# SPEC CPU®2017 Integer Speed Result

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## Dell Inc.

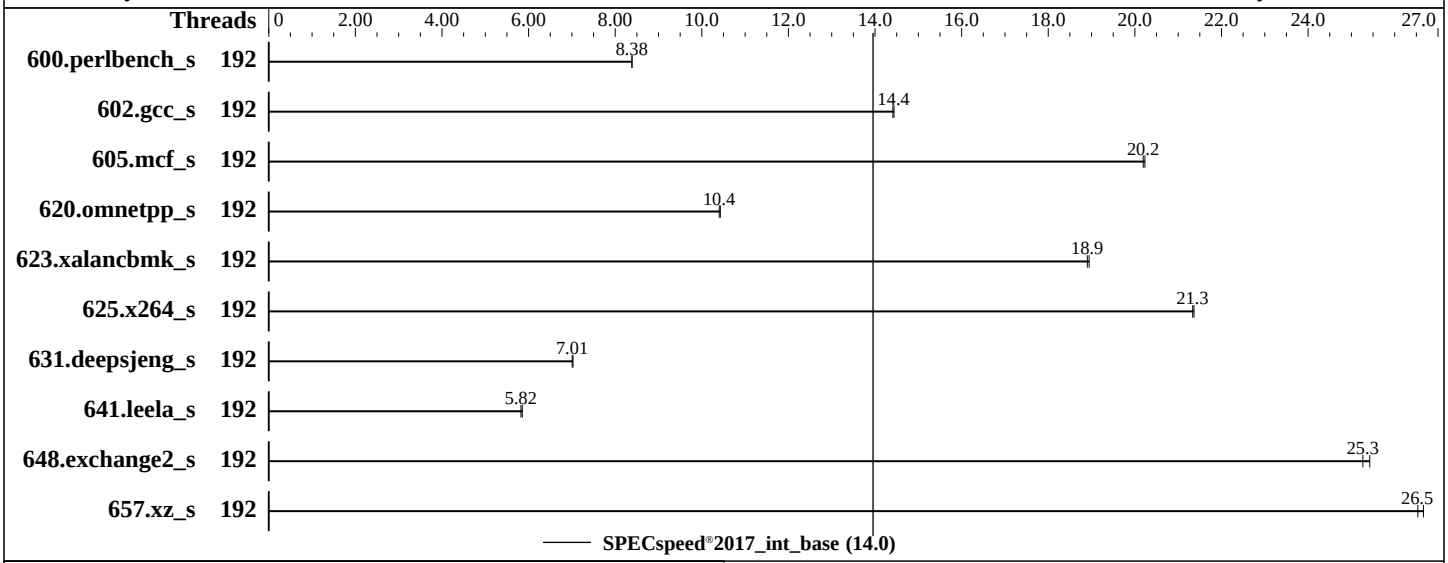
PowerEdge R7625 (AMD EPYC 9654 96-Core Processor)

SPECspeed®2017_int_base = 14.0

SPECspeed®2017_int_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: | Ubuntu 22.04.1 LTS 5.15.0-46-generic |
| Compiler: | C/C++/Fortran: Version 4.0.0 of AOCC |
| Parallel: | Yes |
| 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. |

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 600.perlbench_s | 192 | 212 | 8.39 | **212** | **8.38** | | | | | | | | | |
| 602.gcc_s | 192 | **276** | **14.4** | 276 | 14.4 | | | | | | | | | |
| 605.mcf_s | 192 | **234** | **20.2** | 233 | 20.2 | | | | | | | | | |
| 620.omnetpp_s | 192 | **157** | **10.4** | 156 | 10.4 | | | | | | | | | |
| 623.xalancbmk_s | 192 | 74.8 | 18.9 | **75.0** | **18.9** | | | | | | | | | |
| 625.x264_s | 192 | 82.6 | 21.4 | **82.7** | **21.3** | | | | | | | | | |
| 631.deepsjeng_s | 192 | **205** | **7.01** | 204 | 7.03 | | | | | | | | | |
| 641.leela_s | 192 | **293** | **5.82** | 291 | 5.86 | | | | | | | | | |
| 648.exchange2_s | 192 | 116 | 25.4 | **116** | **25.3** | | | | | | | | | |
| 657.xz_s | 192 | 232 | 26.7 | **233** | **26.5** | | | | | | | | | |

**SPECspeed®2017_int_base = 14.0**

**SPECspeed®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.
```

**(Continued on next page)**

## Operating System Notes (Continued)

```
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:
GOMP_CPU_AFFINITY = "0-191"
LD_LIBRARY_PATH =
     "/mnt/ramdisk/cpu2017-1.1.8-aocc400-B1a/amd_speed_aocc400_genoa_B_lib/li
     b:"
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 = "192"
```

## 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
       L3 Cache as NUMA Domain : Enabled
         NUMA Nodes per Socket : 4
```

**(Continued on next page)**

## Platform Notes (Continued)

```
                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/cpu2017-1.1.8-aocc400-B1a/bin/sysinfo
  Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
  running on amd-sut Wed Oct 19 21:28:47 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
```

**(Continued on next page)**

## Platform Notes (Continued)

```
Core(s) per socket:                  96
Socket(s):                           2
Stepping:                            1
Frequency boost:                     enabled
CPU max MHz:                         3709.0000
CPU min MHz:                         400.0000
BogoMIPS:                            4801.51
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:                           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
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      NUMA node19 CPU(s):                152-159
      NUMA node20 CPU(s):                160-167
      NUMA node21 CPU(s):                168-175
      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 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
      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: 64056 MB
    node 0 free: 63843 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 64509 MB
    node 1 free: 64363 MB
    node 2 cpus: 16 17 18 19 20 21 22 23
    node 2 size: 64509 MB
    node 2 free: 64287 MB
    node 3 cpus: 24 25 26 27 28 29 30 31
    node 3 size: 64509 MB
    node 3 free: 64317 MB
    node 4 cpus: 32 33 34 35 36 37 38 39
    node 4 size: 64509 MB
```

**(Continued on next page)**

## Platform Notes (Continued)

```
node 4 free: 64364 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 64509 MB
node 5 free: 64364 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 64474 MB
node 6 free: 60775 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 64509 MB
node 7 free: 64342 MB
node 8 cpus: 64 65 66 67 68 69 70 71
node 8 size: 64508 MB
node 8 free: 64351 MB
node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 64492 MB
node 9 free: 64363 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 64508 MB
node 10 free: 64283 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 64508 MB
node 11 free: 64368 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 64509 MB
node 12 free: 64372 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 64509 MB
node 13 free: 64393 MB
node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 64509 MB
node 14 free: 64394 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 64509 MB
node 15 free: 64393 MB
node 16 cpus: 128 129 130 131 132 133 134 135
node 16 size: 64509 MB
node 16 free: 64394 MB
node 17 cpus: 136 137 138 139 140 141 142 143
node 17 size: 64509 MB
node 17 free: 64391 MB
node 18 cpus: 144 145 146 147 148 149 150 151
node 18 size: 64509 MB
node 18 free: 64383 MB
node 19 cpus: 152 153 154 155 156 157 158 159
node 19 size: 64509 MB
node 19 free: 64395 MB
node 20 cpus: 160 161 162 163 164 165 166 167
```

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## Platform Notes (Continued)

```
node 20 size: 64508 MB
node 20 free: 64387 MB
node 21 cpus: 168 169 170 171 172 173 174 175
node 21 size: 64482 MB
node 21 free: 64363 MB
node 22 cpus: 176 177 178 179 180 181 182 183
node 22 size: 64508 MB
node 22 free: 64395 MB
node 23 cpus: 184 185 186 187 188 189 190 191
node 23 size: 64508 MB
node 23 free: 64391 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
```


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## Platform Notes (Continued)

```
    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
    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:       1584840200 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  /sbin/tuned-adm active
      Current active profile: latency-performance

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

  /usr/bin/lsb_release -d
     Ubuntu 22.04.1 LTS

  From /etc/*release* /etc/*version*
     debian_version: bookworm/sid
     os-release:
        PRETTY_NAME="Ubuntu 22.04.1 LTS"
        NAME="Ubuntu"
        VERSION_ID="22.04"
        VERSION="22.04.1 LTS (Jammy Jellyfish)"
        VERSION_CODENAME=jammy
        ID=ubuntu
        ID_LIKE=debian
        HOME_URL="https://www.ubuntu.com/"

  uname -a:
     Linux amd-sut 5.15.0-46-generic #49-Ubuntu SMP Thu Aug 4 18:03:25 UTC 2022 x86_64
     x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:
```


**(Continued on next page)**

## Platform Notes (Continued)

```
 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
 mmio_stale_data:                                   Not affected
 retbleed:                                          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:
                                                    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 19 21:24

 SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1a
    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:         BRZ5015

 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:
     1x 802C0000802C MTC40F2046S1RC48BA1 64 GB 2 rank 4800
     23x 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       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
        | 625.x264_s(base) 657.xz_s(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++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
        | 641.leela_s(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
------------------------------------------------------------------------------

==============================================================================
Fortran | 648.exchange2_s(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
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

## Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

## Base Optimization Flags

C benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -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 -lflang
-lamdalloc

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
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc-ext

Fortran benchmarks:
-m64 -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 -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc

## Base Other Flags

C benchmarks:
`-Wno-return-type -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.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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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