

# SCC24 Informational Webinar



# Agenda

## Today:

- What is the Student Cluster Competition (SCC), IndySCC
- What's new this year
- How do you prepare, write a team application
- Q&A at the end

We're recording this session, the recording and these slides will be posted on the SCC page



# SCC24 Committee Members

- SCC Chair: Dan Dietz, ORNL
- SCC Vice Chair: Darshan Sarojini, UCSD
- IndySCC Chair: Layla Freeborn, University of Colorado Boulder
- SCC Infrastructure Chair: Andy Sydelko, Purdue University
- App Experts: Josh Vermaas, MSU; Andrew Pang, Georgia Tech  
Anna Fuchs, Jannek Squar, Universität Hamburg
- Benchmarking Experts: Amiya K. Maji, Ryan DeRue, Purdue University
- Chair Emeritus: Jenett Tillotson, NCAR
- A whole bunch of other awesome people!



# What is the Student Cluster Competition

HPC is one of the **best tools in existence** for science and engineering

The SCC fosters skill development and social connections to bring new people into HPC



Screenshots from <https://www.advancedclustering.com/hpc-provides-economic-return-investment-study-finds/>,  
<https://www.nextgov.com/emerging-tech/2020/12/how-supercomputing-and-advanced-x-rays-helped-government-fight-covid-19/171070/>,  
<https://www.hpcwire.com/2015/11/18/hpc-roi-invest-a-dollar-to-make-500-plus-reports-idc/> and  
<https://www.hpcwire.com/2021/04/22/microsoft-to-provide-worlds-most-powerful-weather-climate-supercomputer-for-uks-met-office/>



# What is the Student Cluster Competition

A 48-hour, non-stop contest to build and run a (small) supercomputer

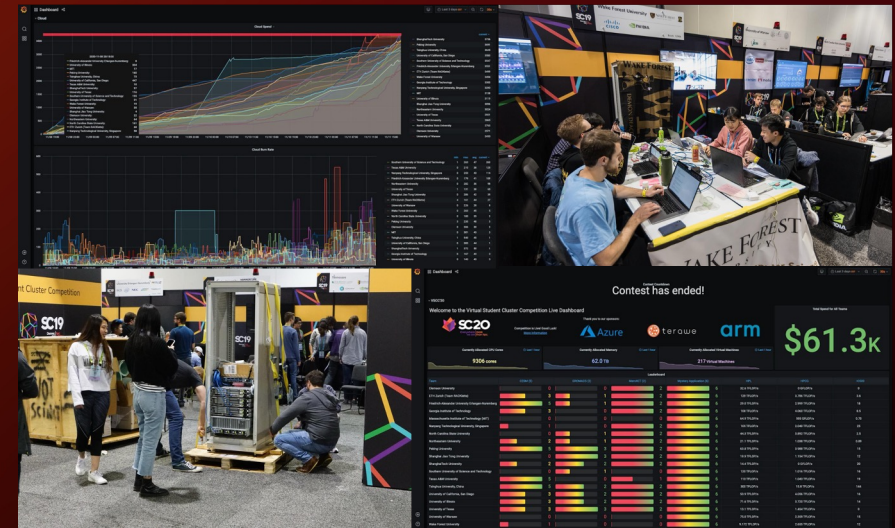
Teams of 6 undergraduate<sup>1</sup> students:

- Design and build a HPC Cluster
- Measure and tune its performance
- Run real science workloads on your cluster
- Handle real-world events like power outages
- Report on your results

All within a power budget

1. Student Team Members must:

- Be enrolled in a university or high school
- Be at least 18 years old by the beginning of the SCC
- Not have received a bachelor's degree or equivalent before the beginning of the competition



# IndySCC

- A cloud-based competition held simultaneously with SCC (new this year!)
- More educationally focused, lower bar for entry
- Many of the same goals as the SCC
- Will use Jetstream2, an ACCESS resource hosted at Indiana University
- Combination of teams not selected for the SCC, teams only interested in IndySCC (more later)
- Opportunities for teams to attend in person (more later)



# SCC Schedule (week of SC)

- Friday/ Saturday
  - Teams arrive
- Saturday
  - Afternoon: Safety briefings and Students@SC Orientation
  - After the briefings: building begins!
- Monday morning:
  - **Benchmarking** begins!
  - At the end of benchmarking, **final configuration is locked** in - no more hardware changes
- Monday evening:
  - **Mystery app, datasets announced**
  - **Main contest starts**
- Monday -> Wednesday
  - Teams run applications, gather results, interact with conference goers, other events
- Wednesday evening:
  - **Competition ends!**
- Thursday
  - **Results announced at Awards Ceremony!**



# IndySCC schedule

- **End of August/beginning of September** - IndySCC Orientation, IndySCC teams get access to hardware
- **September 9 – October 22**- Application 1 webinar + homework
- **September 23 – October 6** - Application 2 webinar + homework
- **Week of October 7** - Benchmarking application webinar
- **October 18 – November 8** - “Hero” runs (24 hours per team)
- **November 9-14** - infrastructure “reset”
- **November 18-20**: Final 48-hour competition, takes place at the same time as the SCC





# What's it like?



# Competition components

- Benchmarks - get the highest score on the selected set of HPL, MLPerf Inference, and a mystery benchmark (SCC only)
  - No IO500, HPCG, optional benchmark this year
- Applications - complete tasks and report results and performance
- Reproducibility challenge: reproduce the results of an SC23 paper, and write your findings in a journal-quality report
- Mystery Application
- Team Poster
- Lightning talk - TBD
- Competition Rules: <https://sc24.supercomputing.org/students/student-cluster-competition/>



# The Benchmarks

- HPL – High Performance Linpack
  - Dense linear system solver
  - <http://top500.org/project/linpack>
- MLPerf Inference
  - <https://mlcommons.org/>
- Mystery Benchmark! (SCC only)



# The Applications

- NAMD

- NAMD is a parallel molecular dynamics code designed for high-performance simulation of large biomolecular systems
- <http://www.ks.uiuc.edu/Research/namd/>

- ICON

- ICON is a flexible, scalable, high-performance modelling framework for weather, climate and environmental prediction that provides actionable information for society and advances our understanding of the Earth's climate system.
- Focus on I/O tuning
- <https://icon-model.org/>
- Reproducibility Challenge announced later in the year
- Mystery Application announced at the start of the competition



# What's new this year? New SCC rules

- New Power Rules
  - The power cap has been raised to 4500W
  - There is a 2000W power cap per node
  - New PDUs that can do per-node metering
  - No extra budget for networking
- Teams are required to bring at least three compute nodes
  - Teams wanting to bring something that does fit into this cluster model, reach out to [student-cluster-competition@info.supercomputing.org](mailto:student-cluster-competition@info.supercomputing.org)
- New file servers that will allow 1/10/25 gig uplink (to the server)
  - SCC working to acquire optics
  - Teams required to bring 1 gig connectivity plan, 10/25 optional
  - Servers have 4 TB drives, larger datasets
- Noise limit - 85 dBA, measured at the team booth table and neighboring team booth tables
- Booths are 5 feet deeper



# What's new this year?

- Mystery benchmark (SCC only)
- Simplifying the competition events
  - No planned power outage
  - No poster session
    - Teams will still need to send in a team poster about a month before the conference
  - No cloud component
- Wanting team members to attend the conference
  - Scavenger hunt
  - Events TBD



# What's new this year for the IndySCC?

- Travel opportunities for IndySCC teams
- This is a work in progress
  - Space in SCC booth to huddle and compete for a limited number of teams
  - Limited number of fully funded opportunities - travel, hotel, registration
    - Focus on teams from HSIs, HBCUs, other MSIs or similar institutions outside the US, teams historically underrepresented in the SCC
  - Remaining space in SCC booth for limited number of self-funded teams
    - Select option, detail in “Strength of Vendor/Institution” section
  - Decisions on these teams may come after notification deadline



# How Do You Prepare for the SCC?

- Preparation before the event:
  - Teams form partnerships with institutions and vendors
  - Design a cluster, practice building and running the applications
  - Plan logistics of getting to the competition
  - SCC provides for the 6 team members and 1 advisor:
    - Conference registrations
    - Single Occupancy Hotel Rooms
      - Conference provided hotel rooms cannot be shared with other attendees
  - We encourage institution and vendor partners to cover other expenses
    - Travel, shipping





# Tips for the application

- Be sure to address all of the questions!
- SCC or IndySCC -
  - Can select SCC, IndySCC, or both
- Strength of Team
  - How will you work together as a team to win?
- Strength of Diversity
  - Not academic diversity, but diversity in areas such as underrepresented groups in your home region and institution
  - What does diversity mean to you?
  - Efforts taken to recruit diverse team



# Tips for the application

- Strength of Hardware and Software (SCC only)
  - Detail your hardware and software
  - Go beyond technical specs and let us know how the specs will allow you to win
  - Why did you make the choices you did?
- Strength of Vendor/Institution Relationship
  - Describe support you are receiving
- Team Preparation
  - What is your plan to prepare?
  - Don't list course catalog
- Team Education Goals
  - Be as specific as possible!



# More Information

- SC24 SCC Website & Rules
  - <https://sc24.supercomputing.org/students/student-cluster-competition/>
  - <https://sc24.supercomputing.org/students/indyscc/>
- Cluster Competition Website
  - <https://studentclustercompetition.us/>
- MAR 1, 2024
- Applications Open
  
- MAY 15, 2024
- Applications Close
  
- JUN 15, 2024
- Notifications Sent



# Questions?

- Email Us
  - [student-cluster-competition@info.supercomputing.org](mailto:student-cluster-competition@info.supercomputing.org)

