SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

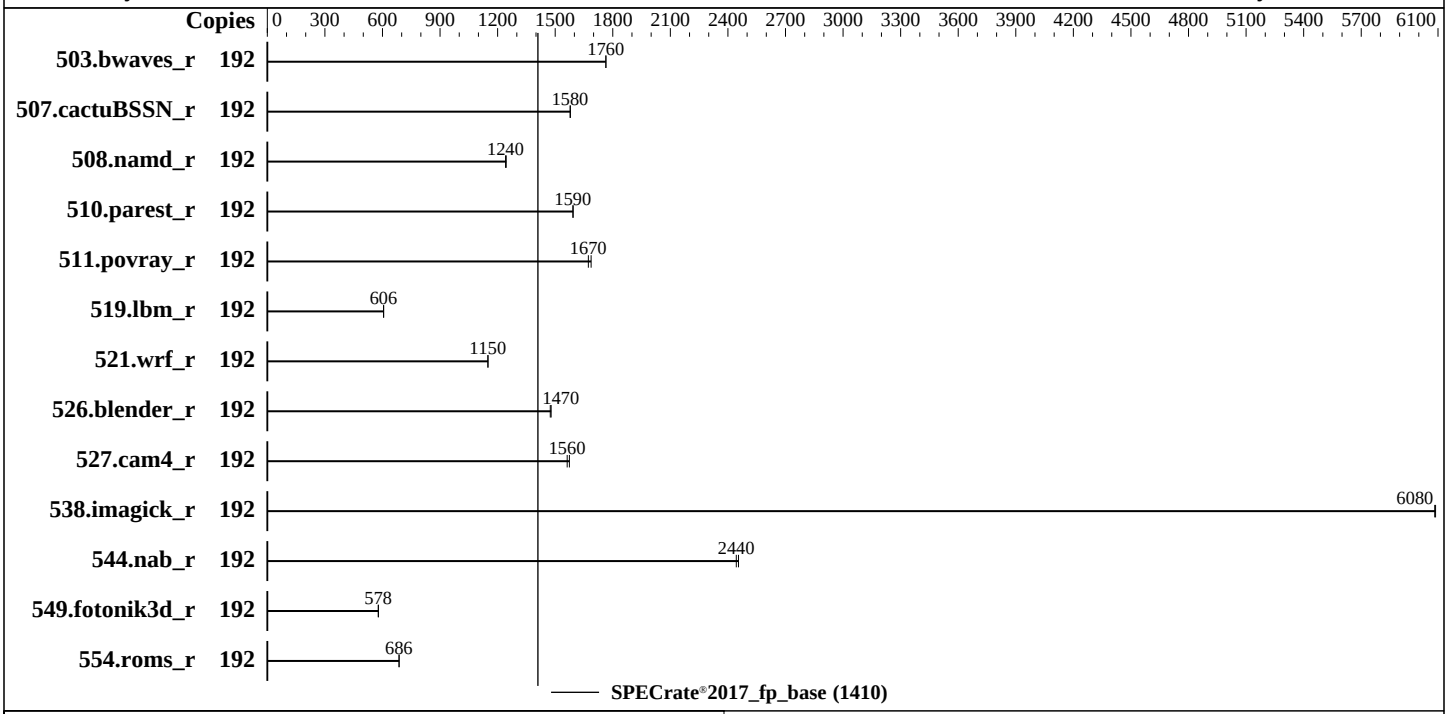
PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Oct-2022
Hardware Availability: Nov-2022
Software Availability: Nov-2022



Hardware

CPU Name:	AMD EPYC 9654
Max MHz:	3700
Nominal:	2400
Enabled:	192 cores, 2 chips
Orderable:	1,2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	384 MB I+D on chip per chip, 32 MB shared / 8 cores
Other:	None
Memory:	1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	125 GB on tmpfs
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.22-default
Compiler:	C/C++/Fortran: Version 4.0.0 of AOCC
Parallel:	No
Firmware:	Version 1.0.0 released Sep-2022
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.

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	**1091**	**1760**	1091	1760									
507.cactuBSSN_r	192	154	1580	**154**	**1580**									
508.namd_r	192	**147**	**1240**	147	1240									
510.parest_r	192	**315**	**1590**	315	1590									
511.povray_r	192	266	1690	**268**	**1670**									
519.lbm_r	192	334	606	**334**	**606**									
521.wrf_r	192	**374**	**1150**	374	1150									
526.blender_r	192	**198**	**1470**	198	1480									
527.cam4_r	192	213	1570	**215**	**1560**									
538.imagick_r	192	78.4	6090	**78.5**	**6080**									
544.nab_r	192	132	2460	**132**	**2440**									
549.fotonik3d_r	192	1293	579	**1294**	**578**									
554.roms_r	192	444	687	**445**	**686**									

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_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.
```

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Operating System Notes (Continued)

```
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.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/mnt/ramdisk/cpu2017-1.1.8-aocc400-B1/amd_rate_aocc400_genoa_B_lib/lib:
      /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1/amd_rate_aocc400_genoa_B_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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"
```

Platform Notes

```
 BIOS settings:
            DRAM Refresh Delay : Performance
        DIMM Self Healing on
    Uncorrectable Memory Error : Disabled
             Logical Processor : Disabled
     Virtualization Technology : Disabled
          L1 Stride Prefetcher : Disabled
         NUMA Nodes per Socket : 4
       L3 Cache as NUMA Domain : Enabled
```

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Platform Notes (Continued)

```
              System Profile : Custom
           Memory Patrol Scrub : Disabled
           PCI ASPM L1 Link
              Power Management : Disabled
            Determinism Slider : Power Determinism

 Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Tue Oct 18 13:07:32 2022

 SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo

 From /proc/cpuinfo
    model name : AMD EPYC 9654 96-Core Processor
       2  "physical id"s (chips)
       192 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The following
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 96
       siblings  : 96
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
       25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
       53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
       81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
       physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
       25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
       53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
       81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

 From lscpu from util-linux 2.37.2:
      Architecture:                    x86_64
      CPU op-mode(s):                  32-bit, 64-bit
      Address sizes:                   52 bits physical, 57 bits virtual
      Byte Order:                      Little Endian
      CPU(s):                          192
      On-line CPU(s) list:             0-191
      Vendor ID:                       AuthenticAMD
      Model name:                      AMD EPYC 9654 96-Core Processor
      CPU family:                      25
      Model:                           17
      Thread(s) per core:              1
      Core(s) per socket:              96
      Socket(s):                       2
      Stepping:                        1
```

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Platform Notes (Continued)

```
Frequency boost:                  enabled
CPU max MHz:                      3707.8120
CPU min MHz:                      1500.0000
BogoMIPS:                         4801.60
Flags:                            fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb
bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt
lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57
rdpid overflow_recov succor smca fsrm flush_l1d
Virtualization:                   AMD-V
L1d cache:                        6 MiB (192 instances)
L1i cache:                        6 MiB (192 instances)
L2 cache:                         192 MiB (192 instances)
L3 cache:                         768 MiB (24 instances)
NUMA node(s):                     24
NUMA node0 CPU(s):                0-7
NUMA node1 CPU(s):                8-15
NUMA node2 CPU(s):                16-23
NUMA node3 CPU(s):                24-31
NUMA node4 CPU(s):                32-39
NUMA node5 CPU(s):                40-47
NUMA node6 CPU(s):                48-55
NUMA node7 CPU(s):                56-63
NUMA node8 CPU(s):                64-71
NUMA node9 CPU(s):                72-79
NUMA node10 CPU(s):               80-87
NUMA node11 CPU(s):               88-95
NUMA node12 CPU(s):               96-103
NUMA node13 CPU(s):               104-111
NUMA node14 CPU(s):               112-119
NUMA node15 CPU(s):               120-127
NUMA node16 CPU(s):               128-135
NUMA node17 CPU(s):               136-143
NUMA node18 CPU(s):               144-151
NUMA node19 CPU(s):               152-159
NUMA node20 CPU(s):               160-167
NUMA node21 CPU(s):               168-175
```

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Platform Notes (Continued)

```
      NUMA node22 CPU(s):              176-183
      NUMA node23 CPU(s):              184-191
      Vulnerability Itlb multihit:     Not affected
      Vulnerability L1tf:              Not affected
      Vulnerability Mds:               Not affected
      Vulnerability Meltdown:          Not affected
      Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
      prctl and seccomp
      Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user
      pointer sanitization
      Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW,
      STIBP disabled, RSB filling
      Vulnerability Srbds:             Not affected
      Vulnerability Tsx async abort:   Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       6M    8 Data            1    64        1             64
      L1i       32K       6M    8 Instruction     1    64        1             64
      L2         1M     192M    8 Unified         2  2048        1             64
      L3        32M     768M   16 Unified         3 32768        1             64

  /proc/cpuinfo cache data
     cache size : 1024 KB

  From numactl --hardware
  WARNING: a numactl 'node' might or might not correspond to a physical chip.
    available: 24 nodes (0-23)
    node 0 cpus: 0 1 2 3 4 5 6 7
    node 0 size: 64055 MB
    node 0 free: 63184 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 64509 MB
    node 1 free: 64081 MB
    node 2 cpus: 16 17 18 19 20 21 22 23
    node 2 size: 64509 MB
    node 2 free: 64065 MB
    node 3 cpus: 24 25 26 27 28 29 30 31
    node 3 size: 64509 MB
    node 3 free: 64081 MB
    node 4 cpus: 32 33 34 35 36 37 38 39
    node 4 size: 64509 MB
    node 4 free: 64049 MB
    node 5 cpus: 40 41 42 43 44 45 46 47
    node 5 size: 64509 MB
    node 5 free: 64080 MB
    node 6 cpus: 48 49 50 51 52 53 54 55
```

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Platform Notes (Continued)

```
node 6 size: 64509 MB
node 6 free: 64083 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 64509 MB
node 7 free: 62309 MB
node 8 cpus: 64 65 66 67 68 69 70 71
node 8 size: 64508 MB
node 8 free: 64032 MB
node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 64492 MB
node 9 free: 64066 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 64473 MB
node 10 free: 64055 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 64508 MB
node 11 free: 62365 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 64509 MB
node 12 free: 64073 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 64509 MB
node 13 free: 64086 MB
node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 64509 MB
node 14 free: 64088 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 64509 MB
node 15 free: 64061 MB
node 16 cpus: 128 129 130 131 132 133 134 135
node 16 size: 64509 MB
node 16 free: 64080 MB
node 17 cpus: 136 137 138 139 140 141 142 143
node 17 size: 64509 MB
node 17 free: 64100 MB
node 18 cpus: 144 145 146 147 148 149 150 151
node 18 size: 64509 MB
node 18 free: 64087 MB
node 19 cpus: 152 153 154 155 156 157 158 159
node 19 size: 64509 MB
node 19 free: 64068 MB
node 20 cpus: 160 161 162 163 164 165 166 167
node 20 size: 64508 MB
node 20 free: 64085 MB
node 21 cpus: 168 169 170 171 172 173 174 175
node 21 size: 64442 MB
node 21 free: 64015 MB
```

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Platform Notes (Continued)

```
node 22 cpus: 176 177 178 179 180 181 182 183
node 22 size: 64508 MB
node 22 free: 64089 MB
node 23 cpus: 184 185 186 187 188 189 190 191
node 23 size: 64508 MB
node 23 free: 64044 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
20  21  22  23
  0:  10  12  12  12  11  12  12  12  11  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  1:  12  10  12  12  12  11  12  12  12  11  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  2:  12  12  10  12  12  12  11  12  12  12  11  12  32  32  32  32  32  32  32  32
  32  32  32  32
  3:  12  12  12  10  12  12  12  11  12  12  12  11  32  32  32  32  32  32  32  32
  32  32  32  32
  4:  11  12  12  12  10  12  12  12  11  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  5:  12  11  12  12  12  10  12  12  12  11  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  6:  12  12  11  12  12  12  10  12  12  12  11  12  32  32  32  32  32  32  32  32
  32  32  32  32
  7:  12  12  12  11  12  12  12  10  12  12  12  11  32  32  32  32  32  32  32  32
  32  32  32  32
  8:  11  12  12  12  11  12  12  12  10  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  9:  12  11  12  12  12  11  12  12  12  10  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
 10:  12  12  11  12  12  12  11  12  12  12  10  12  32  32  32  32  32  32  32  32
 32  32  32  32
 11:  12  12  12  11  12  12  12  11  12  12  12  10  32  32  32  32  32  32  32  32
 32  32  32  32
 12:  32  32  32  32  32  32  32  32  32  32  32  32  10  12  12  12  11  12  12  12
 11  12  12  12
 13:  32  32  32  32  32  32  32  32  32  32  32  32  12  10  12  12  12  11  12  12
 12  11  12  12
 14:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  10  12  12  12  11  12
 12  12  11  12
 15:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  10  12  12  12  11
 12  12  12  11
 16:  32  32  32  32  32  32  32  32  32  32  32  32  11  12  12  12  10  12  12  12
 11  12  12  12
 17:  32  32  32  32  32  32  32  32  32  32  32  32  12  11  12  12  12  10  12  12
 12  11  12  12
 18:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  11  12  12  12  10  12
 12  12  11  12
```

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Platform Notes (Continued)

```
    19:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  12  12  12  10
    12  12  12  11
    20:  32  32  32  32  32  32  32  32  32  32  32  32  11  12  12  12  11  12  12  12
    10  12  12  12
    21:  32  32  32  32  32  32  32  32  32  32  32  32  12  11  12  12  12  11  12  12
    12  10  12  12
    22:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  11  12  12  12  11  12
    12  12  10  12
    23:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  12  12  12  11
    12  12  12  10

  From /proc/meminfo
     MemTotal:       1584796700 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  /sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
     performance

  From /etc/*release* /etc/*version*
     os-release:
        NAME="SLES"
        VERSION="15-SP4"
        VERSION_ID="15.4"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp4"

  uname -a:
     Linux localhost.localdomain 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May
     11 06:57:18 UTC 2022 (49db222) x86_64 x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:

  CVE-2018-12207 (iTLB Multihit):                    Not affected
  CVE-2018-3620 (L1 Terminal Fault):                 Not affected
  Microarchitectural Data Sampling:                  Not affected
  CVE-2017-5754 (Meltdown):                          Not affected
  CVE-2018-3639 (Speculative Store Bypass):          Mitigation: Speculative Store
                                                     Bypass disabled via prctl and
                                                     seccomp
  CVE-2017-5753 (Spectre variant 1):                 Mitigation: usercopy/swapgs
                                                     barriers and __user pointer
                                                     sanitization
  CVE-2017-5715 (Spectre variant 2):                 Mitigation: Retpolines, IBPB:
```

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Platform Notes (Continued)

```
                                                      conditional, IBRS_FW, STIBP:
                                                      disabled, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

 run-level 3 Oct 18 11:41

 SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1
    Filesystem     Type   Size  Used Avail Use% Mounted on
    tmpfs          tmpfs  125G  3.4G  122G   3% /mnt/ramdisk

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

 Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you
 interpret this section. The 'dmidecode' program reads system data which is "intended to
 allow hardware to be accurately determined", but the intent may not be met, as there are
 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
   Memory:
     24x 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800

 BIOS:
    BIOS Vendor:       Dell Inc.
    BIOS Version:      1.0.0
    BIOS Date:         09/28/2022
    BIOS Revision:     1.0

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
C++             | 508.namd_r(base) 510.parest_r(base)
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
```

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Compiler Version Notes (Continued)

```
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang

C++ benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang

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

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang

Benchmarks using both C and C++:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang

Benchmarks using Fortran, C, and C++:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang

Base Other Flags

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

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

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

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Base Other Flags (Continued)

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

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

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

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/aocc400-flags.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.0.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-v1.0.xml`

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