ROOT-CERN

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Introduction

Root[1][2] is scientific toolkit used for data analysis , statistical analysis,multivariate analysis (TMVA)[3], visualization and storage. It's C++ programming based, but also integrated to other languages like Python(PYRoot)[4], and R(ROOTR)[5].

1 Build Prerequisites

Before, going to install Root first, we have to install pre-requisites for Root-Build Prerequisites [6]. I'm Ubuntu user. So, I have installed root on ubuntu. Just write packages Figure 1 on ubuntu terminal and press Enter Figure 2.

2 Downloading

After, install packages for Build-Prerequisites, now we have to download the root packages[7] in source.tar file[8].

3 Installation

After, download .tar file you can shift this file in your desired working area. Like I copy this .tar file in Home Directory Figure 3. Now, extract this **root_v6.20.04.source.tar.gz** like Figure 4.

Now, go into **root-6.20.04** directory Figure 5, then **./configure - -all** Figure 5. Now go back from this directory Figure 5 by typing **cd ..**. Make a directory **mkdir root** Figure 5, go into root directory **cd root** Figure 5. At the last, type **cmake ../root-6.20.04/** and Press Enter Figure 5.

After cmake, now we have to make all files like **make -j4** Figure 6. After make files, now type **make install** Figure 7. Now root install in your working **Home** directory. Now, we have to set path for Root. For this purpose open a new terminal and type **nano .bashrc** and Press Enter Figure 8. When you Enter this will open a new terminal like Figure 9 and Scroll down and type **source /home/muhammad/root/bin/thisroot.sh** here before **root/bin/thisroot.sh** write your home address, then press **Ctrl+S** and then **Ctrl+X** to Exit.
Open a new terminal and Write **source .bashrc** like Figure 10 and press Enter and then Type **root** like Figure 10 and Press Enter. To Exit from root terminal press **.q**.

4 Setting the Environment Variables

For setting the Environment variables [12] open a new terminal and write the following command on terminal like Figure 11.

5 PyRoot

Here, I will discuss how to install Pyroot[13] binding in Root. For this purpose, first we have to install pre-requisite for this. First, open a new terminal and write **sudo apt install python-pip** like Figure 12 and Press Enter. Now, write **pip install jupyter metakernel** like Figure 13 and Press Enter. After this installation, write on terminal **root –notebook** and Press Enter. This will open a Jupyter notebook like Figure 14.

6 Root-Tutorials

For root-tutorials you can visit my Github repository [9] and other tutorials [10], [11].

References

[1] Root, *https://root.cern.ch/*

[2] Root, *https://arxiv.org/pdf/1508.07749.pdf*

[3] TMVA, *https://arxiv.org/abs/physics/0703039*

[4] PyRoot, *https://root.cern.ch/pyroot*

[5] ROOTR, *https://root.cern.ch/doc/master/md_bindings_r_doc_users-guide_ROOTR_Users_Guide.html*

[6] Build-Prerequisites *https://root.cern.ch/build-prerequisites*

[7] Release 6.20/04 - 2020-04-01 *https://root.cern.ch/content/release-62004*

[8] Root Source distribution *https://root.cern/download/root_v6.20.04.source.tar.gz*

[9] Root-codes, *https://github.com/MFarooq786/root-codes*

[10] Root-Project official, *https://github.com/root-project/root/tree/master/tutorials*

[11] Root-Summer-Course,*https://github.com/root-project/training*

[12] Setting the Environment Variables, *https://root.cern.ch/root/htmldoc/guides/users-guide/GettingStarted.html*

[13] PyRoot-Binding,*https://root.cern.ch/how/how-use-pyroot-root-python-bindings*

```
sudo apt-get install git dpkg-dev cmake g++ gcc binutils libx11-dev libxpm-dev
sudo apt-get install gfortran libssl-dev libpcre3-dev libxft-dev libxext-dev
sudo apt-get install xlibmesa-glu-dev libglew1.5-dev libftgl-dev libmysqlclient-dev
sudo apt-get install libfftw3-dev libcfitsio-dev graphviz-dev libavahi-compat-libdnssd-dev
sudo apt-get install libldap2-dev python-dev libxml2-dev libkrb5-dev libgsl0-dev libqt4-dev

sudo apt-get install libssl-dev libpcre3-dev xlibmesa-glu-dev ibglew1.5-dev libftgl-dev
sudo apt-get install libmysqlclient-dev libfftw3-dev libcfitsio-dev graphviz-dev
sudo apt-get install libavahi-compat-libdnssd-dev libldap2-dev python-dev python-numpy-dev
sudo apt-get install libxml2-dev libkrb5-dev libgsl0-dev libqt4-dev r-base
```

Figure 1: Root-Build-Prerequisites

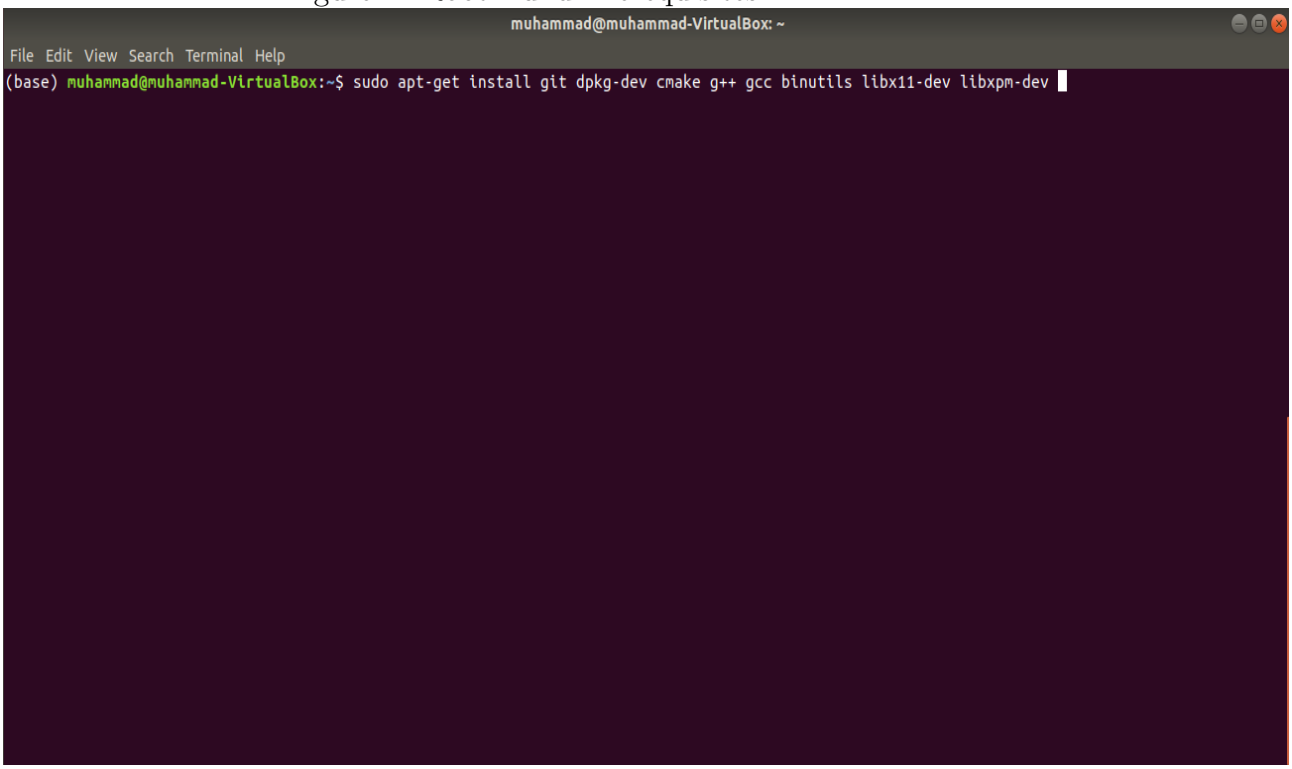

Figure 2: packages installation

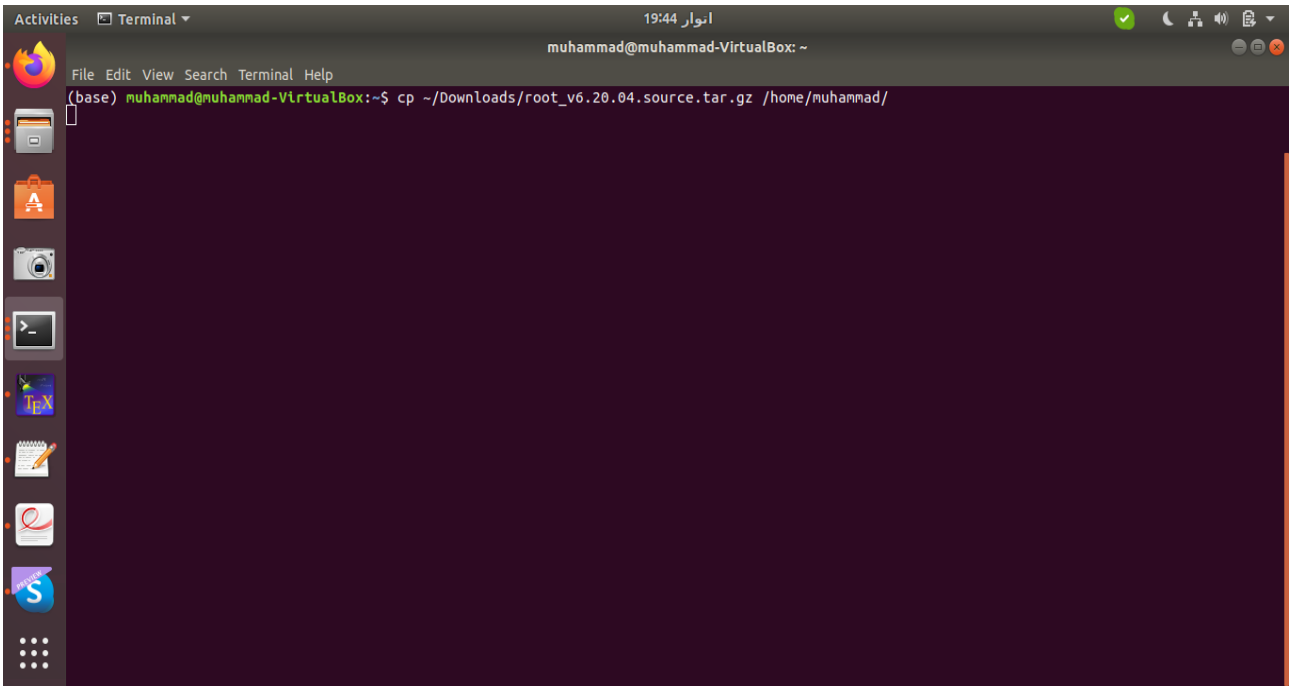

Figure 3: Home-Working Directory

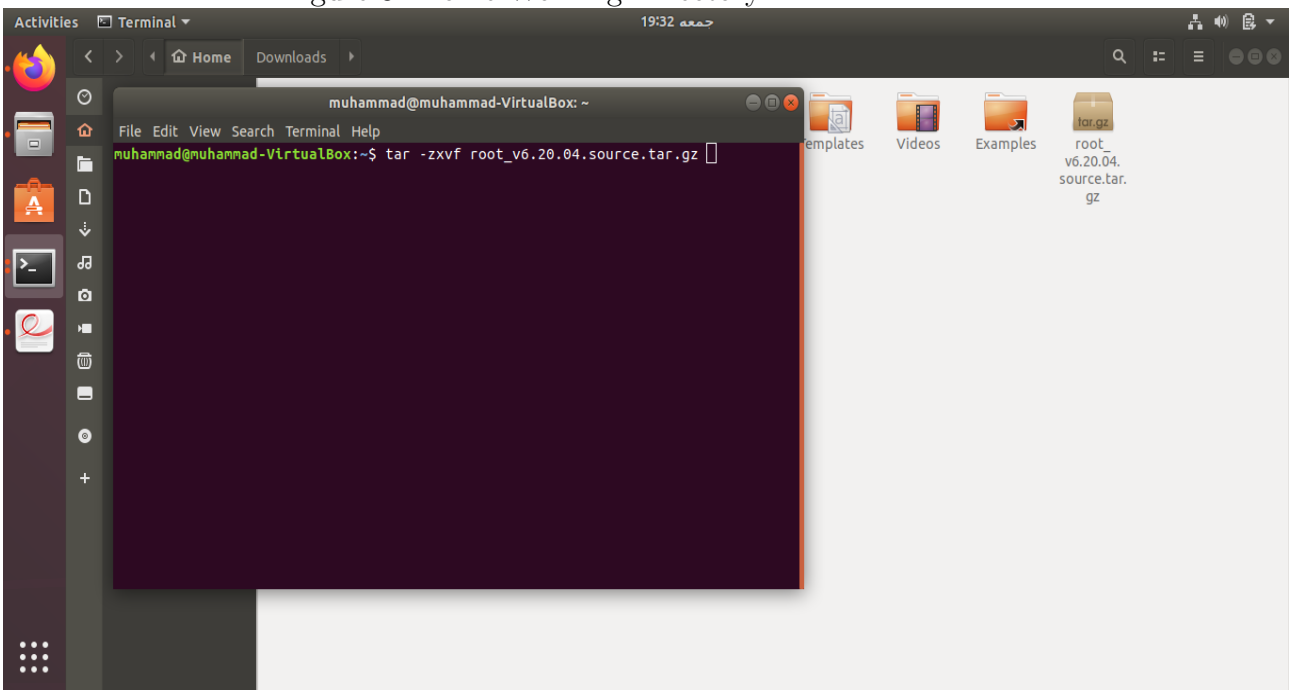

Figure 4: extract .tar file

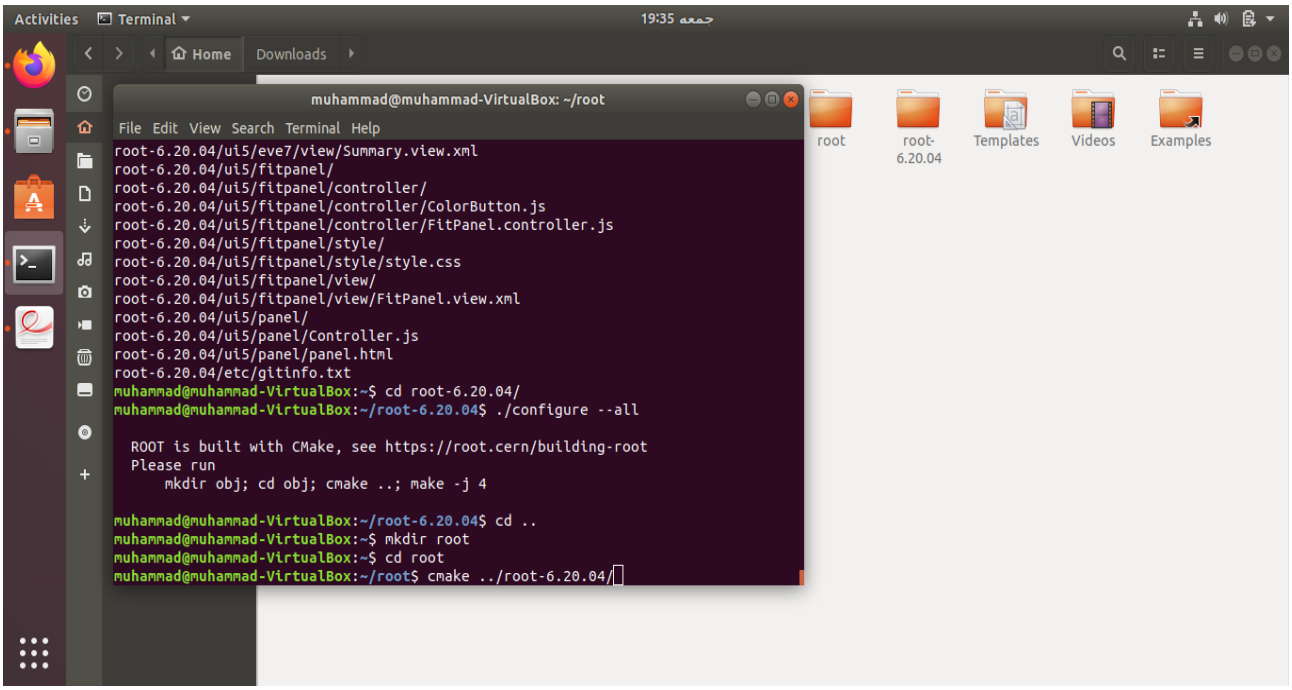

Figure 5: cmake

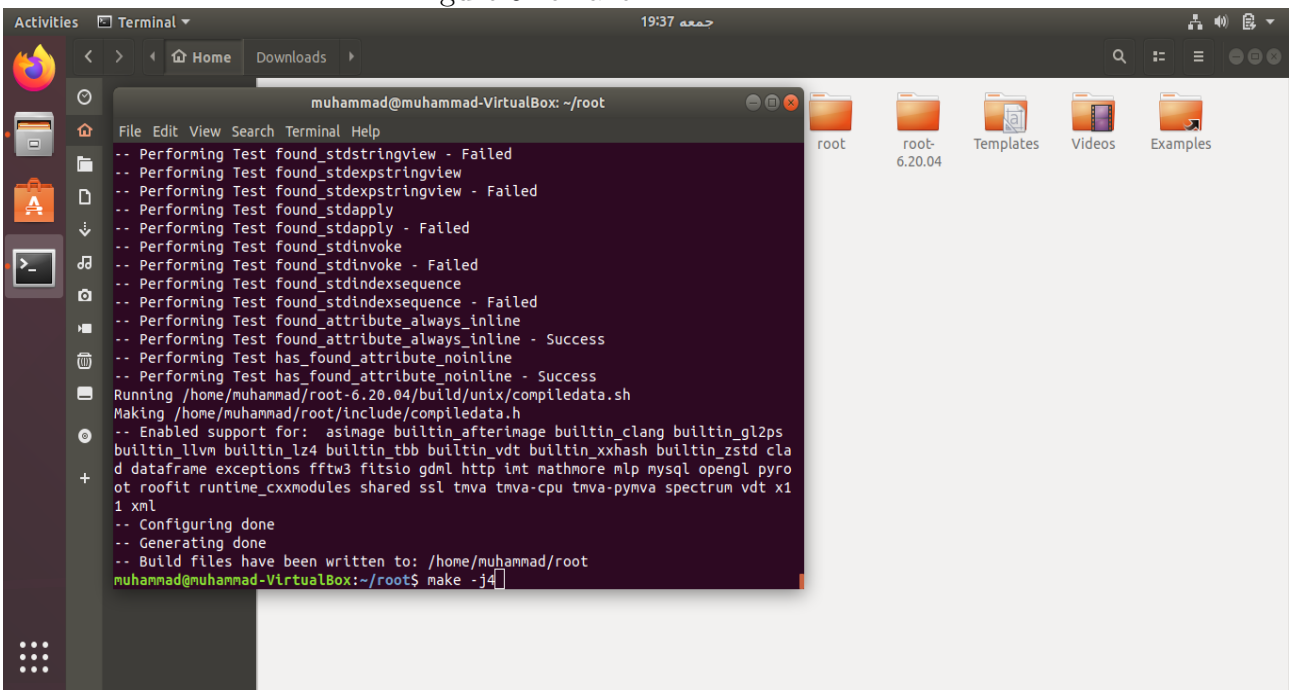

Figure 6: make files

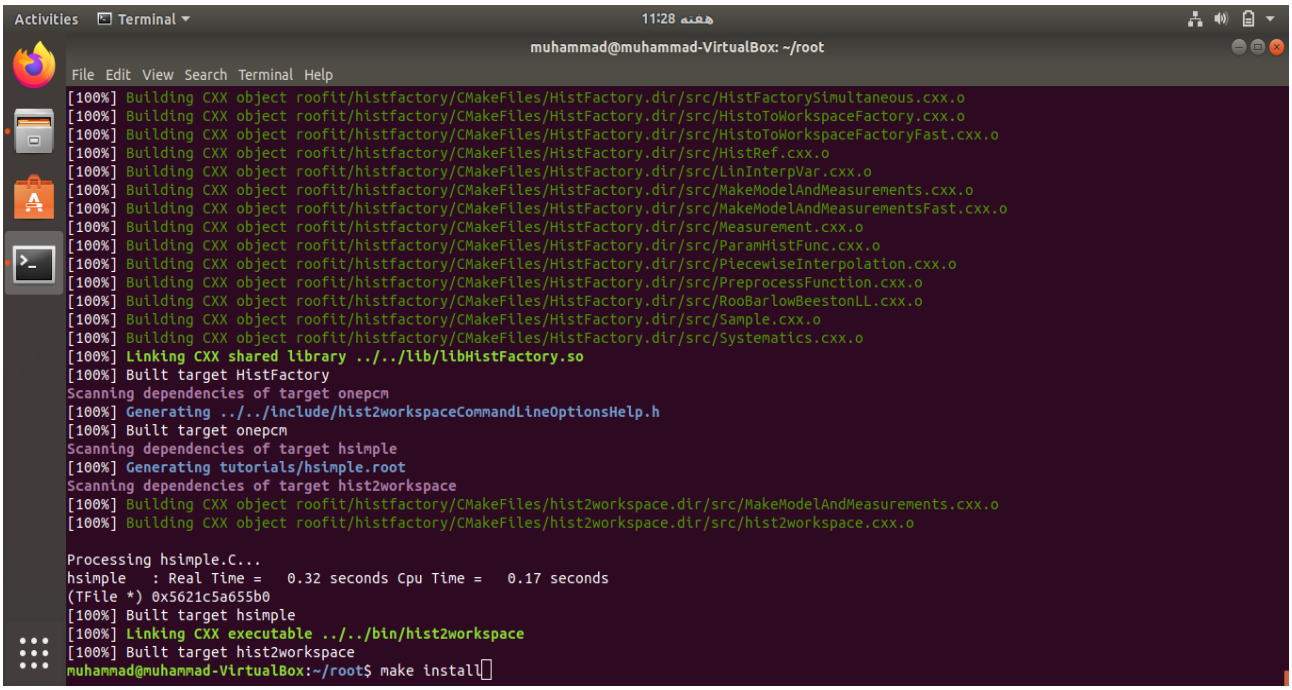

Figure 7: make install

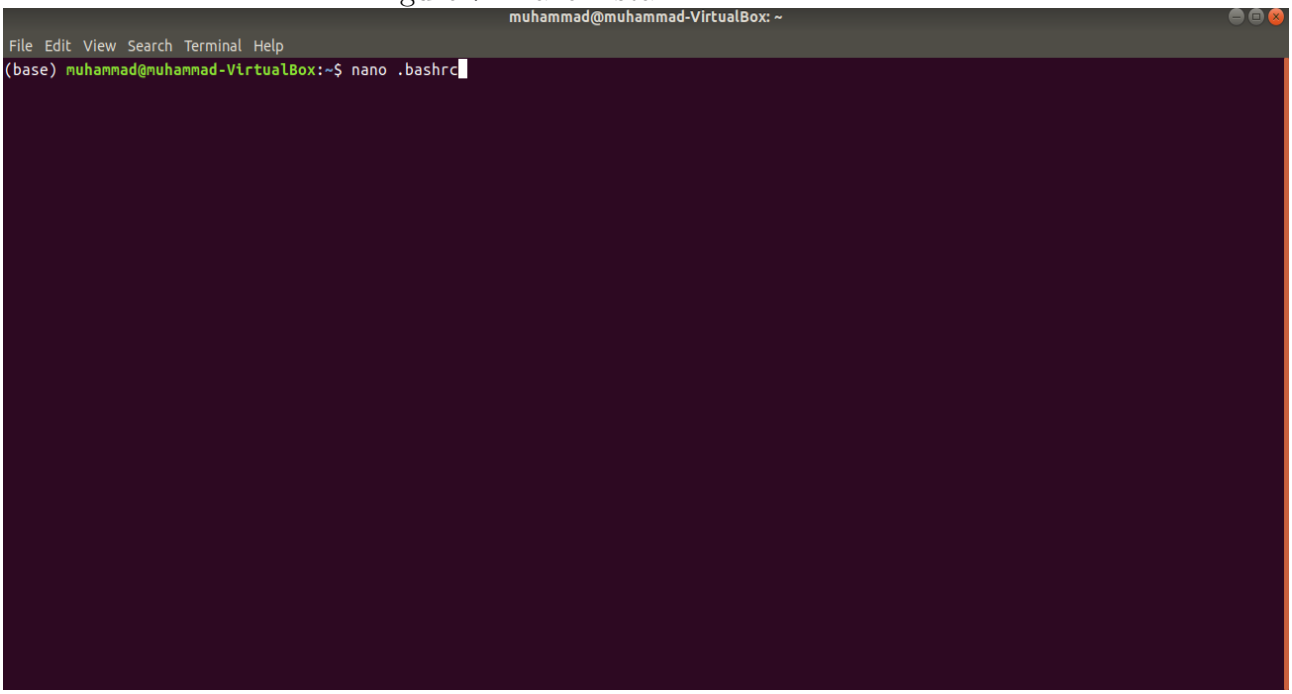

Figure 8: nano .bashrc

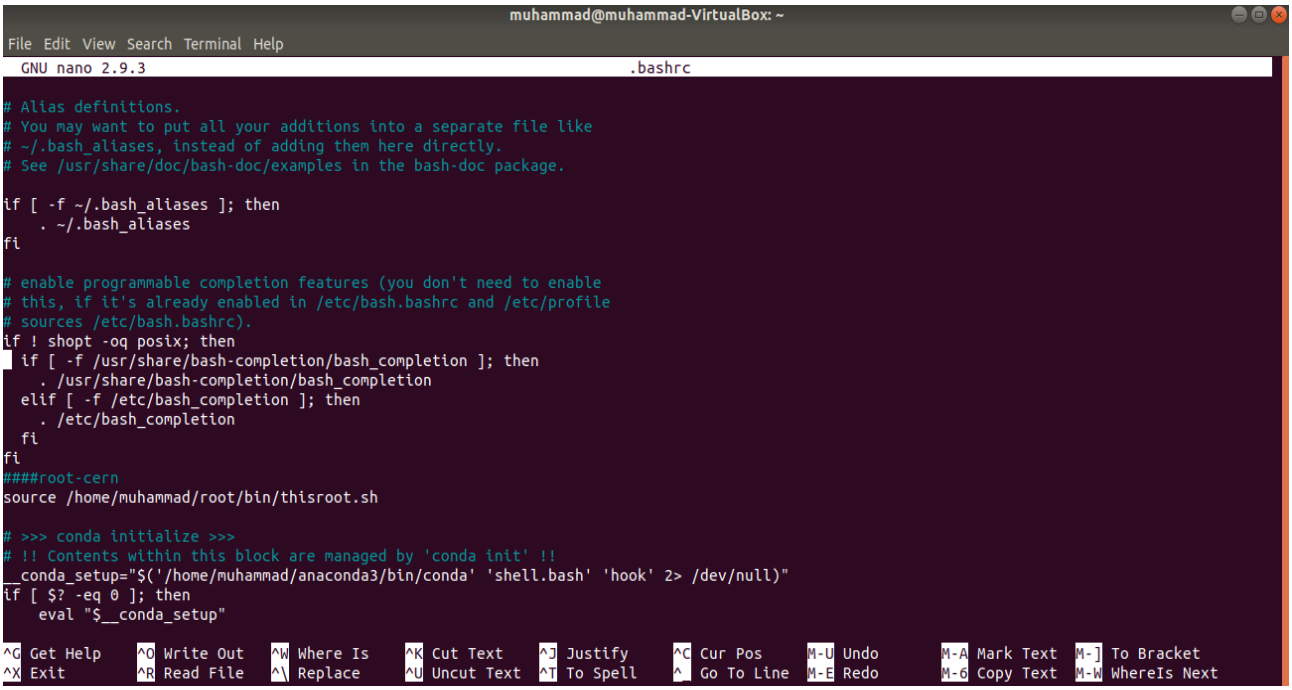

Figure 9: path setting

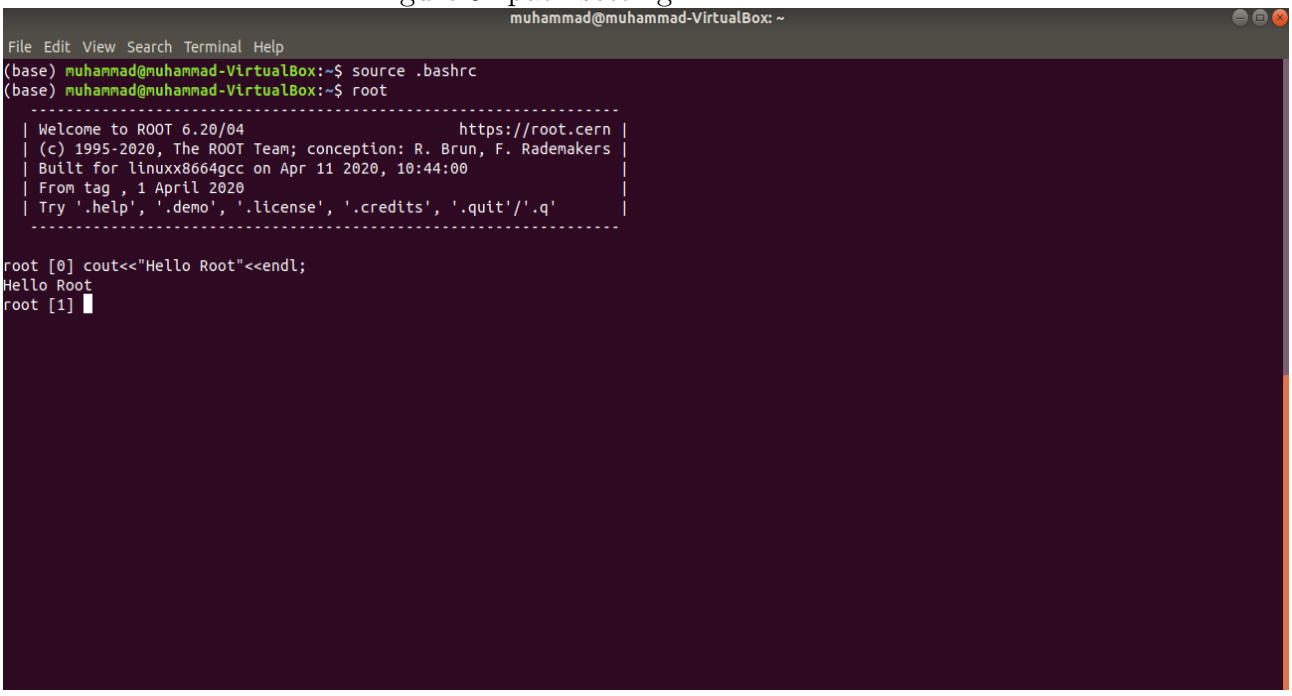

Figure 10: Welcome Root

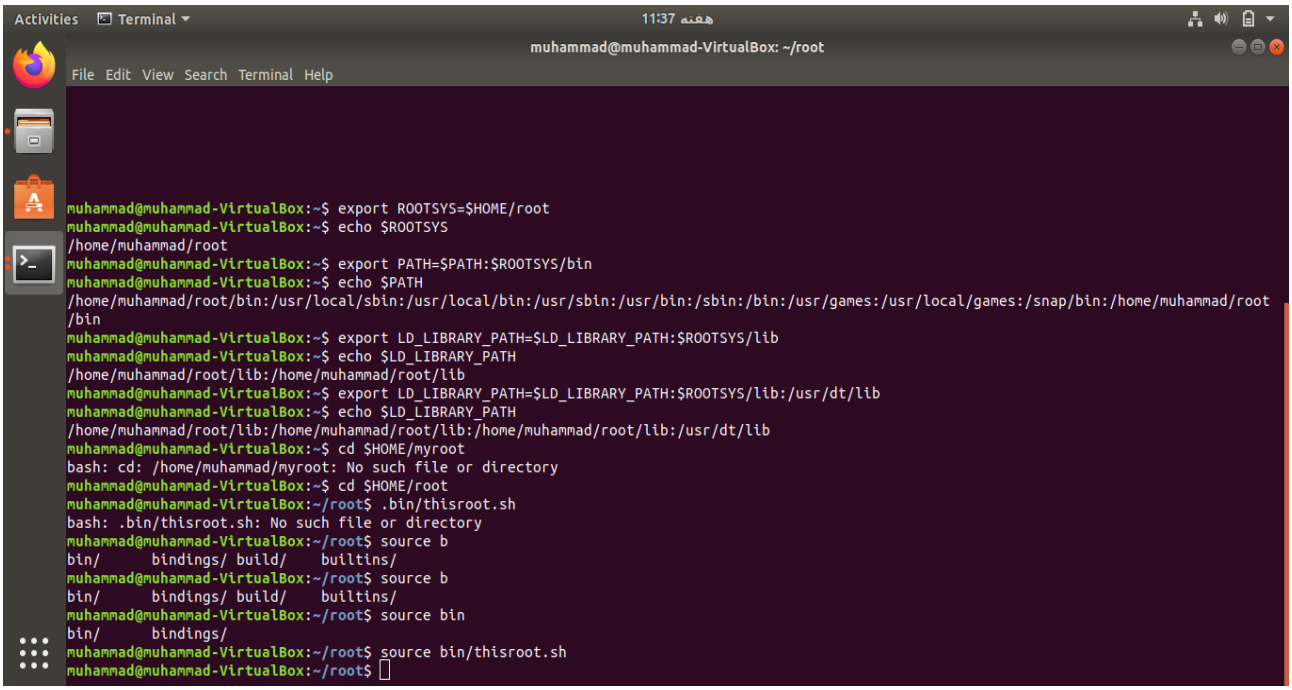

Figure 11: Environment variables

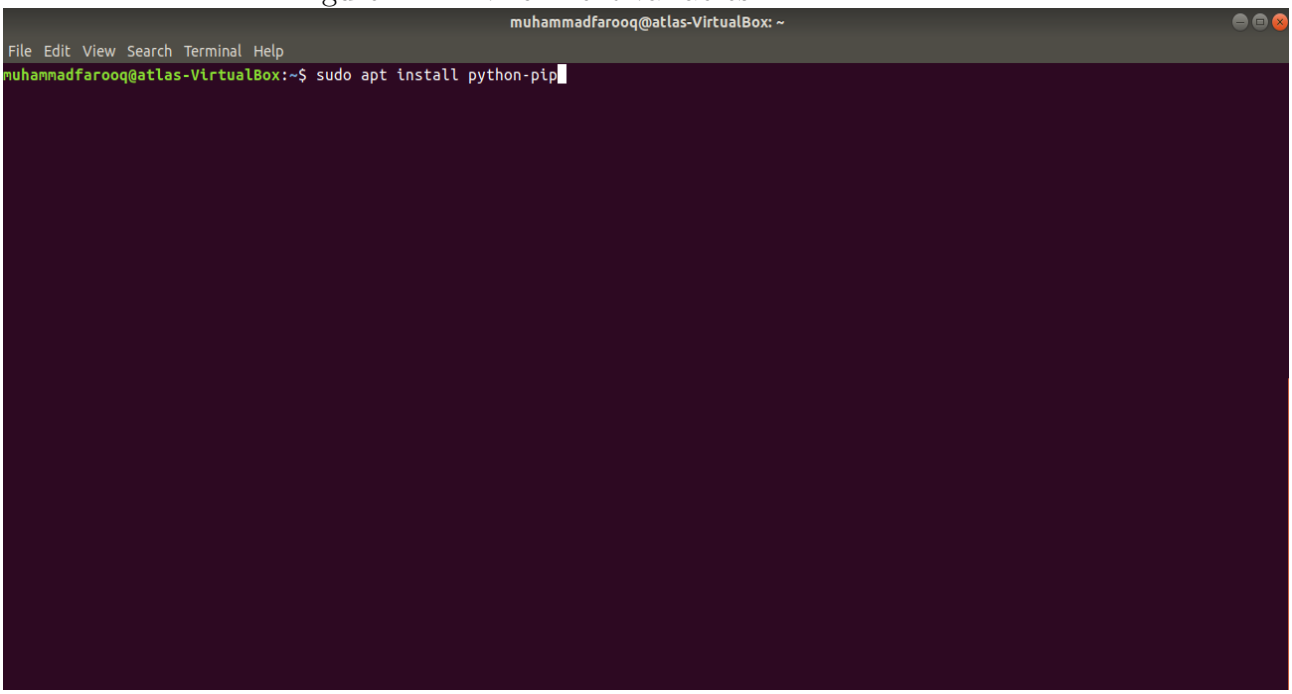

Figure 12: python-pip

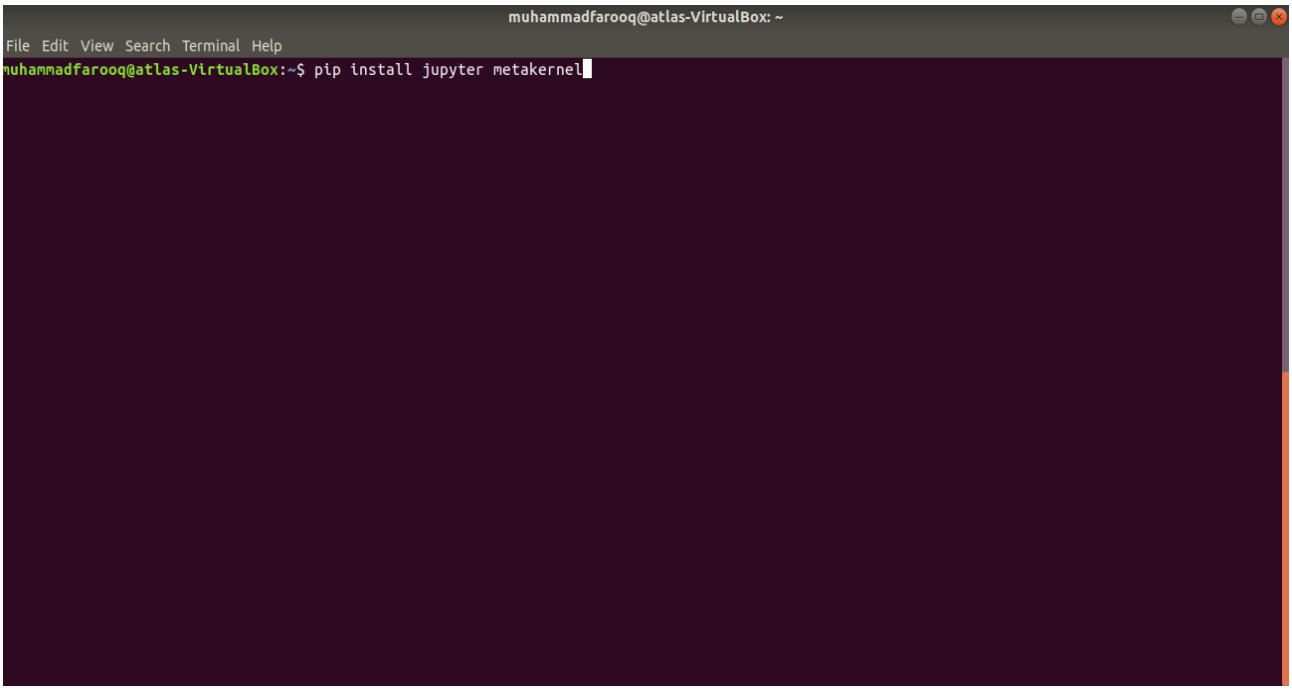

Figure 13: jupyter kernel

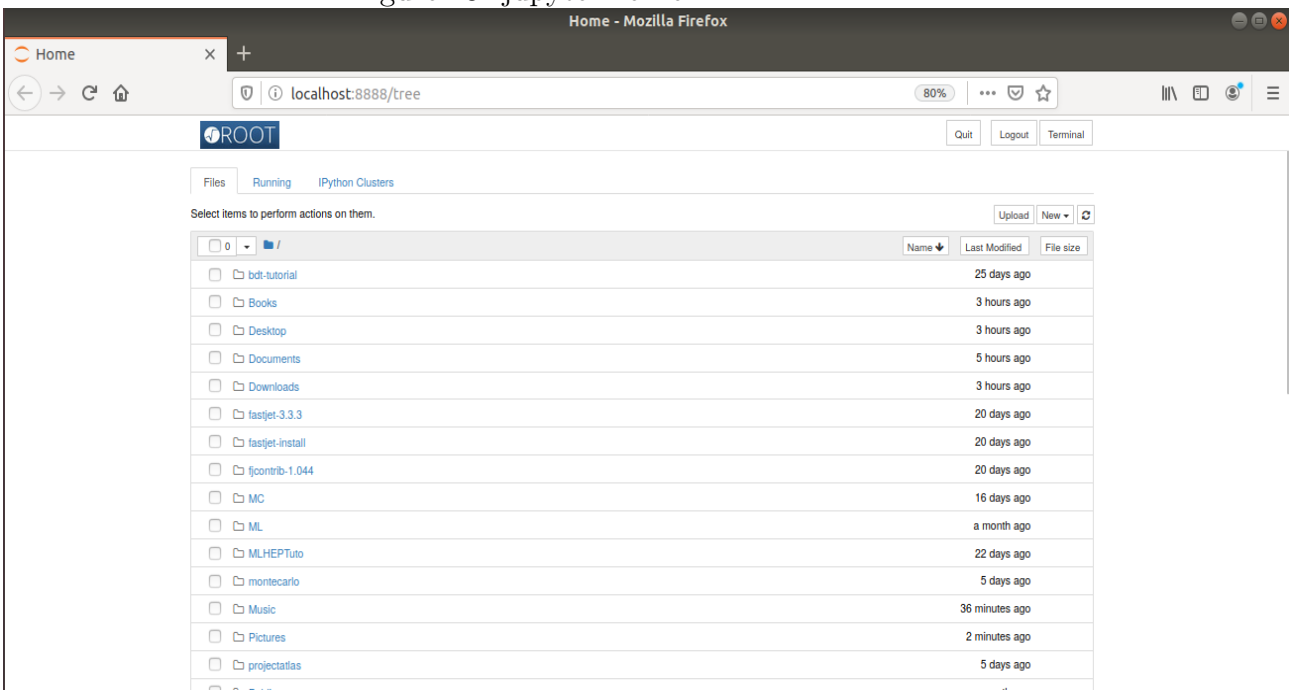

Figure 14: Root-Notebook