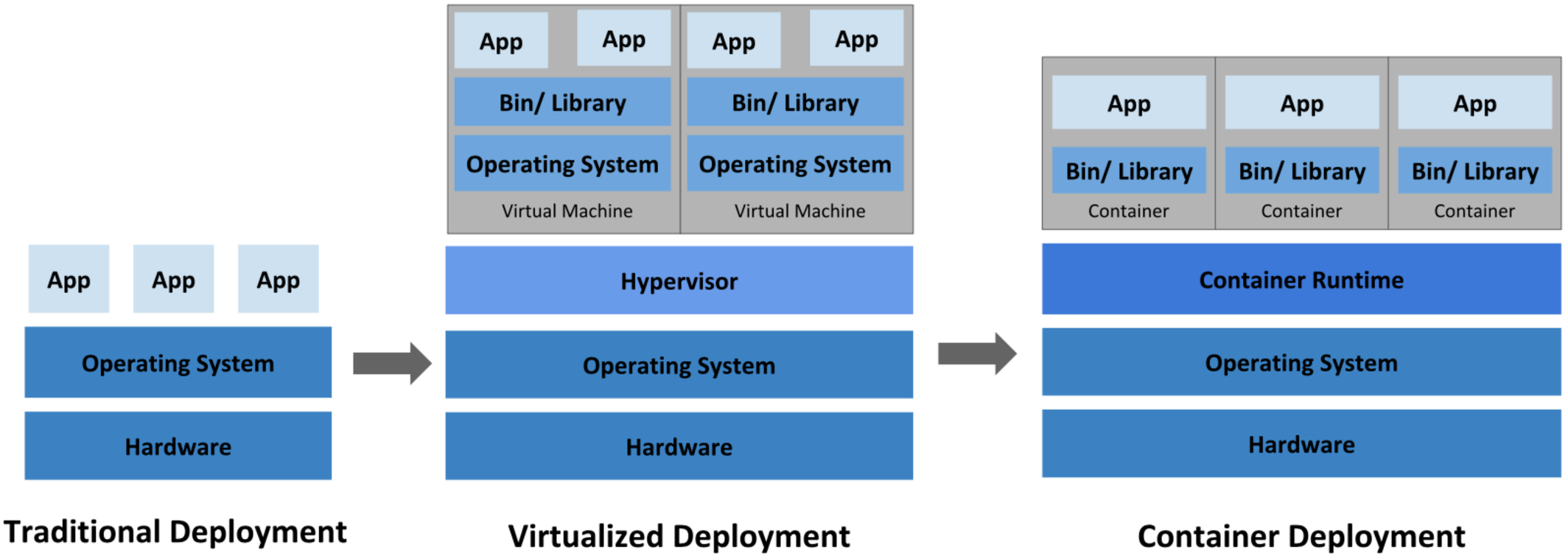
Cloud Computing Applications and Services

(Aplicações e Serviços de Computação em Nuvem)

Kubernetes

University of Minho 2021/2022

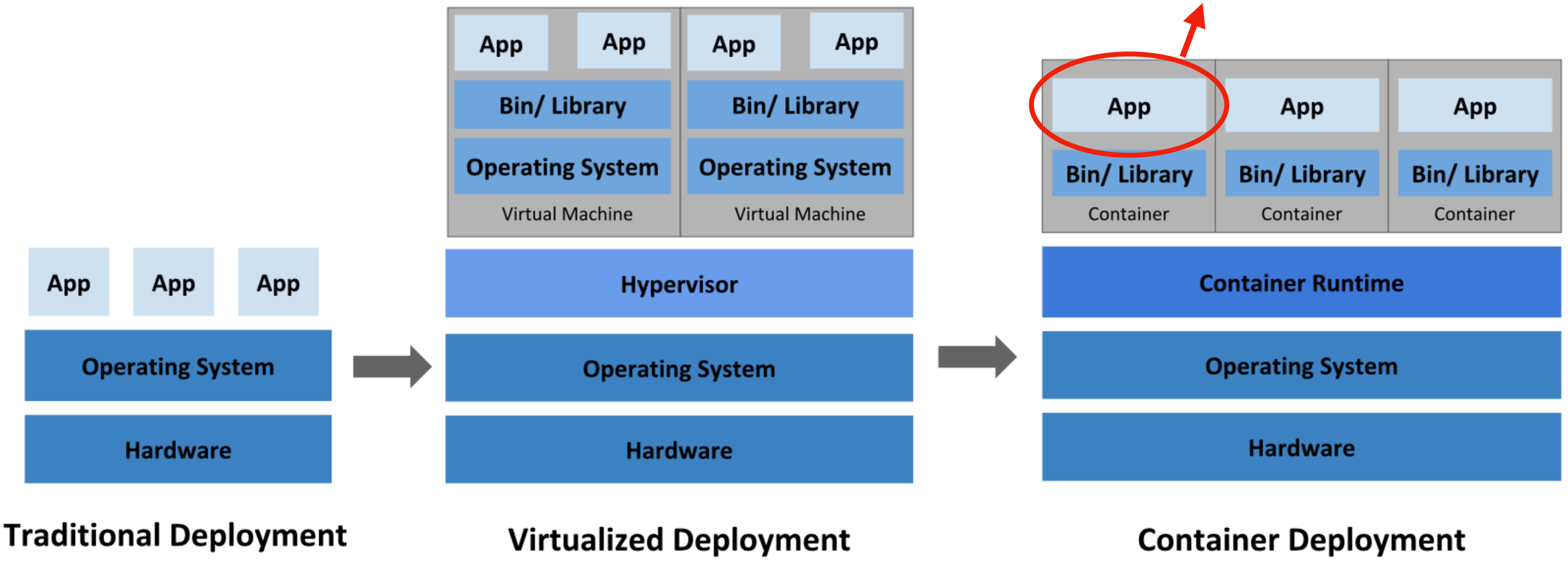
Application deployment



Application deployment

How to distribute multiple containers across different machines?

What if containers fail? How to manage containers in a production environment?



Kubernetes

Kubernetes, also known as K8s, is an open-source system for automating deployment, scaling, and management of containerised applications.

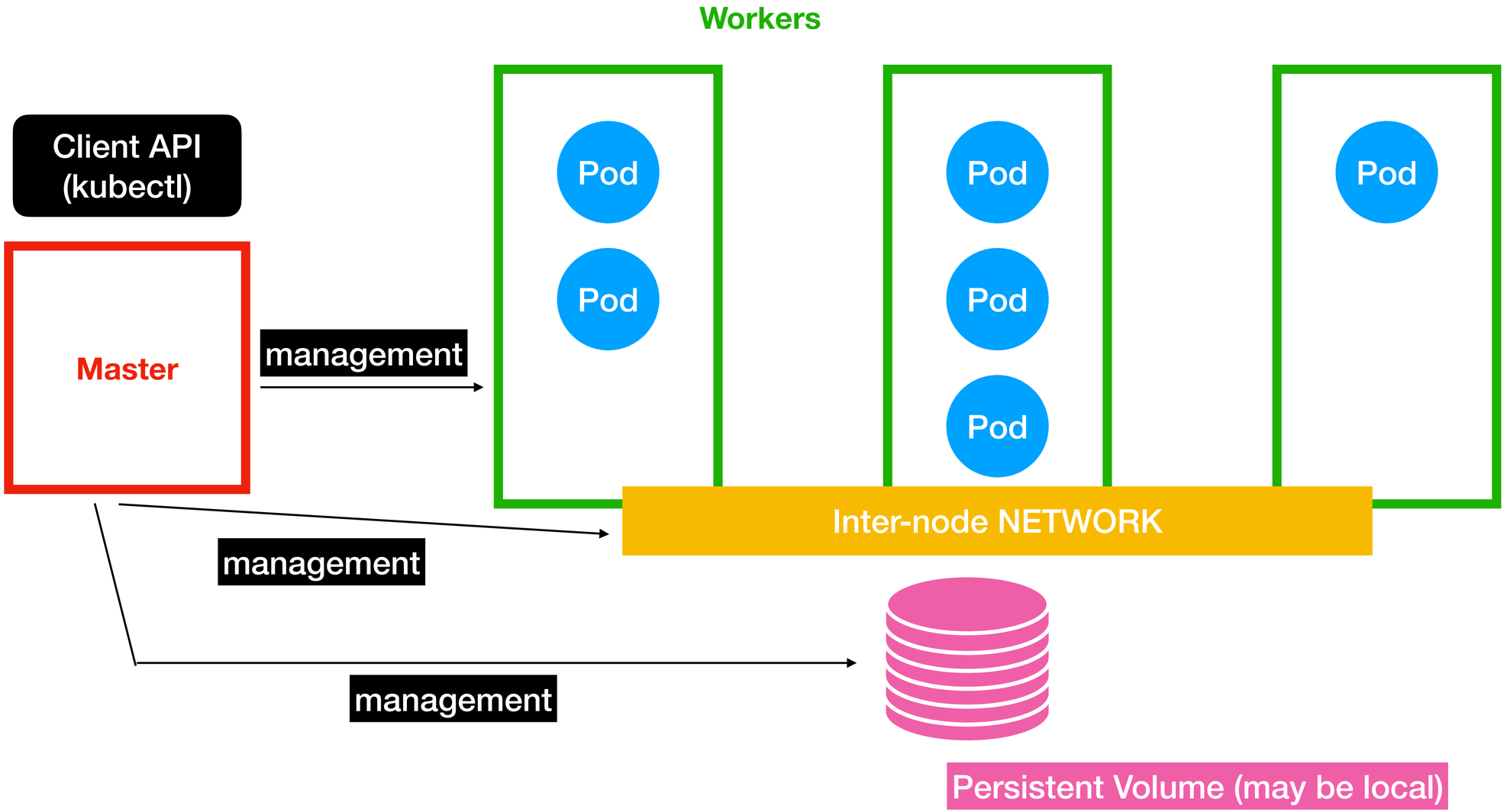
It groups containers that make up an application into logical units for easy management and discovery.

https://kubernetes.io

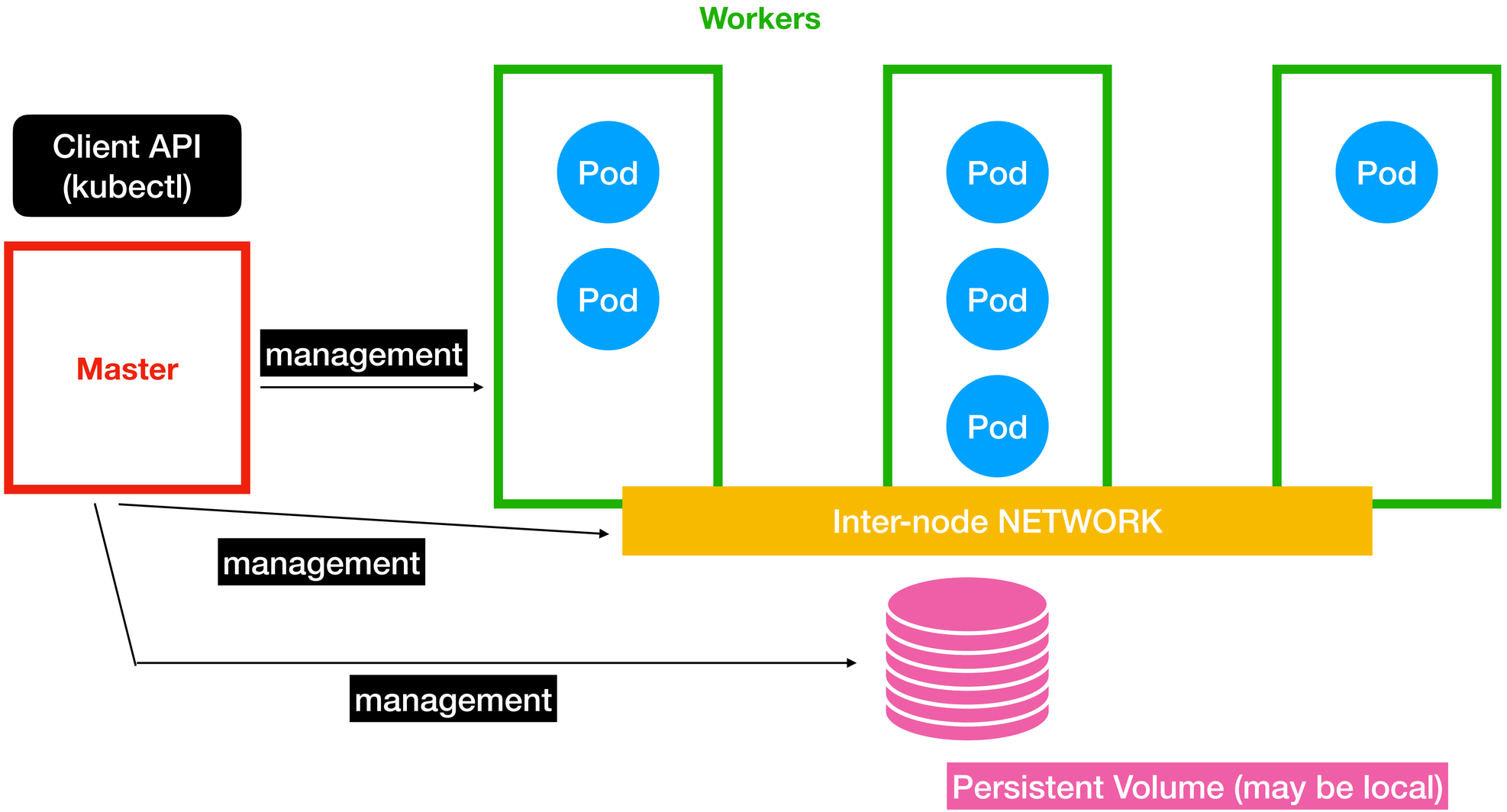
It helps you with:

- **Service discovery** and **load balancing**; **Storage** orchestration; **Automated rollouts and rollbacks**; **Automatic bin packing**; **Self-healing**; **Secret and configuration management**;

Kubernetes cluster components



Kubernetes cluster components

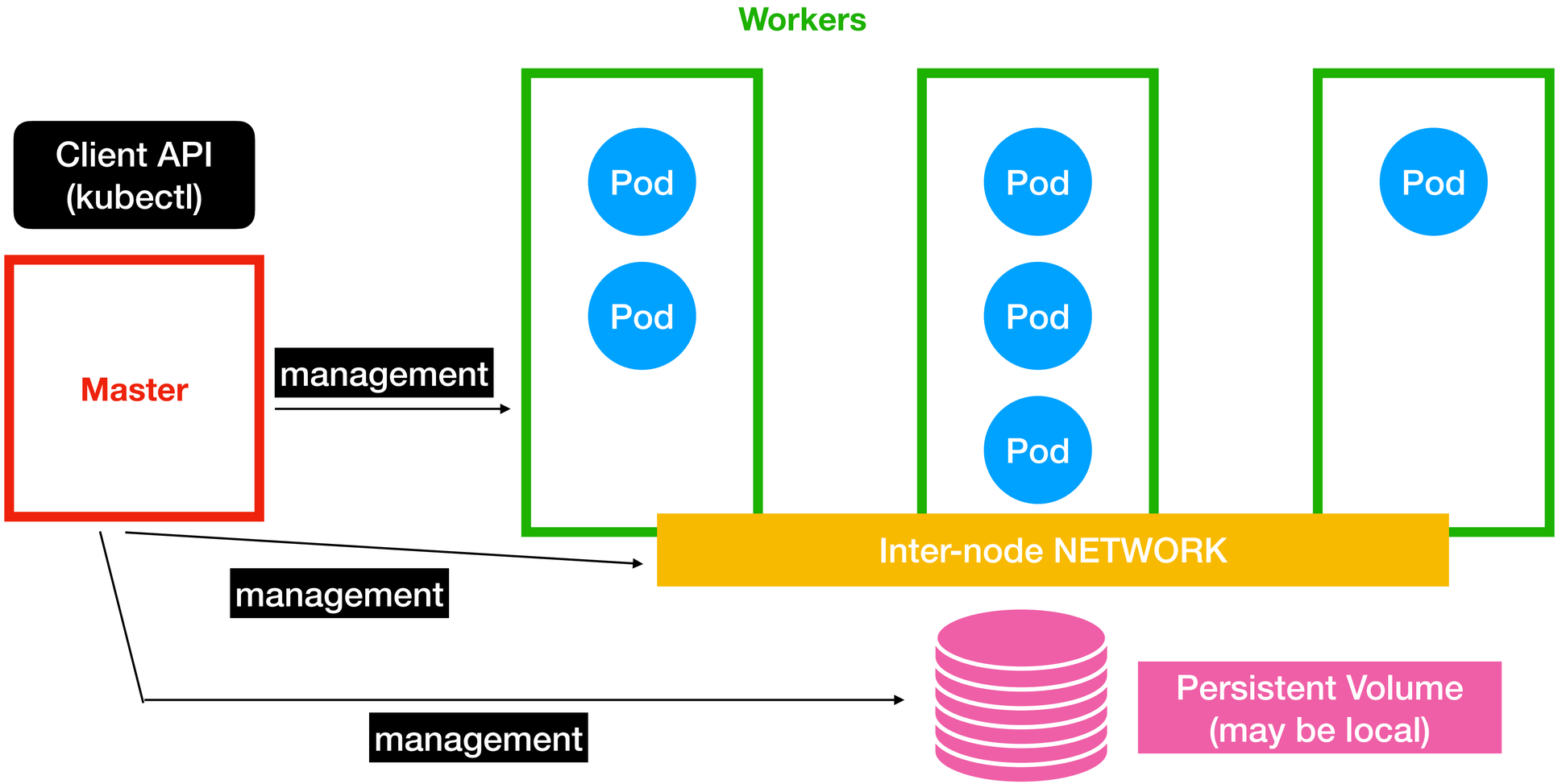


Worker nodes host the containerised apps.

Control processes (Master) manage the cluster and its interaction with the underlying infrastructure (e.g. AWS).

Storage for the entire ecosystem can be configured and adapted to each type of application.

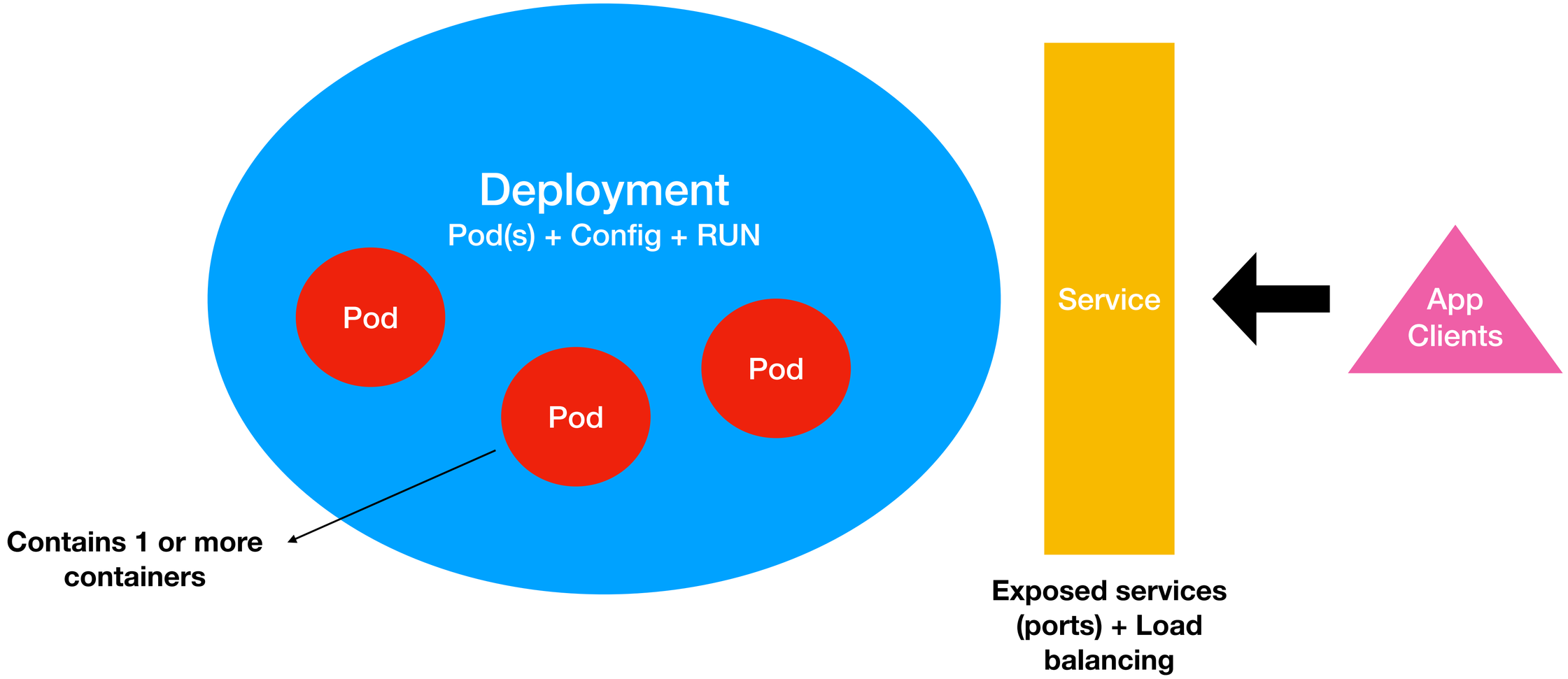
Kubernetes cluster components



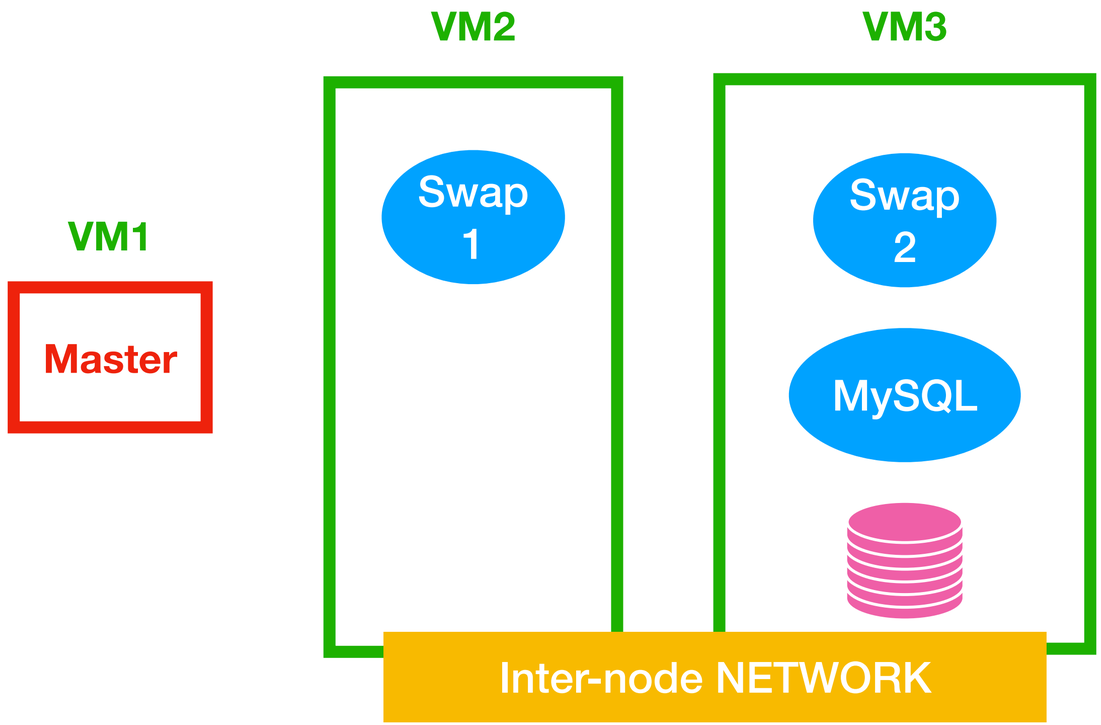
Kubernetes does not provide a way for containers across nodes to communicate with each other, it assumes that each container (pod) has a unique, routable IP inside the cluster.

Flannel provides an overlay network to allow inter-node networking.

Concepts


Deployment
Pod(s) + Config + RUN
Pod
Pod
Pod
Contains 1 or more containers
Service
App Clients
Exposed services (ports) + Load balancing

End game for today



Useful links:

- **Overview docs**:
  - https://kubernetes.io/docs/concepts/
  - https://kubernetes.io/docs/tutorials/kubernetes-basics/
- **Components deep dive**:
  - https://kubernetes.io/docs/concepts/overview/components/
  - https://kubernetes.io/docs/concepts/workloads/
  - https://kubernetes.io/docs/concepts/storage/
  - https://kubernetes.io/docs/concepts/cluster-administration/networking/
  - https://kubernetes.io/docs/concepts/services-networking/service/

Cloud Computing Applications and Services

(Aplicações e Serviços de Computação em Nuvem)

Kubernetes

University of Minho 2021/2022