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Major: Computer Engineering
Skills: Kernel Modding, Performance
Benchmarking, Hardware Modding



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Major: Information Technology
Skills: Cybersecurity, IT, Systems
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Richard Li⁸
Major: Computer Science
Skills: Systems Administration, IT,
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Team Highlanders

HPC Highlanders was originally formed by a small group of students at NJIT interested in HPC. From the start, it was our goal to get as many people interested in the subject as possible. NJIT is one of an elite cohort of R1 universities with both an MSI and HSI designation, and so we quickly gathered a plethora of interested students from a wide variety of backgrounds and disciplines. Eventually, we extended our outreach to other local universities so that we could give as many students as possible the opportunity to learn about and engage with the world of HPC.

To that end, we hold regular meetings, lectures, and workshops year-round, collaborate with faculty and engineers in industry, and even have new members assemble their own SBC cluster. Moreover, every student is given an opportunity to not only take part in our workshops and trainings, but to also help create them, ensuring that everyone's feedback, thoughts, and ideas are shared. In just one year, our team has grown to over a hundred students, all with a shared passion for HPC.

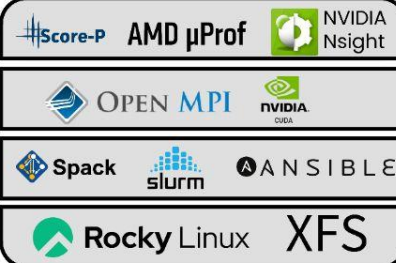
Our core team members are a multidisciplinary mix of students from various backgrounds, universities, and experience levels. Half of our competition team are first-generation immigrants, a third of our team has a background in natural sciences, and we collectively speak over a half dozen languages. Our strength lies in this diversity, as with our team composing a broad spectrum of race, faith, gender, immigration history, interests, majors, and work experience, each member always brings a unique perspective to every challenge.



Preparation

- Practiced on NJIT's Wolver cluster, with a nearly identical hardware configuration to Jetstream2.
- Experimented with different combinations of softwares to build out a stack that worked for the applications, the benchmarks, and us.
- Twice-weekly meetings for team-building and hands-on practice
- Attended workshops and user group meetings run by industry and NJIT's ARCS.
- Our team has taken courses in:
 - Building optimizing compilers
 - GPU Cluster Programming in distributed environments (with MPI)
 - Building, configuring, and maintaining multi-node systems
- Worked on research projects developing software for HPC environments.
- Thus far we have completed the first practice task and are working on the second.

Tech Stack



Optimizations

- High-Performance Linpack
 - Test different BLAS and MPI implementations
 - MPI parameter tuning
- STREAM
 - Being a memory-bandwidth benchmark, we will experiment with different NUMA bindings, Slurm memory mappings, and CPU task distributions
- Exascale Climate Emulator
 - Evaluate performance of vendor and open BLAS implementations
- Structural Simulation Toolkit
 - Test different MPI implementations
 - Tweak input files and MPI parameters to find ideal partitioning