

SC22 SCC Rules

Updated Nov 15 , 2022¹²

The Student Cluster Competition (SCC) began in 2007 to provide an immersive high performance computing experience to undergraduate and high school students. Since 2017 cloud-based HPC resources have been a component of the competition, and in 2020 and 2021 the entire event was virtual.

In 2022 an in-person competition is planned, including a cloud component, and with a virtual component for teams that cannot travel to the conference due to COVID restrictions.

The goal of the competition is to foster interest and experience in HPC for students. The SCC includes components that reflect current, real-world considerations and challenges encountered by HPC professionals.

Violation of any rule may result in a team's disqualification from the competition, or point penalization, at the discretion of the SCC committee. Any unethical conduct not otherwise covered in these rules will also be penalized at the discretion of the SCC Committee.

The following violations will result in immediate disqualification:

- Having anyone other than the 6 registered team members working on the team's cloud resources during competition hours.
- Any communication between your cloud resource and a network other than the approved cloud networks.

All decisions are the sole discretion of the SCC committee, and SCC committee decisions concerning the rules in a given situation, are final.

1. Safety first

Equipment configurations, booth layout, and booth occupancy are always subject to safety as first consideration. If a task cannot be done safely, then it is unacceptable. When in doubt, ask an SCC supervisor or team liaison.

¹ Summary of updates since March 5 version:

- Clarification of power draw limits
- Clarification of Primary Advisor requirements

² Nov 12 update: Booth access clarification in 2.3.2

2. Teams

Teams are composed of six students, an advisor, and vendor partners.

- The advisor provides guidance and recommendations
- The vendor provides the resources (hardware and software, and shipping of hardware to and from the competition. Vendors are also encouraged to cover the team members' travel and incidental costs)
- The students provide the skill and enthusiasm.

Teams can optionally nominate up to two "logistics coordinators", who are secondary advisors or other support staff who should receive a copy of any communications sent to the primary advisor.

Teams will be invited to participate based on their Team Application, submitted via <https://submissions.supercomputing.org/>. The Team Application includes a description of the team, the proposed hardware and software that will make up their cluster, and their approach to the competition. The SCC committee reviews each proposal and provides comments for all submissions. The team composition and proposed hardware and software must all conform to the rules described below.

2.1. Advisor requirements

- Advisors are required to be staff, faculty or graduate students of the team's educational institution(s) or sponsoring HPC center.
- The primary advisor must be authorized to represent their institution, must attend the conference, and must be responsible for their team at all times.
- The primary advisor must be available 24 hours a day during the competition

2.2. Team composition

Student Team Members must:

- Be enrolled in a university or high school
- Be at least 18 years old by the beginning of the SCC (Monday November 14, 2022)
- Not have received a bachelor's degree or equivalent before the beginning of the competition

2.2.1 New Participant Points

Teams are encouraged to include diverse participation including new participants and under-represented groups. To encourage new participants and help new teams participate, "new participant" points will be applied to Team Application evaluations.

Teams must qualify for at least ten (10) "new participant" points in order to be eligible to participate in SCC22, as follows:

- A. Two (2) points for each first-time SC SCC participant (i.e. each team member who did not participate in the Student Cluster Competition for SC19, SC20, or SC21).
- B. One (1) point for each second-time SC SCC participant (i.e. each team member who participated in only one of the Student Cluster Competitions for SC19, SC20 or SC21).
- C. Eight (8) points if this will be the team's first time in any of the major Student Cluster Competitions (SC, ASC and ISC, considering only 2019 and later).
- D. Three (3) points if this will be the team's second time in any of the major Student Cluster Competitions (SC, ASC and ISC, considering only 2019 and later).

The identity of the team, for these purposes, is determined by the institution(s) that the advisor and student members are associated with. If a team is a collaboration of multiple institutions then competitions that any of those institutions participated in will be considered. For previous participation we look back as far as 2019 - a team or member who has participated before but not during or since 2019 is considered "new".

Some examples:

- A completely new team, from an institution that has not participated since before 2019 (or at all), gets 20 new participant points (12 for reason A and 8 for reason C)
- A returning team who participated only at the SC21 SCC, with 2 returning members and 4 new ones, gets 13 new participant points (8 for reason A, 2 for reason B and 3 for reason D)
- A long-standing team that has participated in multiple competitions each year since SC19 or before, but whose all 6 members are first time participants, gets 12 new participant points (for reason A).
- A team that formed in 2022 and participated in the ASC and ISC competitions, but whose members have not participated in the SC SCC before, gets 12 points (12 for reason A, but none for reasons C or D as this will be their 3rd SCC)
- A team that first participated in SC21 and is returning with the same 6 students is not eligible, as they have only 9 new participant points (6 for reason A and 3 for reason D). At least one returning member should make way for a new, inexperienced member to bring the team's new participant score to 10. (Past team members are still welcome to support their team's preparation efforts and are encouraged to cheer their team on during the competition.)

2.3. Team assistance and access to SCC resources

During preparation for the competition, the Team Advisor, vendor partners and other supporters are encouraged to help the team train for the competition. However, only the six registered team members will have access to the cloud-based computational resources during the training period.

2.3.1. No external assistance

Once the competition begins, the six team members must work on the competition tasks with **no external assistance** - advisors, vendor partners and other supporters must not help the team in any way (other than to occasionally deliver coffee, snacks, etc). Outsourcing of competition tasks to either paid services or unpaid volunteers is not permitted.

2.3.2. Only the team members may access the booth, cluster and cloud resources

- During the competition, only the 6 team members that are listed on the team are allowed in the team booth or to touch any computers or equipment being used for the competition (including student laptops).
 - **Update/clarification:** student teams members may, upon invitation by another team, enter that team's booth for the purpose of cooperative debugging. Virtual and in-person student team members can also join the zoom room for cooperative debugging. Afterwards, those teams should write a discourse topic briefly explaining the problem and solution found (or, the hoped for solution found not to work).
- No chairs are allowed near the outside of the booths.
- Terminal windows or screens not displaying visualization of the team's work must not be visible to anyone outside the booth.
- On-site teams are allowed access to clusters and cloud resources only via physical connection to the SCC local network.

2.4. Team conduct

Teams must conduct themselves professionally and adhere to the [SC22 Code of Conduct](#). Students must compete fairly and ethically.

3. Hardware requirements and rules

The two fundamental hardware requirements for team clusters are that they are able to run the applications and exercises of the competition, and that they can operate within the power draw limits described below. Hardware must also meet the following constraints:

Hardware availability:

- 3.1. All hardware used must be commercially available at the time of the start of the competition.
- 3.2. Teams must display, for public view, a complete list of hardware and software used in the system.
- 3.3. No hardware in the competition machine may be subject to a Non-Disclosure Agreement (NDA).
- 3.4. All technical specifications of all hardware components must be available to the general public at the time of the start of the competition.
- 3.5. All performance results from the competition hardware must be permitted to be published without restriction.

Space and infrastructure constraints:

- 3.6. Booths will be 10 feet x 10 feet and back to a solid wall or curtain. Teams must fit into this space along with the hardware for all activities and must have the display visible to the viewing public.
- 3.7. An enclosure, no larger than a single 42U rack, must be provided by the team and all competition hardware must be installed in this rack throughout the competition. No competition hardware will be allowed on tables or pallets.
- 3.8. No special cooling infrastructure is provided by the competition - student cluster hardware will be operating in normal conference center air. Any external cooling systems brought by teams must be closed-loop systems and use only the competition metered power
- 3.9. Once the competition starts no liquid may be removed or added to any cooling systems. (e.g. no drains, no water sources)

Power draw limits:

- 3.10. The competition has a dynamic power limit: the power available to each team for their competition hardware at times during the competition may be as high as 4000-watts (but will usually be lower) and may be as low as 1500-watts (but will usually be higher).
 - Teams must ensure that their hardware's power consumption while idle consumes no more than 1500W, and that their hardware can run the applications and benchmarks without consuming more than 4000W.
 - The power limit during the benchmarking component will be 3000W

- 3.11. Each team will be provided with one circuit and a single Geist MN02E1R1-10L138-3TL6A0H10-S PDU. All competition hardware must be powered through this PDU and must stay within the power limit applicable at the time. Other systems (such as laptops and monitors) may be powered from separate non-competition power sources provided by the conference.
- Teams should be prepared to tune their hardware's power consumption based on the power measured through the PDU's power monitor.
 - A team will be subject to a penalty any time a power draw on the PDU is registered at or above the power limit applicable at that time.
 - A team will be subject to disqualification if a power draw on the PDU is registered at or above 4200-watts, for any duration.
- 3.12. All components associated with the system or with access to it, must be powered through the circuits provided by the Conference.
- 3.13. Battery backup or UPS (Uninterruptible Power Supply) systems may NOT be used during the competition.

Hardware configuration:

- 3.14. No changes to the physical configuration are permitted after the start of the competition. This includes anything on the competition power such as settings of external cooling systems. In the case of hardware failure, replacements can be made while supervised by an SCC committee member.
- 3.15. Use of sleep states (but no power-off and no hibernation) is permitted as long as when all devices in the rack are powered on into their lowest running OS (non-sleep) state they do not exceed the power limitation.

4. Software requirements and rules

4.1. System software

- 4.1.1. All system software (operating system, drivers, filesystems, compilers, etc) used in the competition must be publically or commercially available at the start of the competition.
- 4.1.2. System software must not be modified after the benchmarking period.

4.2. Benchmarks and applications

The application executables used in the competition must be built by the team members from open source implementations. Vendor-provided executables for benchmarks are permitted as long as those executables are publically available, eg by download from the vendor's website. Executables may be built in advance by the team members, but teams must provide the URL of

the source package (for tarballs etc) or commit hash (for git etc repos). Teams should also be prepared to demonstrate building and running the executable if requested.

Teams may study and tune the code used in the benchmarks and applications. Any modifications to the source code made by the team must be shared with the SCC committee.

5. Network connections

A network drop will be provided for outgoing connections only. Teams will NOT be permitted to access their clusters from outside the local network.

Competition hardware may be connected via wired connections only – wireless access is not permitted.

Free wireless access for laptops will be available throughout the convention center via SCinet.

6. Logistics

Teams are responsible for obtaining their cluster hardware and transporting it to the Convention Center. (Team vendor partners are encouraged to help their teams with this).

Teams are responsible for their own travel arrangements to and from the conference, and for daily expenses such as meals. (Team vendor partners are encouraged to help their teams with this).

7. Mandatory events

- 7.1. All participants must attend the safety briefing before any unpacking or assembling of hardware, and before participating in the Benchmarking component or any computing tasks in the competition.
 - Teams whose travel schedule does not permit attending the scheduled safety briefing should contact the committee to arrange an alternative safety briefing that they can attend before performing any of those activities.
- 7.2. All students must attend the Students@SC Orientation.
- 7.3. At least one student competitor from each team must attend the daily committee-and-teams stand-up meeting.

- 7.4. For each team participating in-person, there must be at least 2 student competitors in their team booth at all times while the exhibition floor is open (except during mandatory events scheduled elsewhere).
- 7.5. For each team participating only in the virtual component, at least 2 student competitors must be in the competition zoom session throughout the competition.