Kubernetes

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Agenda

- What is Kubernetes?
- Kubernetes Primitives
- Configuration and Cluster Setup Pointers
- Demo – Using MiniKube

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What is Kubernetes?

- **Kubernetes is a container orchestration platform for applications that run on containers.**
- A collaborative Open Source project Originally Conceived by Google.
- Sometimes also called:
  - Kube
  - K8s (That's 'k' + 8 letters + 's')

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What is Kubernetes?

- Start, stop, update, and manage a cluster of machines running containers in a consistent and maintainable way.
- Particularly suited for horizontally scalable, stateless, or 'microservices' application architectures.
  - Does not mean others will not work or are ignored
- Kubernetes does NOT and will not expose all of the 'features' of the docker command line.

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Kubernetes Key Words

- Physical Components
  - Master
  - Minon/Node
- Virtual Components
  - Pod
  - Replication Controller
  - Service
  - Label
  - Namespace

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Master contains.....

- Consists of..
  - kube-apiserver
  - kube-scheduler
  - kube-controller-manager
  - etcd
- May Also Contain
  - Kube-proxy
  - Network Mgmt utility

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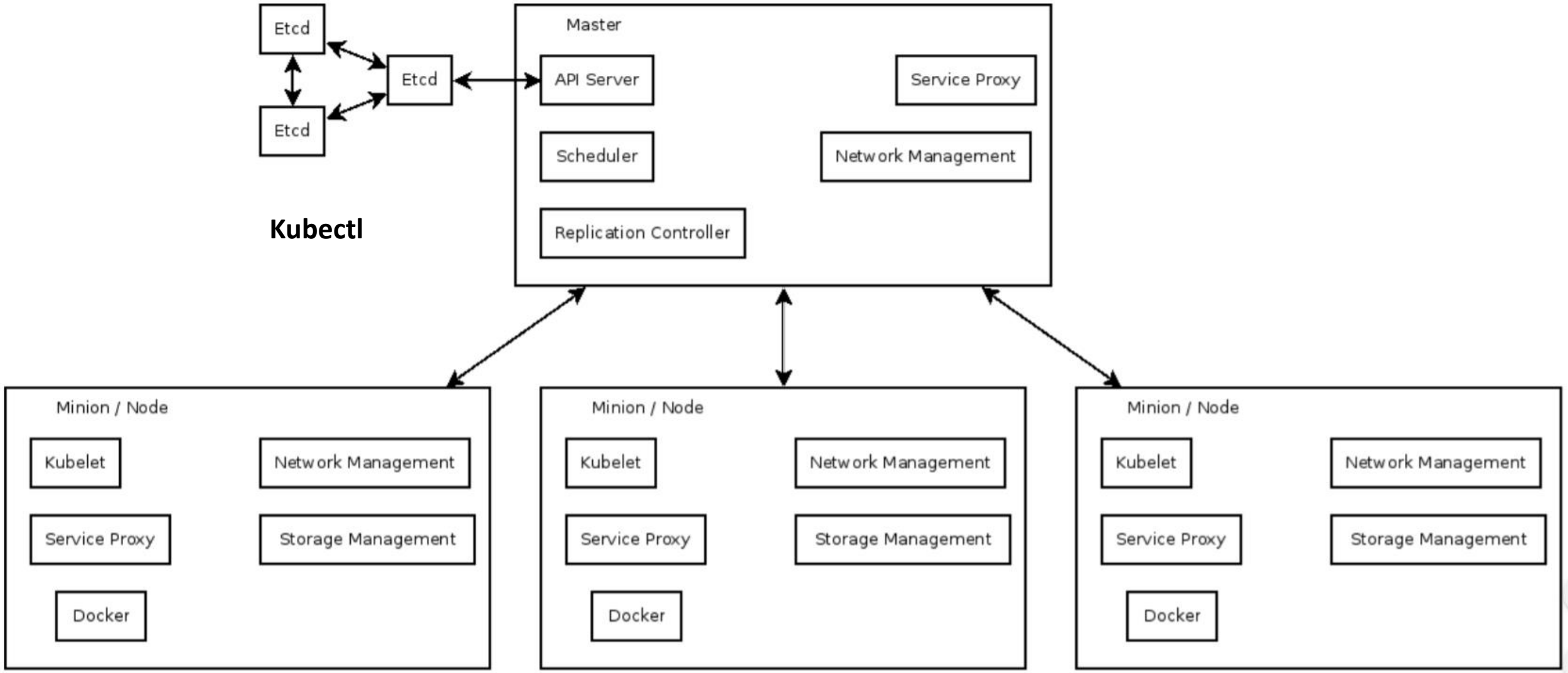
Kubernetes Components



Minon/Node contains…..

- Consists of..
  - kubelet
  - kube-proxy
  - cAdvisor
  - Network Mgmt utility

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POD contains…..

- Single schedulable unit of work
  - Can not move between machines
  - Can not span machines
- One or more containers
  - Shared network namespace
- Metadata about the container(s)
- Env vars – configuration for the container
- Every pod gets an unique IP
  - Assigned by the container engine, not kube!

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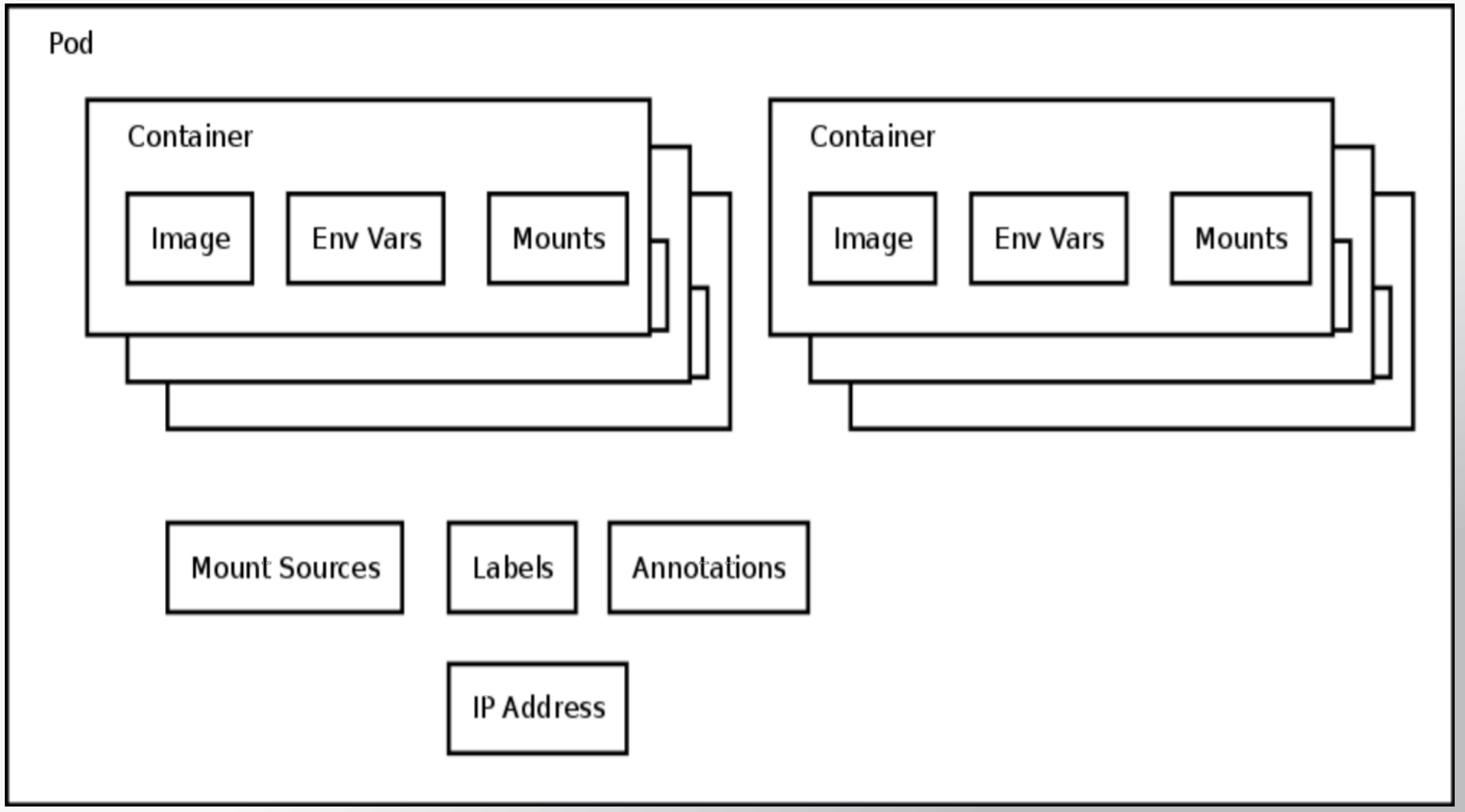
POD



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Replication Controller contains…..

- Consists of
  - Pod template
  - Count
  - Label Selector
- Kube will try to keep $count copies of pods matching the label selector running
- If too few copies are running the replication controller will start a new pod somewhere in the cluster

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Services contains.....

- How 'stuff' finds pods which could be anywhere
- Define:
  - What port in the container
  - Labels on pods which should respond to this type of request
- Can define:
  - What the 'internal' IP should be
  - What the 'external' IP should be
  - What port the service should listen on

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Label contains…..

- List of key=value pairs
- Attached to all objects
- Currently used in 2 main places
  - Matching pods to replication controllers
  - Matching pods to services Can define:
- Objects can be queried from the API server by label

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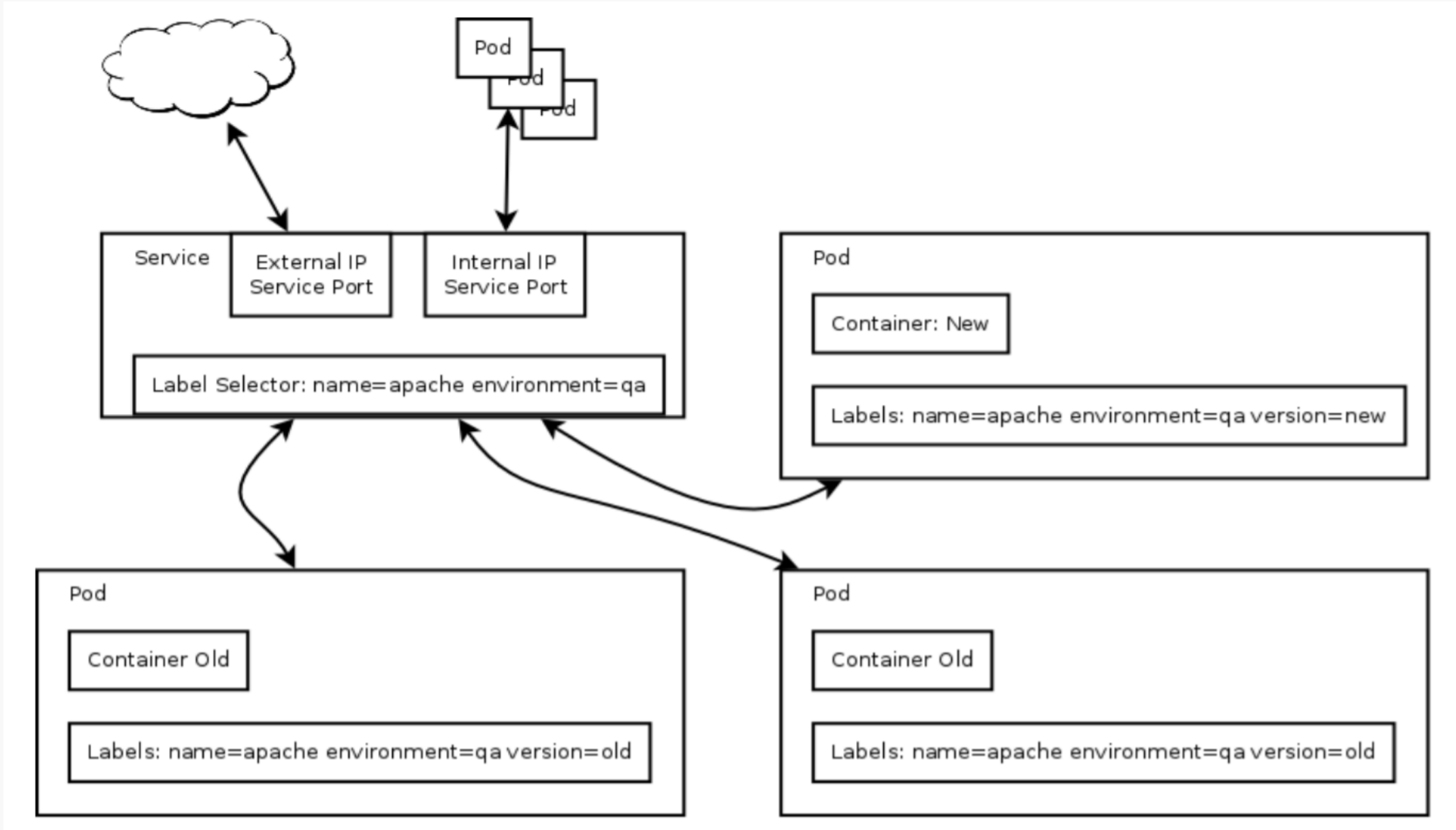
Services and Labels



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Namespace contains.....

- Attached to every object
- Pods in ns1 will not get service variable from ns2
- Users with permission to CRUD objects in ns1 may not have permissions to CRUS object in ns2
- The network is not segregated!

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Configuration differences

- Configuration Changes:
  - Systemd and /etc/kubernetes/ file formatting
  - Kubelet takes: –api_servers=
  - Controller-manager takes –machines=

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Networking Setup

- Networking is a problem in docker BUT NOT IN KUBE
  - If any two docker containers on any two hosts can talk over IP, and kube will just work.
  - Kube makes those problems disapper.

- We use Flannel Framework for Networking.
  - Easy Configuration
  - Can create a vxlan overlay network
  - Can configure docker to launch pods in this overlay

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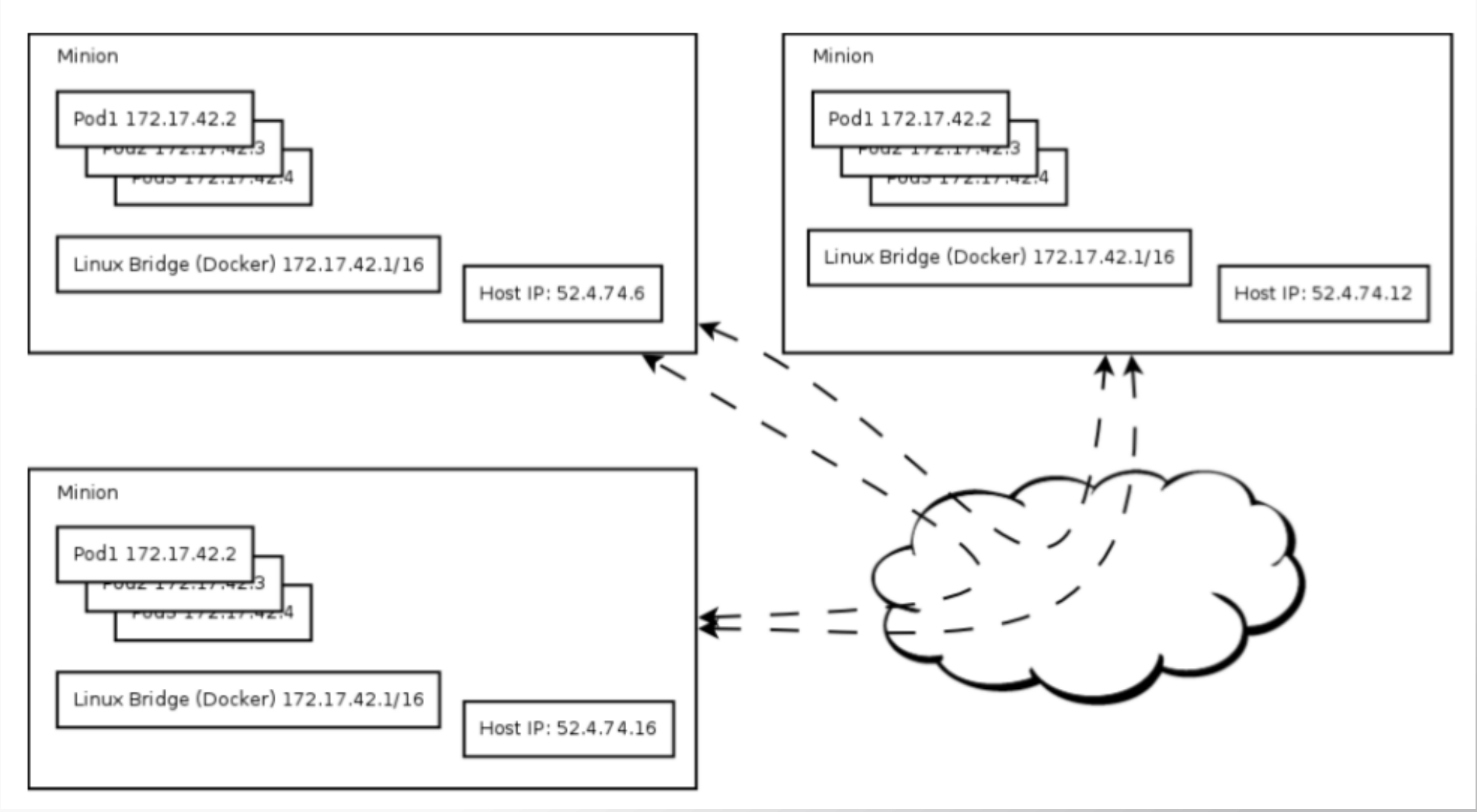
Kube Networking out of the box



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Custom Networking setup

- We use Flannel Framework for Networking.
  - Easy Configuration
  - Can create a vxlan overlay network
  - Can configure docker to launch pods in this overlay
  - Inter communication of the PODs.

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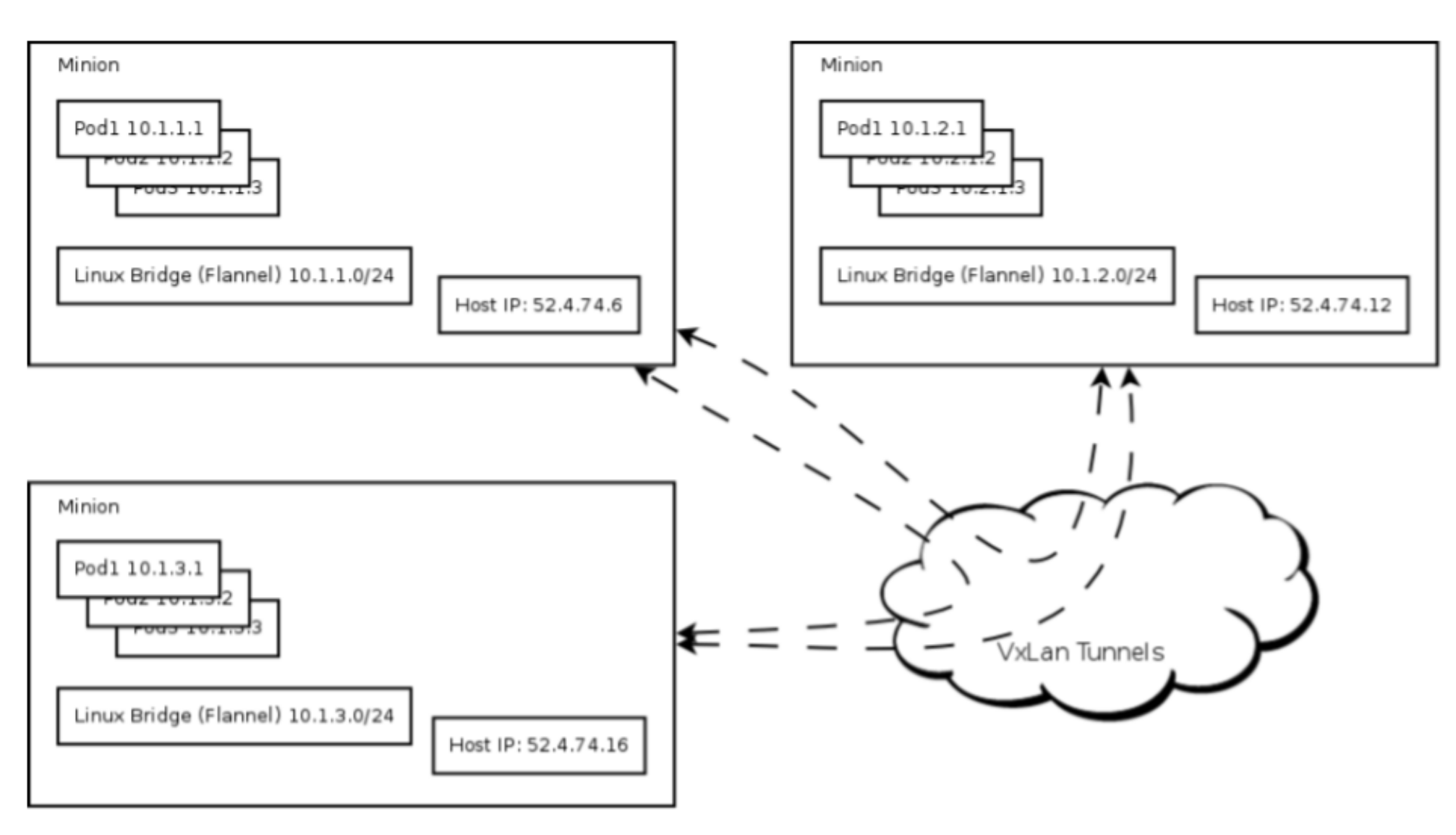
Networking with an overlay network



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