

LA-UR-23-32457

Approved for public release; distribution is unlimited.

Title: LANL code team outbriefs from the El Cap Hackathon, October 2023

Author(s): Pietarila Graham, Anna Mataleena
Pietarila Graham, Jonathan David
Haack, Jeffrey Robert
Ferenbaugh, Charles Roger
Witek, Michael

Intended for: Report

Issued: 2023-11-01



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Triad National Security, LLC for the National Nuclear Security Administration of U.S. Department of Energy under contract 89233218CNA00001. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

LANL code team outbriefs from the El Cap Hackathon, October 2023

Anna Pietarila Graham, HPC-ENV

Jonathan Pietarila Graham, CCS-7

Jeffrey Haack, CCS-2

Charles Ferenbaugh, CCS-7

Michael Witek, XCP-2

El Cap COE Hackathon: **Ristra**

- Goals:
 - Fix multi-GPU strong scaling for Moya (FleCSI-Legion backend).
- We test compiled with the MI300A flags (gfx940 or gfx942)
 - Not there
- Accomplishments:
 - Reorganized sorting of ghost elements except sides, and faces.
 - Learned to use Nsight.
- Blockers encountered:
 - spack Kokkos build for mi300 failed (needed rocm5.7.2 on tioga).
 - Did you open a JIRA ticket? no
- Lessons Learned:
 - Bring our DevOps person along.

El Cap COE Hackathon: Capsaicin

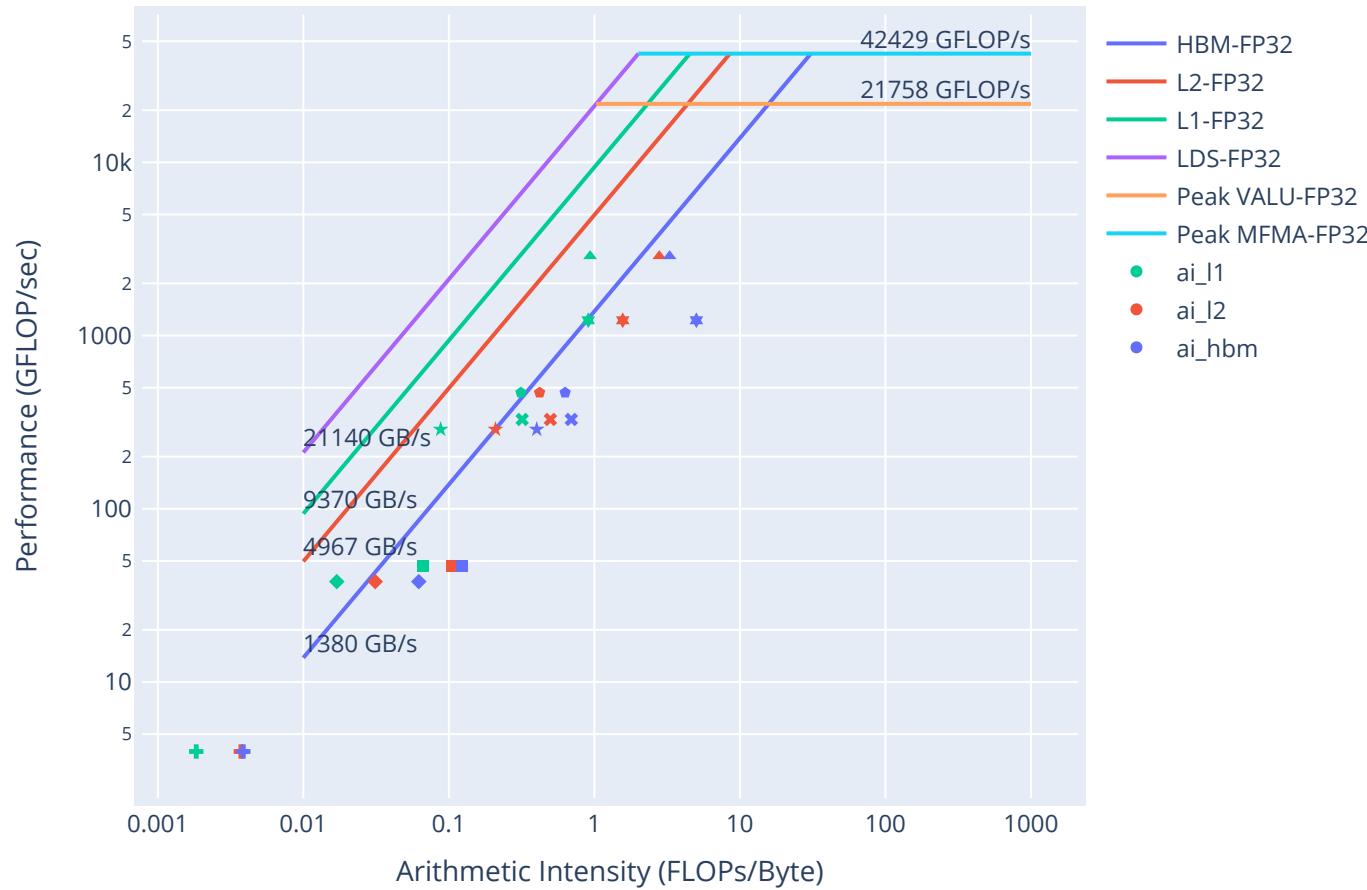
- Goals:
 - See if gfx940 will compile
 - Look into newer rocm improvements (?) on register usage
 - Explore shared memory in kernels
- We test compiled with the MI300A flags (gfx940 or gfx942)
 - We can compile!
 - Had to hack around some env vars in our build system
 - Something in the cce15 magic wrappers (I think) seems to be injecting multiple gfx90 flags
- Accomplishments:
 - Successfully did a mixed build with cce15 and rocm570 w/ amdclang++
 - Started exploring shared mem in a 2D kernel, grab perf numbers this afternoon?
 - Tried to parse occupancy results, looking good
- Blockers encountered:
 - Wifi, potential ihpc downtime.
- Lessons Learned:
- To Be Improved: Anything that could be improved for future hackathon events
 - Can I expense Starlink?
- Wishlist
 - Looking forward to new hardware!

El Cap COE Hackathon: EAP (xRage)

- Goals:
 - Update to more modern RZVernal compilers
 - Test build and run with Kokkos HIP RadDiff implementation
 - Stretch goal: performance evaluation and comparison
- We test compiled with the MI300A flags (gfx940 or gfx942)
 - Success compiling dependencies (Kokkos, hypre) and xrage source code with gfx940 (needed to use custom spackage for kokkos)
- Accomplishments:
 - Compiled with cce@16, rocm@5.5.1
 - Ran xrage + Kokkos + RadDiff – running on AMD GPU
 - Got roofline data
- Blockers encountered:
 - Wi-Fi issues
- Lessons Learned:
 - xrage inputs need careful consideration for “multistage” profiling (most control inputs default for “progressive” runs, not short restarting)
- To Be Improved
 - Badging and login logistics
 - EAP infrastructure (move from “hacked to get working” to robust and comprehensible)
 - Omniperf analyze should “read-only” profile output (hit a bug where profile data got overwritten).
- Wishlist
 - Omniperf should give kernel names as full-verbose or “left-collapsed” (should be “[...]my_kernel_that_adds”, not “hip_parallel_stuff<stuff<stuff<my_k [...]”)

El Cap COE Hackathon: EAP (xRage)

- Got roofline



El Cap COE Hackathon: SAP

- Goals:
 - Build out Spack environment on rzvernal
 - Build Pagosa on rzvernal
- Accomplishments:
 - We were able to build out our Spack environment, but not Pagosa.
- Blockers encountered:
 - Wifi issues
 - Various spack issues
 - Time required to build spack packages
- Lessons Learned:
 - Gained a better understanding of which cce/rocm/llvm versions are compatible with one another.
- To Be Improved: Anything that could be improved for future hackathon events
 - Connection to ihpc-gate/rzvernal was unreliable.
- Wishlist
 - More reliable connection to ihpc-gate/rzvernal