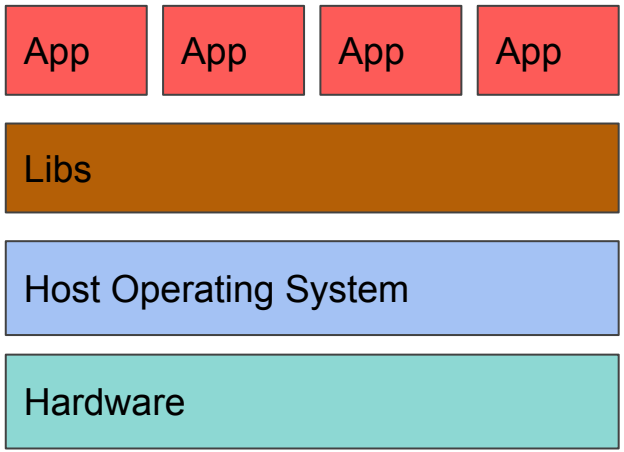
Introduction to containers and kubernetes

Agenda

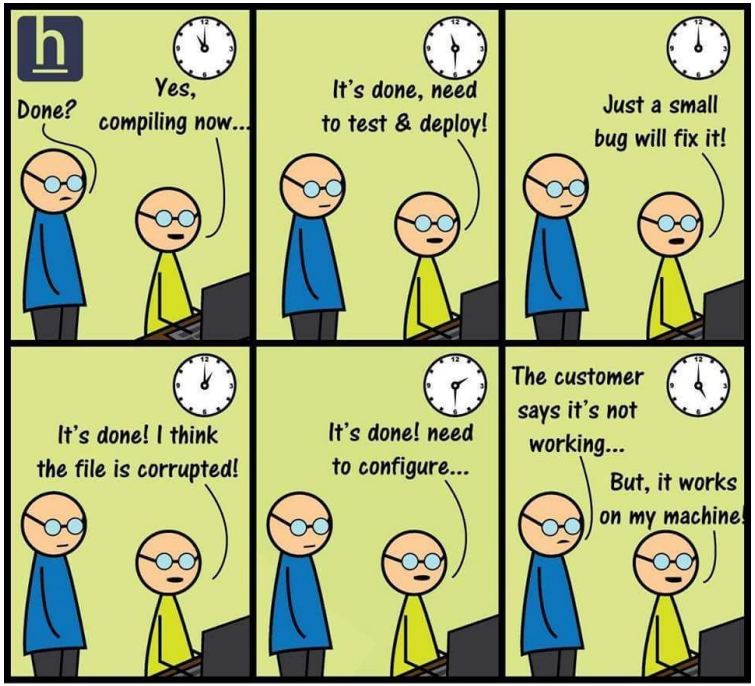
- History of application development
- Container orchestration - the motivation
- Kubernetes

History of application deployment - Traditional Deployment



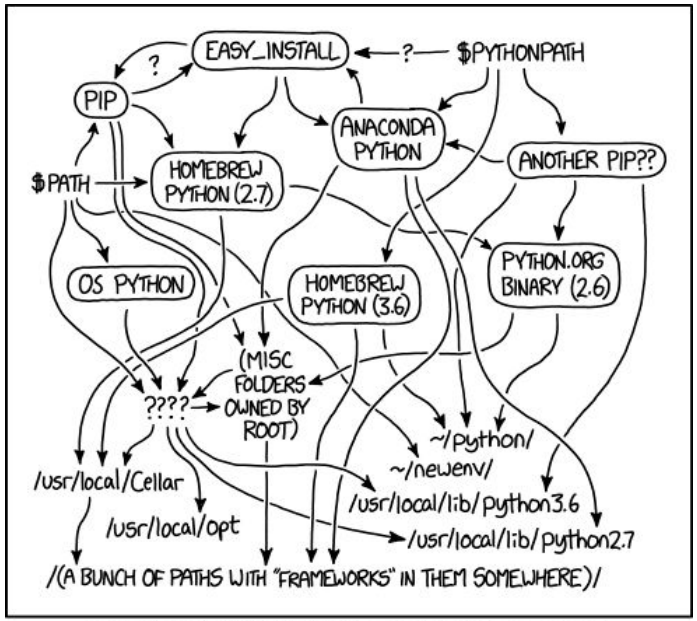
- Monolithic architecture
- Deployment was done using packaging tools (eg InstallShield)
- 3 different environments (development, testing, deployment) means you need to set it up 3 times
- Weeks, months wasted setting up the different environments
- Deployment environment may not be “clean” (dependency issues)

History of application deployment - It works for my machine



- Developer “forget” to include dependencies
- Bugs/defects are not reproducible

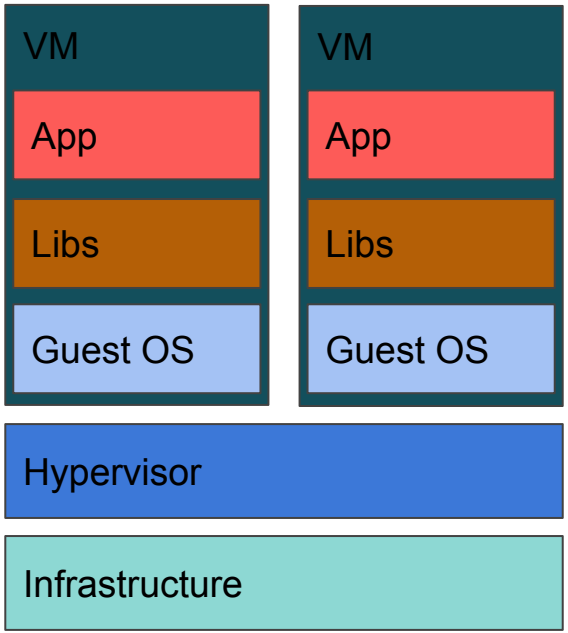
History of application development - dependency hell



MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

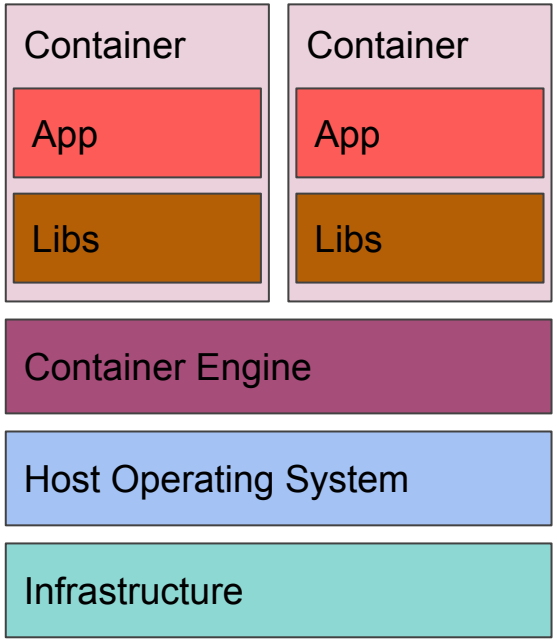
- Different applications require different versions of libraries
- Sometimes these libraries clash!

History of application deployment - Virtual Machines



- Virtualize the hardware
- Applications are now isolated from each other
- Time to deploy reduced
- High overhead (each VM is it's own OS)

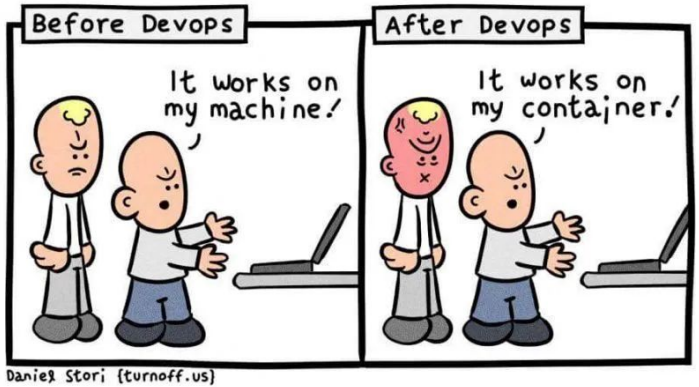
History of application deployment - Container



- Virtualize the OS
- Increased developer velocity
- Run more applications
- Much easier and faster to simulate the production environment
- Development environment and deployment environment are almost identical
- Microservices architecture

History of application deployment - Container

- Things are definitely much better, but applications are getting more complex
- Really much simpler to for developers to create dependencies for development and testing



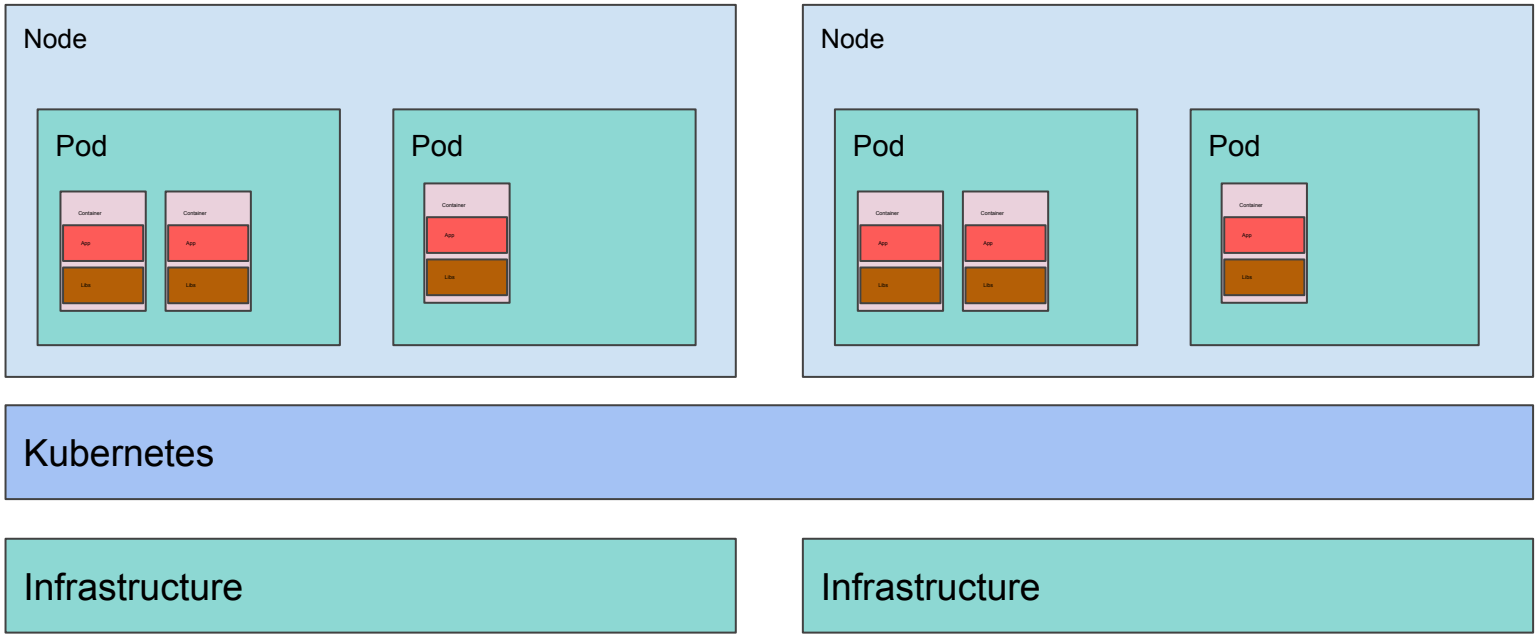
Container Orchestration motivations

- What happens when the container crashes/stops running?
- You want the different containers to talk to each other?
- When you want to scale across multiple hardware?

Kubernetes

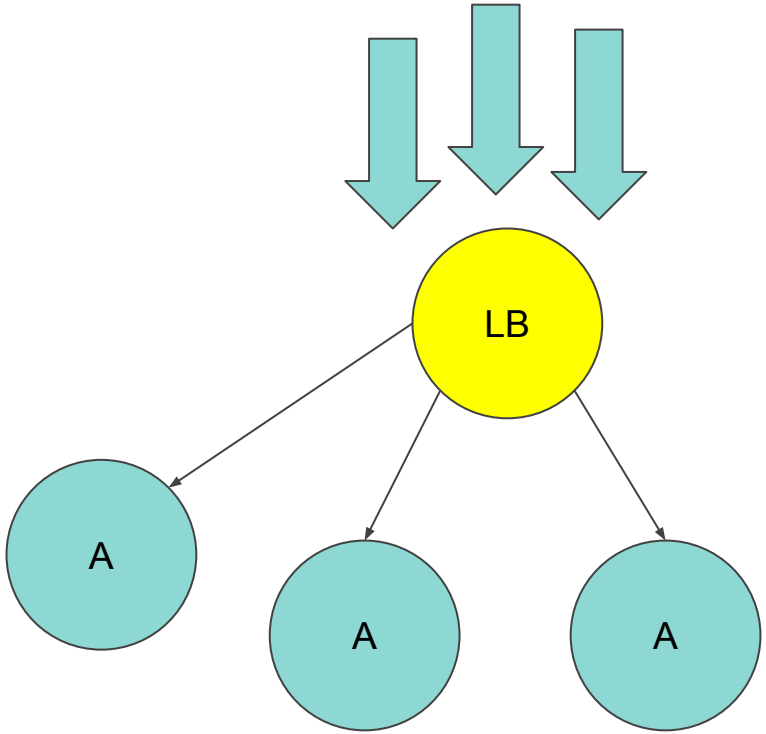
- Container orchestration
- Experience accumulated by Google on running production workloads
- Automated configuring/coordinating/managing of your containers
- Runs across multiple hardware
- Manage storage
- Manage traffic

Kubernetes - nodes, pods, containers



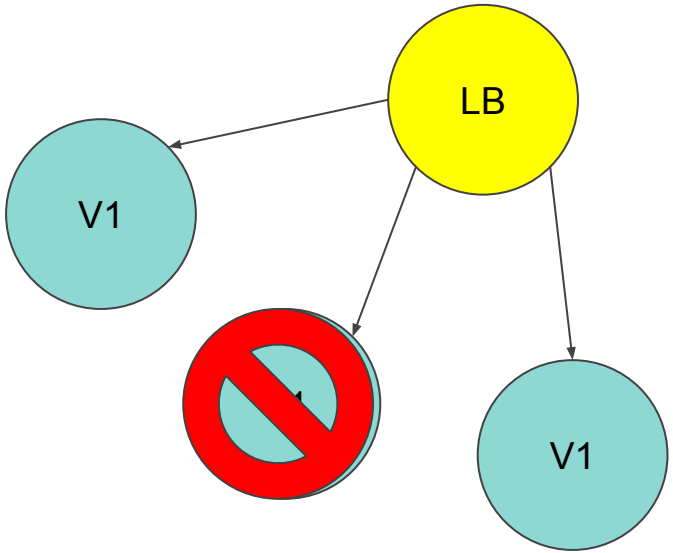
Kubernetes

- Scale your applications



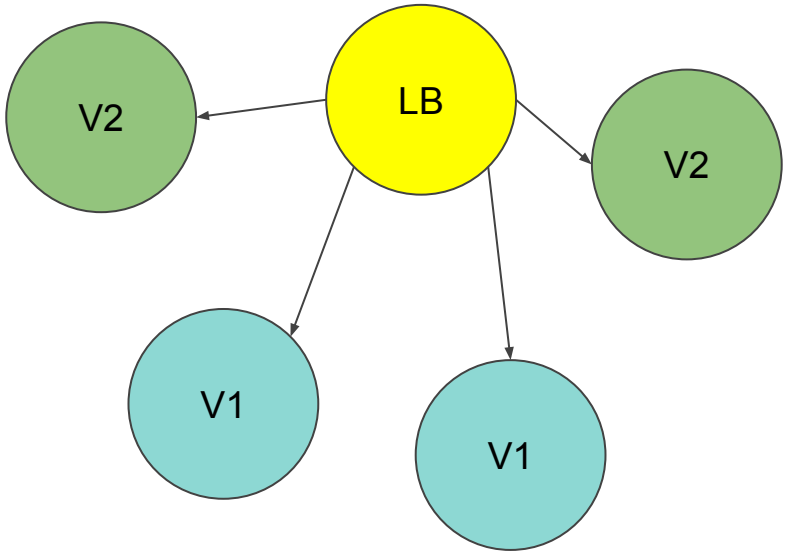
Kubernetes

- Replace containers



Kubernetes

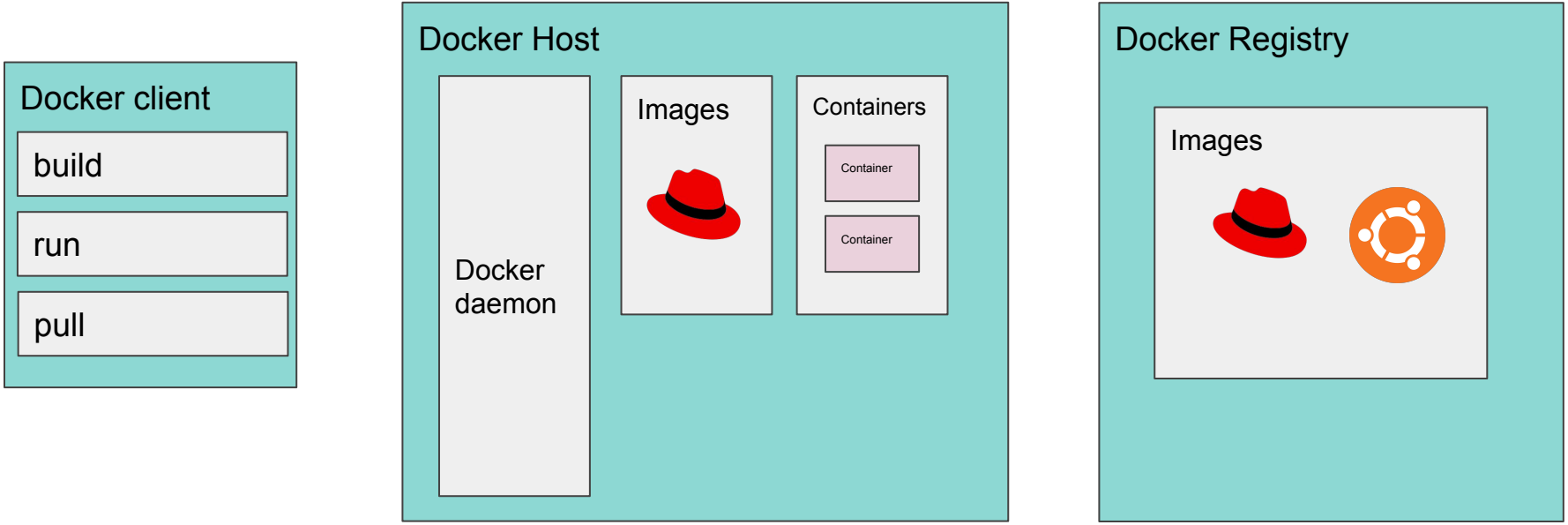
- Update your application



End of Presentation

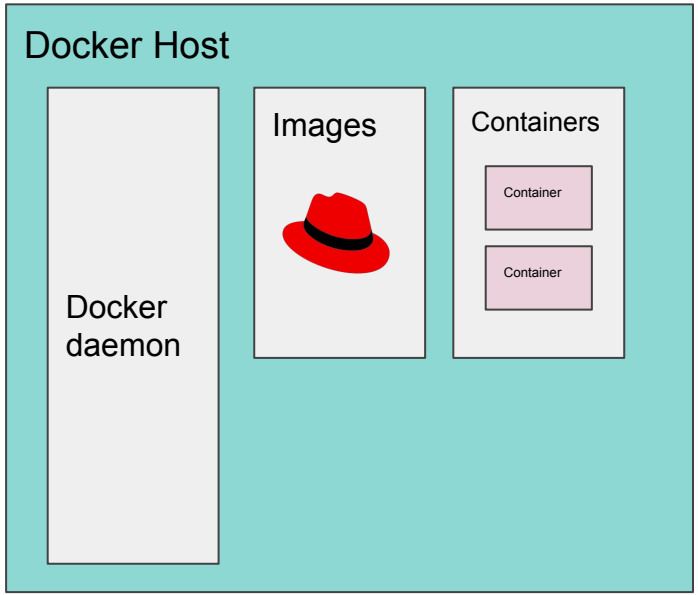
Additional Notes

Container - A docker example



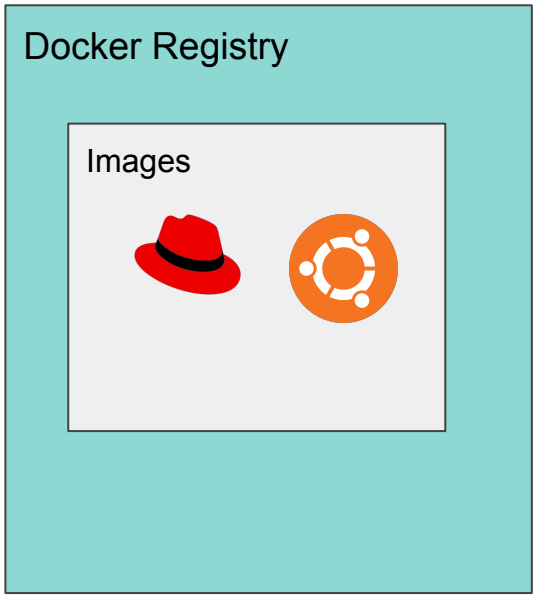
Container - A docker example

- Docker host
- Docker daemon - listens to API requests and manages images, containers, networks, volumes on the docker host
- Images - package of binaries and dependencies
- Containers - instance of images running



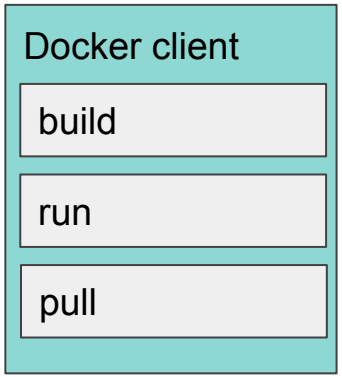
Container - A docker example

- Docker registry
- A repository of all images



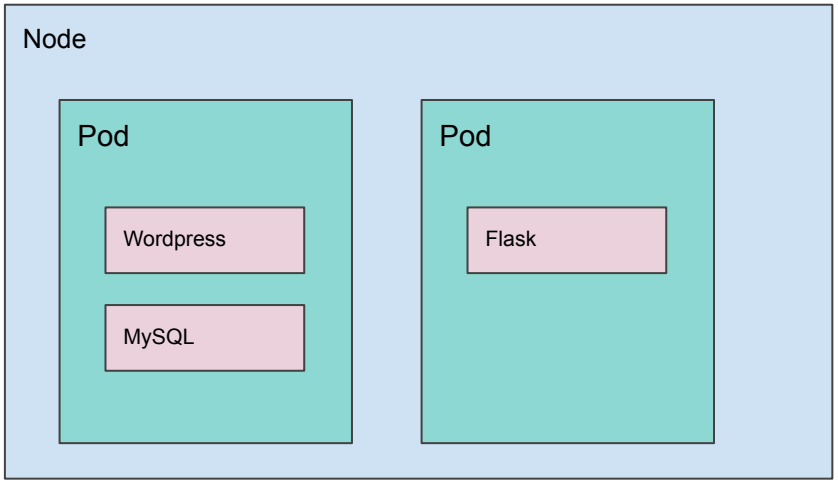
Container - A docker example

- Build - build/create a docker image
- Run - creates a running instance of a particular image
- Pull - pulls a docker image from the docker repository

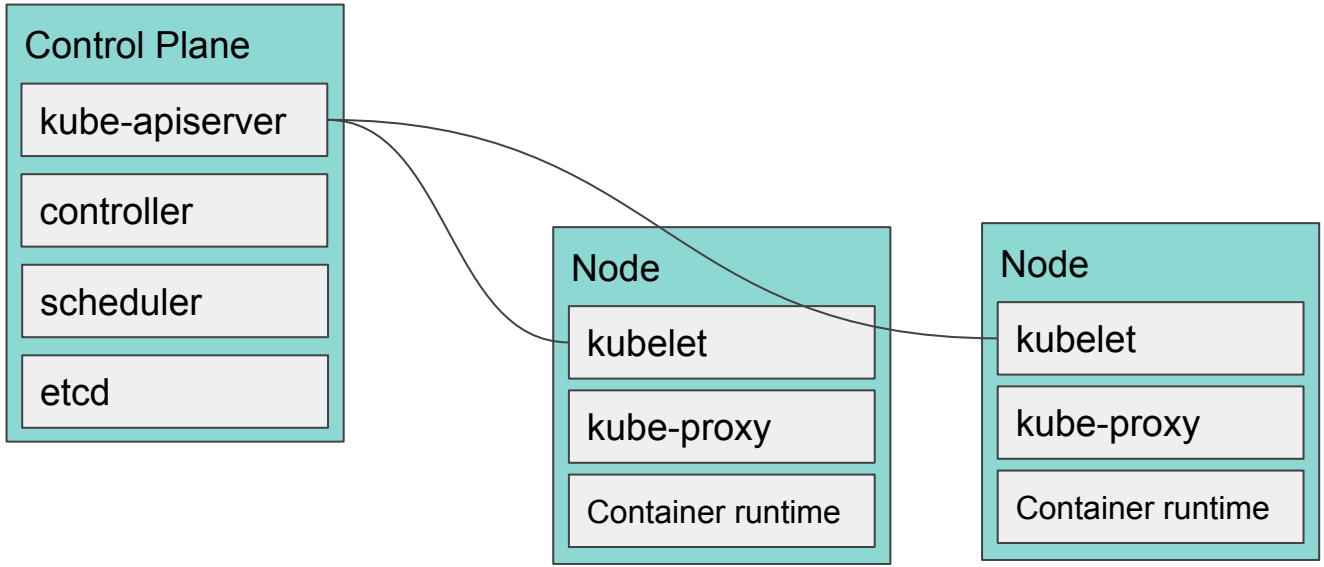


Kubernetes - nodes, pods, containers

- Node - one particular machine, contains one or more pods
- Pod - single instance of an app, containing 1 or more containers

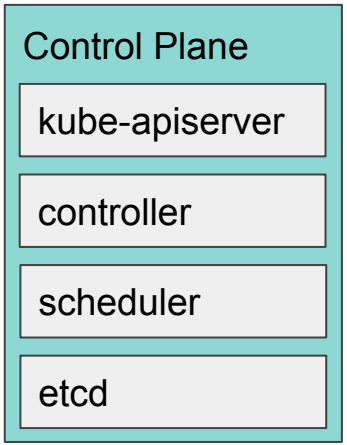


Kubernetes cluster



Kubernetes - control plane

- Manages worker nodes and pods in the cluster
- Kube-apiserver exposes a rest API for clients to communicate commands
- Controller monitors the state of the objects in the cluster, and takes action to ensure the cluster stays in the wanted state
- Scheduler monitors and assigns containers to nodes



Kubernetes - node

- Kubelet - agent running on the node, that monitors request from the API server, and ensures containers are running
- Kube-proxy - network proxy, maintaining network rules on nodes
- Container runtime - software responsible for running containers