SC23 SCC Rules

Updated Mar 1, 2023

The Student Cluster Competition (SCC) began in 2007 to provide an immersive high performance computing experience to undergraduate and high school students. 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.

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.

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 start of travel to the SCC (Friday, November 10, 2023 for students traveling internationally or Saturday, November 11, 2023 for students traveling domestically).
- Not have received a bachelor's degree or equivalent before the beginning of the competition, Monday, November 13, 2023.

2.2.1 Team Makeup

Teams are encouraged to include diverse participation including new participants and under-represented groups. To encourage new participants and help new teams participate, **half of the students making up any team must be first-time participants in the SCC.**

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

Advisors, vendors, and other external people can help the teams set up their clusters in the exhibit hall. Once benchmarking 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.

Teams are encouraged and allowed to help other teams. Teams are also encouraged to interact with conference attendees. Vendor partners, advisors, and alternate team members are welcome to come by during the exhibit hall hours to express support. However, teams must not receive advice or assistance from anyone except for other students competing on an SCC team

(no attendees, exhibitors, advisors, vendor partners, alternate team members, etc can help) once benchmarking starts Monday morning.

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

- Once the competition starts on Monday morning, 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).
    - **Clarification:** student teams members may, upon invitation by another team, enter that team's booth for the purpose of cooperative debugging.
- Teams are required to keep their booth and the area in front of their booth neat and presentable. No booth chairs are allowed to be placed outside of the booths.
- Terminal windows or screens not displaying visualization of the team's work must not be readily visible to anyone outside the booth. This is to prevent attendees from seeing what the team is working on and offering advice.
- Teams are allowed access to clusters only via physical connection to the SCC local network. See Section 5 for further rules regarding network access.

2.4. Team conduct

Teams must conduct themselves professionally and adhere to the SC23 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. Teams must fit into this space along with the hardware for all activities. The back wall will have a mounted display and teams are to create a presentation for that display.

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. 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. Teams must ensure that their hardware's power consumption and that their hardware can run the applications and benchmarks without consuming more than 4000W.

3.11. Teams will be given an extra 500W for networking equipment outside the 4000W.

3.12. Benchmarks will be run with a 4000W power limit for the computational hardware and a 500W power limit for the networking gear.

3.13. Each team will be provided with one 208V circuit and a single Geist MN02E1R1-10L138-3TL6A0H10-S PDU. All competition hardware must be powered through this PDU. Other systems (such as laptops,monitors, switches for connecting laptops to the cluster) may be powered from separate non-competition power sources which will be provided for 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 4000W for the computational system and/or 500W for the networking equipment during the 48-hour competition. Teams are allowed to go over these limits for brief periods during benchmarking for tuning purposes only.
- A team will be subject to disqualification if total power draw on the PDU is registered at or above 4900W at any time and for any duration.

3.14. All components associated with the system or with access to it, must be powered through the competition PDU provided by the conference. Teams must not, at any time during setup or the competition, plug or unplug the networking connections plugged into the RJ45 ports of the PDU.

3.15. Battery backup or UPS (Uninterruptible Power Supply) systems may NOT be used during the competition.

Hardware configuration:

3.16. **Hardware should be comprised of at least three computational nodes. Individual nodes will be limited to 2000W power draw.** Once benchmarking is done, no more changes to the PDU will be allowed. Total power draw for the computational portion of your machine will be 4000W.

Teams will be given 500W for networking equipment. Networking equipment will be limited to 500W. Networking equipment will need to be plugged into PDU ports separate from the computational hardware.

If you have a hardware proposal that does not fit into this structure, please reach out to student-cluster-competition@info.supercomputing.org and we will attempt to accommodate your hardware configuration.

3.17. No changes to the physical configuration are permitted after the start of the competition. No one is allowed to touch any hardware plugged into the competition PDU after the end of benchmarking and the start of the competition without permission from the SCC committee. This includes, among other things, changing how the equipment is plugged into the PDU or reseating of cables plugged into the networking equipment powered by the competition PDU. In the case of hardware failure, replacements can be made while supervised by an SCC committee member.

3.18. 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, e.g. by download from the vendor's website. Teams using a vendor-provided binary for a benchmark must, at least 1 week before the competition starts, inform the committee of the URL for the binary and obtain confirmation from the committee that this is a valid binary for the benchmark. 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 repos, etc). 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 SCC-provided local network. All outgoing connections will be logged and possibly inspected.

The only external sites that teams are allowed to access are publicly accessible websites. The committee may also choose to make public information about external websites that teams are accessing.

VPNs, proxies, network tunneling, or remote desktop of any type to any equipment, including student laptops, connected to the competition hardware is not permitted.

Competition hardware may be accessed via wired connections only – wireless access is not permitted. Teams must supply their own network cables, switches, and adapters for this purpose. This network equipment used to access the cluster can be powered from a circuit external to the PDU and provided by the SCC.

Many commodity switches used for this purpose have a built-in wireless router. Any network devices provided by the teams or vendors in the competition area must have any wireless networking turned off. Free wireless Internet 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. Movement of equipment within the convention center must abide by conference logistics rules and be coordinated with Freeman, the SC vendor who handles the Exhibit Hall. (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 Saturday Students@SC Orientation and Student Mixer.

7.3. At least one student competitor from each team must attend the daily committee-and-teams stand-up meeting.

7.4. 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. Further mandatory events will be announced at a later date.