



Team Members



Chenxiao Li
Computer Science



Xingxing Hao
Computing Science



Yize Jiang
Computer Science



Jinyuan Mao
Business Analysis



Yixun Hong
Information Security



Hourong Li
English language and literature

Strengths

- Expertise in Linux Cluster Maintenance:** We have extensive hands-on experience in building, configuring, and maintaining large-scale HPC clusters.
- Program and Compilation Optimization Proficiency:** Our members excel at compiler optimization and cross-architecture tuning for both CPU and GPU workloads, leveraging profiling tools and customized scripts for fine-grained performance control.
- System-Level Optimization I Strengths:** Our strength lies in bridging software and hardware perspectives — from kernel-level and filesystem configuration to workload profiling and optimizing — allowing us to design holistic optimization strategies across the entire HPC stack.

Diversity

- Cultural diversity:** With members hailing from various cultural province of China, across thousands of kilometers, we bring a unique blend of ideas to the table. We are here because of our passion for pushing the boundaries of supercomputing.
- Diversity in Expertise and Perspective:** With backgrounds in computer science, mathematics, management, and international studies, our team integrates diverse problem-solving perspective to approach HPC challenges from multiple angles.



Strategies

Resource Management

• System Configuration

We use Ubuntu 24.04 as our base image for its stability and HPC compatibility. Cluster provisioning are automated through Ansible for consistent, rapid deployment.

• Dependency Management

All compilers and libraries are managed via Spack for reproducible builds and flexible versioning.

We are also experimenting with Nix for declarative, next-generation HPC environments.

• Resource Tracking

We monitor node allocation and performance on Exosphere, and custom scripts and probes.

These integrate into our Grafana-based observability system, open-sourced on our GitHub repository.



Benchmark

- Test the network latency between nodes and select appropriate nodes for MPI.
- Tune configurations to achieve maximum performance of hardware units.

ECE

• Visualization

We explored various data visualization tools and libraries to represent complex datasets intuitively.

• Dataset transmission

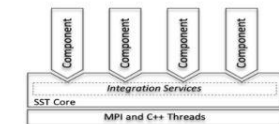
We utilized Globus, a high-performance data transfer platform to efficiently download the dataset needed.

• Familiarize with the workflow

The ECE system has a rather sophisticated workflow, such as SHT and Cholesky decomposition. Our team also practiced the ParSEC Runtime system.

• Instance Selection

After practices on tasks, we tried multiple instances. Eventually we choose m3.xl with 32 CPU cores.



SST

• Components Exploration

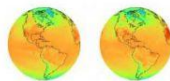
We experimented with components from the SST element libraries.

• Potential for parallelism

We focused on enhancing parallelism during the create phase.

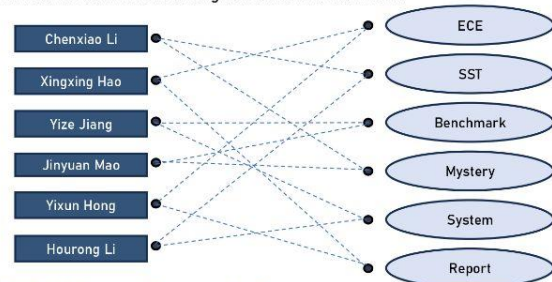
• Partitioner for Load Balancing:

Explore different partitioners for task distribution between components to fully utilize the compute resources.



Team Preparation & Task Assignment

- Cross-task collaboration:** Each task is assigned to multiple members with one lead in charge. And everyone owns a primary role while supporting others to tackle shared challenges.
- Weekly sync meetings:** We regularly review progress, refine application strategies, and coordinate goals toward the final competition.
- Iterative testing and optimization:** Applications are rapidly tested and tuned on both JS2 and our self-built cluster.
- Configuration benchmarking:** Before the competition, we experiment with diverse software and hardware setups to identify the most effective configurations for each workload.
- Continuous learning:** Our team builds on insights from previous competitions and internal seminars to strengthen skills and teamwork.



Why will we win?

- Proven excellence:** Our team has consistently delivered outstanding results in IndySCC and other HPC competitions, building a strong foundation of practical experience and technical mastery.
- Tailored unique optimizing methods** to boost performance and efficiency under competitive settings.
- Diverse skillsets** equipped by each teammate.
- A collaborative environment** ensured balanced and effective optimization to each task.

Driven by skill, powered by experience,
we are united to excel.

