# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

$SPECrate^{®}2017\_fp\_base = 1410$
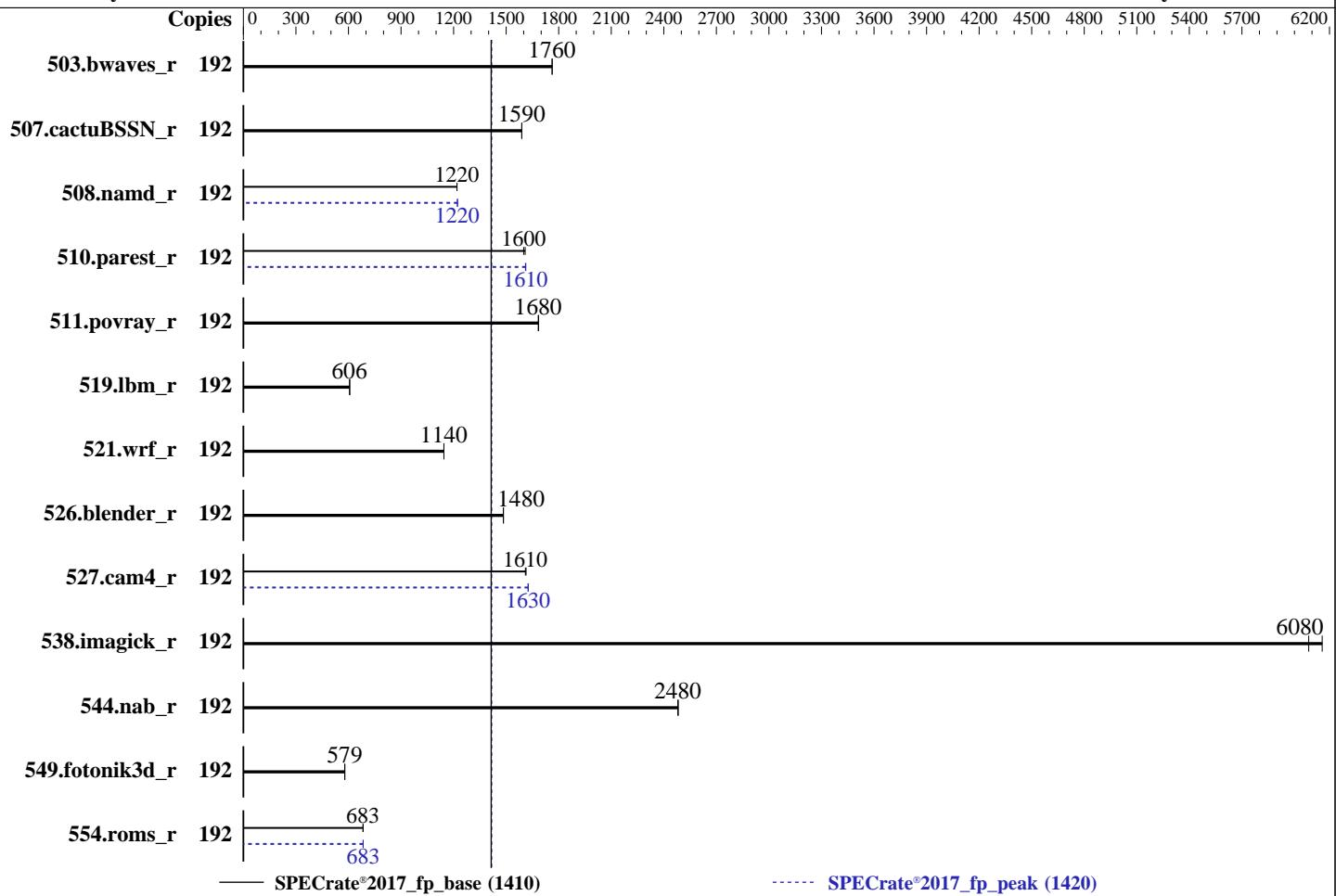
$SPECrate^{®}2017\_fp\_peak = 1420$

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

**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

| Benchmark | Copies | Result |
|---|---|---|
| 503.bwaves_r | 192 | 1760 |
| 507.cactuBSSN_r | 192 | 1590 |
| 508.namd_r | 192 | 1220 / 1220 |
| 510.parest_r | 192 | 1600 / 1610 |
| 511.povray_r | 192 | 1680 |
| 519.lbm_r | 192 | 606 |
| 521.wrf_r | 192 | 1140 |
| 526.blender_r | 192 | 1480 |
| 527.cam4_r | 192 | 1610 / 1630 |
| 538.imagick_r | 192 | 6080 |
| 544.nab_r | 192 | 2480 |
| 549.fotonik3d_r | 192 | 579 |
| 554.roms_r | 192 | 683 / 683 |

SPECrate®2017_fp_base (1410)    SPECrate®2017_fp_peak (1420)

## Hardware

CPU Name: AMD EPYC 9654
 Max MHz: 3700
 Nominal: 2400
Enabled: 192 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores
 Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 110 GB on tmpfs
Other: Cooling: Air

## Software

OS: SUSE Linux Enterprise Server 15 SP4
 5.14.21-150400.22-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version 1.6.8 released Nov-2023
File System: tmpfs
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.

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| | |
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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 | 192 | 1092 | 1760 | **1093** | **1760** | | | 192 | 1092 | 1760 | **1093** | **1760** | | |
| 507.cactuBSSN_r | 192 | 153 | 1590 | **153** | **1590** | | | 192 | 153 | 1590 | **153** | **1590** | | |
| 508.namd_r | 192 | 150 | 1220 | **150** | **1220** | | | 192 | **149** | **1220** | 149 | 1220 | | |
| 510.parest_r | 192 | **314** | **1600** | 312 | 1610 | | | 192 | 312 | 1610 | **312** | **1610** | | |
| 511.povray_r | 192 | **266** | **1680** | 266 | 1690 | | | 192 | **266** | **1680** | 266 | 1690 | | |
| 519.lbm_r | 192 | **334** | **606** | 333 | 608 | | | 192 | **334** | **606** | 333 | 608 | | |
| 521.wrf_r | 192 | 376 | 1140 | **376** | **1140** | | | 192 | 376 | 1140 | **376** | **1140** | | |
| 526.blender_r | 192 | 197 | 1480 | **197** | **1480** | | | 192 | 197 | 1480 | **197** | **1480** | | |
| 527.cam4_r | 192 | 208 | 1610 | **209** | **1610** | | | 192 | **207** | **1630** | 207 | 1630 | | |
| 538.imagick_r | 192 | 77.5 | 6160 | **78.5** | **6080** | | | 192 | 77.5 | 6160 | **78.5** | **6080** | | |
| 544.nab_r | 192 | **130** | **2480** | 130 | 2480 | | | 192 | **130** | **2480** | 130 | 2480 | | |
| 549.fotonik3d_r | 192 | **1293** | **579** | 1292 | 579 | | | 192 | **1293** | **579** | 1292 | 579 | | |
| 554.roms_r | 192 | 446 | 683 | **447** | **683** | | | 192 | **446** | **683** | 446 | 684 | | |
| SPECrate®2017_fp_base = | | **1410** | | | | | | | | | | | | |
| SPECrate®2017_fp_peak = | | **1420** | | | | | | | | | | | | |

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 110 GB ramdisk created with the cmd: "mount -t tmpfs -o size=110G tmpfs /mnt/ramdisk"
```

## Platform Notes

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

             Logical Processor : Disabled
    Virtualization Technology : Disabled
        NUMA Nodes per Socket : 4

               System Profile : Custom
                     C-States : Disabled
           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 localhost Fri Feb  9 14:26:46 2024

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

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

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## Platform Notes (Continued)

```
  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+suse.124.g2bc0b2c447)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. 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 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
    x86_64 x86_64 x86_64 GNU/Linux

    ------------------------------------------------------------
  2. w
     14:26:46 up 1 day,  2:51,  2 users,  load average: 1.57, 70.16, 137.07
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                26Nov61 38.00s  1.70s  0.36s /bin/bash ./amd_rate_aocc400_znver4_A1.sh
    root     tty2     -                09:05    2:12   0.06s  0.06s -bash

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

    ------------------------------------------------------------
  4. ulimit -a
    core file size          (blocks, -c) unlimited
    data seg size           (kbytes, -d) unlimited
    scheduling priority             (-e) 0
    file size               (blocks, -f) unlimited
    pending signals                 (-i) 6190526
    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) 6190526
    virtual memory          (kbytes, -v) unlimited
    file locks                      (-x) unlimited
```

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## Platform Notes (Continued)

```
      ----------------------------------------------------------
      5. sysinfo process ancestry
       /usr/lib/systemd/systemd linux --switched-root --system --deserialize 34
       login -- root
       -bash
       /bin/bash ./DELL_rate.sh
       /bin/bash ./dell-run-main.sh rate
       /bin/bash ./dell-run-main.sh rate
       /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-adddcD=1
         --define DL-VERS=v4.8.5 --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-adddcD=1 --define DL-VERS=v4.8.5 --output_format
         html,txt,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-adddcD=1 --define DL-VERS=v4.8.5
         --output_format html,pdf,txt --nopower --runmode rate --tune base:peak --size test:train:refrate fprate
         --nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.001/templogs/preenv.fprate.001.0.log --lognum 001.0
         --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 9654 96-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       : 96
          siblings        : 96
          2 physical ids (chips)
          192 processors (hardware threads)
          physical id 0: core ids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
          physical id 1: core ids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
          physical id 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
          physical id 1: apicids
          256-263,272-279,288-295,304-311,320-327,336-343,352-359,368-375,384-391,400-407,416-423,432-439
        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):                  192
        On-line CPU(s) list:     0-191
        Vendor ID:               AuthenticAMD
        Model name:              AMD EPYC 9654 96-Core Processor
        CPU family:              25
        Model:                   17
        Thread(s) per core:      1
```

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## Platform Notes (Continued)

```
      Core(s) per socket:            96
      Socket(s):                     2
      Stepping:                      1
      BogoMIPS:                      4801.52
      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
                                     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:                     6 MiB (192 instances)
      L1i cache:                     6 MiB (192 instances)
      L2 cache:                      192 MiB (192 instances)
      L3 cache:                      768 MiB (24 instances)
      NUMA node(s):                  8
      NUMA node0 CPU(s):             0-23
      NUMA node1 CPU(s):             24-47
      NUMA node2 CPU(s):             48-71
      NUMA node3 CPU(s):             72-95
      NUMA node4 CPU(s):             96-119
      NUMA node5 CPU(s):             120-143
      NUMA node6 CPU(s):             144-167
      NUMA node7 CPU(s):             168-191
      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 and seccomp
      Vulnerability Spectre v1:      Mitigation; usercopy/swapgs barriers and __user pointer sanitization
      Vulnerability Spectre v2:      Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, 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       6M    8 Data             1     64        1             64
        L1i       32K       6M    8 Instruction      1     64        1             64
        L2         1M     192M    8 Unified          2   2048        1             64
        L3        32M     768M   16 Unified          3  32768        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: 0-23
      node 0 size: 193039 MB
      node 0 free: 191762 MB
      node 1 cpus: 24-47
```

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## Platform Notes (Continued)

```
   node 1 size: 193528 MB
   node 1 free: 192730 MB
   node 2 cpus: 48-71
   node 2 size: 193528 MB
   node 2 free: 189262 MB
   node 3 cpus: 72-95
   node 3 size: 193512 MB
   node 3 free: 192601 MB
   node 4 cpus: 96-119
   node 4 size: 193528 MB
   node 4 free: 192673 MB
   node 5 cpus: 120-143
   node 5 size: 193528 MB
   node 5 free: 192757 MB
   node 6 cpus: 144-167
   node 6 size: 193528 MB
   node 6 free: 192717 MB
   node 7 cpus: 168-191
   node 7 size: 193462 MB
   node 7 free: 192656 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:     1584799568 kB


   ------------------------------------------------------------
10. who -r
   run-level 3 Nov 26 12:47


   ------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
   Default Target  Status
   multi-user      degraded


   ------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
     UNIT                             LOAD   ACTIVE SUB    DESCRIPTION
   * NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online


   ------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         NetworkManager NetworkManager-dispatcher NetworkManager-wait-online YaST2-Firstboot
                   YaST2-Second-Stage apparmor auditd cron display-manager firewalld getty@ haveged
                   irqbalance issue-generator kbdsettings klog lvm2-monitor nscd purge-kernels rollback
                   rsyslog smartd sshd wpa_supplicant
   enabled-runtime systemd-remount-fs
   disabled        ModemManager accounts-daemon appstream-sync-cache autofs autoyast-initscripts
                   blk-availability bluetooth bluetooth-mesh boot-sysctl ca-certificates chrony-wait chronyd
                   console-getty cups cups-browsed debug-shell dnsmasq ebtables exchange-bmc-os-info gpm
```

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## Platform Notes (Continued)

```
                 grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd iscsi iscsi-init iscsid
                 iscsiuio issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap
                 nm-cloud-setup nmb ostree-remount postfix rdisc rpcbind rpmconfigcheck rsyncd rtkit-daemon
                 serial-getty@ smartd_generate_opts smb snmpd snmptrapd speech-dispatcherd
                 systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                 systemd-time-wait-sync systemd-timesyncd tuned udisks2 upower wicked wickedd-auto4
                 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny wpa_supplicant@
   indirect      wickedd

  ----------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=ef117b4a-6c89-42a3-b0a0-2cc3fe661a68
   linux
   splash=silent
   quiet
   security=
   mitigations=auto

  ----------------------------------------------------------
15. cpupower frequency-info
   analyzing CPU 0:
     Unable to determine current policy
     boost state support:
       Supported: yes
       Active: yes

  ----------------------------------------------------------
16. tuned-adm active
   No current active profile.

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

(Continued on next page)

## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1420

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

**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

## Platform Notes (Continued)

```
      ----------------------------------------------------------
      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 SUSE Linux Enterprise Server 15 SP4


      ----------------------------------------------------------
      21. 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  110G  3.4G  107G   4% /mnt/ramdisk


      ----------------------------------------------------------
      22. /sys/devices/virtual/dmi/id
          Vendor:        Dell Inc.
          Product:       PowerEdge R7625
          Product Family: PowerEdge
          Serial:        1234567


      ----------------------------------------------------------
      23. dmidecode
        Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
        The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
        determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
        "DMTF SMBIOS" standard.
        Memory:
          14x 80AD000080AD HMCG94AEBRA109N 64 GB 2 rank 4800
          7x 80AD000080AD HMCG94AEBRA123N 64 GB 2 rank 4800
          3x 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800



      ----------------------------------------------------------
      24. BIOS
      (This section combines info from /sys/devices and dmidecode.)
          BIOS Vendor:       Dell Inc.
          BIOS Version:      1.6.8
          BIOS Date:         11/24/2023
          BIOS Revision:     1.6
```

## 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
--------------------------------------------------------------------------------------------------
```

**(Continued on next page)**

## Dell Inc.

SPECrate®2017_fp_base = 1410

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_peak = 1420

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**Test Date:** Feb-2024
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**Software Availability:** Nov-2022

## Compiler Version Notes (Continued)

```
==============================================================================
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
------------------------------------------------------------------------------


==============================================================================
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
------------------------------------------------------------------------------
```

# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1420

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

**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

## 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 -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
```

**(Continued on next page)**

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

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**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

# Base Optimization Flags (Continued)

C benchmarks (continued):
```
-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
-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
```

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result
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## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1420

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

**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

## Base Optimization Flags (Continued)

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

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
```

**(Continued on next page)**

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

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

**Test Date:** Feb-2024
**Hardware Availability:** Nov-2022
**Software Availability:** Nov-2022

# Peak Compiler Invocation (Continued)

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: `basepeak = yes`

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:

**(Continued on next page)**

## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1420

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**Software Availability:** Nov-2022

# Peak Optimization Flags (Continued)

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`
`-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: `basepeak = yes`

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: `basepeak = yes`

526.blender_r: `basepeak = yes`

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`

## Dell Inc.

PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

$SPECrate®2017\_fp\_base = 1410$

$SPECrate®2017\_fp\_peak = 1420$

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**Test Date:** Feb-2024
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# Peak Other Flags (Continued)

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.

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