

IOI 2021 Contest Operations Manual

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This is the IOI 2021 Contest Operations Manual. It specifies requirements, preparations, setup, testing and other procedures that Teams have to manage at their Contest Venues, including activities required before, during, and after the contests.

As IOI 2021 will be conducted as an online contest, many contest operations at the various Contest Venues must be handled by the respective Teams. This includes provision of local contest infrastructure for their Contestants, who will use a Contestant VM to connect to the Online Contest Environment to participate in the contest.

Team Leaders are responsible to enforce all IOI 2021 Competition Rules for their Teams, including directions in this Manual and other documents provided by the IOI 2021 Organising Committee.

Overview

While IOI 2021 is run as an online contest, Contestants will still have to physically convene at Contest Venues arranged for by their respective Teams.

Teams will provide Contestants with Contestant PCs, which are to be installed with the Contestant VM that is provided by the IOI 2021 Host Technical Committee (HTC). Contestants must use this Contestant VM to connect to the Online Contest Environment, access the Contest Management System (CMS), read Task Statements, submit their task solutions, as well as write, test, and debug their programs. The CMS is also referred to as the Grading System.

Please take note of the following critical dates.

Date	Activity	Action by Teams / Contestant
12 Jun	Release of Contestant VM	The final official version of the Contestant VM is released. Teams must download, install, and test. Earlier beta and release candidate versions are also available; please refer to the IOI 2021 Contestant PC Manual for more details.
19 Jun	Practice Day	Practice session starts at 18:00 SGT. However, there are preparatory activities required from 17:00 SGT.
22 Jun	Contest Day 1	The contest officially starts at 18:00 SGT. However, there are preparatory activities required from 14:00 SGT.
25 Jun	Contest Day 2	The contest officially starts at 18:00 SGT. However, there are preparatory activities required from 14:00 SGT.

The Contest Operations section in this Manual has further details and specific timelines for required activities and procedures on Practice Day, Contest Day 1, and Contest Day 2. All times are in SGT time zone, which is GMT+8, unless otherwise specified.

Contest Requirements

Teams need to prepare for these contest requirements.

Contest Venues

Teams need to establish a venue, i.e. Contest Venue, for their Contestants to convene to participate in the IOI 2021 contests. There should be one venue per Team as far as is practicable. However, in light of the present COVID-19 pandemic situation, Teams may establish additional Contest Venues if they are constrained by their local authority regulations.

Teams must ensure that their selected venues are fit for purpose, allow for the adherence and application of all IOI 2021 Competition Rules, as well as comply with other directions in this Manual. Contest Venues must have:

- Suitable and conducive environment for running the contests.
- Availability of or ability to accommodate suitable computers for use as Contestant PCs. Please refer to the IOI 2021 Contestant PC Manual for more information.
- Good Internet connectivity. Please refer to the Internet Connectivity Requirements section in this Manual.
- Sufficient physical separation between Contestants so that they cannot see each other's screen or written work.
- Convenient access to restrooms.

Examples of possible venues include:

- Computer laboratory in local universities or schools
- Meeting room in a corporate office
- Conference room in a hotel
- Team Leader's or Contestant's place of residence

Teams must ensure that they have timely access to their Contest Venues, including for before-start and after-end activities, and providing allowances for time overruns.

For the avoidance of doubt, the following is allowed (but not required) in the Contest Venue:

- Food and drinks
- Mascots
- External non-programmable keyboards and pointing devices

We recommend Teams to plan for contingencies, such as the following:

- Hardware or software problems with the Contestant PCs
- Internet access or other network reachability problems
- Power supply, HVAC, or other building facilities problems at the Contest Venue

- Ready access to support staff (e.g. for network, building facilities, etc)

Internet Connectivity Requirements

The IOI 2021 Online Contest Environment is hosted in Amazon Web Services (AWS) Cloud, in the Asia/Singapore region (ap-southeast-1). Internet access to AWS Cloud is absolutely critical.

Teams are entirely responsible for their own Internet access and network reachability to IOI 2021 Online Contest Environment. To this end, Teams must carefully evaluate their options, especially if they face network reliability challenges in their locality or upstream network service provider.

There are two critical requirements for Internet connectivity:

- **Bandwidth:** At least a reasonably dedicated 15 Mbps bandwidth to each Contestant PC. This bandwidth may be required to download large data sets or for live updating of the Contestant VM.
- **Network Firewall:** Contestant PC must have outgoing access to SSH, DNS, HTTP, HTTPS, and TCP port 655. The latter is for VPN connection to the IOI 2021 Online Contest Environment. We also strongly recommend outgoing access to UDP port 655 for the VPN as well.

Internet connectivity is also required for Proctors to communicate with the IOI 2021 Organising Committee, the HTC, and others, using the communication channels prescribed later in this Manual.

We further recommend that Teams make plans for backup Internet connections, such as through different broadband Internet providers or using a 4G mobile hotspot. Please remember to check that the above Bandwidth and Network Firewall requirements are tested on these backup networks.

Proctors

Proctors assist Team Leaders to supervise Contestants at the Contest Venues, and ensure their compliance with IOI 2021 Competition Rules and directions in this Manual.

The Team Leader and Deputy Team Leader are expected to be among the Proctors for their Team. Other Proctors are adjuncts who are appointed by the Team Leader. Proctors must not have any conflict of interest with the performance of the participant (e.g. parent/sibling of Contestant, coach of Contestant).

Team Leaders, Deputy Team Leaders, and all other Proctors must be registered in the IOI Registration System and their identities will be published on the IOI Statistics website.

There must be sufficient numbers of Proctors so that all Contestants are physically observed by at least one Proctor at all times, while concurrently providing for:

- Escorting a Contestant to a restroom break,
- Allowing Proctors themselves to take breaks,

- Dealing with other contingencies at the Contest Venue.

For example:

- If there is a single room containing all Contestants, then there must be at least two Proctors. This allows one Proctor to always be present inside the Contest Venue while another takes a break or escorts a Contestant out for a restroom break.
- If Contestants are contained in two rooms in close proximity, there must be at least three Proctors, all of them being able to conveniently and expeditiously reach either room at any time.
- In the situation with two Contest Venues which are in different localities, each being a single room that accommodates Contestants, then each venue requires at least two Proctors, for a total of four Proctors required for the Team.

Contestant PC and Contestant VM

Contestants must use the provided Contestant PC, which must run the Contestant VM, to connect to the Online Contest Environment to participate in the contest.

Please refer to the IOI 2021 Contestant PC Manual for more details.

Screen Recording

There must be a complete and full desktop screen recording of the Contestant PC. This must commence from before the contest starts, and stop after the contest ends. Screen recordings must subsequently be uploaded as instructed by the HTC, within 24 hours from the end of each respective contest.

Please refer to the IOI 2021 Screen Recording Procedures for more details.

Communication Platform

We will use two communication channels:

- Matrix/Element: This is a messaging (i.e. chat) system. It replaces the role of Keybase in IOI 2020. Matrix (<https://matrix.org>) itself is an open network for secure, decentralised communication. Element is the client app used to access the Matrix network. The Element clients for Windows, macOS, and Linux are available from <https://element.io>. Element clients for Android and iOS are available from their respective app stores. Matrix is the technically correct name for this messaging platform, so this will be how we refer to it, even though the name of the client app we prescribe is Element.
- Zoom: We will use Zoom (<https://zoom.us>) for video conferencing. Please make sure that your audio is setup and working. For participating in GA sessions, please ensure that you have a working video camera.

Team Leaders, Deputy Team Leaders, and other Proctors who had previously been on Keybase will be onboarded to Matrix automatically. The new credentials for Matrix will be sent to their Keybase accounts. New users will be onboarded manually; the IOI 2021

Organising Committee will contact you. Previous Keybase users who've lost their accounts should reach out to the IOI 2021 Organising Committee.

For most activities during IOI 2021 week, and especially during contest operations (Practice Day, Contest Day 1 and Contest Day 2), our primary communication channel will be via Element. Team Leaders must ensure that they are logged in and actively monitor their messages. Deputy Team Leaders ought to be on Matrix as well, as a backup in case the Team Leader cannot be reached.

Zoom will be used when video conferencing is needed. Zoom will also be used for some key activities during IOI 2021 week, including for some GA sessions.

Video Recording (Optional)

Video recordings may be useful in assisting to investigate allegations of non-compliance with the IOI 2021 Competition Rules or other applicable regulations or directions.

The IOI 2021 Organising Committee is not mandating these video recordings. The decision to make video recordings is left to the discretion of Team Leaders. Team Leaders should consider privacy concerns as well as other regulations that apply.

If video recordings are made, these are the recommendations:

- There ought to be multiple cameras so as to establish a comprehensive assessment of activities within the Contest Venue, including that one Proctor is present at all times.
- The recordings should include an overview of the Contestant PC's screen, so as to establish that the Contestant VM is solely in use during the contest.
- The recordings should see the faces of all Contestants.
- A local physical clock is recorded in the video.

Contest Operations

The actual IOI 2021 Contest operations will run from 19 June 2021 to 25 June 2021. Teams must adhere to the following procedures.

Communications

We will use Matrix for communication with all Teams via their Team Leaders, Deputy Team Leaders, and Proctors, who must all be logged in and actively monitoring the ContestOps room. The HTC will not actively monitor any other chat rooms during contest operations.

Contestants should use the CMS for all queries during contests as far as is practicable. If it is necessary to communicate with HTC or HSC, they must request to do so via their Proctors.

Proctors can check the connectivity status of their Contestant VMs to the IOI 2021 Online Contest Environment at our monitoring website <https://pop.ioi2021.sg/>.

Contestant Credentials

Contestant account credentials to the Online Contest Environment will be disseminated with the official release version of the Contestant VM. These credentials will serve two purposes:

- The primary use is for the VPN connection to the Online Contest Environment. When the VPN is connected, web browser access from the Contestant VM to the CMS will not require further authentication. Access to the CMS will not be available directly from the Internet; Contestants must use the VPN connection from inside the Contestant VM.
- In case of a problem with the VPN, the HTC will enable direct access to the CMS from the Internet. Teams will be informed of this change, and provided with instructions to disable the VPN in the Contestant VM. In this scenario, Contestants will use their credentials to login directly to the Contest Website.

Prohibitions on Contestant PC and VM

Teams must ensure that the Contestant VM is not used in any unauthorised manner. These rules apply strictly from the Release Candidate versions onwards:

- Ensure that there is no attempt to “root”, or to gain root access to, the Contestant VM.
- Ensure that there is no attempt to read or write the Contestant VM’s virtual disk contents outside of running the Contestant VM through VMware Workstation.
- Ensure that the Virtual Machine settings are not modified.
- No external devices are attached to the Contestant VM.

The HTC will verify the integrity of the Contestant VMs. Contestants found using Contestant VMs with unauthorised access or modifications will be disqualified. This applies to both Practice Day and Contest Days.

Teams must also ensure the following on the Contestant PC:

- There are no messaging, collaboration, communication, and other cloud sharing applications running.
- Suspend all operating system notifications, such as by turning on Focus Assist in Windows 10.
- There must be only one display in use. An external monitor can be connected to a laptop only if the laptop’s built-in display(s) is disabled.

Practice Day

Practice Day will be the first full-scale live test of the entire IOI 2021 contest infrastructure. Teams must endeavour to have all their Contestants and Proctors participate in Practice Day. The IOI 2021 Organising Committee will not be responsible for problems arising from their absence from this practice. Contestants will not receive any consideration during Contest Day 1 and Contest Day 2 for problems that should have been caught earlier had their respective Teams fully participated in the Practice Day.

Teams are strongly encouraged to conduct practice at the actual venue they will use for Contest Day 1 and 2. Teams should also involve all their technical support staff, and test their backup Contestant PCs, backup Internet access, and other technical infrastructure.

The Contestant VM must be running and connected to the IOI 2021 Online Contest Environment no later than 1 hour before the Practice start time.

The schedule for Practice Day is as follows.

Time	Activity
1 hr before start	Teams must ensure that Contestant PCs and Contestant VMs are running and connected to the IOI 2021 Online Contest Environment, the latest at this time. Team Leaders and Proctors must be online and contactable on Matrix.
15 mins before start	Contestants must be seated at their Contestant PCs. Screen recording must start at this time. The Contestant VM window must be maximised or run in full-screen mode. The "ioi" user account will be reprovisioned (reset to default).
5 mins before start	Contestants should login to the "ioi" account. Their desktop screen will be locked after a successful login.
Start of Practice	Contest begins. Screen will be automatically unlocked.
1 hr after start	Teams may test out their backup plans, such as backup Contestant PCs, backup Internet access, etc.
End of Practice	Contest ends. Screen recording should be stopped. Wait for instructions from HTC.
15 mins after	Wait for confirmation from Proctors before shutting down the Contestant VM and Contestant PC. Teams are reminded to upload screen recordings within 24 hours from the end of practice.

Teams must endeavour to adhere to actual Contest procedures up to 1 hour after Practice Start, so that HTC can test the full contest infrastructure. Thereafter, Teams are free to test out their own operational and contingency plans, such as switching Contestant PCs or using a backup Internet connection.

The HTC may make arrangements with individual Teams if further tests are required following the Practice Contest.

Contestants must take note that their user account in the Contestant VM will be reset to a default state prior to Practice start. Any customised settings in the user account configured earlier will be lost. Contestants should familiarise themselves with any custom setups they need to do. This will be the same for each Contest Day.

Contest Day 1 and 2

Teams must ensure that their Contest Venues are fully prepared and ready no later than 4 hours before the start of the Contest. This includes turning on the Contestant PC and ensuring that the Contestant VM is running and connected to the IOI 2021 Online Contest Environment.

If the local timezone makes this difficult, the Contestant PC and Contestant VM can be started at a convenient time the prior day, and ensuring that the Contestant PC does not sleep, suspend, hibernate or power off. This time is essential for the HTC to perform integrity checks and any necessary live updates of the Contestant VM; and any delays may result in late start for the respective Contestant.

Teams are reminded that the Contestant VM must be the latest official version released by the HTC, and that there are no unauthorised access or modifications to the Contestant VM.

The schedule for Contest Day 1 and 2 are as follows.

Time	Activity
4 hrs before start	Teams must ensure that Contestant PCs and Contestant VMs are running and connected to the IOI 2021 Online Contest Environment, the latest at this time.
1 hour before start	Team Leaders, Deputy Leaders, and Proctors must be on-site, logged in to Matrix, and actively monitor their Matrix messages. We recommend that Contestants should be on-site at this time.
30 mins before start	Contestants must be seated at their Contestant PCs. Screen recording must start at this time. The Contestant VM window must be maximised or run in full-screen mode.
20 mins before start	The "ioi" user account will be reprovisioned (reset to default). Their desktop screen will be locked.
10 mins before start	Contestants should login to the "ioi" account. Concurrently, HTC will begin unlocking the desktop screens. This process could take a while. Hence, please do not be alarmed if it does not happen immediately. Once the desktop screen is unlocked, contestants will <i>only</i> be allowed to navigate to the CMS website to await the start of the contest. For instance, contestants <i>must not</i> start typing, or begin configuring editors/terminals/other programming tools.
5 min before start	All desktop screens should be automatically unlocked by this time. If any contestant's screen is still not unlocked, please contact the HTC immediately.
Start of Contest	Contest begins.
End of Contest	Contest ends. Desktop screen will remain unlocked. Do <i>not</i> dismiss Contestants, stop screen recording, or shutdown

	Contestant VM/PC until specifically instructed by HTC.
From 5 mins after end	HTC will instruct when: <ul style="list-style-type: none">- Contestants who did not request for extra time (and do not intend to) may be dismissed.- Other Contestants can be dismissed after their requests have been resolved.- Screen recording can be stopped after Contestants have been dismissed. Recordings must be uploaded to Dropbox file request link (get from "ioibot" in Matrix using "dropbox" command) within 24 hrs from end of Contest.- Contestant VM and Contestant PC can be stopped.