DOCKER TECHNOLOGY FOR ROBOTICS PROJECTS

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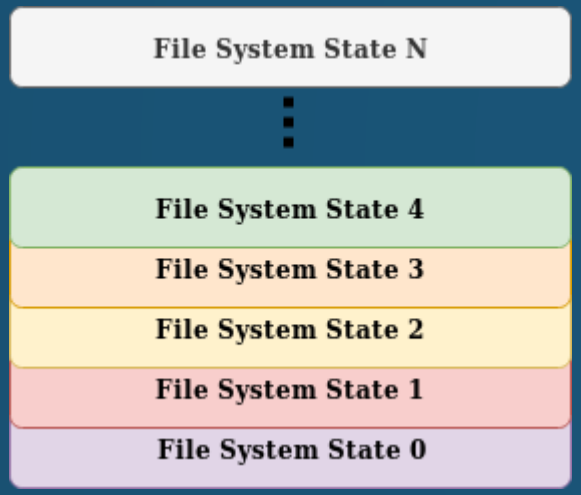
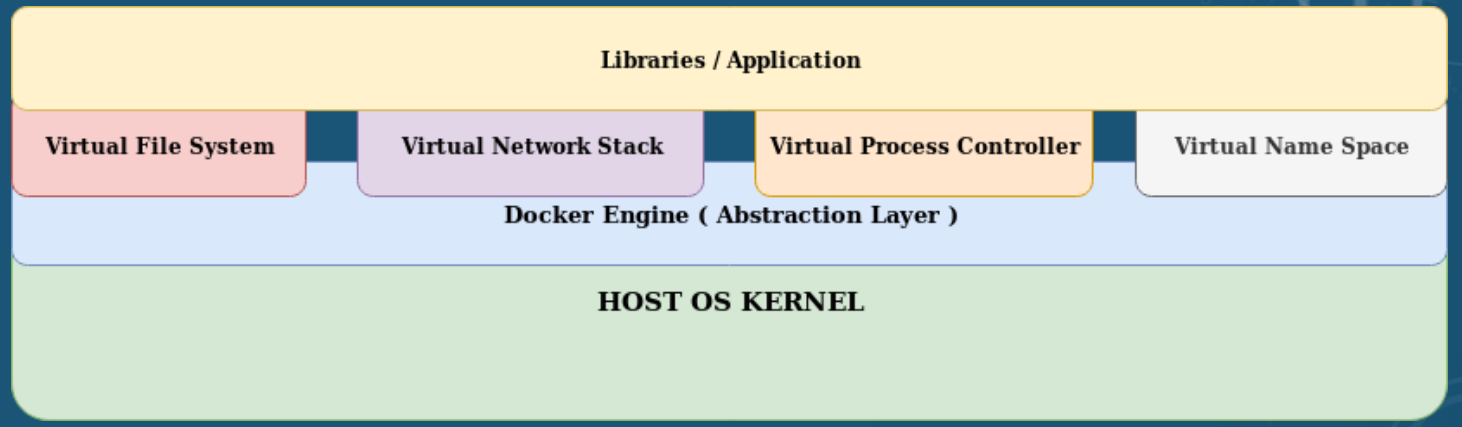
OVERVIEW

- Docker Overview
- General Motivation
- RaspberryPi Migration
- Intel NUC Migration
- Docker Limitation

DOCKER OVERVIEW

- Docker Image (Dockerfile)
- Docker Container (Docker Compose)





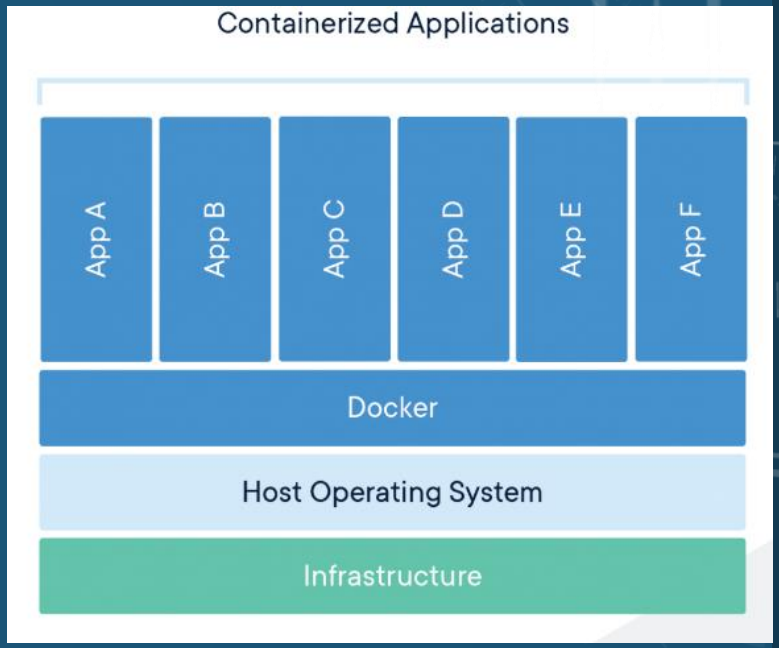
GENERAL MOTIVATION

Any robotic project muchly depends on:

- Operating System (OS): Ubuntu, Debian, CentOS, etc.
- Robot Operating System (ROS) : Indigo, Jade, Kinetic, etc.
- Third-party libraries: OpenCV, Eigen, GLU Mesa, CouchDB, Ecto, ORK, etc.
- File system:
  - OS specific: /Users/ (MacOS), /home/ (Linux)
  - User specific: /home/trinh-pc/hcr/ws
- Network Configuration: IP range, IP port, etc.

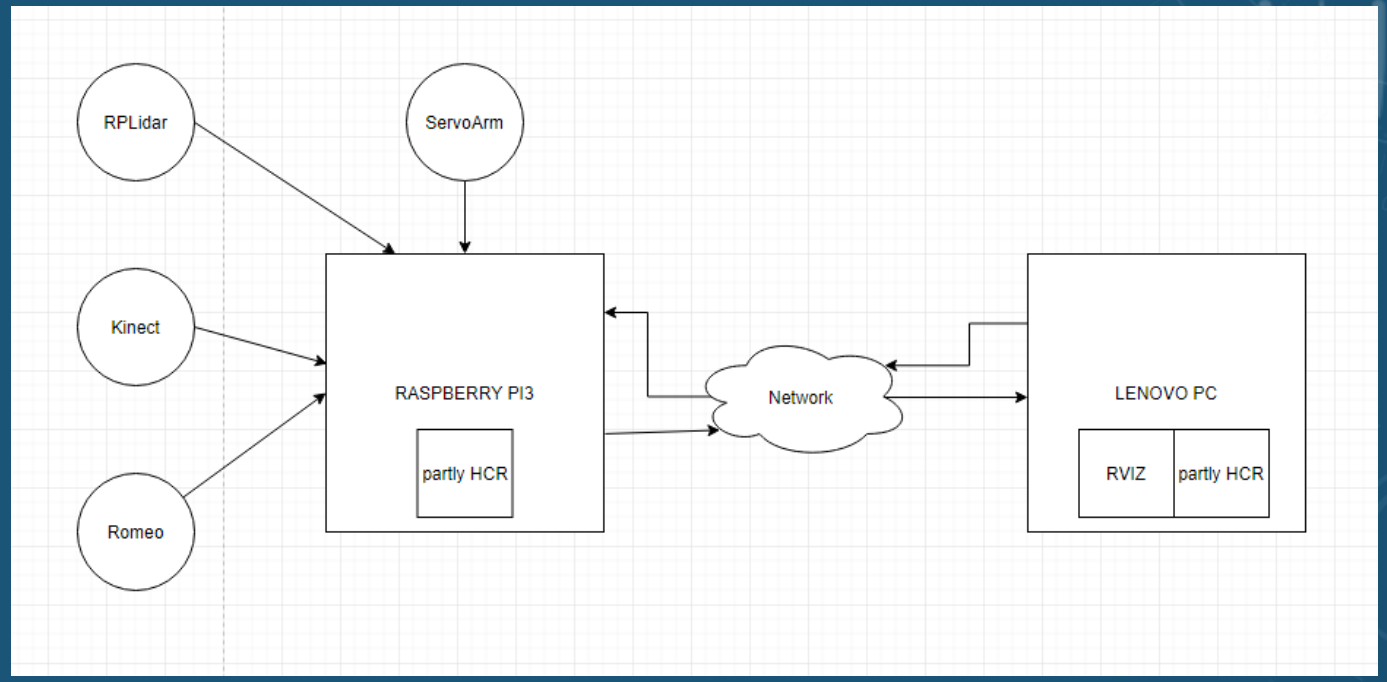
The dependency scale will grow along with the project scale!

https://www.docker.com/resources/what-container



RASPBERRYPI MIGRATION

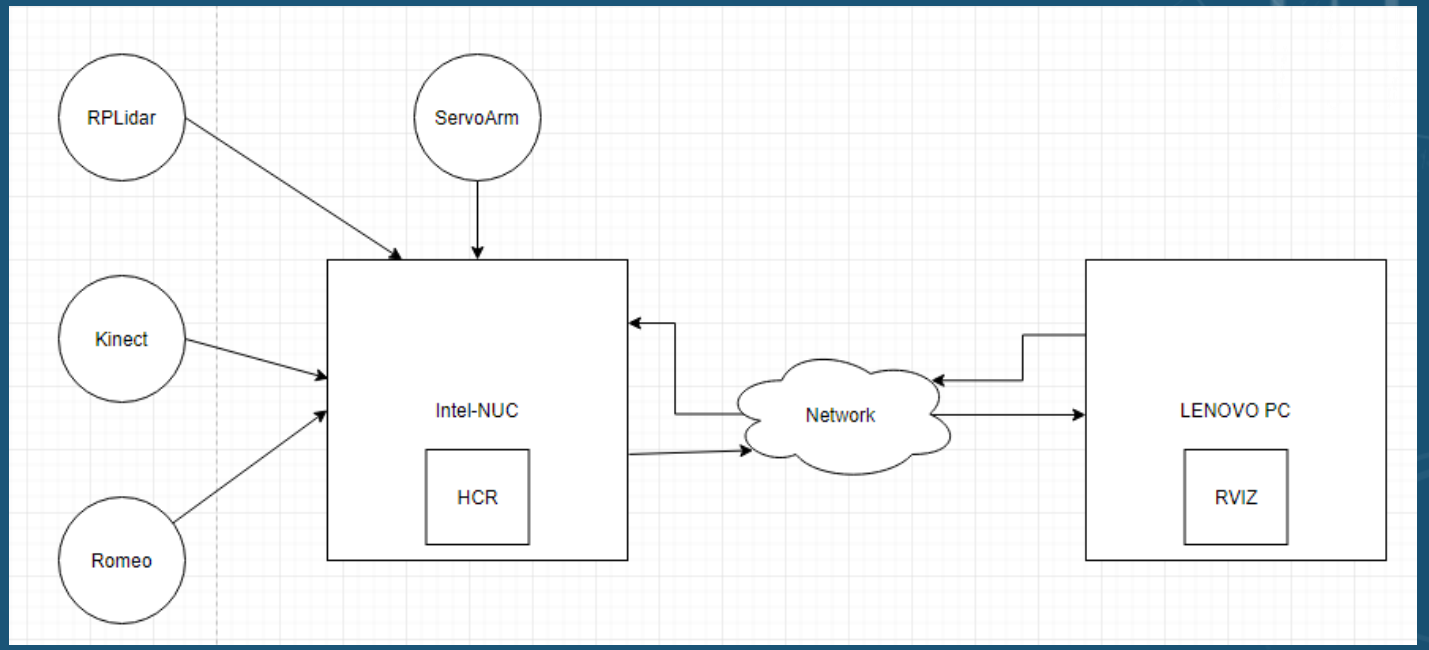
- Step 1: Encapsulate all dependencies that require for HCR Sofwares (both parts: running on Raspberry Pi 3 as well as PC)
- Step 2: Develop Dockerfile from these dependencies.
- Step 3: Develop Docker Compose. It will spin up an image, described in Dockerfile, to a container.
- Step 4: Develop entry point to start the program into the Docker container.



INTEL NUC MIGRATION

- Step 1: clone new HCR project
- Step 2: build docker image
- Step 3: start HCR

  (with low power mode)



DOCKER LIMITATION

- Security Issue:
  - Docker Hub where we store the Docker images is a public repository.
  - Privileged Access: Docker assigns itself the root user in its container.
- Highly Cross-Platform: (machine level)
  - Some modules of HCR requires Intel-based unit. Even using Docker, we cannot run them in Raspberry Pi (with ARM)
- Ultra High Performance & Ultra Low Latency:
  - Add Docker containers → Add more virtualized layers → More Network latency, I/O latency, etc.
- Graphical Interfaces (RViz):
  - We cannot run Rviz inside Docker Container because it don't support any GUI application.