

The Howling Hurricanes

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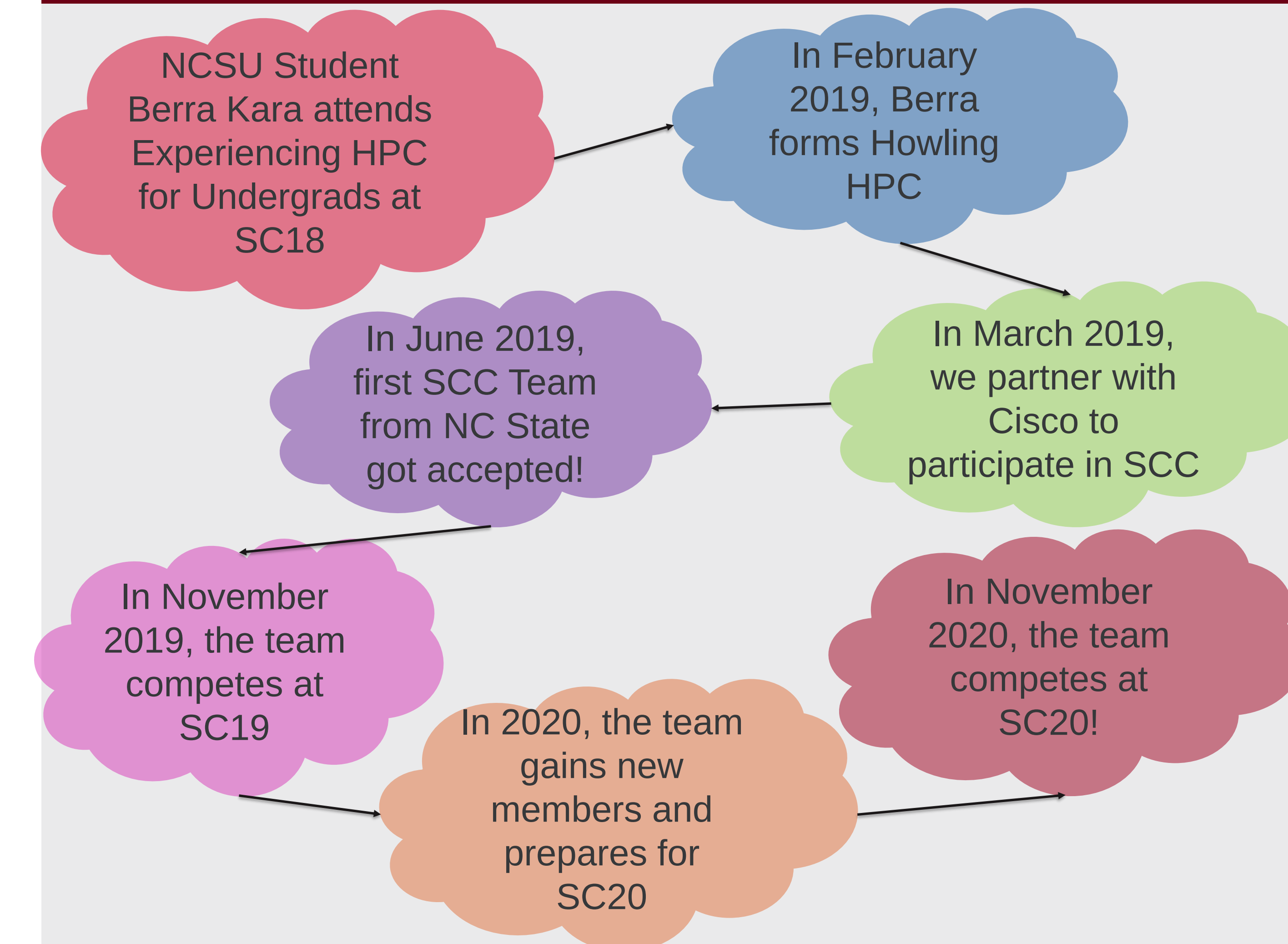


About the Team

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Main: IO500 | Support: Reproducibility Challenge
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Main: CESM | Support: GROMACS

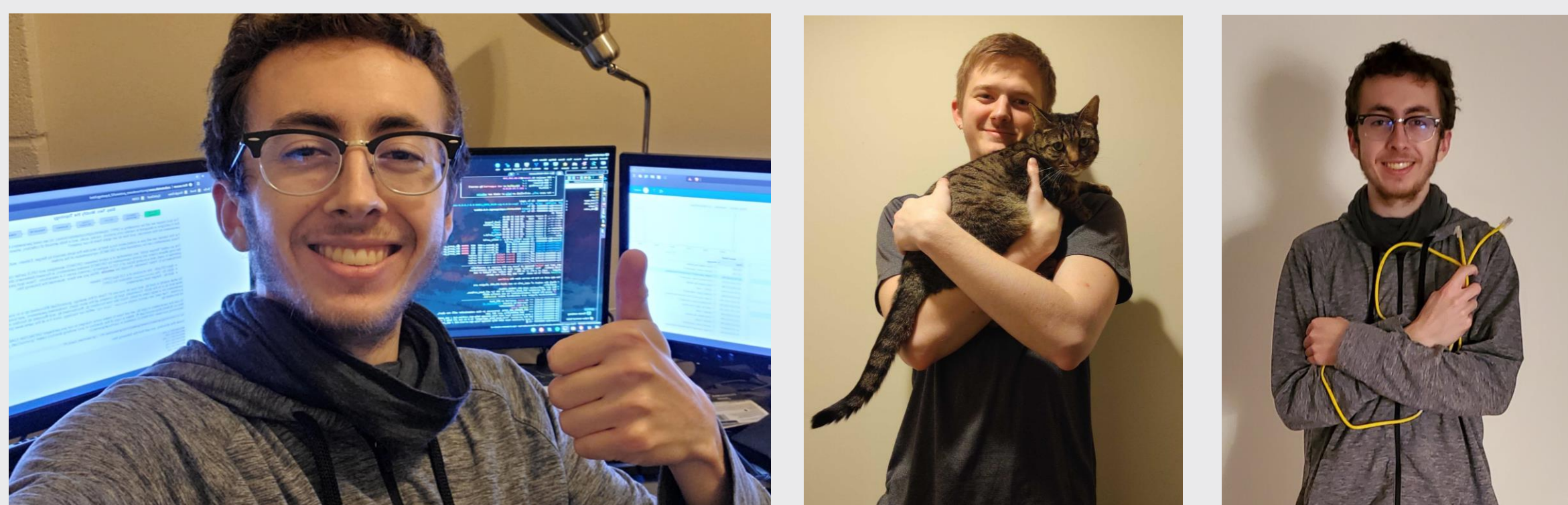


Team Creation Timeline



Introduction

We're the Howling Hurricanes! Our team is composed of six students from two universities (NC State and Iowa State). With a total of 5 different majors between us all, there's plenty of academic diversity to be found. Originally founded in 2019, we've been hard at work preparing for SC's Student Cluster Competition, and we hope to turn the surprise shift to online clusters into an advantage!



Software

We're using CentOS 7 for our cluster because all the software packages we wanted to install were available for it. These packages include OpenMPI, CUDA, and all the applications. It has also been the OS of choice for previous teams, so the team decided that it was good to go with an OS that's tried and true. We'll also be using Slurm as our scheduler which, combined with strategically powering nodes on/off, should keep us within the budget.



Azure Configuration

Our plan is to have 2 Azure clusters with focuses on CPU-heavy workloads and GPU-heavy workloads. This will allow us to easily divide what each team member is doing. Each cluster will use Slurm as it's scheduler due to our familiarity with it, and have a D12_v2 as it's head node. The HPC node setup for each cluster is listed below:

CPU-Heavy

This cluster will be used to run the applications that don't support CUDA but do support MPI, like CESM. It will use 4 HB60rs nodes, since they strike a good balance between performance and cost.

GPU-Heavy

To focus on applications that can take advantage of CUDA, this cluster will use 4 NC24r nodes. These were chosen because of their support for InfiniBand alongside CUDA, which will be helpful for running GROMACS, which utilizes both.

Our strategy during the competition will be to have each team member use 2 nodes for their application, which will allow up to 4 applications to be running simultaneously.

Why We will Win

- Breadth of Knowledge:** Our team consists of students from 5 different majors: Electrical and Computer Engineering, Computer Science Mathematics, and Physics
- Depth of Understanding:** Fascination with HPC led us to explore and develop our own expertise in the process
- Unwavering Support:** NC State ECE Department and our corporate sponsor Cisco provided guidance and assistance
- Diversity is our Strength:** Our members are from different states (and countries!) and the LGBTQ community

Acknowledgments

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 - John Ravi
 - * Cisco
 - Mike Younkers
 - Steven Carter
 - Jeff Squyres



Team Preparation and Strategies

- We had field experts (from both outside in inside our institutions) give us lectures about different software and optimization strategies, particularly when compiling.
- We've had countless meetings over Zoom to discuss and strategize how we'll approach the applications.
- We've been given remote access to on-campus cluster utilities to practice our skills.
- We have attended workshops to learn more about HPC resources
- We are confident in utilizing our diverse backgrounds and experiences to help us in the competition.