

Kubernetes: What's it do?

Presenter

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Agenda

- What is Kubernetes
- Kubernetes Primitives
- Configuration and Cluster Setup Pointers
- Demo – using kube

What is Kubernetes?

- A declarative language for launching containers.

What is Kubernetes?

- A highly collaborative open source project originally conceived by Google
 - Google has 10+ years experience w/ containerized apps
 - Red Hat has been a member since day 0.
 - Red Hat is the second largest contributing member with many ideas coming from gearhead
- Sometimes called:
 - kube
 - k8s (that's 'k' + 8 letters + 's')
- Start, stop, update, and manage a cluster of machines running containers in a consistent and maintainable way.

What is Kubernetes?

- Particularly suited for horizontally scaleable, stateless, or 'microservices' application architectures.
 - Does not mean others will not work or are ignored
- Additional functionality to make containers easier to use in a cluster (reachability and discovery).
- Kubernetes does NOT and will not expose all of the 'features' of the docker command line.

Kubernetes Primitives and Key Words

- Master
- Minion/Node
- Pod
- Replication Controller
- Service
- Label
- Namespace

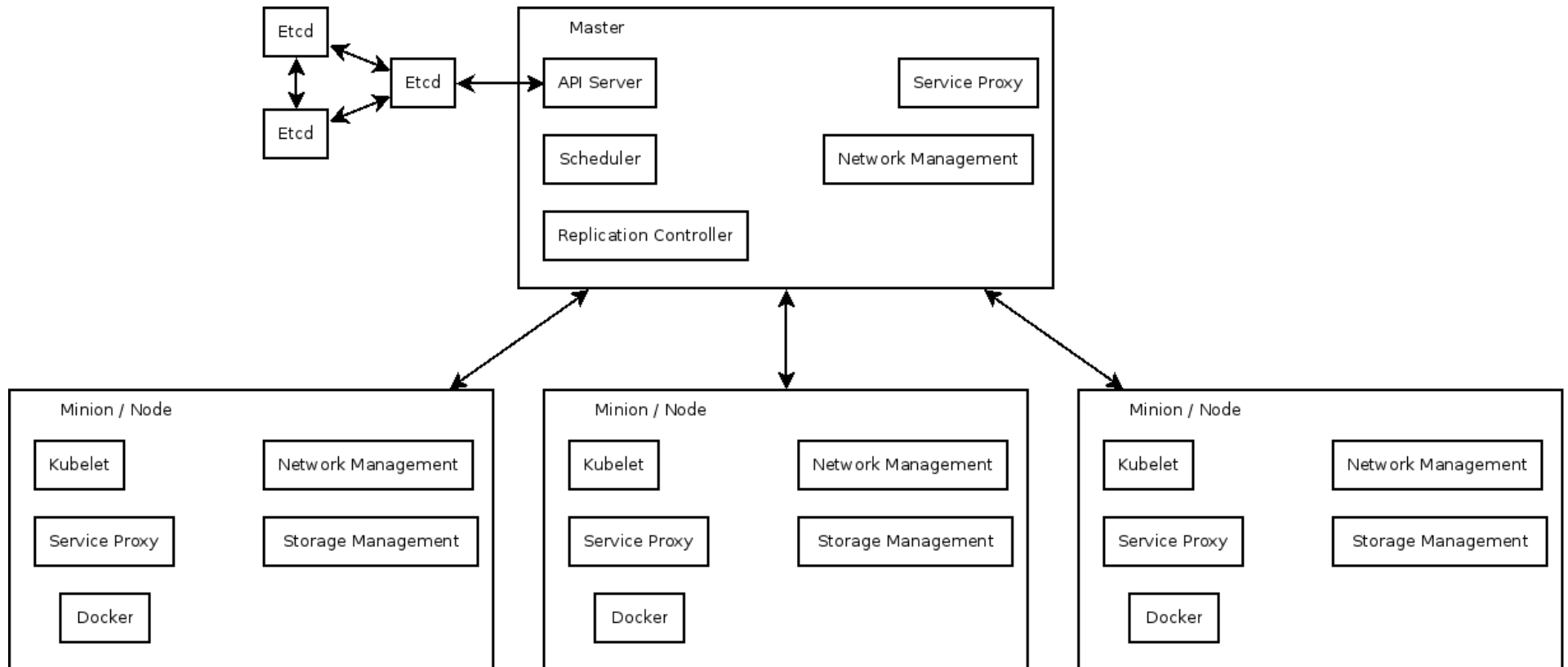
Master

- Typically consists of:
 - kube-apiserver
 - kube-scheduler
 - kube-controller-manager
 - etcd
- Might contain:
 - kube-proxy
 - a network management utility

Minion - Node

- Typically consists of:
 - kubelet
 - kube-proxy
 - cAdvisor
- Might contain:
 - a network management utility
- May be referred to by either name.

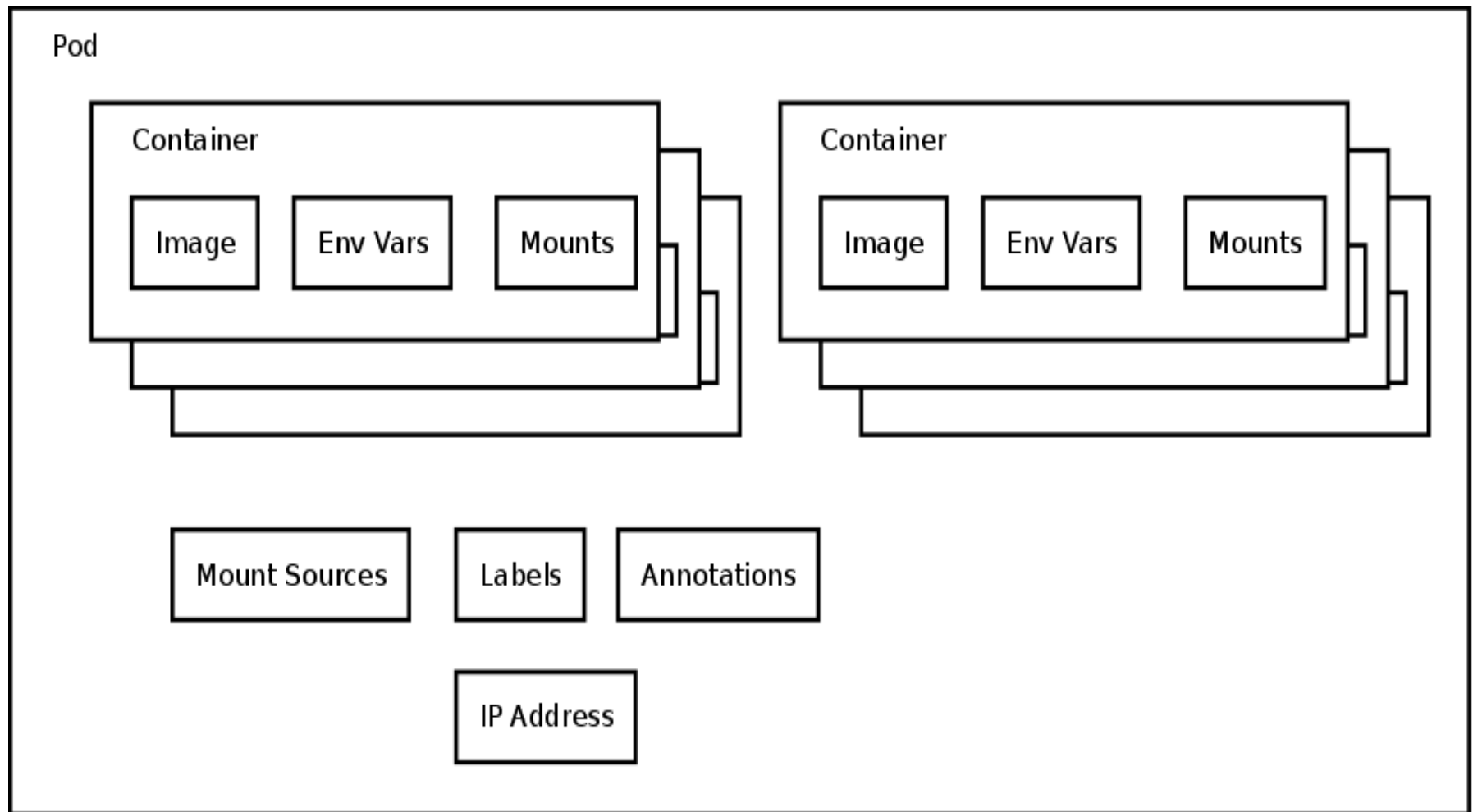
Systems and Binaries



Pod

- 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!

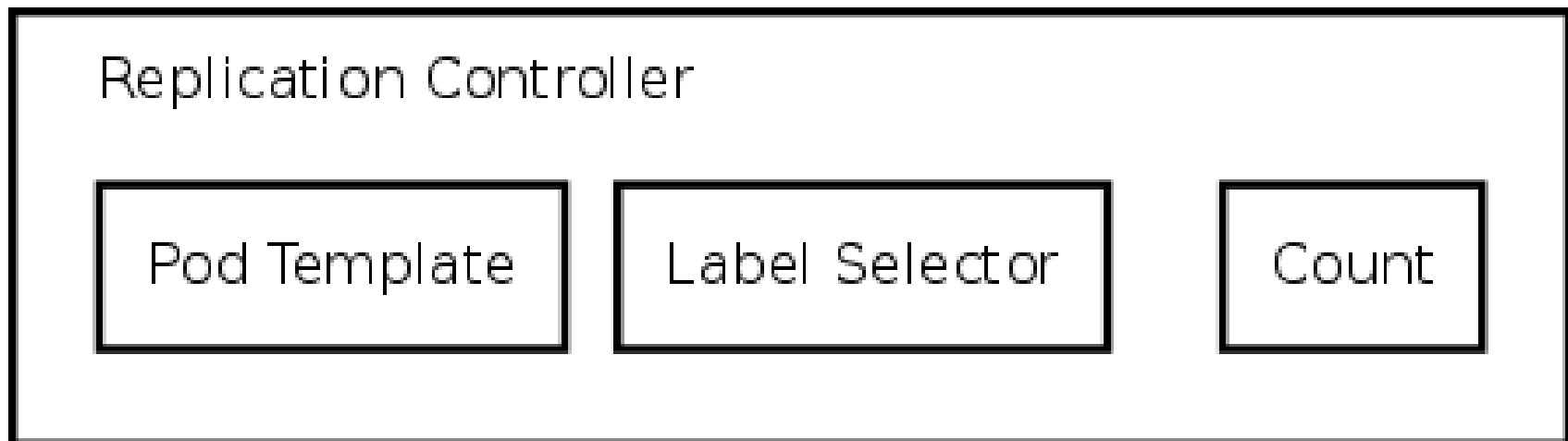
Pod



Replication Controller

- 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

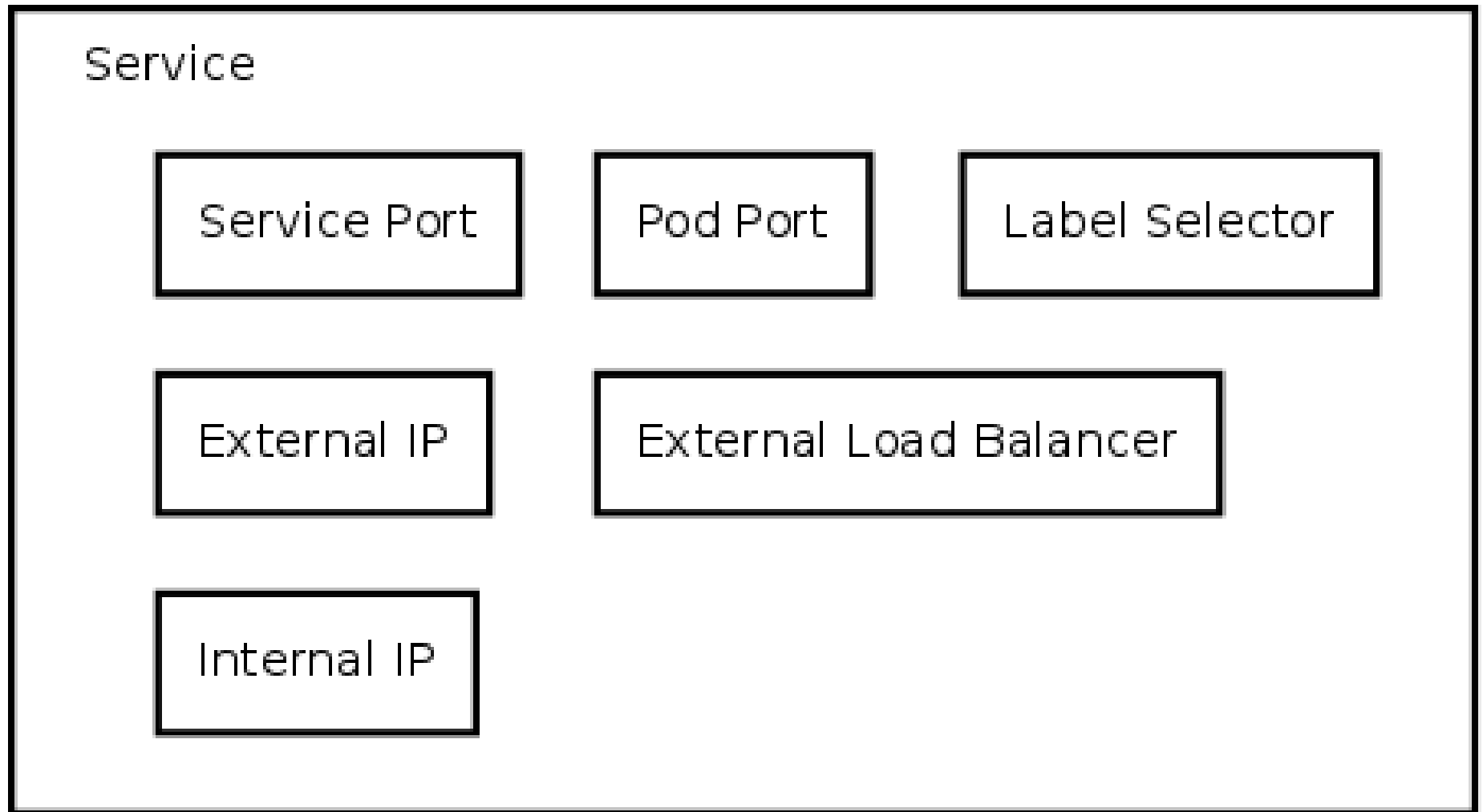
Replication Controller



Services

- 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

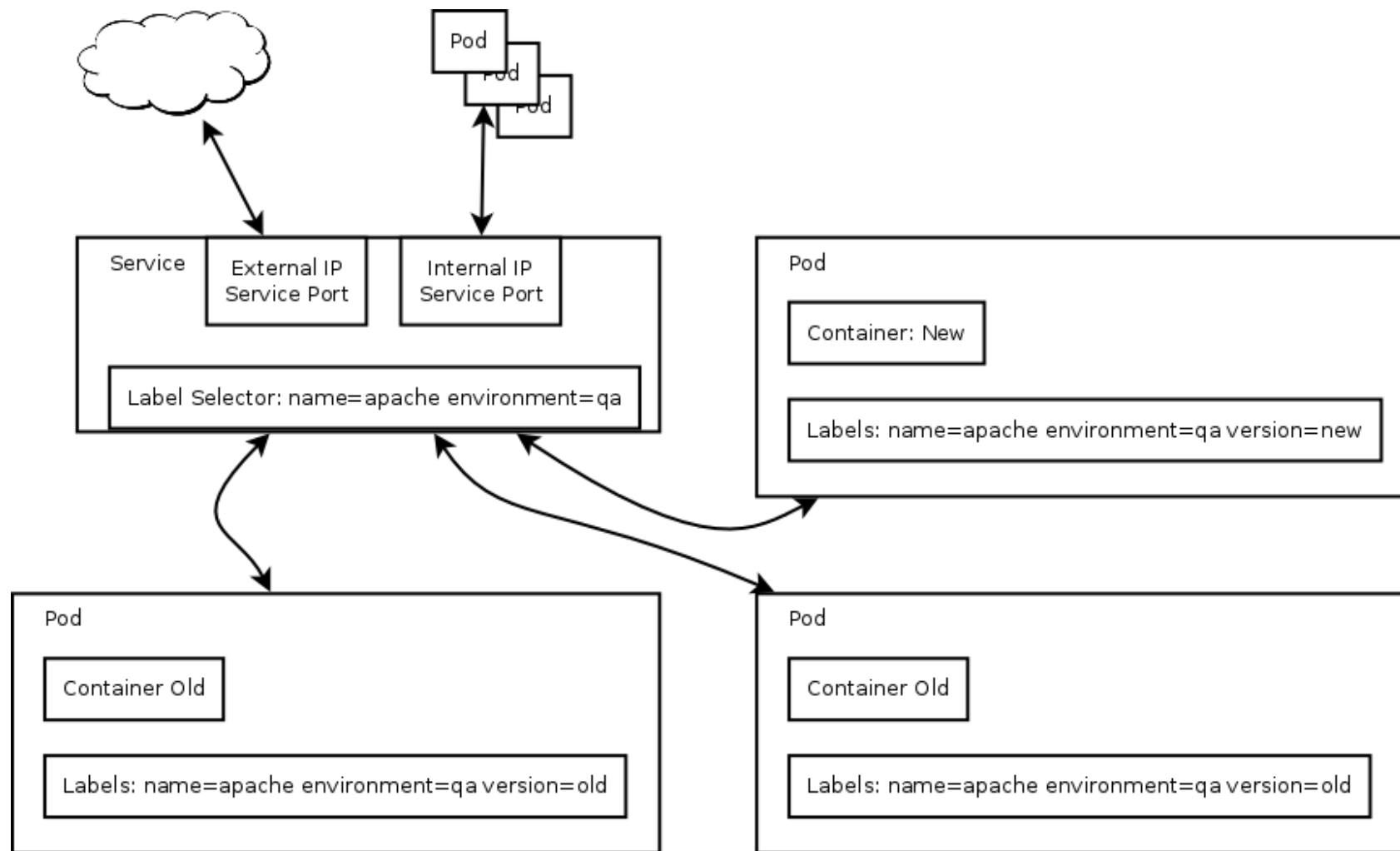
Services



Labels

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

Services and Labels



Namespace

- 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!

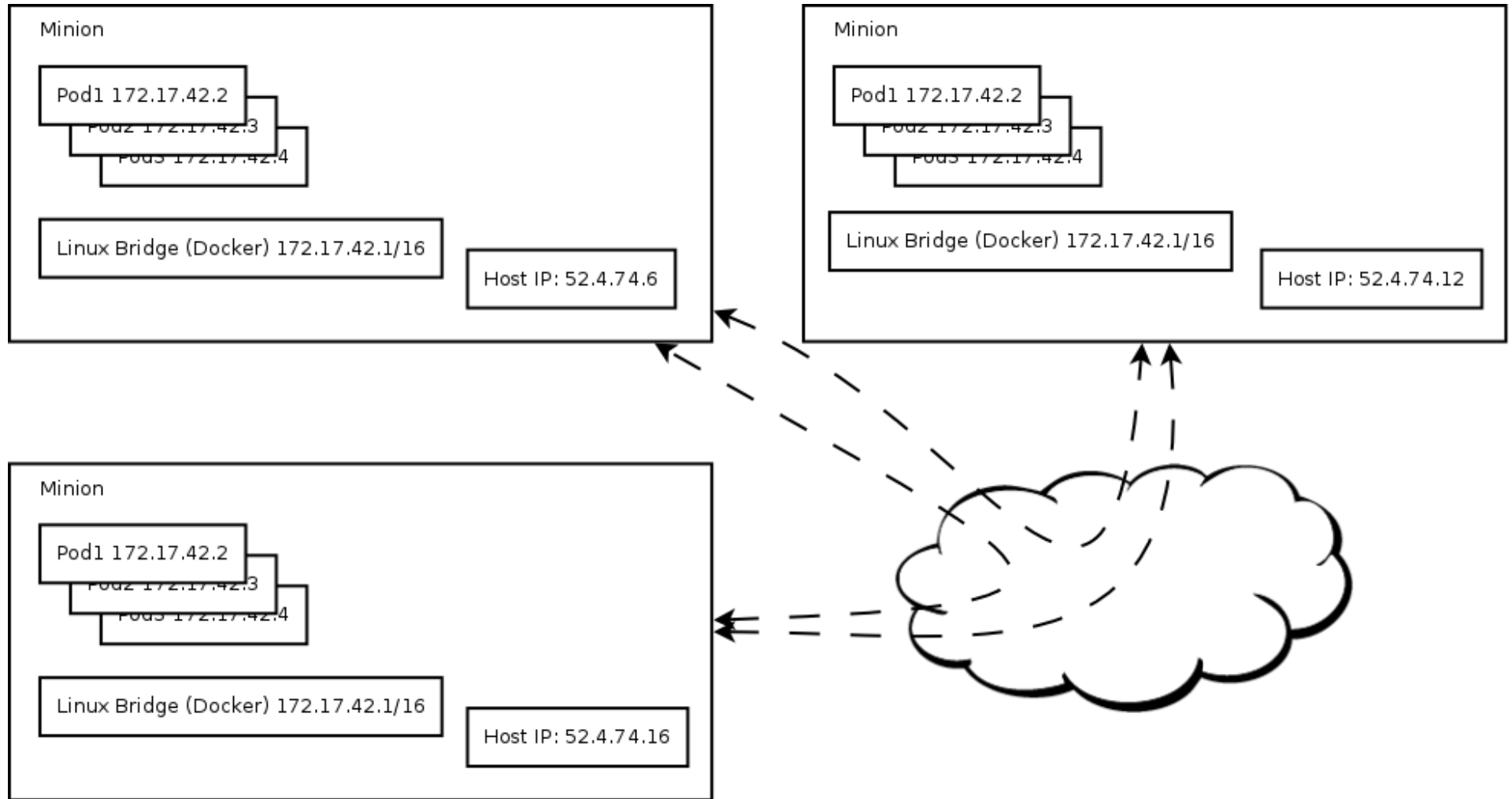
Configuration differences since last talk

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

Networking Setup – In Fedora

- Networking is a docker problem – not kube
 - Kube makes those problems apparent!
 - If any two docker containers on any two hosts can talk over IP, kube will just work.

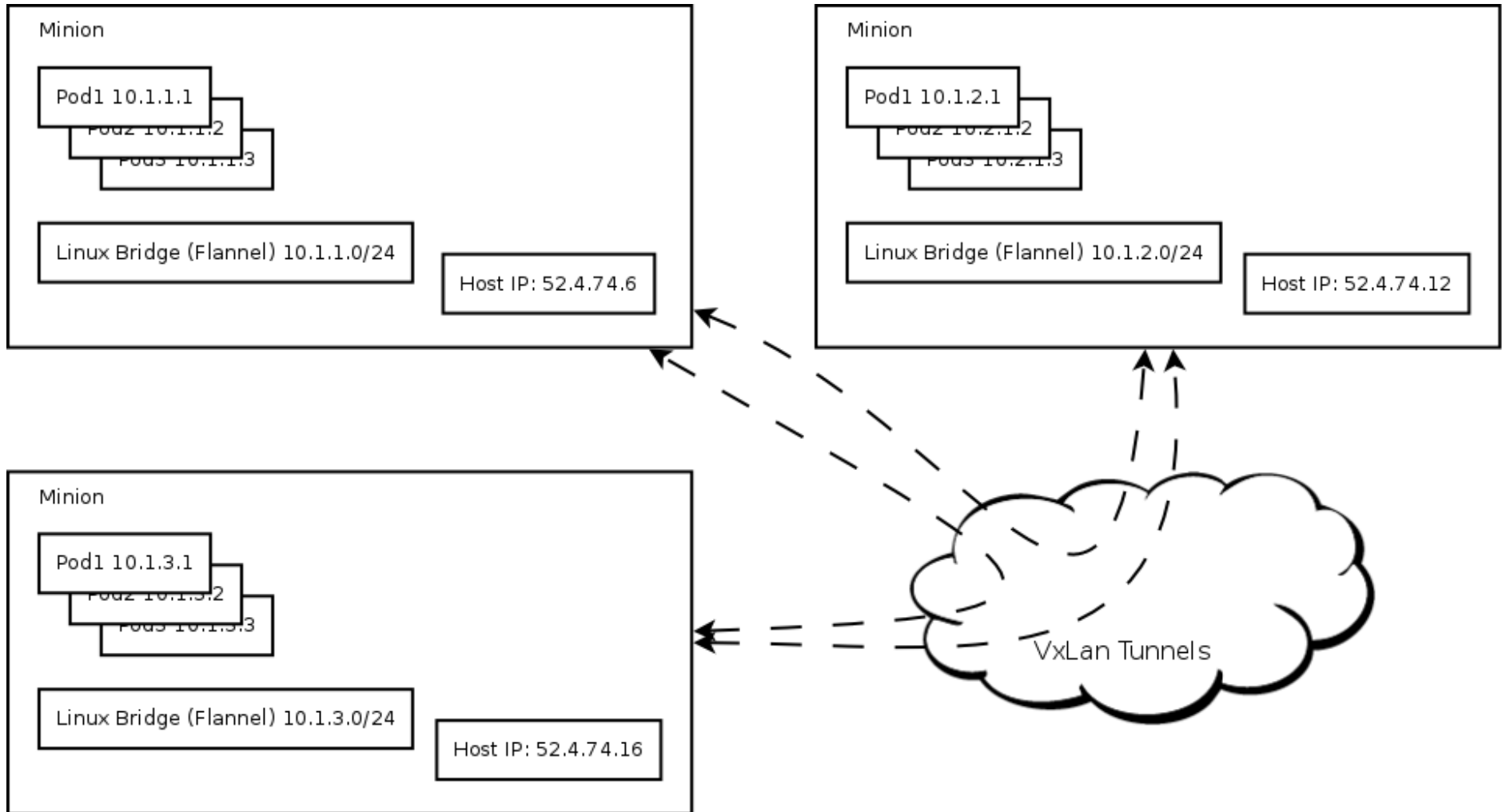
Networking Docker Out Of The Box



Networking Setup – Available in Fedora

- Flannel
 - Super super easy configuration
 - Can create a vxlan overlay network
 - Can configure docker to launch pods in this overlay
 - Pods just work!
- There are many other solutions.
 - This one is easy.

Networking with an overlay network



Demo

- Create a multi tier web application
- Show that it works
- Update the web front end with 0 downtime
- How I'm cheating in the demo
 - Cluster is already set up.
 - Containers already created
 - Containers already pulled (docker pull is slow)
 - services and replication controllers already written

Demo

