ROS tutorial

How to install ROS on Ubuntu 20.04 OS

Before Installing ROS Noetic

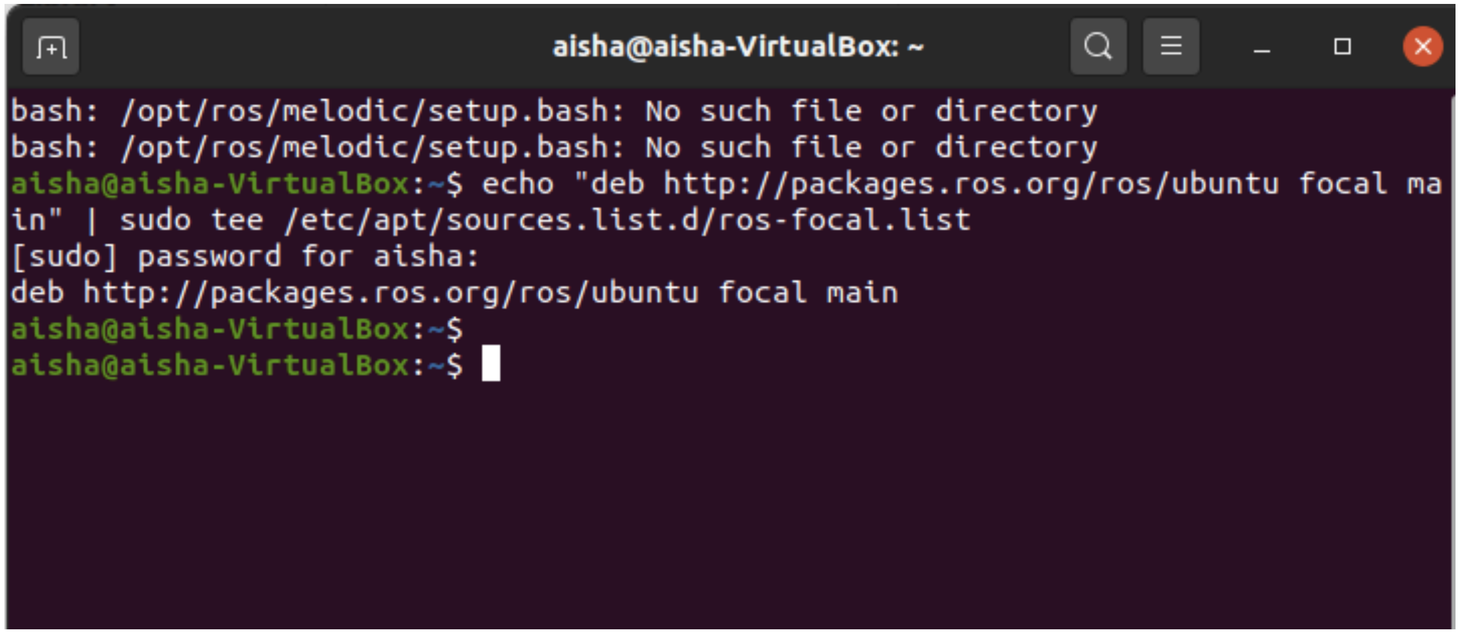
Step 1 — Set up ROS Noetic repo for Ubuntu 20.04

To install Noetic on Ubuntu 20.04, first we will need to add the official ROS Noetic repo to `sources.list`. Instead of adding directly to `/etc/apt/sources.list`, we will create a new list file `ros-noetic.list`.

To do just that type in the following command:

```
echo "deb http://packages.ros.org/ros/ubuntu focal main" | sudo tee /etc/apt/sources.list.d/ros-focal.list
```

The following screenshot illustrates the output you're supposed to see after typing the command:



Step 2 — Add official ROS keyring

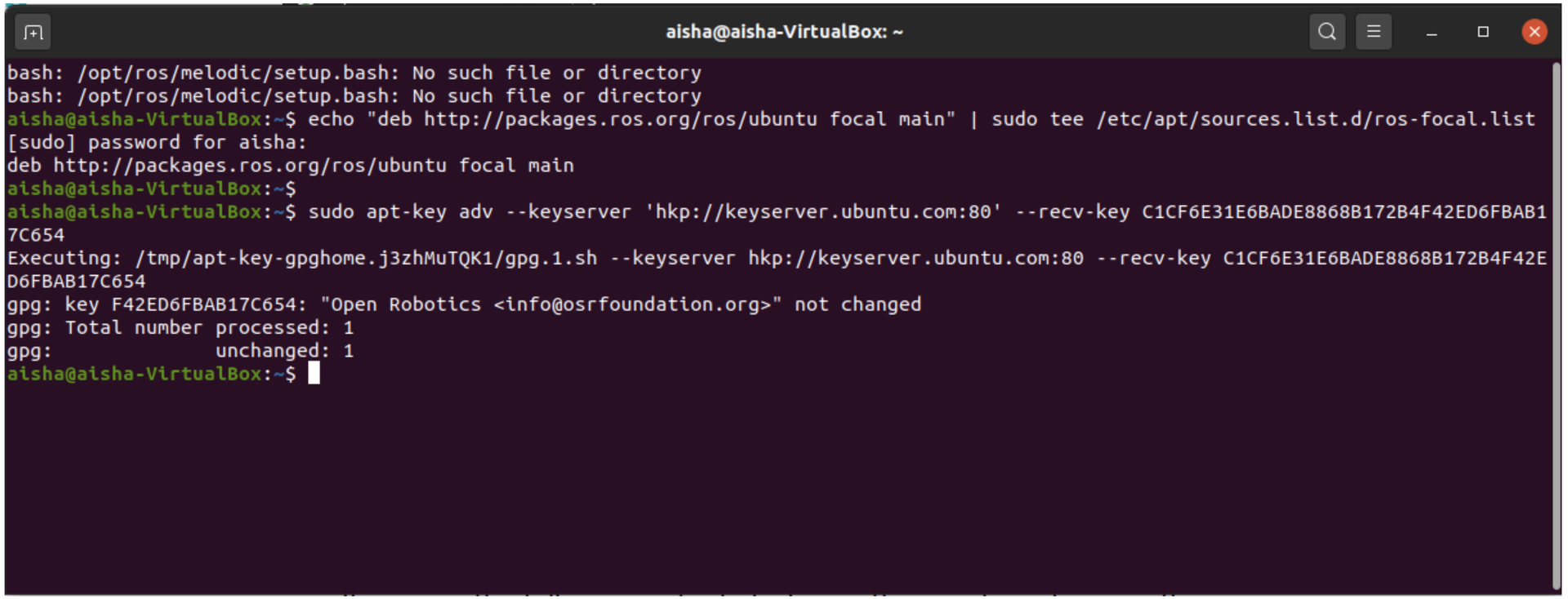
Use `apt-key` to add the key to be downloaded from Ubuntu key server. Note that if this does not work, you can also try to replace `hkp://keyserver.ubuntu.com:80` with hkp://pgp.mit.edu:80.

To accomplish just that run the following command:

```
sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

Expected output:

If you see the following output starting with executing, it means the key is successfully added. As you can see, the key is issued by Open Robotics, which is the maintainer of ROS. Another detail is that `apt-key` downloads the key to the directory `tmp` and the key will be removed automatically.

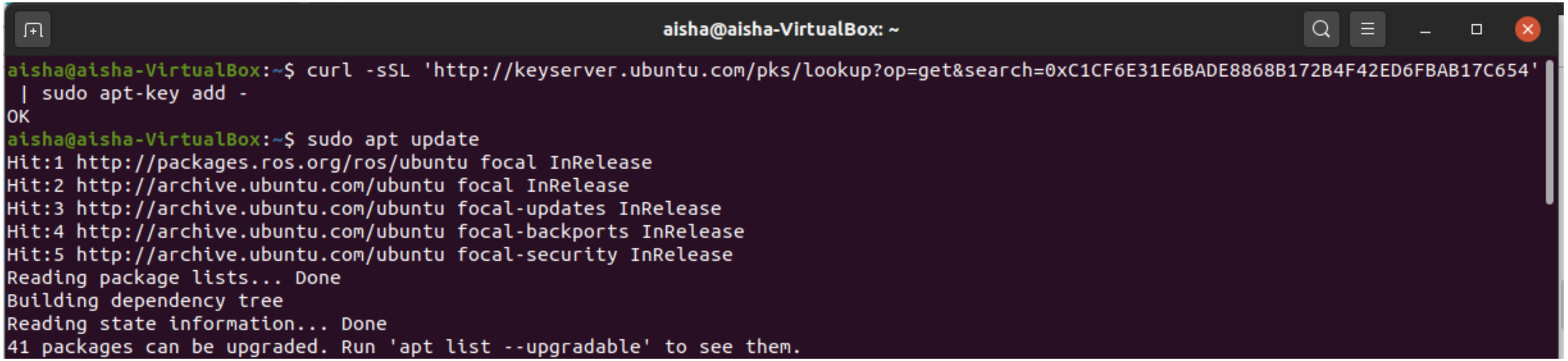


Step 3 — Update ROS package index

Next, we will need to get the ROS Noetic package information from the repository we just added using `apt update`.

```
sudo apt update
```

You will see output like the following:



Step 4 — Install ROS Noetic package

Now we are ready to install Noetic on Ubuntu 20.04 after all the preparation work. Like Ubuntu's `ubuntu-dektop`, `ubuntu-desktop-mini` packages, ROS comes with metapackages for you to install. The four officially documented ROS Noetic metapackages are:

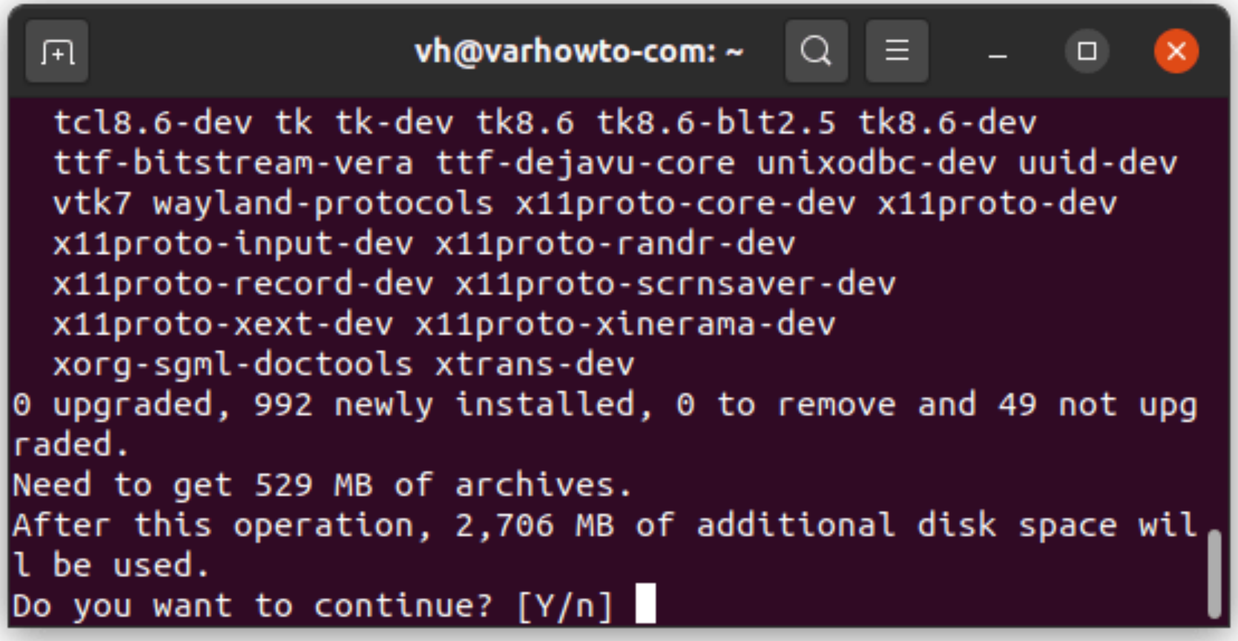
- ros-noetic-desktop-full
- ros-noetic-desktop
- ros-noetic-ros-base
- ros-noetic-ros-core

Install ros-noetic-desktop-full

The package `ros-noetic-desktop-full` includes all the packages in `ros-noetic-desktop` and also the perception (`ros-noetic-perception`) and simulation (`ros-noetic-simulators`) packages.
To install ros-noetic-desktop-full, run

```
sudo apt install ros-noetic-desktop-full
```

After you run the command above, you will see the following output. As you can see, 992 new packages will be installed and takes 2.7 GB space.
Press Y and enter or simply press enter to continue installing. As this `desktop-full` metapackage depends on a lot of other messages, this whole installation will take about 10 minutes.



Set up ROS Noetic environment

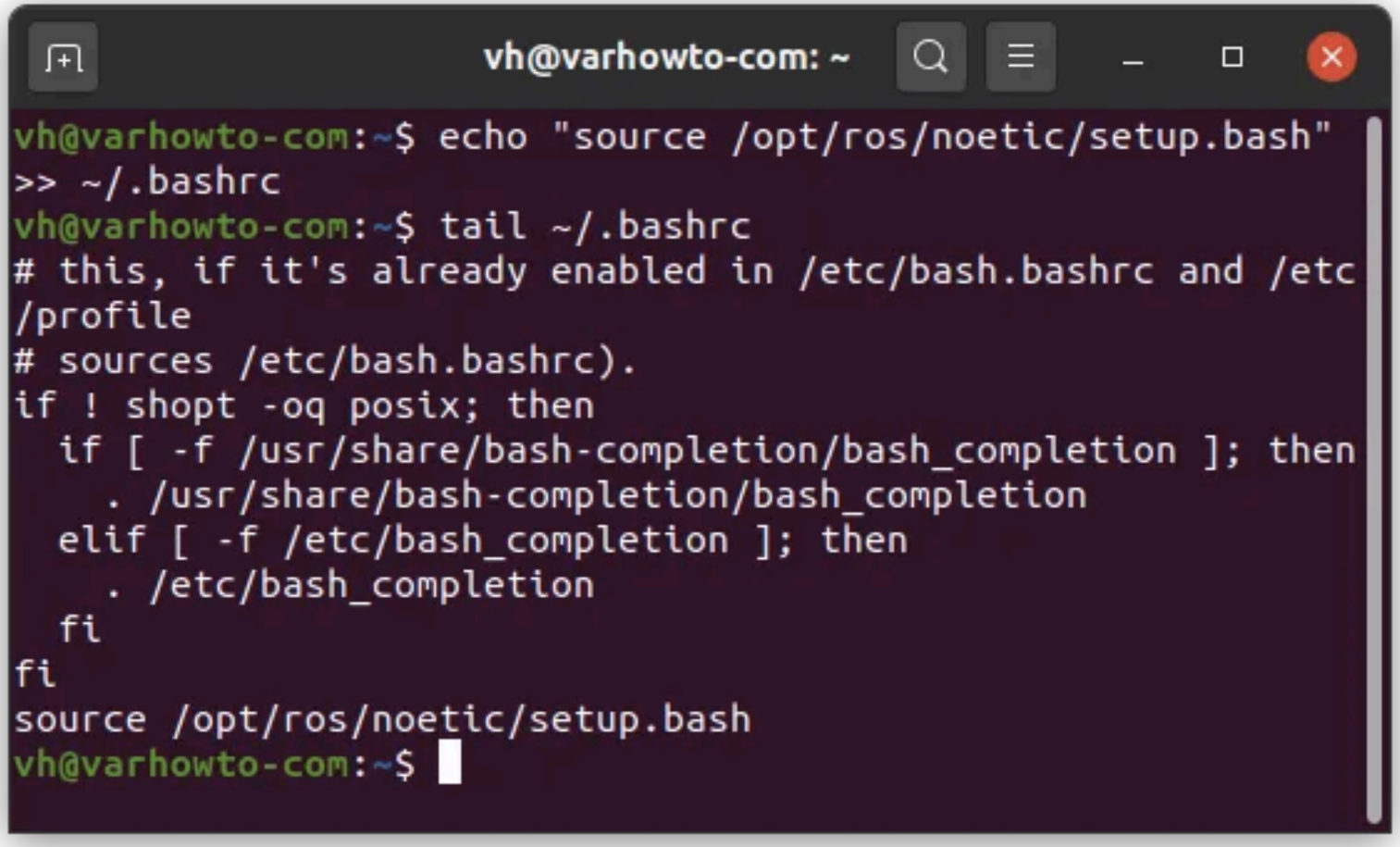
After installing ROS Noetic on your Ubuntu 20.04 computer, we will now set up your environment. In order to use ROS terminal commands and let `catkin` find your ROS program files such as header files in your includes directory, you will need to run the `setup.bash` file after you run `apt install`. To do that, run the following command:

```
source /opt/ros/noetic/setup.bash
```

To avoid run the command above every time, which is especially true when you are developing with ROS, it is recommended to put it in the `.bashrc` file located in the home directory `~`. To do it run the following:

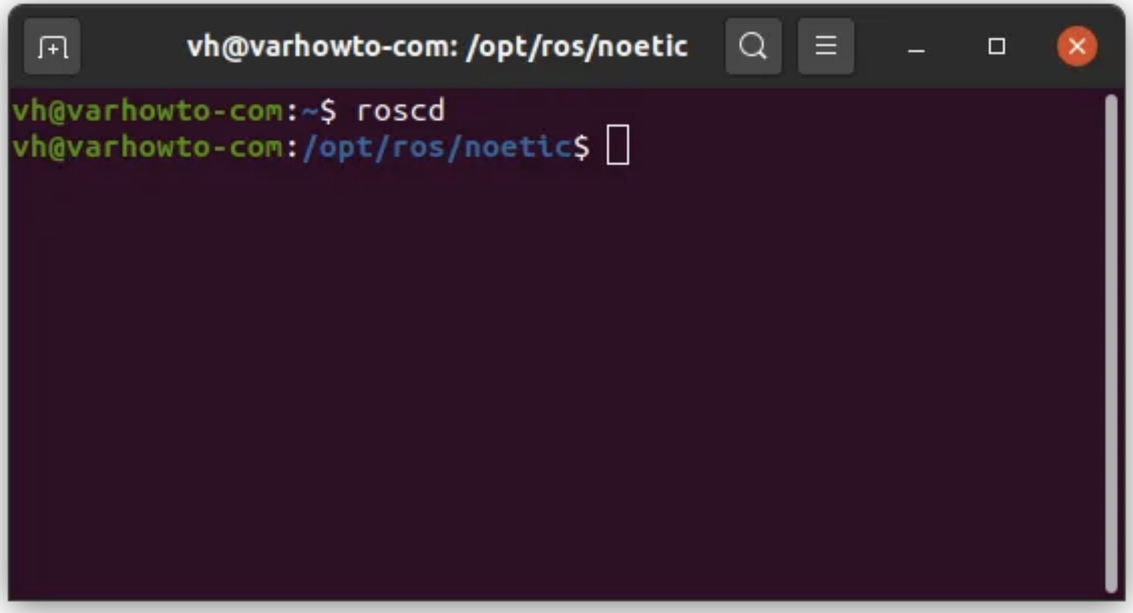
```
echo "source /opt/ros/noetic/setup.bash" >> ~/.bashrc
```

Run `tail ~/.bashrc` to double check, you should see the `setup.bash` is being sourced:

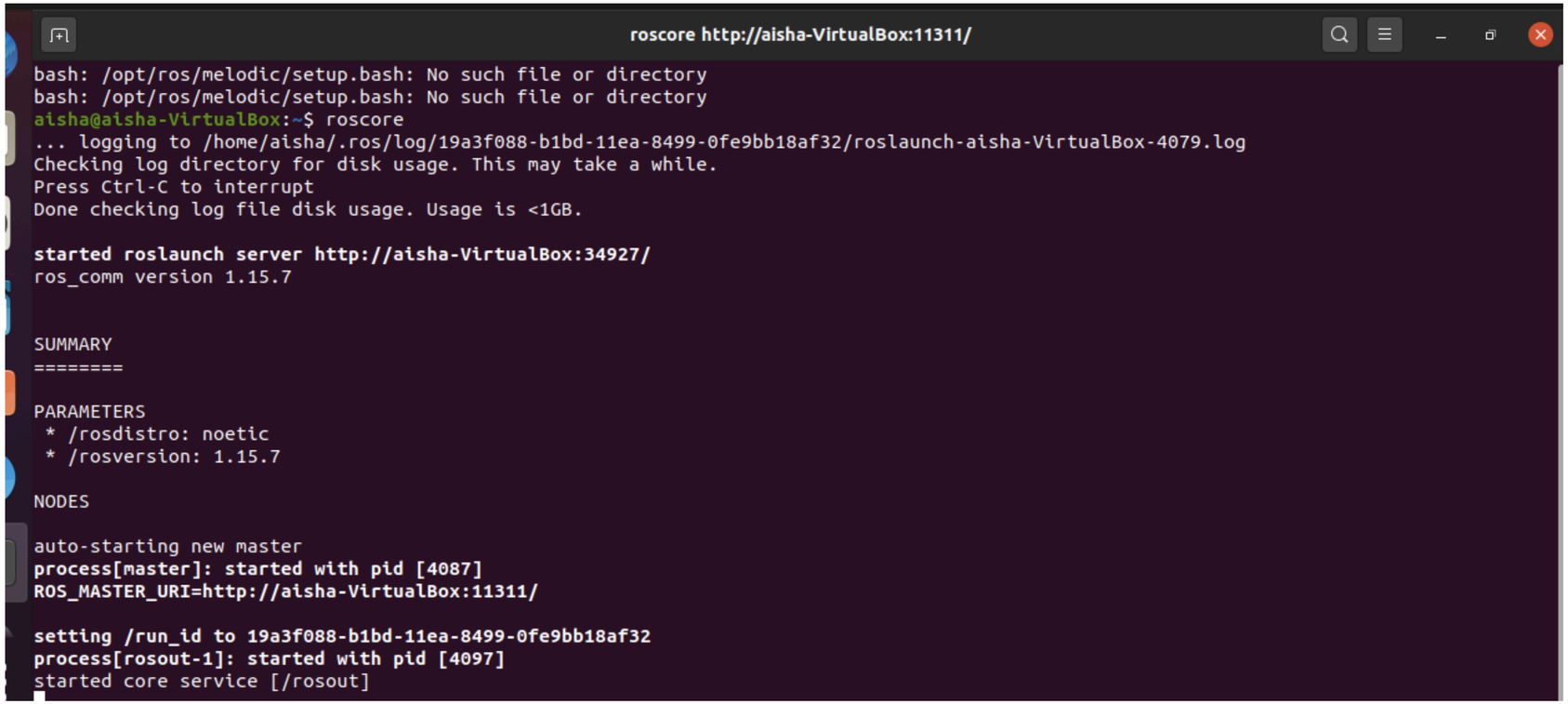


Verify Noetic installation

Congratulations! Now you learned how to install ROS Noetic on Ubuntu 20.04. But how do we know it is installed successfully?
We can simply run `roscd`. You can see the current directory of your prompt is changed to where we installed Noetic: `/opt/ros/noetic`.



We can also verify the installation by running `roscore` to start a ros master. You will see the `roscore` is logging in a log file in `~/.ros/log/`. You can also see the ros distro and the ros version in the summary. In addition, you also know the ROS master URI is on the 11311 port which is the default ROS port.



Reference:

- How to Install ROS Noetic on Ubuntu 20.04

Thanks!

تثبیت ROS علی نظام تشغیل Ubuntu 20.04

١.١ تنصيب source.list

قم بتنصيب جهاز الكمبيوتر الخاص بك لقبول software من packages.ros.org

قم بكتابة الأمر التالي في برنامج terminal :

```
sudo sh -c echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc)
main" > /etc/apt/sources.list.d/ros-latest.list’
```

١٠١ قم بتنصيب المفاتيح الخاص بك

قم بكتابة الأمر التالي في برنامج تيرمنال :

```
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv-key
C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

ملاحظة :

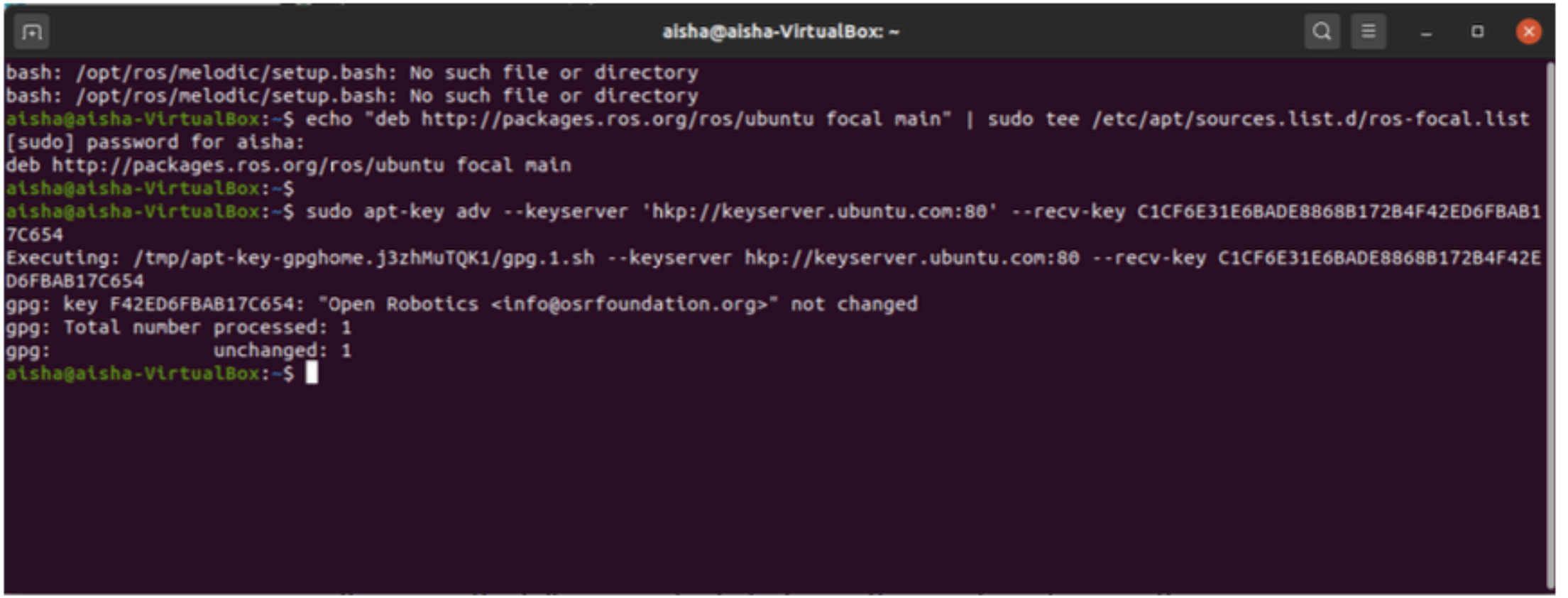
في حال واجهت أية مشاكل في الوصول إلى سيرفر المفاتيح قم بإزالة hkp://pgp.mit.edu:80

أو hkp://keyserver.ubuntu.com:80 في الأمر السابق

apt-key. بدلاً من curl بدلاً من ذلك ، يمكن استخدم أمر

proxy server الأمر خصوصًا مفيد إذا كنت تستخدم

سيظهر لك كما في السكرينشوت التالي :

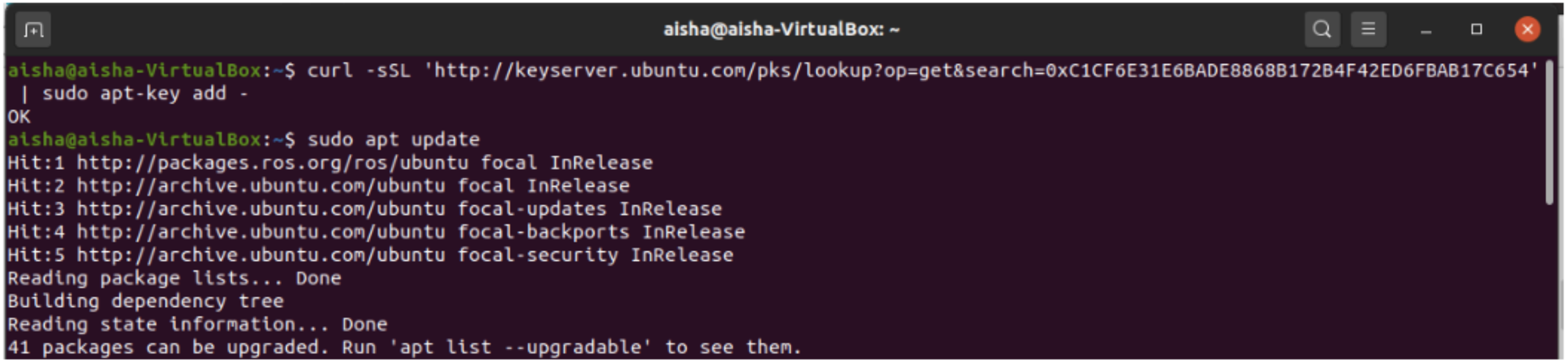


تنصيب ROS

أولاً، تأكيد من أن Debian package index الخاصة بك مُحدّثة تبعًا لآخر نسخة متاحة . لذا قم بكتابة الأمر التالي في برنامج تيرمنال :

sudo apt update

سيظهر كما التالي :

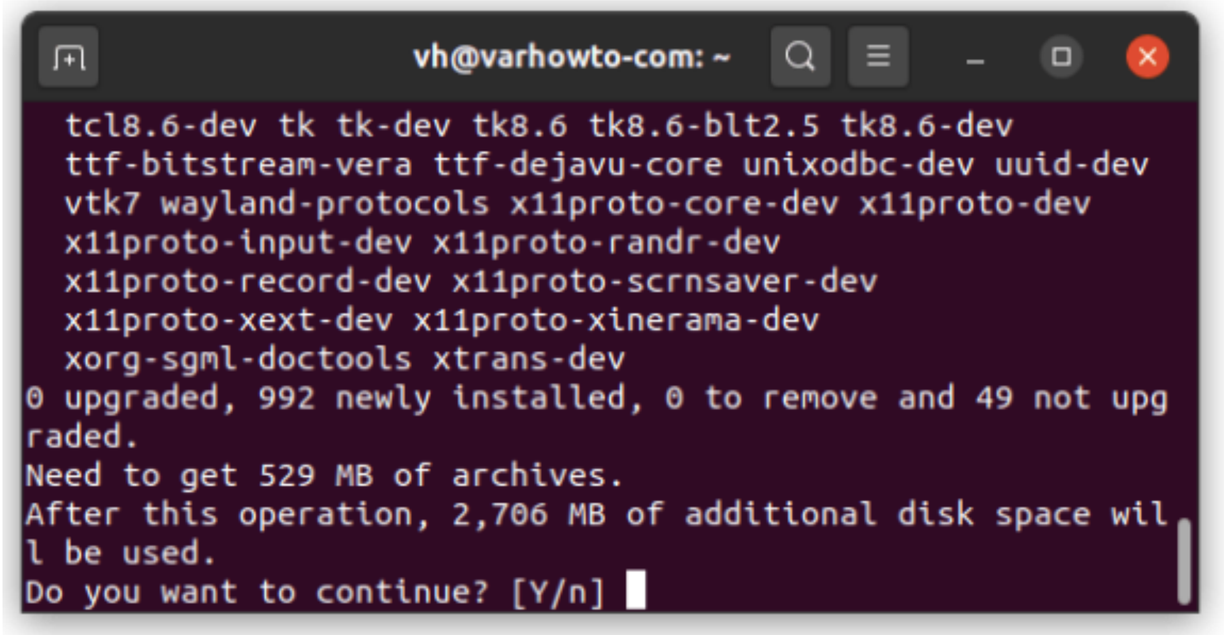


الآن قم باختيار أية مقدار من **ROS** تود تنصيبه :

- التنصيب الكامل لسطح المكتب (**Desktop-full install**) -يُنصح بِه- : تتضمن كل شيء في سطح المكتب بالإِضافة إلى المحاكي (**simulators**) ثلاثي وثنائي الأبعاد ، وكذلك حُزم الإِدراك **perception packages** . للتنصيب قم بكتابة الأمر التالي :

```
sudo apt install ros-noetic-desktop-full
```

سيظهر لك التالي : مما يعني أنه قام بتنزيل ٩٩٢ من الحُزمّ. عليك ضغط **enter** أو **Y** حتى يتم إكمال التنزيل .



قم بتجهيز البيئة الخاصة في ROS

يجب عليك أن تسبق كل نص يخص bash terminal تستخدم به نظام ROS بكلمة source (مصدر) كما في الأمر التالي:

```
source /opt/ros/noetic/setup.bash
```

من الأسهل أن تقوم بذلك آليًا في كل مرة هيكل* جديدة تُدشَن، لذلك قم بكتابة الأمر التالي:

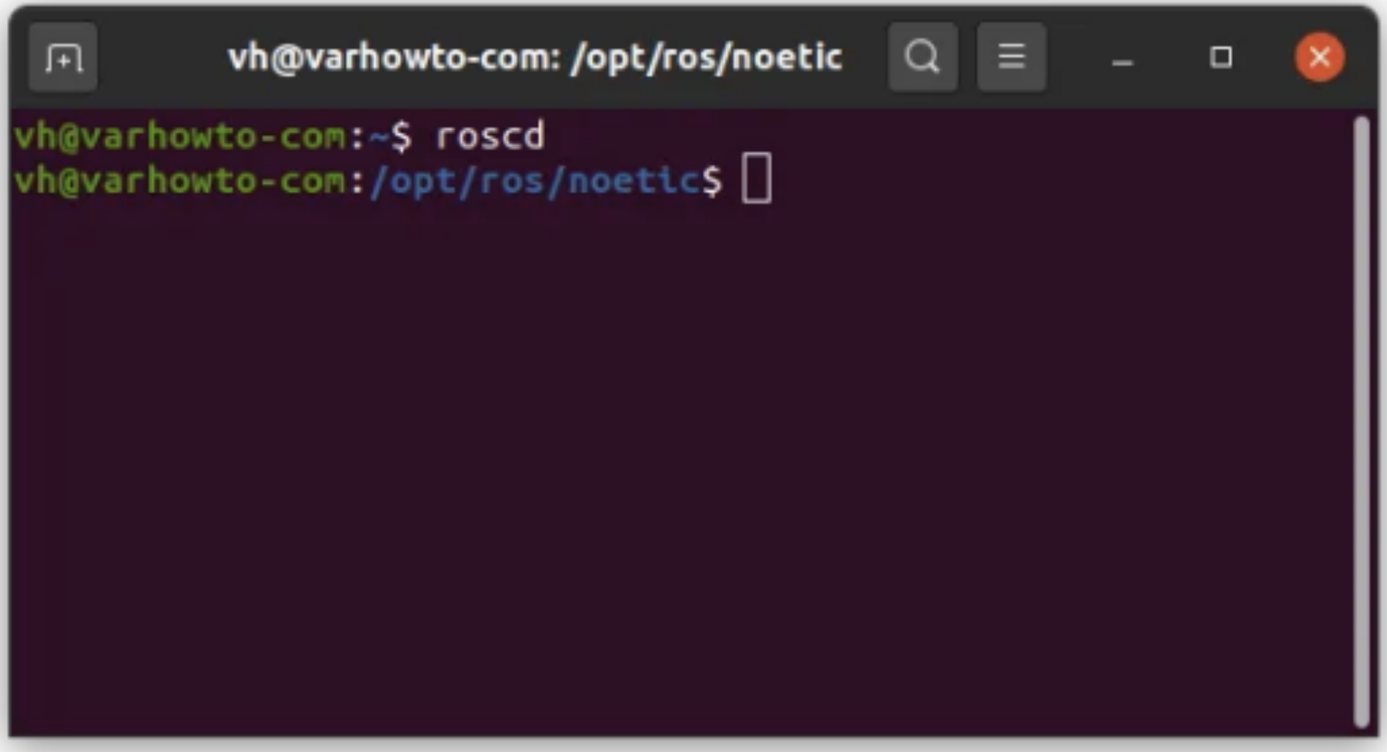
```
echo "source /opt/ros/noetic/setup.bash" >> ~/.bashrc
source ~/.bashrc
```

*هيكل يُقصد به shell

التأكُد من تنزيل نظام ROS

ROS Noetic: يمكنك كتابة الأمر التالي مما سيُظهِر لك المجلد الحالي والذي حيث ماقمنا بثبيت نظام

`/opt/ros/noetic`

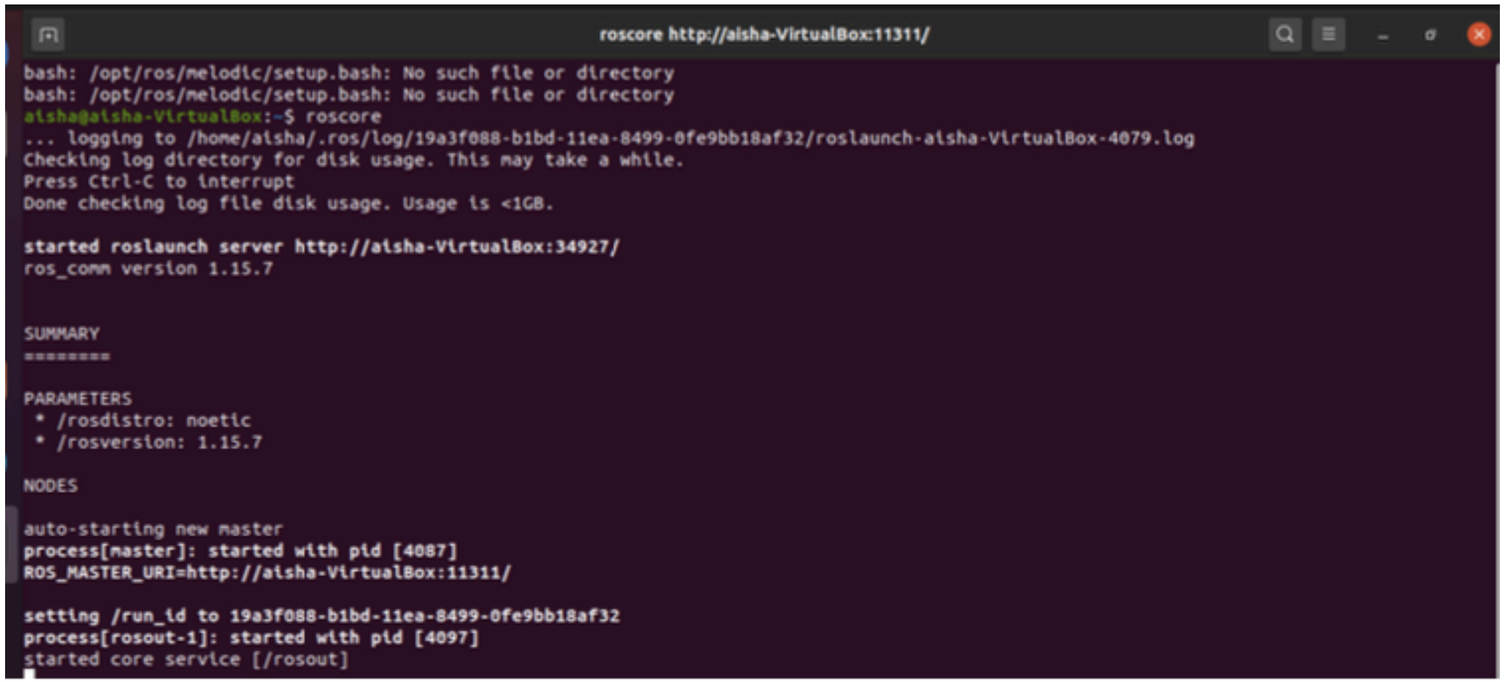


يتبع

أخيراً، للتأكُد من أن نظام ROS تم تثبيته في جهاز قم بكتابة الأمر التالي :

roscoe

سترى النتيجة التالية :



شكرًا!