EKS

Kubernetes on AWS


kops

"Make this easier for me"

"Native AWS Integrations."

"An Open Source Kubernetes Experience."

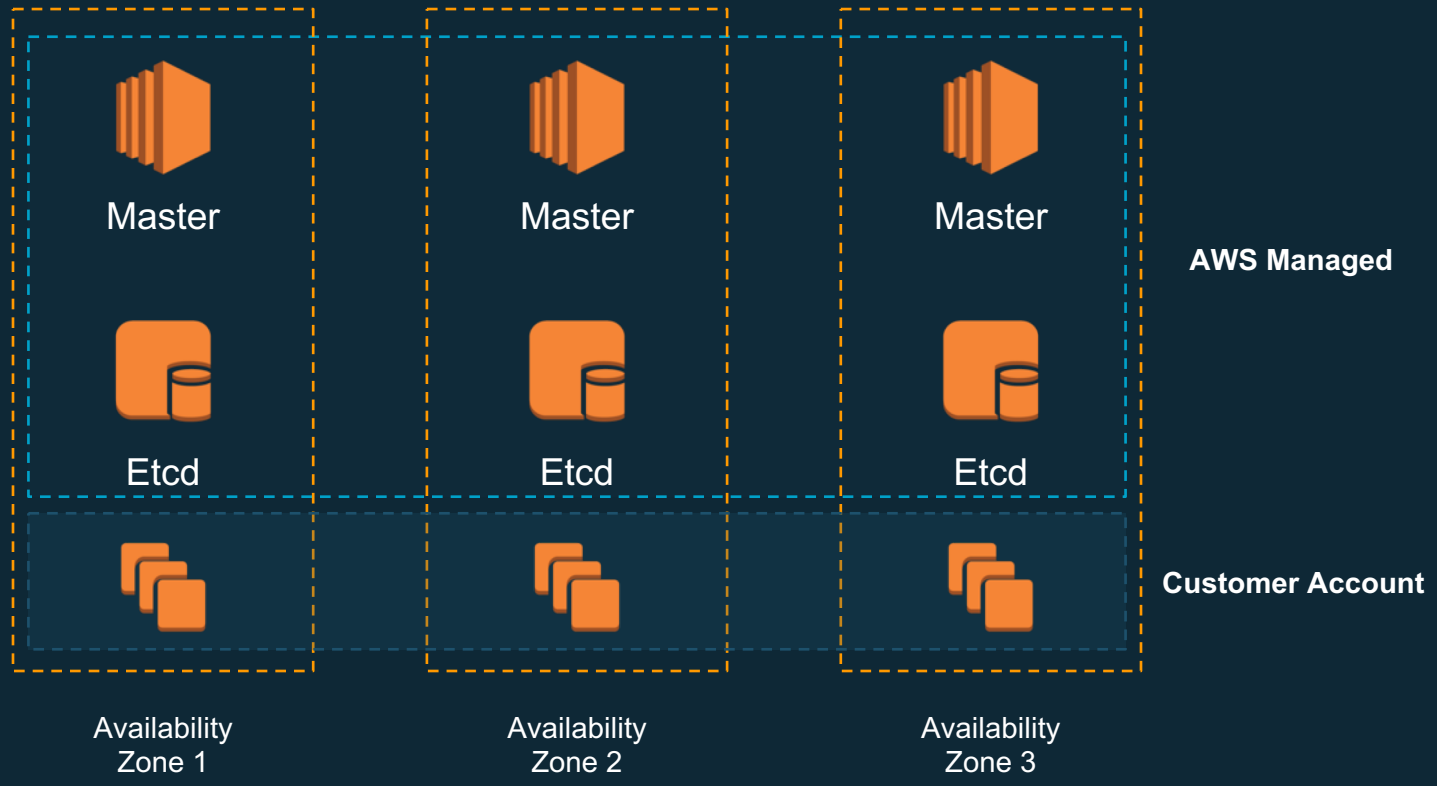
Amazon EKS

ELASTIC CONTAINER SERVICE FOR KUBERNETES

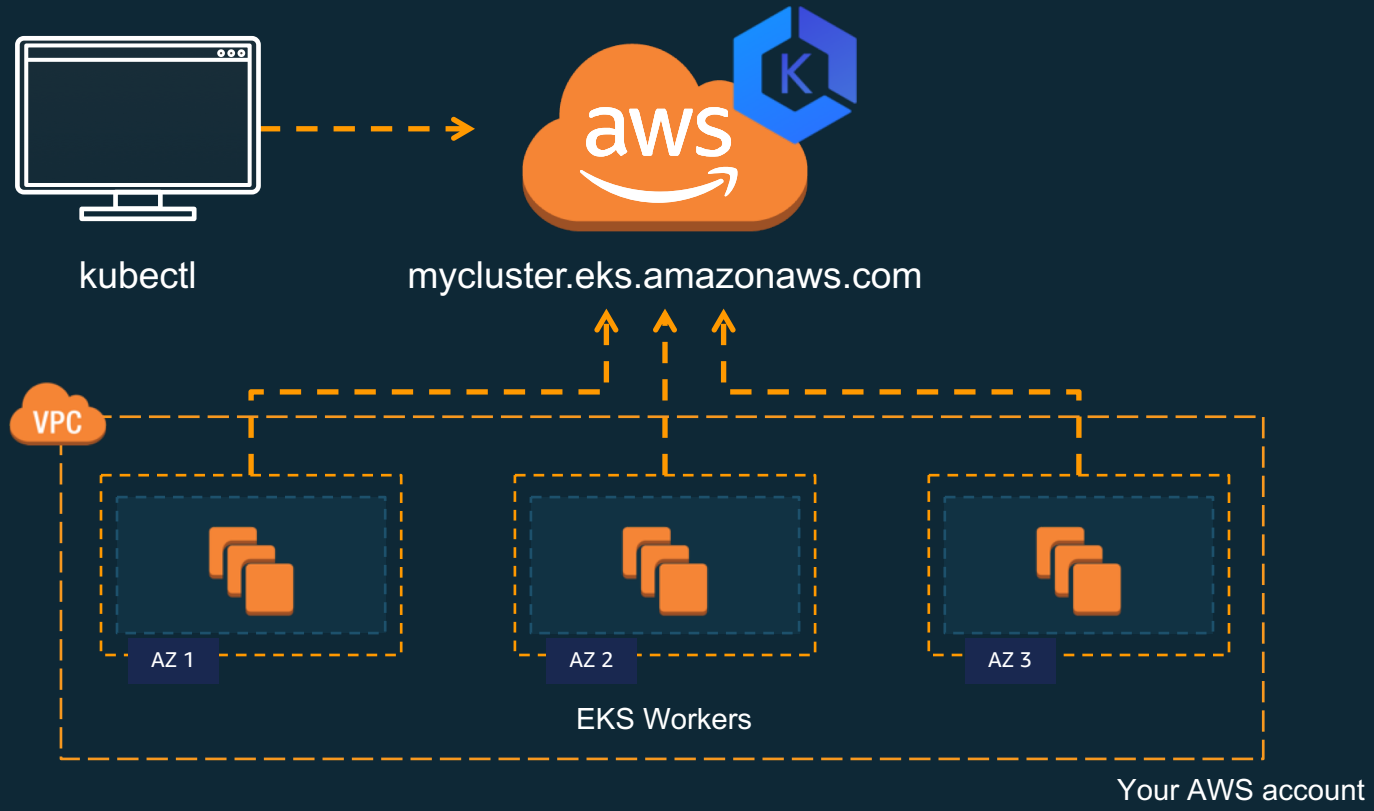
(EKS)

EKS is Kubernetes Certified

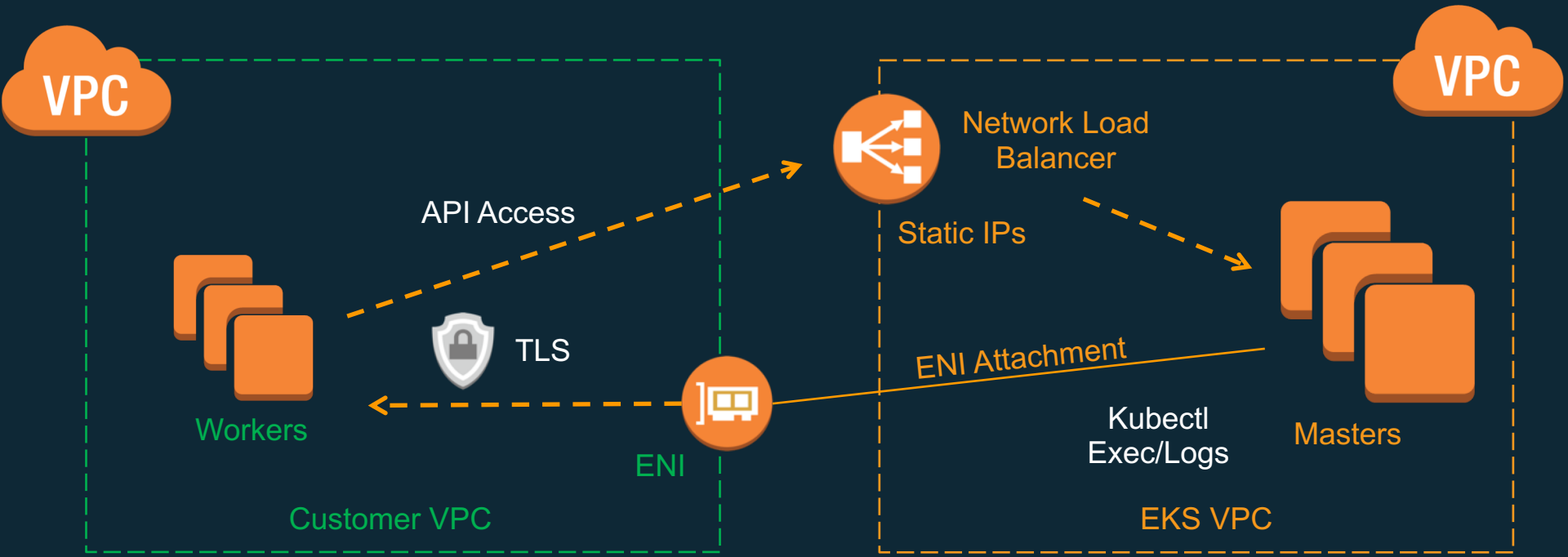
Architecture


Master
Master
Master
Etcd
Etcd
Etcd
AWS Managed
Customer Account
Availability Zone 1
Availability Zone 2
Availability Zone 3

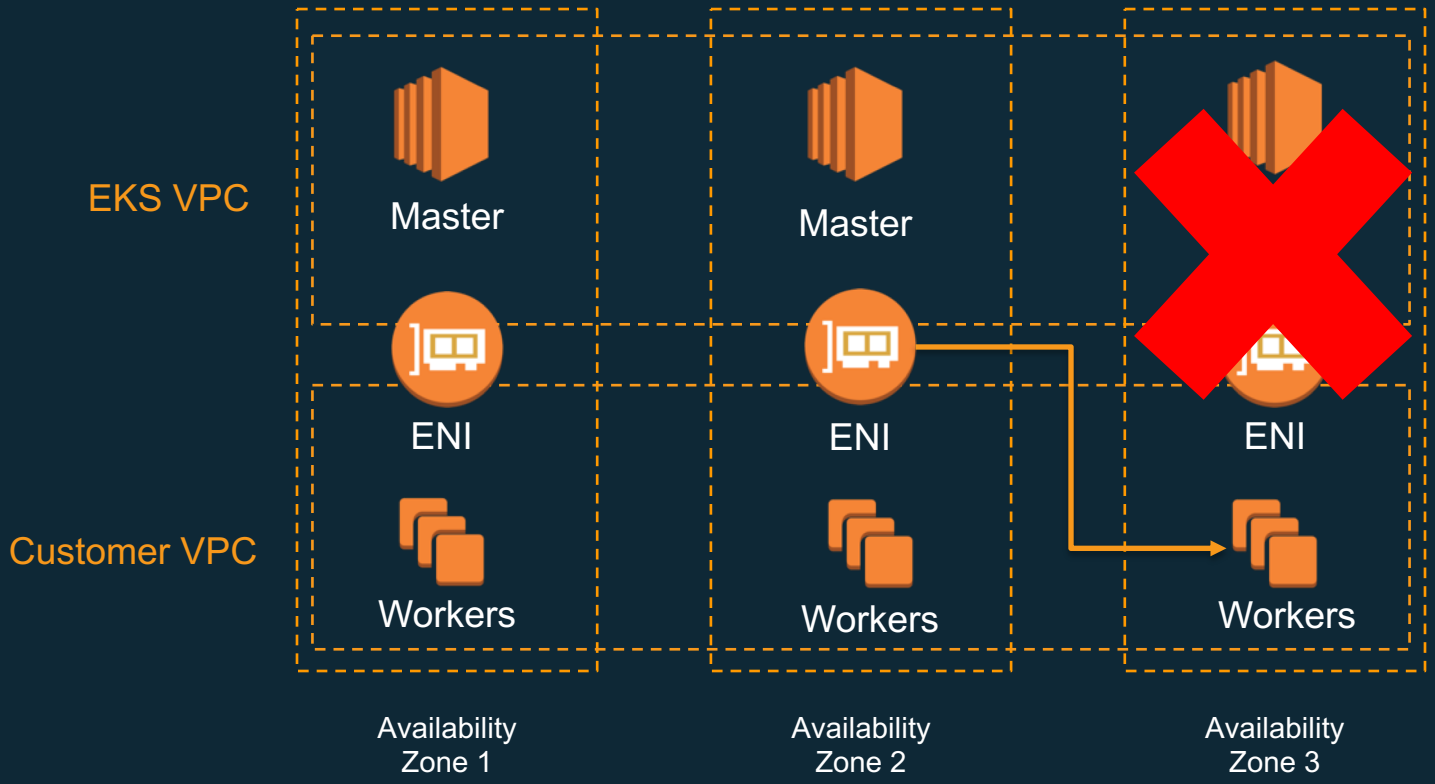
Amazon EKS


kubectl
mycluster.eks.amazonaws.com
VPC
AZ 1
AZ 2
AZ 3
EKS Workers
Your AWS account

Cross-account Kubernetes



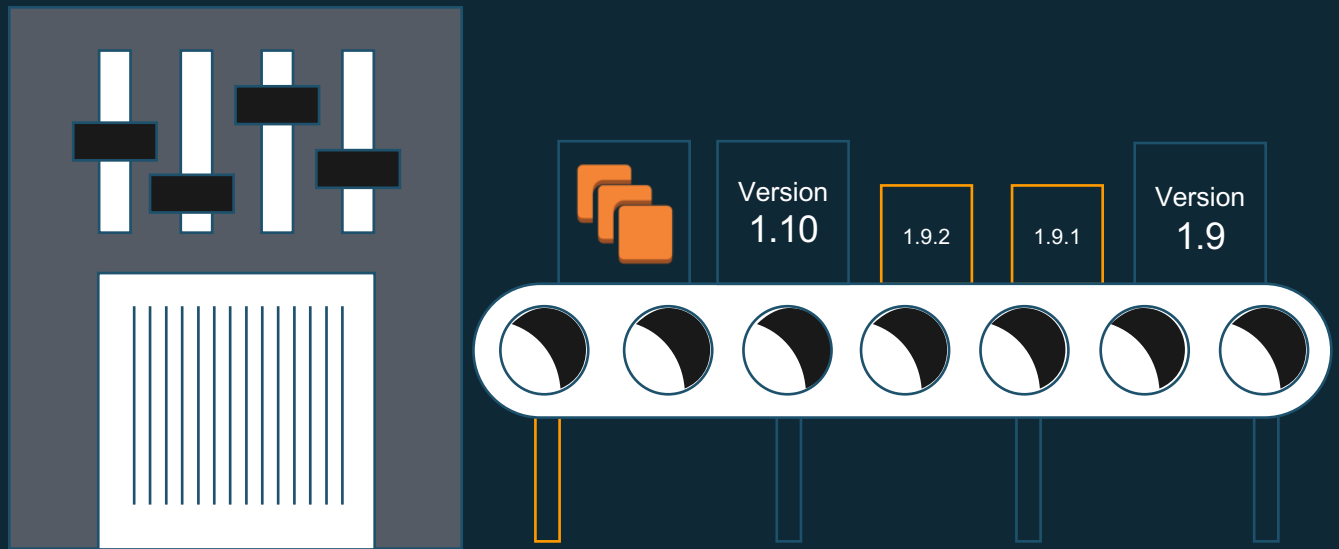
EKS Cross-Account Networking: Availability Zones



Versions and Upgrades

Semantic Versioning (semver)

Kubernetes Upgrades



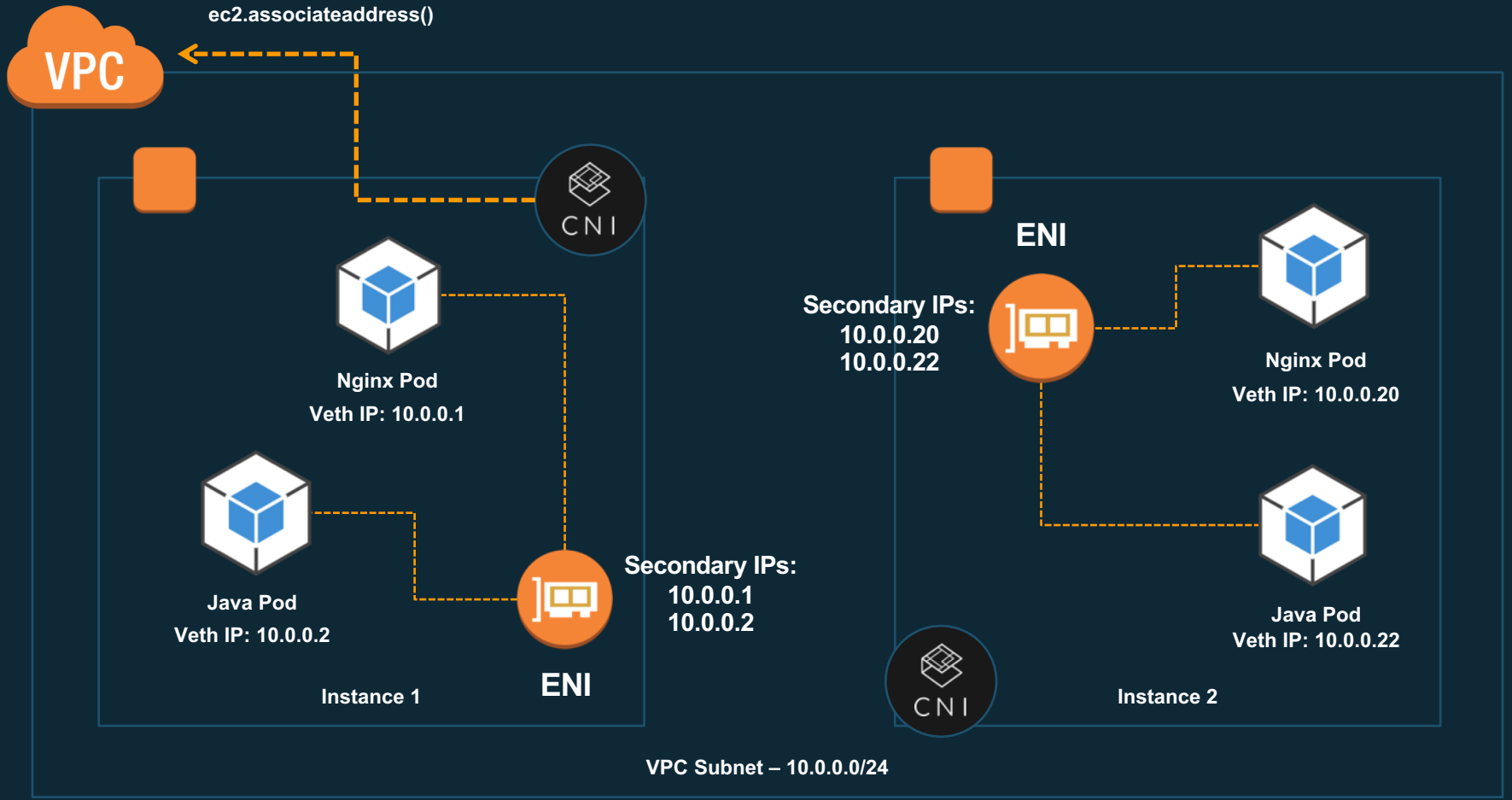
EKS Networking

Native VPC networking with CNI plugin

Pods have the same VPC address inside the pod as on the VPC

Simple, secure networking

Open source and on Github


ec2.associateaddress()
VPC
CNI
Nginx Pod
Veth IP: 10.0.0.1
Java Pod
Veth IP: 10.0.0.2
Secondary IPs:
10.0.0.1
10.0.0.2
ENI
Instance 1
ENI
Secondary IPs:
10.0.0.20
10.0.0.22
Nginx Pod
Veth IP: 10.0.0.20
Java Pod
Veth IP: 10.0.0.22
CNI
Instance 2
VPC Subnet – 10.0.0.0/24

How do I provision EKS nodes?

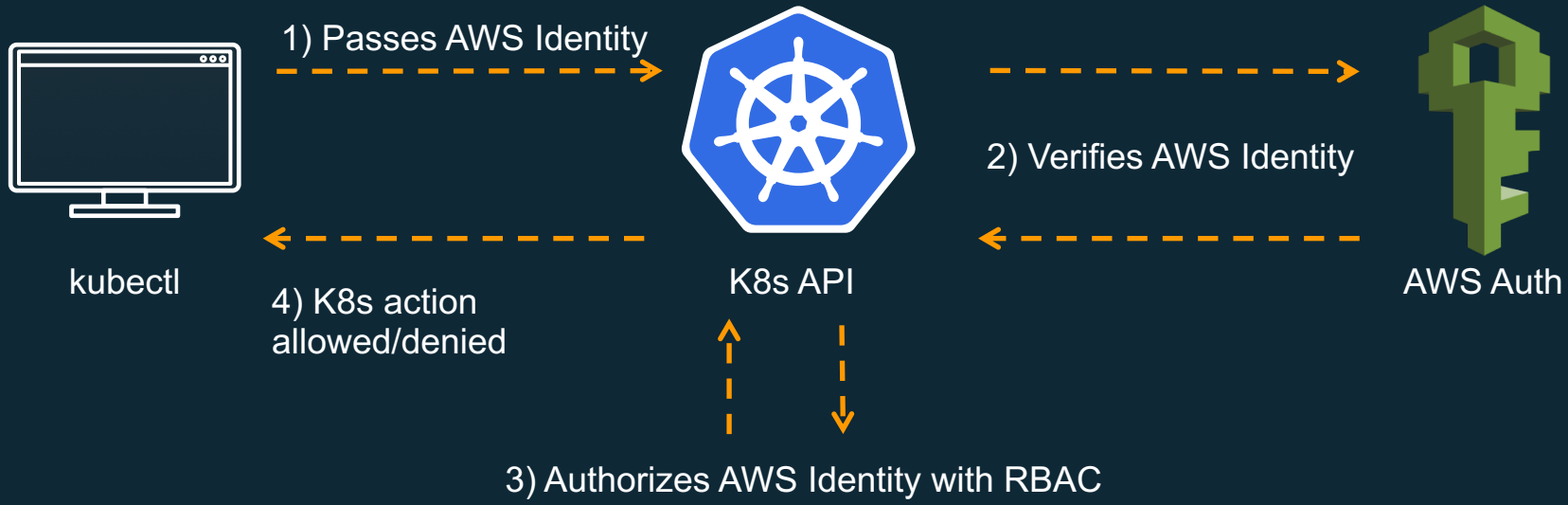
Integrations

Identity and Access Management (IAM)

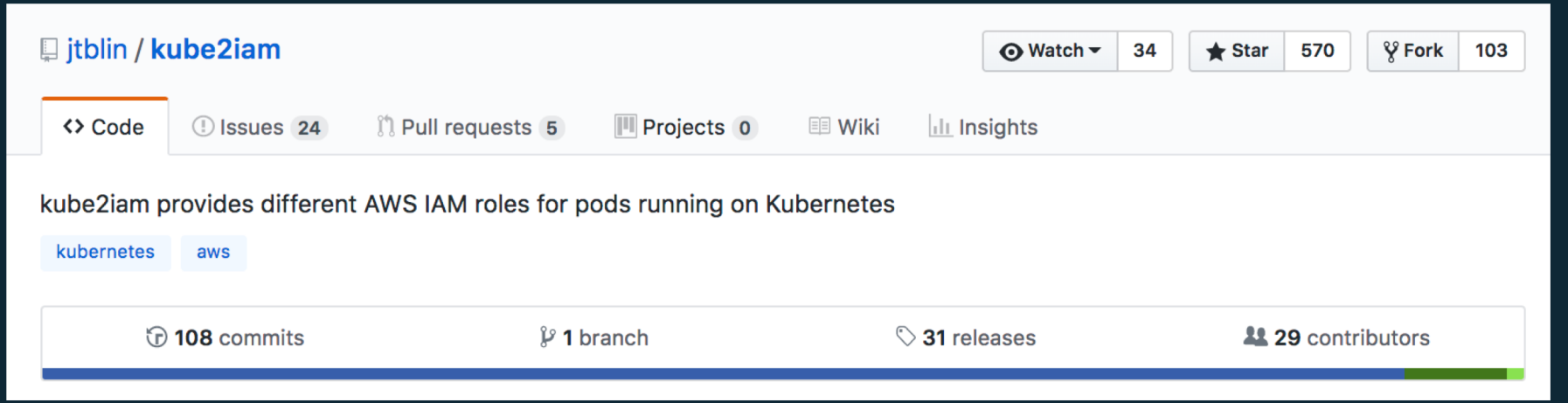
I want to use AWS accounts to operate Kubernetes

An open source approach to integrating
AWS IAM authentication with Kubernetes

IAM Authentication with kubectl



I want to give a pod permissions to an AWS service



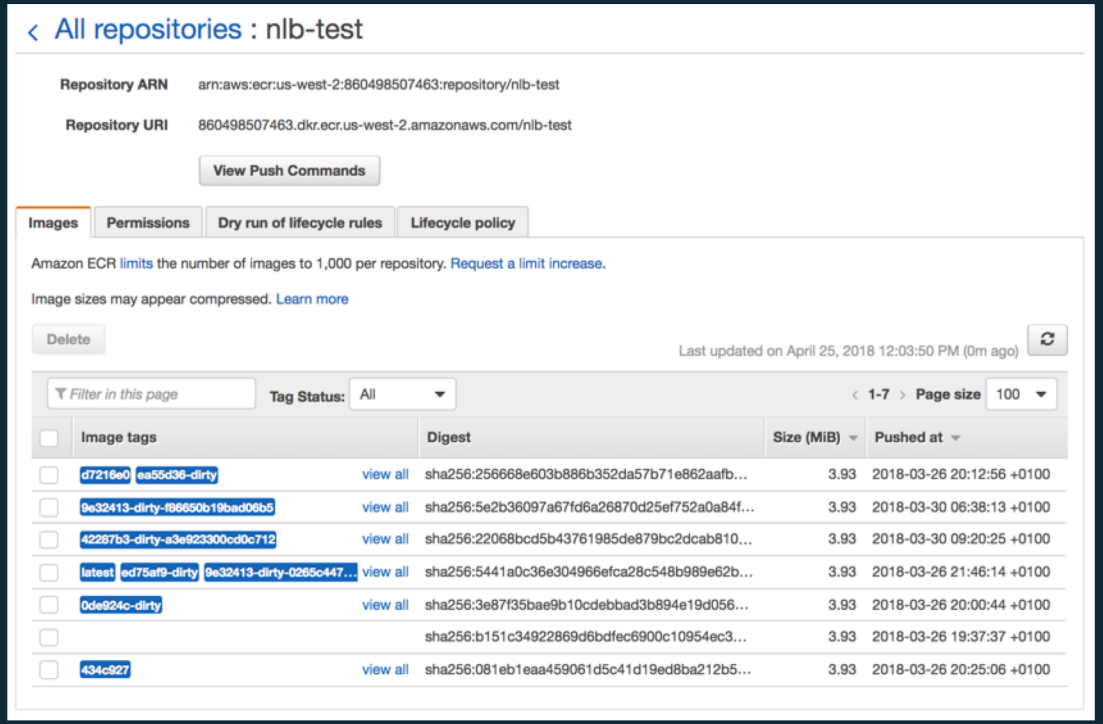
- Runs as a DaemonSet on your workers
- Creates iptables rules to redirect metadata service to kube2iam
- Add annotations to your pods to grant them AWS IAM Roles

kube2iam example

```yaml
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  replicas: 3
  template:
    metadata:
      annotations:
        iam.amazonaws.com/role: arn:aws:iam:123567989012/role/nginx-role
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx:1.9.1
        ports:
        - containerPort: 80
```

Container Registry: Amazon ECR

Amazon ECR



- Simple to create
- High Availibility by default
- IAM permissions
- Lifecycle rules
- Encrypted at rest
- Billed on storage

Load Balancers

Services: LoadBalancer

```
$ kubectl run nginx --image=nginx --replicas 3 --port=80
$ kubectl expose deployment nginx --type=LoadBalancer
$ kubectl get services -o=wide
```

```
NAME      TYPE           CLUSTER-IP      EXTERNAL-IP                                                              PORT(S)
nginx     LoadBalancer   100.70.217.164  a5cefe533ac1d11e7a38f0a67818e472-1987464052.eu-west-1.elb.amazonaws.com   80:31108/TCP
```

DNS name	Availability Zones	Type	Port Configuration
a5cefe533ac1d11e7a38f0a67818e472-1987464052.eu-west-1.elb.amazonaws.com	eu-west-1b, eu-west-1c, eu-west-1a	classic	80 (TCP) forwarding to 31108 (TCP)

Instance ID	Name	Availability Zone	Status	Actions
i-0478980a1a86faa09	micro.k8s.demothe.cloud	eu-west-1b	InService	Remove from Load Balancer
i-0885393f80f3db7de	micro.k8s.demothe.cloud	eu-west-1a	InService	Remove from Load Balancer
i-0d701a00358fb084f	micro.k8s.demothe.cloud	eu-west-1c	InService	Remove from Load Balancer
i-0a3b00eeabdf3b0ce	micro.k8s.demothe.cloud	eu-west-1c	InService	Remove from Load Balancer
i-08617f4b745d3bb74	micro.k8s.demothe.cloud	eu-west-1b	InService	Remove from Load Balancer
i-077d170e688971c98	micro.k8s.demothe.cloud	eu-west-1a	InService	Remove from Load Balancer

Configure your load balancers via annotations

```
service.beta.kubernetes.io/ aws-load-balancer-type
service.beta.kubernetes.io/ aws-load-balancer-internal
service.beta.kubernetes.io/ aws-load-balancer-proxy-protocol
service.beta.kubernetes.io/ aws-load-balancer-access-log-emit-interval
service.beta.kubernetes.io/ aws-load-balancer-access-log-enabled
service.beta.kubernetes.io/ aws-load-balancer-access-log-s3-bucket-name
service.beta.kubernetes.io/ aws-load-balancer-access-log-s3-bucket-prefix
service.beta.kubernetes.io/ aws-load-balancer-connection-draining-enabled
service.beta.kubernetes.io/ aws-load-balancer-connection-draining-timeout
service.beta.kubernetes.io/ aws-load-balancer-connection-idle-timeout
service.beta.kubernetes.io/ aws-load-balancer-cross-zone-load-balancing-enabled
service.beta.kubernetes.io/ aws-load-balancer-extra-security-groups
service.beta.kubernetes.io/ aws-load-balancer-ssl-cert
service.beta.kubernetes.io/ aws-load-balancer-ssl-ports
service.beta.kubernetes.io/ aws-load-balancer-ssl-negotiation-policy
service.beta.kubernetes.io/ aws-load-balancer-backend-protocol
service.beta.kubernetes.io/ aws-load-balancer-additional-resource-tags
service.beta.kubernetes.io/ aws-load-balancer-healthcheck-healthy-threshold
service.beta.kubernetes.io/ aws-load-balancer-healthcheck-unhealthy-threshold
service.beta.kubernetes.io/ aws-load-balancer-healthcheck-timeout
service.beta.kubernetes.io/ aws-load-balancer-healthcheck-interval
```

- Draining
- Logging
- SSL Certs
- Tagging
- Security groups
- Health checks

Network Load Balancer (layer 4)

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx
  namespace: default
  labels:
    app: nginx
  annotations:
    service.beta.kubernetes.io/aws-load-balancer-type: "nlb"
    service.beta.kubernetes.io/aws-load-balancer-additional-resource-tags: 'Name=nginx'
spec:
  type: LoadBalancer
  externalTrafficPolicy: Local
  ports:
  - name: http
    port: 80
    protocol: TCP
    targetPort: 80
  selector:
    app: nginx
```

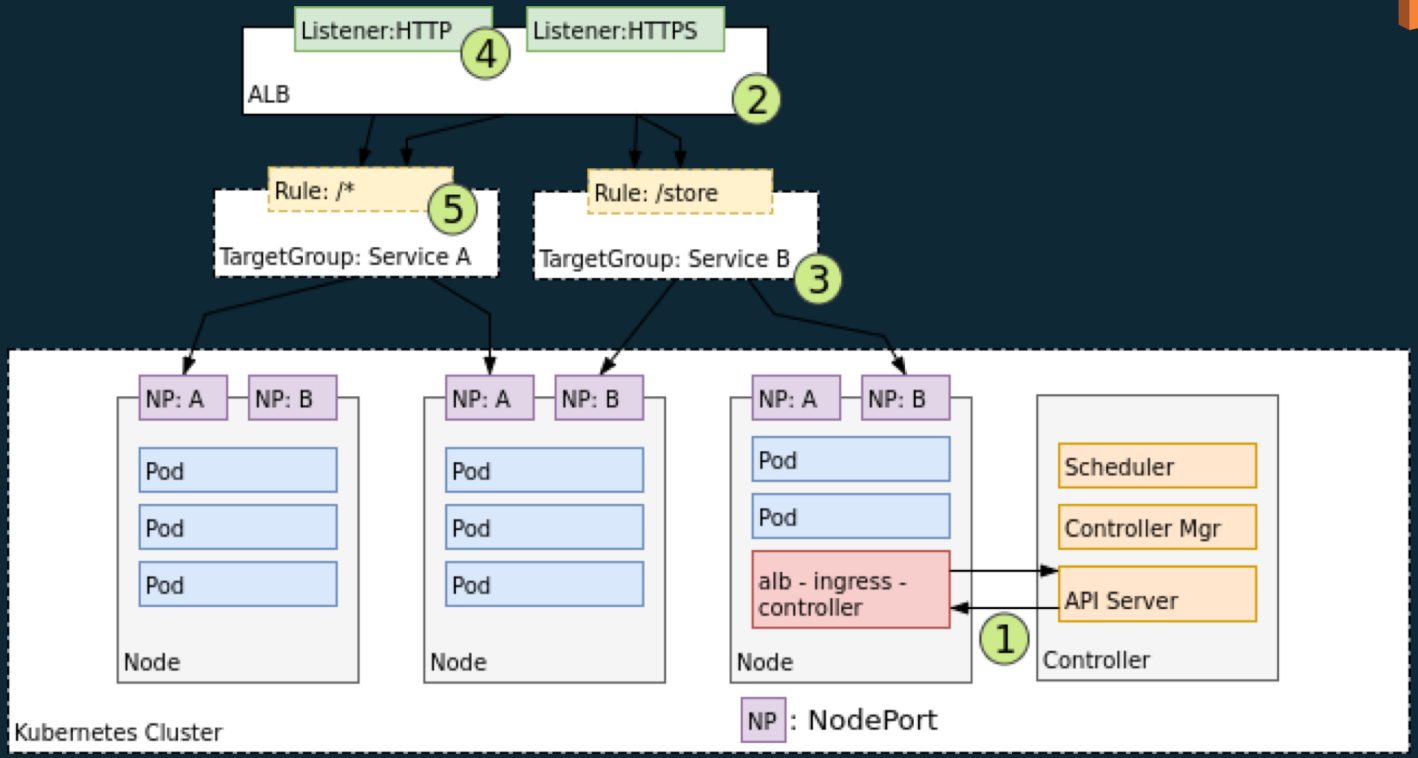
Application Load Balancer (layer 7)

CoreOS ALB Ingress Controller: Supported by AWS

Exposes ALB functionality to Kubernetes via Ingress Resources

Layer 7 load balancing, supports content-based routing by host or path

Load Balancing



DNS

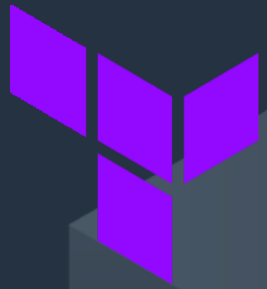
Automatic Route53 DNS creation for services

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx
  annotations:
    external-dns.alpha.kubernetes.io/hostname: nginx.demothe.cloud.
spec:
  type: LoadBalancer
  ports:
  - port: 80
    name: http
    targetPort: 80
  selector:
    app: nginx
```

…works with ingress too

```
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: nginx
  annotations:
    kubernetes.io/ingress.class: "nginx"
spec:
  rules:
  - host: nginx.demothe.cloud
    http:
      paths:
      - backend:
          serviceName: nginx
          servicePort: 80
```

Orchestration



Deploying AWS resources with K8s (operator)

https://github.com/linki/cloudformation-operator

```
apiVersion: cloudformation.linki.space/v1alpha1
kind: Stack
metadata:
  name: my-bucket
spec:
  template: |
    ---
    AWSTemplateFormatVersion: '2010-09-09'

    Resources:
      S3Bucket:
        Type::AWS::S3::Bucket
        Properties:
          BucketName: my-bucket
```

Deploy AWS resources right from your K8s YAML files.

User's don't need AWS permissions, the IAM Role for the host(s) running the operator do.

Demo

Cluster auto scaler

Recap

Recap

- EKS runs the control plane for you (just bring nodes)
- EKS is upstream open source Kubernetes
- All integrations are open source
- The master nodes are HA (across 3 AZ’s)

One more thing

Roadmap:
Can I use Fargate with EKS?

Thank you!