Lab 1 (Week 1)
Linux OS, Virtual Machine and Mininet

CAN201

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Outline

- Linux OS
- Virtual Machine
- Mininet
- Hands-on Practice
- Appendix

Linux Operating System

- Why do we use Linux OS?
  - Windows
  - Macintosh/MacOS
  - Linux
    - ✓ open-source
    - ✓ user friendly, e.g., built-in networking commands
    - ✓ many free apps networking related
- For this module, we mainly use Ubuntu Linux OS.

Virtual Machine

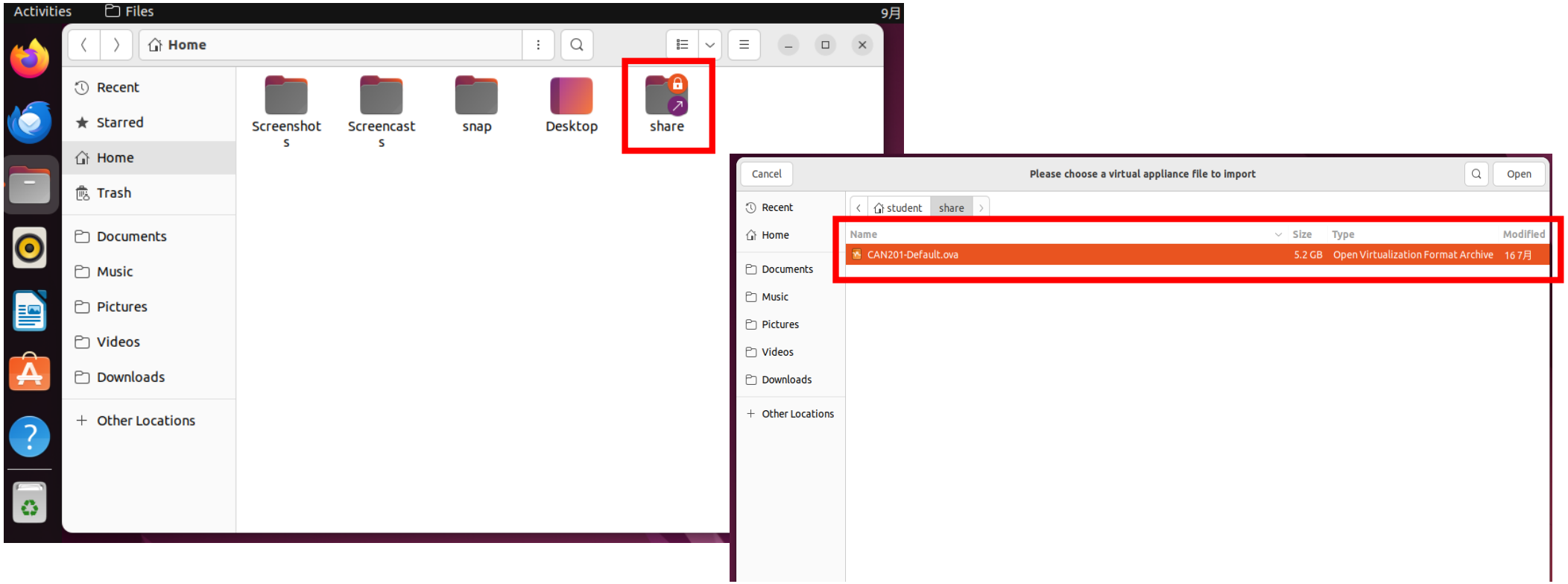
- Why do we use VM?
  - A physical machine can run multiple VMs (guest OSes)
  - Run Linux guest OS (if your host OS is Windows)
  - Much safer doing network security lab against VM
  - SDN lab-friendly

Virtual Machine

- Getting VM hypervisor
  - VirtualBox (open-source)
  - ❑ https://www.virtualbox.org/wiki/Downloads
  - VMware (not free)
  - ❑ https://www.vmware.com/products/workstation-player.html
  - Other VM hypervisors: QEMU, KVM, UML, etc.

Virtual Machine

- A Ready-made Ubuntu (20.04 LTS) OVA file “CAN201-Default.ova” has been created, which is located in the “share” folder.



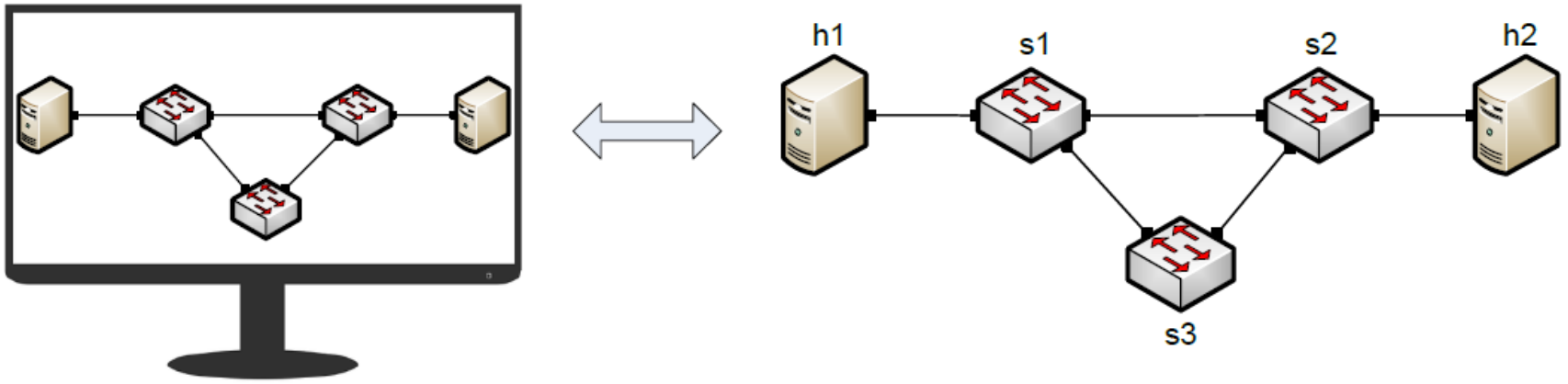
Virtual Machine

- The ready-made Virtualbox OVA (installing Ubuntu OS) includes the following softwares (which will be used for this module):

Software Name	License number
Wireshark (install on Ubuntu)	Version 3.4.9 or later (open source) https://www.wireshark.org/download.html
Mininet (install on Ubuntu)	Version 2.3.0 or later (open source) http://mininet.org/
Ryu SDN framework (install on Ubuntu)	Version 1 or later (open source) https://ryu-sdn.org/
Python (install on Ubuntu)	Version 3.0 or later (open source) https://www.python.org/downloads/
Snort (install on Ubuntu)	Version 3.0 or later (open source) https://www.snort.org/
Nmap (install on Ubuntu)	Version 7.9 or later (open source) https://nmap.org/

Mininet

- Mininet: a virtual testbed used for testing network tools and protocols.



Mininet

- Mininet offers the following features:
  - Fast prototyping for new networking protocols.
  - Simplified testing for complex topologies without the need of buying expensive hardware.
  - Realistic execution as it runs real code on the Unix and Linux kernels.
  - Open source environment backed by a large community contributing extensive documentation.

Hands-on Practice

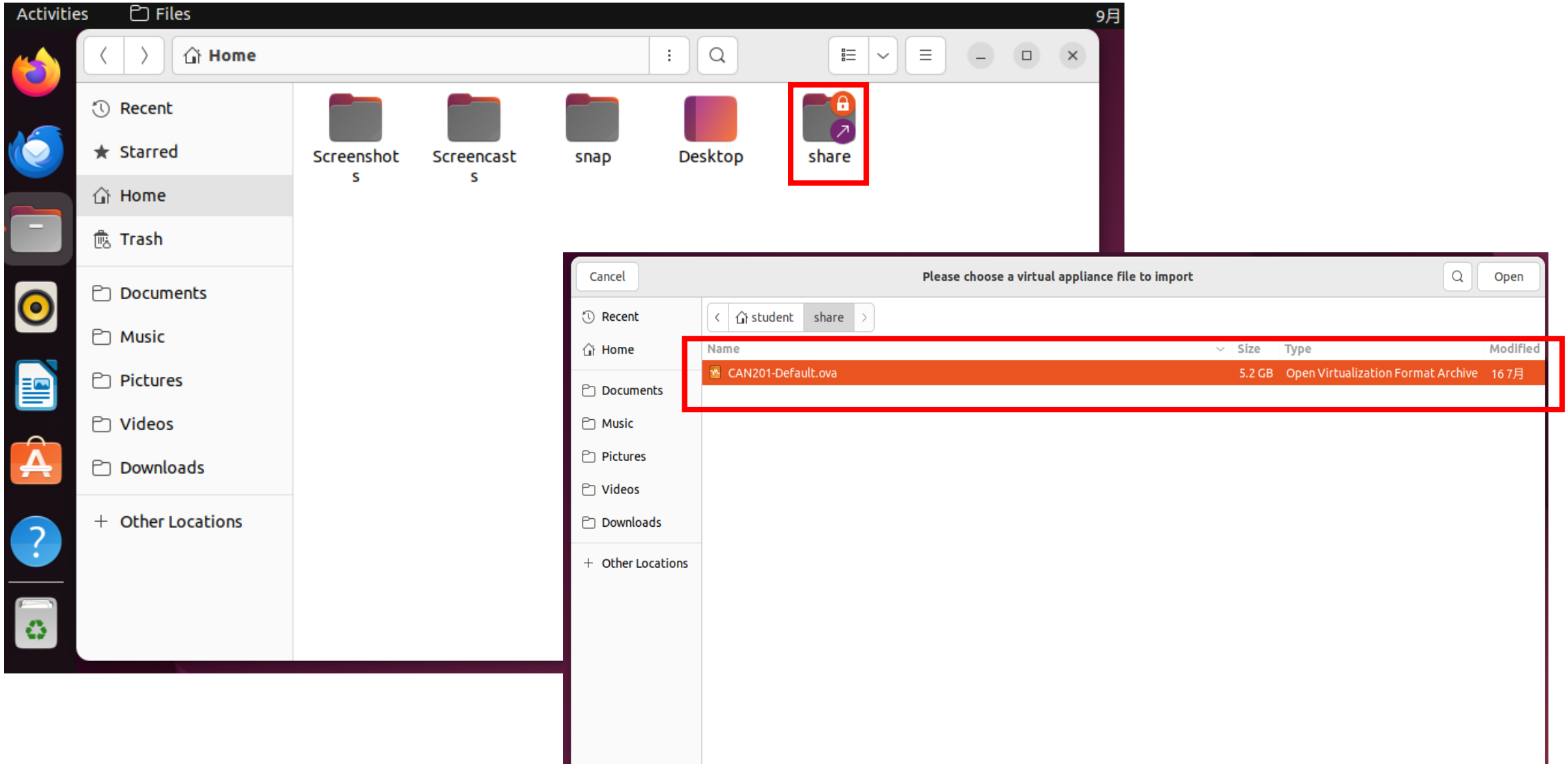
1. Create a VM using the given Ubuntu OS image. Call the VM “VM1” and use the Nat network termed “NatNetwork”. How to do it? Please refer to the following appendix.
2. Create another VM using the same given Ubuntu OS image, name it “VM2” and use the same “NatNetwork”. Also refer to the appendix. Hint: change the MAC address for VM2.
3. Open a terminal on VM1 and type the command “ifconfig” to check VM1’s IP address (e.g., like 10.0.1.5). And then you try to use VM2 to ping VM1’s IP address: 1) open a terminal on VM2; 2) type this command “ping 10.0.1.5” to see if VM2 can ping VM1.

Notice: VM1 and VM2 must have different IP addresses. If in your case they are the same (like, 10.0.1.15), then you must have done sth. wrong!!!

Appendix

- (Optional) Copy or Download the Ubuntu image VirtualBox OVA file
- Open VirtualBox software
- Create the virtual machine by importing the OVA file
- Set up the virtual network for the virtual machines
- Run the virtual machine

Copy the Ubuntu OVA file



Download the Ubuntu OVA file

1. OVA file is available:

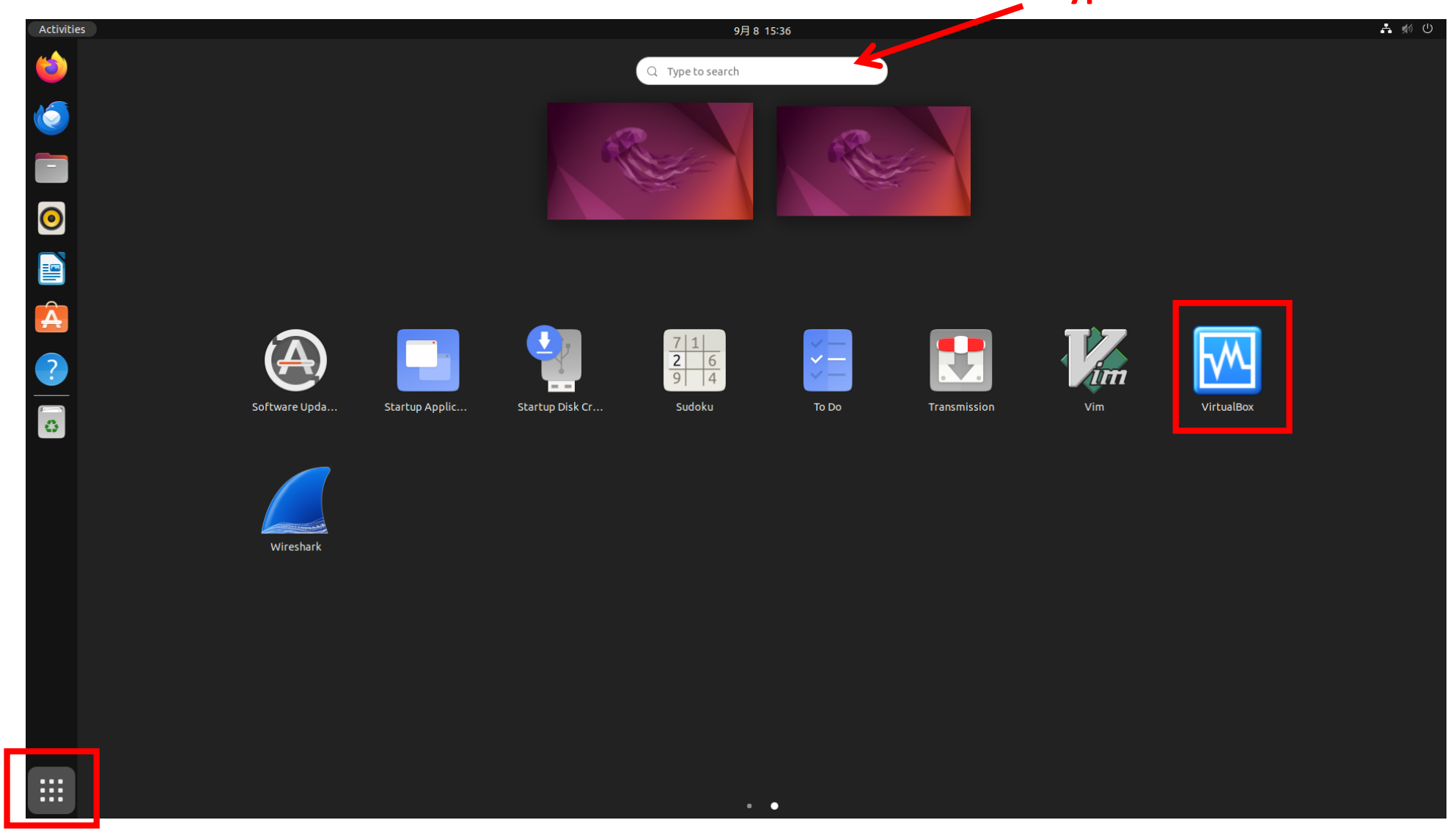
Baidu Pan (extracting code: nff7):
https://pan.baidu.com/s/1pacJXtJhSwmjdwZXBhkP8A?pwd=nff7

Google drive:
https://drive.google.com/drive/folders/17gJ4X_0LTpLVm67o6FVZPbWE2Uwepp3x

2. Choose the CAN201-Default.ova and download it.

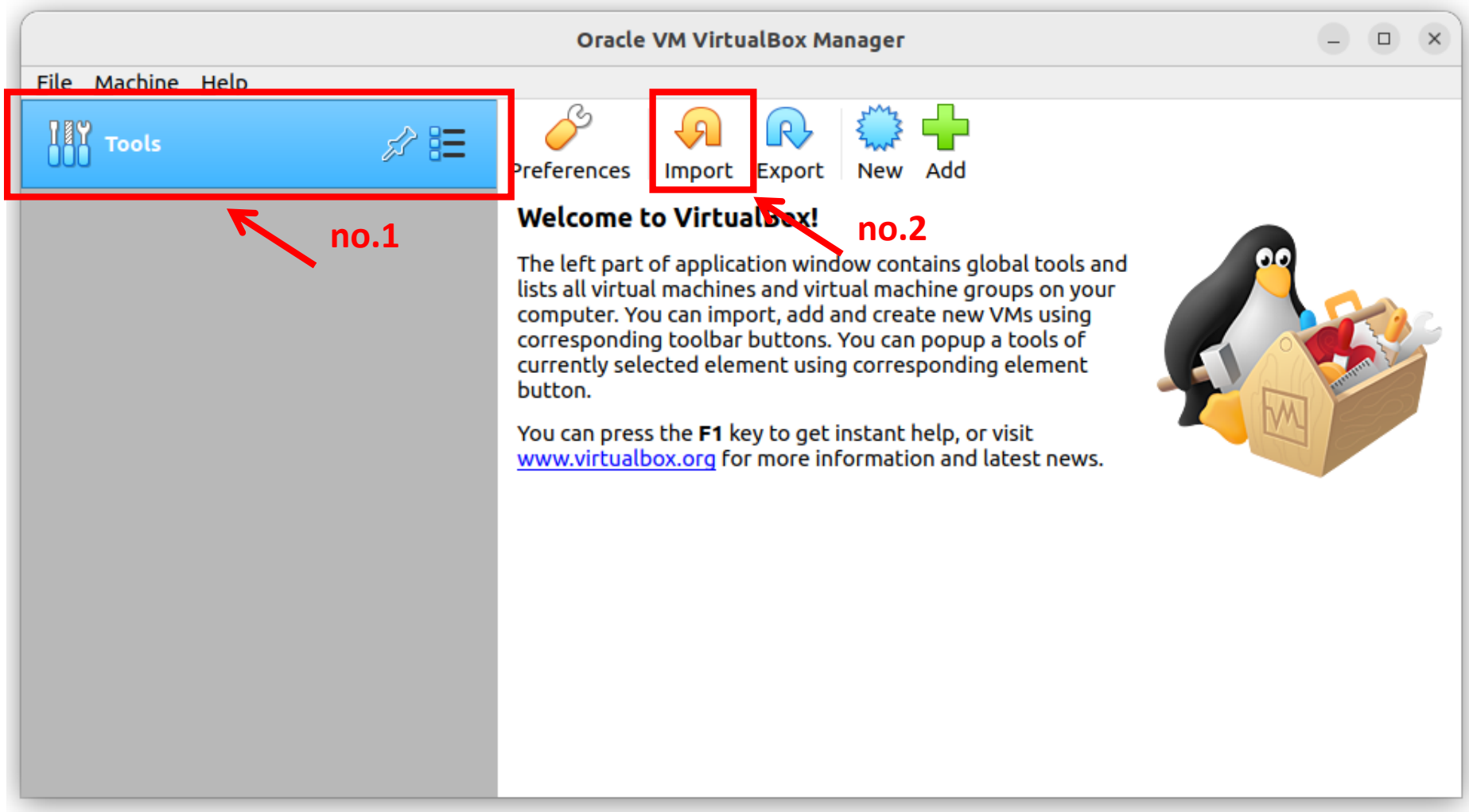
Note : The OS of the image is the linux Ubuntu 20.04 (64-bits).

Open VirtualBox software



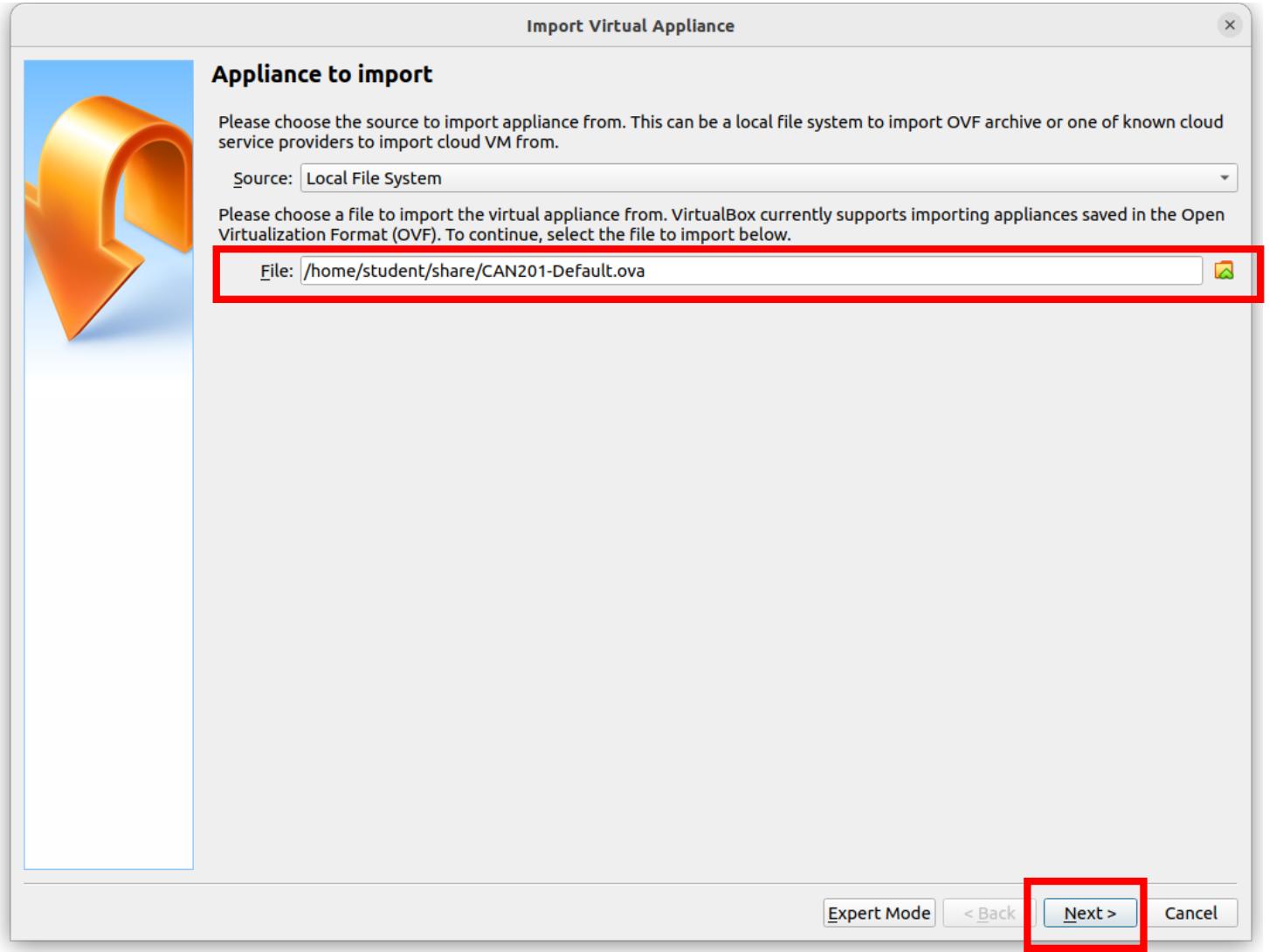
Import the Ubuntu OVA file

1. Choose Tools and click Import in VirtualBox



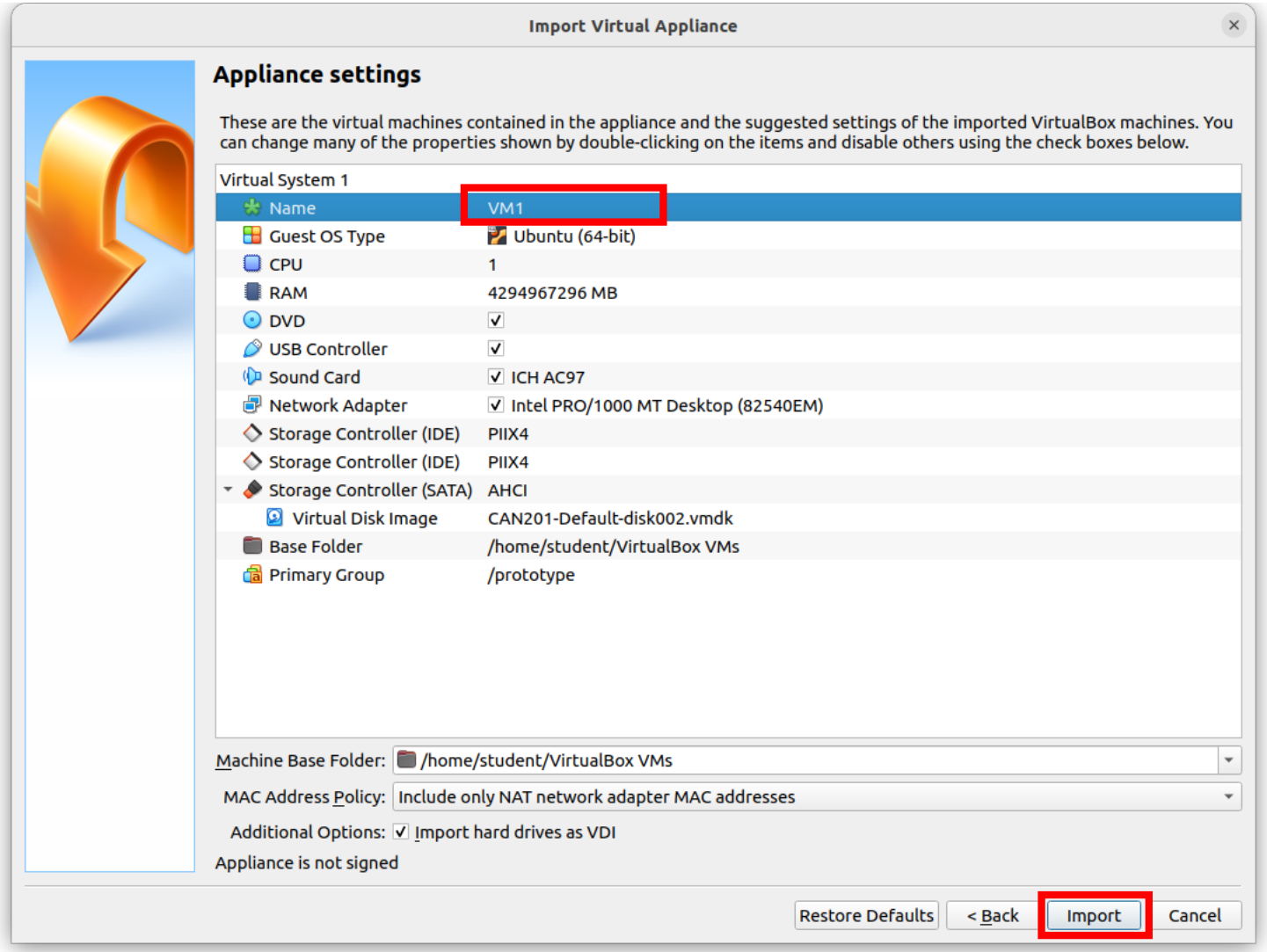
Import the Ubuntu Image

2. Select the OVA file and click Next.



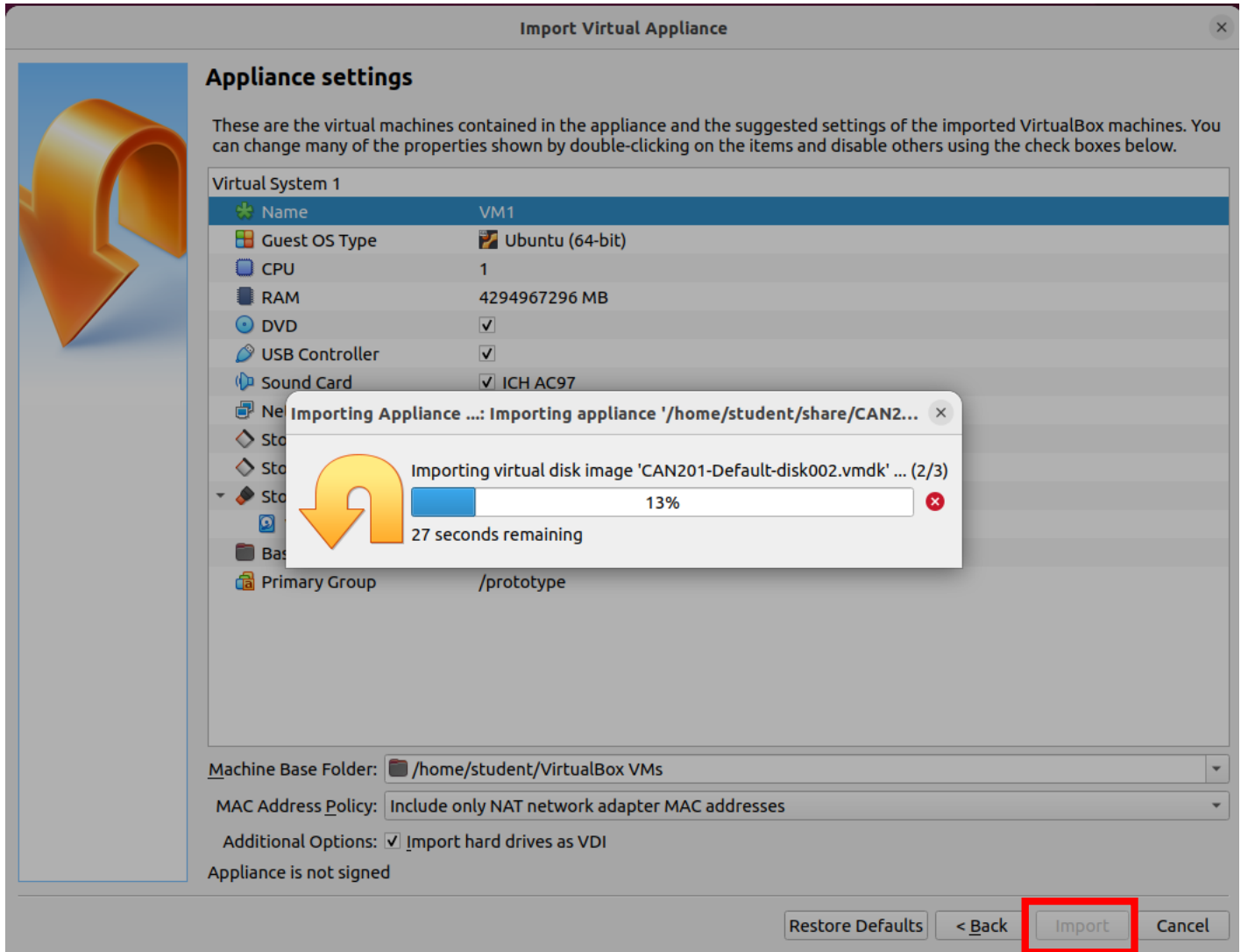
Import the Ubuntu Image

2. Change the VM name from “CAN201-Default” to “VM1”.



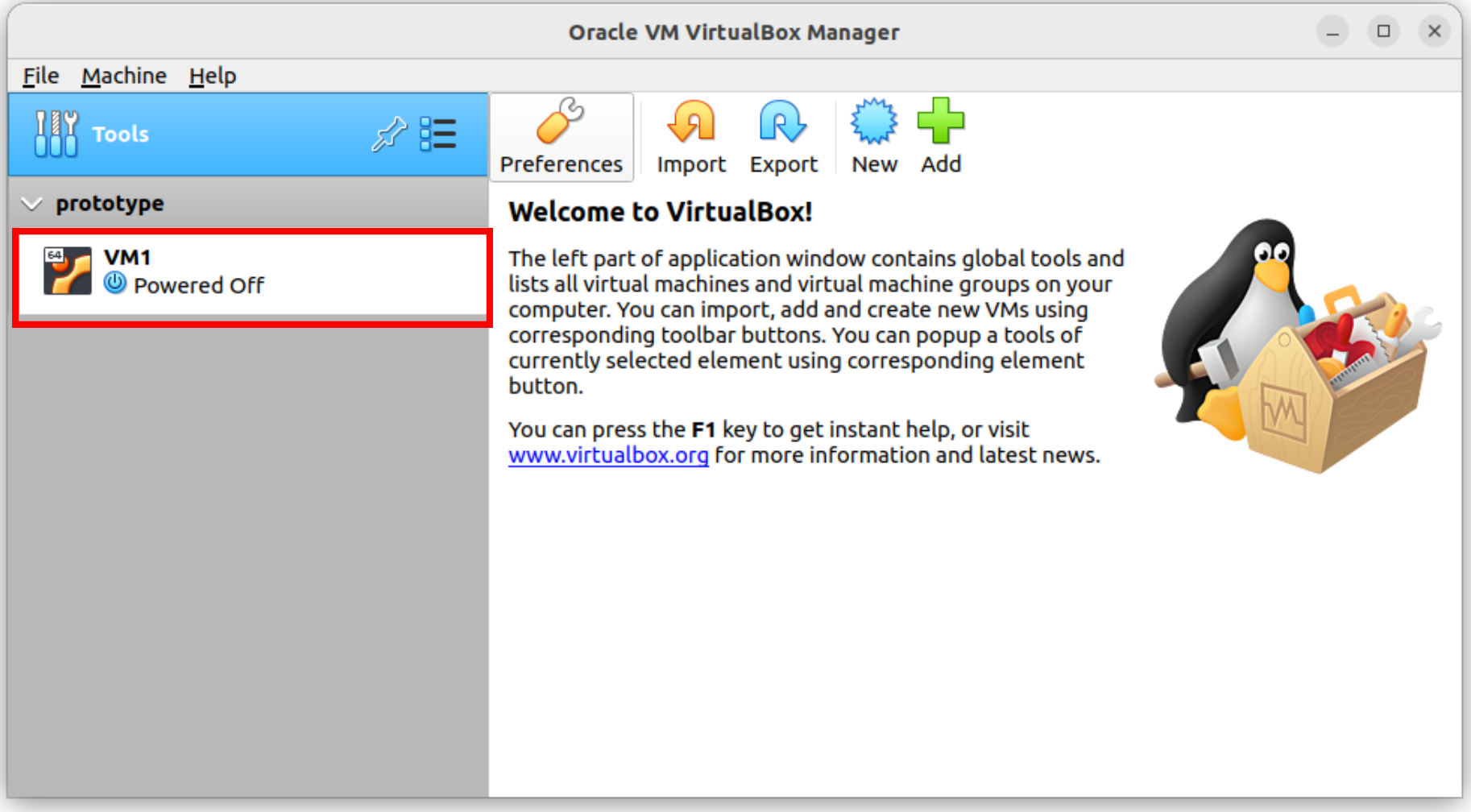
Import the Ubuntu Image

3. Click Import.



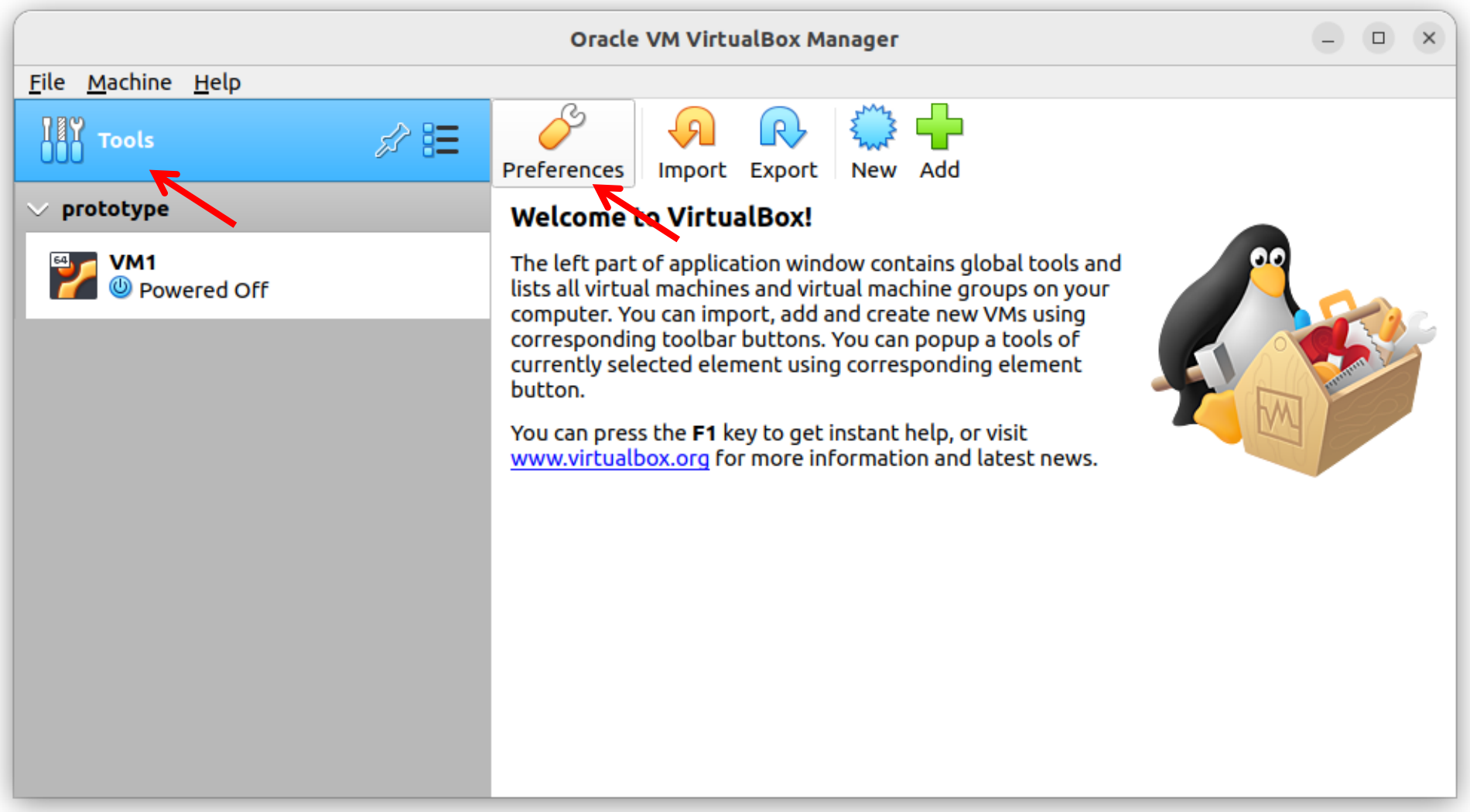
Import the Ubuntu Image

After a while, a new virtual machine option (should be named VM1 rather than CAN201-Default) will appear in the list of VirtualBox.



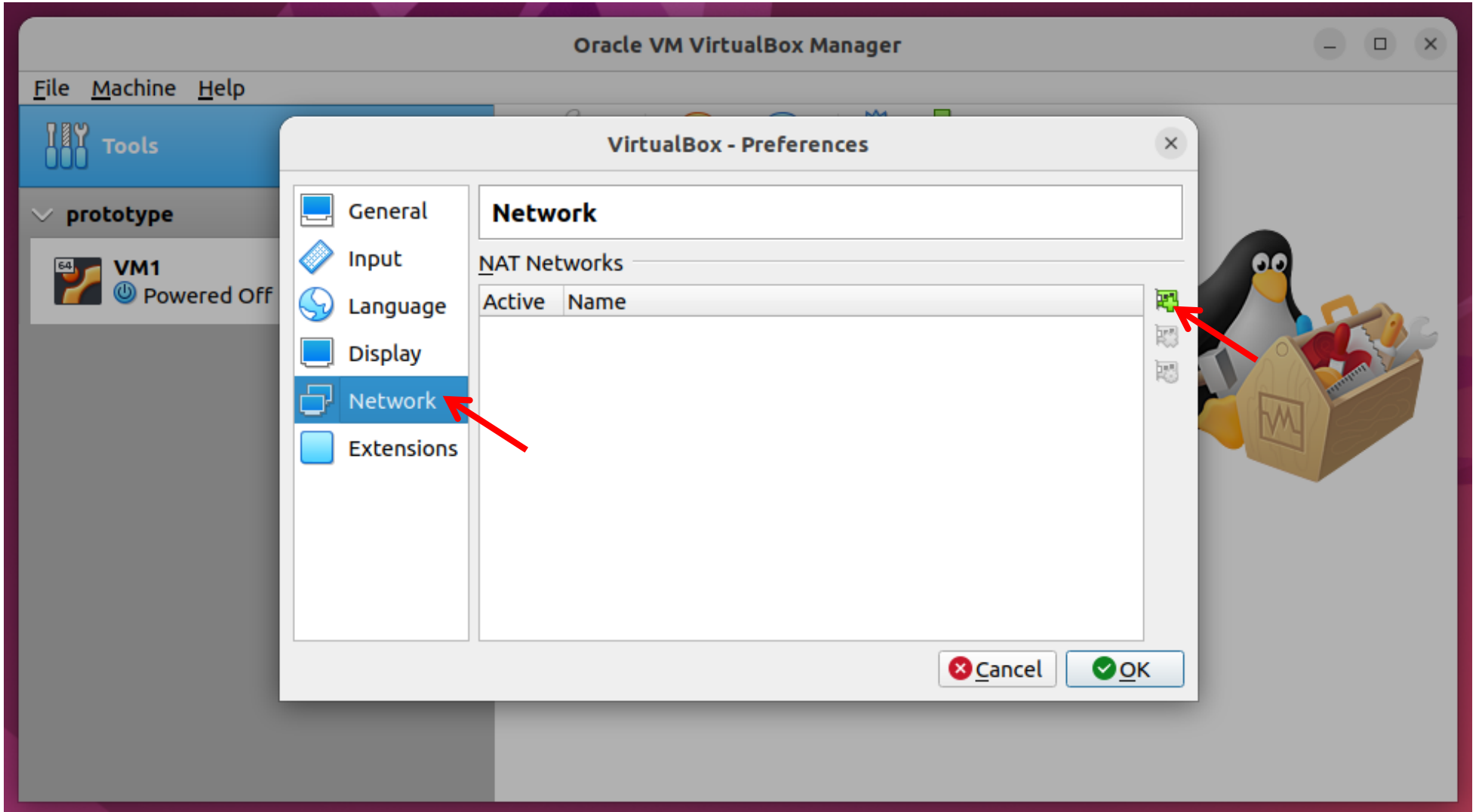
Set up the virtual network

1. Click Tools and click Preferences.



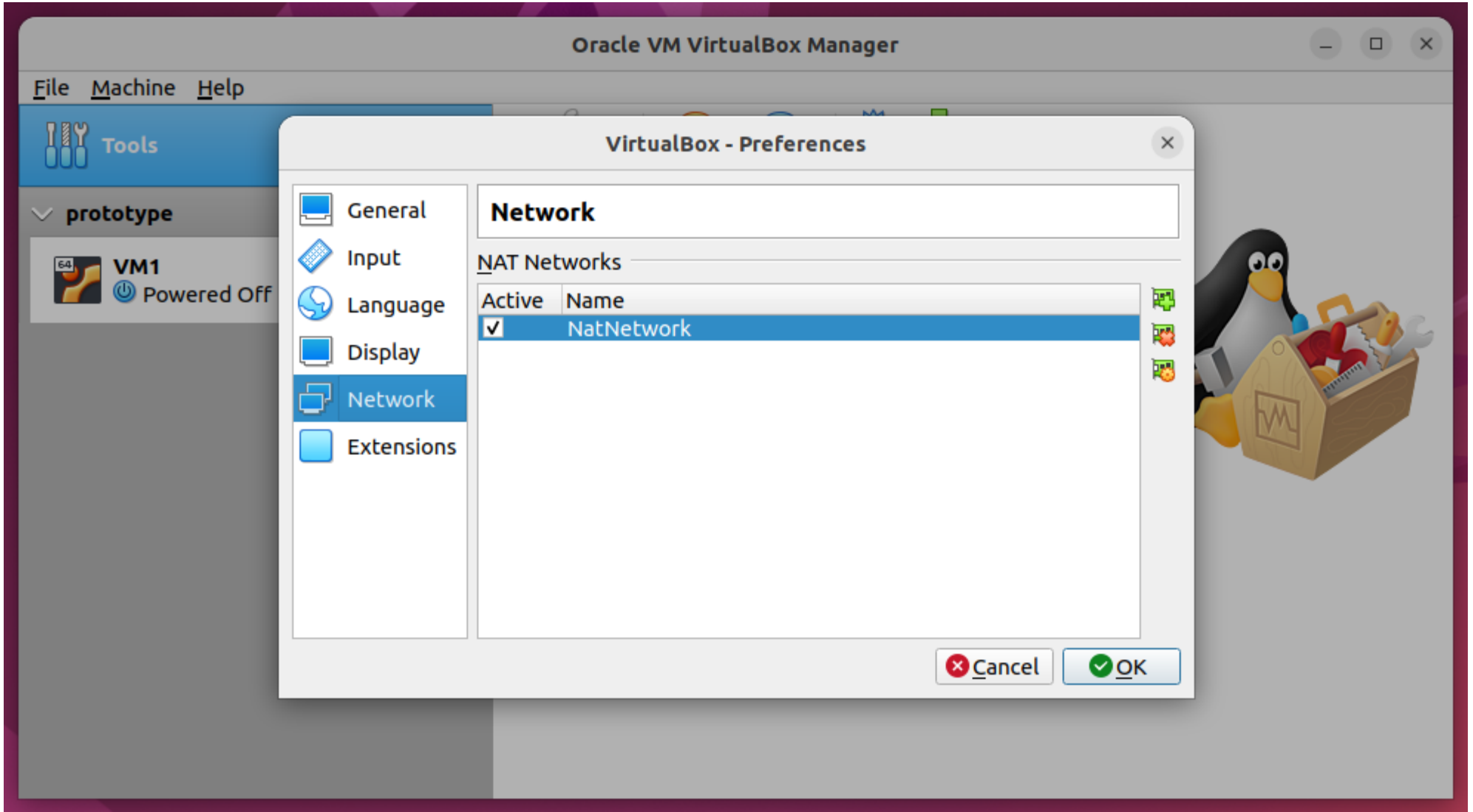
Set up the virtual network

2. Click Network and click create a new NAT network .



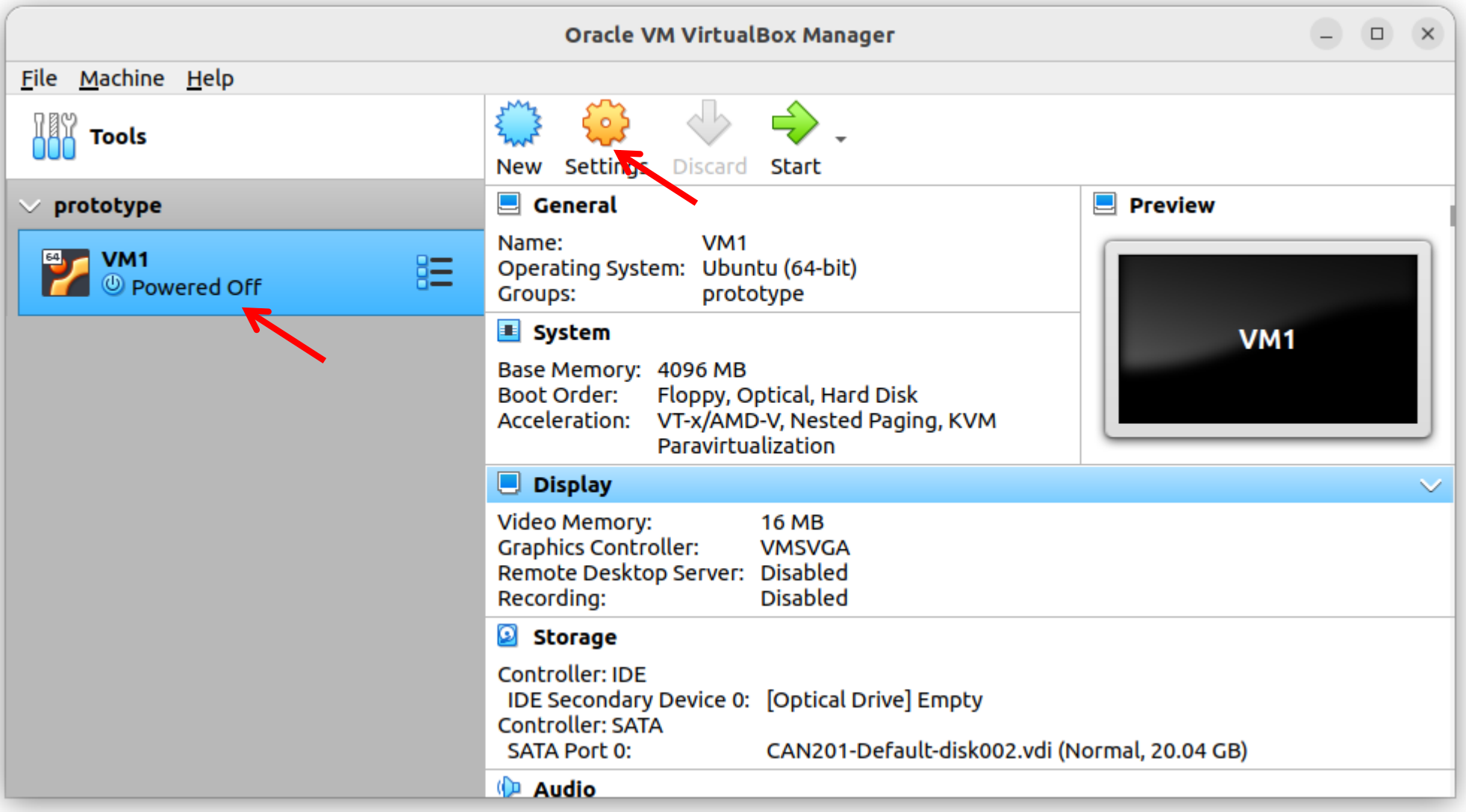
Set up the virtual network

3. Click OK .



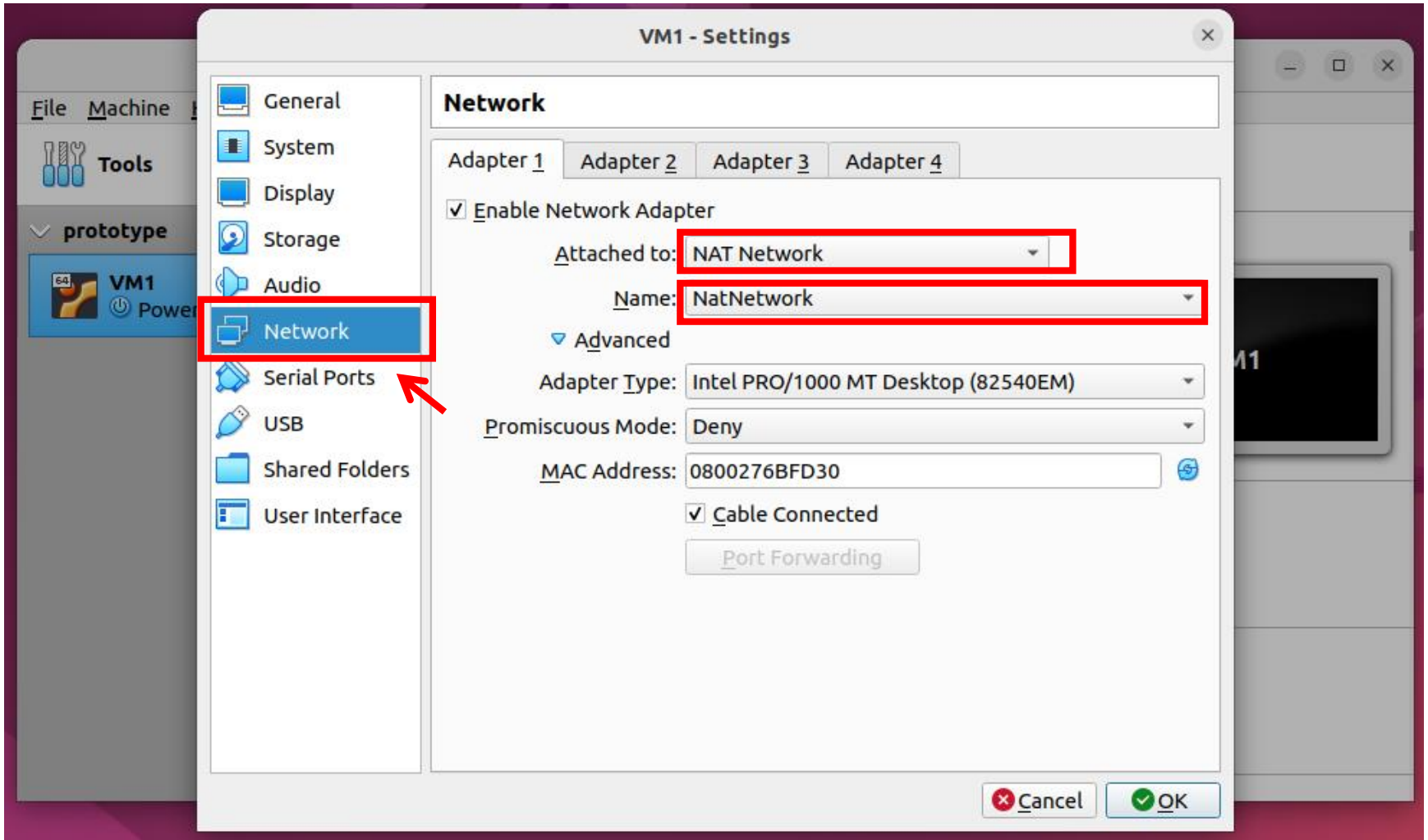
Set up the virtual network

4. Click VM1 and click Settings.



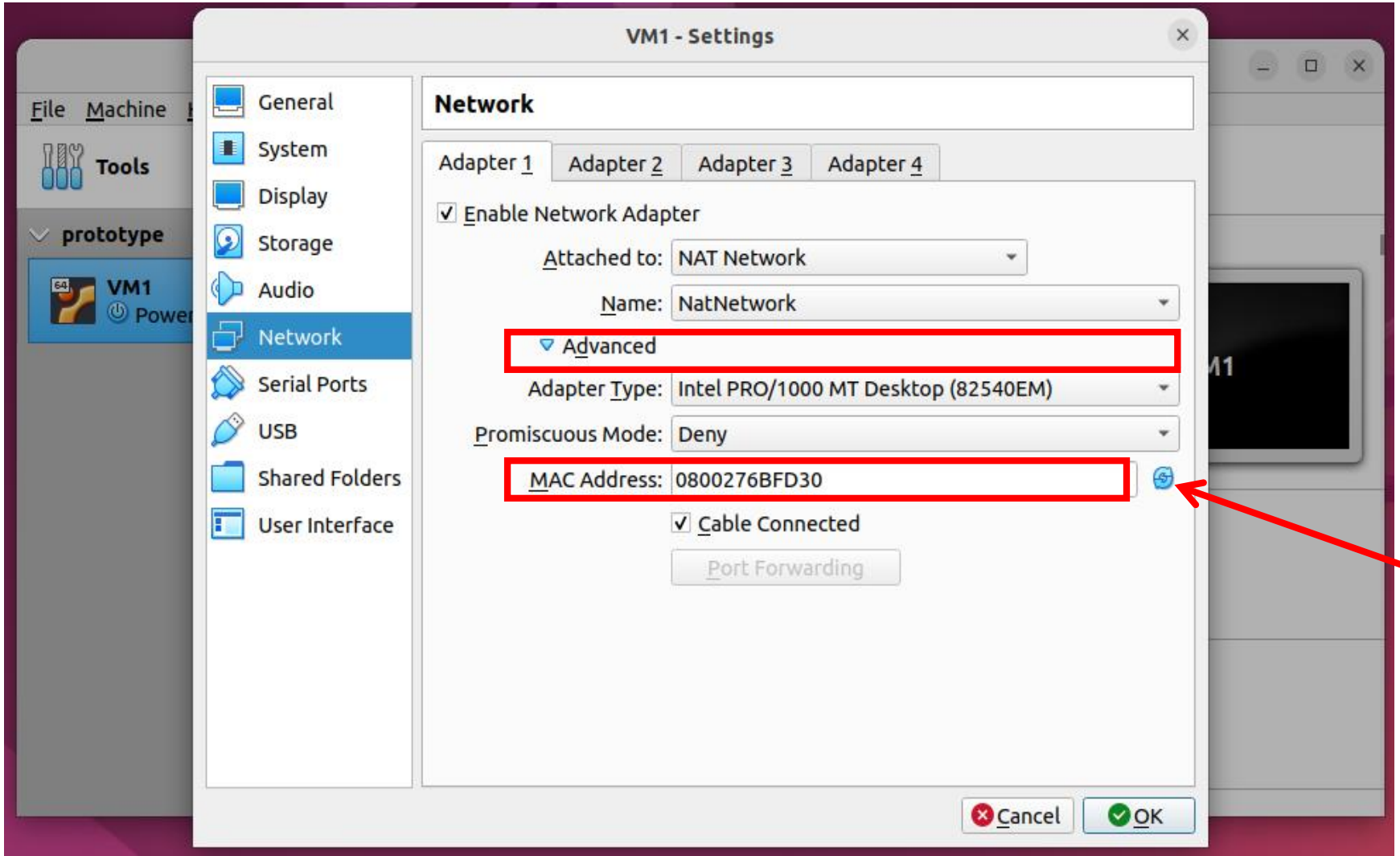
Set up the virtual network

5. Click Network and set Attached to: NAT Network ; Name: NatNetwork.



Set up the virtual network

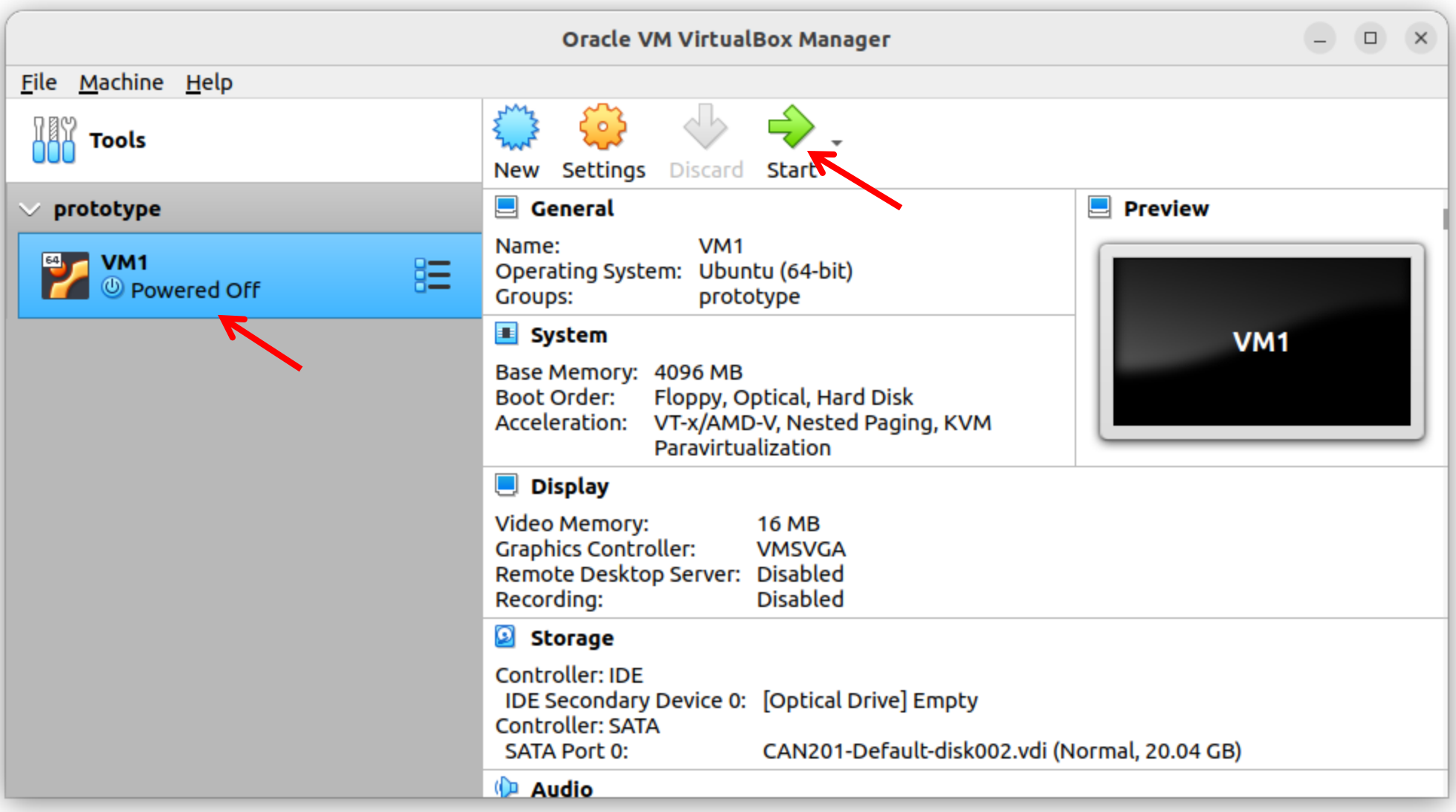
6. Click Advanced and set MAC Address you want. Finally , click OK.



Modify the MAC address

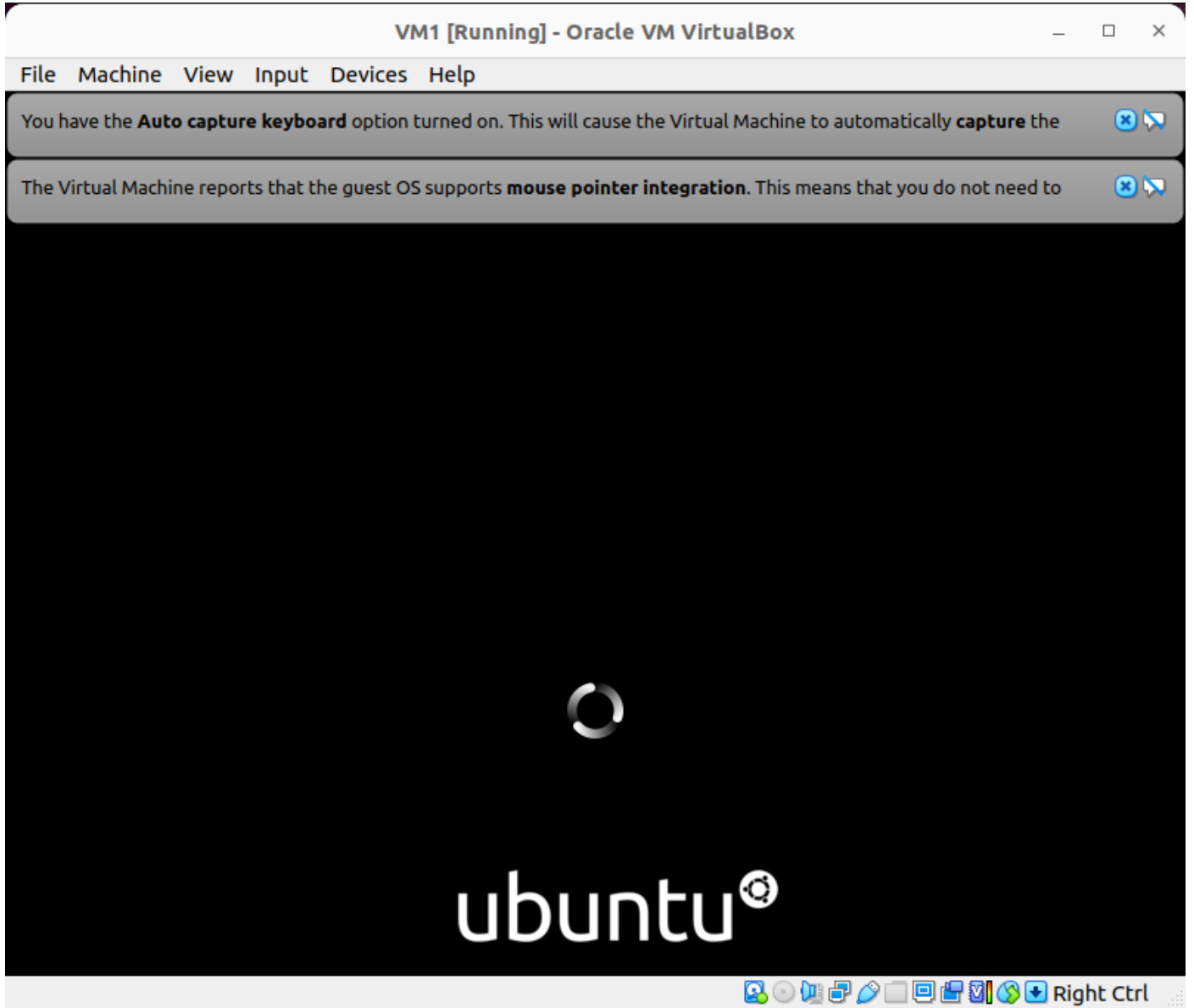
Run the virtual machine

1. Choose VM1 and click the Start.



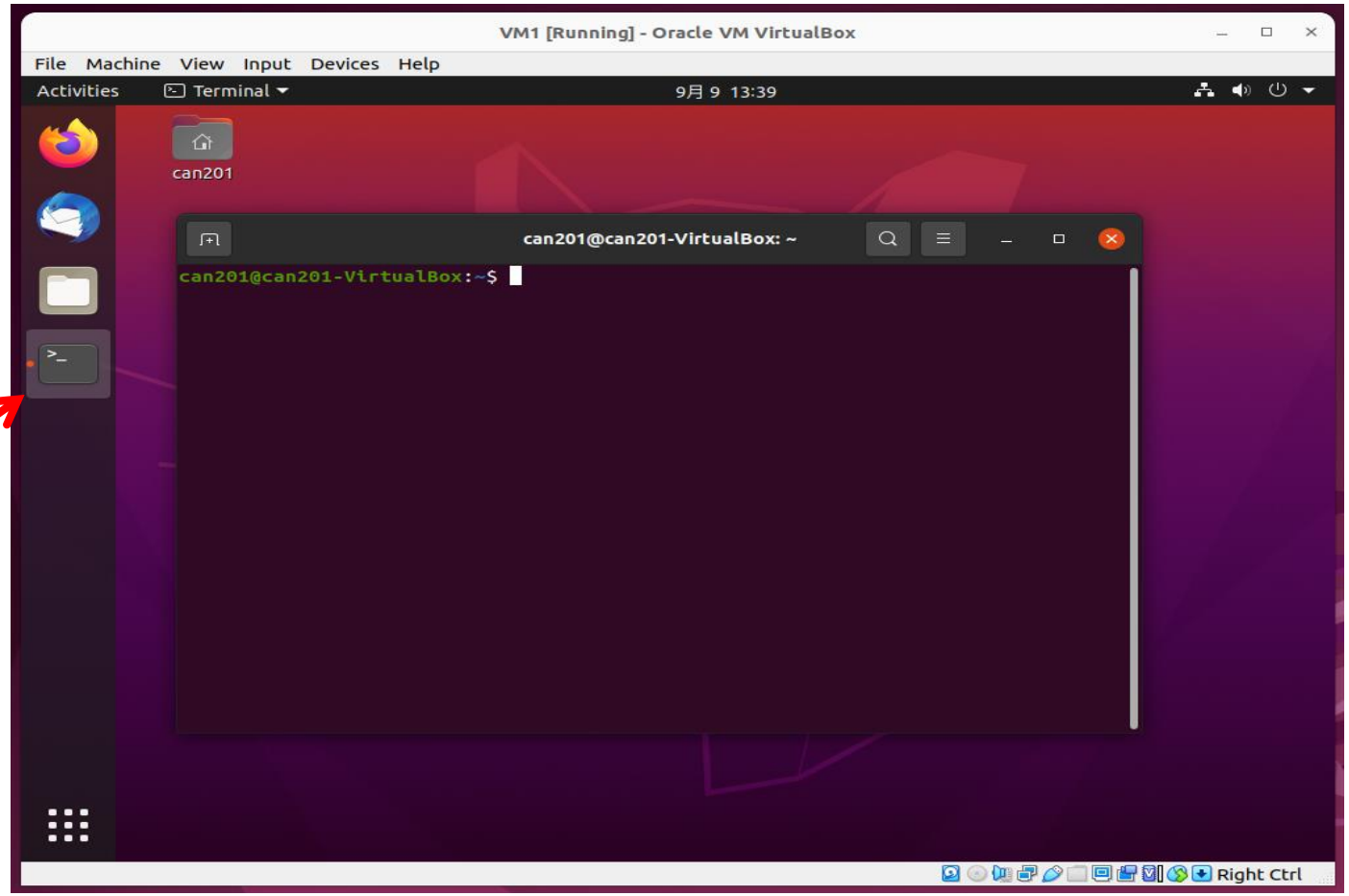
Run the virtual machine

2. Wait a few seconds.



Run the virtual machine

Ubuntu graphic interface/window shows up.



Open a terminal

Entering ubuntu does not require a password, but remember that the administrator password is **password** .

- Office hours (appointment required):

Monday 12:00 – 13:00

Tuesday 12:00 – 13:00