

WHAT IS GIT?

Version Control System (VCS) for tracking changes in computer files



- ✓ Distributed version control
- ✓ Coordinates work between multiple developers
- ✓ Who made what changes and when
- ✓ Revert back at any time
- ✓ Local & remote repos

```
Activities  Terminal  Nov 1 09:59  [Icons]
swasti@swasti-VirtualBox: ~/Desktop
swasti@swasti-VirtualBox: ~/Desktop
swasti@swasti-VirtualBox: ~/Desktop
swasti@swasti-VirtualBox:~$ git config --global user.name "swastti"
swasti@swasti-VirtualBox:~$ git config --global user.email "jainswati1603@gmail.com"
swasti@swasti-VirtualBox:~$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /home/swasti/.git/
swasti@swasti-VirtualBox:~$ cd Desktop
swasti@swasti-VirtualBox:~/Desktop$ touch Readme.md
swasti@swasti-VirtualBox:~/Desktop$ cat Readme.md
swasti@swasti-VirtualBox:~/Desktop$ gedit Readme.md
swasti@swasti-VirtualBox:~/Desktop$ cat Readme.md
#Git is Initialised in local repository using
git init
swasti@swasti-VirtualBox:~/Desktop$ git add .
error: open("Desktop/story.txt"): Permission denied
error: unable to index file 'Desktop/story.txt'
fatal: adding files failed
```

```
Activities Terminal Nov 1 09:59
swasti@swasti-VirtualBox: ~/Desktop

error: open("Desktop/story.txt"): Permission denied
error: unable to index file 'Desktop/story.txt'
fatal: adding files failed
swasti@swasti-VirtualBox:~/Desktop$ ls
a          image      names      Readme.md
helloworld.odt lp.gz 'Old Firefox Data' story.txt
swasti@swasti-VirtualBox:~/Desktop$ git add Readme.md
swasti@swasti-VirtualBox:~/Desktop$ git commit -m "First Commit"
gi: command not found
swasti@swasti-VirtualBox:~/Desktop$ git commit -m "First Commit"
[master (root-commit) 5d8ec48] First Commit
1 file changed, 2 insertions(+)
create mode 100644 Desktop/Readme.md
swasti@swasti-VirtualBox:~/Desktop$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    ../.ViDemo.txt.swp
    ../.bash_history
    ../.bash_logout
    ../.bashrc
    ../.cache/
    ../.config/
    ../.gitconfig
    ../.gnupg/
    ../.lessshst
    ../.local/
```

```
Activities Terminal Nov 1 10:00
swasti@swasti-VirtualBox: ~/Desktop

nothing added to commit but untracked files present (use "git add" to track)
swasti@swasti-VirtualBox:~/Desktop$ git push origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
swasti@swasti-VirtualBox:~/Desktop$ git remote add origin https://github.com/swastti/Github_tut.git
swasti@swasti-VirtualBox:~/Desktop$ git push origin master
Username for 'https://github.com': swastti
Password for 'https://swastti@github.com':
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 4 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (4/4), 308 bytes | 308.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/swastti/Github_tut.git
 * [new branch]      master -> master
swasti@swasti-VirtualBox:~/Desktop$ git log
commit 5d8ec48100943d0238a21e78d12074d71d7212ea (HEAD -> master, origin/master)
Author: swastti <jainswati1603@gmail.com>
Date: Tue Nov 1 09:35:49 2022 +0530

    First Commit
swasti@swasti-VirtualBox:~/Desktop$ git branch
```

```
Activities Terminal Nov 1 10:00 swasti@swasti-VirtualBox: ~/Desktop

swasti@swasti-VirtualBox: ~/Desktop

First Commit
swasti@swasti-VirtualBox:~/Desktop$ git branch
* master
swasti@swasti-VirtualBox:~/Desktop$ git checkout -b feature
Switched to a new branch 'feature'
swasti@swasti-VirtualBox:~/Desktop$ git checkout master
Switched to branch 'master'
swasti@swasti-VirtualBox:~/Desktop$ git checkout feature
Switched to branch 'feature'
swasti@swasti-VirtualBox:~/Desktop$ gedit Readme.md
swasti@swasti-VirtualBox:~/Desktop$ git status
On branch feature
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   Readme.md

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        ../ViDemo.txt.swp
        ../.bash_history
        ../.bash_logout
        ../.bashrc
        ../.cache/
        ../.config/
        ../.gitconfig
```

```
Activities Terminal Nov 1 10:00 swasti@swasti-VirtualBox: ~/Desktop

swasti@swasti-VirtualBox: ~/Desktop

        ../snap/
        ../viDemo.txt

no changes added to commit (use "git add" and/or "git commit -a")
swasti@swasti-VirtualBox:~/Desktop$ git add Readme.md
swasti@swasti-VirtualBox:~/Desktop$ git commit -m "New branch added"
[feature dba5ba3] New branch added
1 file changed, 3 insertions(+)
swasti@swasti-VirtualBox:~/Desktop$ git push origin feature
Username for 'https://github.com': swastti
Password for 'https://swastti@github.com':
remote: Support for password authentication was removed on August 13, 2021.
remote: Please see https://docs.github.com/en/get-started/getting-started-with-git/about-remote-repositories#cloning-with-https-urls for information on currently recommended modes of authentication.
fatal: Authentication failed for 'https://github.com/swastti/Github_tut.git/'
swasti@swasti-VirtualBox:~/Desktop$ git push origin feature
Username for 'https://github.com': swastti
Password for 'https://swastti@github.com':
Enumerating objects: 7, done.
Counting objects: 100% (7/7), done.
Delta compression using up to 4 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (4/4), 370 bytes | 370.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
remote:
remote: Create a pull request for 'feature' on GitHub by visiting:
```

```
Activities Terminal Nov 1 10:01 swasti@swasti-VirtualBox: ~/Desktop

Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
remote:
remote: Create a pull request for 'feature' on GitHub by visiting:
remote: https://github.com/swastti/Github_tut/pull/new/feature
remote:
To https://github.com/swastti/Github_tut.git
* [new branch] feature -> feature
swasti@swasti-VirtualBox:~/Desktop$ git diff feature
swasti@swasti-VirtualBox:~/Desktop$ git pull
There is no tracking information for the current branch.
Please specify which branch you want to merge with.
See git-pull(1) for details.

    git pull <remote> <branch>

If you wish to set tracking information for this branch you can do so with:

    git branch --set-upstream-to=origin/<branch> feature

swasti@swasti-VirtualBox:~/Desktop$ git pull origin master
From https://github.com/swastti/Github_tut
* branch master -> FETCH_HEAD
Already up to date.
swasti@swasti-VirtualBox:~/Desktop$ git branch -d feature
error: Cannot delete branch 'feature' checked out at '/home/swasti'
swasti@swasti-VirtualBox:~/Desktop$ git checkout master
Switched to branch 'master'
```

```
Activities Terminal Nov 1 10:01 swasti@swasti-VirtualBox: ~/Desktop

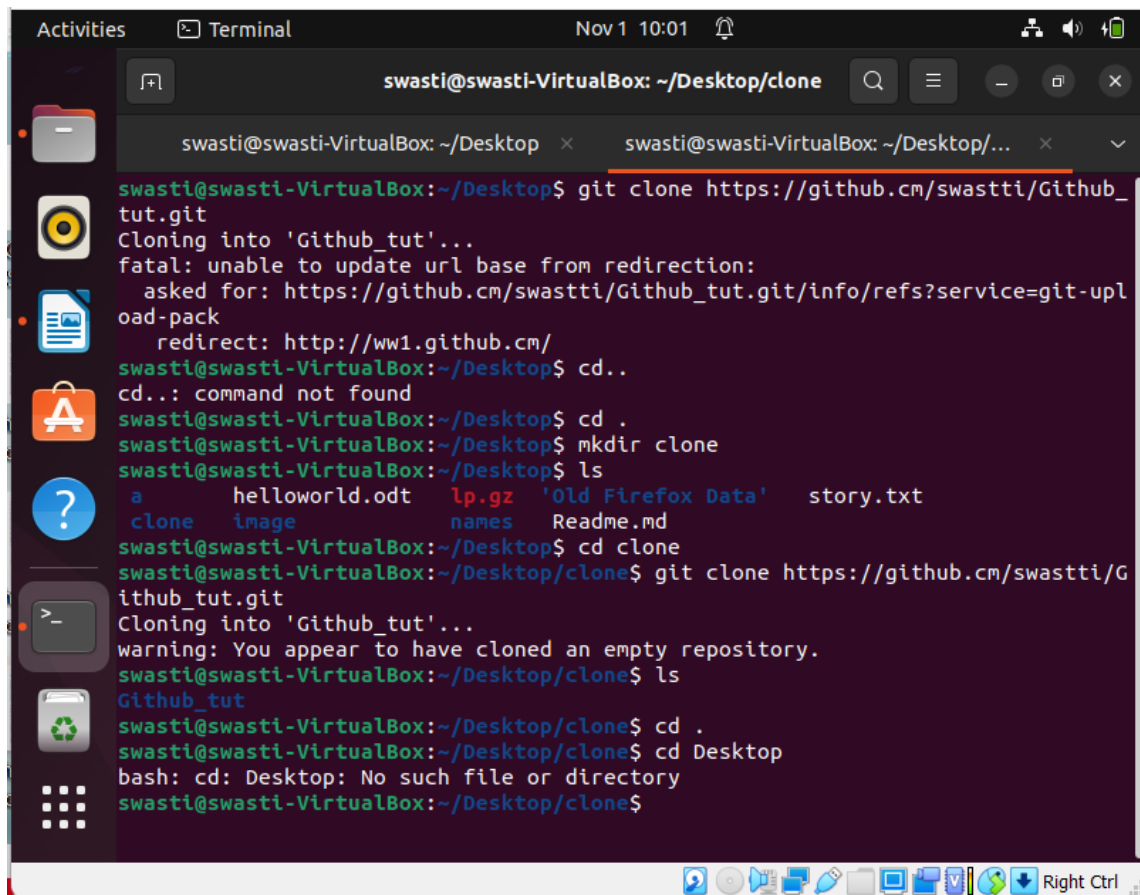
swasti@swasti-VirtualBox:~/Desktop$ git diff feature
swasti@swasti-VirtualBox:~/Desktop$ git pull
There is no tracking information for the current branch.
Please specify which branch you want to merge with.
See git-pull(1) for details.

    git pull <remote> <branch>

If you wish to set tracking information for this branch you can do so with:

    git branch --set-upstream-to=origin/<branch> feature

swasti@swasti-VirtualBox:~/Desktop$ git pull origin master
From https://github.com/swastti/Github_tut
* branch master -> FETCH_HEAD
Already up to date.
swasti@swasti-VirtualBox:~/Desktop$ git branch -d feature
error: Cannot delete branch 'feature' checked out at '/home/swasti'
swasti@swasti-VirtualBox:~/Desktop$ git checkout master
Switched to branch 'master'
swasti@swasti-VirtualBox:~/Desktop$ git branch -d feature
error: The branch 'feature' is not fully merged.
If you are sure you want to delete it, run 'git branch -D feature'.
swasti@swasti-VirtualBox:~/Desktop$ git branch -D feature
Deleted branch feature (was dba5ba3).
swasti@swasti-VirtualBox:~/Desktop$
```



```
swasti@swasti-VirtualBox: ~/Desktop/clone
swasti@swasti-VirtualBox:~/Desktop$ git clone https://github.com/swastti/Github_tut.git
Cloning into 'Github_tut'...
fatal: unable to update url base from redirection:
  asked for: https://github.com/swastti/Github_tut.git/info/refs?service=git-upload-pack
  redirect: http://ww1.github.com/
swasti@swasti-VirtualBox:~/Desktop$ cd..
cd..: command not found
swasti@swasti-VirtualBox:~/Desktop$ cd .
swasti@swasti-VirtualBox:~/Desktop$ mkdir clone
swasti@swasti-VirtualBox:~/Desktop$ ls
a          helloworld.odt  lp.gz  'Old Firefox Data'  story.txt
clone      image           names  Readme.md
swasti@swasti-VirtualBox:~/Desktop$ cd clone
swasti@swasti-VirtualBox:~/Desktop/clone$ git clone https://github.com/swastti/Github_tut.git
Cloning into 'Github_tut'...
warning: You appear to have cloned an empty repository.
swasti@swasti-VirtualBox:~/Desktop/clone$ ls
Github_tut
swasti@swasti-VirtualBox:~/Desktop/clone$ cd .
swasti@swasti-VirtualBox:~/Desktop/clone$ cd Desktop
bash: cd: Desktop: No such file or directory
swasti@swasti-VirtualBox:~/Desktop/clone$
```

Docker is a centralized platform for packaging, deploying, and running applications. Before Docker, many users face the problem that a particular code is running in the developer's system but not in the user's system. So, the main reason to develop docker is to help developers to develop applications easily, ship them into containers, and can be deployed anywhere.

What is Docker?

Docker is an **open-source centralized platform designed** to create, deploy, and run applications. Docker uses **container** on the host's operating system to run applications. It allows applications to use the same **Linux kernel** as a system on the host computer, rather than creating a whole virtual operating system. Containers ensure that our application works in any environment like development, test, or production.

Docker Container and Image

Docker images are the “source code” for our containers; we use them to build containers. They can have software pre-installed which speeds up deployment. They are portable, and we can use existing images or build our own.

Containers are the organizational units and one of the Docker basics concept. When we build an image and start running it; we are running in a container. The container analogy is used because of the portability of the software we have running in our container. We can move it, in other words, “ship” the software, modify, manage, create or get rid of it, destroy it, just as cargo ships can do with real containers.

In simple terms, an image is a template, and a container is a copy of that template. You can have multiple containers (copies) of the same image.

Docker container is a running instance of an image. You can use Command Line Interface (CLI) commands to run, start, stop, move, or delete a container. You can also provide configuration for the network and environment variables. Docker container is an isolated and secure application platform, but it can share and access to resources running in a different host or container.

An image is a read-only template with instructions for creating a Docker container. A docker image is described in text file called a **Dockerfile**, which has a simple, well-defined syntax. An image does not have states and never changes. Docker Engine provides the core Docker technology that enables images and containers.

You can understand container and image with the help of the following command.

1. `$ docker run hello-world`

The above command **docker run hello-world** has three parts.

- 1) **docker:** It is docker engine and used to run docker program. It tells to the operating system that you are running docker program.

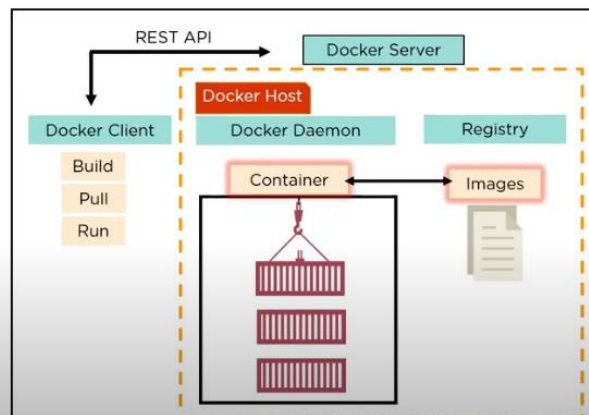
- 2) **run:** This subcommand is used to create and run a docker container.

- 3) **hello-world:** It is a name of an image. You need to specify the name of an image which is to load into the container.

Docker containers run on top of the host's Operation system. This helps you to improves efficiency and security. Moreover, we can run more containers on the same infrastructure than we can run Virtual machines because containers use fewer resources.

1

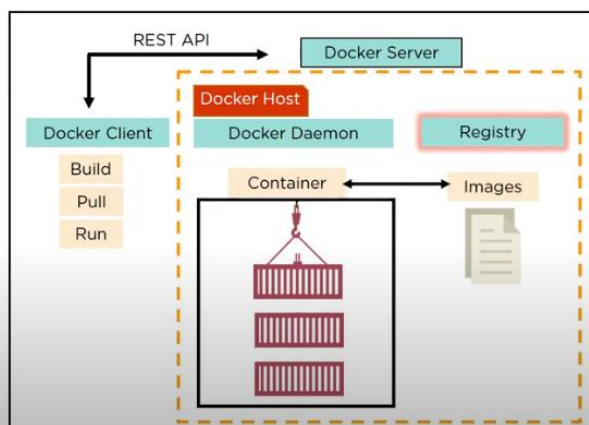
Explain the architecture of Docker



- Docker uses a client-server architecture
- Docker Client is a service which runs a command. The command is translated using REST API and is sent to the Docker Daemon (server)
- Docker Daemon accepts the request and interacts with the operating system in order to build Docker Images and run Docker containers
- A Docker Image is a template of instruction which is used to create containers

1

Explain the architecture of Docker



- Docker container is an executable package of application and its dependencies together
- Docker registry is a service to host and distribute Docker Images among users

2

What are the advantages of Docker over Virtual machine

Criteria	Virtual Machine	Docker
Memory space	Occupies a lot of memory space	Docker Containers occupy less space
Boot-up time	Long boot-up time	Short boot-up time
Performance	Running multiple virtual machines leads to unstable performance	Containers have a better performance as they are hosted in a single Docker engine
Scaling	Difficult to scale up	Easy to scale up
Efficiency	Low efficiency	High efficiency
Portability	Compatibility issues while porting across different platforms	Easily portable across different platforms
Space allocation	Data volumes cannot be shared	Data volumes can be shared and reused among multiple containers

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Differences between Docker Image and Docker Container

Docker Images



- Docker Images are templates of Docker Containers
- An image is built using a Dockerfile
- It is stored in a Docker repository or a Docker hub
- The image layer is a read only filesystem

Docker Container



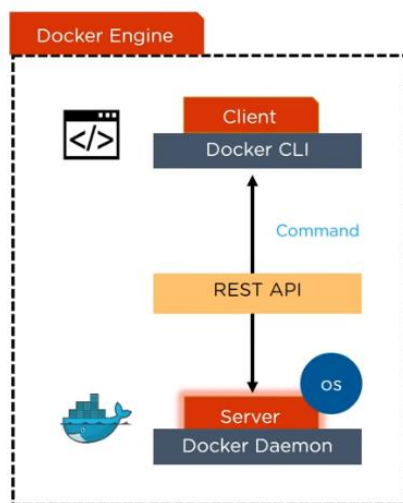
- Containers are runtime instances of a Docker Image
- Containers are created using Docker Images
- They are stored in the Docker daemon
- Every container layer is a read-write filesystem

What is Docker?

Docker is a tool which is used to automate the deployment of applications in lightweight containers so that applications can work efficiently in different environments



How does Docker work?



- Docker Engine or Docker is the base engine installed on your host machine to build and run containers using Docker components and services
- It uses a client-server architecture
- Docker Client and Server communicate using Rest API
- Docker Client is a service which runs a command. The command is translated using REST API and is sent to the Docker Daemon (server)
- Then, Docker Daemon checks the client request and interacts with the operating system in order to create or manage containers

What happens here?

Command

docker info

docker pull

docker run -i -t image_name /bin/bash

docker start our_container

docker stop container_name

docker ps

docker stats

docker images

Description

Information Command

Download an image

Run image as a container

Start container

Stop container

List of all running containers

Container information

List of images downloaded

Command	Description
Docker Cleanup	Kill all running containers.

Containers

Use `docker container my_command`

`create` — Create a container from an image.

`start` — Start an existing container.

`run` — Create a new container and start it.

`ls` — List running containers.

`inspect` — See lots of info about a container.

`logs` — Print logs.

`stop` — Gracefully stop running container.

`kill` — Stop main process in container abruptly.

`rm` — Delete a stopped container.

Images

Use `docker image my_command`

`build` — Build an image.

`push` — Push an image to a remote registry.

`ls` — List images.

`history` — See intermediate image info.

`inspect` — See lots of info about an image, including the layers.

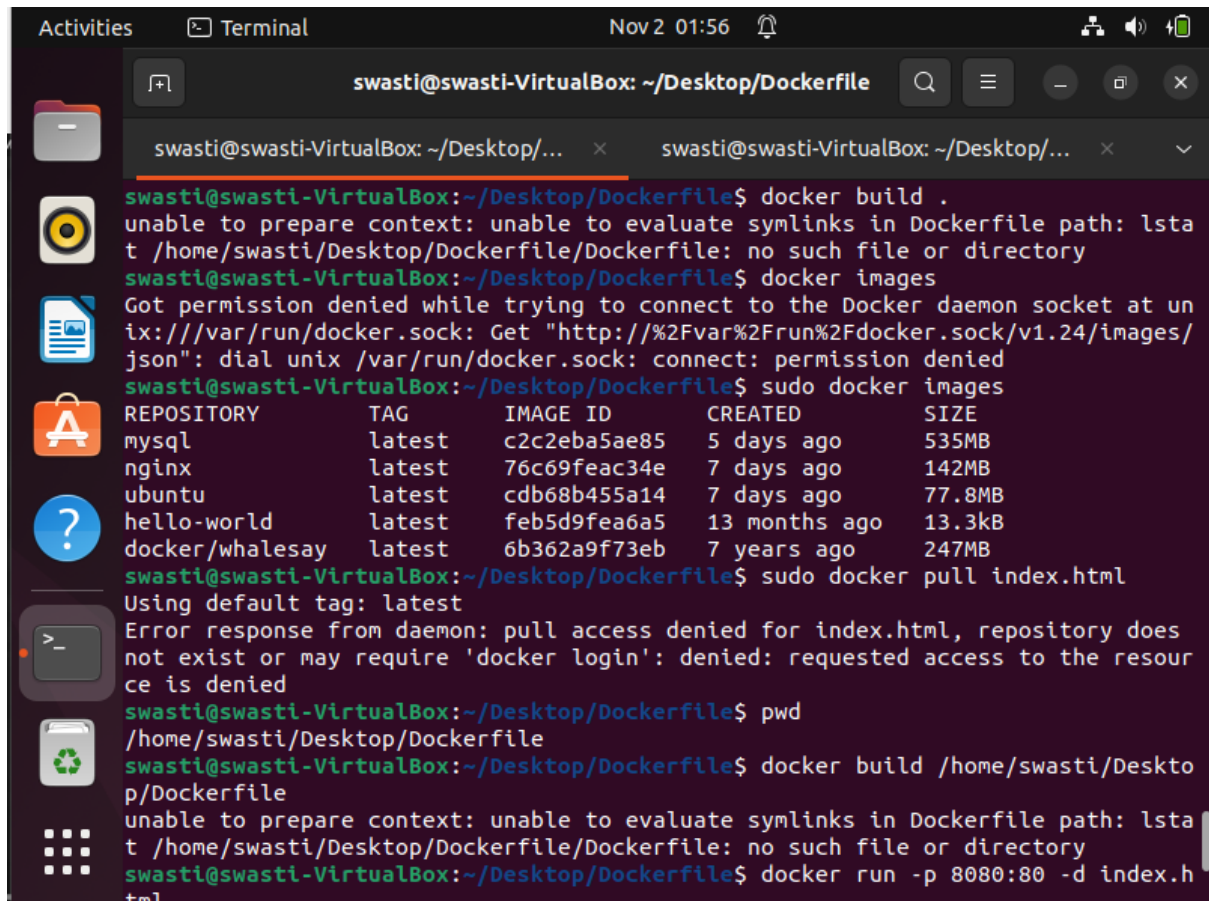
`rm` — Delete an image.

Misc

`docker version` — List info about your Docker Client and Server versions.

`docker login` — Log in to a Docker registry.

`docker system prune` — Delete all unused containers, unused networks, and dangling images.



The screenshot shows a terminal window titled "swasti@swasti-VirtualBox: ~/Desktop/Dockerfile". The terminal displays the following commands and outputs:

```
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker build .
unable to prepare context: unable to evaluate symlinks in Dockerfile path: lstat /home/swasti/Desktop/Dockerfile/Dockerfile: no such file or directory
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker images
Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images/json": dial unix /var/run/docker.sock: connect: permission denied
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ sudo docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mysql                latest             c2c2eba5ae85       5 days ago         535MB
nginx                latest             76c69feac34e       7 days ago         142MB
ubuntu               latest             cdb68b455a14       7 days ago         77.8MB
hello-world          latest             feb5d9fea6a5       13 months ago      13.3kB
docker/whalesay       latest             6b362a9f73eb       7 years ago        247MB
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ sudo docker pull index.html
Using default tag: latest
Error response from daemon: pull access denied for index.html, repository does not exist or may require 'docker login': denied: requested access to the resource is denied
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ pwd
/home/swasti/Desktop/Dockerfile
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker build /home/swasti/Desktop/Dockerfile
unable to prepare context: unable to evaluate symlinks in Dockerfile path: lstat /home/swasti/Desktop/Dockerfile/Dockerfile: no such file or directory
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker run -p 8080:80 -d index.html
```

Activities Terminal Nov 2 01:56

swasti@swasti-VirtualBox: ~/Desktop/Dockerfile

```
swasti@swasti-VirtualBox: ~/Desktop/... x swasti@swasti-VirtualBox: ~/Desktop/... x v
ce is denied
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ pwd
/home/swasti/Desktop/Dockerfile
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker build /home/swasti/Desktop/Dockerfile
unable to prepare context: unable to evaluate symlinks in Dockerfile path: lstat /home/swasti/Desktop/Dockerfile/Dockerfile: no such file or directory
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ docker run -p 8080:80 -d index.html
docker: Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containers/create": dial unix /var/run/docker.sock: connect: permission denied.
See 'docker run --help'.
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ sudo docker run -p 8080:80 -d index.html
Unable to find image 'index.html:latest' locally
docker: Error response from daemon: pull access denied for index.html, repository does not exist or may require 'docker login': denied: requested access to the resource is denied.
See 'docker run --help'.
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$ sudo docker run -p 8080:80 -d Dockerfile
docker: invalid reference format: repository name must be lowercase.
See 'docker run --help'.
swasti@swasti-VirtualBox:~/Desktop/Dockerfile$
```

01

What is Jenkins?

Jenkins is an open-source automation tool written in Java with plugins built for Continuous Integration purposes.

03

Define the process of Jenkins.

- Commit the changes
- Detect source code changes
- The build either passes or fails
- Generate feedback

10

What is Maven? What is the benefit of integrating Maven with Jenkins?

Maven is a build management tool. It uses a simple pom.xml to configure all the dependencies needed to build, test and run the code.