

Rockchip Linux Docker Deploy Developer Guide

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Preface

Overview

This document is going to introduce the basic usage of Docker, and provides the way to build the image environment for building the docker of the SDK, and summarizes some frequently ask questions during usage process and provides solutions for reference.

Product Version

| Chipset | Kernel Version |
|---------|----------------|
| ALL | ALL |

Intended Audience

This document (this guide) is mainly intended for:

Technical support engineers

Software development engineers

Revision History

| Version | Author | Date | Change Description |
|---------|--------|------------|---------------------------|
| V1.0.0 | WJL | 2022-04-12 | Initial version |
| V1.0.1 | WJL | 2023-02-20 | Update content and layout |
| V1.0.2 | WJL | 2023-03-29 | Update Dockerfile and FAQ |
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1. Overview

Docker is an open source application container engine. Developers can package applications and dependencies into a lightweight and portable container, and then publish them to any popular Linux device, which can use system resources more efficiently and ensure a consistent operating environment, to realize continuous release and deployment, and facilitate porting, maintenance, and expansion in the future.

Validated systems are as follows:

| Release Version | Docker Version | Image Load | Firmware Build |
|-----------------|----------------|------------|----------------|
| ubuntu 22.04 | 24.0.5 | pass | pass |
| ubuntu 21.10 | 20.10.12 | pass | pass |
| ubuntu 21.04 | 20.10.7 | pass | pass |
| ubuntu 18.04 | 20.10.7 | pass | pass |
| fedora35 | 20.10.12 | pass | NR (not run) |

2. Installation

2.1 Debian-based Distributions, Such As Debian, Ubuntu

```
sudo apt-get install docker.io
```

2.2 Relhat-based Distributions, Such As Redhat, fedora, centos

```
sudo yum install docker
sudo dnf install docker
```

3. Usage

3.1 Create an Image with a Dockerfile

```
# $name:$tag Image name: tag name
# Dockfile is built based on the context, the built directory must contain
Dockerfile
# $dockerfile specifies the Dockerfile name, it is PATH/Dockerfile by default
# $dockerfile_dir Dockerfile is located at PATH
sudo docker build -f $dockerfile -t $name:$tag $dockerfile_dir
```

3.2 Delete an Image or Container

```
# $imageID
sudo docker rmi $imageID

# $containerID
sudo docker rm $containerID
```

3.3 Rename Image or Container

```
# $imageID: Image ID
# $name:$tag: image name:tag name
sudo docker tag $imageID $name:$tag

# $containerID container ID
# $name container name
sudo docker rename $containerID $name
```

3.4 To Check the Image or Container

```
sudo docker image ls

sudo docker container ls
```

3.5 Run Docker Environment

```
# Run Docker environment
# --privileged: privileged mode
# -it: means enabling interactive mode, /bin/bash: means interactive mode
# -v $host_dir:$docker_dir: maps the host directory into Docker
# -p $host_port:$docker_port: maps the host port into Docker
# -u $docker_user: specifies to use the user in Docker to log in
# -w $cwd_dir: switches to the path inside the container
# -d --detach: set background running mode

# Run the specified image
sudo docker run --privileged -it -u $docker_user -v $host_dir:$docker_dir
$imageID /bin/bash
```

```
# Run the specified container
sudo docker exec -it -w $cwd_dir $containerID /bin/bash
```

3.6 Image Management

```
# Login to dockerhub account
sudo docker login -u $username -p $password

# Pull the dockerhub image
sudo docker image pull $imageID

# Push image to dockerhub
sudo docker image push $username/$imagename

# Export local image (tar archive file)
sudo docker image save $name:$tag -o ${dockerimage.tar}

# Import local image (tar archive file)
sudo docker image load -i ${dockerimage.tar}

# Change the local image and commit
# -m commit information
# -a the author of the commit
# $containerID: the container ID which is changed
# $new_name:$new_tag: committed image name tag
sudo docker commit -m $commit_message -a $author $containerID
$new_name:$new_tag
```

4. How to build SDK with Docker

4.1 Build Docker Image

4.1.1 Build by Using Dockerfile

```
# Refer to the Dockerfile provided by this document
# Suppose Dockerfile is in /home/docker/Dockerfile
cd /home/docker
sudo docker build -t docker_rk:latest .
```

4.1.2 Use the Provided Image

Docker image is available at [docker](#).

4.2 Build SDK by using Docker

```
# Suppose the SDK is located at /home/user/sdk
# Maps the SDK to the Docker image and enter the image
sudo docker run --privileged -it -u rk -v /home/user/sdk:/home/rk/sdk
docker_rk:latest /bin/bash

# Switch to the path in Docker, the compilation method can be check through
build.sh -h
cd /home/rk/sdk
./build.sh -h
```

4.3 Update Docker Image

```
# After exiting the Docker image, all modifications except the mapping
directory will not be saved. If you want to save the corresponding
modifications, the Docker image needs to be updated
# Supports the container instantiated by this image is rk@ecbbcdc7e5ca:/$
# Follow the command below to update the Docker image
sudo docker commit -m "update" ecbbcdc7e5ca docker_rk:latest
```

5. How to run Docker in Rockchip platform

5.1 Kernel config

To run Docker, you need the kernel to enable the support of cgroups, namespace, netfilter, overlaysfs and other functions, please make sure that the configuration you use has met the requirements of docker running. The host can be checked by the script `/usr/share/docker.io/contrib/check-config.sh`, or obtained by [check-config.sh](#) if it is not already available on the system.

At the same time, we provide a general docker configuration, which can be configured with the following command:

```
make ARCH=arm64 rockchip_linux_defconfig rockchip_linux_docker.config
```

5.2 Buildroot config

Buildroot does not enable docker-related configurations by default, if you need docker-related functions, you can enable the following configurations:

```
BR2_PACKAGE_CGROUPFS_MOUNT=y
BR2_PACKAGE_DOCKER_ENGINE=y
BR2_PACKAGE_DOCKER_ENGINE_EXPERIMENTAL=y
BR2_PACKAGE_DOCKER_ENGINE_STATIC_CLIENT=y
BR2_PACKAGE_DOCKER_ENGINE_DRIVER_BTRFS=y
BR2_PACKAGE_DOCKER_ENGINE_DRIVER_DEVICEMAPPER=y
BR2_PACKAGE_DOCKER_ENGINE_DRIVER_VFS=y
```

5.3 Debian config

Docker can be installed directly on Debian. It should be noted that Debian uses iptables-nft by default, and docker uses iptables-legacy by default, so you need to configure iptables to use the legacy version, which can be switched by the following command:

```
# Using iptables-legacy
update-alternatives --set iptables /usr/sbin/iptables-legacy
update-alternatives --set ip6tables /usr/sbin/ip6tables-legacy

# Using iptables-nft
update-alternatives --set iptables /usr/sbin/iptables-nft
update-alternatives --set ip6tables /usr/sbin/ip6tables-nft
```

6. Dockerfile Reference

```
FROM ubuntu:22.04
RUN \
# use mirror sources
echo "deb http://mirrors.ustc.edu.cn/ubuntu/ jammy main restricted universe
multiverse\n\
deb http://mirrors.ustc.edu.cn/ubuntu/ jammy-security main restricted universe
multiverse\n\
deb http://mirrors.ustc.edu.cn/ubuntu/ jammy-updates main restricted universe
multiverse\n\
deb http://mirrors.ustc.edu.cn/ubuntu/ jammy-backports main restricted universe
multiverse" \
> /etc/apt/sources.list \
# install packages
&& DEBIAN_FRONTEND=noninteractive apt-get update -y \
&& DEBIAN_FRONTEND=noninteractive apt-get upgrade -y \
&& DEBIAN_FRONTEND=noninteractive apt-get install -y \
bc binfmt-support bison bsdmainutils build-essential chrpath cmake cpio curl
device-tree-compiler diffstat \
expat expect fdisk file flex gawk git iputils-ping libegl1-mesa libelf-dev
libgmp-dev libgucharmap-2-90-dev \
liblz4-tool libmpc-dev libncurses-dev libsdl1.2-dev libssl-dev locales live-
build mesa-common-dev net-tools \
patchelf python2 python2-dev python3 python-is-python3 python3-git python3-
jinja2 python3-pexpect python3-pip \
python3-pyelftools python3-subunit qemu-user-static repo rsync ssh strace swig
vim socat sudo texinfo time tree \
```



```
unzip wget \
# add user in docker
&& useradd -c 'rk user' -m -d /home/rk -s /bin/bash rk && usermod -a -G sudo rk \
&& sed -i -e '/\%sudo\tALL=(ALL:ALL) ALL/ c \%sudo ALL=(ALL) NOPASSWD: ALL'
/etc/sudoers \
&& echo "docker image build complete"
# delete useless package and cache if need
#&& apt-get autoclean && apt-get autoremove && rm -rf /var/lib/apt/lists/*
```

7. FAQ

7.1 Error Pulling Image Configuration: Get Https:.....Read: Connection Reset by Peer

The current network cannot access the Docker official website image repository. You can solve this problem by configuring the Docker domestic image repository. Please refer to the following modifications:

```
# Add the following content to /etc/docker/daemon.json
{
  "registry-mirrors": ["https://docker.mirrors.ustc.edu.cn/"]
}
```

7.2 Error.GitError: rev-parse: fatal: detected dubious ownership in repository at

Usually the ownership of the repository belongs to the host user who currently downloads the repository, when compiling in Docker, because the user in the Docker environment does not have the ownership of the repository, it will trigger a compilation error, you can modify the transfer right of all repositories through the following command. When a user in Docker takes ownership of the repository, the Host host user also loses the permission of the repository due to permission transfer.

```
git config --global --add safe.directory "*" "
```