

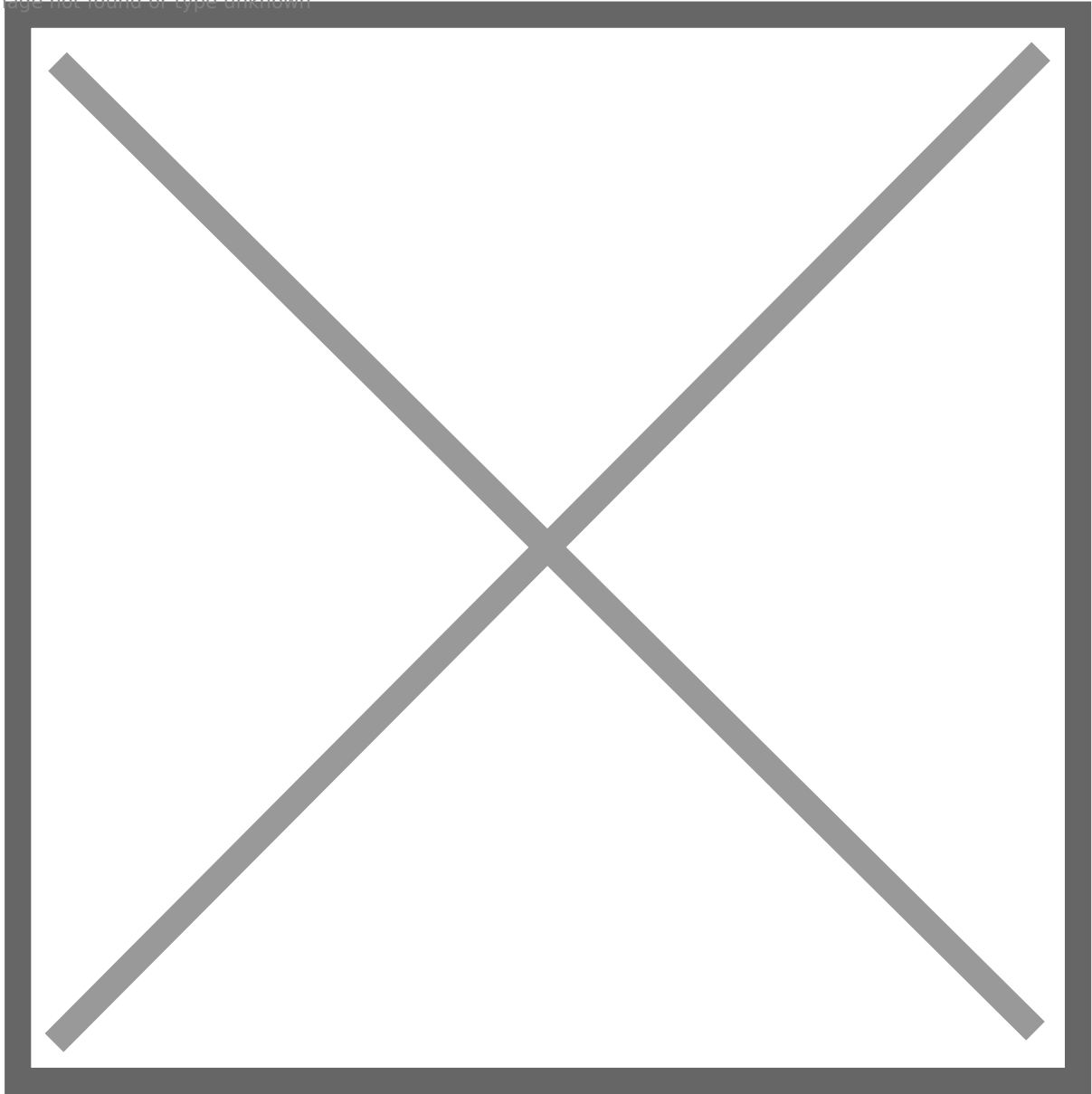
DevOps

- [AWS — Deploying React App With NGINX on EKS](#)

AWS — Deploying React App With NGINX on EKS

A step by step guide with an
example project

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AWS provides more than 100 services and it's very important to know which service you should select for your needs. Amazon Elastic Kubernetes Service (Amazon EKS) is a managed service that makes it easy for you to run Kubernetes on AWS without needing to stand up or maintain your own Kubernetes control plane. Kubernetes is an open-source system for automating the deployment, scaling, and management of containerized applications.

In this post, we are going to deploy the React application with an NGINX web server. First, we dockerize our app and push that image to Amazon ECR and run that app on Amazon EKS.

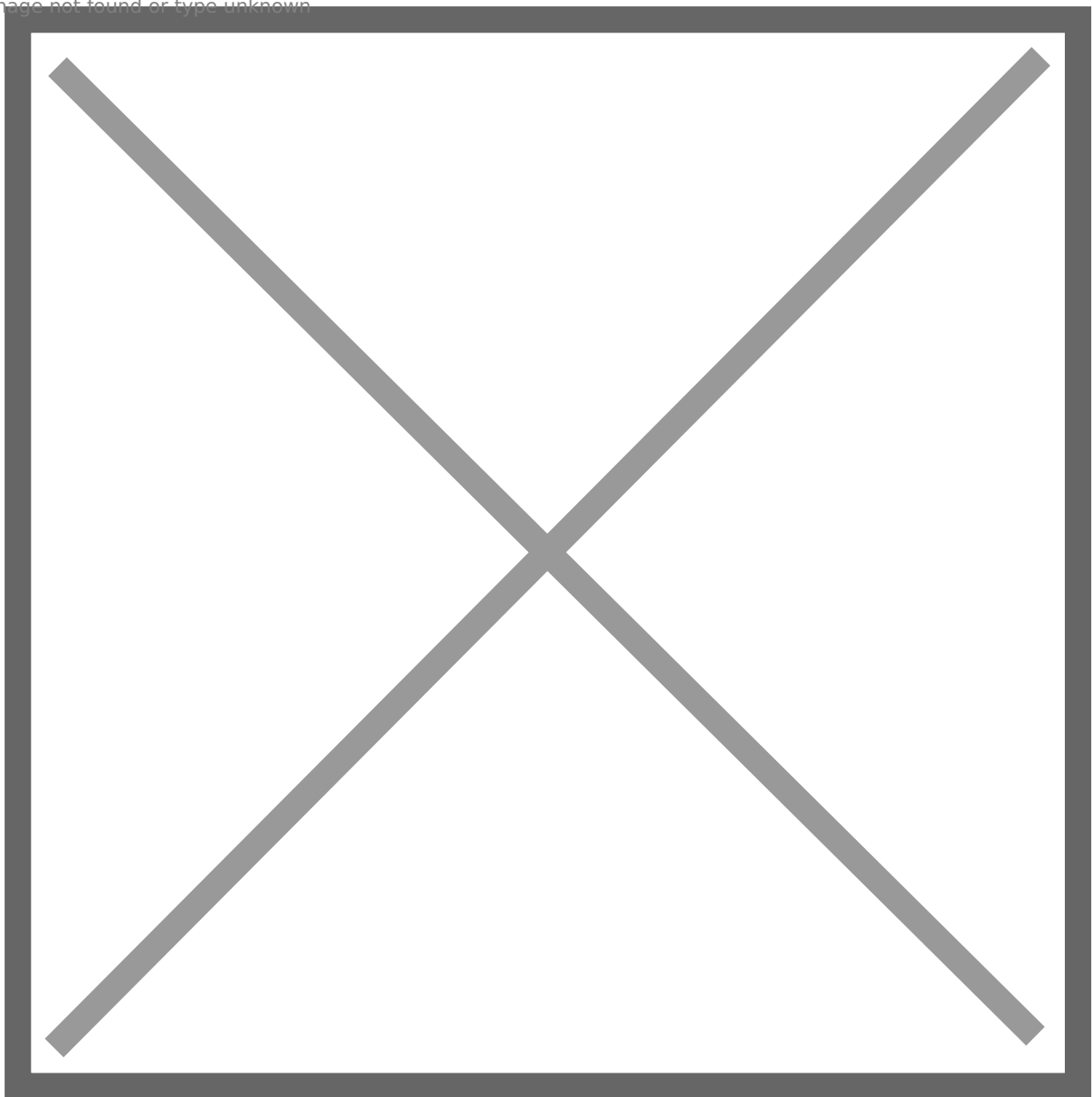
- ***Example Project***
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- ***Create a Cluster and Worker Nodes***
- ***Configure kubectl to use Cluster***

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Example Project

This is a simple project which demonstrates developing and running a React application with NGINX. We have a simple app in which we can add users, count, and display them at the side, and retrieve them whenever you want.

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Example Project

If you want to practice your own here is a Github link to this project. You can clone it and run it on your machine as well.

```
// clone the project
git clone https://github.com/bbachi/react-nginx-example.git
// install React dependencies and start
cd my-app
npm install
npm start
```

Prerequisites

- If you are new to React please go through the below link on how to develop and build the React project with the NGINX web server.

[How To Serve React Application With NGINX and Docker](#)

The other prerequisites to this post are Docker essentials and Kubernetes essentials. We are not going to discuss the basics such as what is a container or what is Kubernetes, rather, we will see how to build a Kubernetes cluster on AWS EKS. Below are the prerequisites you should know before going through this article

Docker Essentials

You need to understand Docker concepts such as creating images, container management, etc. Below are some of the links that you can understand about Docker if you are new.

- [Docker Docs](#)
- [Docker — A Beginner's guide to Dockerfile with a sample project](#)
- [Docker — Image creation and Management](#)
- [Docker — Container Management With Examples](#)

- [Understanding Docker Volumes with an example](#)

Kubernetes Essentials

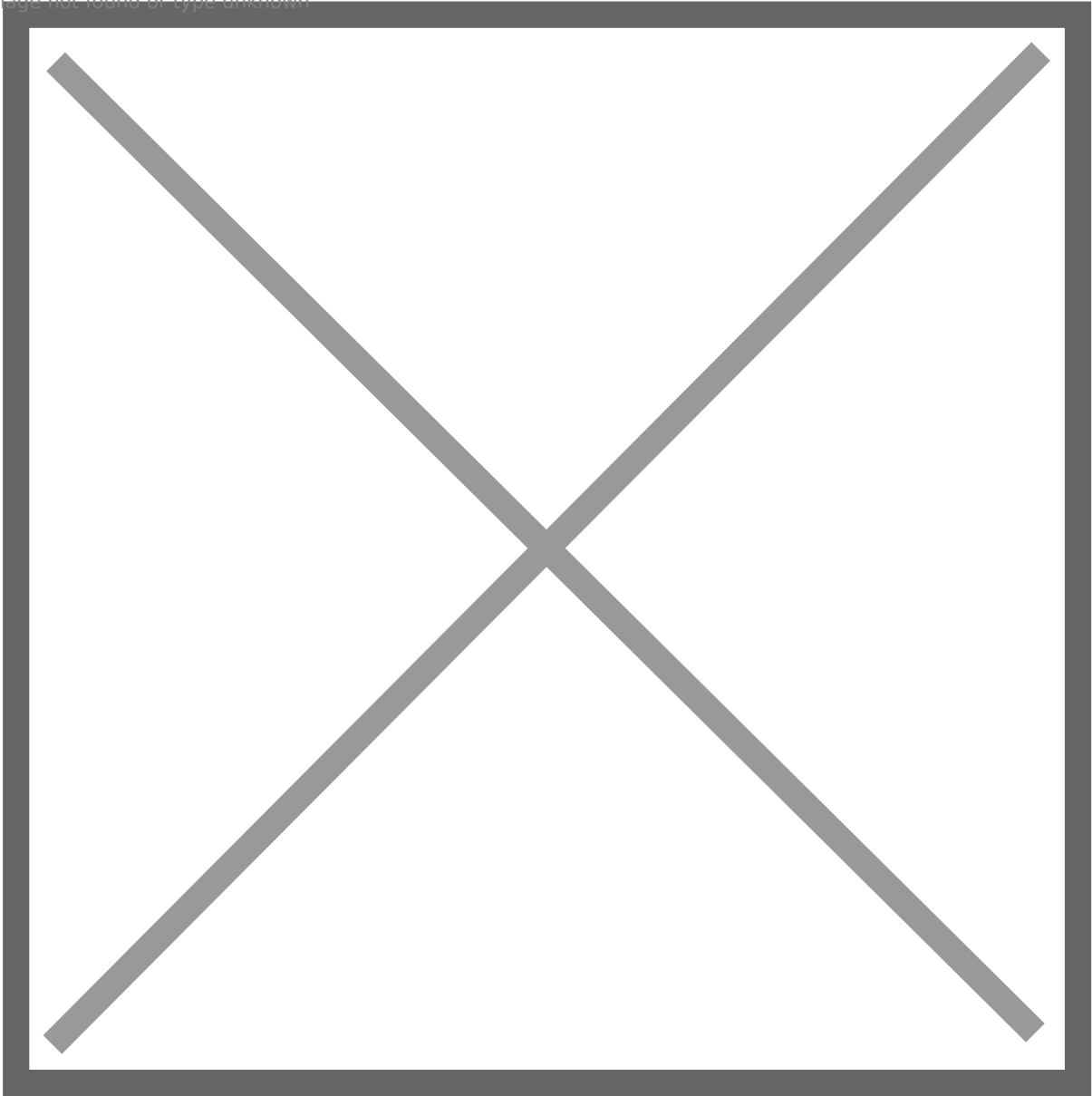
You need to understand Kubernetes' essentials as well along with Docker essentials. Here are some of the docs to help you understand the concepts of Kubernetes.

- [Kubernetes Docs](#)
- [How to Get Started with Kubernetes](#)
- [Some Example Projects](#)

AWS account

- AWS account setup: AWS offers a free tier for one year [here is the link to set it up](#).
- Once you set it up you have a root account. It's not a best practice to use your root account to do any tasks instead you should create an IAM group that has permissions for administrator access and add a user to it and log in with that user.
- [Install AWS CLI](#)
- Configure AWS CLI for the user you just created above. You should use this command `aws` `configure` and it will ask for access key id and secret key.

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log in with user credentials

- You have to install Docker for Desktop (whatever your OS is). [Please follow this link](#) to install Docker on your laptop. Once installed you can check the Docker info or version with the following commands.

```
docker info  
docker --version
```

- The Kubernetes command-line tool, [kubectl](#), allows you to run commands against Kubernetes clusters. [Install it from here](#).

Dockerize the Project

AWS EKS is a managed service that makes it easy for you to run Kubernetes on AWS. The first thing you need to do is to dockerize your project.

Here is the Dockerfile and it is using multi-stage builds to reduce the image size and surface attacks.

```
FROM node:10 AS ui-build
WORKDIR /usr/src/app
COPY my-app/ ./my-app/
RUN cd my-app && npm install && npm run build

FROM nginx:alpine

#!/bin/sh

COPY ./nginx/nginx.conf /etc/nginx/nginx.conf

## Remove default nginx index page
RUN rm -rf /usr/share/nginx/html/*

# Copy from the stahg 1
COPY --from=ui-build /usr/src/app/my-app/build/ /usr/share/nginx/html

EXPOSE 4200 80

ENTRYPOINT ["nginx", "-g", "daemon off;"]
```

Dockerfile

Here are the commands to build the image and run it on the Docker engine on your local machine.

If you are new to Docker and check [this detailed post on this topic](#).

```
// build the image
docker build -t react-nginx-ui .// run the image
docker run -d --name react-nginx-webapp -p 80:80 react-nginx-ui// list the image you just built
docker images// list the container
docker ps
```

Pushing Docker Image To ECR

Amazon Elastic Container Registry (ECR) is a fully-managed [Docker](#) container registry that makes it easy for developers to store, manage, and deploy Docker container images. Amazon ECR is integrated with [Amazon Elastic Container Service \(ECS\)](#), simplifying your development to production workflow.

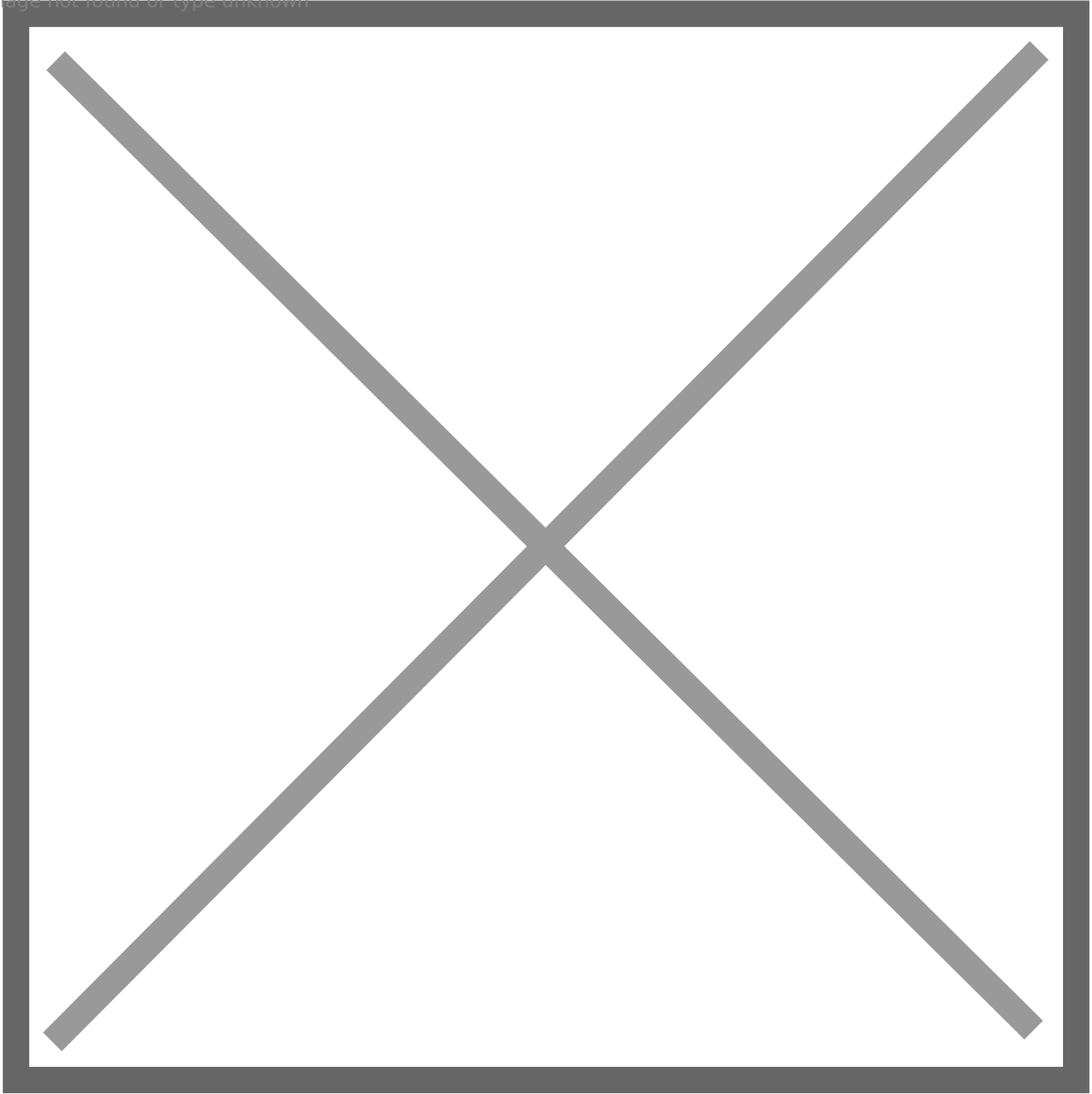
Amazon ECS works with any Docker registry such as Docker Hub, etc. But, in this post, we see how we can use Amazon ECR to store our Docker images. Once you set up the Amazon account and create an IAM user with Administrator access the first thing you need to create a Docker repository.

You can create your first repository either by AWS console or AWS CLI

AWS console

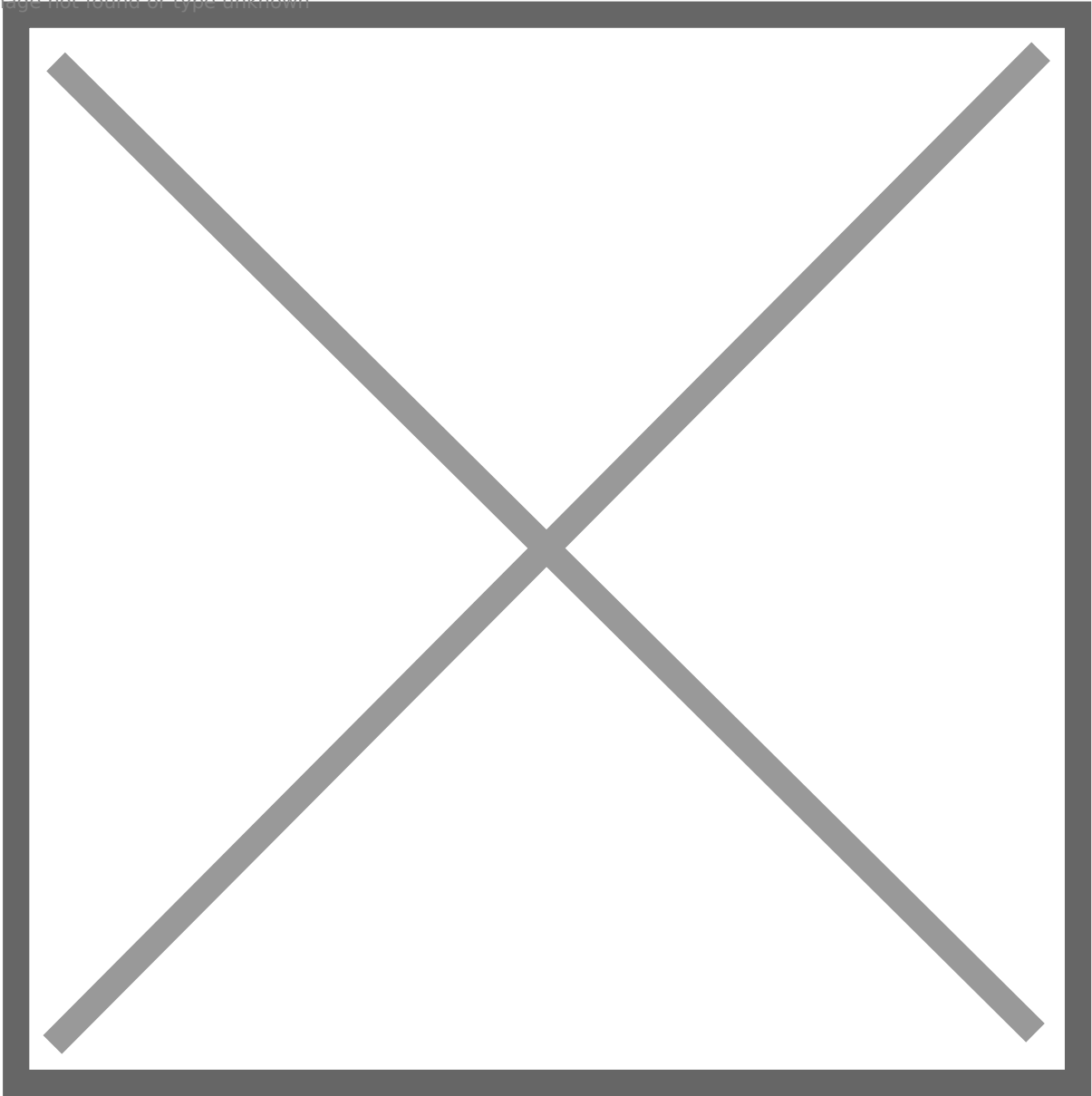
Creating a repository with AWS console is straightforward and all you need to give a name.

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creating repository

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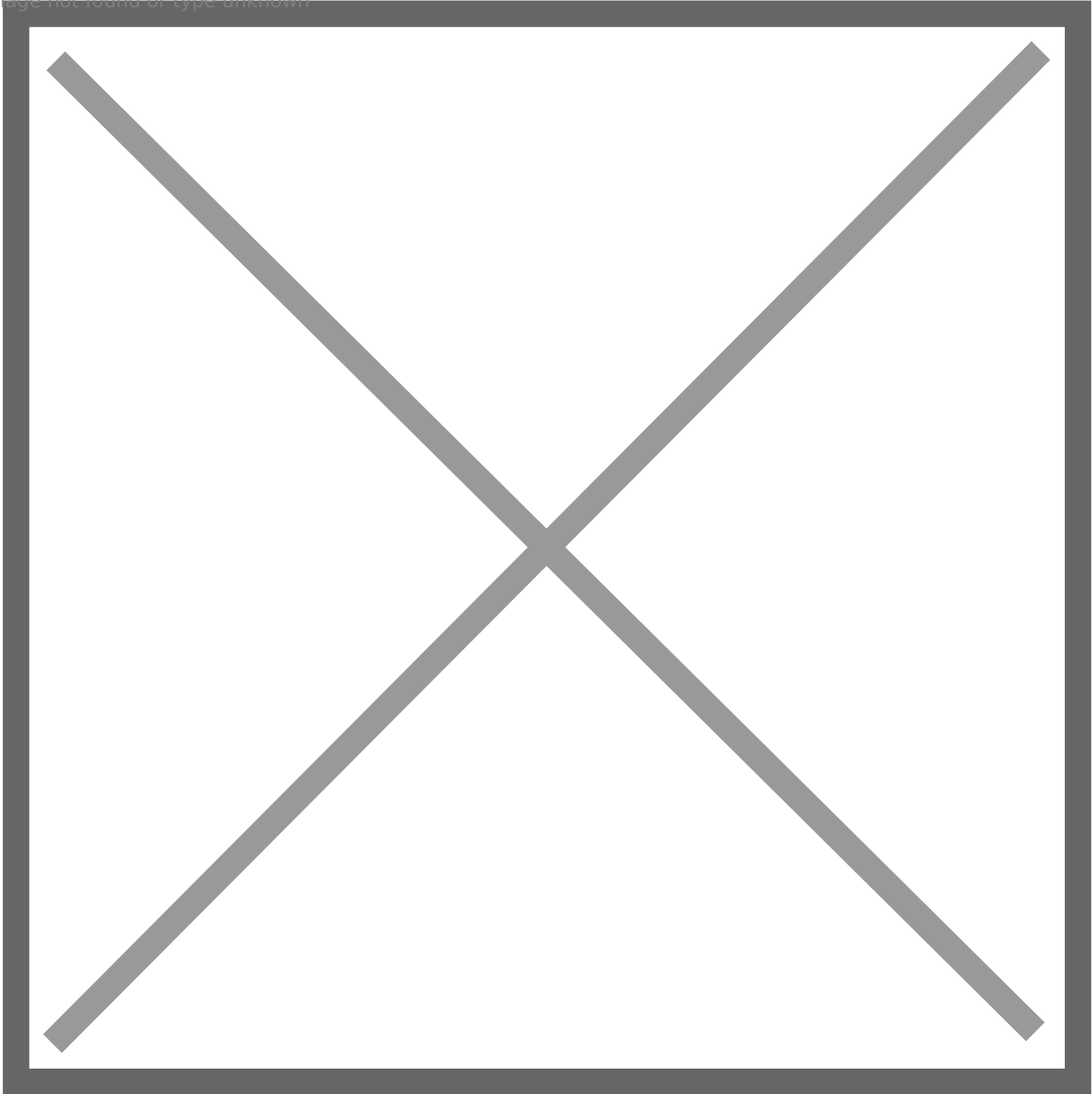
repository

AWS CLI

The first thing you need to do is authenticate to your default registry. Here is the command to authenticate to your default registry. You need to make sure you are putting the correct regions and account id in the command.

```
aws ecr get-login-password --region us-east-1 | docker login --username AWS --password-stdin  
aws_account_id.dkr.ecr.us-east-1.amazonaws.com
```

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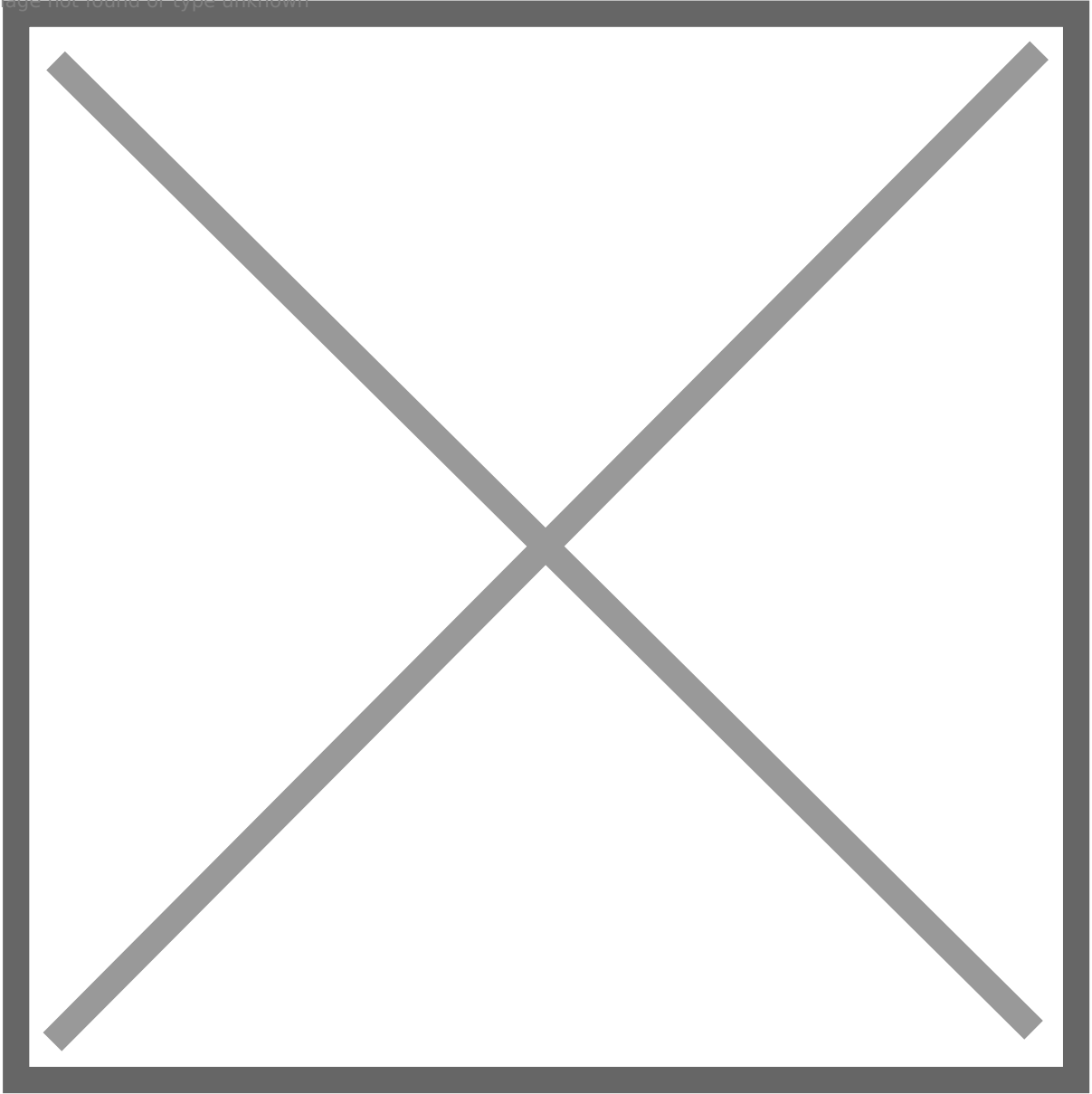


Authenticating to ECR

It's time to create a repository with the following command

```
aws ecr create-repository \  
  --repository-name frontend/web-app \  
  --image-scanning-configuration scanOnPush=true \  
  --image-tag-mutability IMMUTABLE \  
  --region us-east-2
```

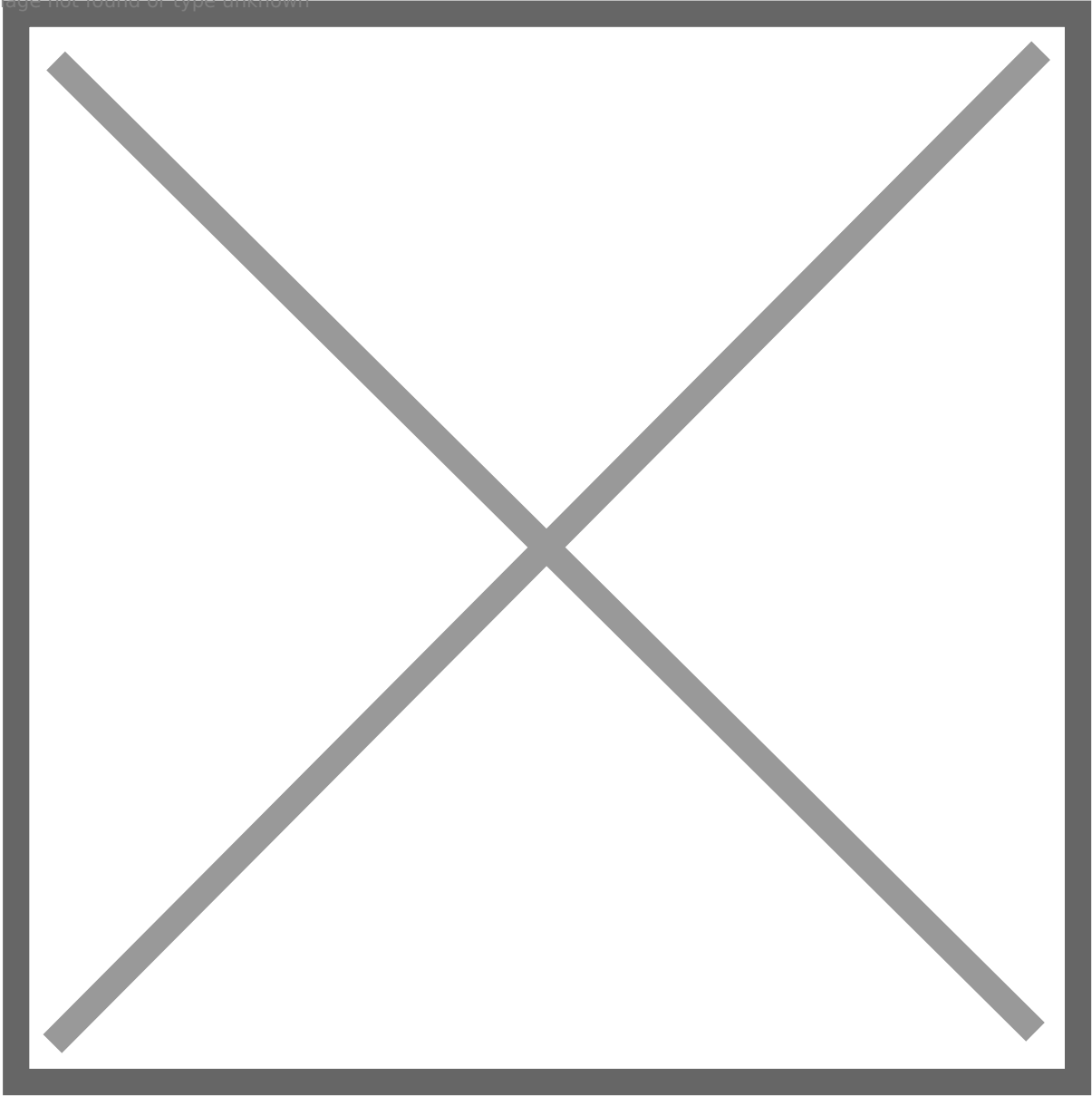
Image not found or type unknown



Creating repository

You will have the same result as well.

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Repository

Tagging your local Docker image and Pushing

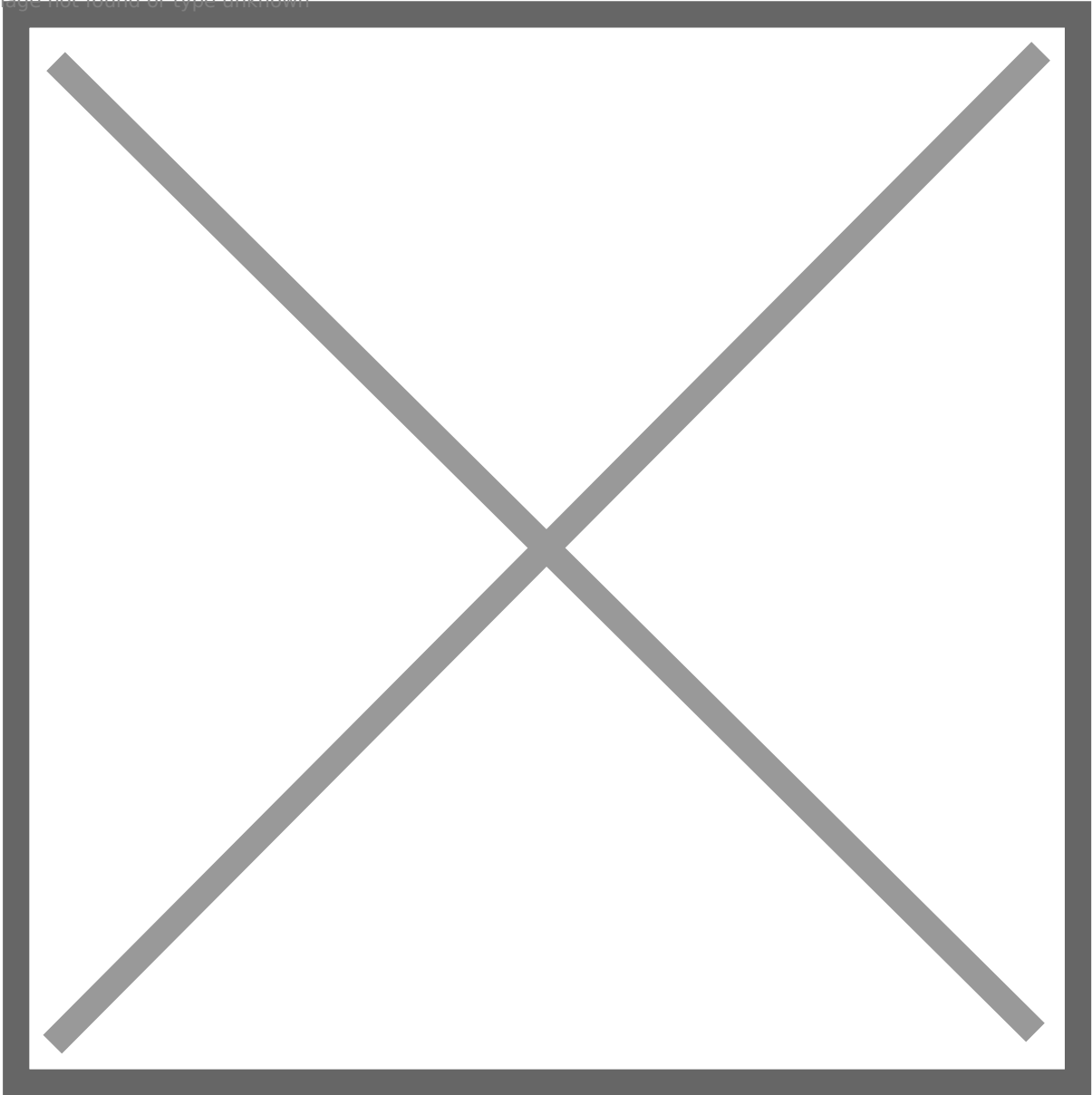
You have created a Docker image on your local machine earlier. It's time to tag that image with this repository URI in the above image.

```
docker tag react-nginx-ui:latest 864227929192.dkr.ecr.us-east-2.amazonaws.com/frontend/web-app: v
```

Once you tag the image and it's time to push the Docker image into your repository.

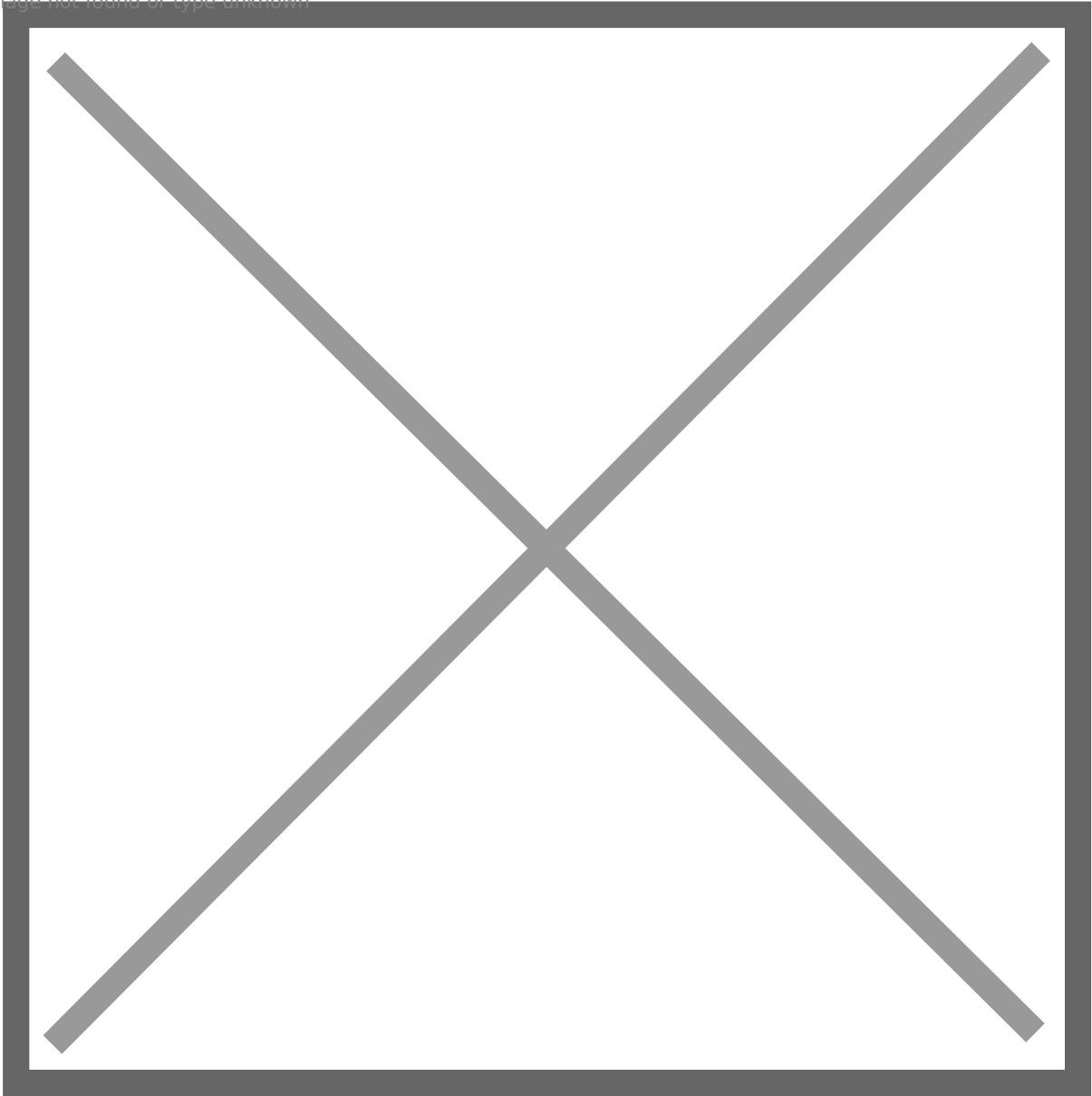
```
// list the images
docker images// push the image
docker push 864227929192.dkr.ecr.us-east-2.amazonaws.com/frontend/web-app:v1
```

Image not found or type unknown



pushing Docker image

Image not found or type unknown



Docker image with tag v1

Create a Cluster and Worker Nodes

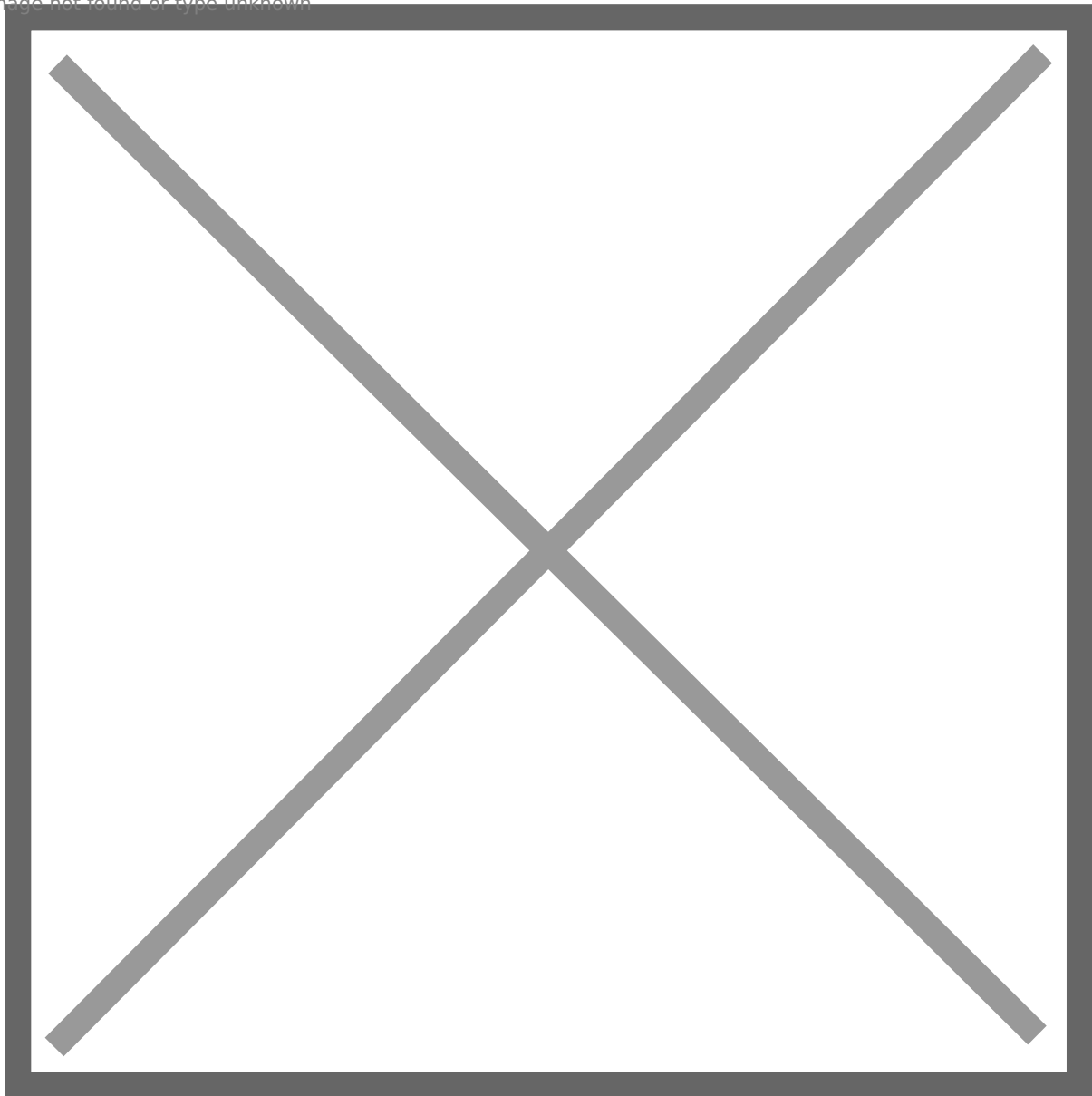
Getting started with AWS EKS is easy all you need to do the following steps

- We need to create an AWS EKS cluster with AWS console, SDK, or AWS CLI.
- Create a worker node group that registers with EKS Cluster
- When your cluster is ready, you can configure **kubectI** to communicate with your cluster.
- Deploy and manage your applications on the cluster

Cluster Creation

Let's create a cluster by [following this guide here](#). Make sure you created a role for the EKS to allow Amazon EKS and the Kubernetes control plane to manage AWS resources on your behalf. I created a role called **eks_cluster_role**. [Here is a link to create a cluster role](#).

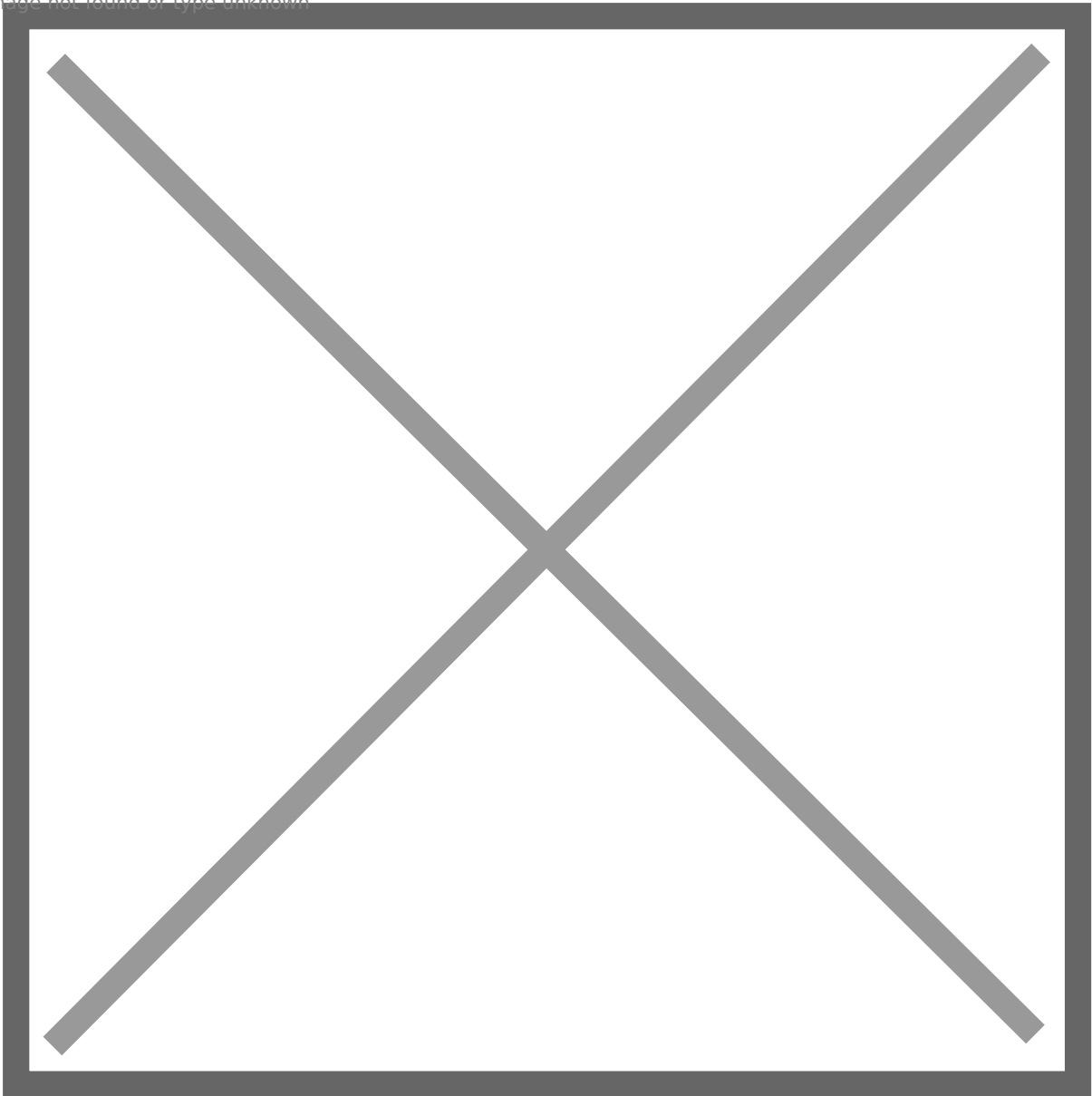
Image not found or type unknown



eks_cluster_role

Let's create a cluster by giving the below information.

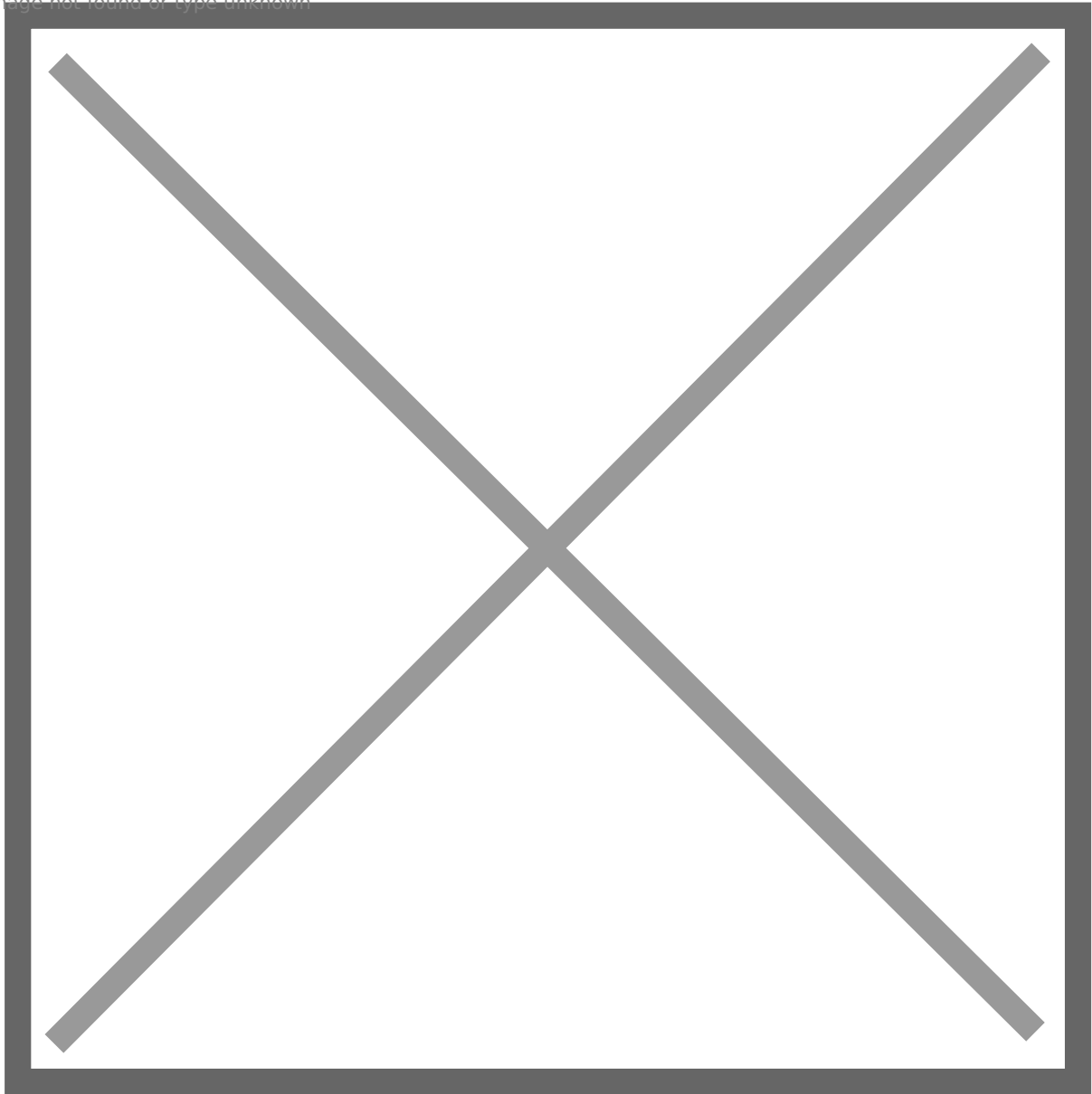
Image not found or type unknown



Creating Cluster

It takes some time for the cluster to get created and it should be in the active state once it is created.

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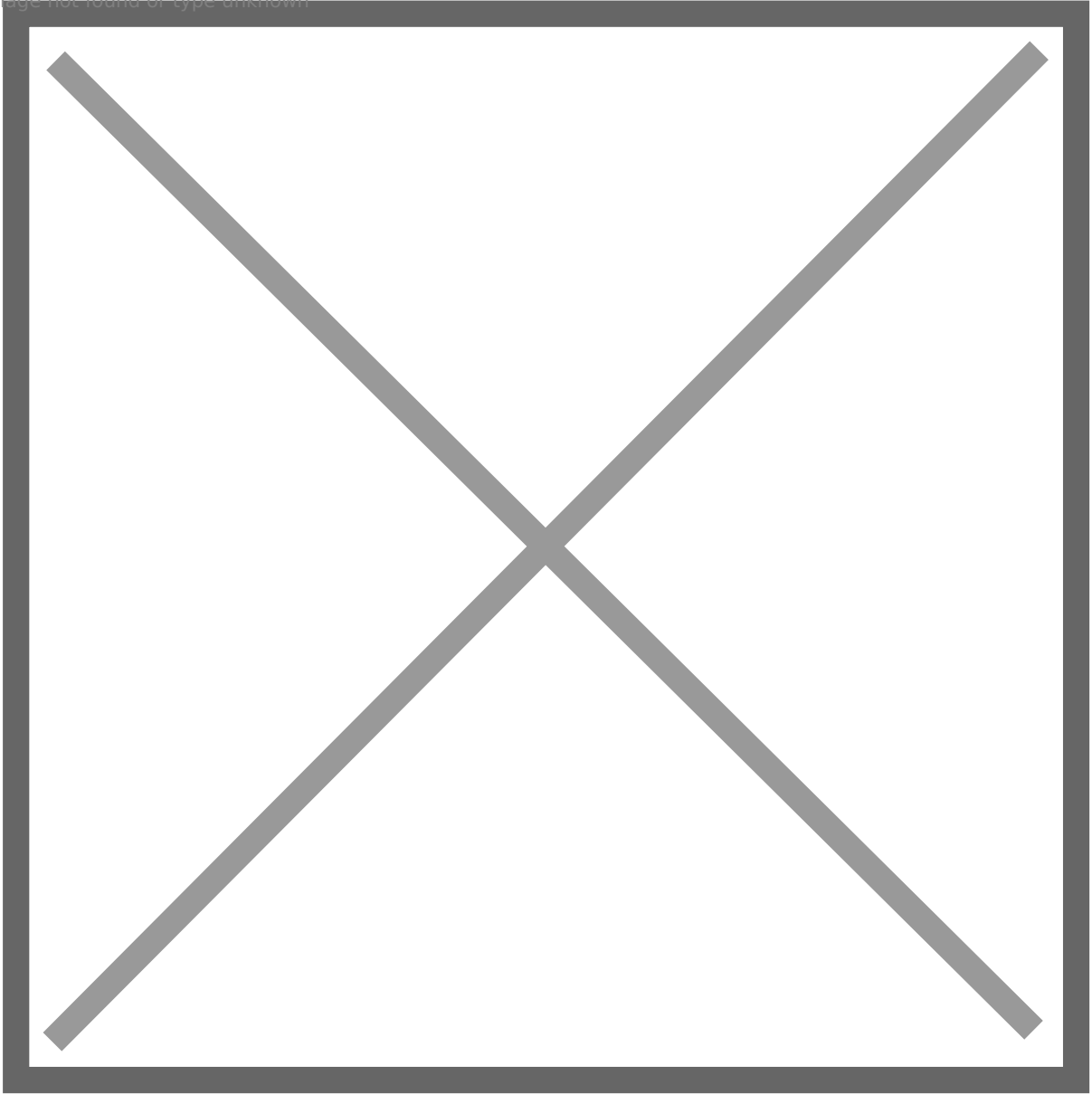


Cluster Created

Create Worker Nodes

It's time to create nodes and before you do that we have to create this role called `NodeInstanceRole`. [Follow this guide to create one.](#)

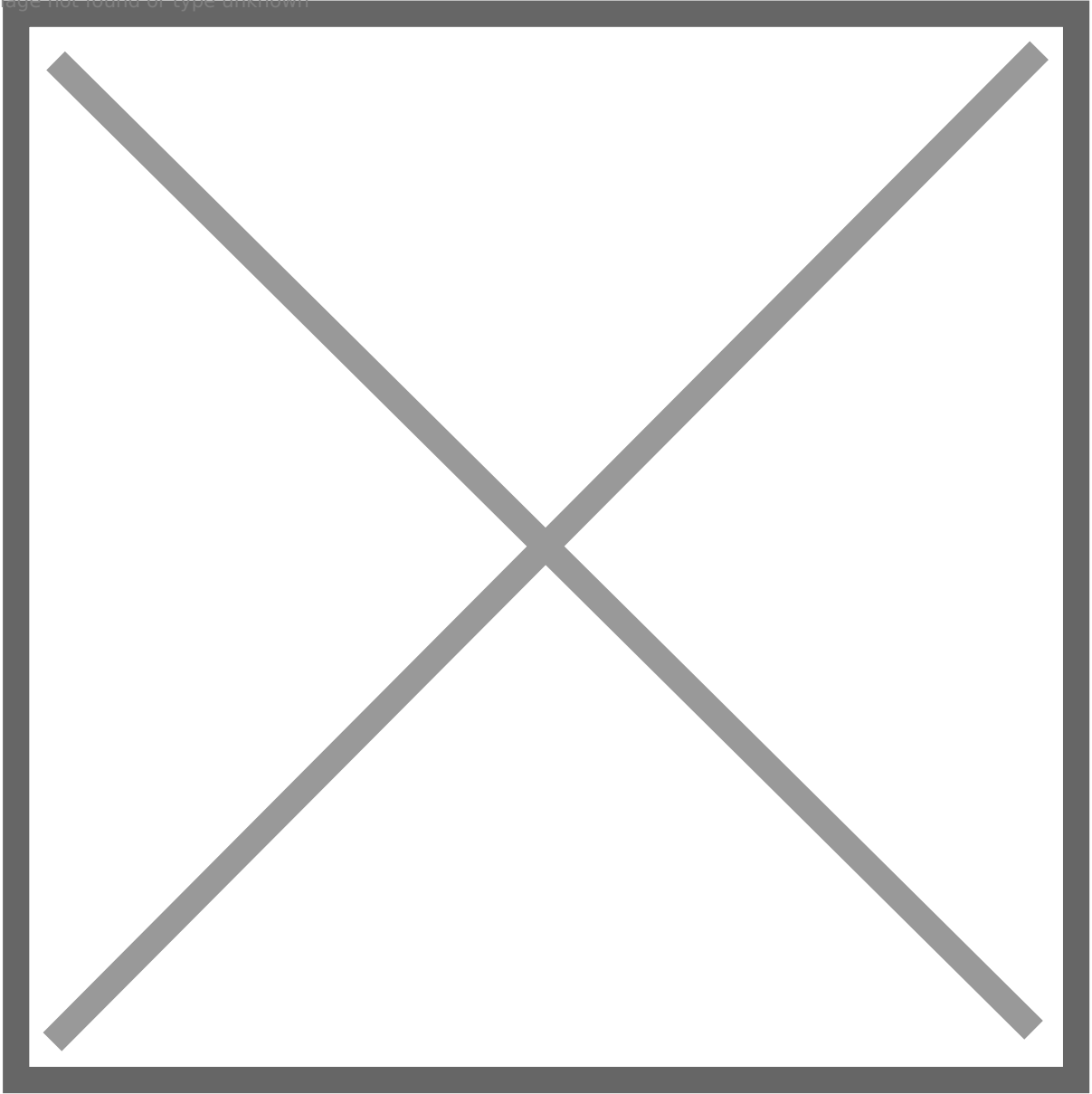
Image not found or type unknown



NodeInstanceRole

Follow [this guide](#) to create a node group after the role is created.

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Node Group is active

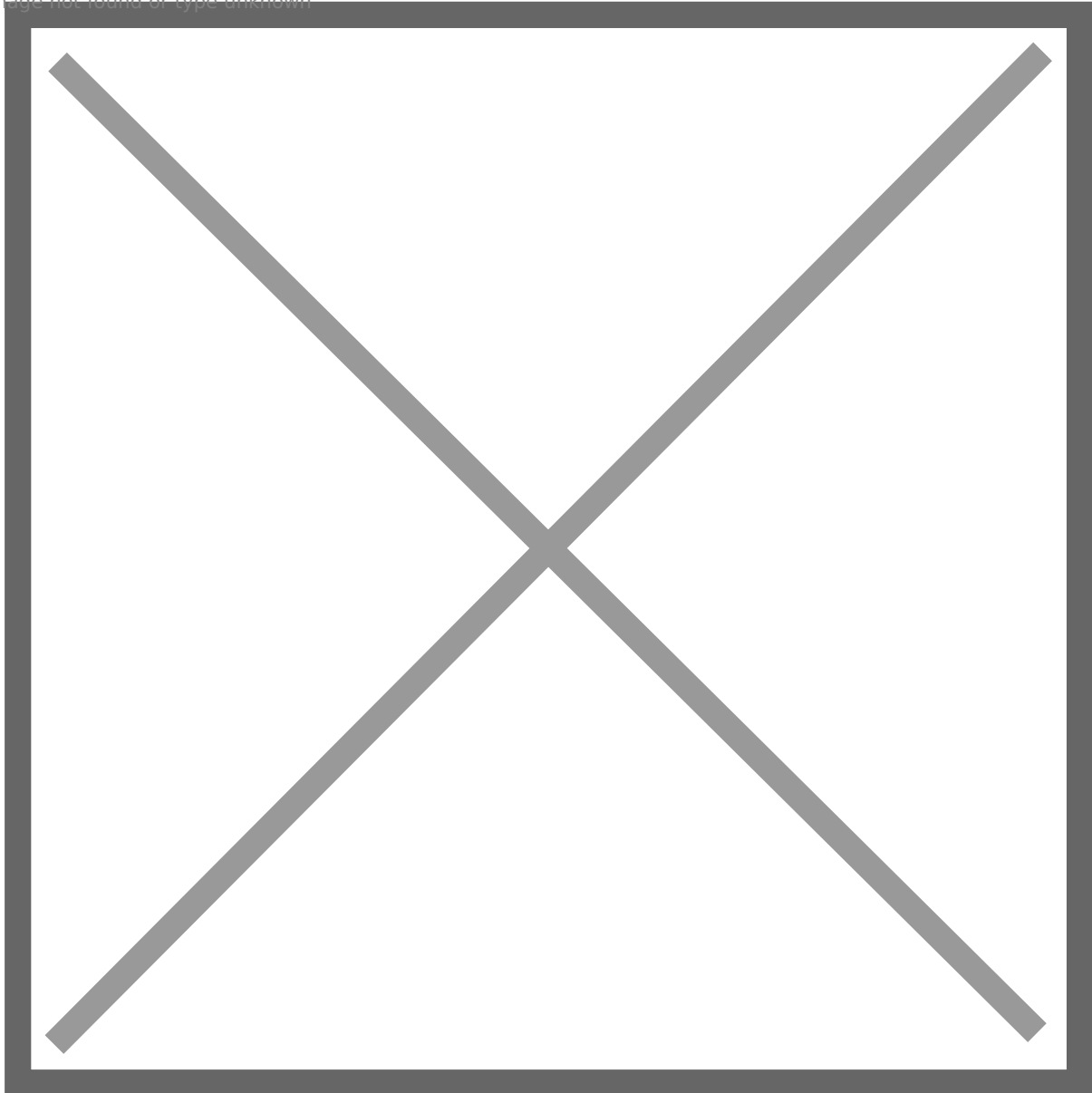
Configure kubectl to use Cluster

- We need to install kubectl on our machine, [follow this guide to install depending on your OS](#).

- The next thing we need to do is to install an aws-iam-authenticator. [Follow this guide](#). We need this to authenticate the cluster and it uses the same user as AWS CLI is authenticated with.
- Use the AWS CLI **update-kubeconfig** command to create or update your kubeconfig for your cluster. Here region-code is **us-east-2** and cluster_name is **frontend_clutser**

```
aws eks --region region-code update-kubeconfig --name cluster_name
```

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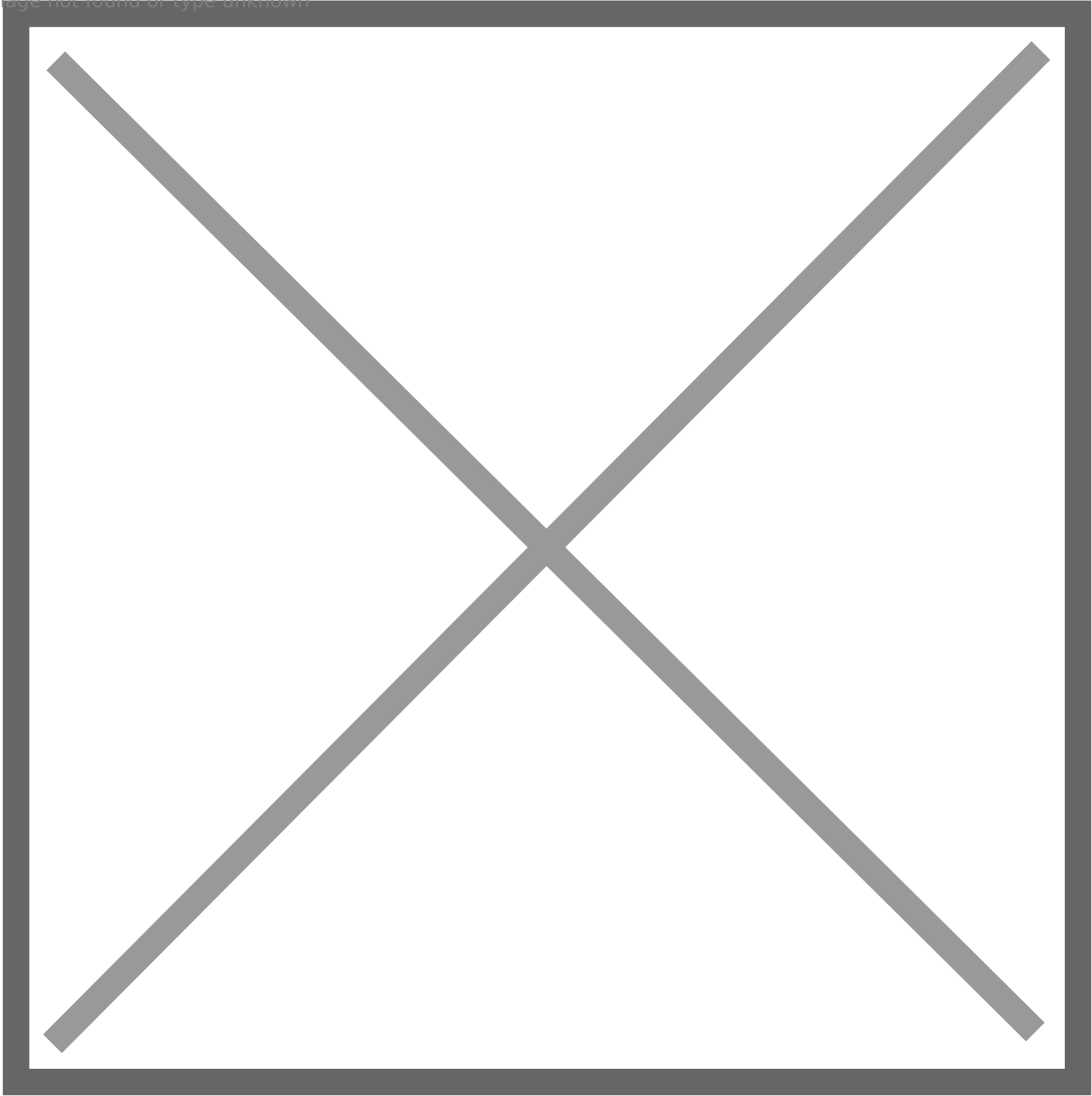


connected to the cluster

You can check with these commands.

```
// get the service  
kubectl get nodes// get the current context  
kubectl config current-context
```

Image not found or type unknown



connected to cluster

Deploy Kubernetes Objects On AWS EKS Cluster

Now we have configured kubectl to use AWS EKS from our own machine. Let's create deployment and service objects and use the image from the AWS ECR. Here is the manifest file which contains these objects.

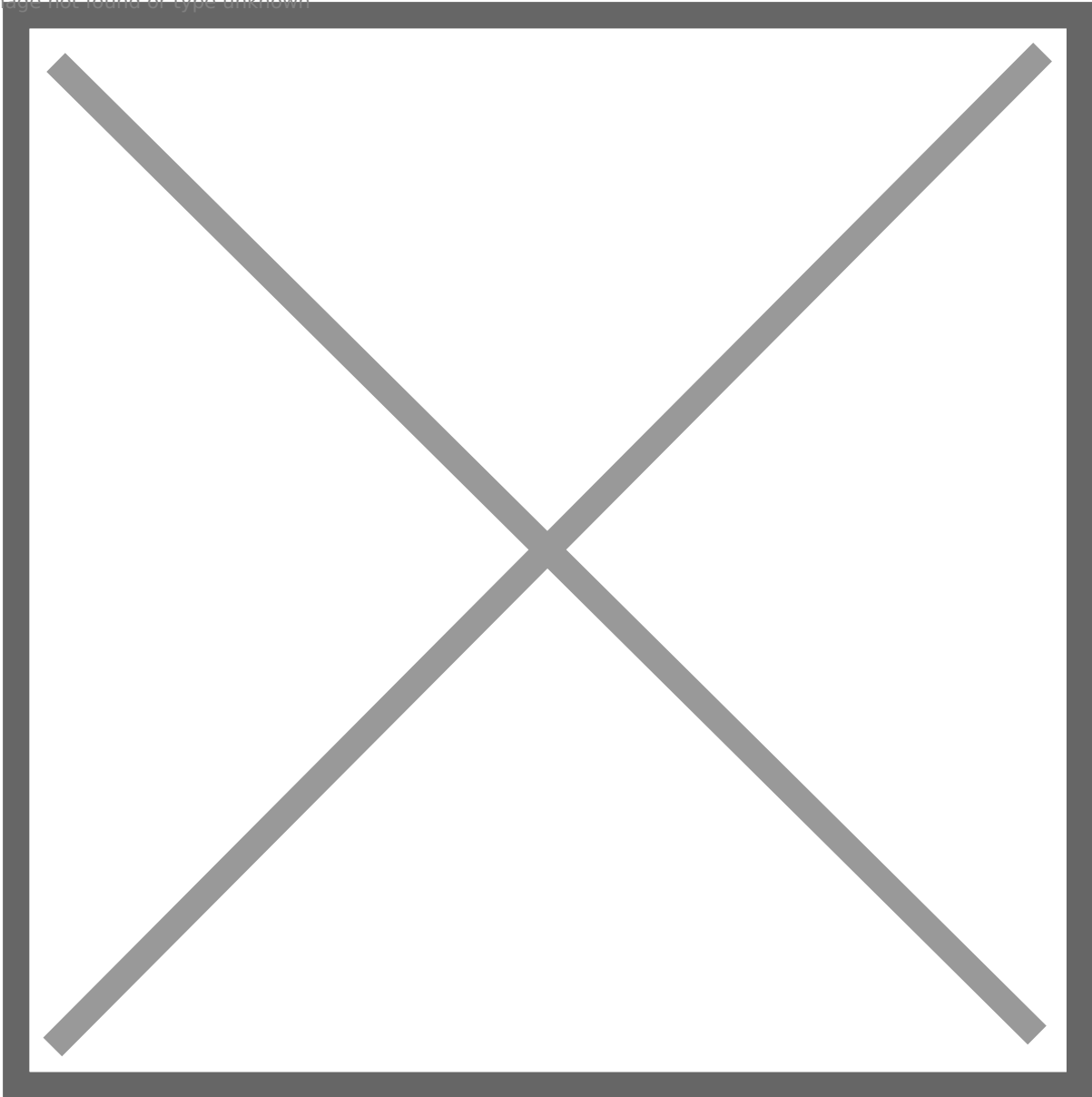
```
apiVersion: apps/v1
kind: Deployment
metadata:
  creationTimestamp: null
  labels:
    app: nginx-webapp
  name: nginx-webapp
spec:
  replicas: 5
  selector:
    matchLabels:
      app: nginx-webapp
  strategy: {}
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: nginx-webapp
    spec:
      containers:
        - image: 864227929192.dkr.ecr.us-east-2.amazonaws.com/frontend/web-
app:v1
          name: webapp
          imagePullPolicy: Always
          resources: {}
          ports:
            - containerPort: 80
status: {}
```

```
apiVersion: v1
kind: Service
metadata:
  name: nginx-webapp
  labels:
    run: nginx-webapp
spec:
  ports:
    - port: 80
      protocol: TCP
  selector:
    app: nginx-webapp
  type: LoadBalancer
```

manifest.yml

If you cloned the above example project and you are at the root folder just use this command to create objects `kubectl create -f manifest.yml`

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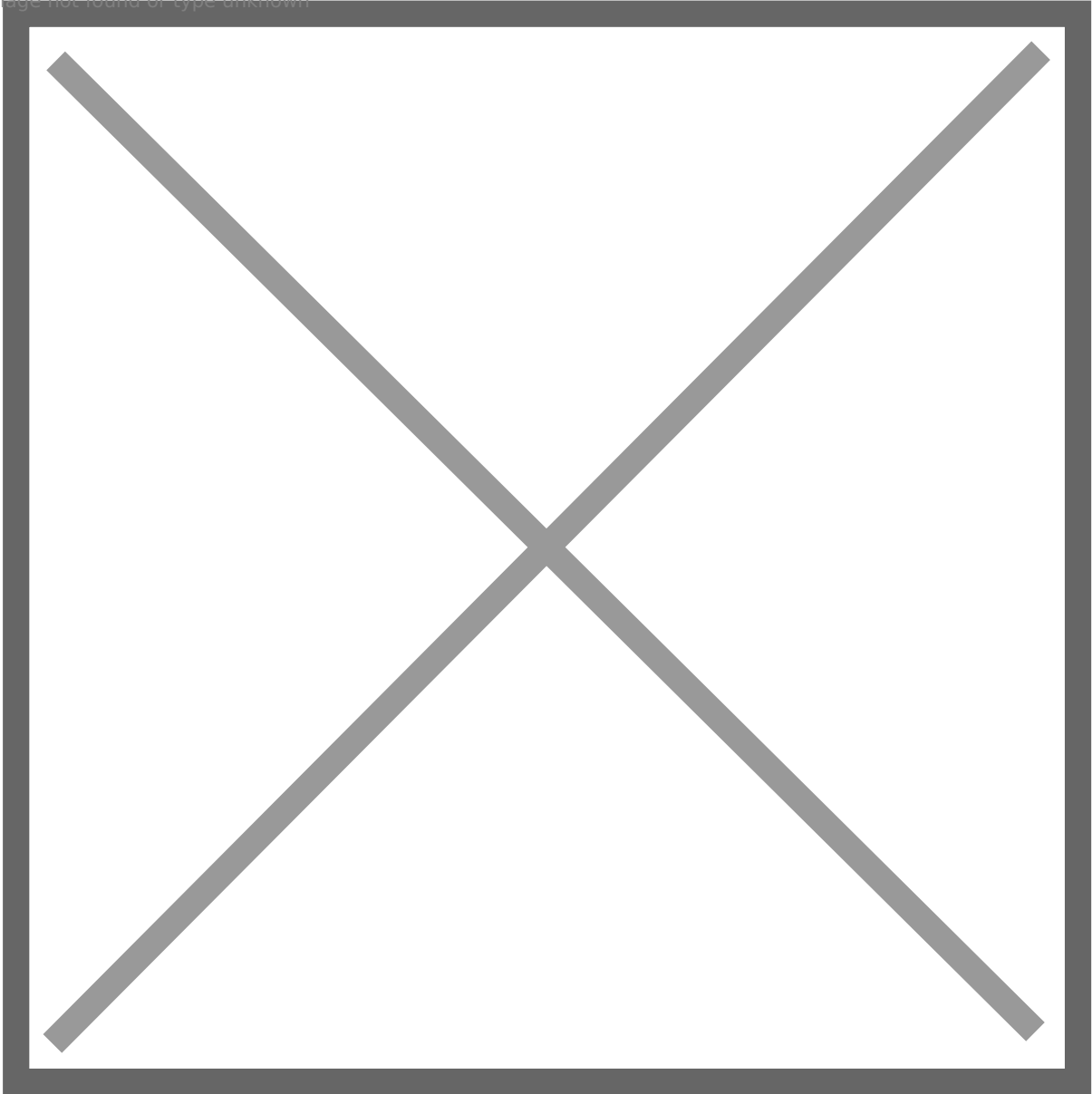


`kubectl create -f manifest.yml`

You can use the following commands to verify all the objects are in the desired state.

```
// list the deployment
kubectl get deploy// list the pods
kubectl get po// list the service
kubectl get svc
```

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all objects are deployed

Summary

- Amazon Elastic Kubernetes Service (Amazon EKS) is a managed service that makes it easy for you to run Kubernetes on AWS without needing to stand up or maintain your own Kubernetes control plane.
- You need to create an AWS Account as a prerequisite.
- It's not a best practice to use your root account to do any tasks instead you should create an IAM group that has permissions for administrator access and add a user to it and log in

with that user.

- You should use this command `aws configure` with access key and secret key.
- Amazon EKS is a managed service that makes it easy for you to run Kubernetes on AWS.
- Amazon Elastic Container Registry (ECR) is a fully-managed [Docker](#) container registry that makes it easy for developers to store, manage, and deploy Docker container images.
- Amazon ECR is integrated with [Amazon Elastic Container Service \(ECS\)](#), simplifying your development to production workflow.
- Amazon ECS works with any Docker registry such as Docker Hub, etc.
- You have to follow these steps to run apps on the Kubernetes cluster: we need to create an AWS EKS cluster with AWS console, SDK, or AWS CLI. Create a worker node group that registers with EKS Cluster, when your cluster is ready, you can configure **kubectl** to communicate with your cluster, Deploy and manage your applications on the cluster

Conclusion

We have deployed a simple React application with an NGINX web server on AWS EKS Cluster. In future posts, we will see how we can add a load balancer and how we can route requests to the Kubernetes Cluster.