SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R7625 (AMD EPYC 9224 24-Core Processor)

$SPECrate®2017\_int\_base = 501$

$SPECrate®2017\_int\_peak = Not Run$

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

Test Date: Jun-2024
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Benchmark	Copies	Result
500.perlbench_r	96	359
502.gcc_r	96	401
505.mcf_r	96	758
520.omnetpp_r	96	251
523.xalancbmk_r	96	541
525.x264_r	96	1260
531.deepsjeng_r	96	432
541.leela_r	96	418
548.exchange2_r	96	1230
557.xz_r	96	239

SPECrate®2017_int_base (501)

Hardware

CPU Name: AMD EPYC 9224
 Max MHz: 3700
 Nominal: 2500
Enabled: 48 cores, 2 chips, 2 threads/core
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: 2304 GB (24 x 96 GB 2Rx4 PC5-5600B-R, running at 4800)
Storage: 70 GB on tmpfs
Other: CPU Cooling: Air

Software

OS: Ubuntu 22.04.3 LTS
 5.15.0-84-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version 1.7.2 released Dec-2023
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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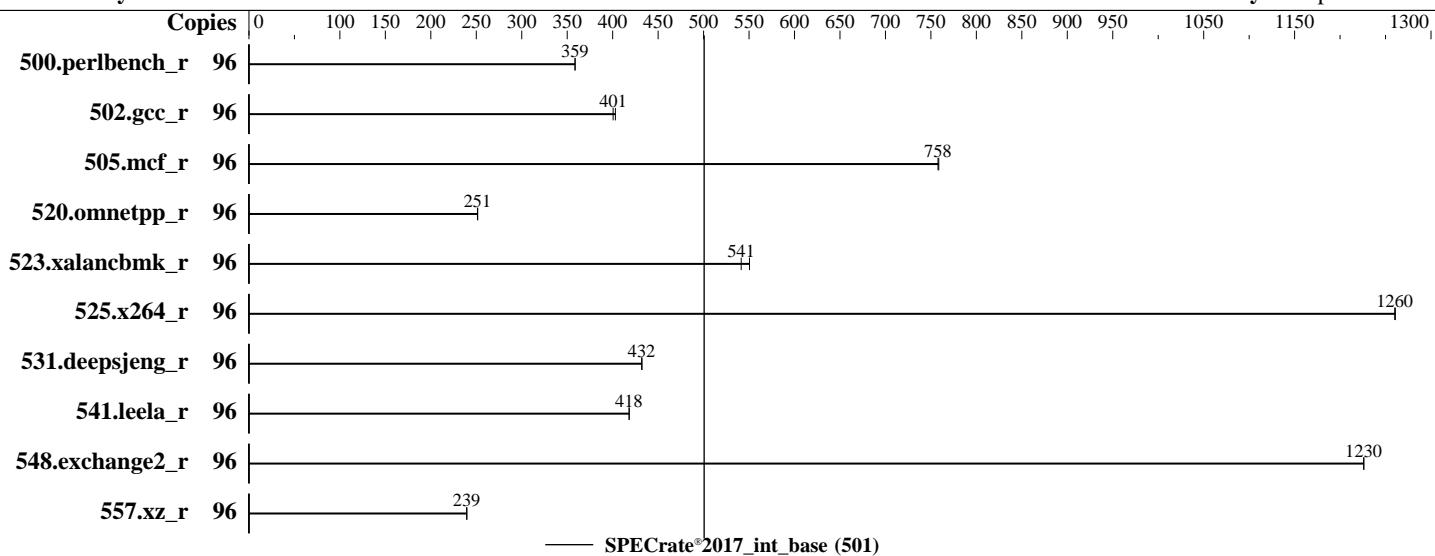SPECrate®2017_int_peak = Not Run

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	96	**426**	**359**	426	359									
502.gcc_r	96	**339**	**401**	337	403									
505.mcf_r	96	204	759	**205**	**758**									
520.omnetpp_r	96	501	252	**501**	**251**									
523.xalancbmk_r	96	184	550	**187**	**541**									
525.x264_r	96	133	1260	**133**	**1260**									
531.deepsjeng_r	96	254	432	**255**	**432**									
541.leela_r	96	**380**	**418**	380	418									
548.exchange2_r	96	**205**	**1230**	205	1230									
557.xz_r	96	432	240	**433**	**239**									
SPECrate®2017_int_base =		**501**												
SPECrate®2017_int_peak =		**Not Run**												

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) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

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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 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"
```

Platform Notes

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

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

                System Profile : Custom
                       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 amd-spa Fri Jun  7 11:28:25 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
```

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Platform Notes (Continued)

```
  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
     11:28:25 up 3 min,  1 user,  load average: 0.35, 0.11, 0.03
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                11:26   33.00s  2.20s  0.37s /bin/bash ./amd_rate_aocc400_znver4_A1.sh


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


  ------------------------------------------------------------
  4. ulimit -a
    time(seconds)        unlimited
    file(blocks)         unlimited
    data(kbytes)         unlimited
    stack(kbytes)        unlimited
    coredump(blocks)     0
    memory(kbytes)       unlimited
    locked memory(kbytes) 2097152
    process              9286981
    nofiles              1024
    vmemory(kbytes)      unlimited
    locks                unlimited
    rtprio               0


  ------------------------------------------------------------
  5. sysinfo process ancestry
   /sbin/init
   /bin/login -p --
   -bash
   /bin/bash ./DELL_rate.sh --tune base
   /bin/bash /home/DellFiles/bin/dell-run-main.sh rate --tune base
   /bin/bash /home/DellFiles/bin/dell-run-main.sh rate --tune base
   /bin/bash /home/DellFiles/bin/AMD/dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define
     DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --output_format html,pdf,txt --tune base
   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-L3NUMA=1 --define DL-BIOS-NPS=4 --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define
     DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --output_format html,pdf,txt --tune base
```

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Platform Notes (Continued)

```
    intrate
 runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 2 --define
   DL-BIOS-L3NUMA=1 --define DL-BIOS-NPS=4 --define DL-BIOSinc=Dell-BIOS_EPYC-4.inc --define
   DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=5.2 --output_format html,pdf,txt --tune base
   --nopower --runmode rate --tune base --size test:train:refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.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 9224 24-Core Processor
    vendor_id        : AuthenticAMD
    cpu family       : 25
    model            : 17
    stepping         : 1
    microcode        : 0xa101144
    bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size         : 3584 4K pages
    cpu cores        : 24
    siblings         : 48
    2 physical ids (chips)
    96 processors (hardware threads)
    physical id 0: core ids 0-5,8-13,16-21,24-29
    physical id 1: core ids 0-5,8-13,16-21,24-29
    physical id 0: apicids 0-11,16-27,32-43,48-59
    physical id 1: apicids 64-75,80-91,96-107,112-123
  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):                         96
  On-line CPU(s) list:            0-95
  Vendor ID:                      AuthenticAMD
  Model name:                     AMD EPYC 9224 24-Core Processor
  CPU family:                     25
  Model:                          17
  Thread(s) per core:             2
  Core(s) per socket:             24
  Socket(s):                      2
  Stepping:                       1
  Frequency boost:                enabled
  CPU max MHz:                    3706.0540
  CPU min MHz:                    1500.0000
  BogoMIPS:                       5001.66
  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
```

(Continued on next page)

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Platform Notes (Continued)

```
                         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):          8
  NUMA node0 CPU(s):     0-5,48-53
  NUMA node1 CPU(s):     6-11,54-59
  NUMA node2 CPU(s):     12-17,60-65
  NUMA node3 CPU(s):     18-23,66-71
  NUMA node4 CPU(s):     24-29,72-77
  NUMA node5 CPU(s):     30-35,78-83
  NUMA node6 CPU(s):     36-41,84-89
  NUMA node7 CPU(s):     42-47,90-95
  Vulnerability Gather data sampling: Not affected
  Vulnerability Itlb multihit:       Not affected
  Vulnerability L1tf:                Not affected
  Vulnerability Mds:                 Not affected
  Vulnerability Meltdown:            Not affected
  Vulnerability Mmio stale data:     Not affected
  Vulnerability Retbleed:            Not affected
  Vulnerability Spec store bypass:   Mitigation; Speculative Store Bypass disabled via prctl and seccomp
  Vulnerability Spectre v1:          Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:          Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                     filling, PBRSB-eIBRS Not affected
  Vulnerability Srbds:               Not affected
  Vulnerability Tsx async abort:     Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE       LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       32K     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: 8 nodes (0-7)
    node 0 cpus: 0-5,48-53
    node 0 size: 289846 MB
    node 0 free: 285822 MB
    node 1 cpus: 6-11,54-59
    node 1 size: 290300 MB
    node 1 free: 289859 MB
    node 2 cpus: 12-17,60-65
    node 2 size: 290300 MB
    node 2 free: 289936 MB
    node 3 cpus: 18-23,66-71
    node 3 size: 290284 MB
    node 3 free: 289909 MB
```

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Platform Notes (Continued)

```
  node 4 cpus: 24-29,72-77
  node 4 size: 290300 MB
  node 4 free: 290021 MB
  node 5 cpus: 30-35,78-83
  node 5 size: 290300 MB
  node 5 free: 290020 MB
  node 6 cpus: 36-41,84-89
  node 6 size: 290252 MB
  node 6 free: 289955 MB
  node 7 cpus: 42-47,90-95
  node 7 size: 290274 MB
  node 7 free: 289992 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:       2377583360 kB


  -------------------------------------------------------------
10. who -r
   run-level 3 Jun 7 11:25


  -------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.10)
  Default Target  Status
  multi-user      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:
       current policy: frequency should be within 1.50 GHz and 2.50 GHz.
                       The governor "performance" may decide which speed to use
                       within this range.
       boost state support:
         Supported: yes
         Active: yes
         Boost States: 0
         Total States: 3
         Pstate-P0:  2500MHz


   ------------------------------------------------------------
   15. tuned-adm active
     Current active profile: throughput-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        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


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

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Platform Notes (Continued)

```
    ----------------------------------------------------------
    20. Disk information
    SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc400-znver4-A1.1
      Filesystem      Type   Size  Used Avail Use% Mounted on
      tmpfs          tmpfs   70G  3.4G   67G   5% /mnt/ramdisk

    ----------------------------------------------------------
    21. /sys/devices/virtual/dmi/id
        Vendor:         Dell Inc.
        Product:        PowerEdge R7625
        Product Family: PowerEdge
        Serial:         SLR7601

    ----------------------------------------------------------
    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:
        24x 80AD000080AD HMCGM4MGBRB244N 96 GB 2 rank 5600, configured at 4800


    ----------------------------------------------------------
    23. BIOS
    (This section combines info from /sys/devices and dmidecode.)
        BIOS Vendor:    Dell Inc.
        BIOS Version:   1.7.2
        BIOS Date:      12/19/2023
        BIOS Revision:  1.7
```

Compiler Version Notes

```
==================================================================================================
C        | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
--------------------------------------------------------------------------------------------------
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++      | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
--------------------------------------------------------------------------------------------------
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  | 548.exchange2_r(base)
--------------------------------------------------------------------------------------------------
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 Integer Rate Result

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Dell Inc.

PowerEdge R7625 (AMD EPYC 9224 24-Core Processor)

SPECrate®2017_int_base =   501

SPECrate®2017_int_peak = Not Run

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

Test Date: Jun-2024
Hardware Availability: Feb-2023
Software Availability: Sep-2023

Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_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`
`-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`
`-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining`
`-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang`
`-lamdalloc`

C++ benchmarks:
`-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3`
`-march=znver4 -fveclib=AMDLIBM -ffast-math`
`-mllvm -unroll-threshold=100 -finline-aggressive`
`-mllvm -loop-unswitch-threshold=200000`
`-mllvm -reduce-array-computations=3 -zopt`
`-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang`

(Continued on next page)

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

Dell Inc.

PowerEdge R7625 (AMD EPYC 9224 24-Core Processor)

SPECrate®2017_int_base =   501

SPECrate®2017_int_peak = Not Run

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Base Other Flags

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

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

Fortran benchmarks:
```
-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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