

# Common networking operations across Kubernetes and OpenStack with Calico

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Product Strategy  
Canonical

@markabaker

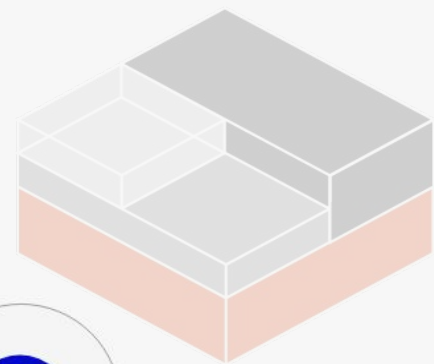
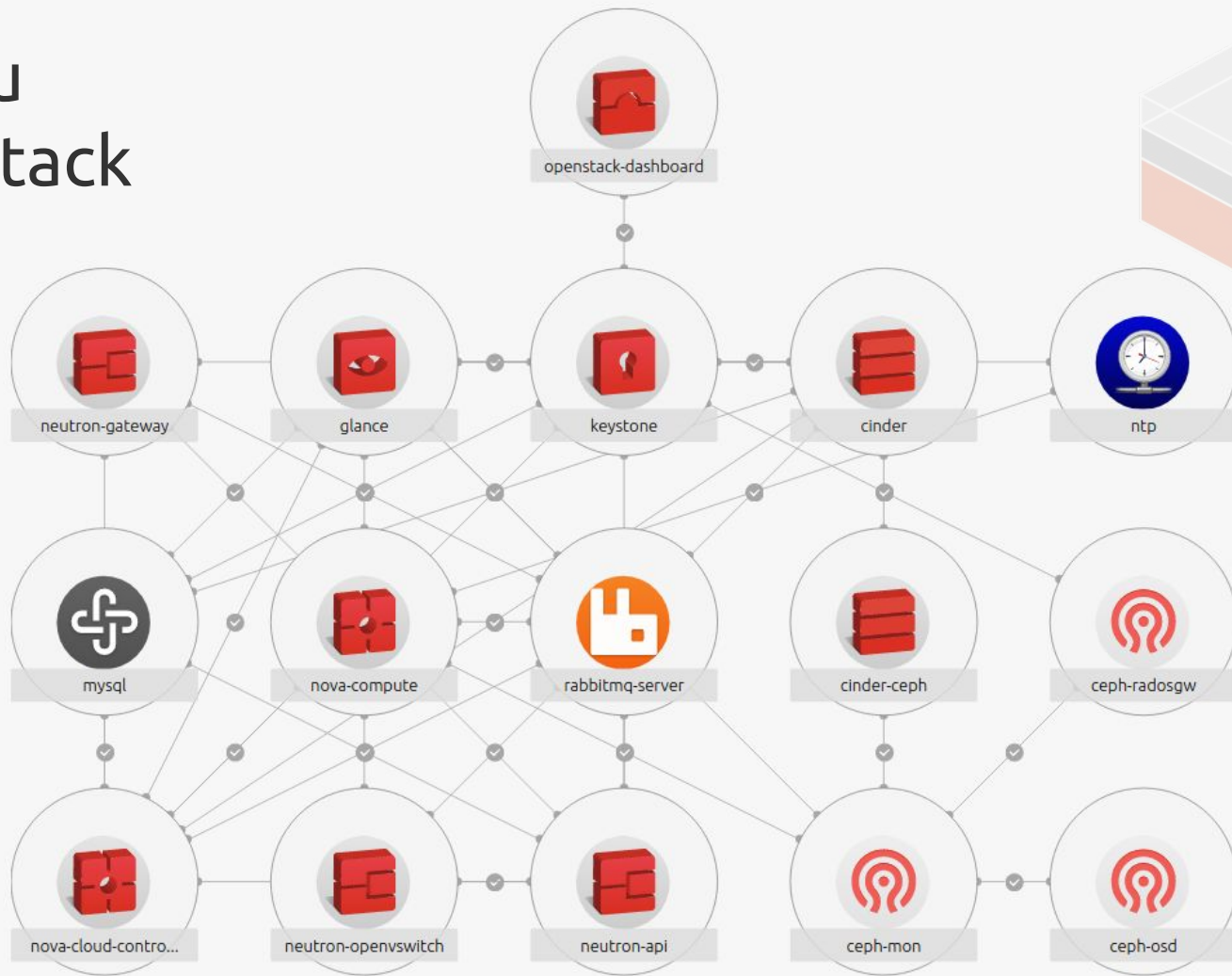
Karthik Prabhakar  
Director of Solution  
Architecture  
Tigera

[kp@tigera.io](mailto:kp@tigera.io)  
(@worldhopper)

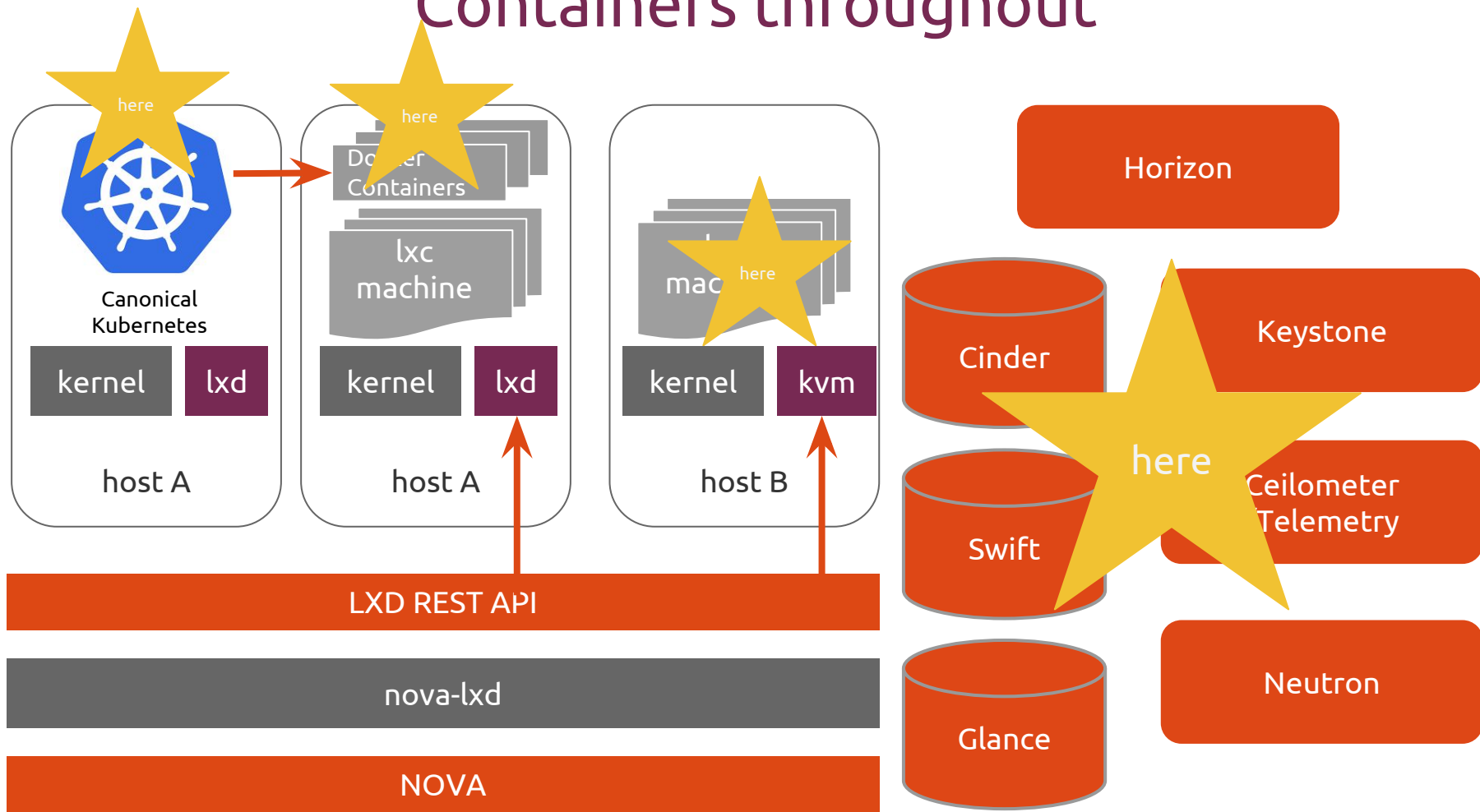
Larry Rensing  
OpenStack Helm  
AT&T

Steve Wilkerson  
OpenStack Helm  
AT&T

# Ubuntu OpenStack



# Containers throughout



# Taxonomy

virtual machines



2008

machine containers



2010

process containers



2014

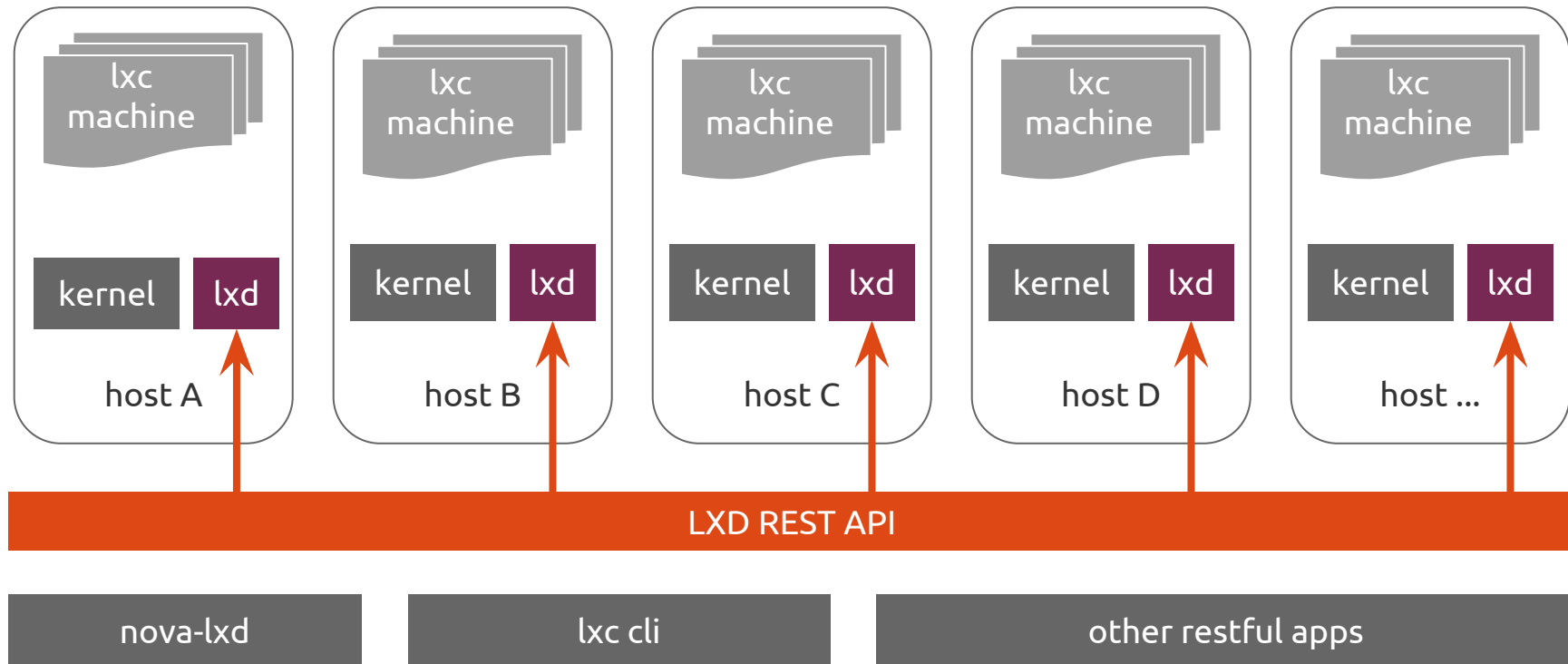
application containers



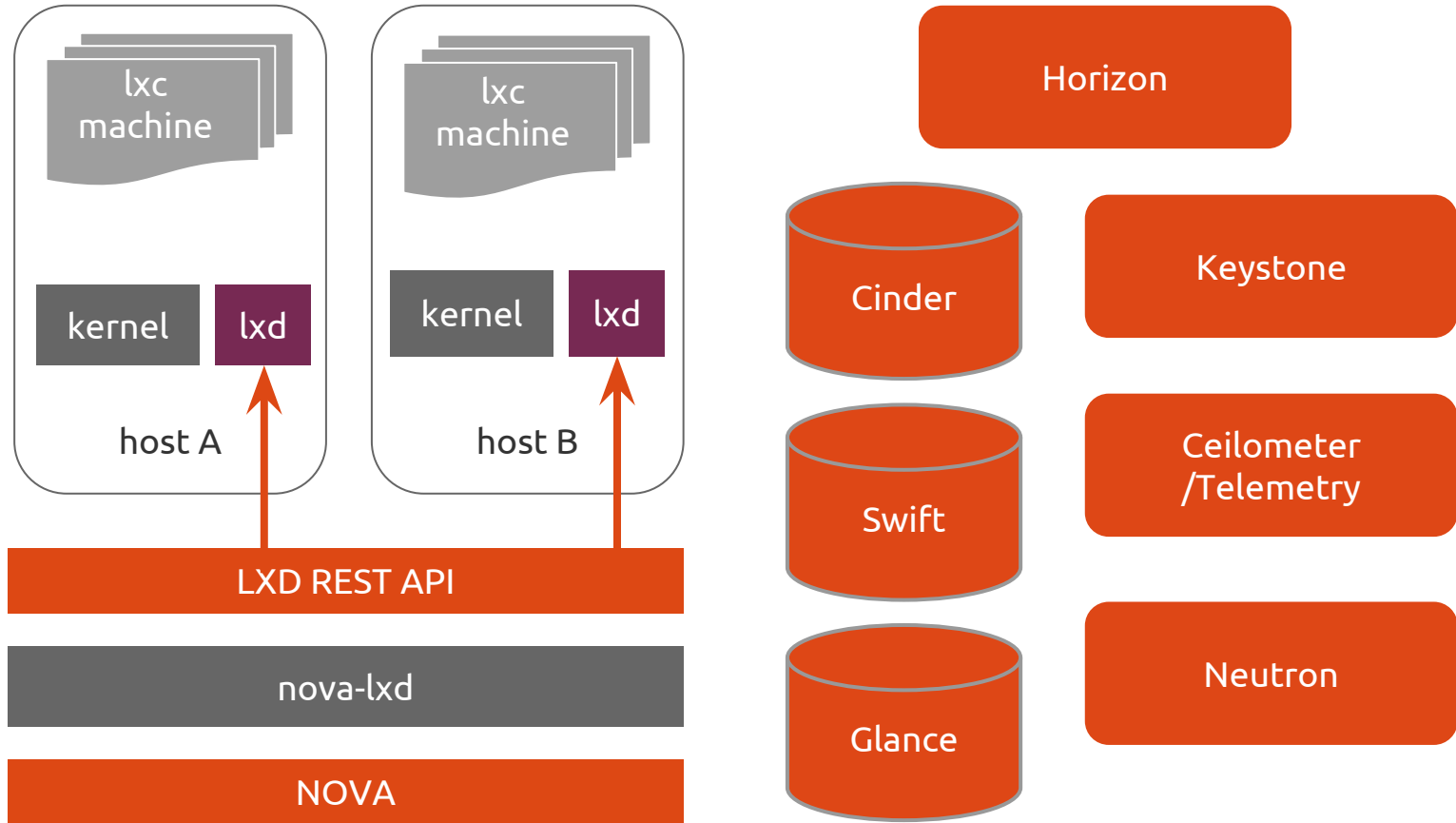
2016

ubuntu

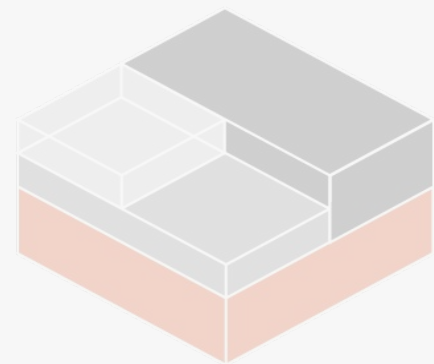
# LXD is a container hypervisor



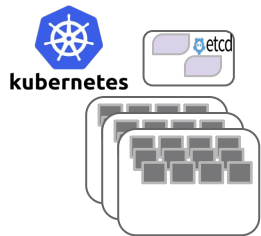
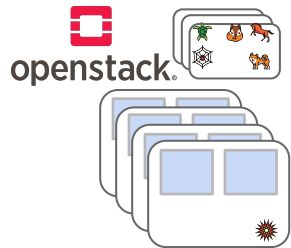
# LXD with OpenStack



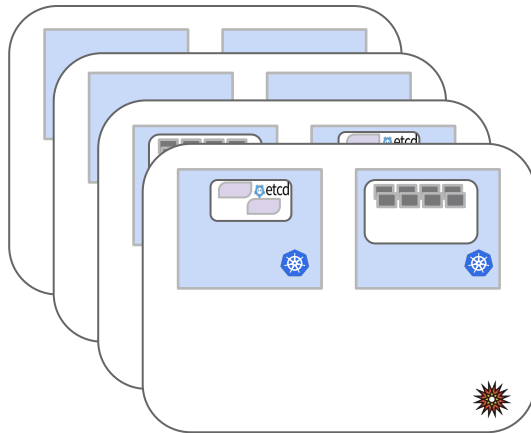
# Canonical Kubernetes



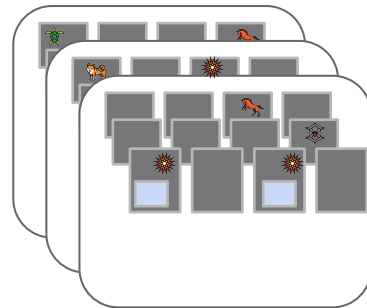
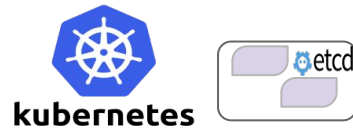
# OpenStack and Kubernetes: 3 Scenario's



Kubernetes  
alongside  
OpenStack



Kubernetes  
in  
OpenStack



OpenStack  
in  
Kubernetes



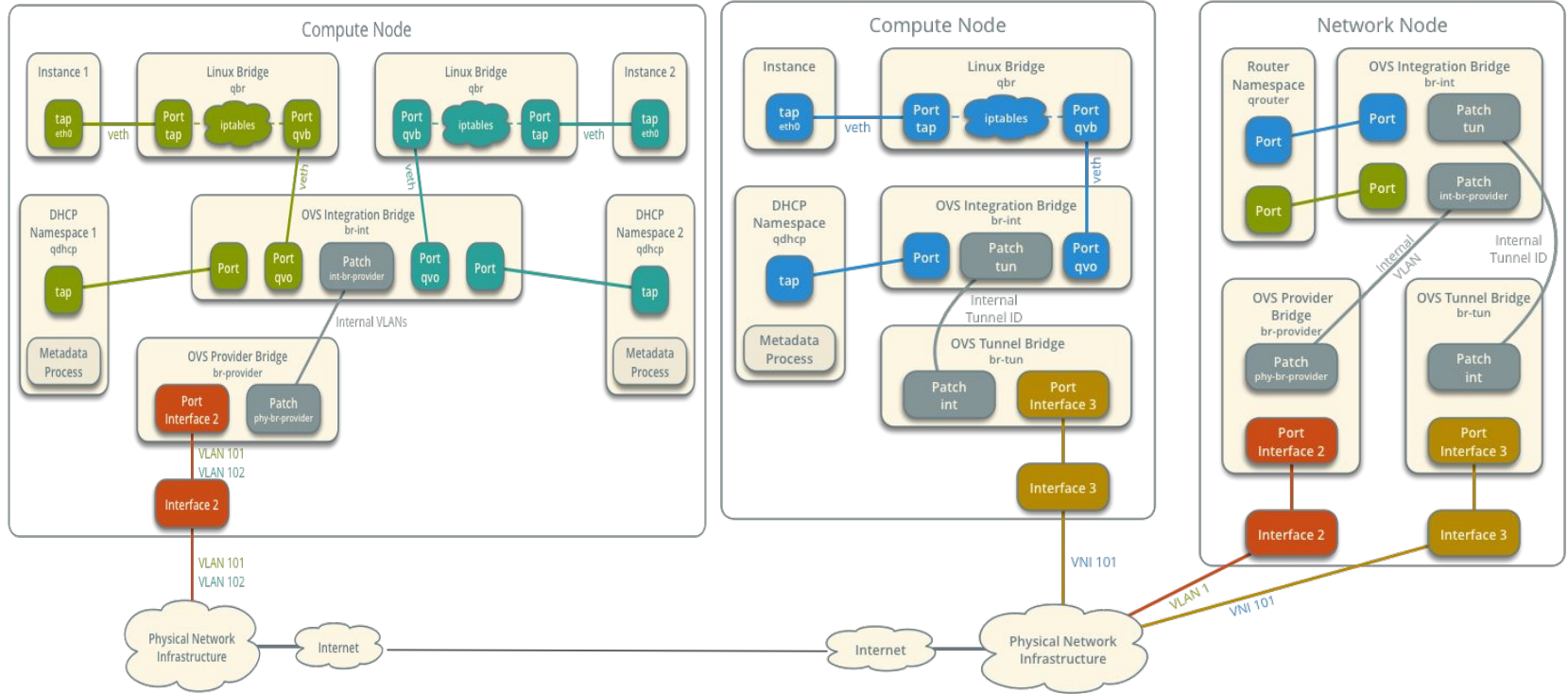
Whatever you choose, you need  
to get the networking right

Let's look at that....

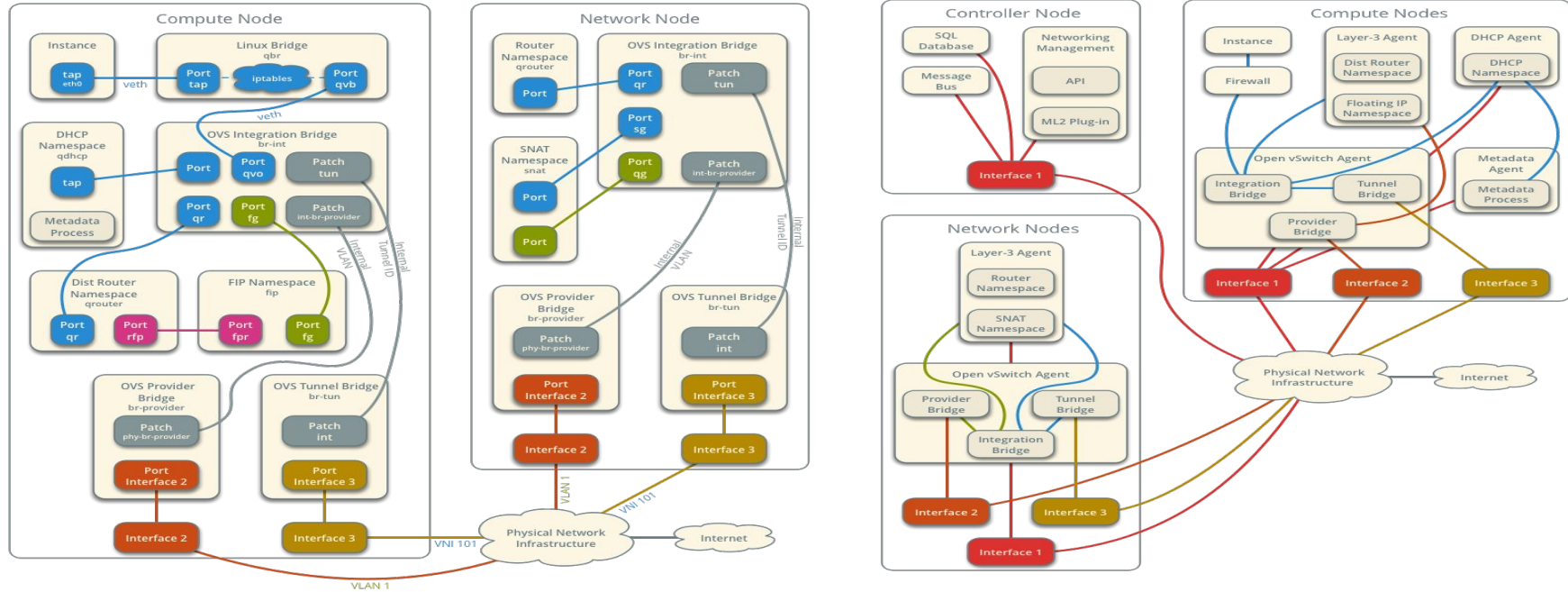
... But before we introduce  
simple, scalable networking....

Let's look at the status quo  
that's neither simple nor  
scalable....

# Exhibit A: Neutron with OpenvSwitch (L2)



# Exhibit B: Neutron with OpenvSwitch and DVR/VRRP





# The Kubernetes Model for Networked Services

=> IP connectivity between nodes

=> **IP per Pod**

=> **Rich Network Policy constructs for isolation**



# Project Calico

## Flexible security policy + simple networking

Intent-based policy spans

- ▶ Public, private & hybrid cloud
- ▶ Heterogeneous workloads and orchestration environments

**Simple, highly scalable**, non-overlay IP networking model

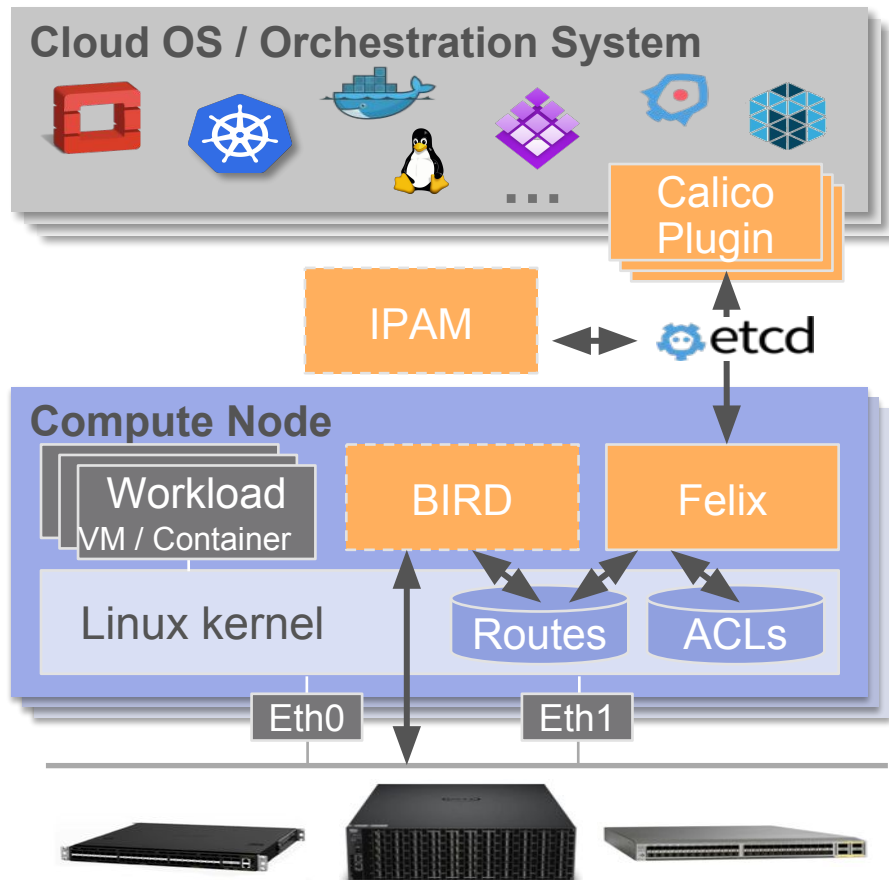
Standard Linux data path

Policy enforced on any underlying fabric

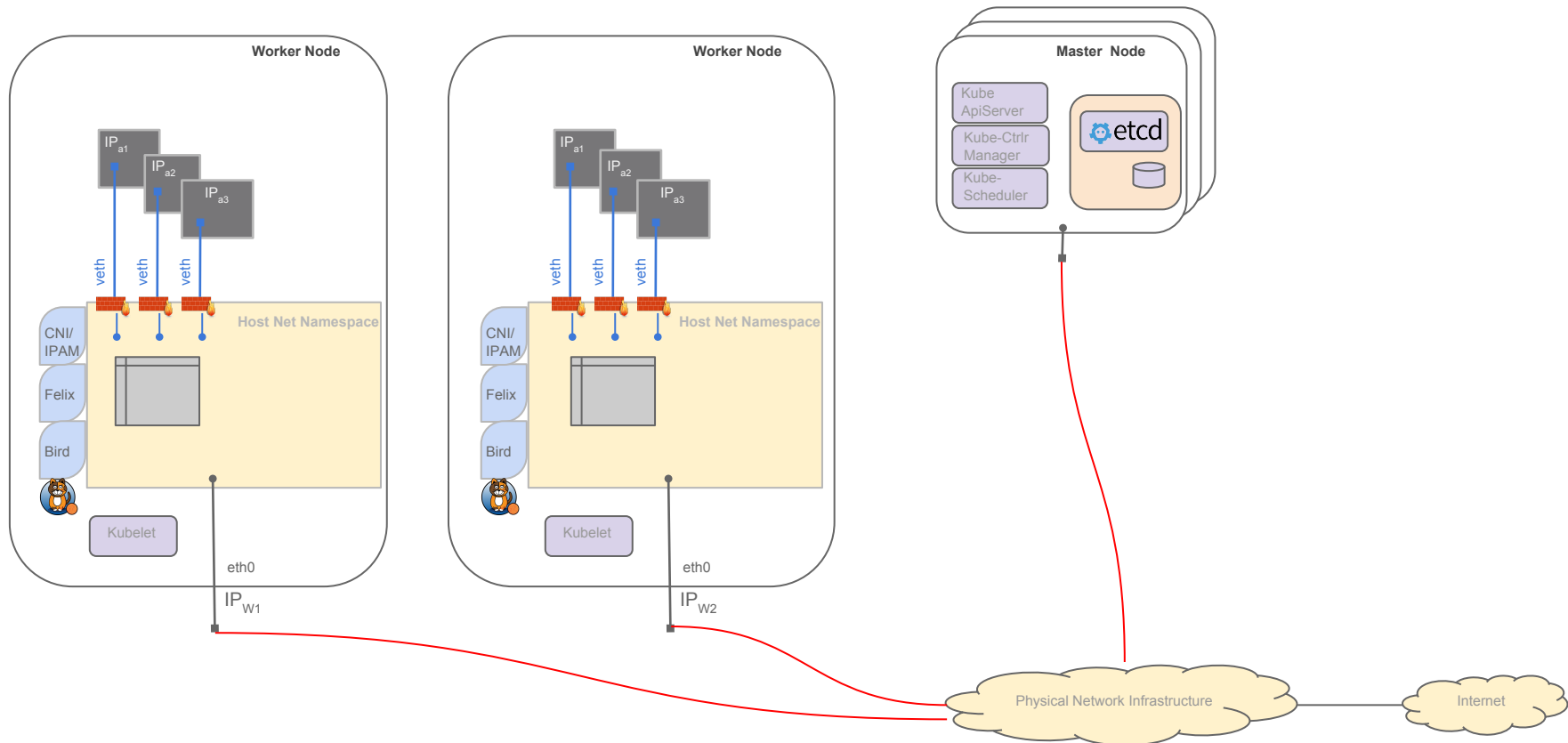
## Open source

Apache license

Maintained by Tigera team

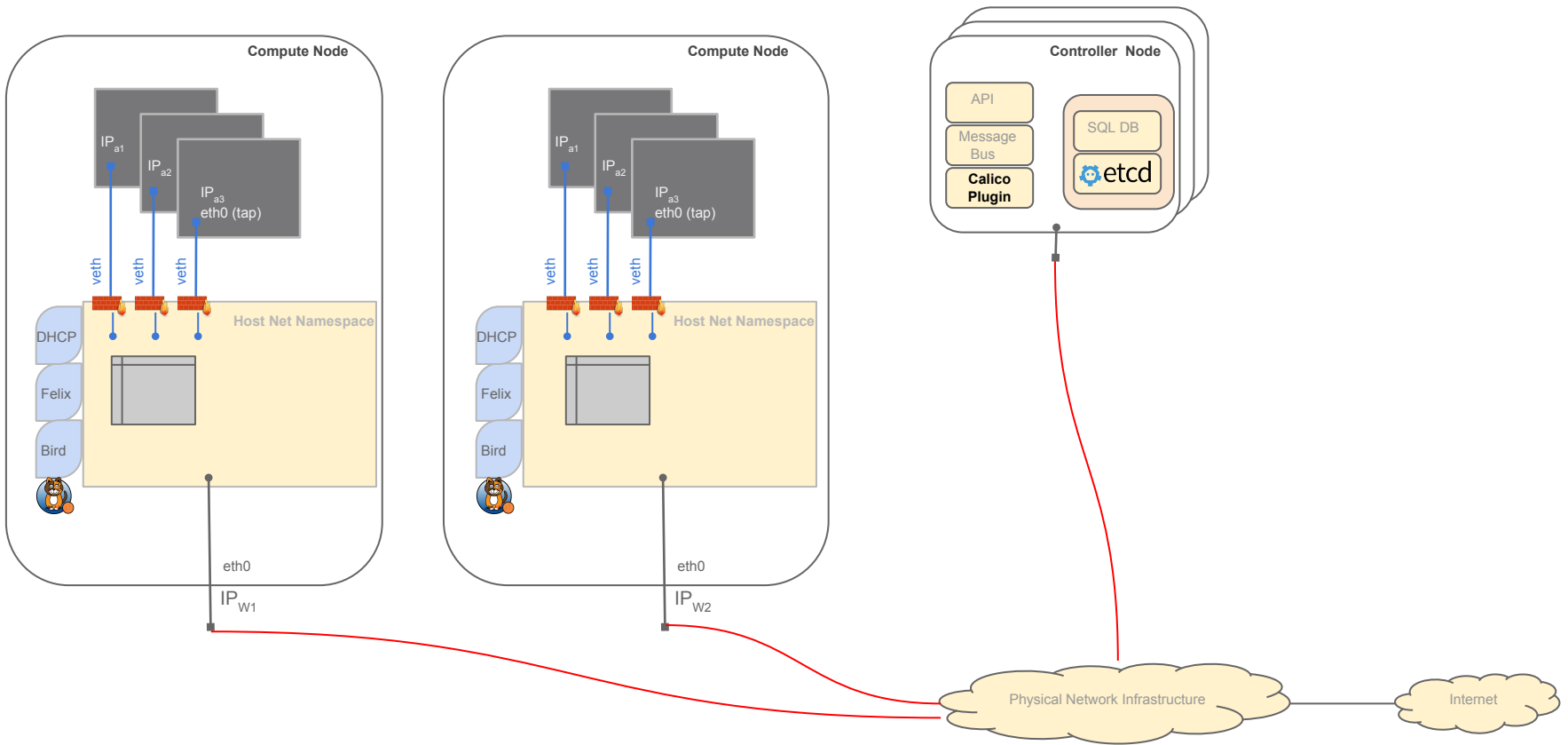


# Kubernetes with Calico





# Neutron with Calico





## Install

kubectl apply -f calico.yaml (Kubernetes)

juju deploy cs: ~project-calico/neutron-calico (OpenStack)

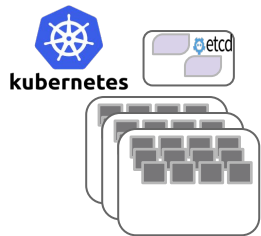
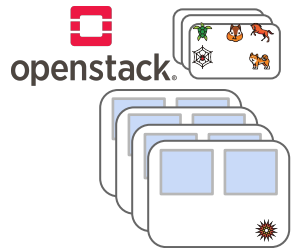
## Operate

Leverage Existing DevOps & Network tooling

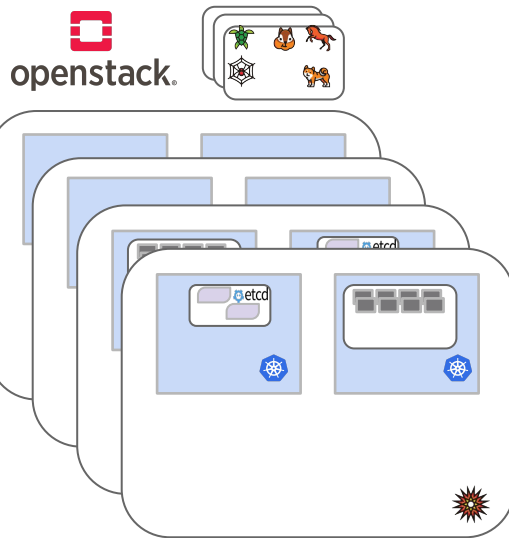
## Troubleshoot

Typical tools required: ping, traceroute, ip route show, iptables -L

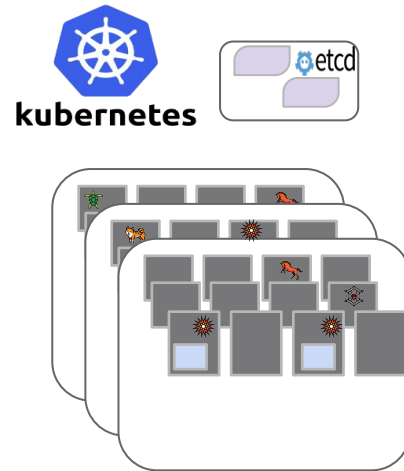
# OpenStack and Kubernetes: 3 Scenario's



Kubernetes  
alongside  
OpenStack



Kubernetes  
in  
OpenStack



OpenStack  
in  
Kubernetes

# OpenStack and Kubernetes

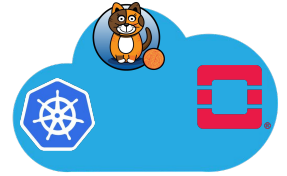
**Network** workloads across OpenStack and Kubernetes at scale

**Secure** and isolate workload application flows

# OpenStack with Kubernetes with Calico

## Network

Every node is a router, every workload has an IP address  
Simple IP routing between OpenStack and Kubernetes



# OpenStack to Kubernetes with Calico

## Network

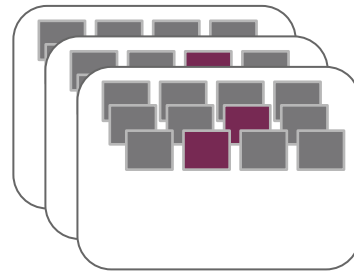
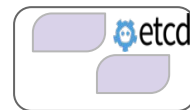
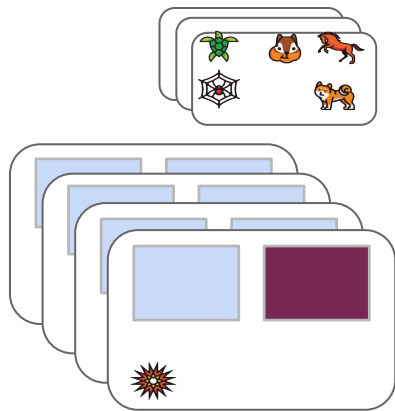
Every node is a router, every workload has an IP address  
Simple IP routing between OpenStack and Kubernetes



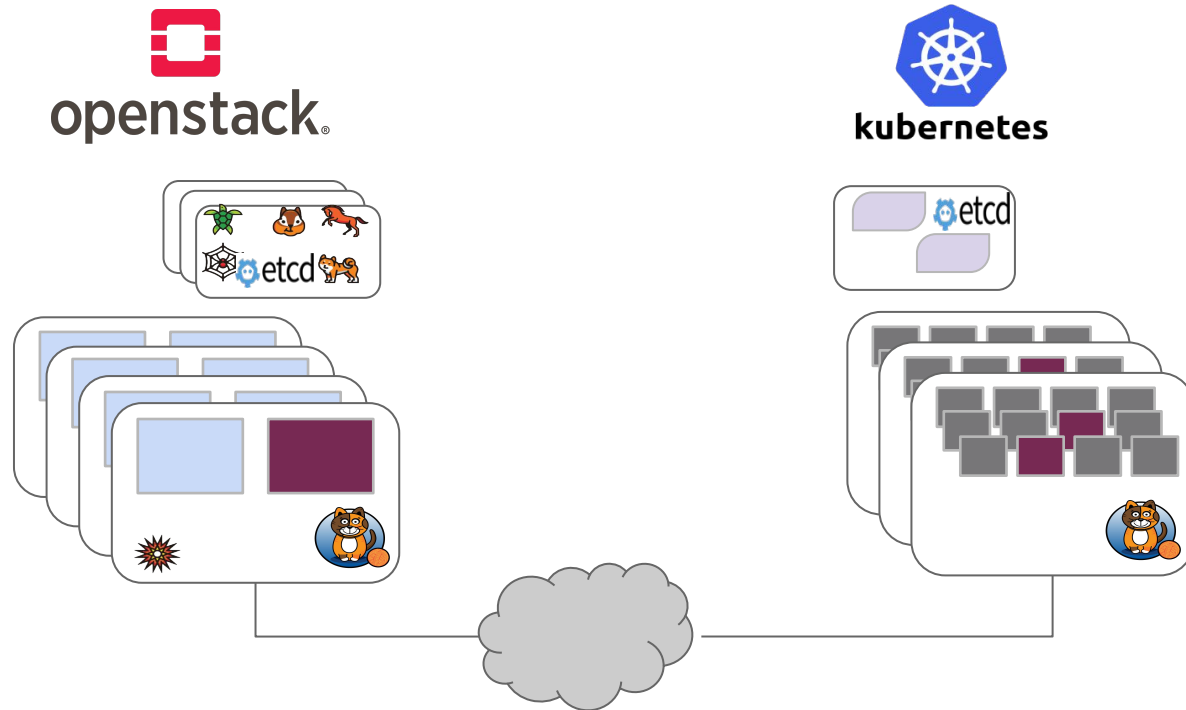
## Secure

Kubernetes: Labels, selectors and (Calico) Network Policy  
OpenStack: Security Groups, and Calico Profiles  
Common Calico Datastore (etcd)



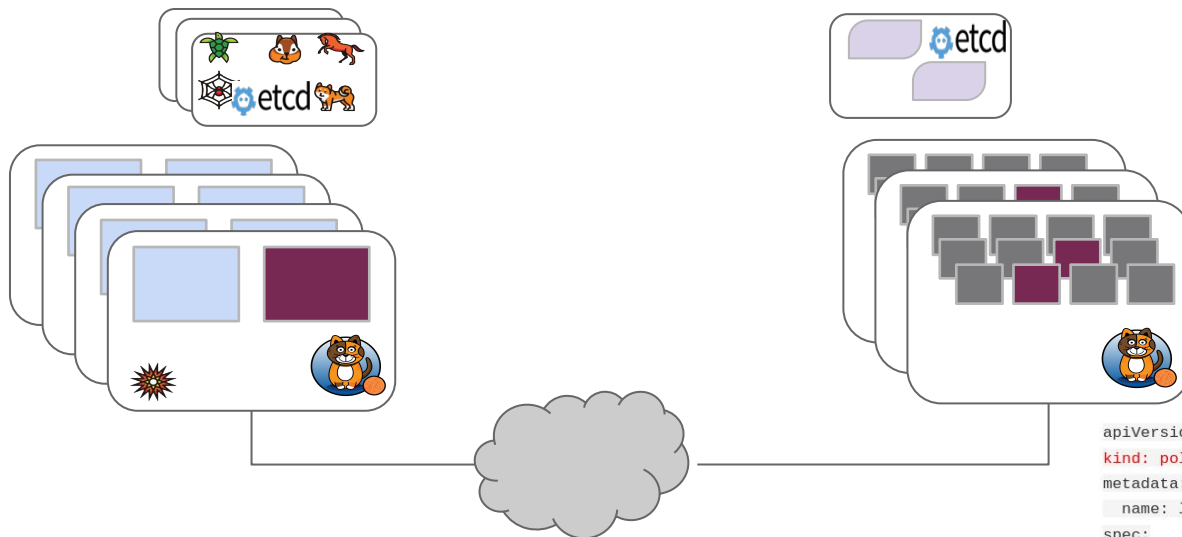


Kubernetes alongside OpenStack



Kubernetes alongside OpenStack with Calico

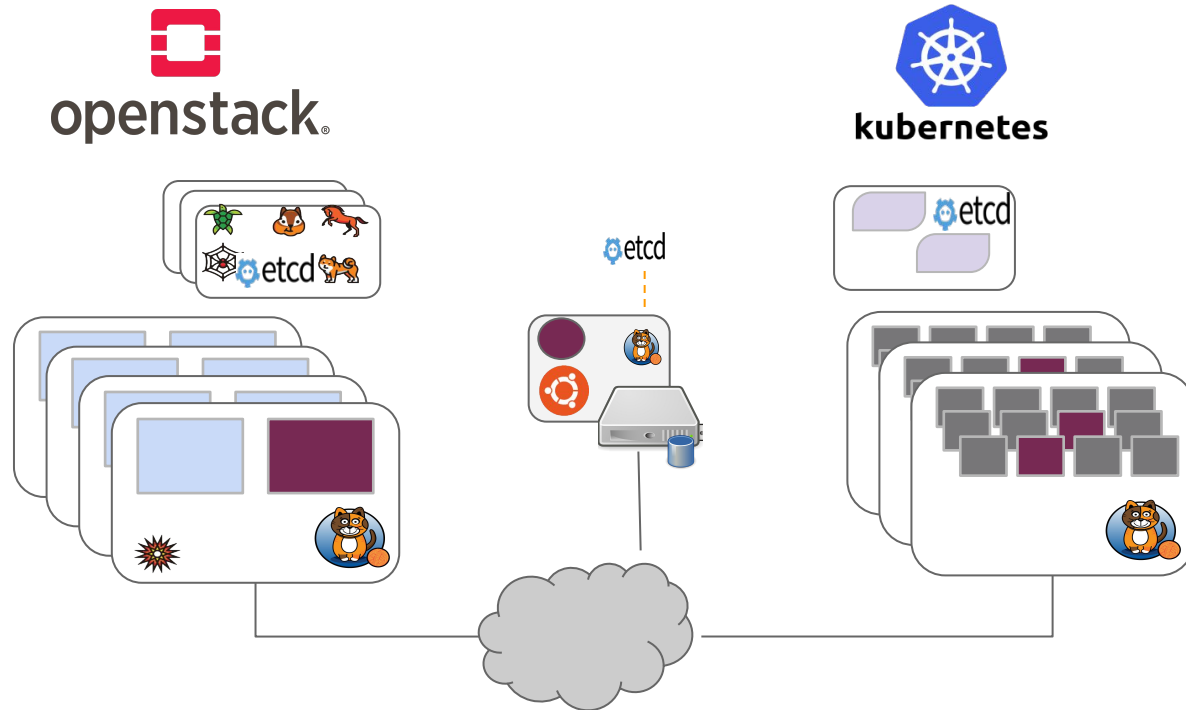




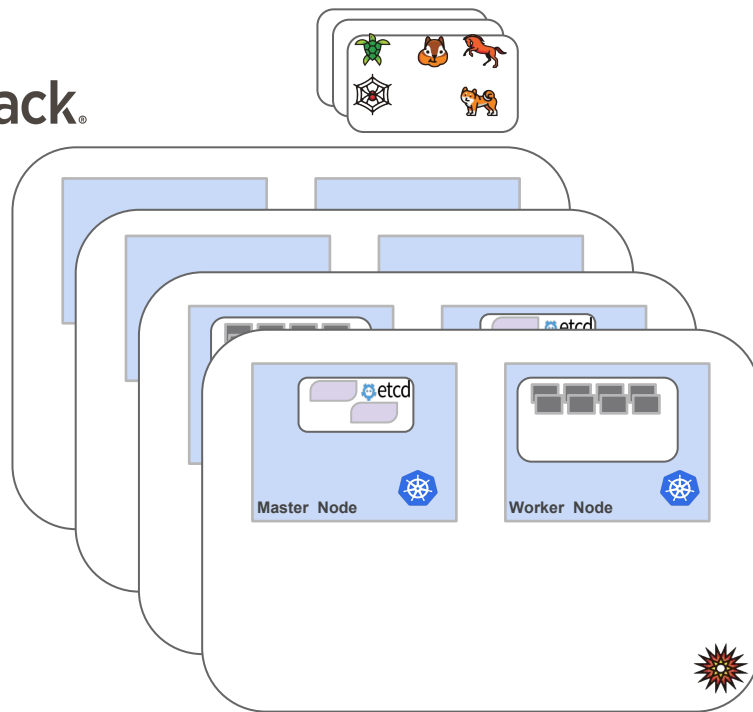
## Kubernetes alongside OpenStack with Calico

```
apiVersion: v1
kind: profile
metadata:
  name: ldap
  tags: ldapserver
  labels:
    profile: ldapserver
spec:
  ingress:
    - action: deny
      source:
        net: 10.0.20.0/24
    - action: allow
      source:
        selector: profile == 'ldapclient'
  egress:
    - action: allow
```

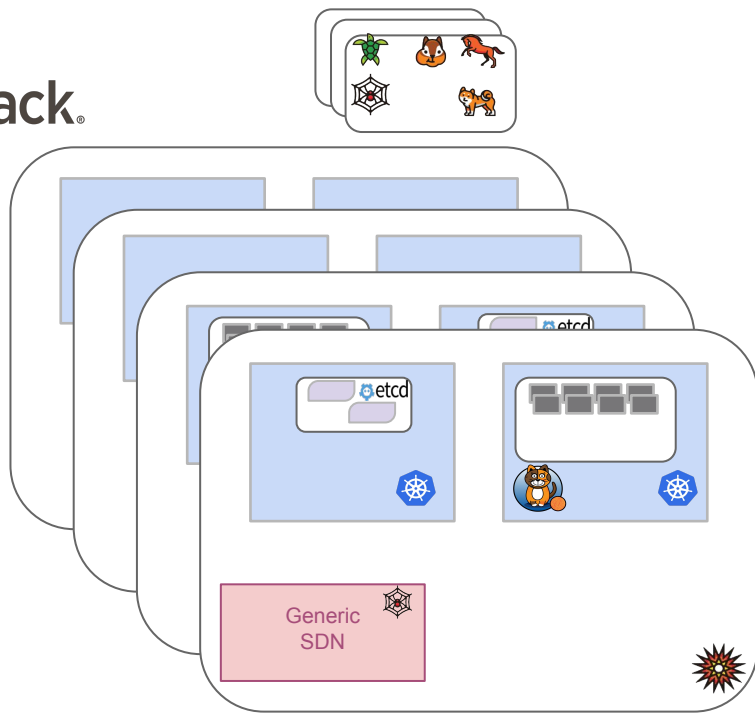
```
apiVersion: v1
kind: policy
metadata:
  name: ldap
spec:
  selector: role == 'ldapclient'
  ingress:
    - action: allow
      protocol: tcp
      source:
        selector: profile == 'ldapserver'
      destination:
        ports:
          - 636
  egress:
    - action: allow
```



Kubernetes alongside OpenStack and other Linux instances  
with Calico

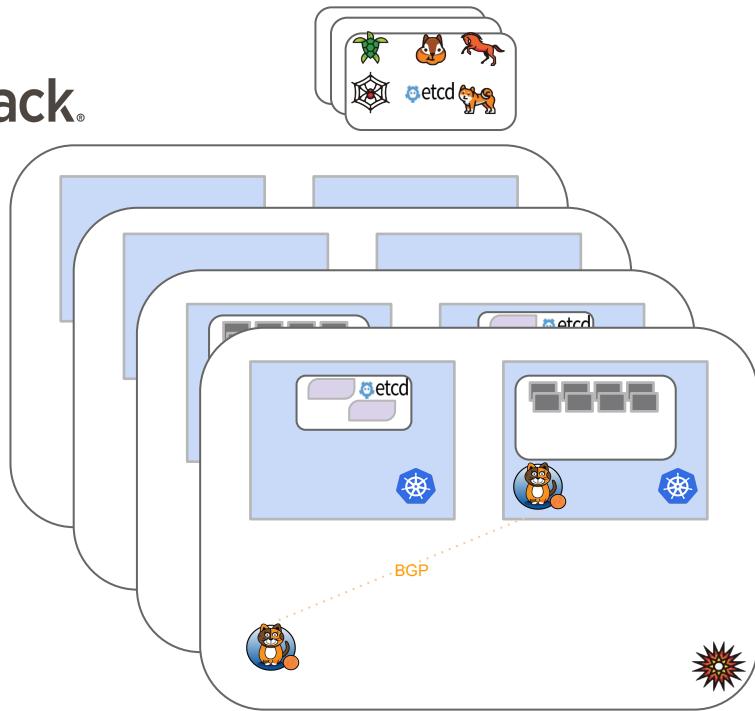


# Kubernetes in OpenStack



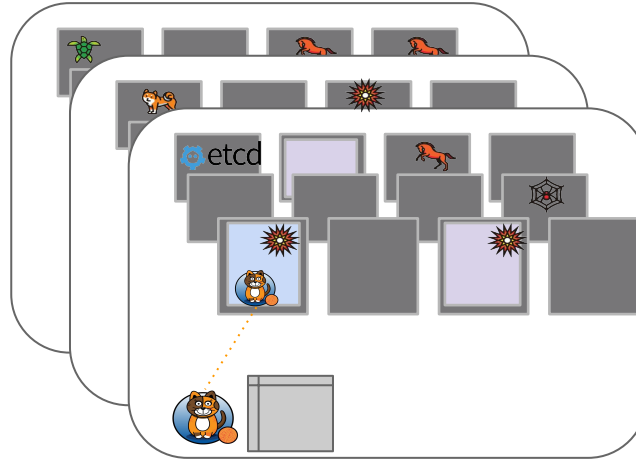
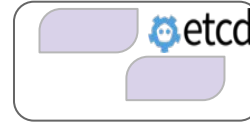
# Kubernetes in OpenStack

Kubernetes with Calico  
OpenStack with another SDN



# Kubernetes in OpenStack

Kubernetes with Calico  
OpenStack with Calico



OpenStack in Kubernetes

# OpenStack-Helm Project



at&t