

Installing ROS 1 Noetic Ninjemys on Ubuntu 20.04 (Focal Fossa) offline requires downloading all necessary packages and dependencies on a system with internet access, transferring them to the offline system, and installing them. Below are clear, precise, and explicit instructions to achieve this.

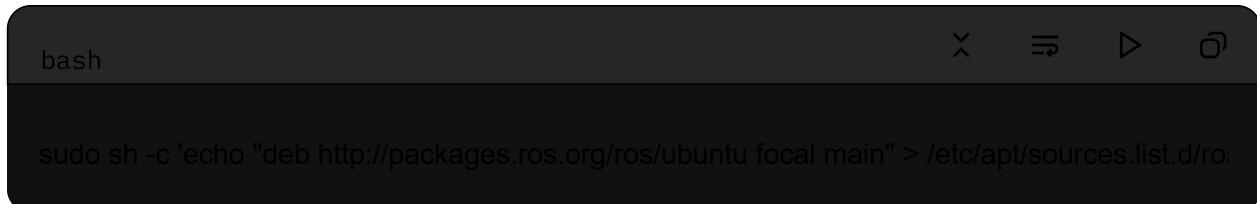
Prerequisites

- **Two systems:**
 - **Online system:** Ubuntu 20.04 with internet access to download packages.
 - **Offline system:** Ubuntu 20.04 where ROS Noetic will be installed.
- **USB drive or network share:** To transfer files between systems.
- **Administrative privileges:** Required on both systems.
- **ROS version:** ROS Noetic (Desktop-Full recommended for complete functionality).

Step 1: Prepare the Online System

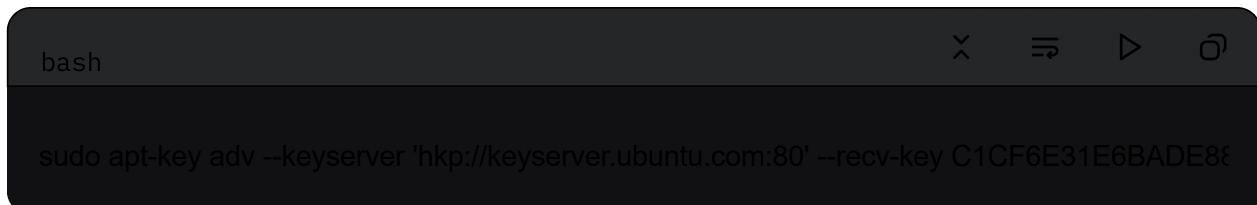
1. Set up the ROS repository:

- Open a terminal on the online system.
- Add the ROS package repository:



```
bash
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu focal main" > /etc/apt/sources.list.d/ros-latest.list'
```

- Add the ROS key:



```
bash
sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE88
```

² Update package lists:

```
bash
```

X Collapse ⌂ Wrap ▶ Run ⌂ Copy

```
sudo apt update
```

³ Download ROS Noetic packages and dependencies:

- Install apt-offline to facilitate offline package management:

```
bash
```

X ⌂ ▶ ⌂

```
sudo apt install apt-offline
```

- Generate a signature file for the ROS Desktop-Full installation:

```
bash
```

X ⌂ ▶ ⌂

```
apt-offline set --install-packages ros-noetic-desktop-full --update --upgrade ros-noetic-sig
```

This creates `ros-noetic-sig` in the current directory, listing all required packages and dependencies.

4 Download all packages:

- Create a directory to store the packages:

```
bash
```

```
mkdir ros_noetic_packages
```

- Download the packages specified in the signature file:

```
bash
```

```
apt-offline get ros-noetic-sig --bundle ros_noetic_packages/ros_bundle.zip
```

This downloads all necessary .deb files into a compressed `ros_bundle.zip` file in the `ros_noetic_packages` directory.

5 Transfer files:

- Copy the entire `ros_noetic_packages` directory (containing `ros_bundle.zip`) to a USB drive or network share.

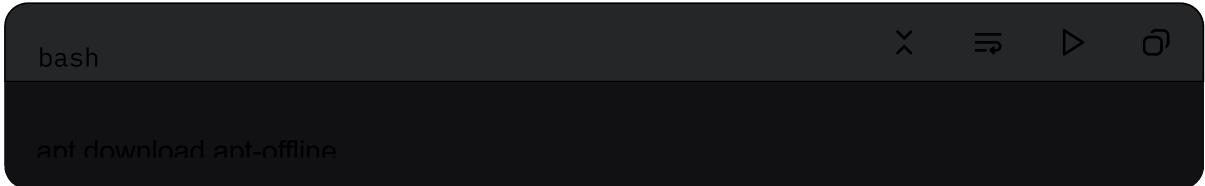
Step 2: Prepare the Offline System

1 Copy files to the offline system:

- Connect the USB drive or access the network share.
- Copy the `ros_noetic_packages` directory to the offline system (e.g., to `/home/user/ros_noetic_packages`).

← **Install** apt-offline :

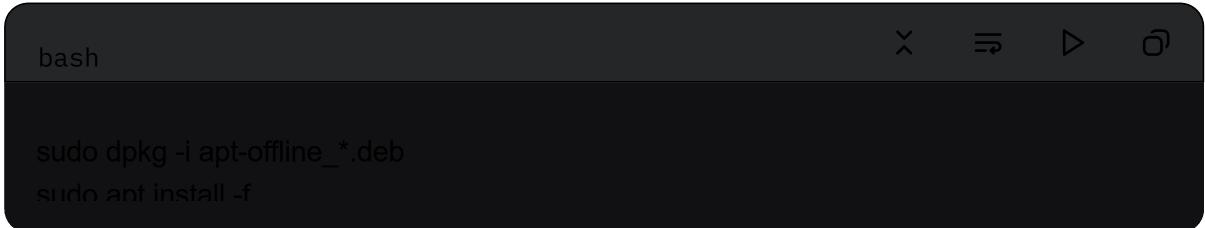
- Ensure apt-offline is installed on the offline system. If not, transfer the apt-offline .deb package from the online system:
- On the online system, download apt-offline :



A screenshot of a terminal window with a dark background and light-colored text. The title bar says "bash". In the main area, the command "ant download apt-offline" is being typed in.

Copy the resulting .deb file to the offline system.

- On the offline system, install it:



A screenshot of a terminal window with a dark background and light-colored text. The title bar says "bash". In the main area, two commands are being typed in sequence: "sudo dpkg -i apt-offline_* .deb" and "sudo ant install -f".

~ Add the ROS repository:

- Create the ROS source list file:

```
bash
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu focal main" > /etc/apt/sources.list.d/ros-latest.list'
```

- Since the offline system cannot fetch the key, manually add the ROS key:

- On the online system, export the key:

```
bash
ant-key export C1CF6F31F6RADF8868R172R4F42FD6FRAR17C654 > ros.key
```

Copy `ros.key` to the offline system.

- On the offline system, import the key:

```
bash
sudo ant-key add ros.key
```

Step 3: Install ROS Noetic Offline

'Unzip the package bundle:

- On the offline system, navigate to the `ros_noetic_packages` directory:

```
bash
cd /home/user/ros_noetic_packages
unzip ros_bundle.zip -d
```

- This extracts all `.deb` files into the current directory.

2 Install the packages:

- Use `apt-offline` to install the downloaded packages:

```
bash
sudo apt-offline install
```

- Alternatively, manually install all `.deb` files:

```
bash
sudo dpkg -i *.deb
sudo apt install -f
```

The `apt install -f` command resolves any dependency issues.

3 Verify installation:

- Check if ROS is installed:

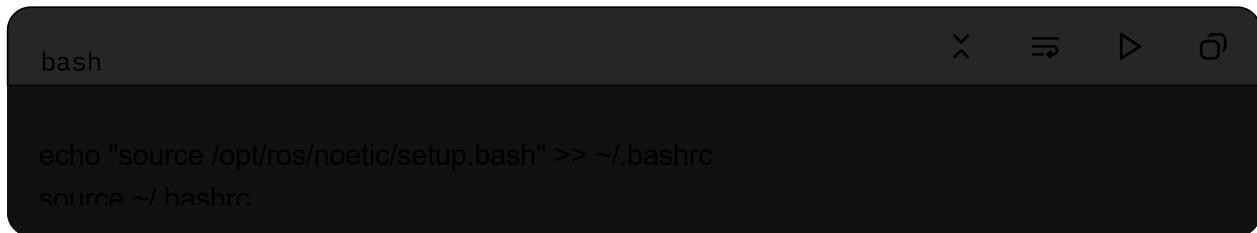
```
bash
rosversion -d
```

This should output `noetic`.

Step 4: Set Up the ROS Environment

• **Configure the environment:**

- Add ROS to your bash session:



A screenshot of a terminal window titled "bash". The window has a dark theme with light-colored text. At the top, there are standard window control icons: a close button (X), a minimize button (double horizontal lines), a maximize button (arrow pointing right), and a refresh/circular arrow icon. The main area of the terminal contains the following text:

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

– **Install additional tools (optional):**

- Install `rosdep` and other utilities if needed:
 - On the online system, download:

```
bash
apt download python3-rosdep python3-rosinstall python3-rosinstall-generator python3-wstc
```

Transfer the `.deb` files to the offline system and install:

```
bash
sudo dpkg -i *.deb
sudo apt install -f
```

- Initialize `rosdep` (offline workaround):

```
bash
sudo rosdep init
```

If `rosdep update` fails due to no internet, skip it or copy the `rosdep` data from an online system:

- On the online system:

```
bash
rosdep update
tar -czf rosdep_data.tar.gz ~/_ros/rosdep
```

Copy `rosdep_data.tar.gz` to the offline system and extract:

```
bash
tar -xzf rosdep_data.tar.gz -C ~/_ros/
```

Step 5: Test the Installation

- 1 Run a simple ROS command:

```
bash x Collapse ⌂ Wrap ▶ Run ⌂ Copy  
roscore
```

If successful, this starts the ROS master.

- 2 Test a basic node (in a new terminal):

```
bash x Collapse ⌂ Wrap ▶ Run ⌂ Copy  
source /opt/ros/noetic/setup.bash  
rosrun roscon tutorials talker
```

This should output messages from the `talker` node.

Notes

- **Package size:** The ROS Noetic Desktop-Full bundle may be several gigabytes, so ensure sufficient storage on the USB drive.
- **Dependencies:** If additional dependencies are needed, repeat the `apt-offline` process for those packages.
- **Troubleshooting:**
 - If `dpkg` reports missing dependencies, run `sudo apt install -f` to fix them.
 - Ensure all `.deb` files are transferred correctly to avoid installation errors.
- **Alternative:** If `apt-offline` is cumbersome, use `apt download` on the online system to manually fetch each package and its dependencies, then transfer and install them.

This process ensures a complete offline installation of ROS Noetic on Ubuntu 20.04. If you encounter specific errors, provide details, and I can assist further.