



The SC20 Student Cluster Competition, and How to Join it

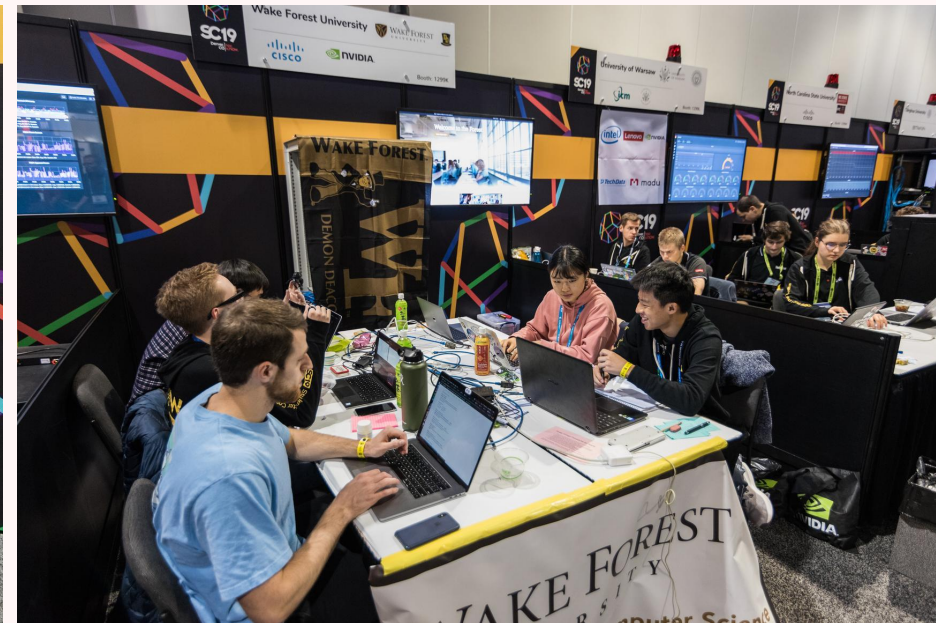
November 15th-20th • Atlanta, GA

Housekeeping

- Q&A session at end - please use the link above slides to ask questions
- We're recording this session, the recording and these slides will be posted on the webinars page
- The zoom password is "cluster"

The SC20 Student Cluster Competition

"SC" is The International Conference for High Performance Computing, Networking, Storage, and Analysis.

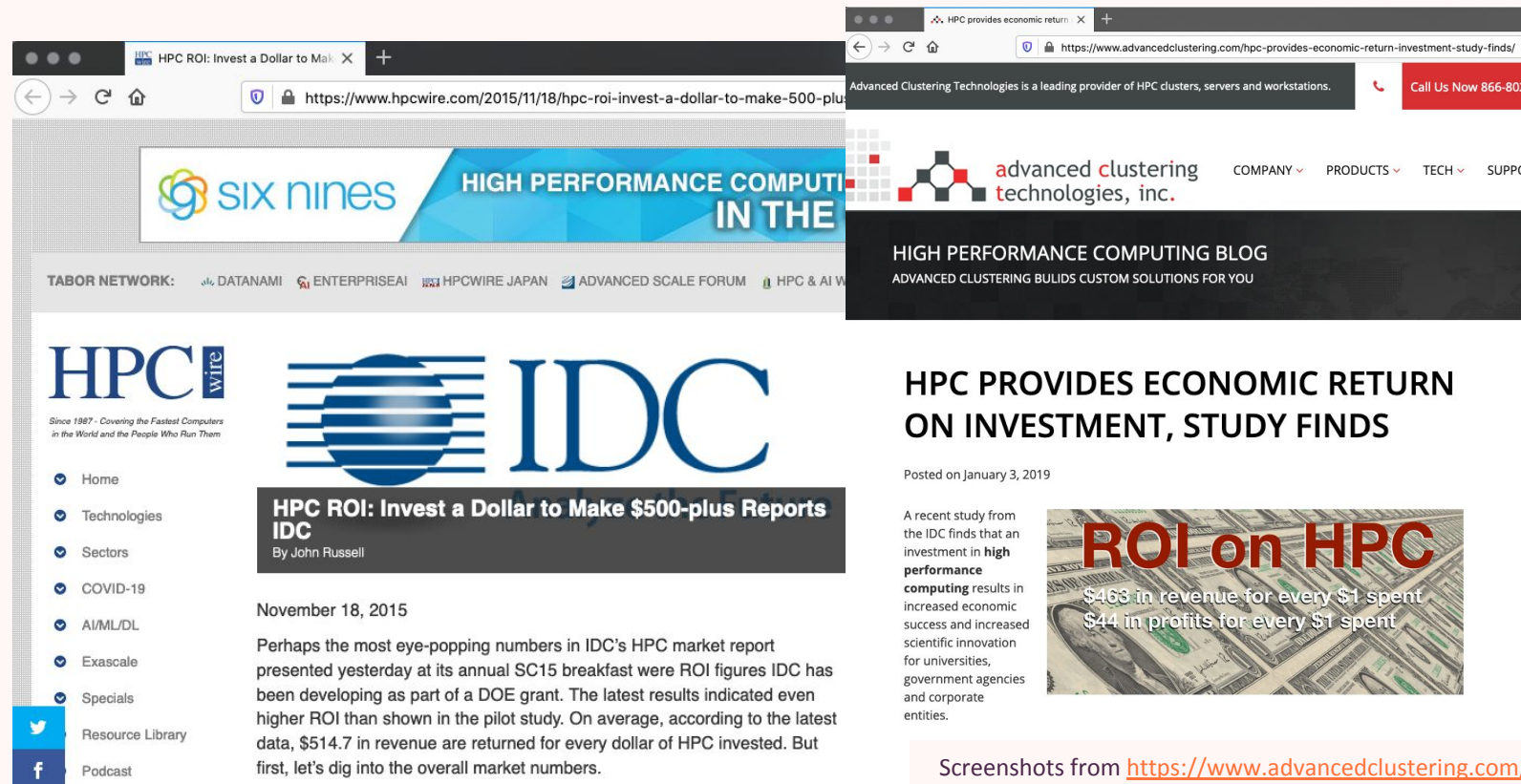


November 15–20, 2020
Georgia World Congress Center - Atlanta, GA
#MoreThanHPC

What is a Student Cluster Competition?

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

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



HPC ROI: Invest a Dollar to Make \$500-plus Reports IDC
By John Russell
November 18, 2015

Perhaps the most eye-popping numbers in IDC's HPC market report presented yesterday at its annual SC15 breakfast were ROI figures IDC has been developing as part of a DOE grant. The latest results indicated even higher ROI than shown in the pilot study. On average, according to the latest data, \$514.7 in revenue are returned for every dollar of HPC invested. But first, let's dig into the overall market numbers.

HPC PROVIDES ECONOMIC RETURN ON INVESTMENT, STUDY FINDS
Posted on January 3, 2019

A recent study from the IDC finds that an investment in **high performance computing** results in increased economic success and increased scientific innovation for universities, government agencies and corporate entities.

ROI on HPC
\$463 in revenue for every \$1 spent
\$44 in profits for every \$1 spent

Screenshots from <https://www.advancedclustering.com/hpc-provides-economic-return-investment-study-finds/> and <https://www.hpcwire.com/2015/11/18/hpc-roi-invest-a-dollar-to-make-500-plus-reports-idc/>

Ok, but What is a Student Cluster Competition?

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

Teams of 6 undergraduate^{1,2} students:

- Design and build a HPC Cluster
- Measure and tune its performance
- Run real science workloads on your cluster and the cloud
- Recover from a disaster scenario
- Report on your results

All within a power budget

1. Team members must be enrolled at an educational institution, but not have been granted an undergraduate degree, at Nov 16, 2020.
2. Team members must be at least 18 years old by the start of the competition.

What's the process?

Preparation before the event:

- Teams form partnerships with institutions and vendors
- Design a cluster, practice building and running the applications
- Webinars to help you prepare
- Logistics of getting to the competition
 - SCC provides conference registration and lodging for 6 team members plus 1 advisor
 - We encourage institution and vendor partners to budget for other expenses
 - Some details shortly
- Build and install your cluster, make posters, start on reports

What's the process?

At SC (dedicated webinar to come):

- Teams arrive Friday/Saturday, safety briefing etc on Saturday
- Saturday PM -> Monday AM: Build and test the cluster, social events
- Monday AM: Benchmarking begins! No more advisor help :)
- Monday PM: Competition kickoff!
- 48 non-stop hours of competition including:
 - Running applications
 - Writing reports
 - Daily standups
 - Presenting posters and lightning talks
 - Disaster recovery (power outage)
 - Scoring interviews
 - Conference events
- Wednesday PM: Competition ends! Party night :)
- Thursday: Awards, wrap-up, cluster teardown

Some words from teams GeekPie HPC (ShanghaiTech University) and Wolfpack HPC (North Carolina State University) about the SC19 Student Cluster Competition



Members of team RACKlette from ETH Zürich are here with us today

- What was your most memorable moment in the SC19 competition?
- How much HPC experience did you / your team have before signing up last year?
- How has the competition impacted your career path?
- What advice would you give to someone thinking about joining the SCC?



Introducing the Committee



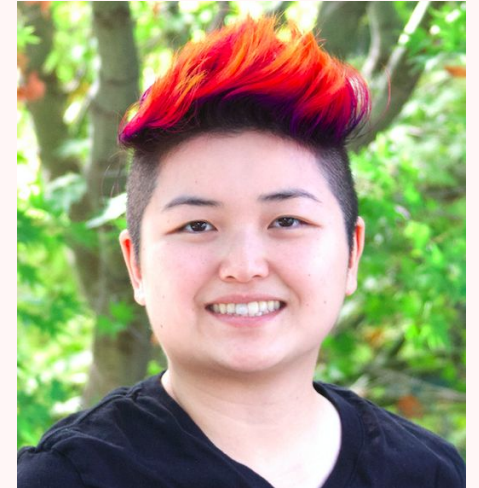
Verónica - co-chair



Scott - co-chair



Jason - vice-chair



Kathleen - deputy chair

Introducing the Committee



Rigo -
infrastructure



Paul -
infrastructure



Stephen -
reproducibility



Rebecca -
student
activities, posters



Andy - cloud



John



Jenna



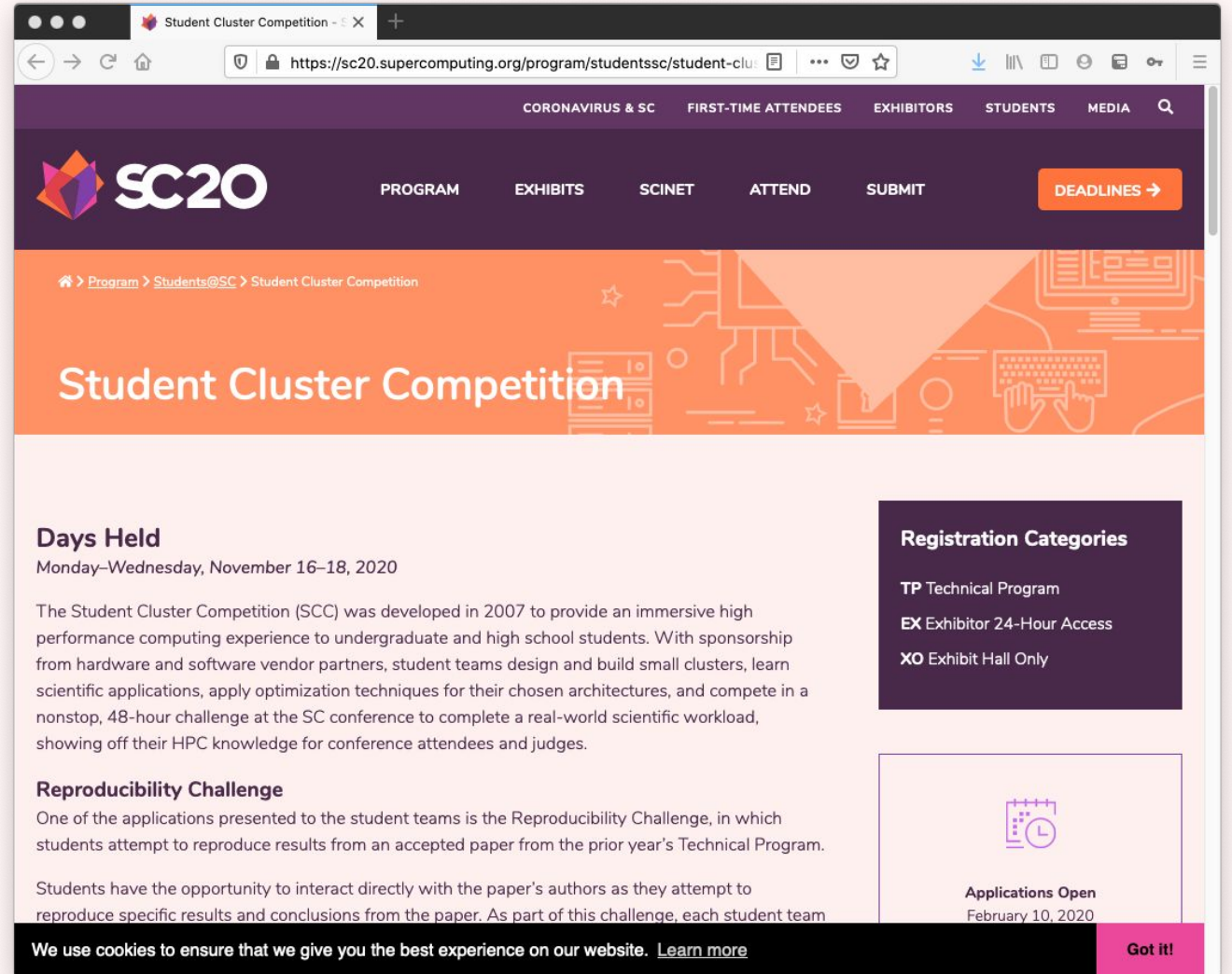
Steve - webinars

- Abinhav - applications
- Stephen - infrastructure
- Ramin
- Angel
- Sam
- Brian
- Carlos
- Esteban

How to apply

1. Bookmark this page:

<https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/>



The screenshot shows the SC20 Student Cluster Competition page. The browser address bar displays the URL: <https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/>. The page features a dark purple header with the SC20 logo and navigation links: CORONAVIRUS & SC, FIRST-TIME ATTENDEES, EXHIBITORS, STUDENTS, MEDIA, PROGRAM, EXHIBITS, SCINET, ATTEND, SUBMIT, and a DEADLINES button. Below the header is a large orange banner with the text "Student Cluster Competition" and a background illustration of circuitry and a hand pointing at a screen. The main content area is white and contains the following sections:

- Days Held**
Monday–Wednesday, November 16–18, 2020
- Registration Categories**
 - TP Technical Program
 - EX Exhibitor 24-Hour Access
 - XO Exhibit Hall Only
- Reproducibility Challenge**

One of the applications presented to the student teams is the Reproducibility Challenge, in which students attempt to reproduce results from an accepted paper from the prior year's Technical Program.

Students have the opportunity to interact directly with the paper's authors as they attempt to reproduce specific results and conclusions from the paper. As part of this challenge, each student team

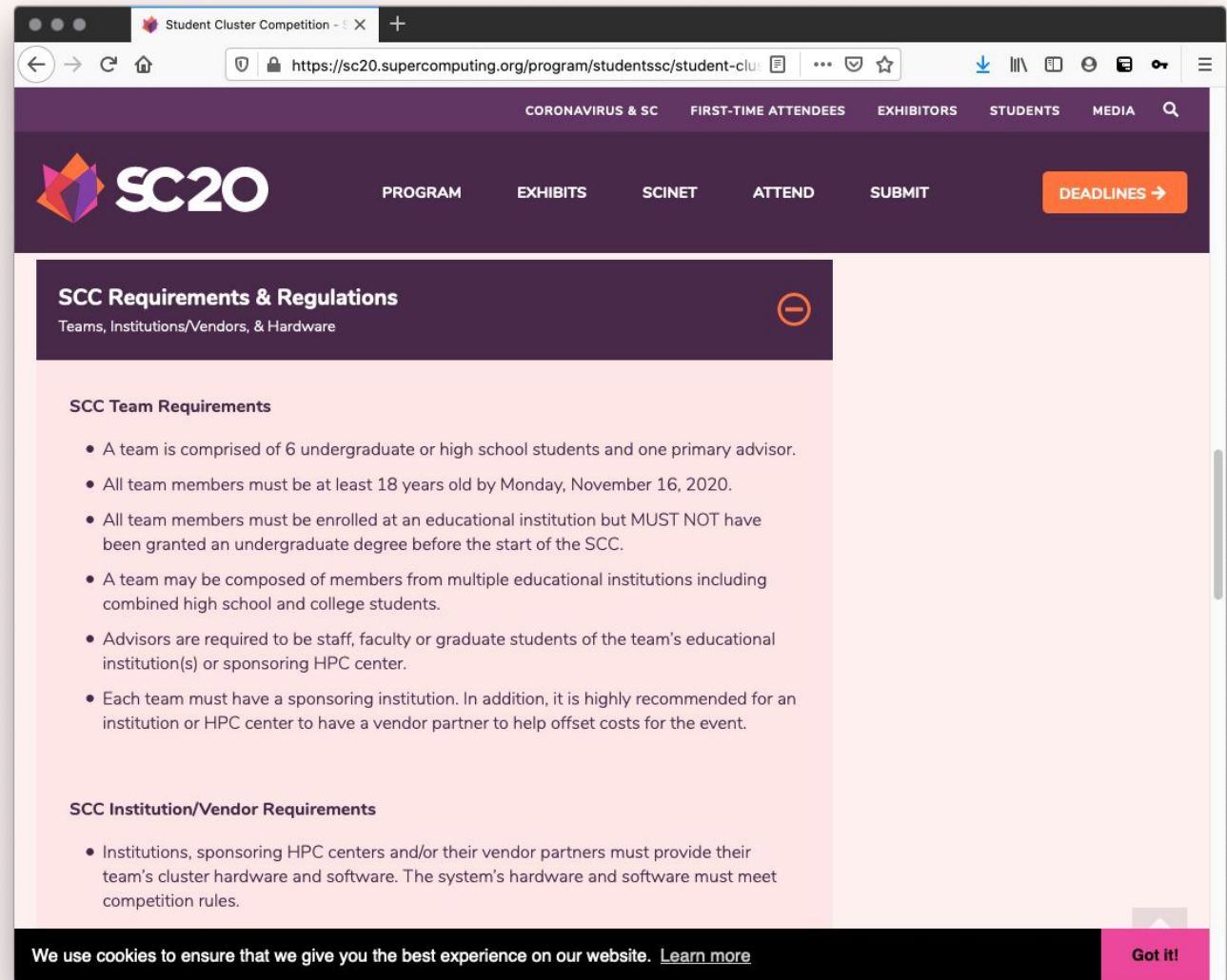
A footer bar at the bottom contains the text: "We use cookies to ensure that we give you the best experience on our website. [Learn more](#)" and a "Got it!" button.

How to apply

2. Read the regulations

Key points:

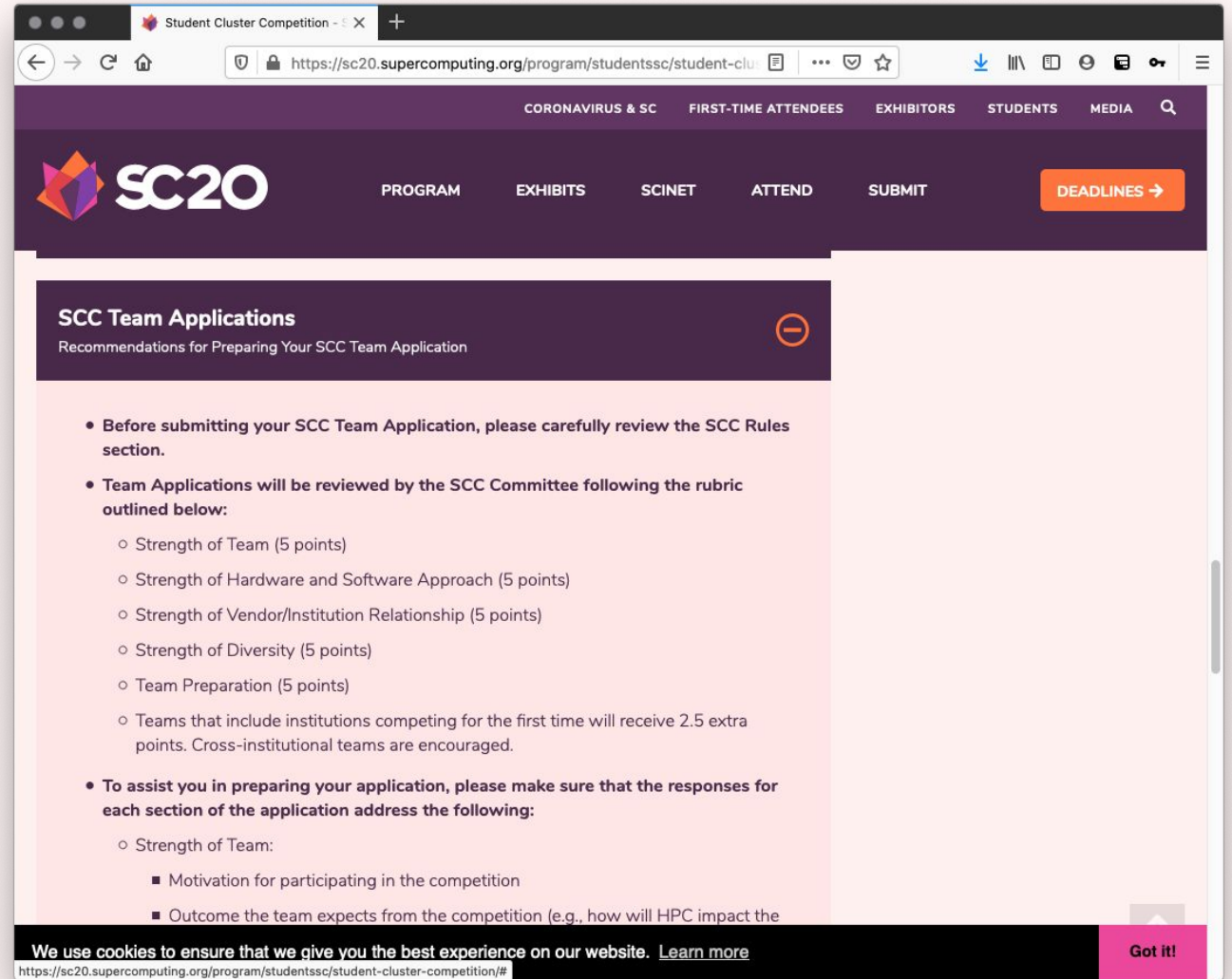
- 6 undergrads + 1 advisor
- Age 18+ at time of event
- Sponsoring institution and/or vendor supplies the hardware and software
 - (can be a loan)
- Also shipping costs, team transportation, etc
- Hardware must be commercially available at time of event
- No NDAs



How to apply

3. Checkout these tips

.. we'll walk through them in a moment



The screenshot shows a web browser displaying the SC20 Student Cluster Competition website. The URL in the address bar is <https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/#>. The website has a dark purple header with the SC20 logo and navigation links: CORONAVIRUS & SC, FIRST-TIME ATTENDEES, EXHIBITORS, STUDENTS, MEDIA, PROGRAM, EXHIBITS, SCINET, ATTEND, SUBMIT, and a DEADLINES button. The main content area is titled "SCC Team Applications" with a subheading "Recommendations for Preparing Your SCC Team Application". It contains a list of tips for applicants:

- Before submitting your SCC Team Application, please carefully review the SCC Rules section.
- Team Applications will be reviewed by the SCC Committee following the rubric outlined below:
 - Strength of Team (5 points)
 - Strength of Hardware and Software Approach (5 points)
 - Strength of Vendor/Institution Relationship (5 points)
 - Strength of Diversity (5 points)
 - Team Preparation (5 points)
 - Teams that include institutions competing for the first time will receive 2.5 extra points. Cross-institutional teams are encouraged.
- To assist you in preparing your application, please make sure that the responses for each section of the application address the following:
 - Strength of Team:
 - Motivation for participating in the competition
 - Outcome the team expects from the competition (e.g., how will HPC impact the

At the bottom of the page, there is a cookie notice: "We use cookies to ensure that we give you the best experience on our website. [Learn more](#)" and a "Got it!" button.

4. Submit via this link

(or this one)

One of the applications presented to the student teams is the Reproducibility Challenge, in which students attempt to reproduce results from an accepted paper from the prior year's Technical Program.

Students have the opportunity to interact directly with the paper's authors as they attempt to reproduce specific methods and conclusions from the paper. As part of this challenge, each student team writes a reproducibility report describing their experience in reproducing the results from the paper. Authors of the most highly rated reproducibility reports are invited to submit their reports to a reproducibility special issue.

Teams & Process

Teams are composed of six students, an advisor, and vendor partners. The advisor provides general guidance and recommendations; the vendor provides the resources (hardware and software); and the students provide the skill and enthusiasm. Students work with their advisors to create a proposal that describes the team's

Preparing your application

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SCC Team Applications

Recommendations for Preparing Your SCC Team Application



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We get many great proposals each year, but we have limited booth space

Knowing what we're looking for can help you to write a winning Team Application

Tip: First-time teams get a bonus!

Preparing your application

[PROGRAM](#)[EXHIBITS](#)[SCINET](#)[ATTEN](#)

○ Strength of Team:

- Motivation for participating in the competition
- Outcome the team expects from the competition (e.g., how will HPC impact the team's academic careers?)

○ Strength of Hardware and Software Approach:

- Describe the hardware and software architecture in detail.
- Explain why the software and hardware architecture will be successful.
- Describe the strategy for running applications and/or optimization during the competition.
- Explain why the architecture is well suited for the competition applications.
- Describe how the team will manage the system's administration and application workflow.

Strength of team

- We're looking for teams who will develop into great HPC professionals
- You don't need to be experts already
- Curious, collaborative, motivated

Hardware and Software

- Why are you choosing this hardware/software?
- Do some research on the applications to get a sense of what each one needs
- What tools will you learn to use? (Tip: ask your vendor partner!)

Preparing your application

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○ Strength of Vendor/Institution Relationship:

- Will the vendor and/or institution provide hardware and fund equipment shipping costs as well as funds for other travel and travel-related expenses that are not covered by the competition?
- What other support will the team receive from vendors and/or the institution?
If reviewers have questions about the architecture, who can answer those questions from the vendor and team?
- If the team is planning to use a new architecture that is not generally available, what is the backup plan if the new architecture is not released or available by the start of the competition?

○ Strength of Diversity:

- Does the team include meaningful contributions by groups that are traditionally underrepresented in the country of the sponsoring institution?
- What efforts made during the team selection process to approach under represented communities?


Vendor/Institution

- We want to know that you'll have sufficient support!
- And that your hardware will be available by the time of the competition
 - If you are using new/upcoming hardware, **have a plan B**

Diversity

- Many HPC professionals look and sound a lot like me
 - And we can contribute a lot .. **BUT:**
- We need more voices informed by different cultural, language, gender, career, etc backgrounds
 - So tell us what your team brings!

Preparing your application

 SC20
PROGRAM EXHIBITS SCINET ATTEN

○ Team Preparation:

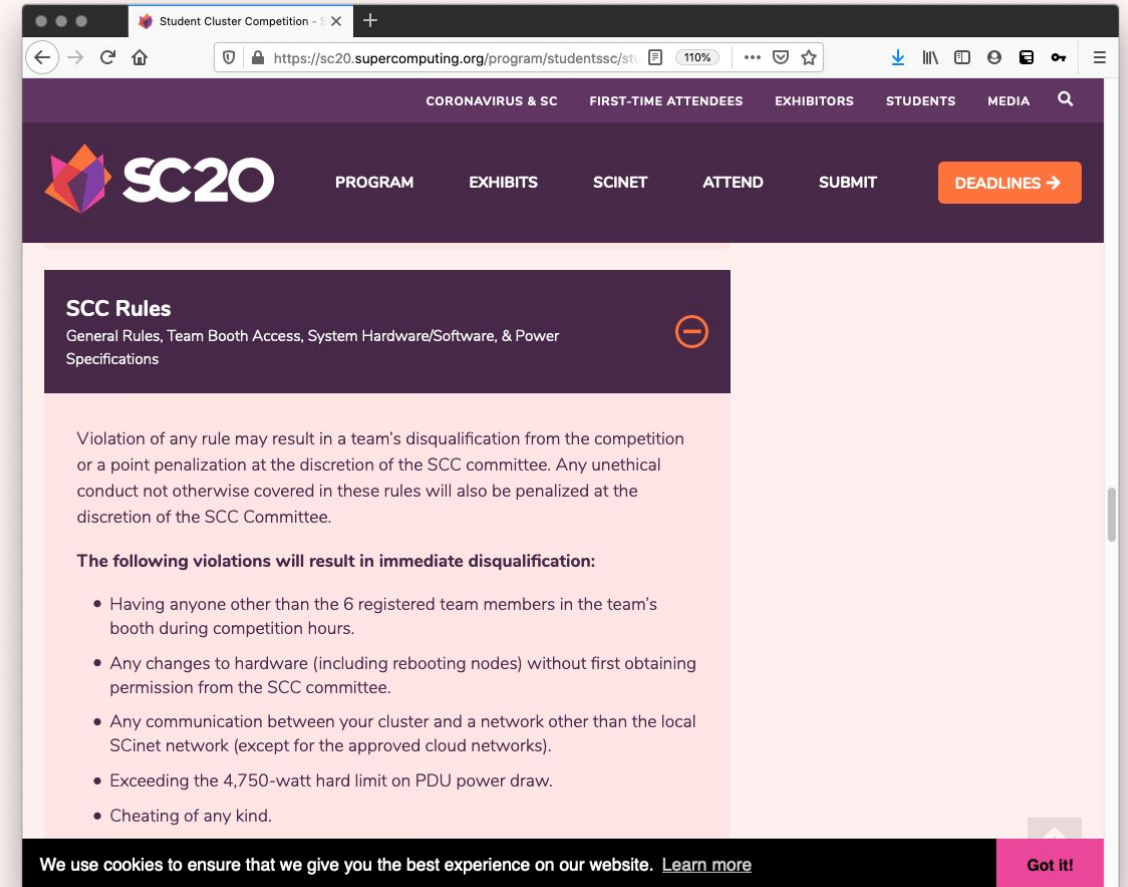
- What courses are available and attended?
- What HPC resources will be used to investigate the applications before vendor hardware arrives?
- What is the team's method for preparing for the competition?
- How will your team utilize cloud resources during preparation and the competition?

Preparation

- You can get from completely new to HPC rising star in time for the competition
- BUT it takes dedication and organization
- So tell us how you're preparing
 - What challenges do you foresee?
 - What is your plan for meeting those challenges?
 - Tip: collaboration with your institutions, vendors and each other will greatly increase your resources

Hardware and Software: Things to know

- New power budget: **4500W**
- Power specifications (including PDU model) are under "SCC Rules" on the SCC main page
- There are 3 benchmarks:
 - Linpack (HPL) (Shows peak performance)
 - HPCG (More realistic, tougher performance benchmark)
 - IO500 (You will need storage, and a parallel filesystem)
- We will have a webinar about benchmarks, watch the [webinars page](#) for announcements



Hardware and Software: Things to know

- This year's applications are posted on on SCC page
- We aim to have webinars about each
- CESM - Parallel climate model.
 - Complex and challenging to optimize
 - Used in IPCC reports
- GROMACS - Molecular dynamics
 - Fast, vectorizes well.
 - Used in COVID-19 research, as well as materials science
- Reproducibility Challenge
 - Reproduce some results from the SC19 paper [MemXCT: memory-centric X-ray CT reconstruction with massive parallelization](#)
- Mystery Application
 - Announced when the event begins!

[PROGRAM](#)[EXHIBITS](#)[SCINET](#)[ATTEND](#)

SCC Benchmarks & Applications

Three Benchmarks and Four Applications for SCC20



Benchmarks

LINPACK Benchmark

<http://top500.org/project/linpack/>

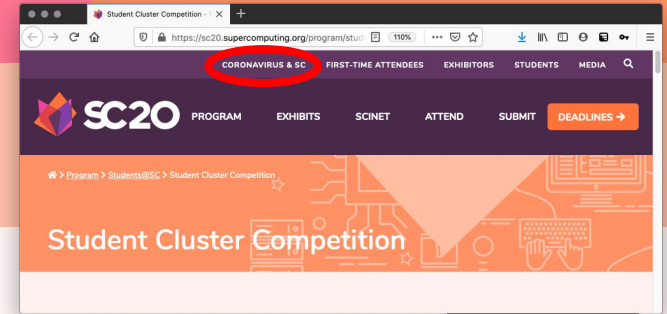
The Linpack Benchmark is a measure of a computer's floating-point rate of execution. It is determined by running a computer program that solves a dense system of linear equations. It is used by the TOP 500 as a tool to rank peak performance. The benchmark allows the user to scale the size of the problem and to optimize the software in order to achieve the best performance for a given machine. This performance does not reflect the overall performance of a given system, as no single number ever can. It does, however, reflect the performance of a dedicated system for solving a dense system of linear equations. Since the problem is very regular, the performance achieved is quite high, and the performance numbers give a good correction of peak performance.

Getting help

- Teams will get access to a Google group
 - Committee, application experts and other teams will be on the group - great place to get help and help each other
- Team liaisons
 - Each team will be assigned a liaison from the committee
 - Your liaison will be able to guide you for questions about the event logistics, etc
- Webinars:
 - <https://sc20.supercomputing.org/program/studentssc/studentssc-webinars/>
 - We'll have a series of webinars like this, about once per month, on topics to help you prepare
- Blog: <https://sc20.supercomputing.org/attend/blog/>
 - <https://sc20.supercomputing.org/2020/05/01/how-to-prepare-for-a-student-cluster-competition/>
- Websites
 - <https://studentclustercompetition.us/index.html>
 - <https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/>



Coronavirus & SC



The health and safety of the SC20 family—participants and volunteers alike—are our first priority. We recognize the impact that COVID-19 is having, and will have, on international travel in particular. *We are closely monitoring any specific travel advisories through official channels, which include the World Health Organization (WHO) and the U.S. State Department.*

The SC20 committee is investigating options for limited remote participation for the conference in November 2020 should the need arise due to travel restrictions associated with COVID-19.

We will make a broad announcement if remote participation becomes available for the conference. We continue to monitor the situation closely, but at this point are hopeful for normal conference operations.

Important Dates

Team applications close: June 19, 2020

Notifications will be sent July 3, 2020

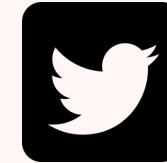
Competition: Monday–Wednesday, November 16–18, 2020

Teams will arrive on the weekend to set up

Webinar schedule:

<https://sc20.supercomputing.org/program/studentssc/studentssc-webinars/>

Apply Now & Follow Us!



[@SCCompSC](https://twitter.com/SCCompSC)

SC20 SCC Program details and team application information:

<https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/>

SC20 SCC Mystery Application:

<https://sc20.supercomputing.org/program/studentssc/student-cluster-competition/>

SCC History:

<https://studentclustercompetition.us/>



Questions?