

Installing ROOT on Windows

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1 Introduction

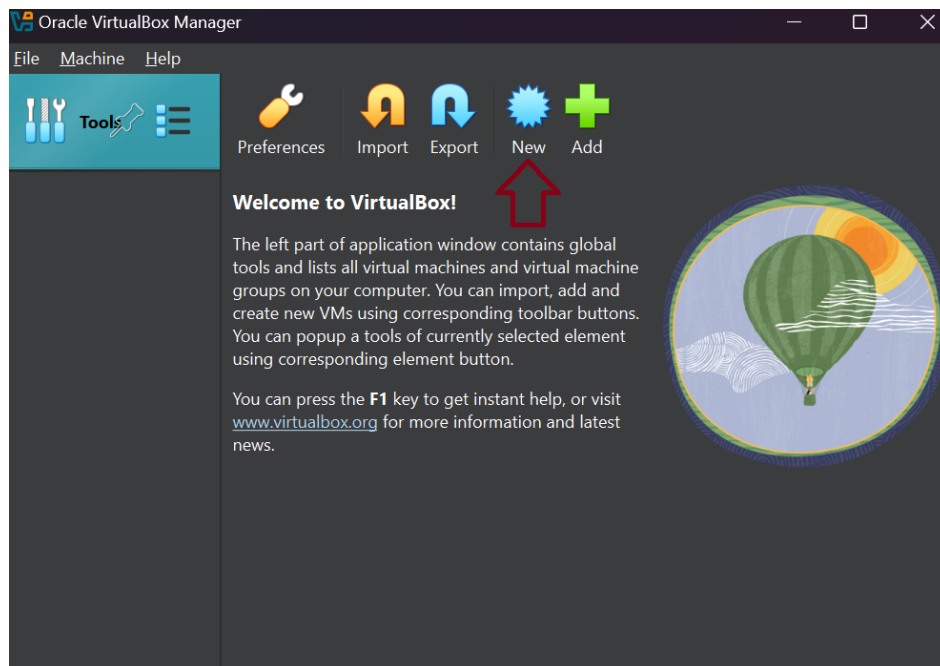
The ROOT framework works best in a Linux or Mac OS and difficulties arise when one tries to install it on Windows. A way to overcome this without actually making the switch to a different OS, is by creating a “smaller computer”, inside of your own, through the use of a virtual machine!

2 Necessary Installations

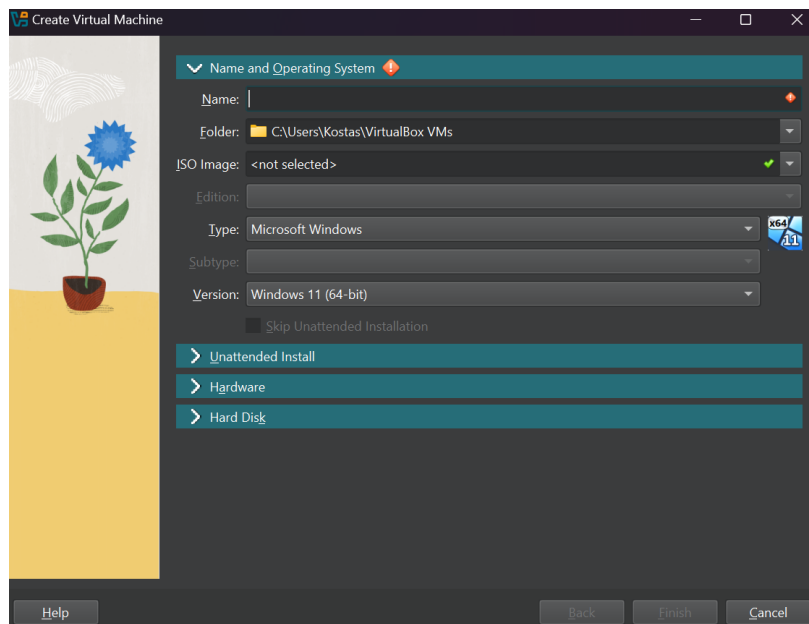
- Initially you will need to install Virtual Box, you can do this by simply pressing “Windows Hosts” [here](#).
- For your next step, you will download the Ubuntu Linux distribution [here](#). Ubuntu 24.04.2 has been used for the purposes of this guide.

3 Creating the Virtual Machine

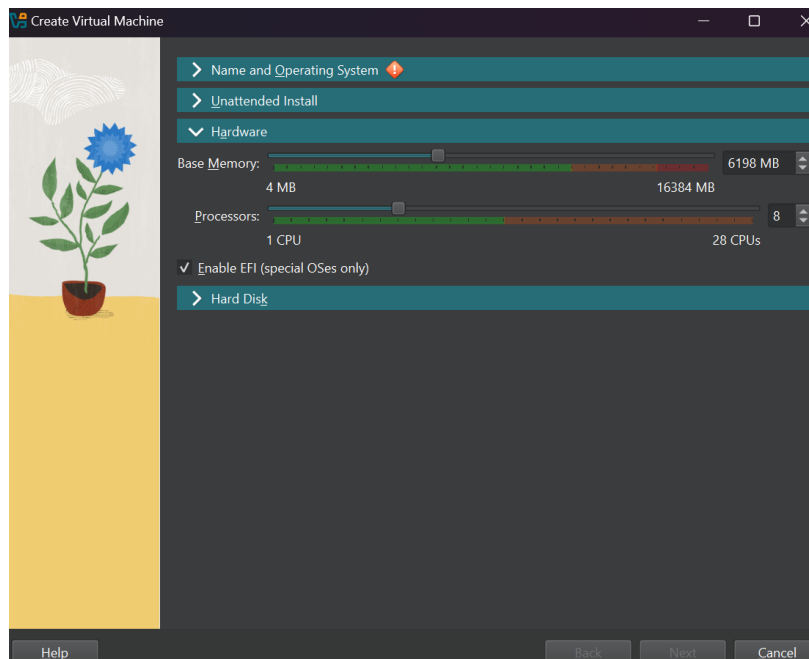
After the installations, you are ready to set up the Virtual Machine. Open up Virtual Box, and press the button that says “New”



After pressing this, name your Virtual Machine however you like and pick the file where you want to store it inside your computer. In the “ISO Image”, please choose the .iso file that corresponds to the Ubuntu version you downloaded in the previous step.

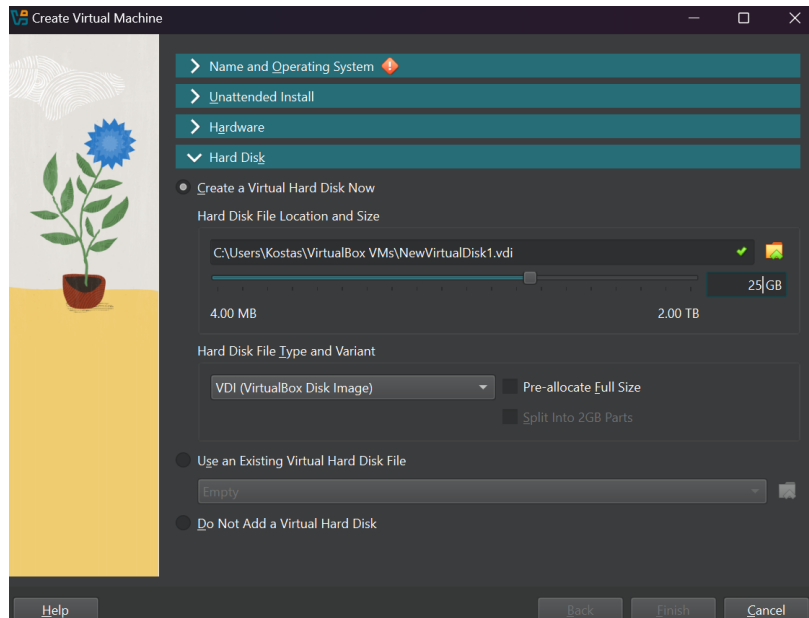


Important!!!: Select **Skip Unattended Installation**, this part is **crucial**. It will allow us to install Ubuntu manually, and this has to be done, for us to be able to access the terminal.



For this step we choose the amount of RAM memory and number of processors we want to allocate for the function of the Virtual Machine. This part seems innocent, but is quite tricky and what one chooses depends on their computer. Generally, you will want to allocate enough RAM for your installation and general tasks inside the Virtual Machine to run smoothly, but if you allocate more memory than what is generally available in your computer, the Virtual Box app will **not** work properly. My recommendation is to use a minimum of 4 GB of RAM and 2 processors and a maximum of 6-8 GB and 4-5 processors depending on the specifications of your PC/laptop.

Something important regarding this part, is that some processors have an option turned off regarding *virtualization*, this basically disallows us to use more than one processor for our virtual machine. Should we try to use more, Virtual Box will make sure to tell us, f.e. for AMD processors the error **AMD-V is disabled in the BIOS** will appear. This part can be easily fixed, but one would have to access the BIOS of their computer and alter the CPU configurations in order to allow more than one processor to be used in a Virtual Machine. Since accessing the BIOS and navigating through it, is personalized in every computer and is related to the motherboard, should you encounter this problem, use Youtube and/or any AI to guide you through the changes that are needed.



Finally you will need some free space in your hard drive for the Virtual Machine to create it's own partition which will be used for Linux to be able to operate. Using about 25-30 GB of disk space will be sufficient for our purposes.

4 Installing Linux

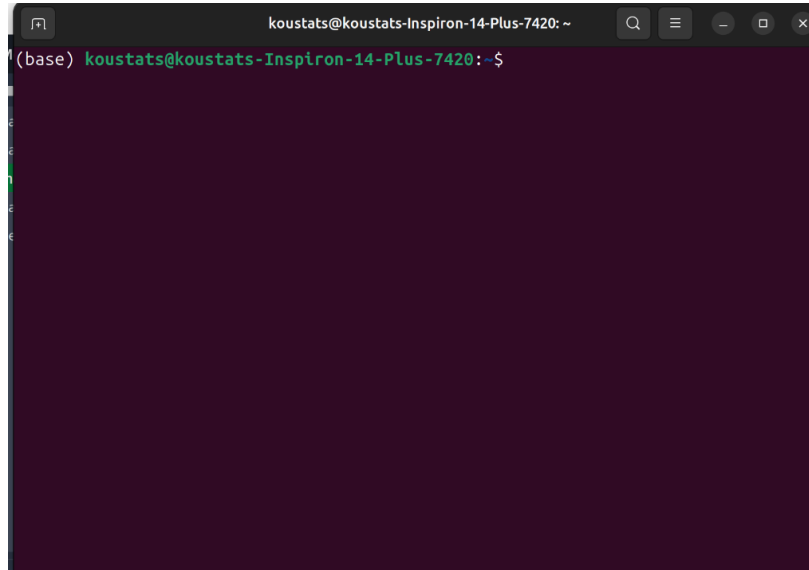
After you have set up the Virtual Machine, you are ready to start it and go through the manual installation of Ubuntu. If you are unfamiliar with this process, you should not worry, since the manual installation of Ubuntu is quite user-beginner friendly, but nonetheless a useful youtube video that guides you through the process can be found [here](#) (you might see some differences regarding the Virtual Box setup, don't worry too much about them, the later part of the video which focuses on the installation of Ubuntu is what you want to focus on if you need help with that).

5 Using Linux

You are now ready to start! Our biggest friend for installations and doing work on ROOT later on will be the Terminal. Go ahead and press the Ubuntu logo on the lower left part of your screen and look up "Terminal". I would recommend to right click it and pin it in your taskbar (which should be located in the left part of your screen), because you will be needing it quite a lot. It would also be helpful if you could access the guide inside the Virtual Machine (perhaps use Firefox to access your email and send this file to yourself) because the copied commands on your Windows clipboard will not transfer to the VM!

6 Prerequisites

In this part we will do the necessary installations for us to be able to download and use ROOT. Initially, go ahead and open the Terminal, you should see something like this:



If you have not used a Terminal before (also called Command Prompt on Windows), this is not a problem at all, most of what you will be doing is copying and pasting commands that I will provide you in this guide. The first ones we need to run are:

```
sudo apt update
sudo apt upgrade
```

Those will just update Linux. The next commands we will run are:

```
sudo apt-get update
sudo apt install binutils cmake dpkg-dev g++ gcc libssl-dev git libx11-dev \
libxext-dev libxft-dev libxpm-dev python3 libtbb-dev libvdt-dev libgif-dev
```

Please note that after every time you run a command that installs something on your computer, you will be asked to provide the password you chose when you installed Ubuntu, so don't forget that! A lot of gibberish will probably show up on your terminal, some times you will be asked to confirm that you want an installation (you will be able to do this by typing 'y' and Enter on your terminal), but for now you will just have to be patient and wait for all the downloads to finish. If you encounter any problems during this installation that are not part of this guide, take a screenshot of the error messages and give them to an AI (GPT, Deepseek etc.) or look it up on Youtube and you should be able to resolve it.

P.S. If your terminal feels too "crowded" you can clear it by typing *clear*, and if you somehow mess up a command, you can use the *up* arrow to recover a command that you previously ran!

7 ROOT! Finally!

I hope that you are not tired, because after the steps you followed, you are now ready to download ROOT and run your first program! Initially you want to visit [this site](#), find the version of ROOT you want to download (preferably the latest one) and press on the corresponding link.

The screenshot shows the ROOT Data Analysis Framework website. The 'Binary distributions' section contains a table with columns for Platform, Files, and Size. The file 'root_v6.34.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz' is highlighted in the table. A right-click context menu is open over this link, showing options like 'Open Link in New Tab', 'Copy', and 'Print Selection...'.

Platform	Files	Size
Almalinux 8.10	root_v6.34.04.Linux-almalinux8.10-x86_64-gcc8.5.tar.gz	278M
Almalinux 9.5	root_v6.34.04.Linux-almalinux9.5-x86_64-gcc11.5.tar.gz	297M
Debian 12	root_v6.34.04.Linux-debian12-x86_64-gcc12.2.tar.gz	284M
Fedora 40	root_v6.34.04.Linux-fedora40-x86_64-gcc14.2.tar.gz	304M
Fedora 41	root_v6.34.04.Linux-fedora41-x86_64-gcc14.2.tar.gz	294M
Ubuntu 20.04	root_v6.34.04.Linux-ubuntu20.04-x86_64-gcc9.4.tar.gz	288M
Ubuntu 22.04	root_v6.34.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz	287M
Ubuntu 24.04	root_v6.34.04.Linux-ubuntu24.04-x86_64-gcc13.1	
Ubuntu 24.10	root_v6.34.04.Linux-ubuntu24.10-x86_64-gcc14.1	
macOS 13.7 arm64 T8020	root_v6.34.04.macos-13.7-arm64-clang150.pkg	
macOS 13.7 arm64 T8020	root_v6.34.04.macos-13.7-arm64-clang150.pkg	
macOS 14.7 x86_64 T8020	root_v6.34.04.macos-14.7-x86_64-clang160.pkg	
macOS 14.7 x86_64 T8020	root_v6.34.04.macos-14.7-x86_64-clang160.pkg	
macOS 15.3 arm64 T8020	root_v6.34.04.macos-15.3-arm64-clang160.pkg	
macOS 15.3 arm64 T8020	root_v6.34.04.macos-15.3-arm64-clang160.pkg	
Windows Visual Studio 2022 32-bit x86	root_v6.34.04.win32.python311.vc17.exe	
Windows Visual Studio 2022 32-bit x86 (release with debugging information)	root_v6.34.04.win32.python311.vc17.relewithdeb	
Windows Visual Studio 2022 32-bit x86 (release with debugging information)	root_v6.34.04.win32.python311.vc17.relewithdeb	
Windows Visual Studio 2022 64-bit x64	root_v6.34.04.win64.python311.vc17.zip	
Windows Visual Studio 2022 64-bit x64	root_v6.34.04.win64.python311.vc17.exe	

Your screen should look like this. Now go ahead and find the version of ROOT that corresponds to the version of Linux you downloaded and are using in this virtual machine (in this guide I use Ubuntu 22.04). Instead of pressing the link and downloading the version through your browser, copy the name of the file as you can see in the screenshot. Now go to your terminal and paste the command:

Please note that the following two commands might not work for you, you need to use the appropriate link that corresponds to the version of ROOT you want to download!

```
wget https://root.cern/download/root_v6.34.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz
```

Now to compile what you just downloaded run the command:

```
tar -xzf root_v6.34.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz
```

And now ROOT should be installed! Now, for us to be able to use ROOT after we open the Terminal we basically have to tell ROOT “where to find us”, this can be done manually, but we can automate it! For a start write in your terminal:

```
nano ~/.bashrc
```

Then go to the end of the file and paste the following command:

```
source root/bin/thisroot.sh
```

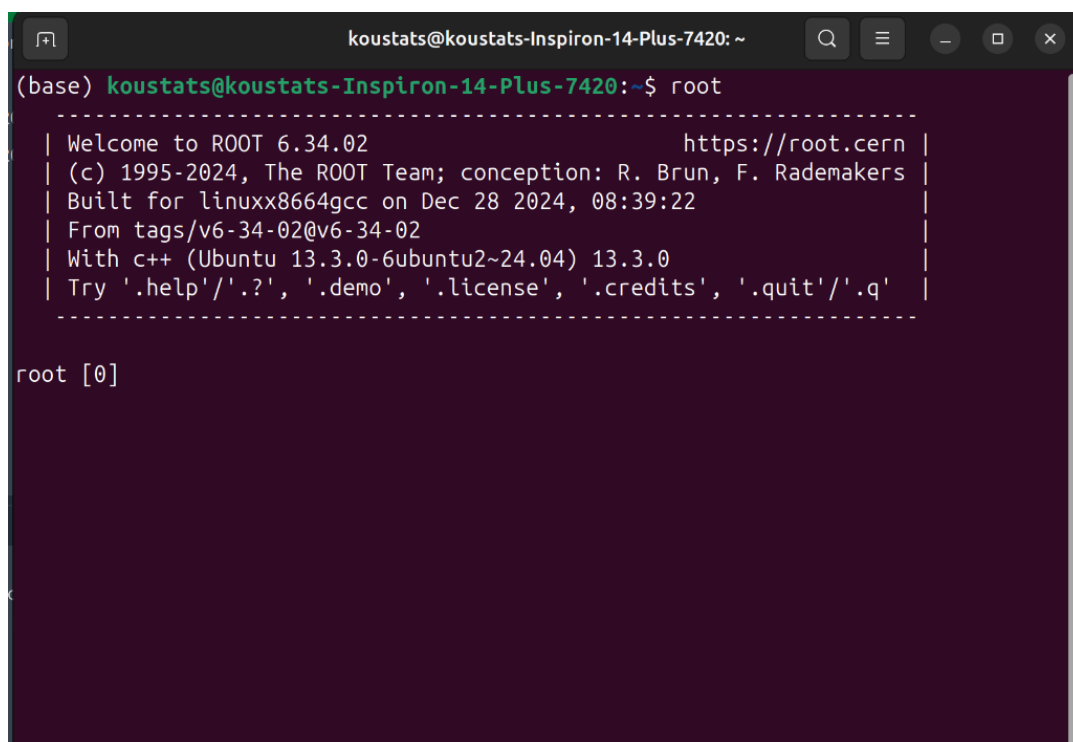
Following this press Ctrl+O to save your changes and exit the editor by pressing Ctrl+X. Finally run the command:

```
source ~/.bashrc
```

In a nutshell the script bashrc runs each and everytime you open a terminal, in this way we help “ROOT find us” every time we open the terminal automatically.

8 Does everything work?

To ensure everything works correctly, type `root` in the terminal. The following should appear:

A terminal window with a dark background. The title bar shows 'koustats@koustats-Inspiron-14-Plus-7420: ~'. The prompt is '(base) koustats@koustats-Inspiron-14-Plus-7420:~\$'. The user has entered 'root'. The output is a welcome message for ROOT 6.34.02, enclosed in a dashed box. The message includes the ROOT website, copyright information, build details, and a list of commands to try. Below the dashed box, the prompt is 'root [0]'.

```
(base) koustats@koustats-Inspiron-14-Plus-7420:~$ root
-----
| Welcome to ROOT 6.34.02                               https://root.cern |
| (c) 1995-2024, The ROOT Team; conception: R. Brun, F. Rademakers |
| Built for linuxx8664gcc on Dec 28 2024, 08:39:22 |
| From tags/v6-34-02@v6-34-02 |
| With c++ (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0 |
| Try '.help'/'.'?', '.demo', '.license', '.credits', '.quit'/'.'q' |
-----

root [0]
```

Now stop ROOT by pressing `Ctrl+Z`. And try running your first ROOT program by pasting this in the terminal:

```
wget https://github.com/theofil/I2TheTerascale/archive/refs/heads/main.zip
unzip main.zip
cd I2TheTerascale-main/code/C/
root -l makePlot.C
```

It should be easy to understand by the output if everything has went according to plan :)