SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

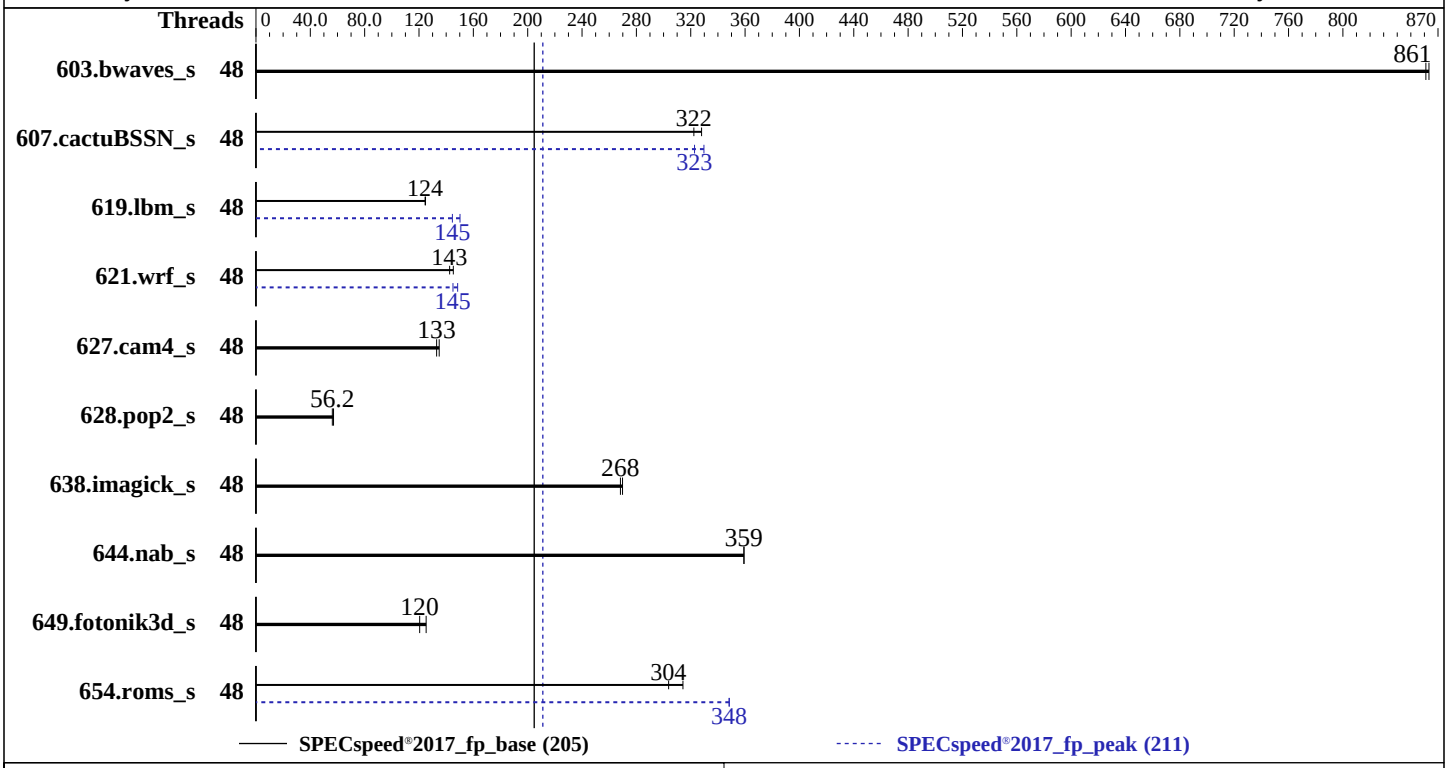
PowerEdge R6525 (AMD EPYC 7473X 24-Core Processor)

SPECspeed®2017_fp_base = 205

SPECspeed®2017_fp_peak = 211

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

Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Dec-2021



Hardware

CPU Name:	AMD EPYC 7473X
Max MHz:	3700
Nominal:	2800
Enabled:	48 cores, 2 chips
Orderable:	1,2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	512 KB I+D on chip per core
L3:	768 MB I+D on chip per chip, 96 MB shared / 3 cores
Other:	None
Memory:	2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)
Storage:	125 GB on tmpfs
Other:	None

Software

OS:	Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64
Compiler:	C/C++/Fortran: Version 3.2.0 of AOCC
Parallel:	Yes
Firmware:	Version 2.6.5 released Dec-2021
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	jemalloc: jemalloc memory allocator library v5.1.0
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage.

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	48	68.3	863	**68.5**	**861**			48	68.3	863	**68.5**	**861**		
607.cactuBSSN_s	48	50.8	328	**51.7**	**322**			48	50.6	330	**51.6**	**323**		
619.lbm_s	48	**42.1**	**124**	42.0	125			48	34.9	150	**36.2**	**145**		
621.wrf_s	48	**92.8**	**143**	91.0	145			48	**91.2**	**145**	89.1	148		
627.cam4_s	48	65.7	135	**66.7**	**133**			48	65.7	135	**66.7**	**133**		
628.pop2_s	48	**211**	**56.2**	208	57.1			48	**211**	**56.2**	208	57.1		
638.imagick_s	48	53.5	270	**53.8**	**268**			48	53.5	270	**53.8**	**268**		
644.nab_s	48	**48.7**	**359**	48.6	359			48	**48.7**	**359**	48.6	359		
649.fotonik3d_s	48	72.8	125	**75.7**	**120**			48	72.8	125	**75.7**	**120**		
654.roms_s	48	50.1	314	**51.8**	**304**			48	**45.2**	**348**	45.2	348		

SPECspeed®2017_fp_base = 205

SPECspeed®2017_fp_peak = 211

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,
```

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Operating System Notes (Continued)

```
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-47"
LD_LIBRARY_PATH =
      "/mnt/ramdisk/cpu2017-1.1.8-aocc320-A1/amd_speed_aocc320_milanx_A_lib/li
      b;/mnt/ramdisk/cpu2017-1.1.8-aocc320-A1/amd_speed_aocc320_milanx_A_lib/l
      ib32:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "48"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-47"

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

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

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-47"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2

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.
```

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General Notes (Continued)

```
jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2


 Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"
```

Platform Notes

```
 BIOS settings:
          Logical Processor : Disabled
    L3 Cache as NUMA Domain : Enabled
  Virtualization Technology : Disabled
         DRAM Refresh Delay : Performance

             System Profile : Custom
       CPU Power Management : Maximum Performance
        Memory Patrol Scrub : Disabled
        PCI ASPM L1 Link
           Power Management : Disabled
   Algorithm Performance
      Boost Disable (ApbDis): Enabled

 Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc320-A1/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on rhel-8-3-amd Thu Feb 24 22:52:22 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 7473X 24-Core Processor
       2  "physical id"s (chips)
       48 "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 : 24
       siblings  : 24
       physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
       physical 1: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

 From lscpu from util-linux 2.32.1:
      Architecture:        x86_64
```

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Platform Notes (Continued)

```
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              48
On-line CPU(s) list: 0-47
Thread(s) per core:  1
Core(s) per socket:  24
Socket(s):           2
NUMA node(s):        16
Vendor ID:           AuthenticAMD
CPU family:          25
Model:               1
Model name:          AMD EPYC 7473X 24-Core Processor
Stepping:            2
CPU MHz:             1849.583
BogoMIPS:            5589.04
Virtualization:      AMD-V
L1d cache:           32K
L1i cache:           32K
L2 cache:            512K
L3 cache:            98304K
NUMA node0 CPU(s):   0-2
NUMA node1 CPU(s):   3-5
NUMA node2 CPU(s):   6-8
NUMA node3 CPU(s):   9-11
NUMA node4 CPU(s):   12-14
NUMA node5 CPU(s):   15-17
NUMA node6 CPU(s):   18-20
NUMA node7 CPU(s):   21-23
NUMA node8 CPU(s):   24-26
NUMA node9 CPU(s):   27-29
NUMA node10 CPU(s):  30-32
NUMA node11 CPU(s):  33-35
NUMA node12 CPU(s):  36-38
NUMA node13 CPU(s):  39-41
NUMA node14 CPU(s):  42-44
NUMA node15 CPU(s):  45-47
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 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 sme ssbd mba sev ibrs ibpb stibp vmmcall
fsgsbase bmi1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb
sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat npt lbrv svm_lock
nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
```

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Platform Notes (Continued)

```
      v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

 /proc/cpuinfo cache data
    cache size : 512 KB

 From numactl --hardware
 WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 16 nodes (0-15)
   node 0 cpus: 0 1 2
   node 0 size: 128587 MB
   node 0 free: 125082 MB
   node 1 cpus: 3 4 5
   node 1 size: 129022 MB
   node 1 free: 128964 MB
   node 2 cpus: 6 7 8
   node 2 size: 129020 MB
   node 2 free: 128842 MB
   node 3 cpus: 9 10 11
   node 3 size: 129022 MB
   node 3 free: 128844 MB
   node 4 cpus: 12 13 14
   node 4 size: 129018 MB
   node 4 free: 128953 MB
   node 5 cpus: 15 16 17
   node 5 size: 129020 MB
   node 5 free: 128962 MB
   node 6 cpus: 18 19 20
   node 6 size: 129018 MB
   node 6 free: 128890 MB
   node 7 cpus: 21 22 23
   node 7 size: 116908 MB
   node 7 free: 116637 MB
   node 8 cpus: 24 25 26
   node 8 size: 129018 MB
   node 8 free: 128957 MB
   node 9 cpus: 27 28 29
   node 9 size: 129018 MB
   node 9 free: 128954 MB
   node 10 cpus: 30 31 32
   node 10 size: 128985 MB
   node 10 free: 128938 MB
   node 11 cpus: 33 34 35
   node 11 size: 129016 MB
   node 11 free: 128961 MB
   node 12 cpus: 36 37 38
   node 12 size: 129016 MB
   node 12 free: 128978 MB
```

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Platform Notes (Continued)

```
   node 13 cpus: 39 40 41
   node 13 size: 129016 MB
   node 13 free: 128978 MB
   node 14 cpus: 42 43 44
   node 14 size: 129018 MB
   node 14 free: 128977 MB
   node 15 cpus: 45 46 47
   node 15 size: 129014 MB
   node 15 free: 128971 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
     1:  11  10  11  11  11  11  11  11  32  32  32  32  32  32  32  32
     2:  11  11  10  11  11  11  11  11  32  32  32  32  32  32  32  32
     3:  11  11  11  10  11  11  11  11  32  32  32  32  32  32  32  32
     4:  11  11  11  11  10  11  11  11  32  32  32  32  32  32  32  32
     5:  11  11  11  11  11  10  11  11  32  32  32  32  32  32  32  32
     6:  11  11  11  11  11  11  10  11  32  32  32  32  32  32  32  32
     7:  11  11  11  11  11  11  11  10  32  32  32  32  32  32  32  32
     8:  32  32  32  32  32  32  32  32  10  11  11  11  11  11  11  11
     9:  32  32  32  32  32  32  32  32  11  10  11  11  11  11  11  11
    10:  32  32  32  32  32  32  32  32  11  11  10  11  11  11  11  11
    11:  32  32  32  32  32  32  32  32  11  11  11  10  11  11  11  11
    12:  32  32  32  32  32  32  32  32  11  11  11  11  10  11  11  11
    13:  32  32  32  32  32  32  32  32  11  11  11  11  11  10  11  11
    14:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  10  11
    15:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  10

  From /proc/meminfo
     MemTotal:       2101017816 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

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

  From /etc/*release* /etc/*version*
     os-release:
        NAME="Red Hat Enterprise Linux"
        VERSION="8.3 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.3"
        PLATFORM_ID="platform:el8"
        PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
        ANSI_COLOR="0;31"
     redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
```


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Platform Notes (Continued)

```
    system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

  uname -a:
    Linux rhel-8-3-amd 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020 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: Full AMD retpoline,
                                                        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 Feb 24 20:27

  SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc320-A1
     Filesystem     Type   Size  Used Avail Use% Mounted on
     tmpfs          tmpfs  125G  3.3G  122G   3% /mnt/ramdisk

  From /sys/devices/virtual/dmi/id
      Vendor:         Dell Inc.
      Product:        PowerEdge R6525
      Product Family: PowerEdge
      Serial:         C3JTPX2

  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:
      16x 802C8632802C 72ASS16G72LZ-3G2B3 128 GB 4 rank 3200
      16x Not Specified Not Specified

  BIOS:
     BIOS Vendor:       Dell Inc.
```

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Platform Notes (Continued)

```
    BIOS Version:      2.6.5
    BIOS Date:         12/28/2021
    BIOS Revision:     2.6

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                | 644.nab_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
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AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------

==============================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                | 654.roms_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
```

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Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                | 628.pop2_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

Base Portability Flags

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

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Base Portability Flags (Continued)

644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Base Other Flags

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

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

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

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

Peak Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: -m64 -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: basepeak = yes

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Peak Optimization Flags (Continued)

654.roms_s: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-Mrecursive -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -Hz,1,0x1 -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -Mrecursive
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP -fopenmp=libomp
-lomp -lamdlibm -ljemalloc -lflang

Peak Other Flags

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

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

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-Milan-rev2.4.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-Milan-rev2.4.xml

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Tested with SPEC CPU®2017 v1.1.8 on 2022-02-24 23:52:22-0500.
Report generated on 2022-03-21 16:18:48 by CPU2017 PS formatter v6442.
Originally published on 2022-03-21.