-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++:

507.cactuBSSN_r: `basepeak = yes`

Peak 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
```

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/Kaytus-Platform-Settings-amd-V1.0.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/Kaytus-Platform-Settings-amd-V1.0.xml
```

Kaytus Systems Pte. Ltd.
KR2280E2 (AMD EPYC 9754)

SPECrate®2017_fp_base = 1420

SPECrate®2017_fp_peak = 1570

CPU2017 License: 6865
Test Sponsor: Kaytus Systems Pte. Ltd.
Tested by: Kaytus Systems Pte. Ltd.

Test Date: Mar-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

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

Tested with SPEC CPU®2017 v1.1.9 on 2024-03-13 19:36:18-0400.
Report generated on 2024-05-21 19:25:55 by CPU2017 PDF formatter v6716.
Originally published on 2024-05-21.