宿主机操作

1. 安装 docker

安装参考连接：docker install

若本地尚未安装docker，先进入docker_server目录:

```
cd ICRA-RM-Sim2Real/docker_server
```

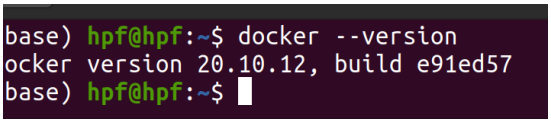
执行:

```
./docker_install.sh
```

若脚本无法执行，则检查脚本是否有运行权限

验证:

```
docker --version
```

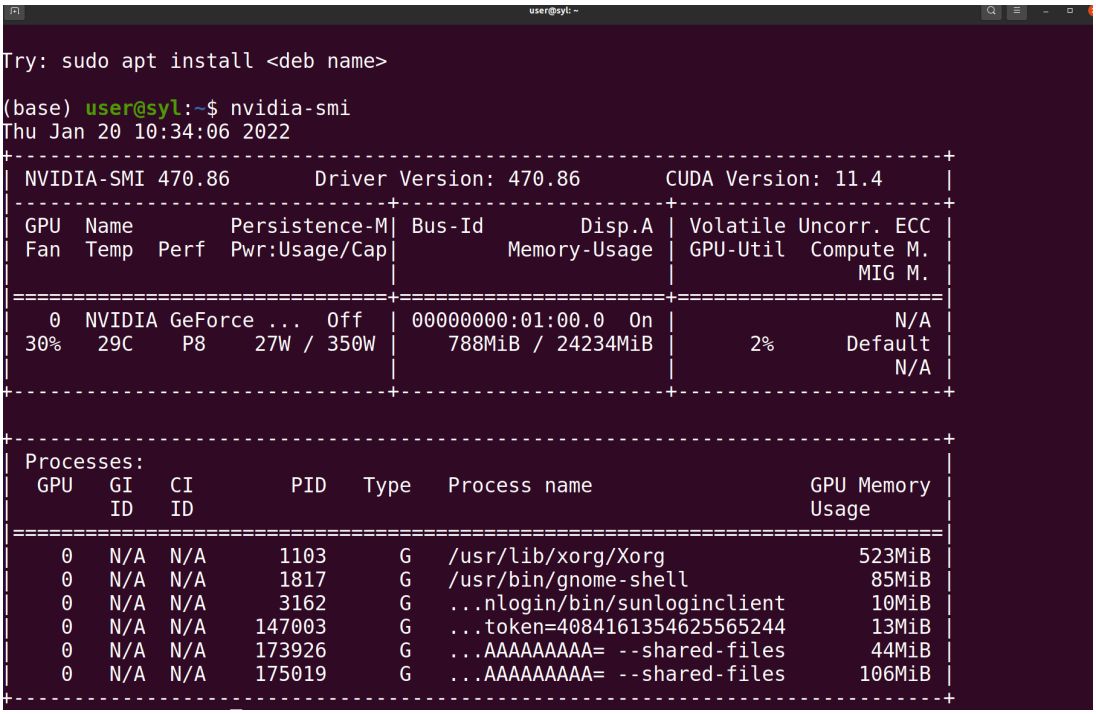


2. 安装 nvida driver

推荐使用Software & Updates中Additional Drivers安装

创建镜像和容器前需要检查宿主机的显卡驱动是否正常

打开终端，输入nvidia-smi



目前支持的驱动版本为470和510

3. 安装 nvidia-docker2

安装参考连接：nvidia-docker2

摘取的主要步骤，可做参考

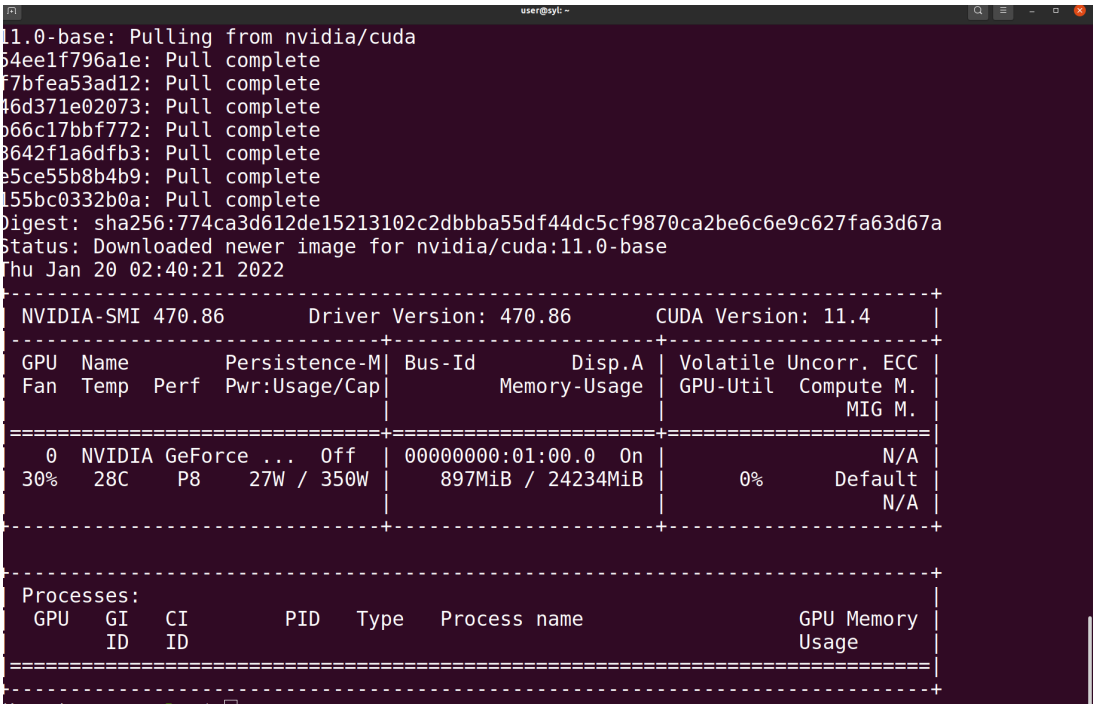
```
sudo systemctl --now enable docker
```

```
distribution=$(. /etc/os-release;echo $ID$VERSION_ID) \
   && curl -s -L https://nvidia.github.io/nvidia-docker/gpgkey | sudo apt-
key add - \
   && curl -s -L https://nvidia.github.io/nvidia-
docker/$distribution/nvidia-docker.list | sudo tee
/etc/apt/sources.list.d/nvidia-docker.list
```

```
sudo apt-get update
sudo apt-get install -y nvidia-docker2
sudo systemctl restart docker
```

验证：

```
sudo docker run --rm --gpus all nvidia/cuda:11.0-base nvidia-smi
```

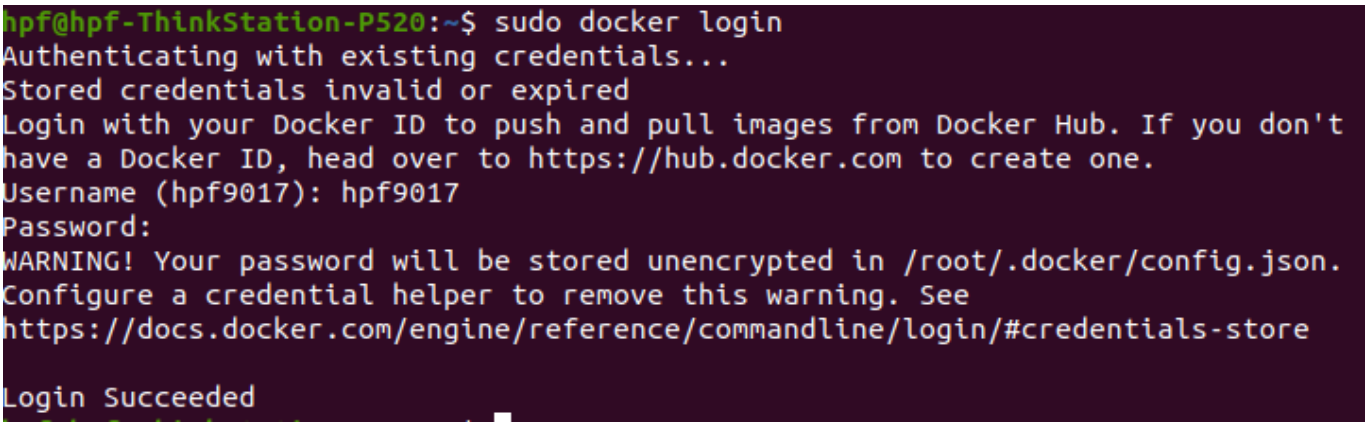


4. 注册 dockerhub

注册dockerhub账号：dockerhub

登录dockerhub账号

```
sudo docker login
```



5. 下载 docker image

下载镜像(tag以最后发布为准)

```
sudo docker pull rmus2022/server:v0.0.2
```

```
hpf@hpf-ThinkStation-P520:~$ sudo docker pull rmus2022/server:v0.0.1
v0.0.1: Pulling from rmus2022/server
35807b77a593: Pulling fs layer
c63faf7ebb91: Pulling fs layer
d0af4aff2aac: Pulling fs layer
4860ac2ea9aa: Pulling fs layer
964f8d4cadc4: Pulling fs layer
f68bad238d01: Pulling fs layer
75dd747f11f9: Pulling fs layer
66bca8babce2: Pulling fs layer
97cfad4752a5: Pulling fs layer
97ed0d5f10a8: Pulling fs layer
d35c98dc1ca2: Pulling fs layer
d47c4d48afef: Pulling fs layer
68f4730d0214: Pulling fs layer
9bd3efcf1156: Pulling fs layer
00f94e76c029: Pulling fs layer
b315e699e5e3: Pulling fs layer
f68bad238d01: Downloading  208.6MB/1.303GB
```

因为镜像文件较大，需等待较长时间

```
7f4183e6255f: Pull complete
fe03d076a06f: Pull complete
3a91a2d10a8c: Pull complete
b83461a2e6dd: Pull complete
483ebabda3d8: Pull complete
65dcfd31299f: Pull complete
9564ffd5b934: Pull complete
41940571ed61: Pull complete
bb83b4ee7497: Pull complete
d7109b48513f: Pull complete
60a1c03c590b: Pull complete
533dcaa506ce: Pull complete
3210a529c5fd: Pull complete
cf017de893d0: Pull complete
c3338802871c: Pull complete
f05d4dbf4046: Pull complete
aba47372644d: Pull complete
bb7a618a61bc: Pull complete
c1c4d57e3d59: Pull complete
83397bc8dc2c: Pull complete
Digest: sha256:ed7e8f6b29744ddb1f78086b037d391da1436b3901409b21b20a0d0f2739d903
Status: Downloaded newer image for rmus2022/server:v0.0.1
docker.io/rmus2022/server:v0.0.1
```

6. 创建 docker container

```
cd ICRA-RM-Sim2Real/docker_server
```

需要确认create_container_server中的tag为正确版本

```
sudo docker rm -f sim2real_server

sudo docker run -id --gpus all --name sim2real_server --network host \
        --privileged -v /dev:/dev -e DISPLAY=$DISPLAY -e QT_X11_NO_MITSHM=1 \
        -v /dev/bus/usb:/dev/bus/usb \
        -v /dev/video0:/dev/video0 \
        -v /dev/video1:/dev/video1 \
        -v /dev/video2:/dev/video2 \
        -v /dev/video3:/dev/video3 \
        -v /dev/video4:/dev/video4 \
        -v /dev/video5:/dev/video5 \
        -v /tmp/.X11-unix:/tmp/.X11-unix \
        -v $HOME/Desktop/shared:/shared \
        rmus2022/server:v0.0.2

sudo xhost +
~
```

```
./create_container_server.sh
```

```
hpf@hpf-ThinkStation-P520:~/ICRA-RM-Sim2Real/docker_server$ ./create_container_s
erver.sh
[sudo] password for hpf:
Error: No such container: sim2real_server
b638f34c5514db9ac6255a880e7967bc603e703b919e3ef4dafcf47037ed1c45
access control disabled, clients can connect from any host
```

当本地没有sim2real_server容器时会报错，不影响

每次运行该脚本，会删除没有docker commit的修改

docker server操作

1. 运行docker

重启后需要执行一次

```
sudo docker start sim2real_server
```

```
cd ICRA-RM-Sim2Real/docker_server
```

密码：123

```
./exec_server.sh
```

进入docker环境

2. 运行habitat sim例程

```
cd ~/habitat-sim/
```

```
./build/viewer ./data/scene_datasets/habitat-test-scenes/van-gogh-room.glb
```

可以通过 w, a, s, d控制机器人移动，通过方向键控制机器人视角。

3. 运行server环境

新建terminal

```
cd ICRA-RM-Sim2Real/docker_server
```

```
./exec_server.sh
```

```
roscore
```

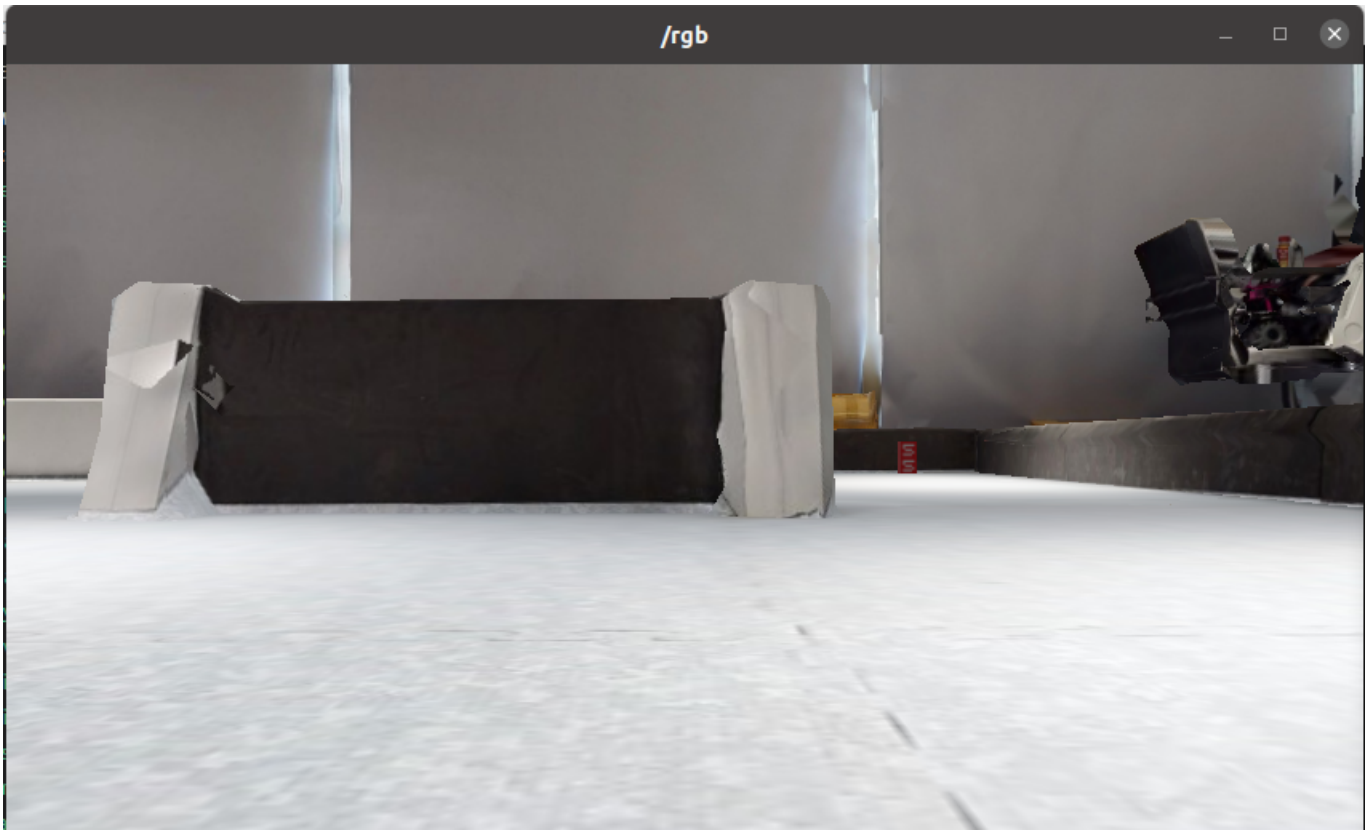
新建terminal

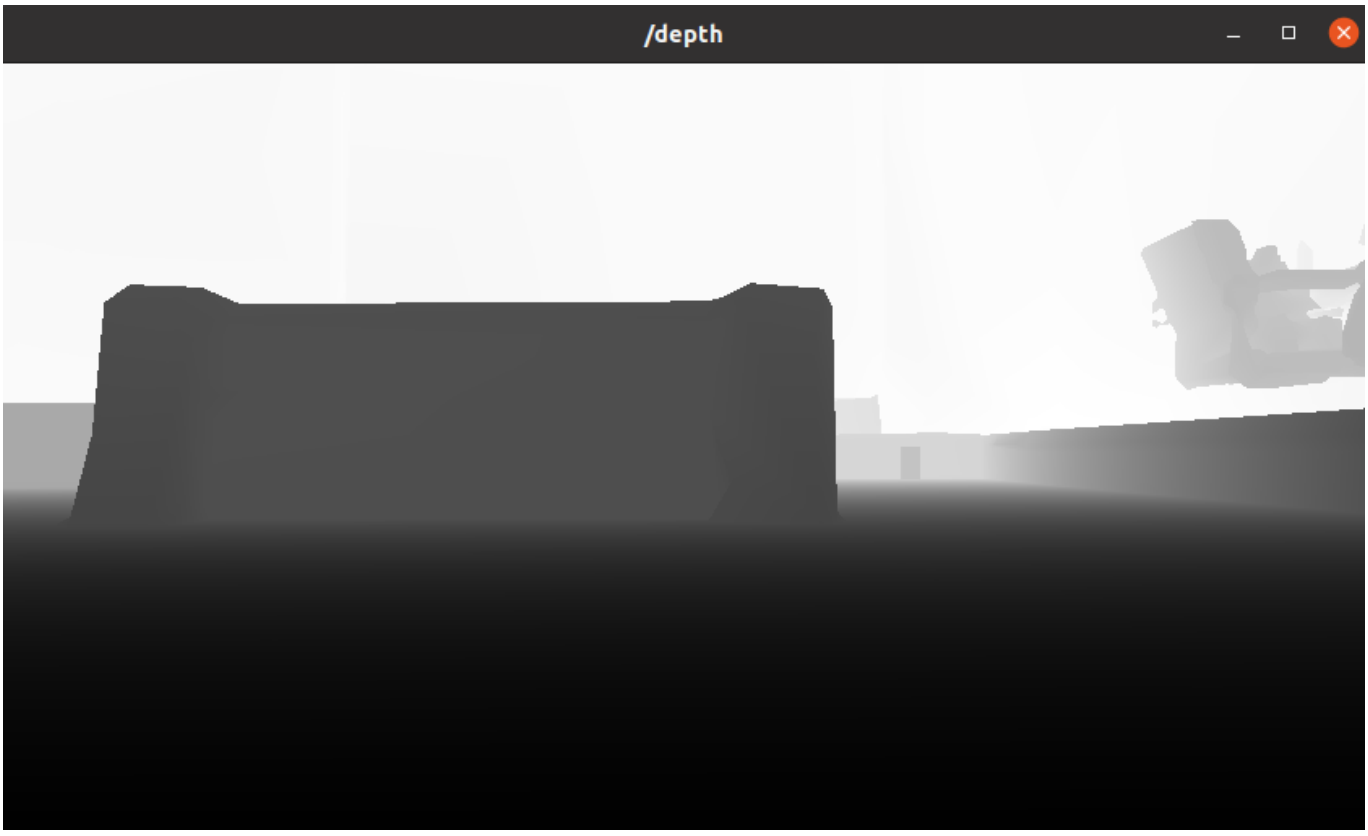
```
cd ICRA-RM-Sim2Real/docker_server
```

```
./exec_server.sh
```

```
cd ~/ros_x_habitat_ws/src/ros_x_habitat/
```

```
python3 src/scripts/roam_with_joy.py --hab-env-config-path
./configs/roam_configs/pointnav_rgbd_roam_mp3d_test_scenes.yaml
```


/rgb


/depth

4. 键盘控制运动和抓取

新建terminal

```
cd ICRA-RM-Sim2Real/docker_server
```

```
./exec_server.sh
```

```
rosrun teleop_twist_keyboard teleop_twist_keyboard.py
```

需要鼠标点击，激活键盘控制程序的terminal

```
(habitat) sim2real@hpf-ThinkStation-P520:/$ rosrun teleop_twist_keyboard teleop_twist_keyboard.py


Reading from the keyboard  and Publishing to Twist!
---------------------------
Moving around:
   u    i    o
   j    k    l
   m    ,    .

For Holonomic mode (strafing), hold down the shift key:
---------------------------
   U    I    O
   J    K    L
   M    <    >

t : up (+z)
b : down (-z)

anything else : stop

q/z : increase/decrease max speeds by 10%
w/x : increase/decrease only linear speed by 10%
e/c : increase/decrease only angular speed by 10%

CTRL-C to quit

currently:      speed 0.5       turn 1.0
```

按键q，z，增大和降低机器人速度

按键i，j，，，l， 控制机器人前进后退和旋转

按键I，J，<，L，控制机器人横向移动

通过k，停止机器人运动

按键1，移动机械臂到抓取位置

按键2，移动机械臂到放置位置

按键3，抓取矿石

按键4，放置矿石

docker client操作

1. 下载 docker image

下载镜像(tag以最后发布为准)

```
sudo docker pull rmus2022/clinet:v0.0.0
```

2. 创建 docker container

```
cd ICRA-RM-Sim2Real/docker_client
```

需要确认create_container_client中的tag为正确版本

需要根据宿主机的cpu修改create_container_client.sh中的cpu和内存参数

举例：

宿主机cpu为：Intel® Xeon(R) W-2125 CPU @ 4.00GHz × 8

机器人cpu为：11th Gen Intel® Core i7-1165G7 @ 2.80GHz × 8

则cpu=（2.8 × 8) / 4 = 5.6

机器人内存为：8GB

则M=8192M

```
./create_container_client.sh
```

当本地没有sim2real_client容器时会报错，不影响

每次运行该脚本，会删除没有docker commit的修改

3. rtab navigation

运行server环境（docker server操作步骤3）

正确显示rgb、depth、third_rgb画面

如果出现错误，重启启动一次

运行client环境

重启后需要执行一次

```
sudo docker start sim2real_client
```

新建terminal

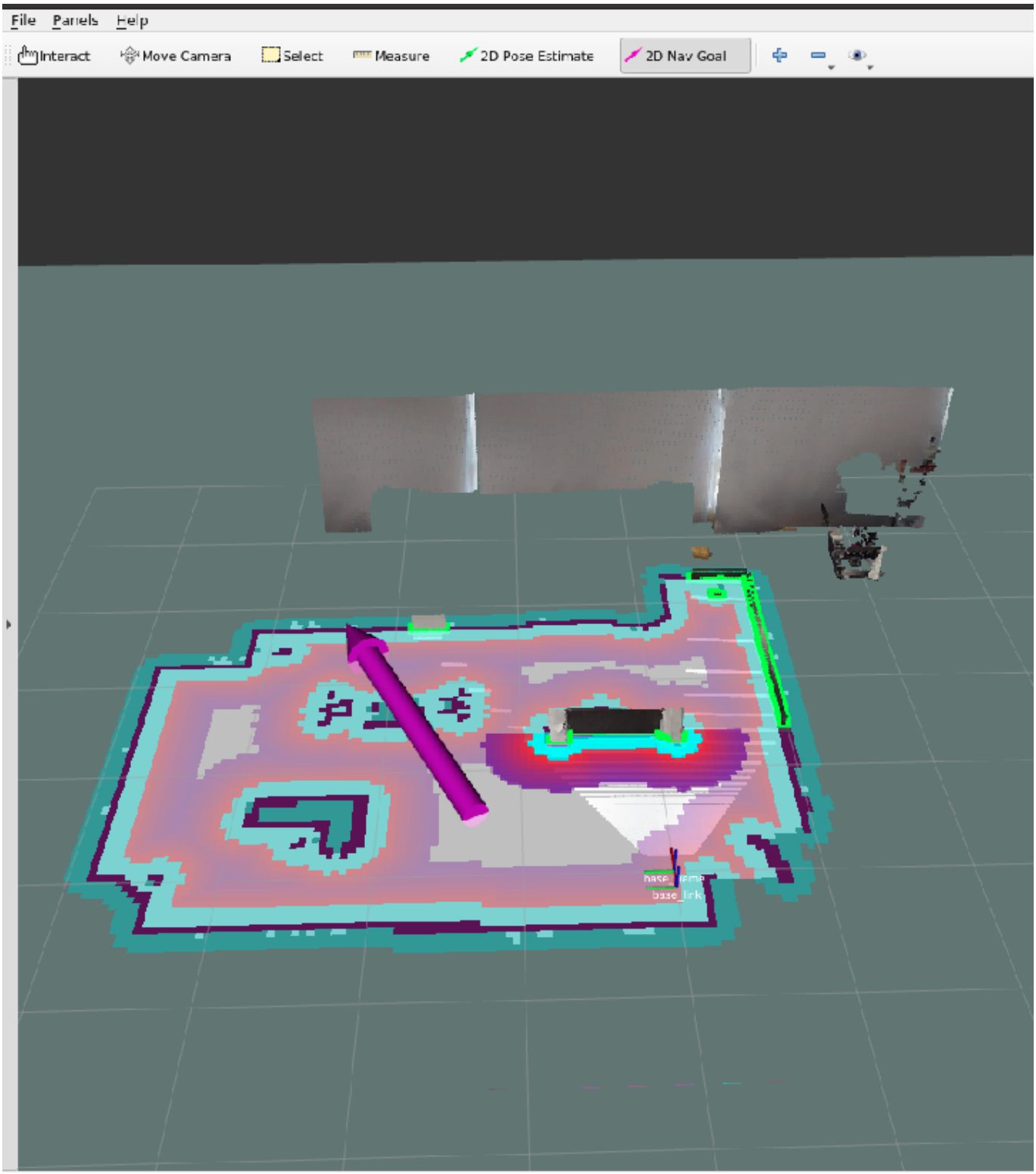
```
cd ICRA-RM-Sim2Real/docker_client
```

```
./exec_client.sh
```

```
cd ~
```

```
roslaunch habitat_navigation rtab_navigation.launch
```

通过rviz发送2D Nav Goal



4. cartographer navigation

运行server环境（docker server操作步骤3）

正确显示rgb、depth、third_rgb画面

如果出现错误，重启启动一次

运行client环境

新建terminal

```
cd ICRA-RM-Sim2Real/docker_client
```

```
./exec_client.sh
```

```
cd ~
```

```
roslaunch carto_navigation env.launch
```

新建terminal

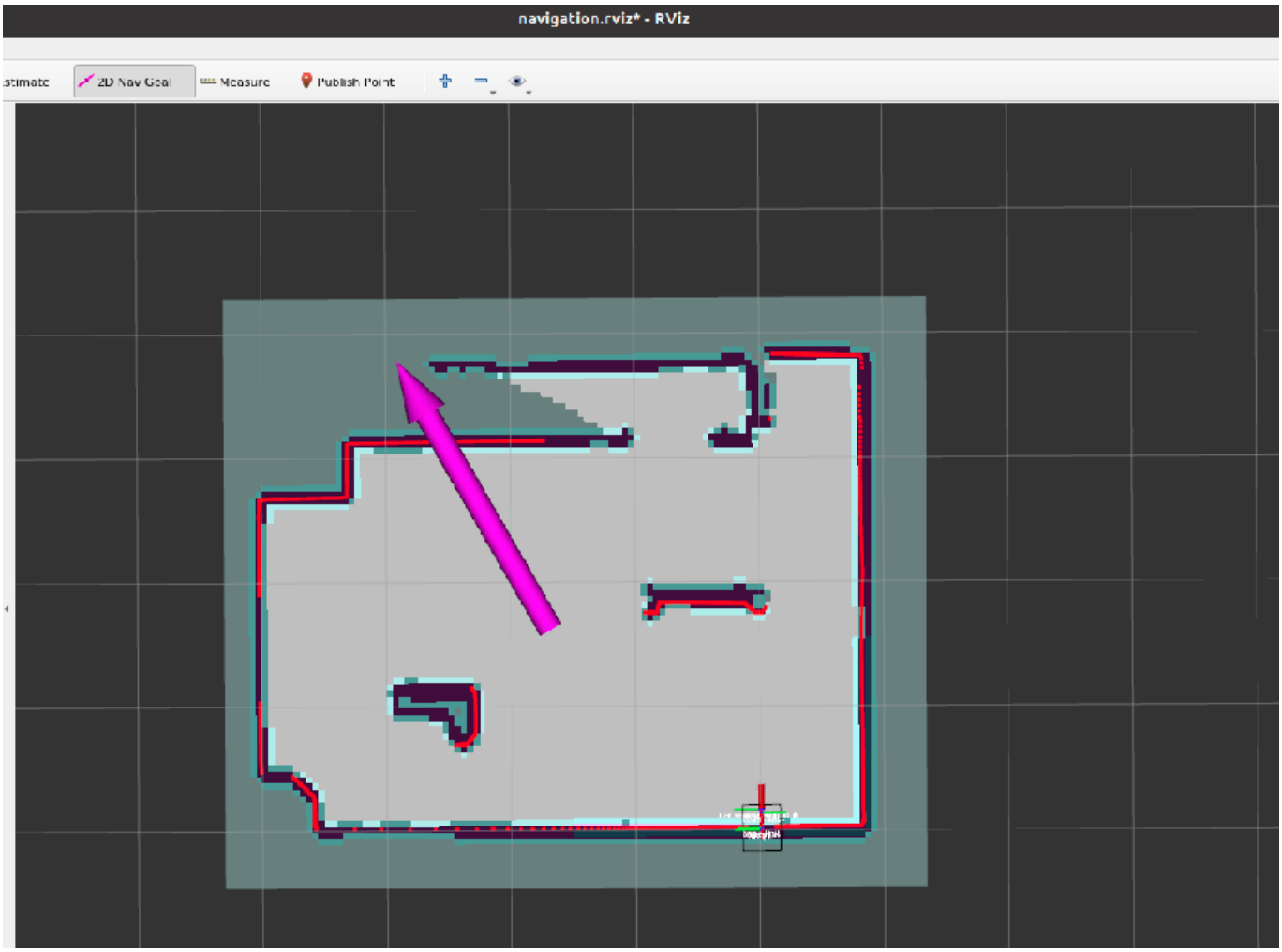
```
cd ICRA-RM-Sim2Real/docker_client
```

```
./exec_client.sh
```

```
cd ~
```

```
roslaunch carto_navigation navigation.launch
```

通过rviz发送2D Nav Goal



4. 抓取矿石（待补充）

4. 放置矿石（待补充）