## Dell Inc.

PowerEdge R7615 (AMD EPYC 9374F 32-Core Processor)

### SPEC CPU®2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>SPECscores®2017_fp_base = 242</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECscores®2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

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

### Threads

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECscores®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** AMD EPYC 9374F  
- **Max MHz:** 4300  
- **Nominal:** 3850  
- **Enabled:** 32 cores, 1 chip  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 256 MB I+D on chip per chip, 32 MB shared / 4 cores  
- **Other:** None  
- **Memory:** 768 GB (12 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 0.5.3 released Nov-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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SPECspeed®2017_fp_base = 242  
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>67.7</td>
<td>872</td>
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<td>46.6</td>
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<td>51.2</td>
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<td>619.lbm_s</td>
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<td>621.wrf_s</td>
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<td>60.1</td>
<td>220</td>
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<td>55.3</td>
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<td>56.5</td>
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<td>43.6</td>
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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.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-31"
LD_LIBRARY_PATH =
  "/mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/amd_speed_aocc400_genoa_B_lib/lib;"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "32"

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"
Dell Inc.  

PowerEdge R7615 (AMD EPYC 9374F 32-Core Processor)  

| SPECspeed®2017_fp_base = 242 |
| SPECspeed®2017_fp_peak = Not Run |

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

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

Platform Notes

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

- System Profile: Custom
- C-States: Disabled
- Memory Patrol Scrub: Disabled
- PCI ASPM L1 Link: Power Management
- Power Management: Disabled
- Determinism Slider: Power Determinism
- Algorithm Performance
- Boost Disable (ApbDis): Enabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on amd-sut Thu Nov 17 16:32:22 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 9374F 32-Core Processor
  1 "physical id"s (chips)
  32 "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 : 32
  siblings : 32
  physical 0: cores 0 1 2 3 16 17 18 19 32 33 34 35 48 49 50 51 64 65 66 67 80 81 82 83 96 97 98 99 112 113 114 115

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): 32
  On-line CPU(s) list: 0-31
  Vendor ID: AuthenticAMD
  Model name: AMD EPYC 9374F 32-Core Processor
  CPU family: 25

(Continued on next page)
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**Test Date:** Nov-2022  
**Hardware Availability:** Feb-2023  
**Software Availability:** Nov-2022

### Platform Notes (Continued)

- **Thread(s) per core:** 1  
- **Core(s) per socket:** 32  
- **Socket(s):** 1  
- **Stepping:** 1  
- **Frequency boost:** enabled  
- **CPU max MHz:** 4306.0000  
- **CPU min MHz:** 400.0000  
- **BogoMIPS:** 7701.95

**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 extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb  
- bpext perfctr_l1c mwaitx cpb cat_l13 cdp_l13 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqgbase bml1 avx2 smep bmi2 erns invpcid cqm rdt_a avx512f  
- avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512v1 xsaveopt xsavec xsaves qxgetbv1 xsavees cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local avx512_bf16 clzero irperf xsaveretpr rdpnu wbnoinvd amd_ppin ccpp arat npt lbv svmlock_nrip_sve tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pffreader avic v_vmsave_vmload vgif v_spec_ctrl avx512vbm umip pku  
- ospke avx512_vbm gfini vaes vpcm1ldq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpnu overflow_recover succor smca fsrm flush_l1d

**Virtualization:** AMD-V  
**L1d cache:** 1 MiB (32 instances)  
**L1i cache:** 1 MiB (32 instances)  
**L2 cache:** 32 MiB (32 instances)  
**L3 cache:** 256 MiB (8 instances)

**NUMA node(s):** 8  
**NUMA node0 CPU(s):** 0–3  
**NUMA node1 CPU(s):** 16–19  
**NUMA node2 CPU(s):** 8–11  
**NUMA node3 CPU(s):** 24–27  
**NUMA node4 CPU(s):** 12–15  
**NUMA node5 CPU(s):** 28–31  
**NUMA node6 CPU(s):** 4–7  
**NUMA node7 CPU(s):** 20–23

**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

(Continued on next page)
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Platform Notes (Continued)
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   1M   8 Data  1  64        1     64
L1i  32K   1M   8 Instruction  1  64        1     64
L2    1M   32M   8 Unified  2 2048        1     64
L3   32M  256M  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: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3
    node 0 size: 96313 MB
    node 0 free: 95771 MB
    node 1 cpus: 16 17 18 19
    node 1 size: 96766 MB
    node 1 free: 93538 MB
    node 2 cpus: 8 9 10 11
    node 2 size: 96766 MB
    node 2 free: 93538 MB
    node 3 cpus: 24 25 26 27
    node 3 size: 96766 MB
    node 3 free: 96501 MB
    node 4 cpus: 12 13 14 15
    node 4 size: 96731 MB
    node 4 free: 96037 MB
    node 5 cpus: 28 29 30 31
    node 5 size: 96726 MB
    node 5 free: 96373 MB
    node 6 cpus: 4 5 6 7
    node 6 size: 96766 MB
    node 6 free: 96028 MB
    node 7 cpus: 20 21 22 23
    node 7 size: 96766 MB
    node 7 free: 96315 MB
node distances:
  node 0 1 2 3 4 5 6 7
    0: 10 11 11 11 11 11 11 11
    1: 11 10 11 11 11 11 11 11

(Continued on next page)
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Platform Notes (Continued)

2: 11 11 10 11 11 11 11 11
3: 11 11 11 10 11 11 11 11
4: 11 11 11 11 10 11 11 11
5: 11 11 11 11 11 10 11 11
6: 11 11 11 11 11 10 11 11
7: 11 11 11 11 11 11 11 10

From /proc/meminfo
MemTotal: 792172184 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:

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

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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):  
Mitigation: seccomp, 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 Nov 17 15:30

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b

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 R7615
Product Family: PowerEdge
Serial: RDB5009

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:
12x 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.5.3
BIOS Date: 11/10/2022
BIOS Revision: 0.5

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================

C | 619.lbm_s(base) 638.imagick_s(base) 644.nab_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

(Continued on next page)
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<td>AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)</td>
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<td>Target: x86_64-unknown-linux-gnu</td>
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<td>InstalledDir: /opt/AMD/aoccc/aocc-compiler-rel-4.0-3206-389/bin</td>
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SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

PowerEdge R7615 (AMD EPYC 9374F 32-Core Processor)

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<thead>
<tr>
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<th>Test Date: Nov-2022</th>
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SPECspeed®2017_fp_base = 242
SPECspeed®2017_fp_peak = Not Run

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

Base Optimization Flags

C benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamlmib -lamlalloc
-llflang

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop

(Continued on next page)
Dell Inc.
PowerEdge R7615 (AMD EPYC 9374F 32-Core Processor)

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang

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

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-m64 -Wl,-align-all -nofallthru-blocks=6
-Wl,-m64 -Wl,-reduce-array-computations=3
-Wl,-m64 -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

Base Other Flags

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

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

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

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

**PowerEdge R7615 (AMD EPYC 9374F 32-Core Processor)**

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The flags files that were used to format this result can be browsed at:


You can also download the XML flags sources by saving the following links:


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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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