Kubernetes or k8s

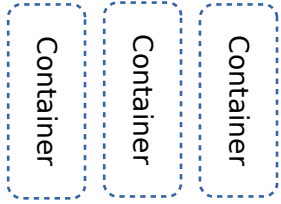Everything you need to know in 5 minutes or ~~20~~ 19 slides.

JJ Asghar, Developer Advocate
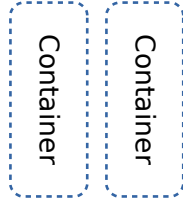jja@ibm.com || awesome@ibm.com
@jjasghar

IBM

Building blocks of k8s

First thing first, you use kubectl (kube-cut-el) to interface with your k8s cluster. You WILL alias it to "k" within a week of typing kubectl out over and over.
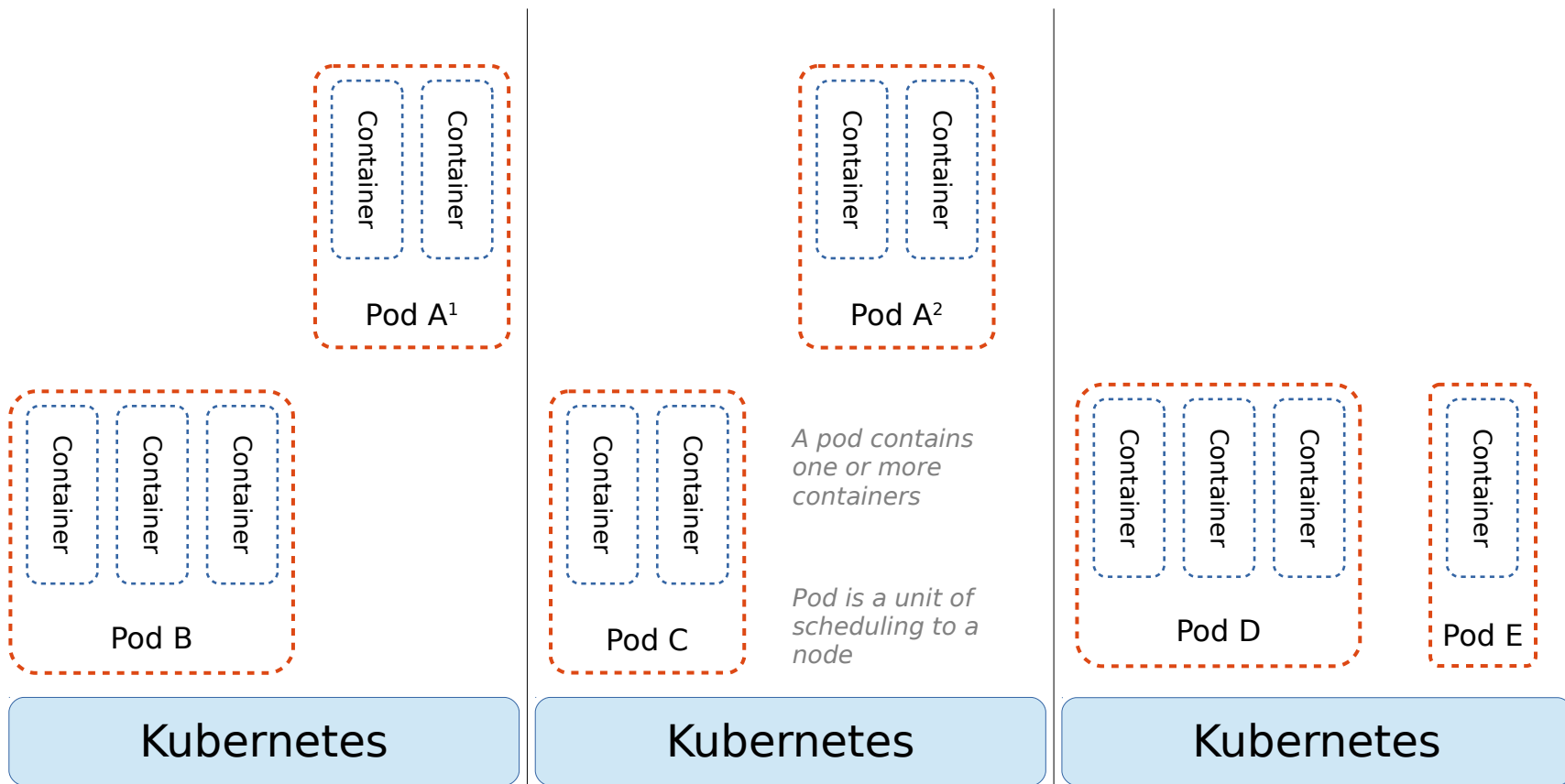
IBM

Containers

Container Container Container

Container Container

Container

| Kubernetes | Kubernetes | Kubernetes |

Pods

Pod A[1]

Pod A[2]

Pod B

Pod C

Pod D

Pod E

A pod contains one or more containers

Pod is a unit of scheduling to a node

Kubernetes

Kubernetes

Kubernetes

Deployments

Container
Container

Pod A[1]

Deployment
Replicas = 2

Container
Container

Pod A[2]

A Deployment ensures a pod is always running on 1 or more nodes.

A Deployment provides upgrade / rollback facilities.

Container
Container
Container

Pod B

Container

Pod E

Kubernetes

Kubernetes

Kubernetes
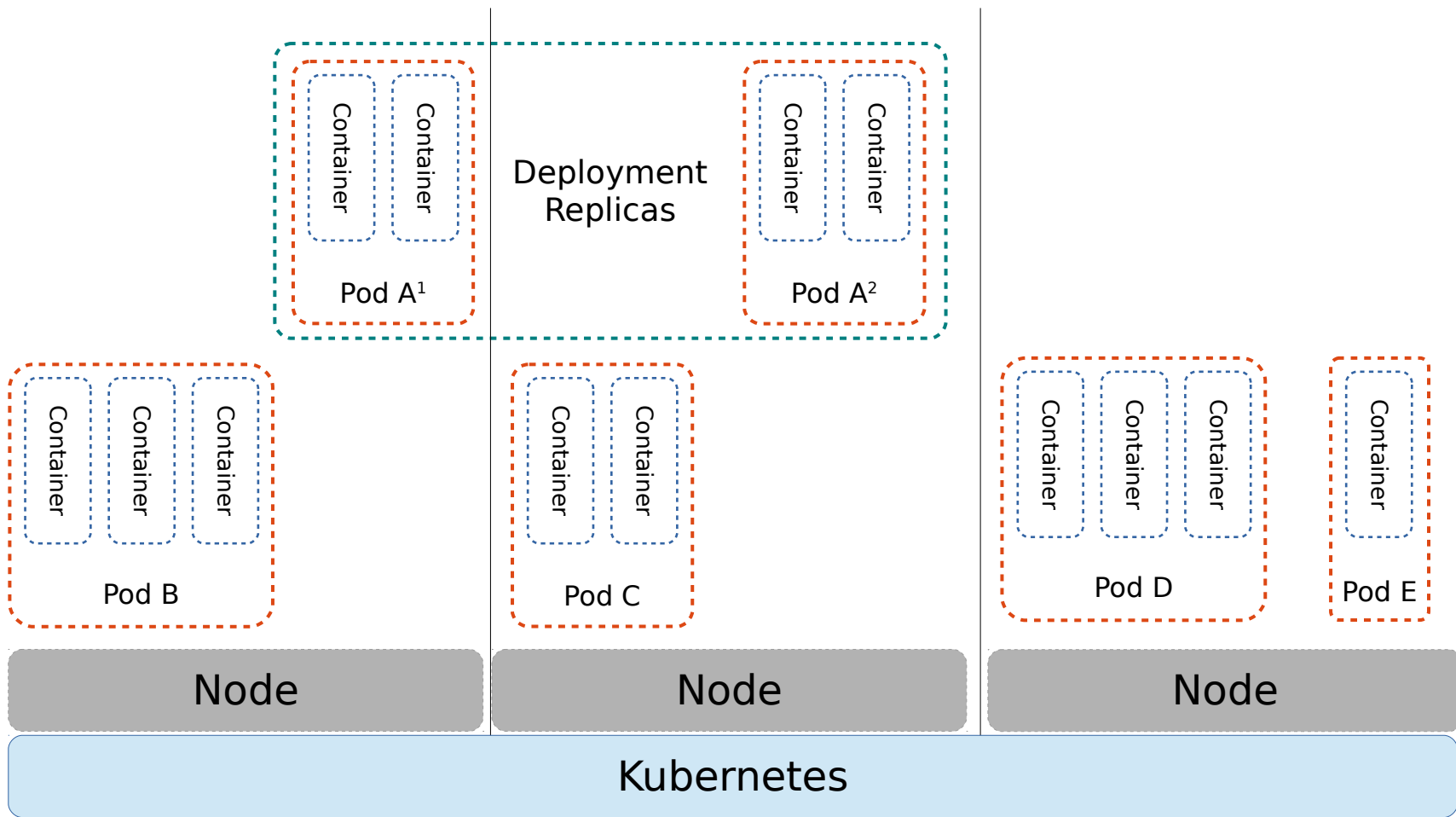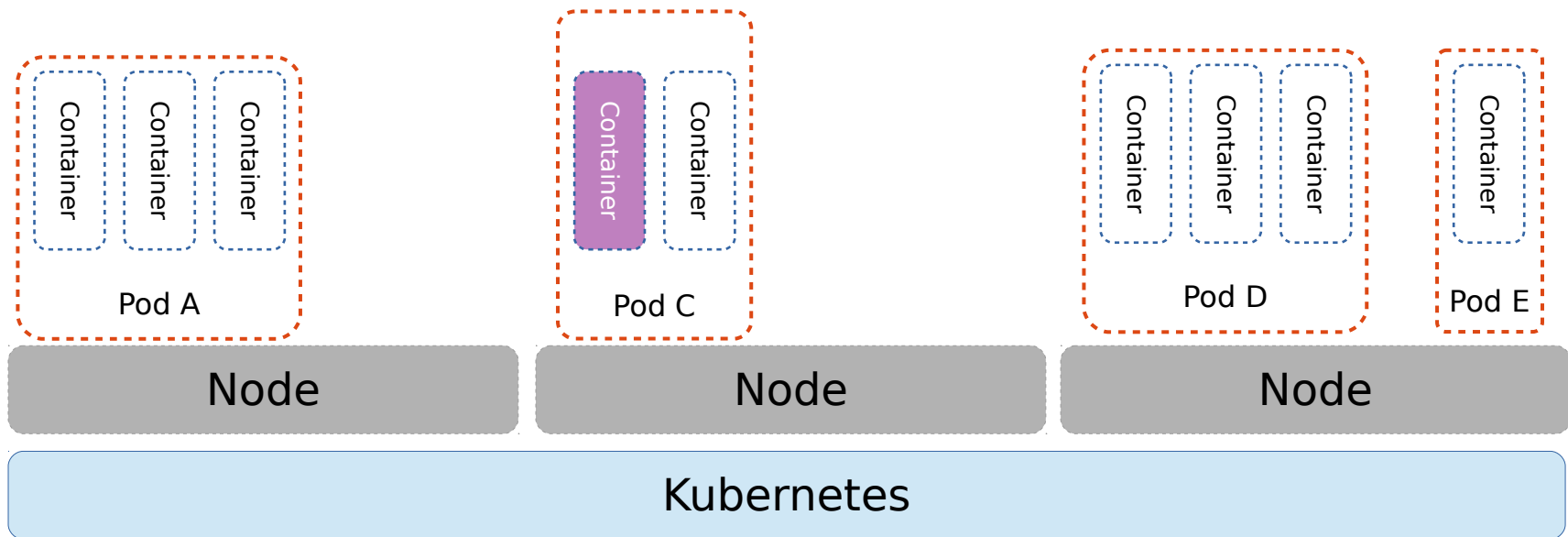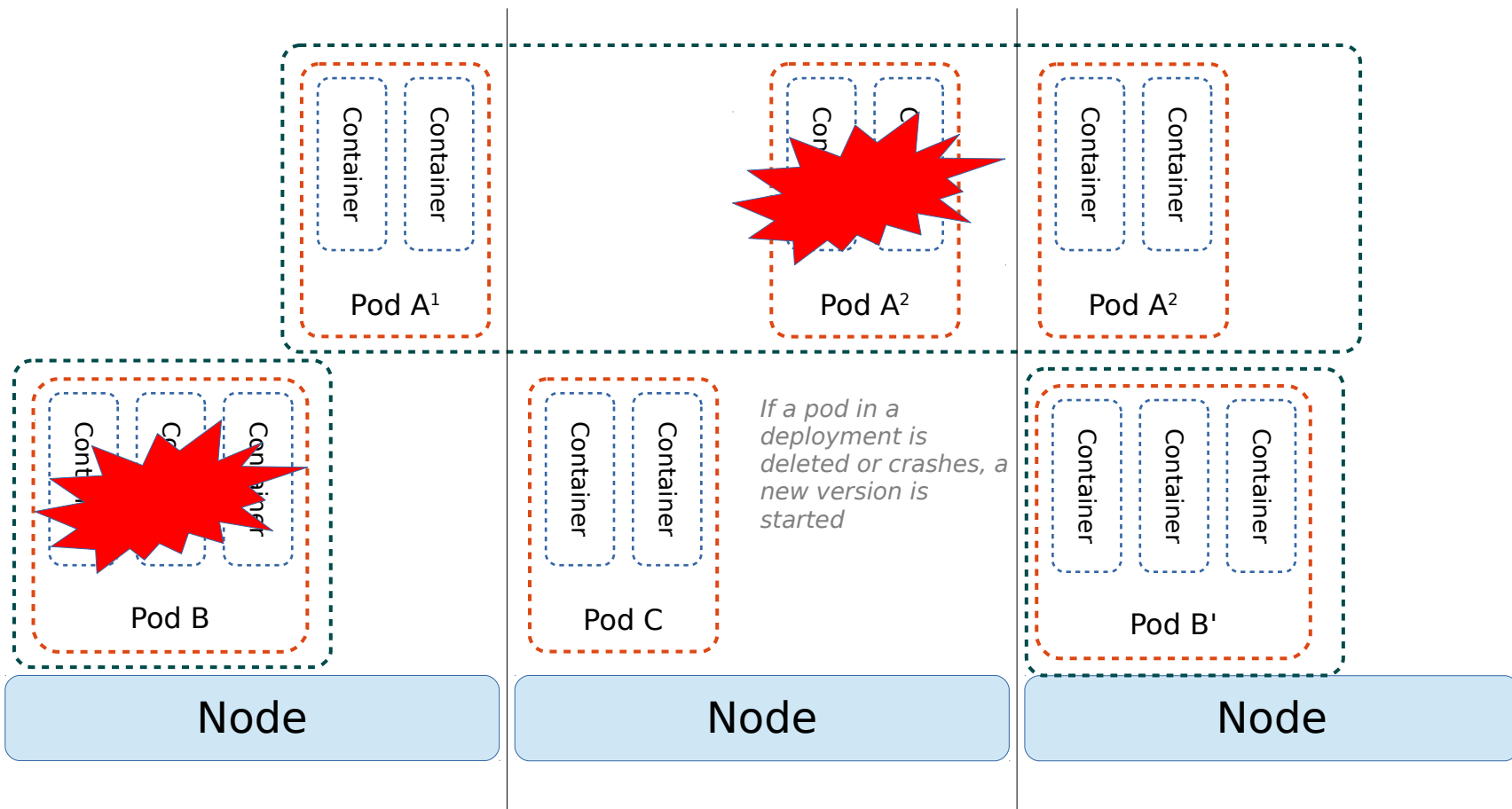
Nodes

Nodes Don't Matter

For developers Nodes are generally hidden. It doesn't matter which Node applications are on.*

*High Availability supported by affinity rules

Failure Recover

Container | Container

Pod A^1

Container | Container

Pod A^2

Container | Container

Pod A^2

Container | Container

Pod B

Container | Container

Pod C

Container | Container | Container

Pod B'

If a pod in a deployment is deleted or crashes, a new version is started

Node

Node

Node

Internal concepts of k8s

Service Discovery

Kube DNS

Service
name: foo-web

80

5000

5000

Container
Container
Container

Pod A

Container
Container

Pod C

Container
Container

Pod C'

Services create an internal DNS name and port mapping to allow other pods access

Applications would connect to http://foo-web

Pods must expose ports explicitly to the outside world

Inside a pod, containers can talk to each other via localhost ports

Selectors can match more than one pod

```
apiVersion: v1
kind: Service
metadata:
  name: foo-web
  labels:
    app: foo-web
spec:
  ports:
  - port: 80
    targetPort: 5000
    name: foo-web-port
    protocol: TCP
  selector:
    app: deploy-c
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deploy-c
  labels:
    app: deploy-c
spec:
  ...
```
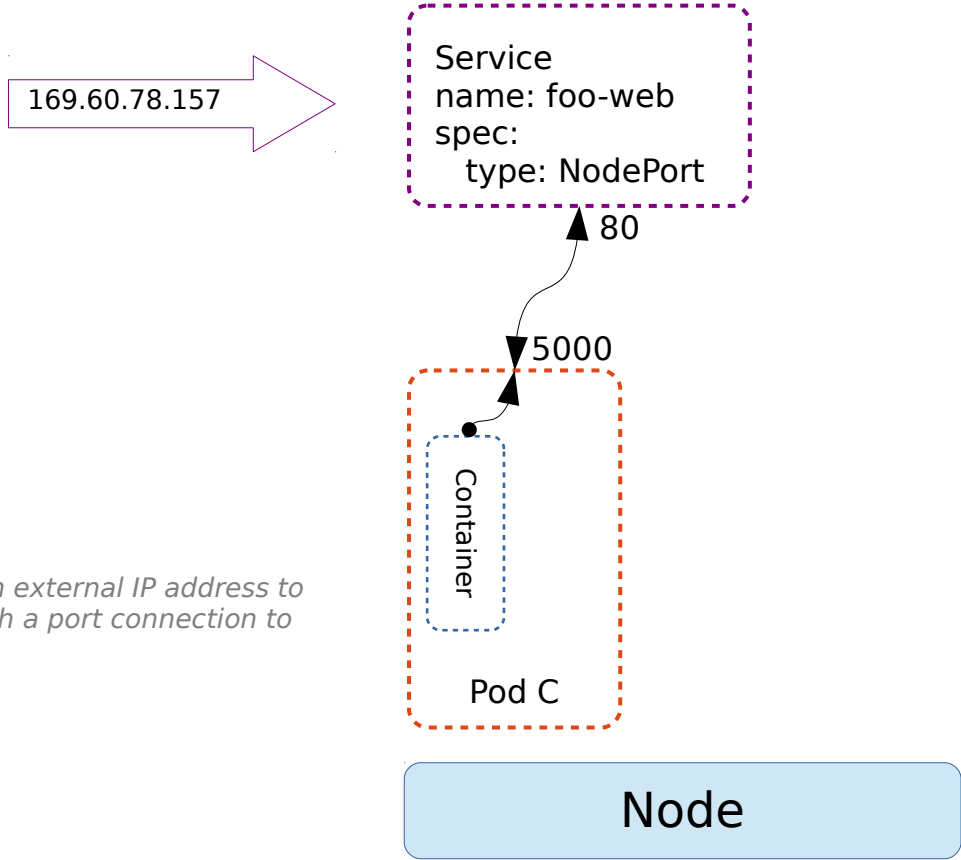
Name Spaces

Visibility of all resources is namespace scoped. Namespaces also provide a primitive for security.

NodePort

169.60.78.157

Service
name: foo-web
spec:
    type: NodePort
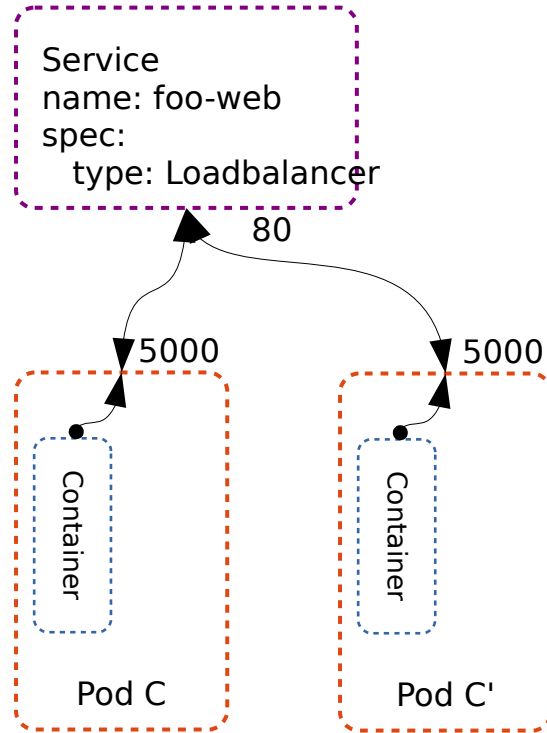
80

5000

Container

Pod C
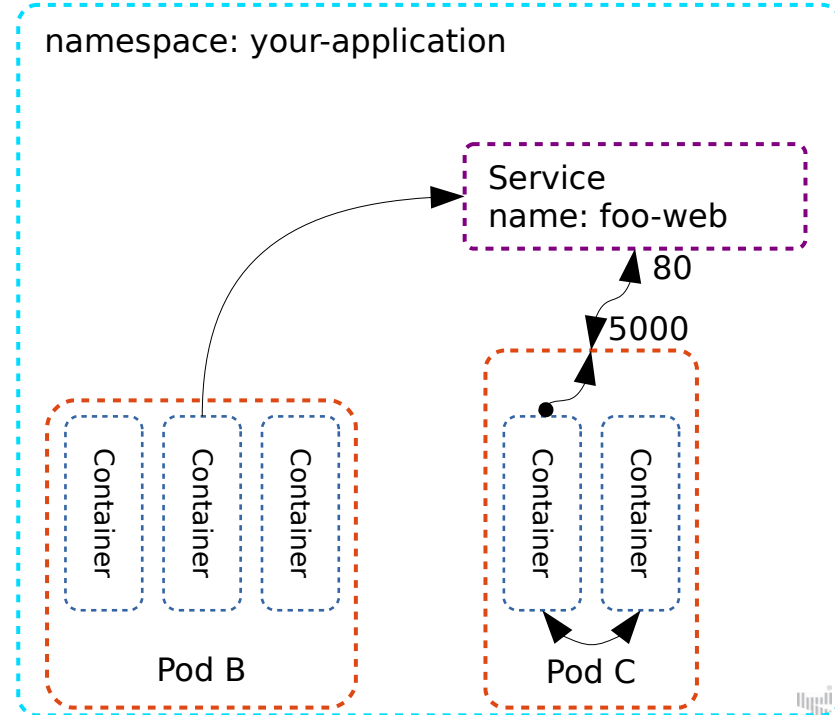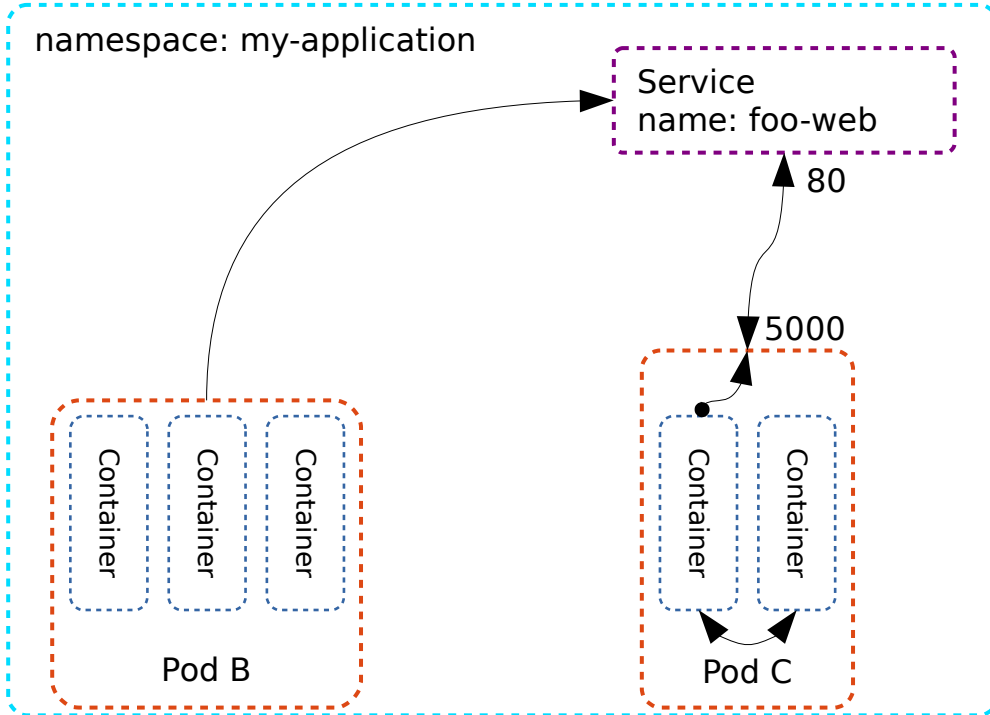
Node

NodePort binds an external IP address to a single Node, with a port connection to the Pod.

Load Balancer

169.60.78.157 →

Service
name: foo-web
spec:
    type: Loadbalancer

80

5000

5000

Container

Container

Pod C

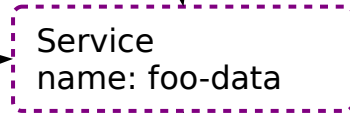Pod C'

Loadbalancers bind an external IP address to a service.

Ingress
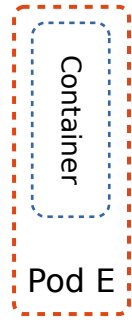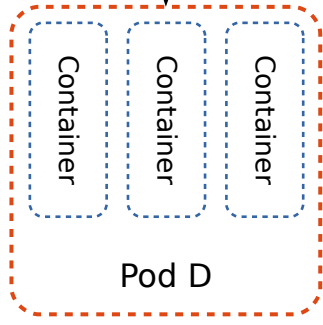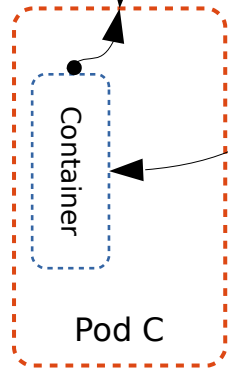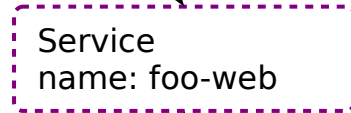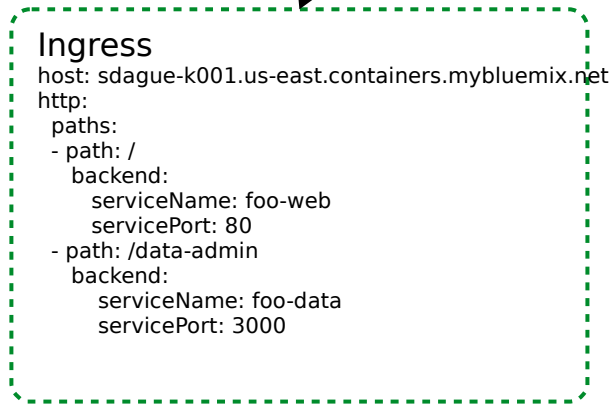
Ingress
host: sdague-k001.us-east.containers.mybluemix.net
http:
 paths:
 - path: /
    backend:
       serviceName: foo-web
       servicePort: 80
 - path: /data-admin
    backend:
       serviceName: foo-data
       servicePort: 3000

Service
name: foo-web

80

5000

Service
name: foo-data

Ingress controllers provide open internet access to http(s) services based on path. Multiple services may be accessed based on path matching from a single ingress controller.

Container

Pod C

Container

Container

Container

Pod D

Container

Pod E

Ingress

Ingress
host: sdague-k001.us-east.containers.mybluemix.net
http:
 paths:
 - path: /
   backend:
      serviceName: foo-web
      servicePort: 80
 - path: /data-admin
   backend:
      serviceName: foo-data
      servicePort: 3000

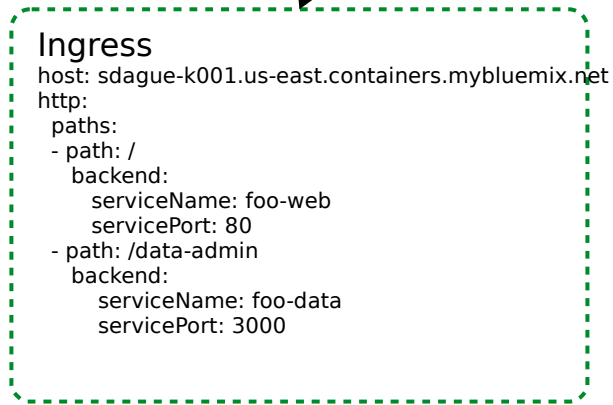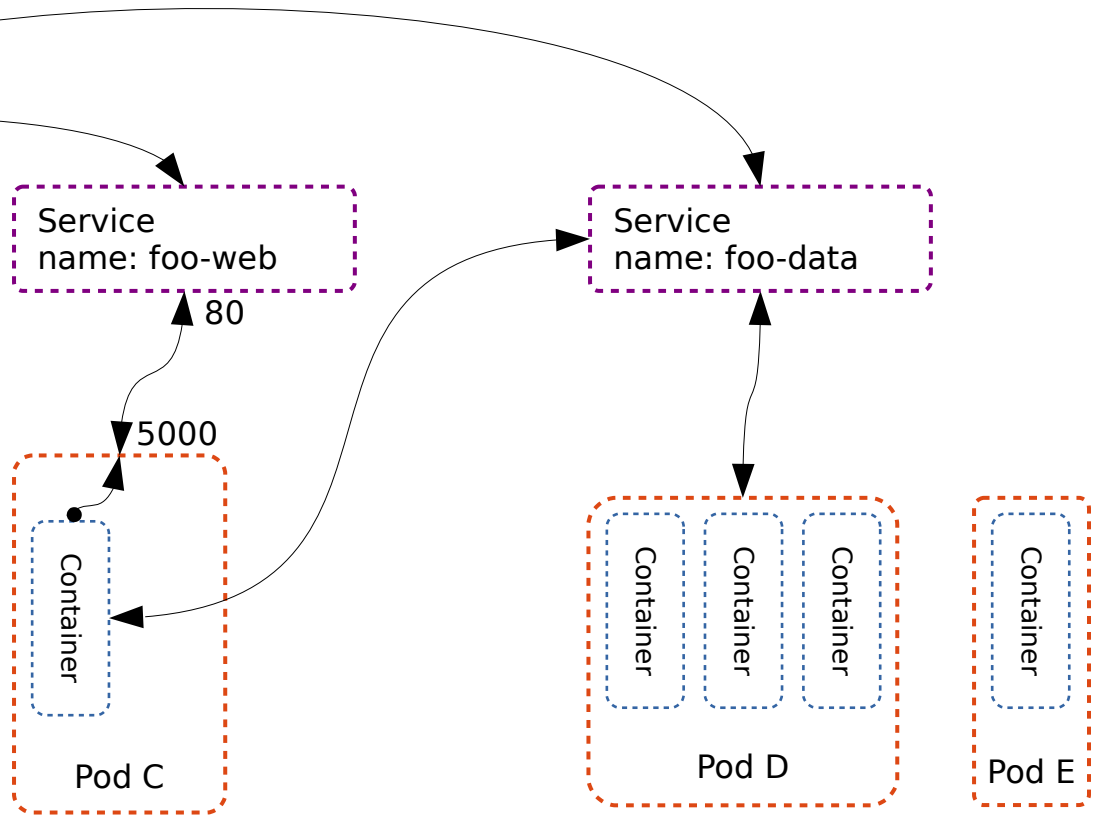*Ingress controllers provide open internet access to http(s) services based on path. Multiple services may be accessed based on path matching from a single ingress controller.*
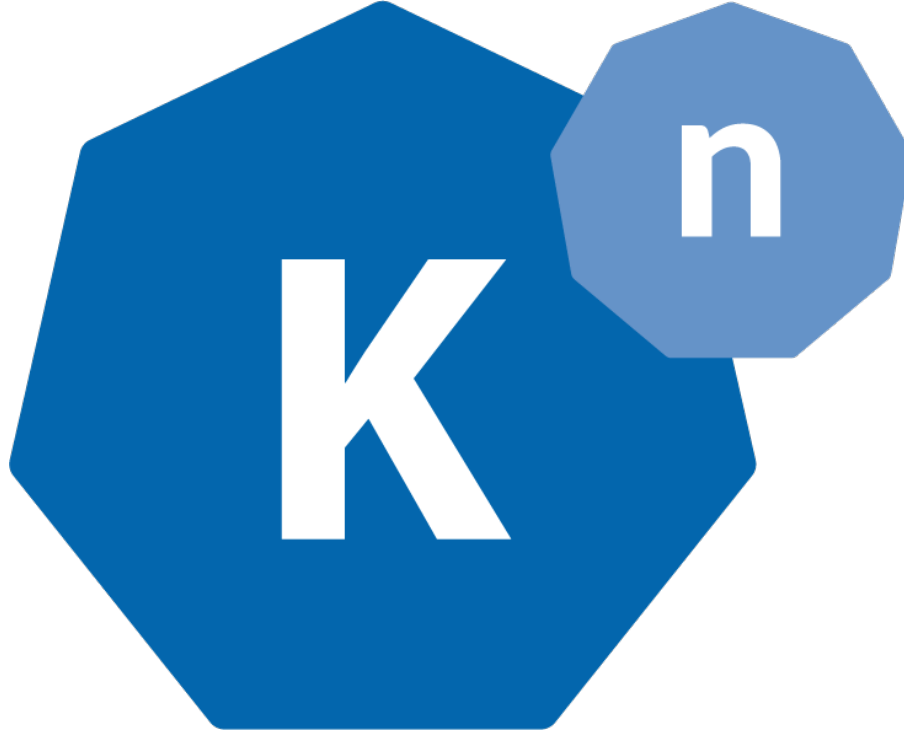
Service
name: foo-web

80

5000

Service
name: foo-data

Container

Pod C

Container
Container
Container

Pod D

Container

Pod E

Ecosystem

Helm

Istio

Knative

I think it should be called Kserverless...

Take a picture of this slide…

- I hear that the IBM cloud, is great for this ;)
    - https://cloud.ibm.com
    - I can get you a promo code to have a real cluster online

- We have workshops that we can run or send you the link

- There's also ways to run Kubernetes on your laptop/desktop
    - Minikube, microk8s, kubeadm-dind-cluster

- Kubernetes is ready for prime time, but you need to do your homework

- Kubernetes is a defacto standardized control plane now
    - You can run anything on it that you can run in a container, let that sink in for a second

- Reach out, no joke, my job is to make your life better to learn this technology
    - awesome@ibm.com or @jjasghar