Docker

# Writing a dockerfile

A Docker image/container is built from a Dockerfile wich contains the code describing the steps that need to be taken in order to build the image.

## Dockerfile structure

Create dockerfile: create a new file and call it “Dockerfile” don’t add any extensions

# use official ubuntu runtime as parent image

FROM ubuntu:18.04

RUN apt-get update \

&& apt-get install -y dos2unix \

&& rm -rf /var/lib/apt/lists/\*

# add the scripts to the container

ADD ./01\_copy\_rawdata.sh /home/Scripts/01\_copy\_rawdata.sh

# fix execute rights if necessairy

RUN chmod 755 /home/Scripts/01\_copy\_rawdata.sh

# convert Windows EOL to UNIX EOL (required when scripts where manipulated in Windows)

RUN dos2unix /home/Scripts/01\_copy\_rawdata.sh

Basic options:

|  |  |
| --- | --- |
| FROM | The base image to build on (look on <https://hub.docker.com/search?q=&type=image>) to find base images that suit your needs |
| RUN | Commands that need to be executed when building the image  Depend on the OS chosen as base image |
| ADD | Usage: ADD “location on host” “location in container”  Add external files or folders to the container. Files and folders specified like this will be **static** meaning that once the image is build, any **changes** made to these files/folders on the host **won’t carry** **over** into the container or the host (and vice versa).  The ADD function can only add files and folders that are available in the folder containing the Dockerfile itself |
| CMD | Usage: CMD [“command1”, “command2”]  Specify commands that will automatically be executed on container start-up |

## docker commands

|  |  |
| --- | --- |
| $docker --help | General info |
| $docker image ls | List all installed images |
| $docker container ls | List all running containers |
| $docker image rm “imagename”:”version” | Remove a image |
| $docker prune | Remove all docker images, containers… (this doesn’t remove docker) |

### docker build

* Build the image from the Dockerfile
* **Usage**: *$docker build --tag=”username”/”imagename”:”version” .*
  + The “username” is only required when you want to push the container to dockerhub
  + The “version” tag isn’t required, when it isn’t specified it will default to “latest”
  + The “.” Indi
* The image name can’t contain upper case letters (or numbers)

### Docker push

* Push a build image to dockerhub so it can be downloaded at any time and place
* **Usage**: *$docker push “username”/”imagename”:”version”*
* In order to push a docker image to dockerhub you need to be logged in: use *$docker login*

### docker run

* Start a container from an image. If the image isn’t present on the host, *“$docker run”* will automatically search dockerhub for the image, download and install it. If the image is already present on the host, it will just launch the container from the image
* **Usage**: *$docker run ‘username’/’imagename’:’version’ ‘command to execute’*
  + The command option isn’t required, when not provided to will default to /bin/bash most of the time
* Docker run has lots of options which can be found here: <https://docs.docker.com/engine/reference/run/>

|  |  |
| --- | --- |
| -it | Keep the output on the attached foreground in a terminal |
| --rm | Remove all remaining container files on container exit  (containers always preserve the final file structure in memory when exited, this command option stops this preventing cluttering of the system) |
| -v | Mount a volume from the host on the container, these volumes will be **dynamic**  **Usage:** *-v “host-location”:”container-location”* |
| --mount | Same as the -v option, but more readable  Doesn’t seem to work on windows  **Usage:** *--mount src=””,target=””,type=””* |
| --name | Give the container a recognizable name |

Both the -v and the --mount option require the full paths to the HOST location and the CONTAINER location

## “Docker in docker”

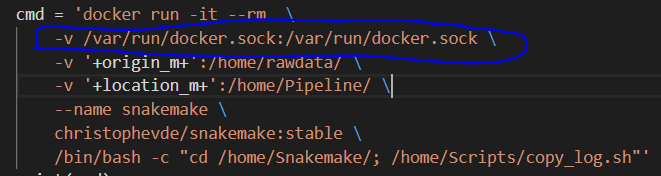
By mounting the docker deamon from the host to the master docker container, the master docker container (the one running snakemake in th is case) can spawn new docker containers. These docker new docker containers wont be child containers running inside the master container but they will be siblings of the master, meaning that they actually run on the HOST, however they are controlled by the master. This trick is used because an actual docker in docker container, while possible to create with the –priviliged tag, isn’t really supported and can even cause file corruption. In general it’s not advised to run more then 1 docker deamon on a system, therefore sharing the deamon between containers is the solution.

Figure 1: the code to mount the docker deamon into a container