

# IOI 2021 Contestant PC Manual

Last update: 1 May 2021

This is the IOI 2021 Contestant PC Manual. It specifies requirements, setup, testing, and use of the Contestant PC and Contestant VM. This Manual must be read in conjunction with other documents provided by the IOI 2021 Organising Committee.

## Overview

Contestants will use Contestant PCs provided for by their Team. The Contestant PCs will be loaded with a Virtual Machine image (Contestant VM), which is installed with Ubuntu 20.04, 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.

To help Teams prepare for the IOI 2021 online contests, early versions of the Contestant VMs will be released for testing, as well as to gain familiarity with the environment. The release schedule is as follows.

Date	Activity	Action by Teams / Contestant
1 May	Availability of 1st beta (ioi-2021.0-beta1)	Download, install, and test the Contestant VM. Send all feedback by 4 May for consideration to include changes in the next Beta.
15 May	Availability of 2nd beta (ioi-2021.0-beta2)	Download, install, and test the Contestant VM. Send all feedback by 11 May. There will be no more feature changes after 18 May.
29 May	Availability of 1st release candidate (ioi-2021.0-rc1)	Download, install and test the Contestant VM. The Online Contest Environment will be available, and test credentials will be distributed. Please send all bug reports by 1 Jun.
5 Jun	Availability of 2nd release candidate (ioi-2021.0-rc2)	This is the final Release Candidate. Please send all critical bug reports immediately.
12 Jun	Release of final version (ioi-2021.0)	This is the official release, and will be the final version of the Contestant VM to be loaded in Contestant PC for IOI 2021 Contests. Teams should install and test immediately.

While we do not plan to release further updates after the final ioi-2021.0 version, Teams must be prepared to download and install newer versions for Contest Day 1 or Contest Day 2 if the HTC determines that there are serious problems that are best fixed with a new VM.

# Setup and Preparations

Teams are encouraged to commence setup and preparations as early as possible. The same Contestant PC and network connection should be used for setup, testing, and actual IOI 2021 as far as practicable.

## Contestant PC Requirements

The Contestant PC is the physical host computer used to run the Contestant VM. The latter is a VMware virtual machine installed with Ubuntu 20.04 and other tools, provided by the HTC, and must be used by the Contestant to participate in the IOI 2021 contests.

Teams must arrange for the Contestant PC. This may be a desktop computer or a laptop computer, and it must run VMware Workstation virtualisation software, or equivalent. We recommend the following minimum hardware requirements for the Contestant PC:

- Windows-compatible computer
- Intel 5th Generation Core processor or newer, minimum 2 cores/4 threads
- 8 GB of RAM
- 100 GB of free storage available
- Monitor display with at least 1024 x 768 screen resolution
- Installed with any edition of Windows 10 operating system, version 1903 or newer
- Installed with VMware Workstation Player 16.x or Workstation Pro 16.x

Please note the following restrictions apply:

- The Contestant PC must only have one display in use. An external monitor can be connected to a laptop only if the laptop's built-in display(s) is disabled.

The following are for Teams to manage at their discretion:

- Contestants may use their own computer as long as their Teams ensure that all IOI 2021 Competition Rules are adhered to, including the directions in the IOI 2021 Contest Operations Manual and this manual.
- Contestants may use any non-programmable keyboard and mouse as long as their Team is satisfied they do not cause interference or inconvenience to other Contestants.
- While we do not mandate a maximum screen size or resolution, Teams should test and verify how well the Contestant VM performs as a guest in a virtual environment with maximised window or in full-screen mode, while also performing Screen Recording as mandated in the IOI 2021 Contest Operations Manual.

We recommend that Teams prepare additional identical Contestant PCs as backup. They should be fully setup and configured, including with the Contestant VM, so Contestants have quick and easy access to a replacement in case they face a problem with their original Contestant PCs.

NOTE: Due to the use of unique per-Contestant VPN connections, each Contestant must have only one active Contestant VM running. Backup Contestant PCs must not run the Contestant VM until the Contestant is ready to switch over. The IOI 2021 Online Contest Environment will only accept one VPN connection per Contestant.

## Contestant PC and VM Setup

Teams must ensure that the Contestant PCs run only operating system features and applications which are essential to participating in the IOI 2021 Contests. The HTC recommends a fresh setup of Windows 10, such as through the “Reset this PC” feature in Windows 10, then subsequently to install applications that are required to participate in IOI 2021.

Messaging, collaboration, communication, and other cloud sharing applications must not run on the Contestant PC. This requirement must be enforced by Proctors during the Practice and actual Contests by monitoring the Contestant activities. It will be advantageous if technical enforcement can also be applied in the Contestant PC.

VMware Workstation hypervisor must be used to run the Virtual Machine for the Contestant VM. Teams can choose to use either VMware Workstation Player 16.x or Workstation Pro 16.x. VMware Workstation Player 16.x is available free of charge for non-commercial use.

Teams must ensure that the Contestant PC supports and has Intel VT-x enabled in the BIOS or UEFI configuration. This might be turned off by default on some computers. Intel VT-x is required for good performance when running Virtual Machines.

The Contestant PC must be configured to *not* sleep, suspend, hibernate, or power off automatically. This is important in order to allow the Contestant PC to be left running unattended, such as may be desired to allow remote testing by HTC, or prepping the contest participation venue significantly ahead of contest start time due to local timezone difficulties.

Teams must ensure that there are no attempts to “root” the Contestant VM, i.e. to gain any kind of unauthorised access to the contents of the Contestant VM. The Contestant VM must only be accessed and used by logging in to the Ubuntu desktop interface with the prescribed user account. The Contestant VM must not have any storage device attached to it, apart from the virtual disk provided as part of the VM image.

The HTC assumes the use of Windows 10 on the Contestant PC. While we are aware that VMware has equivalent virtualisation products for macOS and Linux, and will also run on non-Intel processors, Teams that choose to use those platforms have to be responsible to provide their own technical support, while still complying with all the directions in this Manual and other documents from the IOI 2021 Organising Committee.

## Contestant VM Testing

The HTC plans to release several versions of the Contestant VM as specified in the schedule in this manual. Contestant VM images are large, typically about 4 GB in size. Please plan sufficient time to download.

## Beta Versions

Two beta versions of the Contestant VM are planned, namely ioi-2021.0-beta1 and ioi-2021.0-beta2. Teams should do the following:

- Check that VMware Workstation Player 16.x or Workstation Pro 16.x is installed.

- Check that VMware can import the Contestant VM; check that the Contestant VM can be powered on and the virtualised Ubuntu operating system succeeds in booting up.
- Check user interaction with the Contestant VM, in particular that keyboard and mouse inputs are working, and foreign keyboard layouts work correctly.
- Check that the required software in the Contestant VM, such as web browser, editors, compilers, debuggers, development environments, and various other tools, are installed and working.
- Check that Internet access from inside the Contestant VM, such as browsing external websites, is working.

Contestants should make use of this opportunity to thoroughly familiarise themselves with the environment since they will have to use it exclusively during the IOI 2021 contests. In particular, Contestants should practice writing, compiling, testing, and debugging programs in this environment. It may be beneficial to use this Contestant VM for their IOI training practices.

Teams should provide feedback early, according to the schedule specified in the manual. Feedback may include bug reports and feature requests. Our priority is to fix bugs.

## Release Candidate Versions

Two Release Candidate (RC) versions of the Contestant VM are planned, namely `ioi-2021.0-rc1` and `ioi-2021.0-rc2`. These are close to final, and no further feature requests will be considered. The focus for RC versions is to fix bugs.

With the release of `ioi-2021.0-rc1` of the Contestant VM, the IOI 2021 Online Contest Environment will become live and available for Teams to test. This includes access to a test CMS. The HTC will disseminate test credentials for Teams to distribute to their Contestants.

Teams should check that:

- VPN connection to the IOI 2021 Online Contest Environment works.
- Confirm Contestant credentials.
- Continue testing the computing environment in the Contestant VM.

Teams should provide feedback on bugs as early as possible, according to the schedule specified in the manual. Feature requests will not be considered.

## Preparation for IOI Week

The final version of the Contestant VM, `ioi-2021.0`, will be released on 12 June 2021. Teams are encouraged to download and install the Contestant VM as soon as possible, and begin verification that the Contestant PC and Contestant VM are working and ready for IOI 2021 week. Teams must ensure they are fully ready before IOI 2021 Practice Day.



# Annex A: Contestant VM Software

The IOI 2021 Contestant VM is installed with Ubuntu 20.04 LTS and ubuntu-desktop-minimal package set.

Contestants can expect the following software, with the minimum versions stated below.

<b>Compilers:</b> gcc 9.3.0	<b>Text editors and IDEs:</b> atom 1.55.0 codeblocks 20.03 eclipse 2020-12 emacs 26.3 geany 1.36 joe 4.6 kate 19.12.3 kdevelop 5.5.0 nano 4.8 Sublime 3.2.2 Build 3211 vim 8.1.2269 Visual Studio Code 1.55.0
<b>Debugger:</b> gdb 9.2 ddd 3.3.12 valgrind 3.15.0 visualvm 1.4.3	
<b>Interpreters:</b> ruby 2.7.0p0 python 3.8.5	
<b>Documentation:</b> C/C++, STL Python3	<b>Other applications:</b> firefox 87.0 gnome-terminal 3.36.2 konsole 19.12.3 byobu 5.133

# Annex B: Using the Contestant VM

## Importing and Running the Contestant VM

Run VMware Workstation Player. Click on “Open a Virtual Machine”, locate the Contestant VM image (ioi-2021.0-xxx.ova) in the file dialog, and click Open. Then, click Import in the Import Virtual Machine dialog that appears. You may customise the VM name or change the storage path at your discretion.

After the import is complete, you can start running the Contestant VM.

Note: The steps for VMware Workstation Pro are almost identical, save for some slight UI differences.

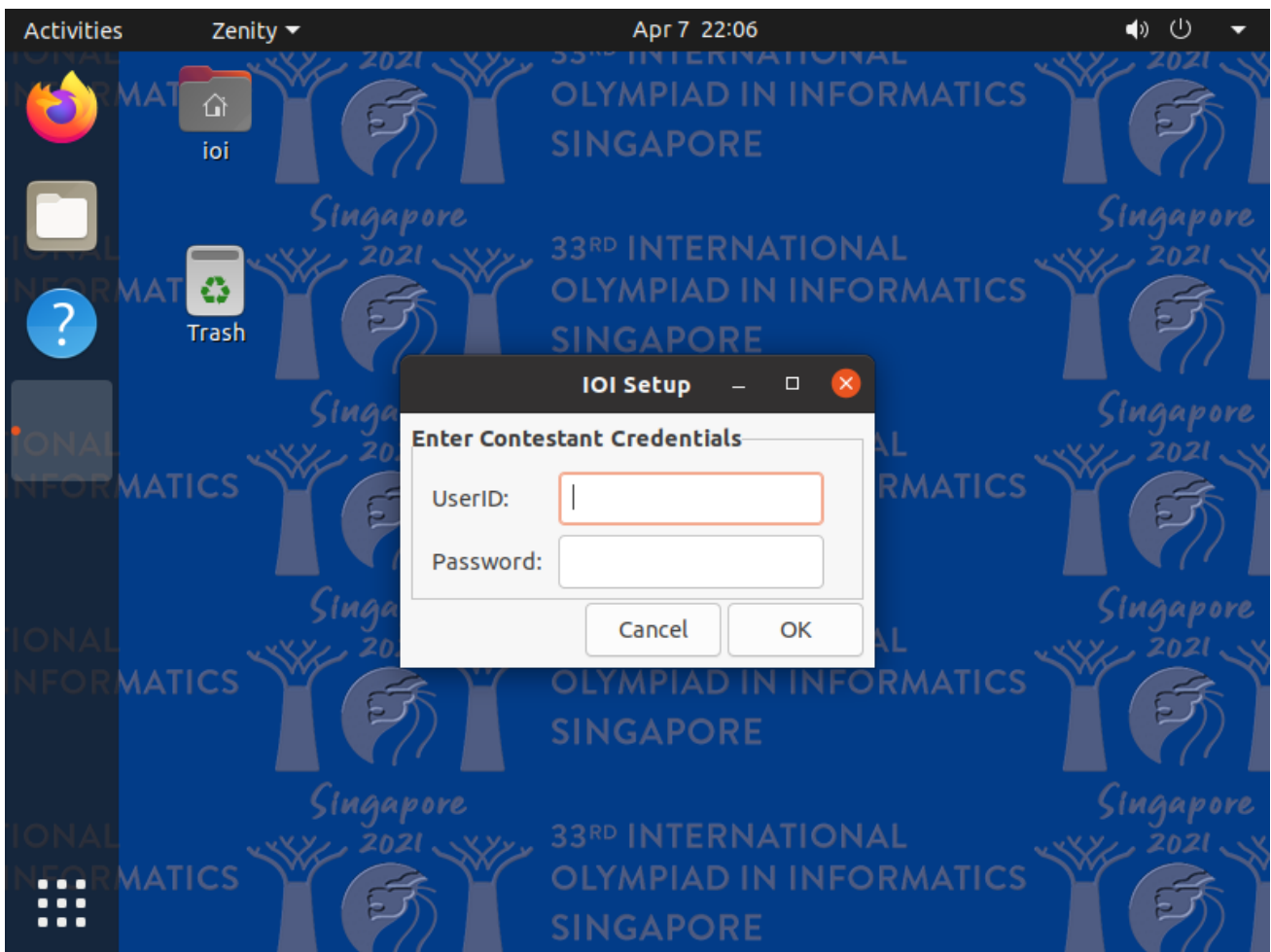
To run the Contestant VM, select the VM, then click Play virtual machine. When the VM has booted up, login using the default “ioi” account listed, and use the default password “ioi”.

The Contestant VM runs like any ordinary installation of Ubuntu 20.04. For users unfamiliar with VMware, here are some quick points to take note:

- When the Contestant VM runs in windowed mode (i.e. alongside other applications on the Windows desktop), you may sometimes need to click inside the Contestant VM display to direct keyboard and mouse inputs into it. If you find your keyboard and mouse inputs “stuck” to the Contestant VM, just press Left-Control and Left-Alt simultaneously to “release” the keyboard and mouse back to Windows.
- Like a regular Ubuntu 20.04 computer, you should shutdown the computer in the proper manner. From the Ubuntu desktop, click on the power button in the top right corner, then “Power Off/Log Out”, then “Power Off...”. Then, confirm by clicking on the “Power Off” button.

## First-Time Login to Contestant VM

At the first login to the Contestant VM, and every subsequent login as long as you do not complete this step, you will be prompted to run the IOI Setup script.



The IOI Setup script will request your Contestant credentials, then download and install a VPN configuration.

The Unix “gecos real name” is also updated with your Contestant ID, e.g. XXX1, which will be displayed in the top right corner on subsequent logins.

Contestants will still use the same Unix userid “ioi”. However, do note that the Ubuntu desktop login screen will now display the “gecos real name”, such as XXX1, after completing this IOI Setup.

The IOI 2021 Online Contest Environment will subsequently identify Contestants on the CMS website by the IP address assigned by the VPN. The website will not prompt for logins. Hence, it is important to ensure that Contestants are using the correct Contestant VM.

Contestants may, at their discretion, change the local Unix password for the “ioi” account in the Contestant VM. This new password will be preserved when the “ioi” account is reprovisioned before the start of Practice or Contest sessions. If the password is forgotten, a new Contestant VM will have to be provisioned.

## General Information

The sidebar on the left is called the Launcher. The top icon in the Launcher is the Firefox web browser.



Firefox has been configured with a default homepage that provides links to the IOI 2021 Contest Website as well as other locally stored documentation.

The Show Applications icon, located at the bottom of the Launcher, shows all installed applications. You can use the search bar to quickly find an application by name. For example, you can easily find the gnome-terminal by starting to type the letters of “terminal”.

Teams should ensure that they are familiar with finding and using the terminal shell. In case of unexpected problems, the HTC may send direction to Proctors to execute commands in a shell.

More information specific to IOI is provided in the “Contestant VM Manual” link in the Firefox homepage. Please take note of the following important highlights:

- Online connection: Contestant VM must be online and connected to the IOI 2021 Online Contest Environment no later than 1 hour before Practice starts, and 4 hours before Contest starts.
- Account reprovisioning: The “ioi” user account will be reprovisioned 15 minutes before Practice or Contest starts.
- Home directory backup: A backup mechanism is provided, but it is not enabled by default.
- Timezone: The default timezone is Asia/Singapore. Contestants may, at their own discretion, choose to use their own timezone. Note that all dates and times communicated by the IOI 2021 Organising Committee are in Asia/Singapore timezone (GMT+8) unless otherwise specified.