SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

PowerEdge R7625 (AMD EPYC 9384X 32-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 338$

$SPECspeed^{®}2017\_fp\_peak = 344$

CPU2017 License: 6573　　**Test Date:** Jul-2023
Test Sponsor: Dell Inc.　　**Hardware Availability:** Jul-2023
Tested by: Dell Inc.　　**Software Availability:** Nov-2022

Threads / results chart:

- **603.bwaves_s** 64 — base: 1890, peak: 1900
- **607.cactuBSSN_s** 64 — base: 521, peak: 522
- **619.lbm_s** 64 — base: 202
- **621.wrf_s** 64 — base: 186, peak: 208
- **627.cam4_s** 64 — base: 224, peak: 224
- **628.pop2_s** 64 — base: 69.4, peak: 71.2
- **638.imagick_s** 64 — base: 427, peak: 427
- **644.nab_s** 64 — base: 613
- **649.fotonik3d_s** 64 — base: 194, peak: 195
- **654.roms_s** 64 — base: 676

——— SPECspeed®2017_fp_base (338)　　- - - - - SPECspeed®2017_fp_peak (344)

Hardware

CPU Name: AMD EPYC 9384X
 Max MHz: 3900
 Nominal: 3100
Enabled: 64 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: 768 MB I+D on chip per chip, 96 MB shared / 4 cores
 Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 60 GB on tmpfs
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.24.21-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: Yes
Firmware: Version 1.4.5 released May-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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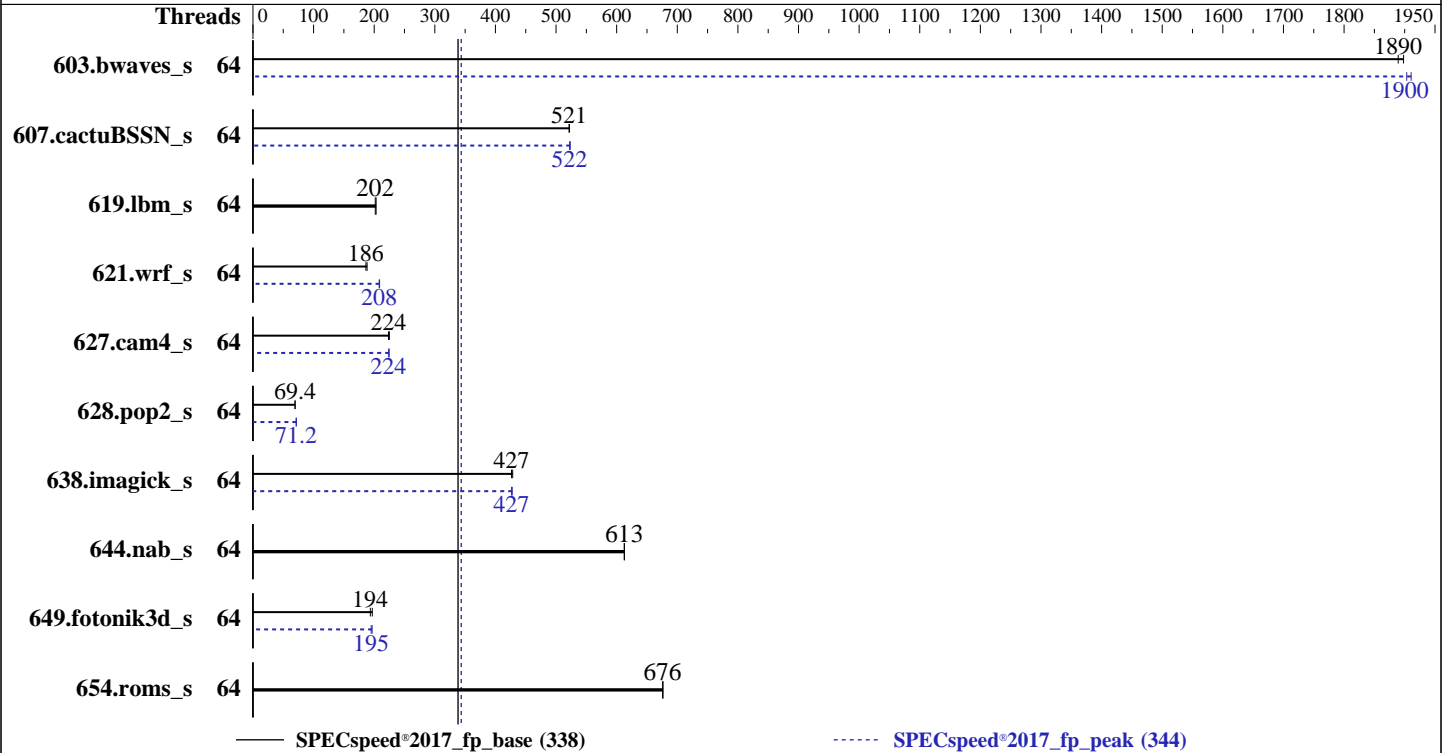
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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	64	31.1	1900	**31.2**	**1890**			64	**31.0**	**1900**	30.9	1910		
607.cactuBSSN_s	64	31.9	522	**32.0**	**521**			64	**31.9**	**522**	31.8	523		
619.lbm_s	64	25.8	203	**26.0**	**202**			64	25.8	203	**26.0**	**202**		
621.wrf_s	64	70.2	188	**71.0**	**186**			64	**63.5**	**208**	63.3	209		
627.cam4_s	64	39.4	225	**39.6**	**224**			64	39.4	225	**39.6**	**224**		
628.pop2_s	64	171	69.6	**171**	**69.4**			64	**167**	**71.2**	166	71.7		
638.imagick_s	64	33.7	429	**33.8**	**427**			64	33.7	428	**33.8**	**427**		
644.nab_s	64	28.5	613	**28.5**	**613**			64	28.5	613	**28.5**	**613**		
649.fotonik3d_s	64	46.3	197	**47.1**	**194**			64	46.4	197	**46.7**	**195**		
654.roms_s	64	23.3	677	**23.3**	**676**			64	23.3	677	**23.3**	**676**		
SPECspeed®2017_fp_base =			**338**											
SPECspeed®2017_fp_peak =			**344**											

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'
run as root.

(Continued on next page)

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Operating System Notes (Continued)

```
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 = "0-63"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1/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 = "64"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-63"
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 60 GB ramdisk created with the cmd: "mount -t tmpfs -o size=60G tmpfs /mnt/ramdisk"
```

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Platform Notes

```
 BIOS settings:
             DRAM Refresh Delay : Performance
             DIMM Self Healing on
   Uncorrectable Memory Error : Disabled
             Logical Processor : Disabled
    Virtualization Technology : Disabled
      L3 Cache as NUMA Domain : Enabled

                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/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Thu Jul 27 13:36:11 2023

 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 (249.12+suse.135.g7b70d88264)
 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 localhost 5.14.21-150400.24.21-default #1 SMP PREEMPT_DYNAMIC Wed Sep 7 06:51:18 UTC 2022 (974d0aa)
   x86_64 x86_64 x86_64 GNU/Linux

 -----------------------------------------------------------
 2. w
    13:36:11 up 4 min,  1 user,  load average: 0.63, 0.74, 0.37
```

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Platform Notes (Continued)

```
    USER     TTY      FROM              LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                 13:35   35.00s  1.56s  0.33s /bin/bash ./amd_speed_aocc400_znver4_A1.sh


    -----------------------------------------------------------
 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) 6190724
    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) 6190724
    virtual memory          (kbytes, -v) unlimited
    file locks                      (-x) unlimited


    -----------------------------------------------------------
 5. sysinfo process ancestry
  /usr/lib/systemd/systemd --switched-root --system --deserialize 30
  login -- root
  -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-BIOS-LogProcD=1
    --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --define DL-VERS=v4.6 --output_format html,pdf,txt
  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-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-LogProcD=1 --define DL-BIOS-adddcD=1 --define
    DL-BIOS-VirtD=1 --define DL-VERS=v4.6 --output_format html,pdf,txt fpspeed
  runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 2 --define
    DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define DL-BIOS-LogProcD=1 --define DL-BIOS-adddcD=1 --define
    DL-BIOS-VirtD=1 --define DL-VERS=v4.6 --output_format html,pdf,txt --nopower --runmode speed --tune
    base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
    $SPEC/tmp/CPU2017.001/templogs/preenv.fpspeed.001.0.log --lognum 001.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
  $SPEC = /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1


    -----------------------------------------------------------
 6. /proc/cpuinfo
    model name      : AMD EPYC 9384X 32-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 17
    stepping        : 1
    microcode       : 0xa101135
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size        : 3584 4K pages
    cpu cores       : 32
```

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Platform Notes (Continued)

```
      siblings       : 32
      2 physical ids (chips)
      64 processors (hardware threads)
      physical id 0: core ids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
      physical id 1: core ids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
      physical id 0: apicids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
      physical id 1: apicids 128-131,144-147,160-163,176-179,192-195,208-211,224-227,240-243
  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):                  64
    On-line CPU(s) list:     0-63
    Vendor ID:               AuthenticAMD
    Model name:              AMD EPYC 9384X 32-Core Processor
    CPU family:              25
    Model:                   17
    Thread(s) per core:      1
    Core(s) per socket:      32
    Socket(s):               2
    Stepping:                1
    Frequency boost:         enabled
    CPU max MHz:             3100.0000
    CPU min MHz:             1500.0000
    BogoMIPS:                6201.90
    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:               2 MiB (64 instances)
    L1i cache:               2 MiB (64 instances)
    L2 cache:                64 MiB (64 instances)
    L3 cache:                1.5 GiB (16 instances)
    NUMA node(s):            2
    NUMA node0 CPU(s):       0-31
    NUMA node1 CPU(s):       32-63
    Vulnerability Itlb multihit:    Not affected
    Vulnerability L1tf:             Not affected
    Vulnerability Mds:              Not affected
    Vulnerability Meltdown:         Not affected
```

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Platform Notes (Continued)

```
  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

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       2M    8 Data             1    64        1             64
      L1i       32K       2M    8 Instruction      1    64        1             64
      L2         1M      64M    8 Unified          2  2048        1             64
      L3        96M     1.5G   16 Unified          3 98304        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: 0-31
    node 0 size: 773627 MB
    node 0 free: 772462 MB
    node 1 cpus: 32-63
    node 1 size: 774083 MB
    node 1 free: 769405 MB
    node distances:
    node   0   1
      0:  10  32
      1:  32  10

  ---------------------------------------------------------------
  9. /proc/meminfo
    MemTotal:      1584855868 kB

  ---------------------------------------------------------------
  10. who -r
    run-level 3 Jul 27 13:33

  ---------------------------------------------------------------
  11. Systemd service manager version: systemd 249 (249.12+suse.135.g7b70d88264)
    Default Target  Status
    multi-user      running

  ---------------------------------------------------------------
  12. Services, from systemctl list-unit-files
    STATE           UNIT FILES
    enabled         YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager firewalld getty@
                    haveged irqbalance issue-generator kbdsettings klog lvm2-monitor nscd postfix
                    purge-kernels rollback rsyslog smartd sshd tuned wicked wickedd-auto4 wickedd-dhcp4
                    wickedd-dhcp6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled        autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                    chronyd console-getty cups cups-browsed debug-shell dmraid-activation ebtables
                    exchange-bmc-os-info gpm grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd
                    issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rdisc
                    rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd
                    systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                    systemd-time-wait-sync systemd-timesyncd udisks2
    indirect        wickedd
```

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Platform Notes (Continued)

```
      ----------------------------------------------------------
      13. Linux kernel boot-time arguments, from /proc/cmdline
        BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.24.21-default
        root=UUID=2cdc8db2-6b0f-453b-b0a0-3317c903ad65
        splash=silent
        mitigations=auto
        quiet
        security=apparmor

      ----------------------------------------------------------
      14. cpupower frequency-info
        analyzing CPU 0:
          current policy: frequency should be within 1.50 GHz and 3.10 GHz.
                          The governor "performance" may decide which speed to use
                          within this range.
          boost state support:
            Supported: yes
            Active: yes

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

(Continued on next page)

Dell Inc.

PowerEdge R7625 (AMD EPYC 9384X 32-Core Processor)

$SPECspeed^{®}2017\_fp\_base = 338$

$SPECspeed^{®}2017\_fp\_peak = 344$

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

Test Date: Jul-2023
Hardware Availability: Jul-2023
Software Availability: Nov-2022

Platform Notes (Continued)

```
    pages_to_scan           4096
    scan_sleep_millisecs    10000


  ------------------------------------------------------------
  19. OS release
    From /etc/*-release /etc/*-version
    os-release SUSE Linux Enterprise Server 15 SP4


  ------------------------------------------------------------
  20. Disk information
  SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1
    Filesystem      Type   Size  Used Avail Use% Mounted on
    tmpfs          tmpfs    60G  3.5G   57G   6% /mnt/ramdisk


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


  ------------------------------------------------------------
  22. dmidecode
    Additional information from dmidecode 3.4 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:
      24x 802C0000802C MTC40F2046S1RC48BA1 64 GB 2 rank 4800



  ------------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Dell Inc.
    BIOS Version:      1.4.5
    BIOS Date:         05/29/2023
    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
```

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Dell Inc.

PowerEdge R7625 (AMD EPYC 9384X 32-Core Processor)

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Test Date: Jul-2023

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Compiler Version Notes (Continued)

```
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      | 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`

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SPEC CPU®2017 Floating Point Speed Result

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$SPECspeed^®2017\_fp\_base = 338$

$SPECspeed^®2017\_fp\_peak = 344$

<table>
<tr><td>CPU2017 License: 6573</td><td>Test Date:</td><td>Jul-2023</td></tr>
<tr><td>Test Sponsor: Dell Inc.</td><td>Hardware Availability:</td><td>Jul-2023</td></tr>
<tr><td>Tested by: Dell Inc.</td><td>Software Availability:</td><td>Nov-2022</td></tr>
</table>

Base Portability Flags (Continued)

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`
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
```

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PowerEdge R7625 (AMD EPYC 9384X 32-Core Processor)

$SPECspeed®2017\_fp\_base = 338$

$SPECspeed®2017\_fp\_peak = 344$

CPU2017 License:	6573	**Test Date:**	Jul-2023
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Jul-2023
Tested by:	Dell Inc.	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

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

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
```

Dell Inc.

PowerEdge R7625 (AMD EPYC 9384X 32-Core Processor)

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CPU2017 License: 6573		**Test Date:**	Jul-2023
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Jul-2023
Tested by:	Dell Inc.	**Software Availability:**	Nov-2022

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_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
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_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 -Mrecursive -mllvm -reduce-array-computations=3
-fvector-transform -fscalar-transform -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang

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

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Peak Optimization Flags (Continued)

621.wrf_s (continued):
```
-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
```

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++:
```
-m64 -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 -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 -finline-aggressive -mllvm -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Peak Other Flags

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

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

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Peak Other Flags (Continued)

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.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.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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