Secure Web Development

Dockerize Backend

ESILV

Roch Moreau - 2023

Dockerize Backend

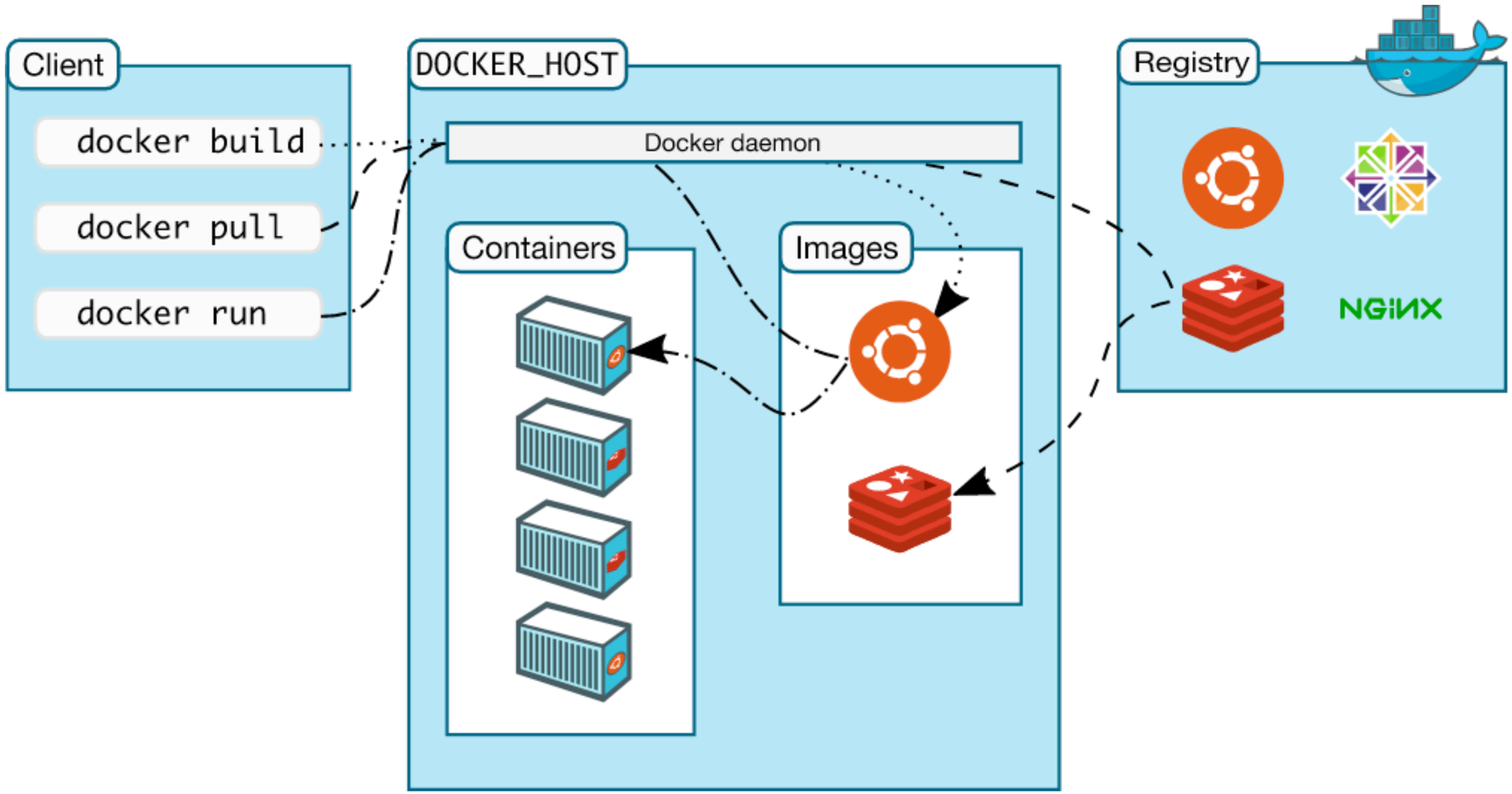
- What is Docker ?
- Why use it ?
- How to
- Beyond Docker

What is Docker ?

“Docker is an open platform for developing, shipping, and running applications”

https://docs.docker.com/get-started/overview/

What is Docker ?



What is Docker ?

Docker objects

- **Repository**: An online platform hosting **Images**
- **Image**: A template, used to create **Containers**
    - Can be based on another **Image**
    - Can be built by yourself, or downloaded from a **Repository**
- **Container**: A runnable instance of an **Image**
    - You can create, start, stop, move, or delete it
    - You can connect it to networks (virtual networks)
    - You can attach storage (virtual storage)
    - You can create an **Image** based on the current state of a **Container**
    - Isolated from other **Containers** and from Host system by default

What is Docker ?
Underlying Technology

- Based on Linux’s containers technology, using namespaces
- Docker on Linux runs natively, low to negligible impact on perfs/battery
- Docker Desktop for Mac installs a Linux VM, keep an eye on your battery usage !
- Docker Desktop for Windows can:
  - Run on WSL (less resource-hungry)
  - Run on Docker’s Linux VM

Why use it ?

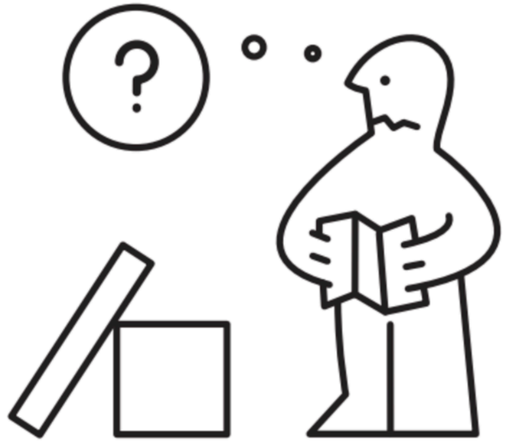
Why use it ?

Advantages of dockerizing an application

- Isolates applications (from system and other applications)
- Provides dependencies along with the application
- Reproducible builds and deployments
- Easy deployments
- Avoids host-related issues (missing dependency, wrong operating system etc...). No more “But... It works on my machine !”
- Better resource usage than VMs (on Linux, on production servers)
- Easier to run multiple versions of a tool like Node

How to use it ?

RTM



https://nodejs.org/en/docs/guides/nodejs-docker-webapp/

Other Resources

- Docker Node Best Practices https://github.com/nodejs/docker-node/blob/main/docs/BestPractices.md
- Principle of Least Privilege https://en.wikipedia.org/wiki/Principle_of_least_privilege
- Docker Security Analyser https://github.com/docker/docker-bench-security
- **node:18-alpine** image to reduce image size https://hub.docker.com/_/node/
- Some good advice https://www.digitalocean.com/community/tutorials/how-to-build-a-node-js-application-with-docker

Beyond Docker

Beyond Docker
Docker-Compose

- "Orchestrate" multiple containers at once
  - E.g. 1 container for backend app, 1 container for database
- Manage docker networks
- https://docs.docker.com/compose/

Beyond Docker
Docker Alternatives

- Podman
  - No root privilege needed, more security
  - Open source
- Kubernetes
  - Powerful container orchestrator
  - Many features
- LXC
  - Offers better isolation, feels like a VM