



Team Members



Benxiang Xiao
Junior
Department of Statistics and Data Science
Participant of ASC24
MLSys and Neuroscience



Xinyu Liang
Sophomore
Department of Computer Science and Engineering
Generative AI models and model infrastructure



Wenbo An
Junior
Department of Electronic and Electrical Engineering
Design automation challenges in analog EDA



Yicheng Xiao
Senior
Department of Computer Science and Engineering
Participant of ASC24
Distributed Machine Learning



Hemu Liu
Senior
Department of Computer Science and Engineering
Applying the knowledge of AI in the field of medical imaging



Ziheng Wang
Junior
Department of Computer Science and Engineering
EDA and RL for circuit design

About Us

The **SUSTech Supercomputing Team (SST)** comprises SUSTech undergraduates who are interested in computational science and engineering. We aim to serve the HPC user community at SUSTech and practice our HPC skills.

Though most of the competing members are first-time participants of the IndySCC competition, our team members have interdisciplinary backgrounds and have experienced former participants as coordinators. Our advisor, **Mr. Jiahua Zhao**, majors in Earth and Ocean sciences and is familiar with climate and ocean simulation software.

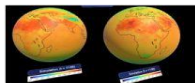
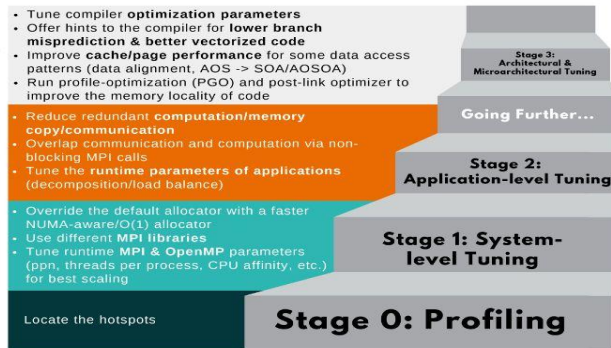
- For **ECE(Exascale Climate Emulator)**, **Benxiang Xiao** and **Xinyu Liang** are both familiar with simulations.
- For **SST(Structural Simulation Toolkit)**, **Yicheng Xiao** and **Wenbo An** have relevant research background.
- For **HPL**, **Hemu Liu** and **Ziheng Wang** have experience in the performance tuning of distributed systems.
- For **Mysterious Application**, all the team members are prepared to cope with the problems.

SST is committed to inclusivity and dedicated to ensuring equal participation for students of all genders and ethnic backgrounds in the exploration and application of HPC technologies. Our team actively promotes diversity by recruiting members from different departments such as Computer Science, Data Science, and Electrical Engineering. This interdisciplinary approach allows us to tackle challenges from multiple perspectives and devise comprehensive methods in the field of supercomputing.



Team Photo
Yicheng Xiao, Benxiang Xiao, Hemu Liu, Xinyu Liang, Wenbo An, Ziheng Wang

Optimization Strategy



ECE

- Detrending the ESM Model: reveal the underlying short-term anomalies
- Warmup: ensures faster and more stable convergence to an accurate solution.
- Ensuring Accuracy: Quantifying the precision of the detrending operation.
- Efficient Data Processing: parallelized workflows to manage thousands of files.



- Structural Simulation Toolkit (SST)** has its natural architecture to be parallelized across ranks
- Try Different **Parallelization Recipes**: Profiling different parallelized scheme
- Analyze Communication Performance and **Topology**
- Bind different computational modules to different cores based on the data transfer efficiency between the cores

- Tune the **input parameters**, such as the problem size, in order to maximize performance based on the hardware configuration.
- Optimize compilation flags** based on CPU computing nodes' architecture and instruction set.
- Parallelization** of HPL benchmark testing.



- Deploy the application with different compilers and libraries using Spack
- Reserve resources for the mystery application according to the time budget/possible power limitation
- Analyze the scalability and computation/communication-intensity

Software Configuration

Package Manager Docker Job Scheduler	Modules & Conda & Mambaforge & Spack Singularity Slurm
Compiler	- GNU C/C++/Fortran Compiler - AOC Compiler - Latest release of clang & polly & bolt - Some open source LLVM-based compilers for vectorization presented in recent
Profiler	- Vtune - Likwid - SST_ELL_REGISTER_PROFILETOOL
MPI BLAS Library Power Management	openmpi openBLAS AOCL
Visualization tool	ParaView Panoply



Team Preparation

- The Center for Computational Science and Engineering at SUSTech provides team members access to the clusters, enabling us to engage in coding practice, benchmarks/applications testing, and software configuration testing.
- We recognize the significance of **effective communication and collaboration**, therefore we have meetings every week to discuss about the applications and keep track of everyone's progress. During the meeting, our advisors and coordinators will give us instructions and suggestions on how to further optimize the applications.
- We're here to grow as a team. Late-night debugging sessions, heated debates over optimization strategies, and the shared grin when a tweak finally works—these are the moments that turn teammates into collaborators. We'll learn to listen, adapt, and lean on each other's strengths, because no breakthrough happens in isolation.



Qiming Cluster