# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

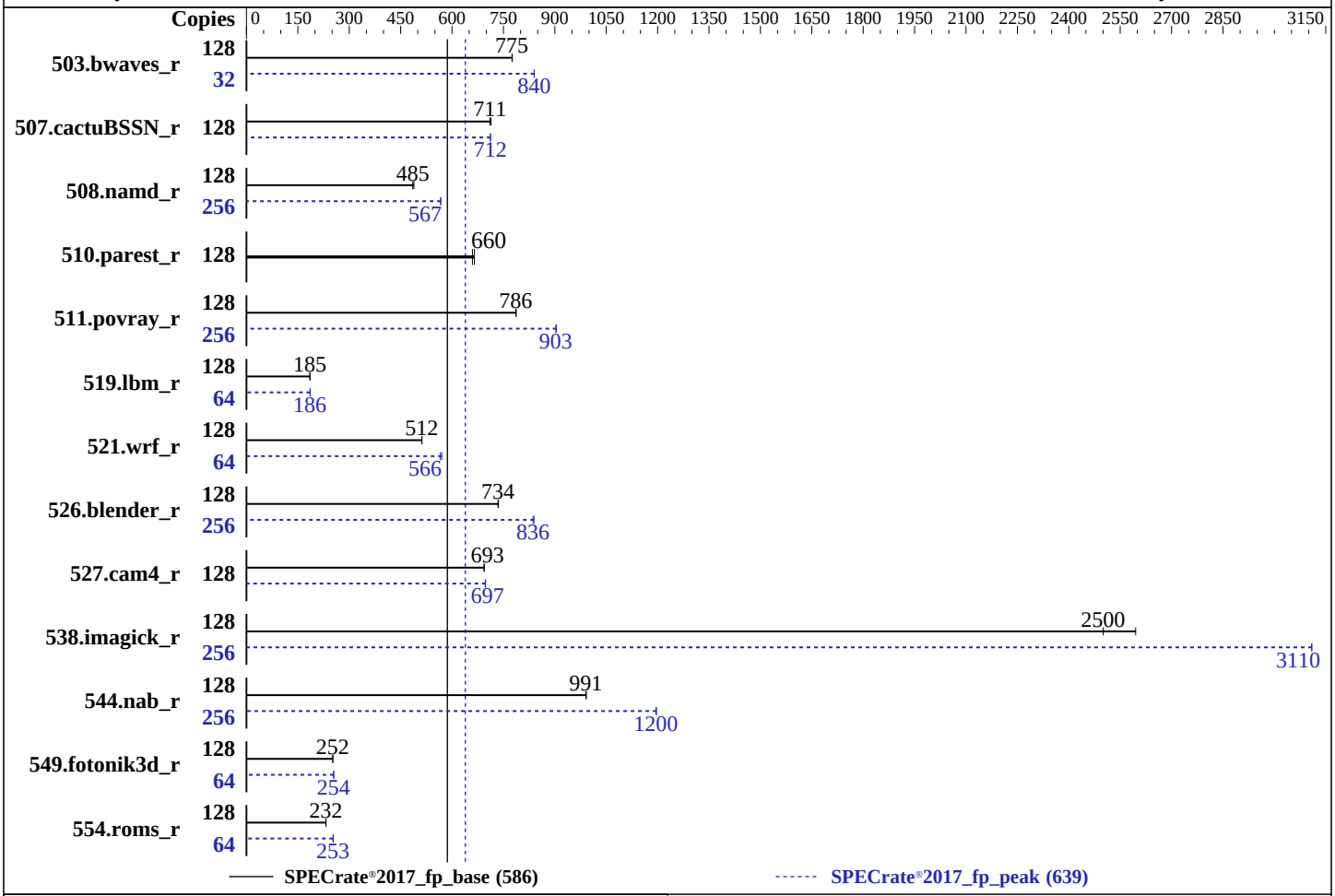
PowerEdge R7525 (AMD EPYC 7713 64-Core Processor)

SPECrate®2017_fp_base = 586

SPECrate®2017_fp_peak = 639

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

**Test Date:** Apr-2024
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2024




## Hardware

| | |
|---|---|
| CPU Name: | AMD EPYC 7713 |
| Max MHz: | 3675 |
| Nominal: | 2000 |
| Enabled: | 128 cores, 2 chips, 2 threads/core |
| Orderable: | 1,2 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 512 KB I+D on chip per core |
| L3: | 256 MB I+D on chip per chip, 32 MB shared / 8 cores |
| Other: | None |
| Memory: | 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R) |
| Storage: | 130 GB on tmpfs |
| Other: | CPU Cooling: Air |

## Software

| | |
|---|---|
| OS: | Ubuntu 22.04.4 LTS 5.15.0-101-generic |
| Compiler: | C/C++/Fortran: Version 3.2.0 of AOCC |
| Parallel: | No |
| Firmware: | Version 2.8.4 released Jun-2022 |
| File System: | tmpfs |
| System State: | Run level 5 (graphical multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| Other: | jemalloc: jemalloc memory allocator library v5.1.0 |
| 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 | **1656** | **775** | 1654 | 776 | | | 32 | **382** | **840** | 382 | 840 | | |
| 507.cactuBSSN_r | 128 | 227 | 714 | **228** | **711** | | | 128 | 227 | 712 | **228** | **712** | | |
| 508.namd_r | 128 | **251** | **485** | 249 | 489 | | | 256 | 429 | 567 | **429** | **567** | | |
| 510.parest_r | 128 | 503 | 665 | **508** | **660** | | | 128 | 503 | 665 | **508** | **660** | | |
| 511.povray_r | 128 | **380** | **786** | 380 | 787 | | | 256 | **662** | **903** | 661 | 905 | | |
| 519.lbm_r | 128 | **728** | **185** | 728 | 185 | | | 64 | **363** | **186** | 363 | 186 | | |
| 521.wrf_r | 128 | **560** | **512** | 560 | 512 | | | 64 | **253** | **566** | 251 | 570 | | |
| 526.blender_r | 128 | **266** | **734** | 265 | 736 | | | 256 | 465 | 839 | **466** | **836** | | |
| 527.cam4_r | 128 | 323 | 694 | **323** | **693** | | | 128 | **321** | **697** | 321 | 698 | | |
| 538.imagick_r | 128 | 123 | 2600 | **127** | **2500** | | | 256 | 205 | 3110 | **205** | **3110** | | |
| 544.nab_r | 128 | 217 | 992 | **217** | **991** | | | 256 | **361** | **1200** | 360 | 1200 | | |
| 549.fotonik3d_r | 128 | **1980** | **252** | 1978 | 252 | | | 64 | 980 | 255 | **981** | **254** | | |
| 554.roms_r | 128 | 876 | 232 | **876** | **232** | | | 64 | 402 | 253 | **402** | **253** | | |

**SPECrate®2017_fp_base = 586**

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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)**

## 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-aocc320-A1/amd_rate_aocc320_milanx_A_lib/lib;/mnt/ramdisk/cpu2017-1.1.9-ao
     cc320-A1/amd_rate_aocc320_milanx_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

## General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2


 Benchmark run from a 130 GB ramdisk created with the cmd: "mount -t tmpfs -o size=130G tmpfs /mnt/ramdisk"
```

## Platform Notes

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

  Virtualization Technology : Disabled
      NUMA Nodes per Socket : 4
    L3 cache as NUMA Domain : Enabled

             System Profile : Custom
       CPU Power Management : Maximum Performance
        Memory Patrol Scrub : Disabled
        PCI ASPM L1 Link
           Power Management : Disabled

 Sysinfo program /mnt/ramdisk/cpu2017-1.1.9-aocc320-A1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on spa-amd Wed Apr  3 03:02:55 2024

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

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## Platform Notes (Continued)

```
------------------------------------------------------------
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------------------------------------------------------------
 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 249 (249.11-0ubuntu3.12)
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 spa-amd 5.15.0-101-generic #111-Ubuntu SMP Tue Mar 5 20:16:58 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. w
   03:02:55 up  6:13,  1 user,  load average: 111.92, 216.62, 241.80
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                25Nov61  6:08m  2.24s  0.53s /bin/bash ./amd_rate_aocc320_milanx_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              4125988
  nofiles              1024
  vmemory(kbytes)      unlimited
  locks                unlimited
  rtprio               0

------------------------------------------------------------
5. sysinfo process ancestry
 /sbin/init
```

(Continued on next page)

## Platform Notes (Continued)

```
 /bin/login -p --
 -bash
 /bin/bash ./DELL_rate.sh
 /bin/bash /home/DellFiles/bin/dell-run-main.sh rate
 /bin/bash /home/DellFiles/bin/dell-run-main.sh rate
 /bin/bash /home/DellFiles/bin/AMD/dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_EPYC-3.inc --define
   DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --output_format html,pdf,txt
 python3 ./run_amd_rate_aocc320_milanx_A1.py
 /bin/bash ./amd_rate_aocc320_milanx_A1.sh
 runcpu --config amd_rate_aocc320_milanx_A1.cfg --tune all --reportable --iterations 2 --define
   DL-BIOS-L3NUMA=1 --define DL-BIOS-NPS=4 --define DL-BIOSinc=Dell-BIOS_EPYC-3.inc --define
   DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --output_format html,pdf,txt fprate
 runcpu --configfile amd_rate_aocc320_milanx_A1.cfg --tune all --reportable --iterations 2 --define
   DL-BIOS-L3NUMA=1 --define DL-BIOS-NPS=4 --define DL-BIOSinc=Dell-BIOS_EPYC-3.inc --define
   DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --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-aocc320-A1

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : AMD EPYC 7713 64-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 1
    stepping        : 1
    microcode       : 0xa0011d1
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
    TLB size        : 2560 4K pages
    cpu cores       : 64
    siblings        : 128
    2 physical ids (chips)
    256 processors (hardware threads)
    physical id 0: core ids 0-63
    physical id 1: core ids 0-63
    physical id 0: apicids 0-127
    physical id 1: apicids 128-255
  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:                   48 bits physical, 48 bits virtual
  Byte Order:                      Little Endian
  CPU(s):                          256
  On-line CPU(s) list:             0-255
  Vendor ID:                       AuthenticAMD
  Model name:                      AMD EPYC 7713 64-Core Processor
  CPU family:                      25
  Model:                           1
  Thread(s) per core:              2
  Core(s) per socket:              64
  Socket(s):                       2
  Stepping:                        1
  BogoMIPS:                        3992.68
```

(Continued on next page)

## 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 invpcid cqm rdt_a rdseed adx smap
                                   clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc
                                   cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr
                                   rdpru wbnoinvd amd_ppin arat npt lbrv svm_lock nrip_save tsc_scale
                                   vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
                                   v_vmsave_vmload vgif v_spec_ctrl umip pku ospke vaes vpclmulqdq rdpid
                                   overflow_recov succor smca
  Virtualization:                  AMD-V
  L1d cache:                       4 MiB (128 instances)
  L1i cache:                       4 MiB (128 instances)
  L2 cache:                        64 MiB (128 instances)
  L3 cache:                        512 MiB (16 instances)
  NUMA node(s):                    16
  NUMA node0 CPU(s):               0-7,128-135
  NUMA node1 CPU(s):               8-15,136-143
  NUMA node2 CPU(s):               16-23,144-151
  NUMA node3 CPU(s):               24-31,152-159
  NUMA node4 CPU(s):               32-39,160-167
  NUMA node5 CPU(s):               40-47,168-175
  NUMA node6 CPU(s):               48-55,176-183
  NUMA node7 CPU(s):               56-63,184-191
  NUMA node8 CPU(s):               64-71,192-199
  NUMA node9 CPU(s):               72-79,200-207
  NUMA node10 CPU(s):              80-87,208-215
  NUMA node11 CPU(s):              88-95,216-223
  NUMA node12 CPU(s):              96-103,224-231
  NUMA node13 CPU(s):              104-111,232-239
  NUMA node14 CPU(s):              112-119,240-247
  NUMA node15 CPU(s):              120-127,248-255
  Vulnerability Gather data sampling: Not affected
  Vulnerability Itlb multihit:     Not affected
  Vulnerability L1tf:              Not affected
  Vulnerability Mds:               Not affected
  Vulnerability Meltdown:          Not affected
  Vulnerability Mmio stale data:   Not affected
  Vulnerability Retbleed:          Not affected
  Vulnerability Spec rstack overflow: Mitigation; safe RET
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
  Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                   filling, PBRSB-eIBRS Not affected
  Vulnerability Srbds:             Not affected
  Vulnerability Tsx async abort:   Not affected

From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       32K       4M    8 Data            1    64        1             64
     L1i       32K       4M    8 Instruction     1    64        1             64
     L2       512K      64M    8 Unified         2  1024        1             64
     L3        32M     512M   16 Unified         3 32768        1             64

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

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## Platform Notes (Continued)

```
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 16 nodes (0-15)
  node 0 cpus: 0-7,128-135
  node 0 size: 64023 MB
  node 0 free: 63177 MB
  node 1 cpus: 8-15,136-143
  node 1 size: 64505 MB
  node 1 free: 63727 MB
  node 2 cpus: 16-23,144-151
  node 2 size: 64507 MB
  node 2 free: 63763 MB
  node 3 cpus: 24-31,152-159
  node 3 size: 64506 MB
  node 3 free: 63799 MB
  node 4 cpus: 32-39,160-167
  node 4 size: 64507 MB
  node 4 free: 63719 MB
  node 5 cpus: 40-47,168-175
  node 5 size: 64506 MB
  node 5 free: 63795 MB
  node 6 cpus: 48-55,176-183
  node 6 size: 64507 MB
  node 6 free: 60301 MB
  node 7 cpus: 56-63,184-191
  node 7 size: 64494 MB
  node 7 free: 63687 MB
  node 8 cpus: 64-71,192-199
  node 8 size: 64507 MB
  node 8 free: 63773 MB
  node 9 cpus: 72-79,200-207
  node 9 size: 64506 MB
  node 9 free: 63789 MB
  node 10 cpus: 80-87,208-215
  node 10 size: 64507 MB
  node 10 free: 63748 MB
  node 11 cpus: 88-95,216-223
  node 11 size: 64506 MB
  node 11 free: 63789 MB
  node 12 cpus: 96-103,224-231
  node 12 size: 64507 MB
  node 12 free: 63781 MB
  node 13 cpus: 104-111,232-239
  node 13 size: 64506 MB
  node 13 free: 63793 MB
  node 14 cpus: 112-119,240-247
  node 14 size: 64507 MB
  node 14 free: 63787 MB
  node 15 cpus: 120-127,248-255
  node 15 size: 64495 MB
  node 15 free: 63803 MB
  node distances:
  node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
    0:  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
    1:  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
    2:  12  12  10  11  12  12  12  12  32  32  32  32  32  32  32  32
    3:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
    4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
    5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
    6:  12  12  12  12  12  12  10  11  32  32  32  32  32  32  32  32
```

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## Platform Notes (Continued)

```
     7:  12  12  12  12  12  12  11  10  32  32  32  32  32  32  32  32
     8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
     9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
    10:  32  32  32  32  32  32  32  32  12  12  10  11  12  12  12  12
    11:  32  32  32  32  32  32  32  32  12  12  11  10  12  12  12  12
    12:  32  32  32  32  32  32  32  32  12  12  12  12  10  11  12  12
    13:  32  32  32  32  32  32  32  32  12  12  12  12  11  10  12  12
    14:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
    15:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1056368908 kB

------------------------------------------------------------
10. who -r
  run-level 5 Nov 25 17:35

------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
  Default Target  Status
  graphical       running

------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          ModemManager apparmor blk-availability cloud-config cloud-final cloud-init
                   cloud-init-local 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-iscsi 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 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-5.15.0-101-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:  2000MHz

------------------------------------------------------------
15. tuned-adm active
```

(Continued on next page)

## Platform Notes (Continued)

```
  Current active profile: latency-performance

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

------------------------------------------------------------
20. Disk information
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc320-A1
  Filesystem     Type   Size  Used Avail Use% Mounted on
  tmpfs          tmpfs  130G  3.4G  127G   3% /mnt/ramdisk

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge R7525
    Product Family: PowerEdge
    Serial:         GK2D853

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

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## Platform Notes (Continued)

```
 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:
     16x 80AD869D80AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200
     16x Not Specified Not Specified


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Dell Inc.
    BIOS Version:      2.8.4
    BIOS Date:         06/23/2022
    BIOS Revision:     2.8
```

## Compiler Version Notes

```
==============================================================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
```

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## Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/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
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 -D__BOOL_DEFINED -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,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang

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## Base Optimization Flags (Continued)

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -Hz,1,0x1 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-loop-fusion
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang

Benchmarks using both C and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch

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## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -z muldefs -lamdlibm -ljemalloc
-lflang

Benchmarks using Fortran, C, and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang

## Base Other Flags

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

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

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

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument

Benchmarks using both C and C++:
-Wno-unused-command-line-argument

**(Continued on next page)**

## Base Other Flags (Continued)

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: `-m64 -flto -Wl,-mllvm -Wl,-function-specialize -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization -mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist`

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## Peak Optimization Flags (Continued)

519.lbm_r (continued):
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

538.imagick_r: Same as 519.lbm_r

544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

C++ benchmarks:

508.namd_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-flv-function-specialization -mllvm -enable-licm-vrp
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang

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## Peak Optimization Flags (Continued)

549.fotonik3d_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang

554.roms_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm
-ljemalloc -lflang

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -Mrecursive -lamdlibm
-ljemalloc -lflang

527.cam4_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true

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## Peak Optimization Flags (Continued)

527.cam4_r (continued):
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -O3 -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-Mrecursive -Hz,1,0x1 -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -lamdlibm -ljemalloc
-lflang

Benchmarks using both C and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Mrecursive -lamdlibm -ljemalloc
-lflang

## Peak Other Flags

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

**(Continued on next page)**

# Peak Other Flags (Continued)

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

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

Benchmarks using both Fortran and C:
`-Wno-unused-command-line-argument`

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:
`-Wno-unused-command-line-argument`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.2.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.2.xml`


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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 2024-04-02 23:02:55-0400.
Report generated on 2024-05-07 22:18:03 by CPU2017 PS formatter v6716.
Originally published on 2024-05-07.