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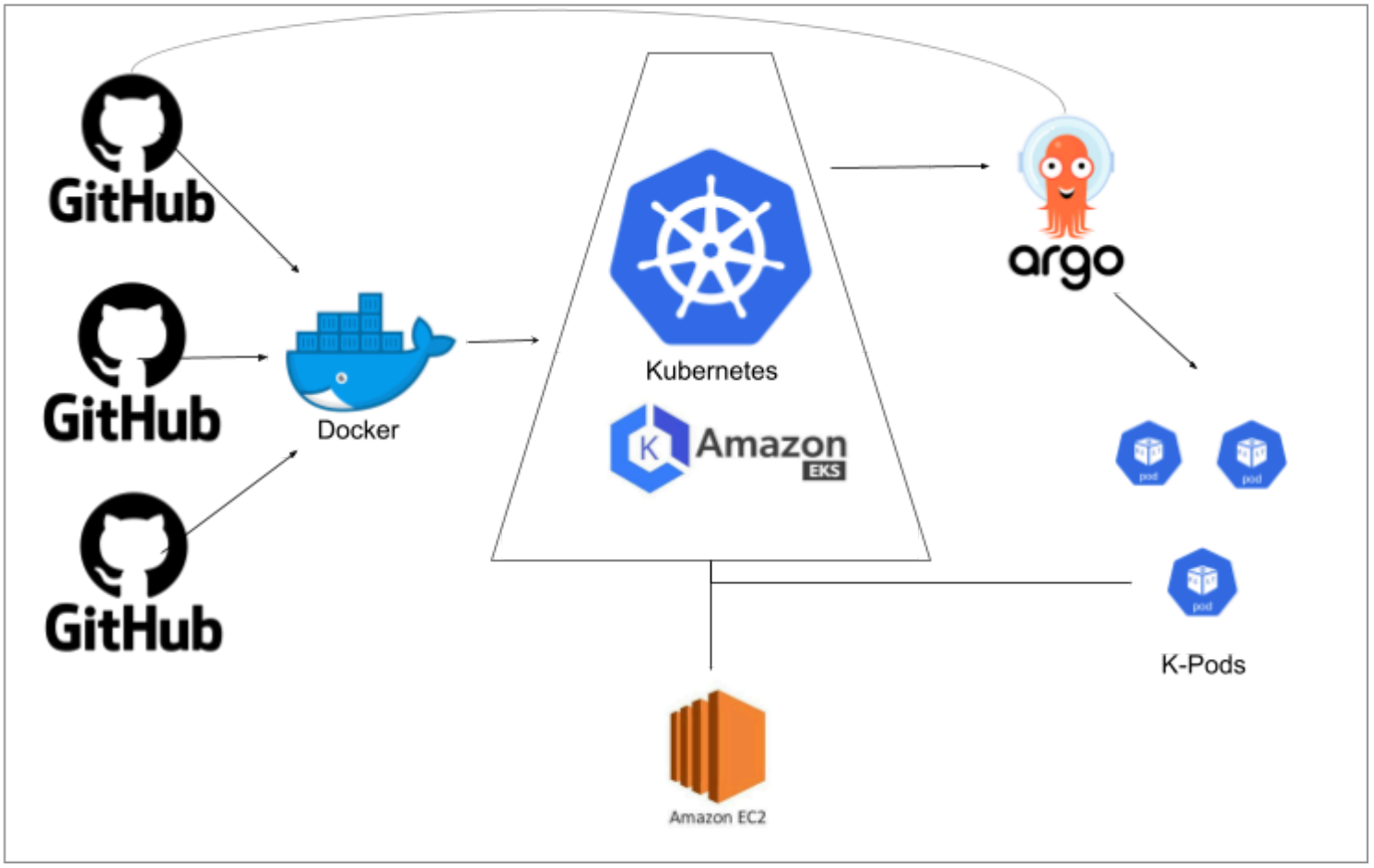
GITOPS CI/CD PIPELINE WITH ARGO-CD ROLLOUT
(GAME DEPLOYMENT)



Task 1: Setup and Configuration:

1. Create a GitRepository

Created a new GitHub repository named "tetriswa" to store the source code of our web application. This repository will be the central location for managing our application code and configurations.

Repository link: https://github.com/RISHIT2070/tetriswa

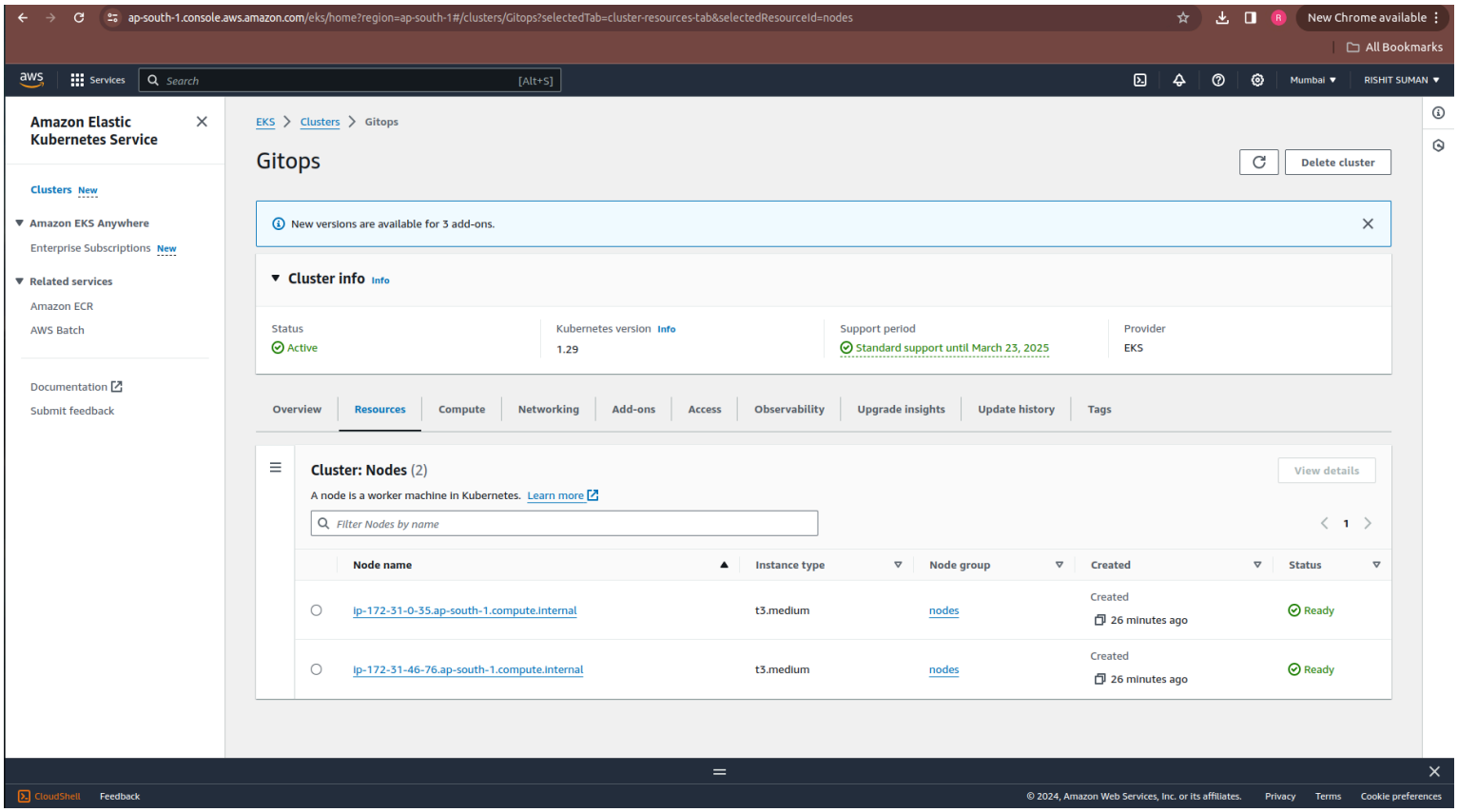
2. Install Argo CD on Your Kubernetes Cluster

Installed Argo CD on our AWS EKS cluster by following the official documentation. Argo CD provides a declarative way to manage Kubernetes resources through GitOps practices. It continuously monitors the Git repository for changes and automatically applies them to the cluster.

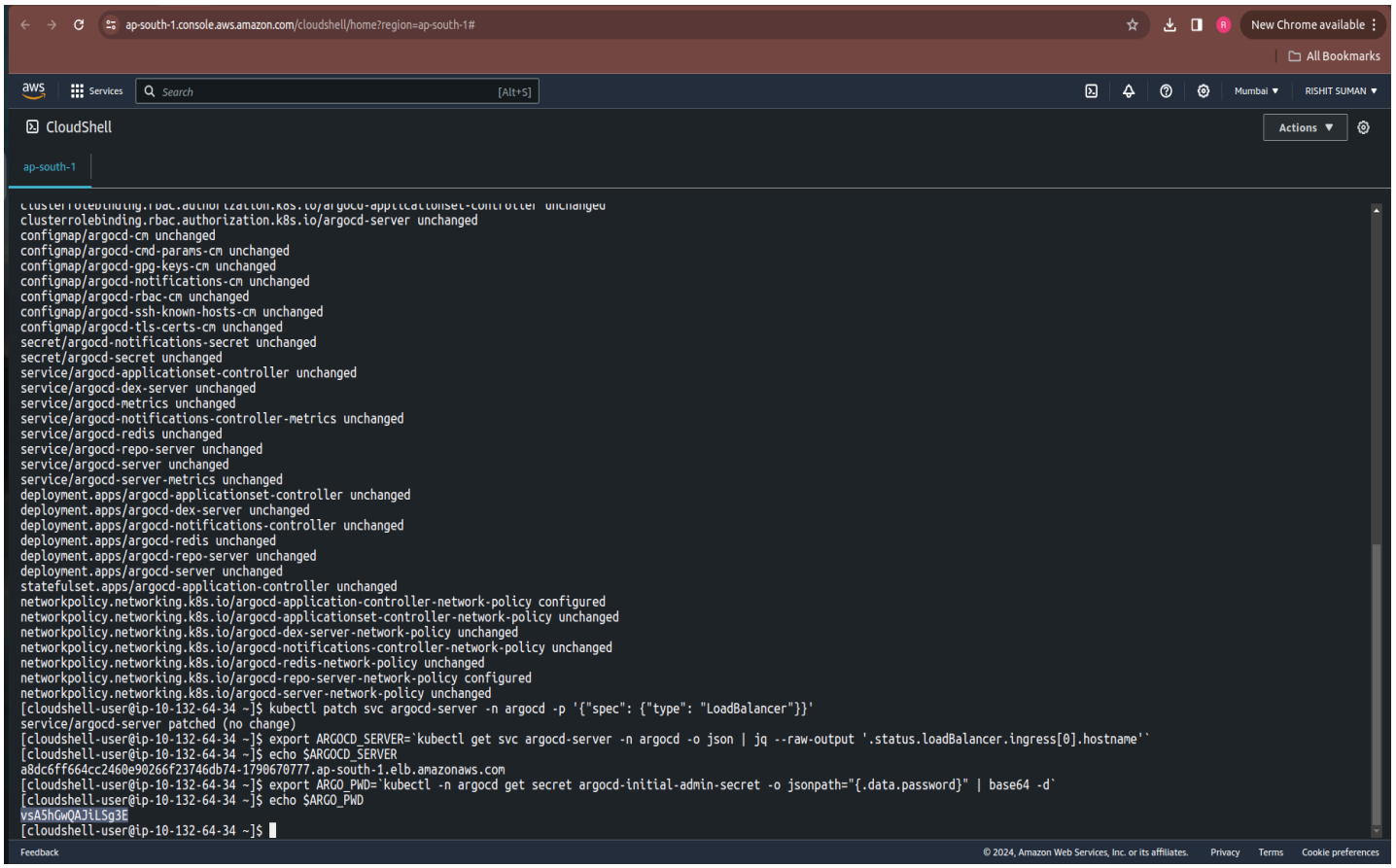
3. Install Argo Rollouts

Installed the Argo Rollouts controller in our AWS EKS cluster using the provided installation guide. Argo Rollouts extends Argo CD by adding support for advanced deployment strategies such as canary releases and blue-green deployments. It allows us to manage the rollout process of our application in a controlled and automated manner.

#Created AWS EKS Cluster Named “Gitops” with 2 Nodes -:



#Installing ARGO CD & ARGO ROLLOUT On AWS CLI



Task 2: Creating the GitOps Pipeline

1. Dockerize the Application

#Dockerized our simple web application by creating a Dockerfile. This file contains instructions for building a Docker image that encapsulates our application code and dependencies.

#Built the Docker image using the docker build command and tagged it with a version number.

#Pushed the Docker image to a public container registry (in this case, Docker Hub) to make it accessible to our AWS EKS cluster.

2. Deploy the Application Using Argo CD

#Updated the Kubernetes manifests (Deployment and Service) in our GitHub repository to reference the Docker image we pushed to Docker Hub. These manifests define how our application should be deployed and exposed within the AWS EKS cluster.

#Configured Argo CD to watch our GitHub repository for changes. When changes are detected, Argo CD automatically synchronizes the cluster's state with the desired state defined in the repository, ensuring that our application is deployed and updated accordingly.

Deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: tetris-deployment
spec:
  replicas: 2
  selector:
    matchLabels:
      app: tetris
  template:
    metadata:
      labels:
        app: tetris
    spec:
      containers:
      - name: tetris
        image: nasi101/tetris
        ports:
        - containerPort: 80
```

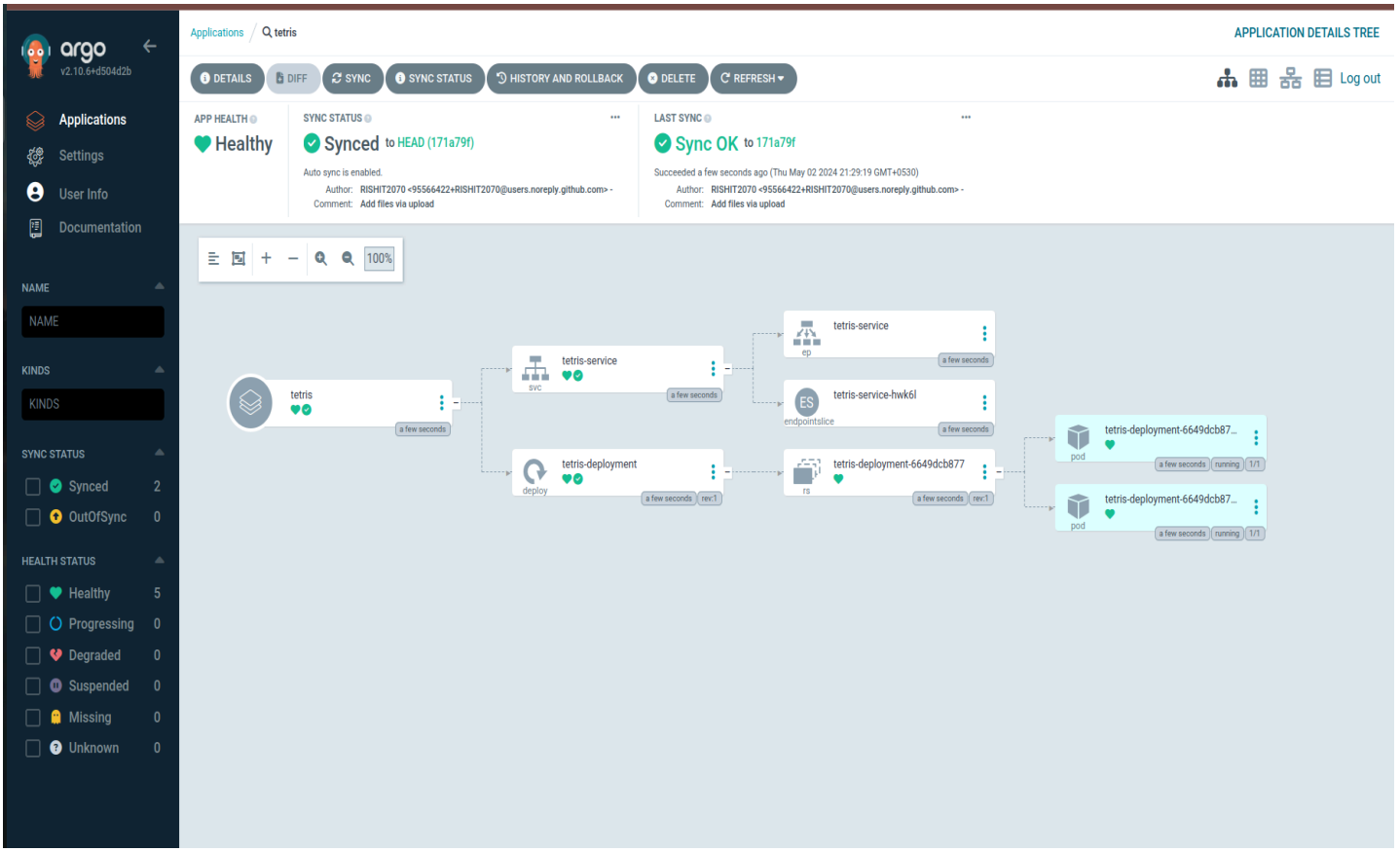
Service.yaml

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: tetris-service
spec:
  selector:
    app: tetris
  ports:
  - protocol: TCP
    port: 80
    targetPort: 80
  type: LoadBalancer
```

Rollout.yaml

```yaml
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: tetris-rollout
  namespace: default
spec:
  template:
    metadata:
      labels:
        app: tetris
    spec:
      containers:
      - name: tetris
        image: nasi101/tetris
  selector:
    matchLabels:
      app: tetris
  replicas: 10
  strategy:
    canary:
      steps:
      - setWeight: 10
      - pause: {}
```

DEPLOYMENT OF CI/CD PIPELINE WITHOUT ROLLOUT



Task 3: Implementing a Canary Release with Argo Rollouts

1. Define a Rollout Strategy

Modified our application's Deployment to use Argo Rollouts instead of the standard Kubernetes Deployment object. This allows us to define a canary release strategy for our application rollout.

Specified the canary release strategy in the rollout definition, including parameters such as traffic weights and rollout steps.

2. Trigger a Rollout

Made a change to our application code, such as adding a new feature or fixing a bug.

Built and pushed a new version of the Docker image to Docker Hub, tagged with a new version number.

Updated the rollout definition in our GitHub repository to reference the new Docker image version. This triggers a new rollout process using the updated image.

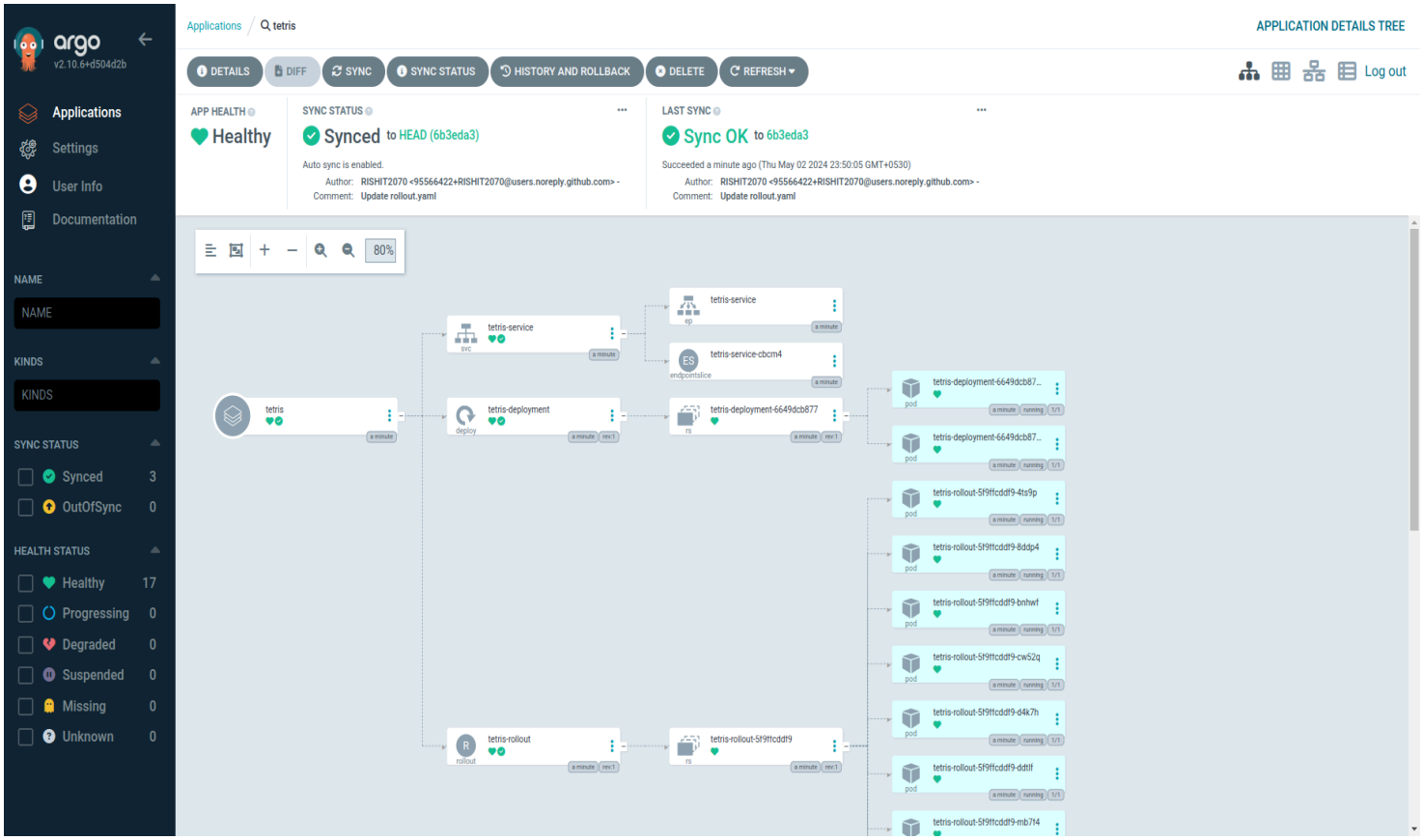
3. Monitor the Rollout

Used Argo Rollouts to monitor the deployment of the new version of our application.

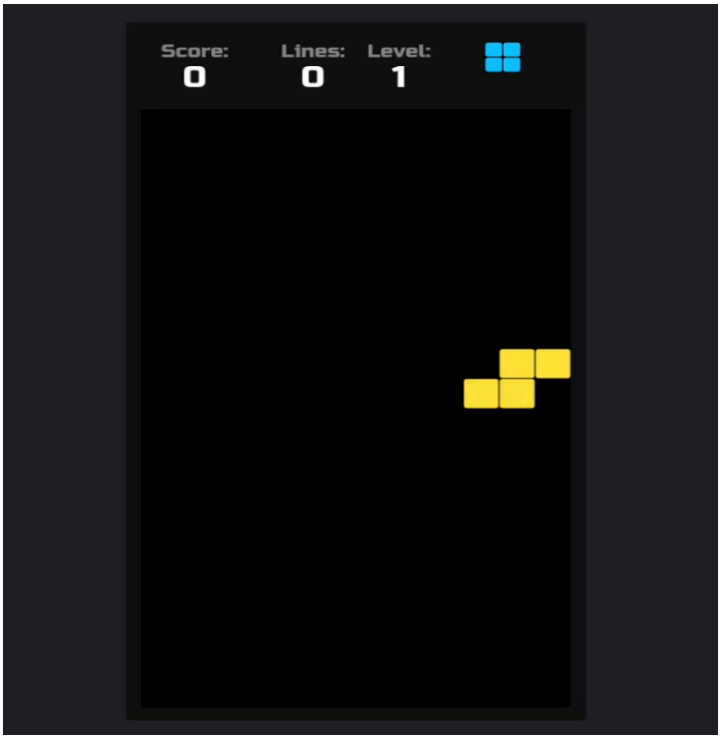
Monitored key metrics such as traffic weights and rollout progress in the Argo Rollouts UI or CLI.

Ensured that the canary release successfully completed and that the new version of the application was deployed without any issues.

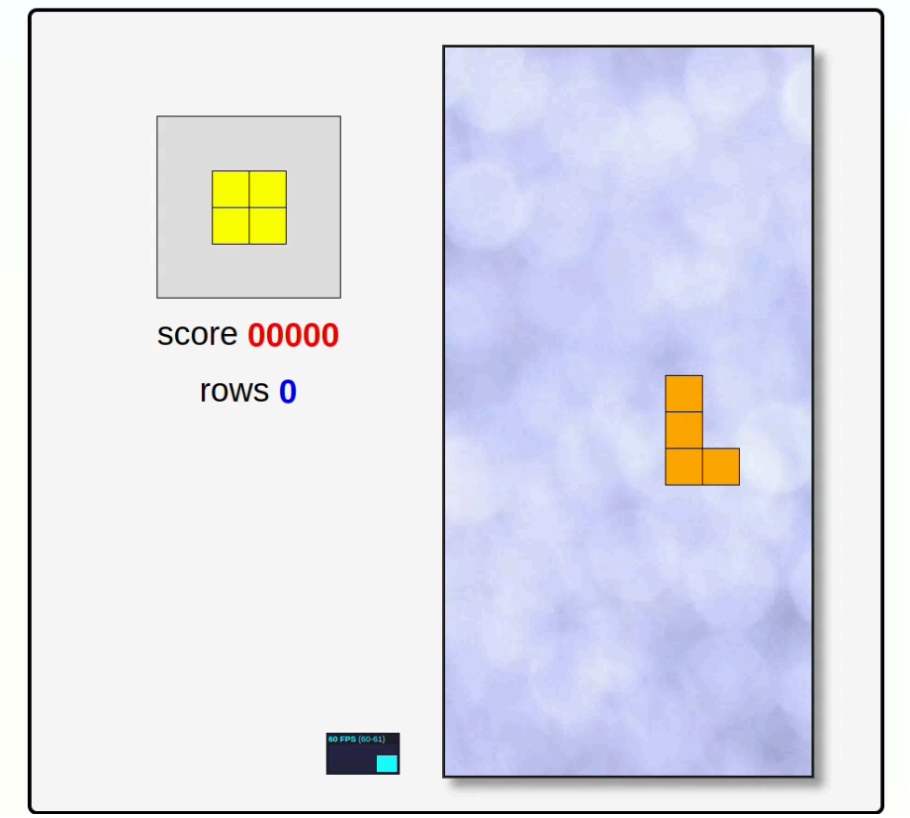
DEPLOYMENT OF CI/CD PIPELINE WITH ARGO CD ROLLOUT



1.Game Deployed : With 1st Docker Image Before updating The 2nd Docker Image In Github Repo :



2. After Updating The 2nd Docker Image In Github Repo :



Monitoring the change Up-to-date in the docker image -:

```
[cloudshell-user@ip-10-132-65-4 ~]$
[cloudshell-user@ip-10-132-65-4 ~]$ kubectl get rollout tetris-rollout
NAME             DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
tetris-rollout   10        10        10           10          88m
[cloudshell-user@ip-10-132-65-4 ~]$ kubectl get rollout tetris-rollout
NAME             DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
tetris-rollout   10        10        10           10          88m
[cloudshell-user@ip-10-132-65-4 ~]$ kubectl get rollout tetris-rollout
NAME             DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
tetris-rollout   10        10        10           10          3m31s
[cloudshell-user@ip-10-132-65-4 ~]$ kubectl get rollout tetris-rollout
NAME             DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
tetris-rollout   10        10        1            10          9m54s
[cloudshell-user@ip-10-132-65-4 ~]$ kubectl get rollout tetris-rollout
NAME             DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
tetris-rollout   10        10        1            10          12m
[cloudshell-user@ip-10-132-65-4 ~]$
Feedback
```

NOTE:

1.I worked On AWS EKS and AWS EC2 for the kubernetes part and after completing the Game deployment , I deleted the node group which I created In the EKS Cluster named “Gitops” . same goes with the cluster.

2. Terminated the EC2 Instance from AWS & If any service is active in Cost & Billing section

3.Created an Alert group on AWS for a minimum threshold cost & Billing.