SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)
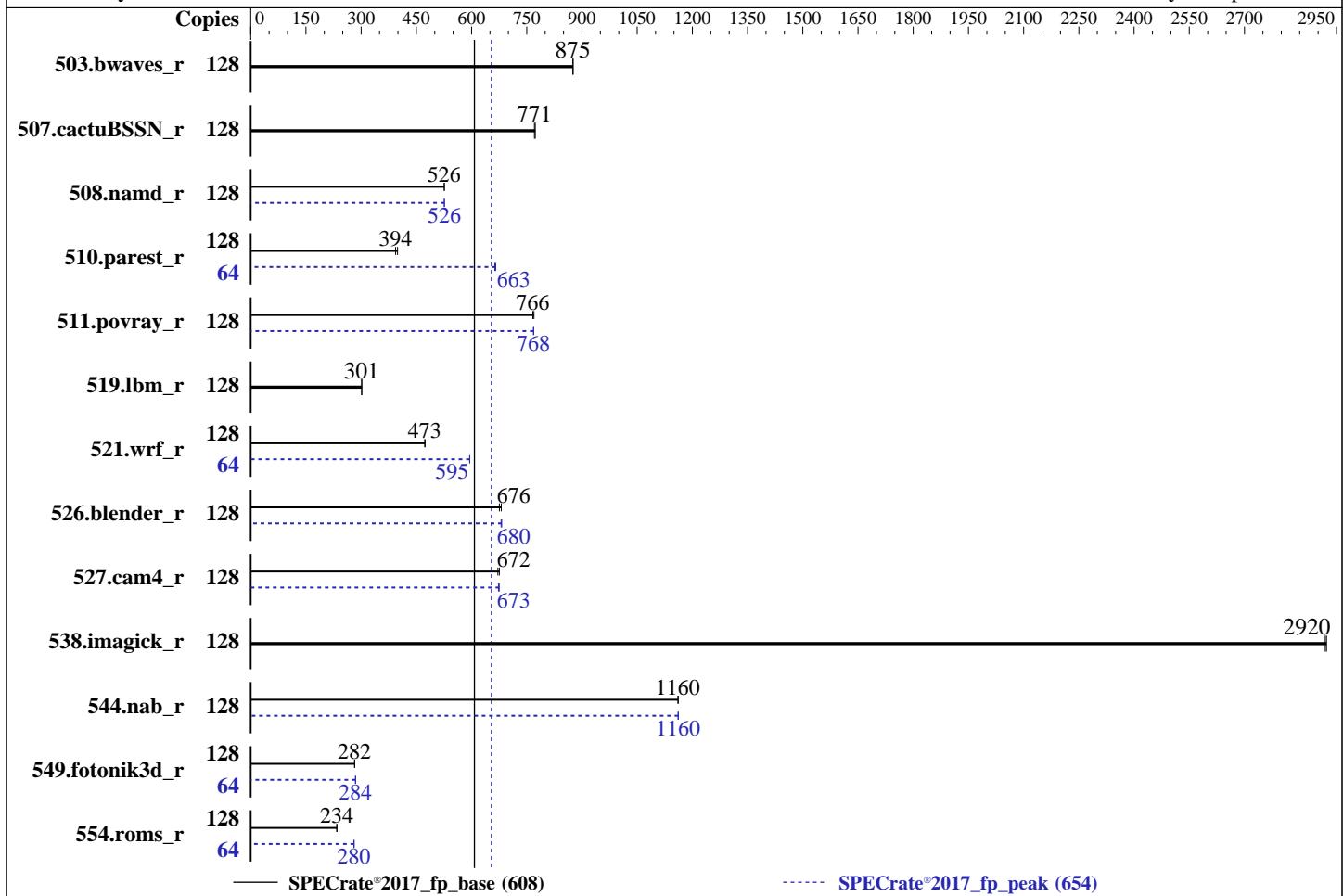
$SPECrate®2017\_fp\_base = 608$

$SPECrate®2017\_fp\_peak = 654$

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Benchmark	Copies	Result
503.bwaves_r	128	875
507.cactuBSSN_r	128	771
508.namd_r	128	526
508.namd_r (peak)	128	526
510.parest_r	128	394
510.parest_r (peak)	64	663
511.povray_r	128	766
511.povray_r (peak)	128	768
519.lbm_r	128	301
521.wrf_r	128	473
521.wrf_r (peak)	64	595
526.blender_r	128	676
526.blender_r (peak)	128	680
527.cam4_r	128	672
527.cam4_r (peak)	128	673
538.imagick_r	128	2920
544.nab_r	128	1160
544.nab_r (peak)	128	1160
549.fotonik3d_r	128	282
549.fotonik3d_r (peak)	64	284
554.roms_r	128	234
554.roms_r (peak)	64	280

SPECrate®2017_fp_base (608)   SPECrate®2017_fp_peak (654)

Hardware

CPU Name: AMD EPYC 9554P
 Max MHz: 3750
 Nominal: 3100
Enabled: 64 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip, 32 MB shared / 8 cores
 Other: None
Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 80 GB on tmpfs
Other: None

Software

OS: Ubuntu 22.04.3 LTS
 5.15.0-84-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version 1.4.6 released Jul-2023
File System: tmpfs
System State: Run level 5 (graphical 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.

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	**1467**	**875**	1465	876			128	**1467**	**875**	1465	876		
507.cactuBSSN_r	128	**210**	**771**	210	773			128	**210**	**771**	210	773		
508.namd_r	128	231	526	**231**	**526**			128	**231**	**526**	231	526		
510.parest_r	128	**851**	**394**	839	399			64	**252**	**663**	252	666		
511.povray_r	128	388	770	**390**	**766**			128	389	769	**389**	**768**		
519.lbm_r	128	**448**	**301**	447	302			128	**448**	**301**	447	302		
521.wrf_r	128	**606**	**473**	605	474			64	**241**	**595**	241	595		
526.blender_r	128	**289**	**676**	286	681			128	**287**	**680**	286	682		
527.cam4_r	128	331	675	**333**	**672**			128	332	675	**333**	**673**		
538.imagick_r	128	**109**	**2920**	109	2920			128	**109**	**2920**	109	2920		
544.nab_r	128	185	1160	**186**	**1160**			128	185	1160	**186**	**1160**		
549.fotonik3d_r	128	**1767**	**282**	1767	282			64	**877**	**284**	875	285		
554.roms_r	128	**871**	**234**	868	234			64	**363**	**280**	362	281		
SPECrate®2017_fp_base =		**608**												
SPECrate®2017_fp_peak =		**654**												

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 =
    "/mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1/amd_rate_aocc400_znver4_A_lib/lib:/mnt/ramdisk/cpu2017
    -1.1.9-aocc400-znver4-A1.1/amd_rate_aocc400_znver4_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

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

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


 Benchmark run from a 80 GB ramdisk created with the cmd: "mount -t tmpfs -o size=80G tmpfs /mnt/ramdisk"
```

Platform Notes

```
 BIOS settings:
            DRAM Refresh Delay : Performance
        DIMM Self Healing on
    Uncorrectable Memory Error : Disabled

    Virtualization Technology : Disabled
           L1 Stride Prefetcher: : Disabled
        NUMA Nodes per Socket : 4

               System Profile : Custom
          Memory Patrol Scrub : Disabled
        PCI ASPM L1 Link
            Power Management : Disabled
          Determinism Slider : Power Determinism

 Sysinfo program /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on amd-spa Mon Nov 27 23:02:26 2023

 SUT (System Under Test) info as seen by some common utilities.

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
```

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Platform Notes (Continued)

```
    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 249 (249.11-0ubuntu3.10)
   12. Services, from systemctl list-unit-files
   13. Linux kernel boot-time arguments, from /proc/cmdline
   14. cpupower frequency-info
   15. tuned-adm active
   16. sysctl
   17. /sys/kernel/mm/transparent_hugepage
   18. /sys/kernel/mm/transparent_hugepage/khugepaged
   19. OS release
   20. Disk information
   21. /sys/devices/virtual/dmi/id
   22. dmidecode
   23. BIOS
    ------------------------------------------------------------


    ------------------------------------------------------------
    1. uname -a
      Linux amd-spa 5.15.0-84-generic #93-Ubuntu SMP Tue Sep 5 17:16:10 UTC 2023 x86_64 x86_64 x86_64 GNU/Linux


    ------------------------------------------------------------
    2. w
       23:02:26 up  3:31,  1 user,  load average: 81.81, 116.23, 122.84
      USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
      root     tty1     -                19:30    3:30m  2.93s  0.41s /bin/bash ./amd_rate_aocc400_znver4_A1.sh


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


    ------------------------------------------------------------
    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              3093810
      nofiles              1024
      vmemory(kbytes)      unlimited
      locks                unlimited
      rtprio               0


    ------------------------------------------------------------
    5. sysinfo process ancestry
     /sbin/init
     /bin/login -p --
     -bash
     /bin/bash ./DELL_rate.sh
     /bin/bash ./dell-run-main.sh rate
     /bin/bash ./dell-run-main.sh rate
```

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Platform Notes (Continued)

```
  /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-LogProc=1
    --define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format html,pdf,txt
  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 2 --define DL-BIOS-NPS=4
    --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define
    DL-VERS=v4.8.1 --output_format html,pdf,txt fprate
  runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 2 --define
    DL-BIOS-NPS=4 --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-LogProc=1 --define
    DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format html,pdf,txt --nopower --runmode rate --tune
    base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
    $SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
$SPEC = /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1


  -----------------------------------------------------------
6. /proc/cpuinfo
    model name      : AMD EPYC 9554P 64-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 17
    stepping        : 1
    microcode       : 0xa10113e
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size        : 3584 4K pages
    cpu cores       : 64
    siblings        : 128
    1 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-63
    physical id 0: apicids 0-127
  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 2.37.2:
  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):                 128
  On-line CPU(s) list:    0-127
  Vendor ID:              AuthenticAMD
  Model name:             AMD EPYC 9554P 64-Core Processor
  CPU family:             25
  Model:                  17
  Thread(s) per core:     2
  Core(s) per socket:     64
  Socket(s):              1
  Stepping:               1
  BogoMIPS:               6202.07
  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
```

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Platform Notes (Continued)

```
                        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
    Virtualization:                     AMD-V
    L1d cache:                          2 MiB (64 instances)
    L1i cache:                          2 MiB (64 instances)
    L2 cache:                           64 MiB (64 instances)
    L3 cache:                           256 MiB (8 instances)
    NUMA node(s):                       4
    NUMA node0 CPU(s):                  0-15,64-79
    NUMA node1 CPU(s):                  16-31,80-95
    NUMA node2 CPU(s):                  32-47,96-111
    NUMA node3 CPU(s):                  48-63,112-127
    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

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       2M    8 Data              1     64        1             64
      L1i       32K       2M    8 Instruction       1     64        1             64
      L2         1M      64M    8 Unified           2   2048        1             64
      L3        32M     256M   16 Unified           3  32768        1             64

    -------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0-15,64-79
    node 0 size: 193026 MB
    node 0 free: 191909 MB
    node 1 cpus: 16-31,80-95
    node 1 size: 193527 MB
    node 1 free: 192334 MB
    node 2 cpus: 32-47,96-111
    node 2 size: 193527 MB
    node 2 free: 188861 MB
    node 3 cpus: 48-63,112-127
    node 3 size: 193485 MB
    node 3 free: 192357 MB
    node distances:
    node   0   1   2   3
      0:  10  12  12  12
```

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Platform Notes (Continued)

```
      1:  12  10  12  12
      2:  12  12  10  12
      3:  12  12  12  10


   ------------------------------------------------------------
   9. /proc/meminfo
     MemTotal:       792131524 kB


   ------------------------------------------------------------
   10. who -r
     run-level 5 Nov 27 19:30


   ------------------------------------------------------------
   11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.10)
     Default Target  Status
     graphical       running


   ------------------------------------------------------------
   12. Services, from systemctl list-unit-files
     STATE           UNIT FILES
     enabled         ModemManager apparmor blk-availability console-setup cron dmesg e2scrub_reap finalrd
                     getty@ gpu-manager grub-common grub-initrd-fallback irqbalance keyboard-setup lm-sensors
                     lvm2-monitor lxd-agent multipathd networkd-dispatcher open-vm-tools pollinate rsyslog
                     secureboot-db setvtrgb ssh systemd-networkd systemd-pstore systemd-resolved
                     systemd-timesyncd thermald tuned ua-reboot-cmds ubuntu-advantage udisks2 ufw vgauth
     enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
     disabled        console-getty debug-shell iscsid nftables open-iscsi rsync serial-getty@
                     systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                     systemd-time-wait-sync upower
     generated       apport
     indirect        uuidd
     masked          cryptdisks cryptdisks-early hwclock lvm2 multipath-tools-boot rc rcS screen-cleanup sudo
                     systemd-networkd-wait-online x11-common

   ------------------------------------------------------------
   13. Linux kernel boot-time arguments, from /proc/cmdline
     BOOT_IMAGE=/vmlinuz-5.15.0-84-generic
     root=/dev/mapper/ubuntu--vg-ubuntu--lv
     ro


   ------------------------------------------------------------
   14. cpupower frequency-info
     analyzing CPU 0:
       Unable to determine current policy
       boost state support:
         Supported: yes
         Active: yes
         Boost States: 0
         Total States: 3
         Pstate-P0:  3100MHz


   ------------------------------------------------------------
   15. tuned-adm active
     Current active profile: latency-performance


   ------------------------------------------------------------
   16. sysctl
     kernel.numa_balancing            1
     kernel.randomize_va_space        0
     vm.compaction_proactiveness     20
```

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Platform Notes (Continued)

```
  vm.dirty_background_bytes              0
  vm.dirty_background_ratio              3
  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


  ---------------------------------------------------------------
17. /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


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


  ---------------------------------------------------------------
19. OS release
  From /etc/*-release /etc/*-version
  os-release Ubuntu 22.04.3 LTS


  ---------------------------------------------------------------
20. Disk information
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1
  Filesystem      Type   Size  Used Avail Use% Mounted on
  tmpfs           tmpfs   80G  3.5G   77G   5% /mnt/ramdisk


  ---------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge R7615
    Product Family: PowerEdge
    Serial:         RDB5009


  ---------------------------------------------------------------
22. 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:
    12x 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800
```

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Platform Notes (Continued)

```
    -------------------------------------------------------------
    23. BIOS
    (This section combines info from /sys/devices and dmidecode.)
       BIOS Vendor:       Dell Inc.
       BIOS Version:      1.4.6
       BIOS Date:         07/06/2023
       BIOS Revision:     1.4
```

Compiler Version Notes

```
==============================================================================
C              | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++            | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C         | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------
```

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SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

Compiler Version Notes (Continued)

```
==============================================================================
Fortran     | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran, C   | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

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

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

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`

(Continued on next page)

Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Base Portability Flags (Continued)

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
-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
```

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

$SPECrate^{®}2017\_fp\_base = 608$

$SPECrate^{®}2017\_fp\_peak = 654$

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-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
```

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
```

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SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

CPU2017 License: 6573　　　　　　　　　　　　　　　　　　　　　**Test Date:** Nov-2023
Test Sponsor: Dell Inc.　　　　　　　　　　　　　　　　　　**Hardware Availability:** Feb-2023
Tested by: Dell Inc.　　　　　　　　　　　　　　　　　　**Software Availability:** Sep-2023

Base Other Flags (Continued)

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
```

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

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

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

CPU2017 License: 6573
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Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Peak Optimization Flags (Continued)

544.nab_r (continued):
```
-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: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang
```

554.roms_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -lflang
```

Benchmarks using both Fortran and C:

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

CPU2017 License: 6573
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Hardware Availability: Feb-2023
Software Availability: Sep-2023

Peak Optimization Flags (Continued)

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
-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

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SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9554P 64-Core Processor)

SPECrate®2017_fp_base = 608

SPECrate®2017_fp_peak = 654

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Peak Optimization Flags (Continued)

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_A1.1.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.1.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/aocc400-flags_A1.1.xml`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.1.xml`

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 2023-11-27 18:02:26-0500.
Report generated on 2024-01-03 17:35:32 by CPU2017 PDF formatter v6716.
Originally published on 2024-01-02.