Docker101 Session

Semester Fall 2025

Outline

- Why Docker?
- What is Docker? Intro
- Images
- Containers
- CLI-Adhoc
- Resolve Our Issues!
- Volumes
- Networks
- Docker vs Virtual Machines
- Compose
- More insights

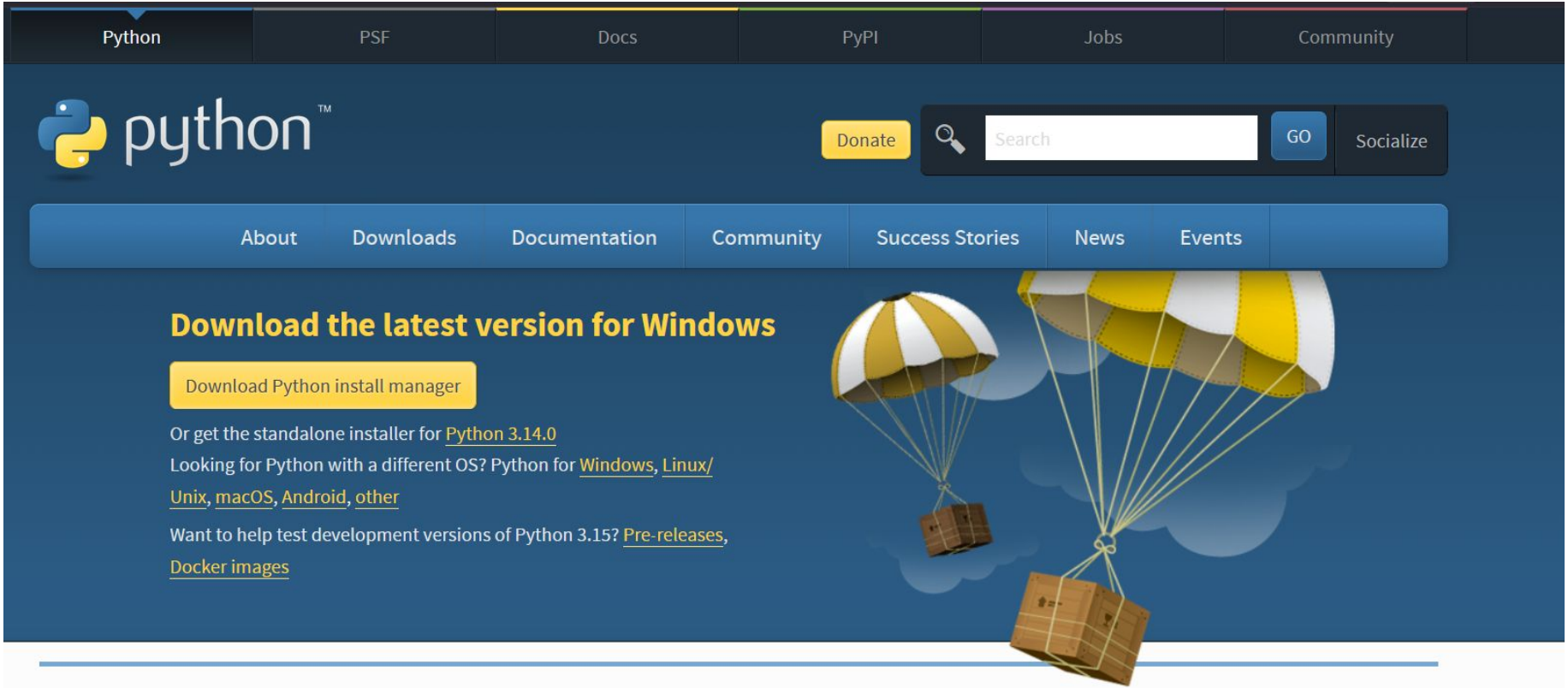
Why Docker?

- Installation cumbersome
- Cross platform?
- It worked on my machine!

Why Docker?

```
$ sudo apt install -y python3

$ sudo apt install -y python3-flask

$ flask --app app run
```

Why Docker?

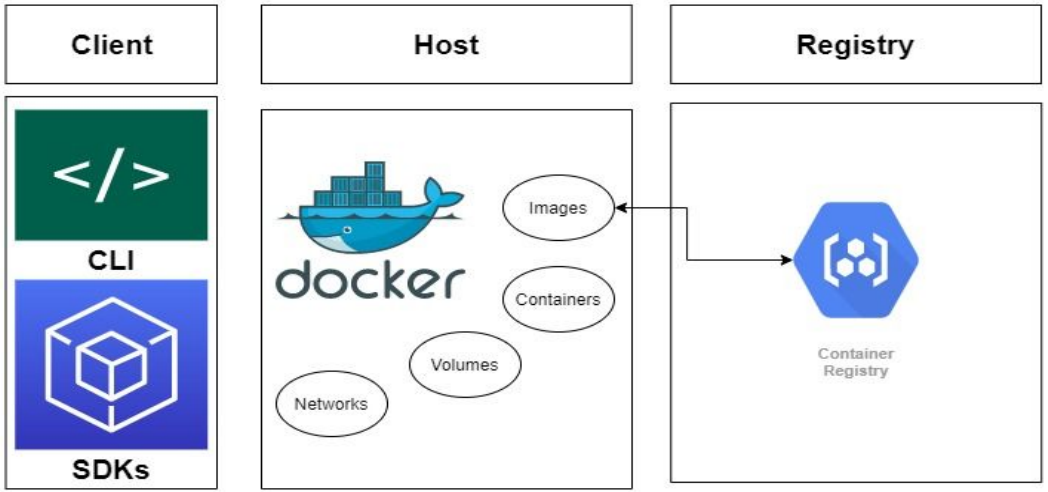

Python
PSF
Docs
PyPI
Jobs
Community
python™
Donate
Search
GO
Socialize
About
Downloads
Documentation
Community
Success Stories
News
Events
Download the latest version for Windows
Download Python install manager
Or get the standalone installer for Python 3.14.0
Looking for Python with a different OS? Python for Windows, Linux/ Unix, macOS, Android, other
Want to help test development versions of Python 3.15? Pre-releases, Docker images

Why Docker?


```
$ sudo yum install python3-pip

$ sudo pip3 install flask

$ flask --app app run
```

What is Docker? intro

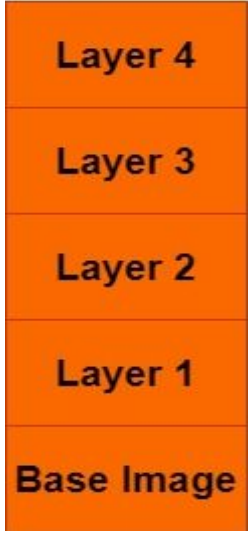
- Architecture: Client-Server



Images

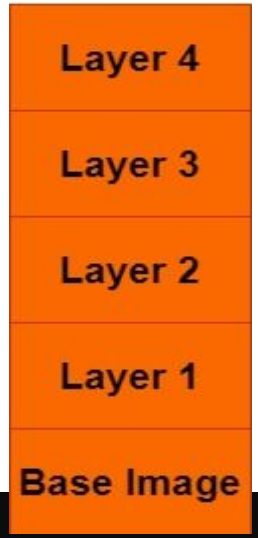
- The docker template!
- Dockerfile
- Immutable layers
- Docker Registry

```
FROM python:3.13-slim
WORKDIR hello-world
RUN pip3 install flask
COPY app.py .
CMD ["flask", "--app", "app", "run", "--host", "0.0.0.0"]
```



Images

- The docker template! acts like Classes in OOP
- Dockerfile
- Image layers
- Docker Registry




```
FROM python:3.13-slim
WORKDIR hello-world
RUN pip3 install flask
COPY app.py .
CMD ["flask", "--app", "app", "run", "--host", "0.0.0.0"]
```

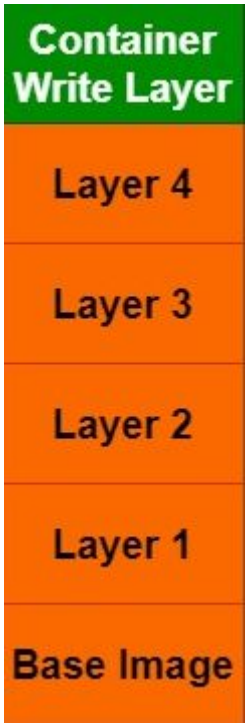
Images

- Example for base images

```
FROM scratch
ADD python3 .
CMD ["./python3]
```

Containers

- Running instance of the docker image template
- Write-On-Copy
- Ephemeral!



Containers

- Running instance of the docker image template
- It is the instance of the classes in OOP
- Ephemeral!

CLI-Adhoc

- List images

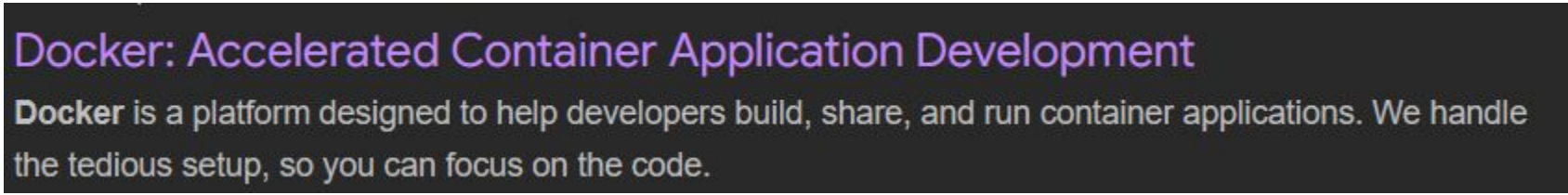
- List containers

- Control container lifecycle: create, stop, kill

```
$ docker images # list images

$ docker ps # list containers

$ docker run <image-name> # run the docker container

$ docker stop <container-id> # to shutdown a running container

$ docker rm <container-id> # to remove an existing container
```

Resolve Our Issues!

- Focus on code i.e. Faster Development ✅
- Portability ✅
- Consistency ✅

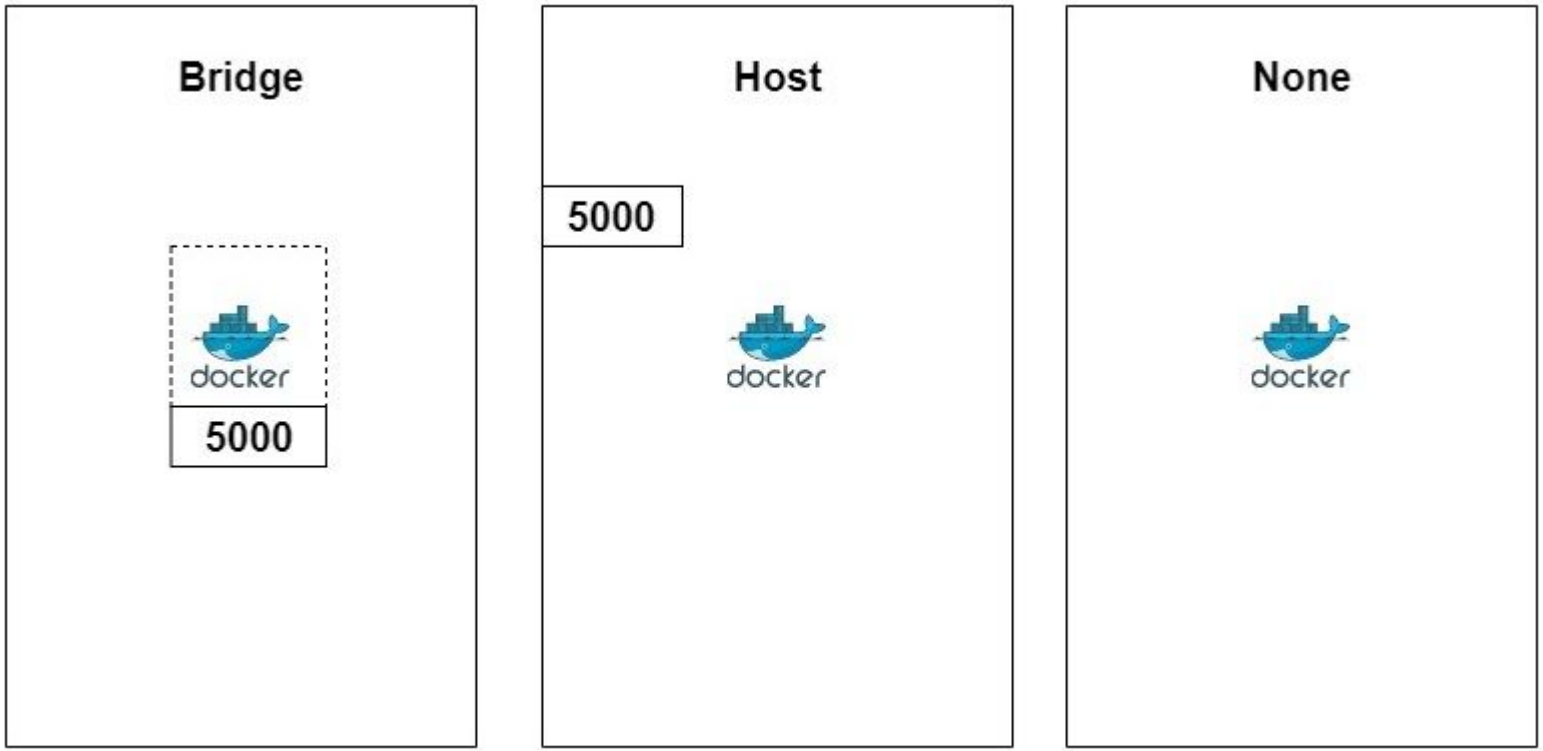


Volumes

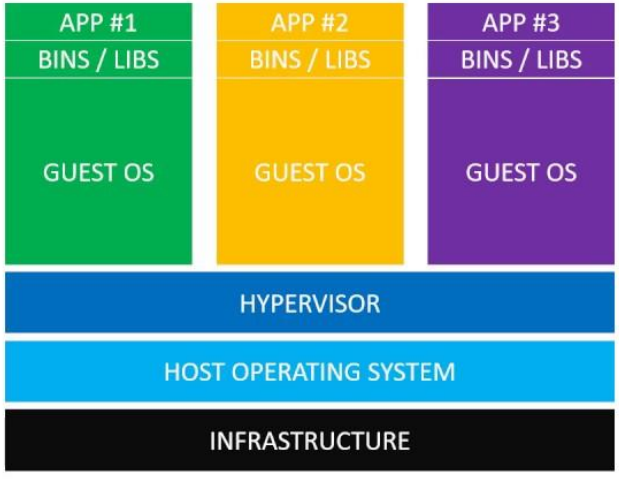
- Docker containers are ephemeral remember?

- Bind Mount

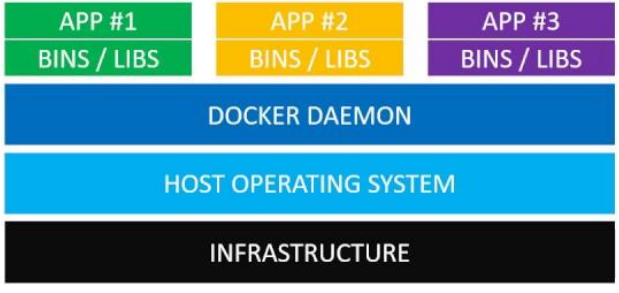
Networks



Docker vs Virtual Machines



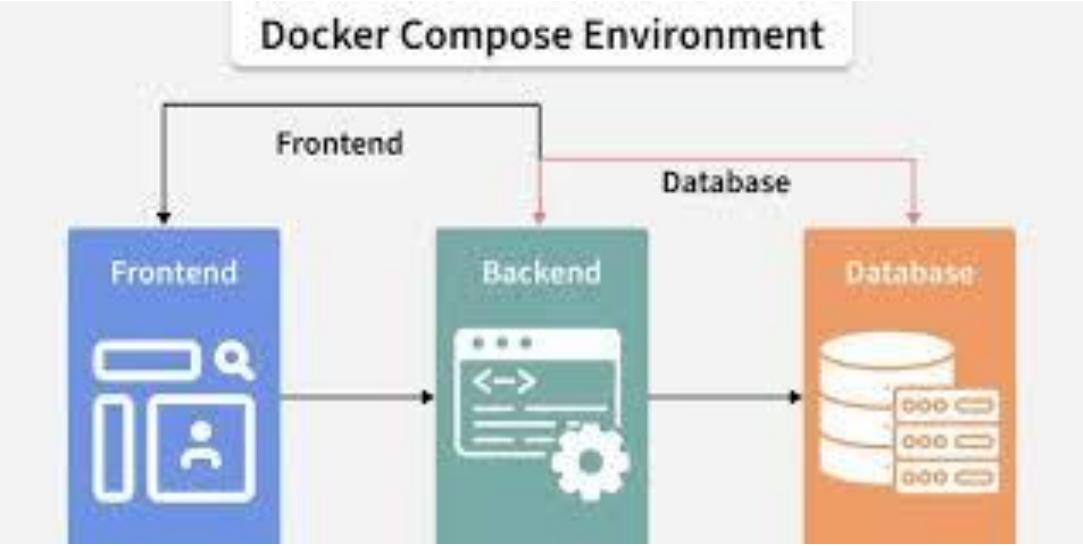
Virtual Machines



Docker Containers

Compose

- Multiple containers associated together



More Insights

- Orchestration
- Docker swarm
- Kubernetes

Q/A