

2、 Common commands for docker image containers

2、 Common commands for docker image containers

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The operating environment and software and hardware reference configurations are as follows:

- REFERENCE MODEL: ROSMASTER X3
- Robot hardware configuration: Arm series main control, Silan A1 lidar, AstraPro Plus depth camera
- Robot system: Ubuntu (version not required) + docker (version 20.10.21 and above)
- PC Virtual Machine: Ubuntu (20.04) + ROS2 (Foxy)
- Usage scenario: Use on a relatively clean 2D plane

2.1、 do not use the sudo command

Usually, to operate docker commands, you need to add the prefix sudo, as follows:

```
sudo docker version
```

But after adding the docker user group, you don't need to add the sudo prefix. How to add a docker user group (run commands in the host running docker):

```
sudo groupadd docker # Add docker user group
sudo gpasswd -a $USER docker # Add the current user to the docker user group, where
$USER can automatically resolve to the currently logged in user
Newgrp Docker# Update the docker user group
```

After adding the above command, use the [docker images] command to test, if there is no error, it means that you can already use the sudo command. If the following error is reported:

```
pi@ubuntu:~$ docker images
WARNING: Error loading config file: /home/pi/.docker/config.json: open
/home/pi/.docker/config.json: permission denied
```

Run the following command on the host to solve the problem:

```
sudo chown "$USER":"$USER" /home/"$USER"/.docker -R
sudo chmod g+rwX "/home/$USER/.docker" -R
```

2.2、 help commands

```
docker info # Displays Docker system information, including the number of images and
containers.
docker --help # Help
```

2.3、 mirror command

1、 Docker pull download image

```
# Download the image
jetson@ubuntu:~$ docker pull ubuntu
Using default tag: latest # Do not write tag, default is latest
latest: Pulling from library/ubuntu
cd741b12a7ea: Pull complete # Layered download
Digest: sha256:67211c14fa74f070d27cc59d69a7fa9aeff8e28ea118ef3babc295a0428a6d21
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest # Real Location
```

2、 Docker images lists the images

```
# Lists the images on the local host
jetson@ubuntu:~$ docker images
REPOSITORY          TAG         IMAGE ID      CREATED       SIZE
yahboomtechnology/ros-foxy  3.4.0      49581aa78b6b  About an hour ago  24.3GB
yahboomtechnology/ros-foxy  3.3.9      cefb5ac2ca02  3 days ago    20.5GB
yahboomtechnology/ros-foxy  3.3.8      49996806c64a  4 days ago    20.5GB
yahboomtechnology/ros-foxy  3.3.7      8989b8860d17  4 days ago    17.1GB
yahboomtechnology/ros-foxy  3.3.6      326531363d6e  5 days ago    16.1GB
hello-world          latest     46331d942d63  13 months ago  9.14kB
```

```
# interpretation
REPOSITORY: The repository source of the mirror
TAG: The label of the image
IMAGE: ID The ID of the image
CREATED: Image creation time
SIZE: Image size
```

```
# The same repository source can have multiple tags, representing different versions
of this repository source, we use REPOSITORY:TAG to define different images, if you
do not define the tag version of the image, docker will use latest images by
default!
```

```
# Optional
-a: Lists all local images
-q: Only the image ID is displayed
```

```
--digests: Displays the summary information of the image
```

3、 docker search

```
# Search for mirrors
jetson@ubuntu:~$ docker search ros2
```

NAME	STARS	OFFICIAL	AUTOMATED	DESCRIPTION
osrf/ros2				**Experimental** Docker Images for
ROS2 deve...	60		[OK]	
tiryoh/ros2-desktop-vnc				A Docker image to provide HTML5 VNC
interfac...	11			
althack/ros2				An assortment of development
containers for ...	7			
tiryoh/ros2				unofficial ROS2 image
	6			
athackst/ros2				[Deprecated-> use althack/ros2]
	5			
uobflightlabstarling/starling-mavros2				ROS2 version of MAVROS
	2			
theosakamg7/ros2_java_docker				Image base
	1		[OK]	

```
# docker search The name of an image corresponds to the image in the DockerHub repository
# optional
--filter=stars=50 : Lists images with a collection of no less than the specified value.
```

4、 docker rmi delete the image

```
# Delete the image
docker rmi -f image id # deletes a single
docker rmi -f image name: tag image name: tag # Delete multiple
docker rmi -f $(docker images -qa) # deletes all
```

2.4、 container commands

To create a container with an image, we use the image of ubuntu here to test and download the image:

```
docker pull ubuntu
```

1、 docker run

```
# command
docker run [OPTIONS] IMAGE [COMMAND][ARG...]
# Description of common parameters
--name="Name" # Specify a name for the container
```

```

-d # runs the container in background mode and returns the ID of the container!
-i # runs the container in interactive mode by using it with -t
-t # reassigns a terminal to the container, usually used with -i
-P # random port mapping (uppercase)
-p # specifies the port mapping (summary), which can generally be written in four
ways
ip:hostPort:containerPort
ip::containerPort
hostPort:containerPort (commonly used)
containerPort

# test
jetson@ubuntu:~$ docker images

```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
yahboomtechnology/ros-foxy	3.4.0	49581aa78b6b	2 hours ago	24.3GB
yahboomtechnology/ros-foxy	3.3.9	cefb5ac2ca02	3 days ago	20.5GB
yahboomtechnology/ros-foxy	3.3.8	49996806c64a	4 days ago	20.5GB
yahboomtechnology/ros-foxy	3.3.7	8989b8860d17	4 days ago	17.1GB
yahboomtechnology/ros-foxy	3.3.6	326531363d6e	5 days ago	16.1GB
ubuntu	latest	bab8ce5c00ca	6 weeks ago	69.2MB
hello-world	latest	46331d942d63	13 months ago	9.14kB

```

# Use ubuntu to start the container in interactive mode and execute the /bin/bash
command inside the container!
jetson@ubuntu:~$ docker run -it ubuntu:latest /bin/bash
root@c54bf9efae47:/# ls
bin boot dev etc home lib media mnt opt proc root run sbin srv sys
tmp usr var
root@c54bf9efae47:/# exit          # Use exit to exit the container back to the host
exit
jetson@ubuntu:~$

```

2、docker ps

```

# command
docker ps [OPTIONS]
# Description of common parameters
-a # lists all currently running containers + historically run containers
-l # displays the most recently created container
-n=? # Displays the last n created containers
-q # silent mode, only the container number is displayed.

#test
jetson@ubuntu:~$ docker ps -a

```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
c54bf9efae47	ubuntu:latest	"/bin/bash"	2 hours ago	Up 4 seconds
	funny_hugle			
3b9c01839579	hello-world	"/hello"	3 hours ago	Exited (0) 3 hours ago
	jovial_brown			

3、Exit the container

```
exit # The container stops exiting
ctrl+P+Q # container does not stop exiting
```

4、Multiple terminals enter a running container

```
# Command 1
docker exec -it docker_id bashShell

# test
jetson@ubuntu:~$ docker ps -a
CONTAINER ID   IMAGE          COMMAND          CREATED        STATUS
PORTS         NAMES
c54bf9efae47   ubuntu:latest  "/bin/bash"      2 hours ago    Up 4 seconds
              funny_hugle
3b9c01839579   hello-world    "/hello"         3 hours ago    Exited (0) 3 hours ago
              jovial_brown
jetson@ubuntu:~$ docker exec -it c5 /bin/bash # The ID of the container can be
abbreviated, as long as it uniquely identifies the container
root@c54bf9efae47:/#

# Command 2
docker attach docker_id

# test
jetson@ubuntu:~$ docker ps -a
CONTAINER ID   IMAGE          COMMAND          CREATED        STATUS
PORTS         NAMES
c54bf9efae47   ubuntu:latest  "/bin/bash"      2 hours ago    Up 35 seconds
              funny_hugle
3b9c01839579   hello-world    "/hello"         3 hours ago    Exited (0) 3 hours ago
              jovial_brown
jetson@ubuntu:~$ docker attach c5 # The ID of the container can be abbreviated,
as long as it uniquely identifies the container
root@c54bf9efae47:/#

# Difference
# exec is to open a new terminal in the container and a new process can be started
# attach goes directly to the terminal of the container startup command and does not
start a new process
```

5、Start and stop the container

```
docker start (container ID or container name) # Start the container
docker restart (container id or container name) # Restart the container
docker stop (container id or container name) # Stop the container
docker kill (container ID or container name) # Forces the container to stop
```

6、Delete the container

```
Docker rm docker_id # Deletes the specified container
docker rm -f $(docker ps -a -q) # Delete all containers
docker ps -a -q|xargs docker rm # Delete all containers
```

2.5、common other commands

1. View the process information running in the container and support ps command parameters.

```
# command
docker top docker_id

# Test
jetson@ubuntu:~$ docker ps -a
CONTAINER ID   IMAGE             COMMAND                  CREATED        STATUS
PORTS         NAMES
c54bf9efae47   ubuntu:latest    "/bin/bash"            2 hours ago   Up 2 minutes
              funny_hugle
3b9c01839579   hello-world      "/hello"               3 hours ago   Exited (0) 3 hours ago
              jovial_brown
jetson@ubuntu:~$ docker top c5
UID            PID            PPID           C
STIME          TTY            TIME           CMD
root           9667           9647           0
14:20          pts/0          00:00:00       /bin/bash
```

2. View the metadata of the container/image

```
# Command
docker inspect docker_id

# Test viewing container metadata
jetson@ubuntu:~$ docker ps -a
CONTAINER ID   IMAGE             COMMAND                  CREATED        STATUS
PORTS         NAMES
c54bf9efae47   ubuntu:latest    "/bin/bash"            2 hours ago   Up 4 minutes
              funny_hugle
3b9c01839579   hello-world      "/hello"               3 hours ago   Exited (0) 3 hours ago
              jovial_brown
jetson@ubuntu:~$ docker inspect c54bf9efae47
[
  {
    # The complete id, the container ID above here, is the first few digits of
    this ID that were intercepted
    "Id": "c54bf9efae471071391202a8718b346d9af76cb1ff17741e206280603d6f0056",
    "Created": "2023-04-24T04:19:46.232822024Z",
    "Path": "/bin/bash",
    "Args": [],
    "State": {
```

```

    "Status": "running",
    "Running": true,
    "Paused": false,
    "Restarting": false,
    "OOMKilled": false,
    "Dead": false,
    "Pid": 9667,
    "ExitCode": 0,
    "Error": "",
    "StartedAt": "2023-04-24T06:20:58.508213216Z",
    "FinishedAt": "2023-04-24T06:19:45.096483592Z"
  },

```

Test viewing image metadata

jetson@ubuntu:~\$ docker images

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	bab8ce5c00ca	6 weeks ago	69.2MB
hello-world	latest	46331d942d63	13 months ago	9.14kB

jetson@ubuntu:~\$ docker inspect bab8ce5c00ca

```

[
  {
    "Id":
"sha256:bab8ce5c00ca3ef91e0d3eb4c6e6d6ec7cffa9574c447fd8d54a8d96e7c1c80e",
    "RepoTags": [
      "ubuntu:latest"
    ],
    "RepoDigests": [

"ubuntu@sha256:67211c14fa74f070d27cc59d69a7fa9aeff8e28ea118ef3bab9c295a0428a6d21"

    ],
    "Parent": "",
    "Comment": "",
    "Created": "2023-03-08T04:32:41.063980445Z",
    "Container":
"094fd0c521be8c84d81524e4a5e814e88a2839899c56f654484d32d171c7195b",
    "ContainerConfig": {
      "Hostname": "094fd0c521be",
      .....
      "Labels": {
        "org.opencontainers.image.ref.name": "ubuntu",
        "org.opencontainers.image.version": "22.04"
      }
    },
    "DockerVersion": "20.10.12",
    "Author": "",
    "Config": {
      "Hostname": "",
      .....
      "Labels": {
        "org.opencontainers.image.ref.name": "ubuntu",
        "org.opencontainers.image.version": "22.04"
      }
    }
  }
]

```

```

    }
  },
  "Architecture": "arm64",
  "Variant": "v8",
  "Os": "linux",
  "Size": 69212233,
  "VirtualSize": 69212233,
  "GraphDriver": {
    "Data": {
      "MergedDir":
"/var/lib/docker/overlay2/8418b919a02d38a64ab86060969b37b435977e9bbdeb6b0840d4eb6982
80e796/merged",
      "UpperDir":
"/var/lib/docker/overlay2/8418b919a02d38a64ab86060969b37b435977e9bbdeb6b0840d4eb6982
80e796/diff",
      "WorkDir":
"/var/lib/docker/overlay2/8418b919a02d38a64ab86060969b37b435977e9bbdeb6b0840d4eb6982
80e796/work"
    },
    "Name": "overlay2"
  },
  "RootFS": {
    "Type": "layers",
    "Layers": [

"sha256:874b048c963ab55b06939c39d59303fb975d323822a4ea48a02ac8dc635ea371"

    ]
  },
  "Metadata": {
    "LastTagTime": "0001-01-01T00:00:00Z"
  }
}
]

```

2.6、 Command Summary

