# SPEC CPU®2017 Floating Point Speed Result

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## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 251$

$SPECspeed^{®}2017\_fp\_peak = 256$

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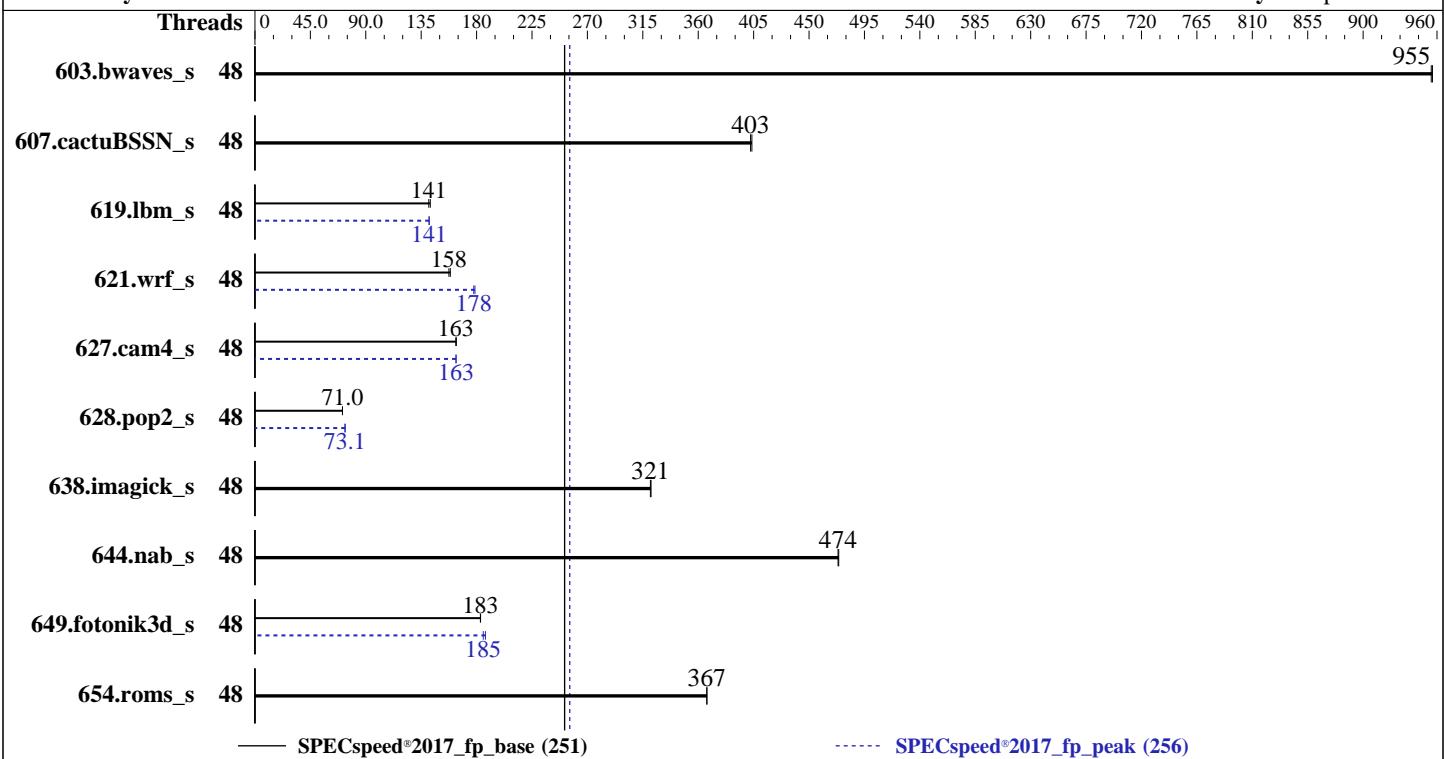**Test Sponsor:** Dell Inc.
**Tested by:** Dell Inc.

**Test Date:** Feb-2024
**Hardware Availability:** May-2023
**Software Availability:** Sep-2023

| Threads | | |
|---|---|---|
| 603.bwaves_s | 48 | 955 |
| 607.cactuBSSN_s | 48 | 403 |
| 619.lbm_s | 48 | 141 / 141 |
| 621.wrf_s | 48 | 158 / 178 |
| 627.cam4_s | 48 | 163 / 163 |
| 628.pop2_s | 48 | 71.0 / 73.1 |
| 638.imagick_s | 48 | 321 |
| 644.nab_s | 48 | 474 |
| 649.fotonik3d_s | 48 | 183 / 185 |
| 654.roms_s | 48 | 367 |

Scale: 0 45.0 90.0 135 180 225 270 315 360 405 450 495 540 585 630 675 720 765 810 855 900 960

——— SPECspeed®2017_fp_base (251)          - - - - SPECspeed®2017_fp_peak (256)

## Hardware

CPU Name: AMD EPYC 9224
 Max MHz: 3700
 Nominal: 2500
Enabled: 48 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: 64 MB I+D on chip per chip, 16 MB shared / 6 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 50 GB on tmpfs
Other: Cooling: DLC

## Software

OS: Ubuntu 22.04.3 LTS
 5.15.0-84-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: Yes
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 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 603.bwaves_s | 48 | 61.7 | 956 | **61.8** | **955** | | | 48 | 61.7 | 956 | **61.8** | **955** | | |
| 607.cactuBSSN_s | 48 | **41.4** | **403** | 41.3 | 404 | | | 48 | **41.4** | **403** | 41.3 | 404 | | |
| 619.lbm_s | 48 | 36.8 | 142 | **37.1** | **141** | | | 48 | 37.0 | 141 | **37.0** | **141** | | |
| 621.wrf_s | 48 | 83.4 | 159 | **84.0** | **158** | | | 48 | **74.4** | **178** | 74.0 | 179 | | |
| 627.cam4_s | 48 | 54.2 | 164 | **54.3** | **163** | | | 48 | 54.3 | 163 | **54.3** | **163** | | |
| 628.pop2_s | 48 | 167 | 71.1 | **167** | **71.0** | | | 48 | 162 | 73.3 | **162** | **73.1** | | |
| 638.imagick_s | 48 | **44.9** | **321** | 44.8 | 322 | | | 48 | **44.9** | **321** | 44.8 | 322 | | |
| 644.nab_s | 48 | **36.9** | **474** | 36.9 | 474 | | | 48 | **36.9** | **474** | 36.9 | 474 | | |
| 649.fotonik3d_s | 48 | **49.8** | **183** | 49.8 | 183 | | | 48 | 48.7 | 187 | **49.2** | **185** | | |
| 654.roms_s | 48 | **42.9** | **367** | 42.9 | 367 | | | 48 | **42.9** | **367** | 42.9 | 367 | | |
| **SPECspeed®2017_fp_base =** | **251** | | | | | | | | | | | | | |
| **SPECspeed®2017_fp_peak =** | **256** | | | | | | | | | | | | | |

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,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
```

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## Operating System Notes (Continued)

```
run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
```

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-47"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1/amd_speed_aocc400_znver4_A_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "48"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-47"
PGHPF_ZMEM = "yes"
```

## 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 50 GB ramdisk created with the cmd: "mount -t tmpfs -o size=50G tmpfs /mnt/ramdisk"
```

## Platform Notes

```
 BIOS settings:
         DRAM Refresh Delay : Performance
```

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## Platform Notes (Continued)

```
        DIMM Self Healing on
   Uncorrectable Memory Error : Disabled

             Logical Processor : Disabled
     Virtualization Technology : Disabled
         NUMA Nodes per Socket : 1

                System Profile : Custom
                      C-States : Disabled
            Memory Patrol Scrub : Disabled
          PCI ASPM L1 Link
              Power Management : Disabled
            Determinism Slider : Power Determinism
       Algorithm Performance
          Boost Disable (ApbDis) : Enabled

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 Thu Feb 22 09:53:24 2024

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

------------------------------------------------------------
Table of contents
------------------------------------------------------------
 1. uname -a
 2. w
 3. Username
 4. ulimit -a
 5. sysinfo process ancestry
 6. /proc/cpuinfo
 7. lscpu
 8. numactl --hardware
 9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 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
   09:53:24 up  2:28,  1 user,  load average: 5.40, 5.51, 3.25
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                07:24    2:28m  2.10s  0.47s /bin/bash ./amd_speed_aocc400_znver4_A1.sh
```

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## Platform Notes (Continued)

```
          ----------------------------------------------------------
          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               3093894
            nofiles               1024
            vmemory(kbytes)       unlimited
            locks                 unlimited
            rtprio                0


          ----------------------------------------------------------
          5. sysinfo process ancestry
           /sbin/init
           /bin/login -p --
           -bash
           /bin/bash ./DELL_speed.sh
           /bin/bash ./dell-run-main.sh speed
           /bin/bash ./dell-run-main.sh speed
           /bin/bash ./dell-run-speccpu.sh speed --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-VERS=4.9.2
             --output_format html,pdf,txt --define DL-LQC=1
           python3 ./run_amd_speed_aocc400_znver4_A1.py
           /bin/bash ./amd_speed_aocc400_znver4_A1.sh
           runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 2 --define
             DL-BIOS-NPS=1 --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-VERS=4.9.2 --output_format html,pdf,txt
             --define DL-LQC=1 fpspeed
           runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 2 --define
             DL-BIOS-NPS=1 --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-VERS=4.9.2 --output_format html,pdf,txt
             --define DL-LQC=1 --nopower --runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv
             --note-preenv --logfile $SPEC/tmp/CPU2017.002/templogs/preenv.fpspeed.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 9224 24-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       : 24
            siblings        : 24
            2 physical ids (chips)
            48 processors (hardware threads)
            physical id 0: core ids 0-5,16-21,32-37,48-53
            physical id 1: core ids 0-5,16-21,32-37,48-53
            physical id 0: apicids 0-5,16-21,32-37,48-53
            physical id 1: apicids 64-69,80-85,96-101,112-117
```

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## Platform Notes (Continued)

```
    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):                          48
  On-line CPU(s) list:             0-47
  Vendor ID:                       AuthenticAMD
  Model name:                      AMD EPYC 9224 24-Core Processor
  CPU family:                      25
  Model:                           17
  Thread(s) per core:              1
  Core(s) per socket:              24
  Socket(s):                       2
  Stepping:                        1
  BogoMIPS:                        5001.67
  Flags:                           fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                                   clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
                                   lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf
                                   rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic
                                   movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic
                                   cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce
                                   topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3
                                   cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall
                                   fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq
                                   rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
                                   avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
                                   cqm_mbm_total cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru
                                   wbnoinvd amd_ppin cppc arat npt lbrv svm_lock nrip_save tsc_scale
                                   vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic
                                   v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke avx512_vbmi2
                                   gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57
                                   rdpid overflow_recov succor smca fsrm flush_l1d
  Virtualization:                  AMD-V
  L1d cache:                       1.5 MiB (48 instances)
  L1i cache:                       1.5 MiB (48 instances)
  L2 cache:                        48 MiB (48 instances)
  L3 cache:                        128 MiB (8 instances)
  NUMA node(s):                    2
  NUMA node0 CPU(s):               0-23
  NUMA node1 CPU(s):               24-47
  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 disabled, RSB
                                   filling, PBRSB-eIBRS Not affected
  Vulnerability Srbds:             Not affected
  Vulnerability Tsx async abort:   Not affected
```

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## Platform Notes (Continued)

```
From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL  SETS PHY-LINE COHERENCY-SIZE
    L1d      32K     1.5M    8 Data             1    64        1             64
    L1i      32K     1.5M    8 Instruction      1    64        1             64
    L2        1M      48M    8 Unified          2  2048        1             64
    L3       16M     128M   16 Unified          3 16384        1             64


----------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0-23
  node 0 size: 386594 MB
  node 0 free: 382233 MB
  node 1 cpus: 24-47
  node 1 size: 386992 MB
  node 1 free: 385719 MB
  node distances:
  node   0   1
    0:  10  32
    1:  32  10


----------------------------------------------------------------
9. /proc/meminfo
  MemTotal:       792153076 kB


----------------------------------------------------------------
10. who -r
  run-level 5 Feb 22 07:24


----------------------------------------------------------------
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

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

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## Platform Notes (Continued)

```
  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:  2500MHz


    ----------------------------------------------------------
  15. tuned-adm active
    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 22.04.3 LTS

    ----------------------------------------------------------
  20. Disk information
```

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## Platform Notes (Continued)

```
 SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1
   Filesystem      Type   Size  Used Avail Use% Mounted on
   tmpfs           tmpfs   50G  3.4G   47G   7% /mnt/ramdisk


    -------------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
     Vendor:         Dell Inc.
     Product:        PowerEdge R6625
     Product Family: PowerEdge
     Serial:         BGP4016


    -------------------------------------------------------------
 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:
     10x 802C0000802C MTC20F2085S1RC48BA1 32 GB 2 rank 4800
      8x 80CE000080CE M321R4GA3BB0-CQKVG 32 GB 2 rank 4800
      6x 80CE000080CE M321R4GA3BB6-CQKVG 32 GB 2 rank 4800



    -------------------------------------------------------------
 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              | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(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, Fortran | 607.cactuBSSN_s(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
--------------------------------------------------------------------------------------------------
```

## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 251$

$SPECspeed^{®}2017\_fp\_peak = 256$

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

**Test Date:** Feb-2024
**Hardware Availability:** May-2023
**Software Availability:** Sep-2023

## Compiler Version Notes (Continued)

```
==============================================================================================
Fortran      | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(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   | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(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`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

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

## Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`
621.wrf_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
627.cam4_s: `-DSPEC_CASE_FLAG -DSPEC_LP64`
628.pop2_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
638.imagick_s: `-DSPEC_LP64`
644.nab_s: `-DSPEC_LP64`
649.fotonik3d_s: `-DSPEC_LP64`

**(Continued on next page)**

## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 251$

$SPECspeed^{®}2017\_fp\_peak = 256$

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

**Test Date:** Feb-2024
**Hardware Availability:** May-2023
**Software Availability:** Sep-2023

# Base Portability Flags (Continued)

654.roms_s: -DSPEC_LP64

# Base Optimization Flags

C benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang
```

Benchmarks using both Fortran and C:
```
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

# SPEC CPU®2017 Floating Point Speed Result

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## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

SPECspeed®2017_fp_base = 251

SPECspeed®2017_fp_peak = 256

| | | | |
|---|---|---|---|
| **CPU2017 License:** 6573 | | **Test Date:** | Feb-2024 |
| **Test Sponsor:** Dell Inc. | | **Hardware Availability:** | May-2023 |
| **Tested by:** Dell Inc. | | **Software Availability:** | Sep-2023 |

# Base Other Flags

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

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

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

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

# Peak Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

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

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

# Peak Portability Flags

```
Same as Base Portability Flags
```

# Peak Optimization Flags

C benchmarks:

```
619.lbm_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
```

**(Continued on next page)**

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

## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

SPECspeed®2017_fp_base = 251

SPECspeed®2017_fp_peak = 256

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

**Test Date:** Feb-2024
**Hardware Availability:** May-2023
**Software Availability:** Sep-2023

# Peak Optimization Flags (Continued)

619.lbm_s (continued):
```
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -flto -Mrecursive
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang
```

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: `-m64 -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 -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

627.cam4_s: `-m64 -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 -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

**(Continued on next page)**

## Dell Inc.

PowerEdge R6625 (AMD EPYC 9224 24-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 251$

$SPECspeed^{®}2017\_fp\_peak = 256$

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

**Test Date:** Feb-2024
**Hardware Availability:** May-2023
**Software Availability:** Sep-2023

# Peak Optimization Flags (Continued)

628.pop2_s: `-m64 -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 -fopenmp`
`-flto -fstruct-layout=9 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
`-Mrecursive -fvector-transform -fscalar-transform`
`-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang`

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: `basepeak = yes`

# Peak Other Flags

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

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

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

Benchmarks using Fortran, C, and C++:
`-Wno-return-type -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-v1.2.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-v1.2.xml`

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

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