

安装 ROS2 Galactic

配置语言环境

确保您有一个支持 UTF-8 的语言环境。 如果不确定的话，可以使用以下命令进行测试。

```
```
```

```
locale # check for UTF-8
```

```
sudo apt update && sudo apt install locales
```

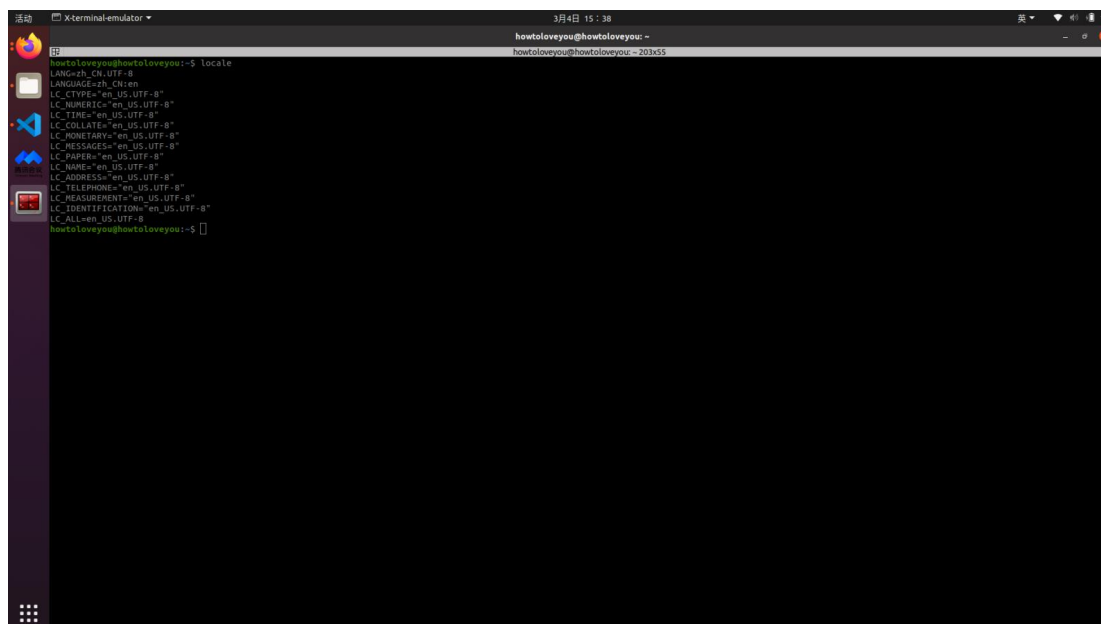
```
sudo locale-gen en_US en_US.UTF-8
```

```
sudo update-locale LC_ALL=en_US.UTF-8 LANG=en_US.UTF-8
```

```
export LANG=en_US.UTF-8
```

```
locale # verify settings
```

```
```
```

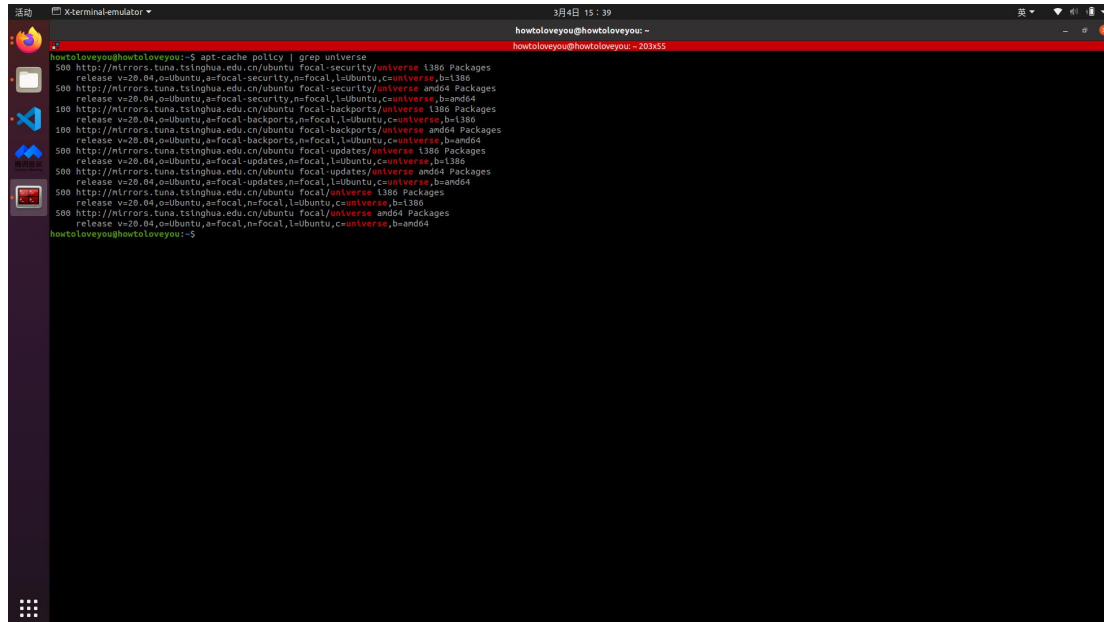


```
howtoloveyou@howtoloveyou:~$ locale
LANG=zh_CN.UTF-8
LANGUAGE=zh_CN:en
LC_CTYPE=en_US.UTF-8
LC_NUMERIC=en_US.UTF-8
LC_TIME=en_US.UTF-8
LC_COLLATE=en_US.UTF-8
LC_MONETARY=en_US.UTF-8
LC_MESSAGES=en_US.UTF-8
LC_PAPER=en_US.UTF-8
LC_NAME=en_US.UTF-8
LC_ADDRESS=en_US.UTF-8
LC_TELEPHONE=en_US.UTF-8
LC_MEASUREMENT=en_US.UTF-8
LC_IDENTIFICATION=en_US.UTF-8
LC_ALL=en_US.UTF-8
howtoloveyou@howtoloveyou:~$
```

配置软件源

您需要将 ROS 2 存储库添加到系统中。 首先，通过使用此命令检查是否启用了 Ubuntu Universe 存储库。

apt-cache policy | grep universe



```
howtoloveyou@howtoloveyou:~$ apt-cache policy | grep universe
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-security/universe 1386 Packages
   release v=20.04,o=Ubuntu,a=focal-security,n=focal,l=Ubuntu,c=universe,b=1386
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-security/universe amd64 Packages
   release v=20.04,o=Ubuntu,a=focal-security,n=focal,l=Ubuntu,c=universe,b=amd64
100 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-backports/universe 1386 Packages
   release v=20.04,o=Ubuntu,a=focal-backports,n=focal,l=Ubuntu,c=universe,b=1386
100 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-backports/universe amd64 Packages
   release v=20.04,o=Ubuntu,a=focal-backports,n=focal,l=Ubuntu,c=universe,b=amd64
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-updates/universe 1386 Packages
   release v=20.04,o=Ubuntu,a=focal-updates,n=focal,l=Ubuntu,c=universe,b=1386
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal-updates/universe amd64 Packages
   release v=20.04,o=Ubuntu,a=focal-updates,n=focal,l=Ubuntu,c=universe,b=amd64
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal/universe 1386 Packages
   release v=20.04,o=Ubuntu,a=focal,n=focal,l=Ubuntu,c=universe,b=1386
500 http://mirrors.tuna.tsinghua.edu.cn/ubuntu focal/universe amd64 Packages
   release v=20.04,o=Ubuntu,a=focal,n=focal,l=Ubuntu,c=universe,b=amd64
howtoloveyou@howtoloveyou:~$
```

如果您没有看到上面那样的输出，请使用以下的命令启用 Ubuntu Universe 存储库。

sudo apt install software-properties-common

sudo add-apt-repository universe

首先使用 apt 授权我们的 ROS 2 密钥，将 ROS 2 存储库添加到您的系统中。

sudo apt update && sudo apt install curl gnupg lsb-release

sudo curl -sSL https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o /usr/share/keyrings/ros-archive-keyring.gpg

curl: (7) Failed to connect to raw.githubusercontent.com port 443: Connection refused

解决方法

1) 打开网站 <https://www.ipaddress.com/>

[Click here for detailed My IP information](#)

Lookup any IPv4 address, IPv6 address, hostname or domain.

2) 查询 raw.githubusercontent.com

```
Q: What IP addresses does raw.githubusercontent.com resolve to?
A: raw.githubusercontent.com resolves to 4 IPv4 addresses and 4 IPv6 addresses:
▪ 185.199.108.133
▪ 185.199.109.133
▪ 185.199.110.133
▪ 185.199.111.133
▪ 2606:50c0:8000::154
▪ 2606:50c0:8001::154
▪ 2606:50c0:8002::154
▪ 2606:50c0:8003::154
```

3) 修改/etc/hosts 文件，将“185.199.108.133 raw.githubusercontent.com”加入到文件末尾

```
parallels@parallels-Parallels-Virtual-Platform:/etc$ cat hosts
127.0.0.1        localhost
127.0.1.1        parallels-Parallels-Virtual-Platform

# The following lines are desirable for IPv6 capable hosts
::1             ip6-localhost ip6-loopback
fe00::0         ip6-localnet
ff00::0         ip6-mcastprefix
ff02::1         ip6-allnodes
ff02::2         ip6-allrouters

185.199.108.133 raw.githubusercontent.com
```

然后将存储库添加到您的源列表中。

```
...

echo "deb [arch=$(dpkg --print-architecture)
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu $(source /etc/os-release && echo
$SUBUNTU_CODENAME) main" | sudo tee /etc/apt/sources.list.d/ros2.list >
/dev/null

...
```

安装 ROS 2 包

在设置好存储库后, 更新您的 apt 存储库, 并安装桌面版的 ROS 2 Galactic。

```
...
```

```
sudo apt update
```

```
sudo apt install ros-galactic-desktop
```

```
...
```

在安装好 ROS 2 后, 每次开启终端都需要通过以下命令 source ROS 2 的环境。

```
...
```

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

```
...
```

或者可以通过如下命令在 .bashrc 文件中 source ROS 2 的环境, 这样就可以“一劳永逸”了。

```
...
```

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

```
...
```

尝试 ROS 2 的例子

确保您已经 source 过 ROS 2 的环境后, 在一个终端中, 运行一个 C++ talker 程序

```
...
```

```
ros2 run demo_nodes_cpp talker
```

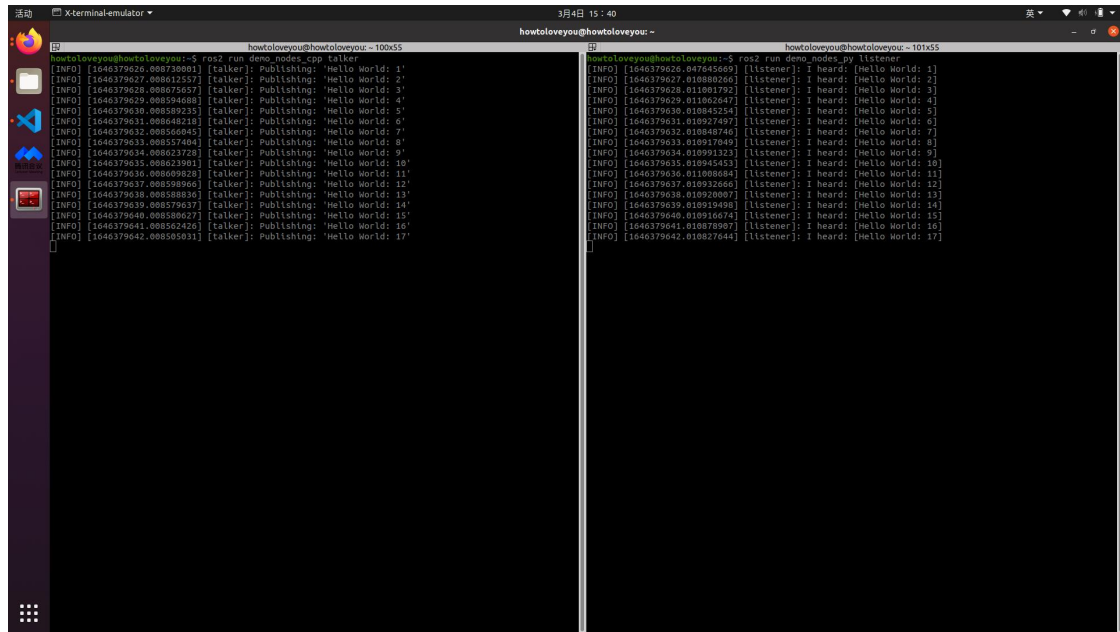
```
...
```

另起一个终端, 运行一个 C++ listener 程序

```
...
```

```
ros2 run demo_nodes_py listener
```

```
...
```



```
howtoloveyou@howtoloveyou:~$ ros2 run demo_nodes_cpp talker
[INFO] [1646379626.088738801] [talker]: Publishing: 'Hello World: 1'
[INFO] [1646379627.088612557] [talker]: Publishing: 'Hello World: 2'
[INFO] [1646379628.088675657] [talker]: Publishing: 'Hello World: 3'
[INFO] [1646379629.088594688] [talker]: Publishing: 'Hello World: 4'
[INFO] [1646379630.088589235] [talker]: Publishing: 'Hello World: 5'
[INFO] [1646379631.088648218] [talker]: Publishing: 'Hello World: 6'
[INFO] [1646379632.088566845] [talker]: Publishing: 'Hello World: 7'
[INFO] [1646379633.088557404] [talker]: Publishing: 'Hello World: 8'
[INFO] [1646379634.088623728] [talker]: Publishing: 'Hello World: 9'
[INFO] [1646379635.088623891] [talker]: Publishing: 'Hello World: 10'
[INFO] [1646379636.088609828] [talker]: Publishing: 'Hello World: 11'
[INFO] [1646379637.088598966] [talker]: Publishing: 'Hello World: 12'
[INFO] [1646379638.088588363] [talker]: Publishing: 'Hello World: 13'
[INFO] [1646379639.088579637] [talker]: Publishing: 'Hello World: 14'
[INFO] [1646379640.088588627] [talker]: Publishing: 'Hello World: 15'
[INFO] [1646379641.088562426] [talker]: Publishing: 'Hello World: 16'
[INFO] [1646379642.088558311] [talker]: Publishing: 'Hello World: 17'

howtoloveyou@howtoloveyou:~$ ros2 run demo_nodes_py listener
[INFO] [1646379628.047645089] [listener]: I heard: [Hello World: 1]
[INFO] [1646379627.018889266] [listener]: I heard: [Hello World: 2]
[INFO] [1646379628.01881792] [listener]: I heard: [Hello World: 3]
[INFO] [1646379629.018626547] [listener]: I heard: [Hello World: 4]
[INFO] [1646379630.018645254] [listener]: I heard: [Hello World: 5]
[INFO] [1646379631.018927497] [listener]: I heard: [Hello World: 6]
[INFO] [1646379632.018840746] [listener]: I heard: [Hello World: 7]
[INFO] [1646379633.018917849] [listener]: I heard: [Hello World: 8]
[INFO] [1646379634.018991323] [listener]: I heard: [Hello World: 9]
[INFO] [1646379635.018945453] [listener]: I heard: [Hello World: 10]
[INFO] [1646379636.018888884] [listener]: I heard: [Hello World: 11]
[INFO] [1646379637.018932666] [listener]: I heard: [Hello World: 12]
[INFO] [1646379638.018920897] [listener]: I heard: [Hello World: 13]
[INFO] [1646379639.018919498] [listener]: I heard: [Hello World: 14]
[INFO] [1646379640.018916674] [listener]: I heard: [Hello World: 15]
[INFO] [1646379641.018878997] [listener]: I heard: [Hello World: 16]
[INFO] [1646379642.018827644] [listener]: I heard: [Hello World: 17]
```

您应该看到 talker 说它正在发布消息，而 listener 说我听到了这些消息。这将验证 C++ 和 Python API 是否正常工作。如果没有正常运行，请考虑是否 source 过 ROS 2 ？