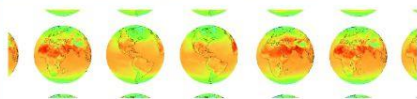




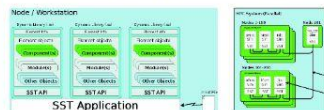
(1) ECE (Exascale Climate Emulator)



An ML-based climate modeling application designed to reproduce high-resolution climate simulation outputs.

- Built with PyTorch; optimized for GPU training
- Focus on CUDA optimization and mixed-precision computations
- Test containerized and native builds, as well as benchmark with varying batch sizes and thread counts

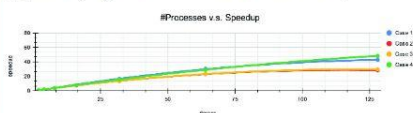
(2) SST (Structure Simulator Toolkit)



A simulation framework for atomic-scale and structural material modeling across multiple domains.

- Utilizes MPI and OpenMP for hybrid parallelism
- CPU-intensive & high memory bandwidth requirements
- Optimize MPI rank and thread configuration
- Focus on implementing performance counters to monitor memory and communication overhead

(3) HPL (High Performance LINPACK)



A dense matrix computation benchmark solving linear equations to evaluate peak floating-point performance.

- Tests FP64 performance using CPU/GPU resources
- Tunable parameters (N,NB,P,Q) to maximize utilization
- Built with optimized BLAS/LAPACK
- Profile data movement and parallel efficiency, and evaluate CPU-only and CUDA-enabled variants



About INpack

The INPack team proudly represents a continued collaboration between Purdue University and Indiana University for the IndySCC25 Student Cluster Competition. This year marks the team's third joint effort, building on a strong tradition of partnership and the joint revolutionizing of HPC.

The team unites students with expertise in cloud engineering, networking, automation, and server management, with one returning member from SCC23.

Diversity & Inclusion

Diversity is a core strength in INpack, enriching collective skill sets that foster creativity, critical thinking, and problem solving capabilities. Our cross-institutional team brings together students from various educational disciplines and cultural backgrounds. Representing four countries — the United States, the Philippines, Indonesia, and India — our team embodies global collaboration and inclusivity. With this, INpack continues to grow both competitively and communally where equity, mutual respect, and diverse voices are celebrated.

Team Strategy & Preparation

- **Self-paced learning resources** from Purdue RCAC and IU IT Training helps our team familiarize itself with Unix, HPC clusters, and parallel programming, encouraging agile self-guided learning
- **Weekly virtual meetings** help our team coordinate, overcoming the physical distance between campuses
- **In-person meetups** facilitate constructive education and deeper team bonding

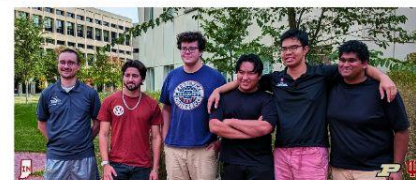


- **Preparatory benchmark running** for deciding on software and toolkits (e.g., XFS versus CephFS on FIO benchmark) to ensure optimized architecture
- **Organized communication channels** with weekly documentation reports for team-wide transparency

Our Software & Toolkits

OS Image	Rocky Linux 9
Compilers	GCC, Intel oneAPI, NVIDIA HPC SDK
MPI	OpenMPI, Intel oneAPI MPI
File Storage	CephFS (via OpenStack Manila FSaaS), XFS (via NFS)
Other Tools	Terraform, Ansible, Openstack CLI

Why We Will Win



We're not just competing — we're bringing the power of real-world HPC experience to the IndySCC25 arena. Our team has trained on some of the fastest academic clusters with mastery of both benchmark optimization and production-scale workloads. With members from various industry-level environments, we know how to achieve maximum reproducible performance. Guided by seasoned mentors from past competing teams, we're here to deliver results — and to win.



Members



David Piedra

- Year: Senior
- Major: Cybersecurity & Networking
- Experience: Amazon, Cloud, Networking, Automation, Linux



Dominic Yoder

- Year: Senior
- Major: Information Technology
- Experience: Purdue RCAC, Computers, Server Hardware, Troubleshooting



Gautam Hari

- Year: Senior
- Major: Computer Science
- Experience: IndySCC '23, ORNL, CrowdStrike, C++, VTK-m



Sky Angeles

- Year: Sophomore
- Major: Computer Science
- Experience: Argonne, LAIR, PyTorch, LLMs, IaC Automation



Ryan Jacobson

- Year: Senior
- Major: Computer Science
- Experience: Python, Software Engineering, Linux, Data Analytics



Tri Nguyen

- Year: Senior
- Major: Computer Science
- Experience: NSF, NCAR, DwyerOmega, AI/ML, RAG models, MLOps

Team Advisors



Dr. Erik Gough
Senior Research Scientist at Purdue RCAC



Dr. Charles Christoffer
Senior Computational Scientist at Purdue RCAC



Dr. Shawn Slavin
Cyberinfrastructure Engagement Specialist (Primary Advisor)



Dr. Winona Snapp-Childs
Director of Research Partnerships at UITS



Dr. Martin Swamy
Professor at the Indiana University Luddy SICE