

Capstone Project Documentation

GitHub repo: -

<https://github.com/Juhi5863/Juhi-Capstone-Project.git>

1. cloud formation template infra repo: -

<https://github.com/Juhi5863/CFT.git>

2. Pipeline in us-east-1 project repo: -

<https://github.com/Juhi5863/pipeline-east-1-CF.git>

3. Terraform template for creating infra in us-east-2 region repo:-

<https://github.com/Juhi5863/terraform-infra.git>

4. Pipeline in us-east-2 project repo: -


<https://github.com/Juhi5863/terraform-east2-deploy.git>

project structure

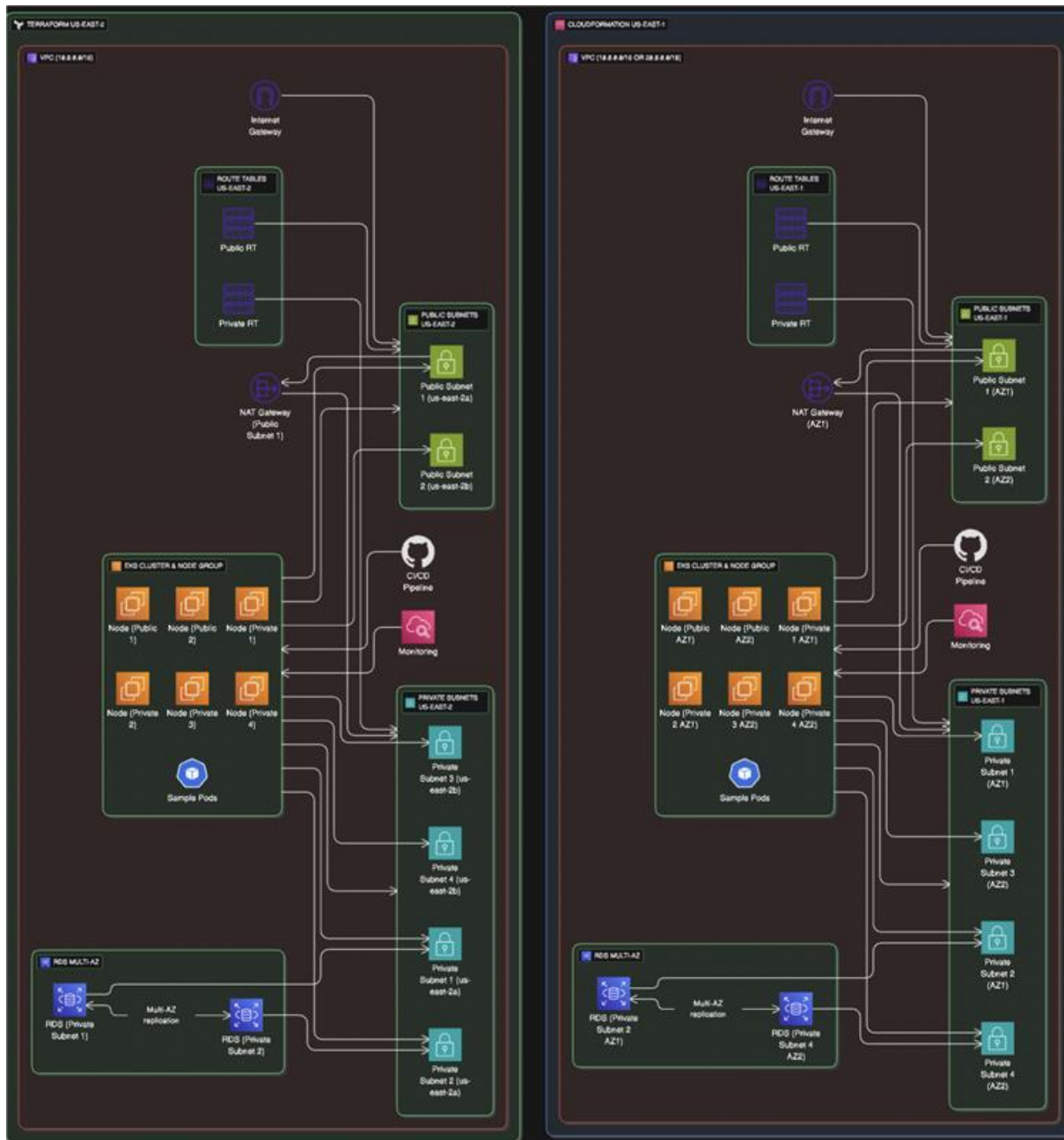
backend (node js)

frontend (React)

database (rds MySQL)

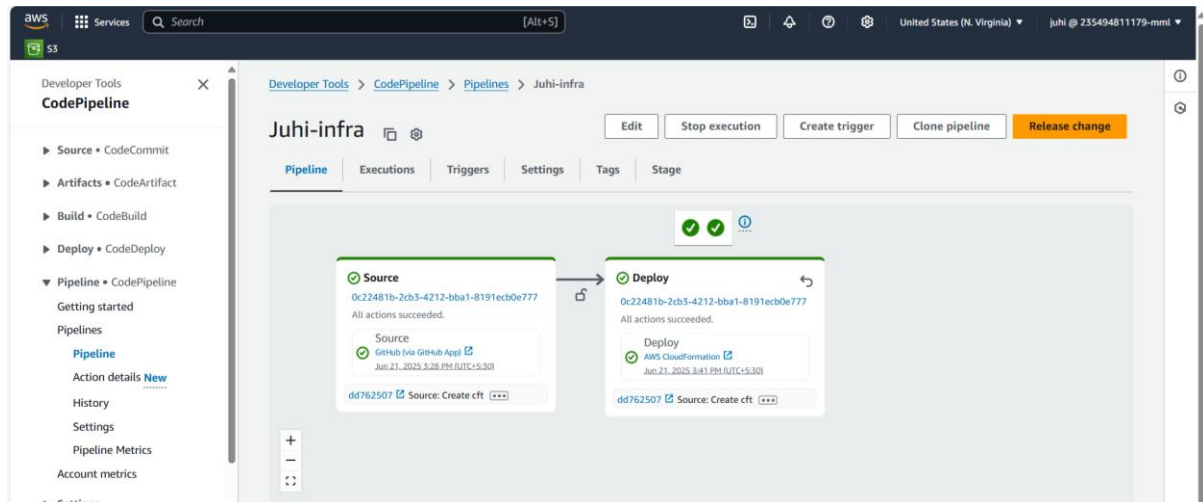
 Juhi5863 Update buildspec.yml 560e85e · 2 days ago 🕒 56 Commits		
📁 backend	changes region and end point	3 days ago
📁 frontend	Update Dockerfile	4 days ago
📁 k8s	changes region and end point	3 days ago

Architecture diagram



Cloud Formation (us-east-1)

1. Infrastructure created in us-east-1 with CFT through Code Pipeline



kubectl get nodes

```
root@ip-10-0-11-146:/home/ubuntu# kubectl get nodes
NAME                                STATUS    ROLES    AGE   VERSION
ip-10-0-15-178.ec2.internal        Ready    <none>   26h   v1.32.3-eks-473151a
ip-10-0-66-57.ec2.internal         Ready    <none>   26h   v1.32.3-eks-473151a
```

mysql endpoint -u admin -p

```
root@ip-10-0-11-146:/home/ubuntu# mysql -h mysql.database.cn0us0ksu6a4.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 12
Server version: 8.0.41 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use inventory;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+-----+
| Tables in inventory |
+-----+
| items               |
+-----+
```

2. Ecr created from both backend and frontend image

aws Search [Alt+S] United States (N. Virginia) terraform_iamUser @ 713881797197-mm1

Amazon ECR Private registry Repositories

Amazon Elastic Container Registry

Private registry
Repositories
Features & Settings

Public registry
Repositories
Settings

ECR public gallery
Amazon ECS
Amazon EKS

Getting started
Documentation

Private repositories (2)

Search by repository substring

Repository name	URI	Created at	Tag immutability	Encryption type
inventory-backend	713881797197.dkr.ecr.us-east-1.amazonaws.com/inventory-backend	June 19, 2025, 18:01:16 (UTC+05.5)	Mutable	AES-256
inventory-frontend	713881797197.dkr.ecr.us-east-1.amazonaws.com/inventory-frontend	June 19, 2025, 18:01:15 (UTC+05.5)	Mutable	AES-256

View push commands Delete Actions Create repository

CloudShell Feedback

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28°C Mostly cloudy

Search

20:18:49 19-06-2025

3. Pipeline for application deployment

aws Services Search [Alt+S] United States (N. Virginia) juhi @ 235494811179-mm1

Developer Tools > CodePipeline > Pipelines > new-juhi-pipeline

new-juhi-pipeline

Edit Stop execution Create trigger Clone pipeline Release change

Pipeline Executions Triggers Settings Tags Stage

Source Build Deploy

cd5bec1e-1ee9-44b5-bb77-aec1114859b All actions succeeded.

Source

GitHub (via GitHub App) 28 minutes ago

444c90d4 Source: Update from ...

cd5bec1e-1ee9-44b5-bb77-aec1114859b All actions succeeded.

Build

AWS CodeBuild 25 minutes ago

444c90d4 Source: Update from ...

cd5bec1e-1ee9-44b5-bb77-aec1114859b All actions succeeded.

Deploy

Amazon EKS 28 minutes ago

444c90d4 Source: Update from ...

CloudShell Feedback

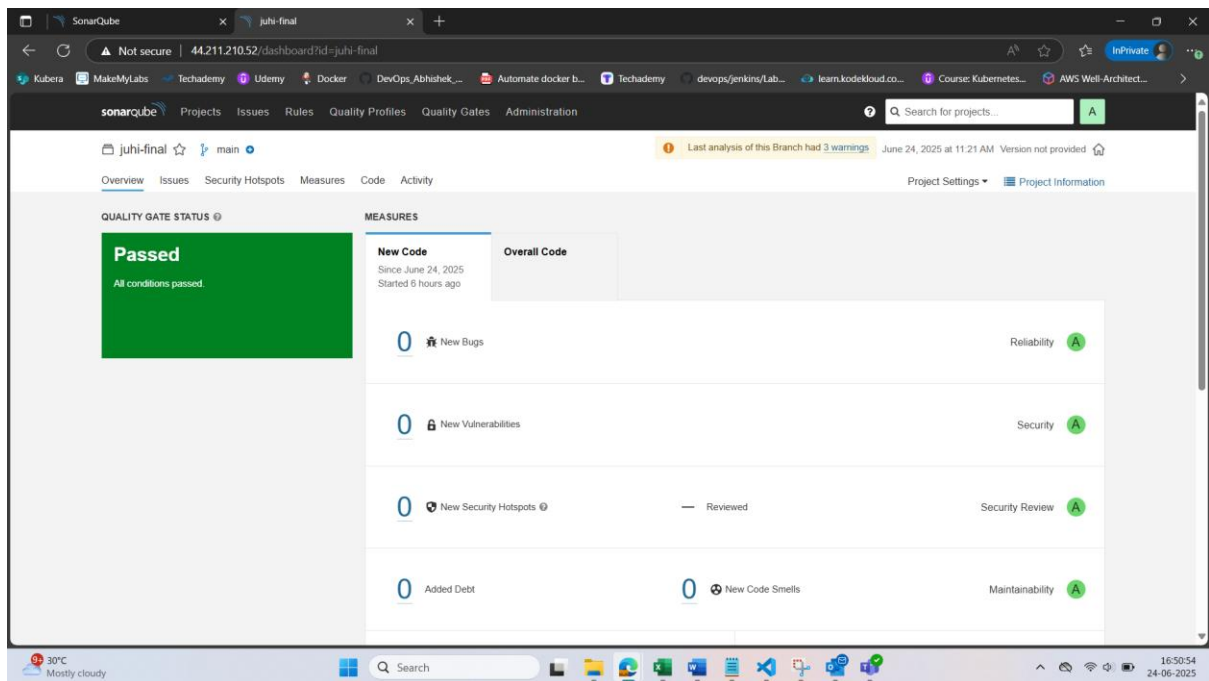
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30°C Mostly cloudy

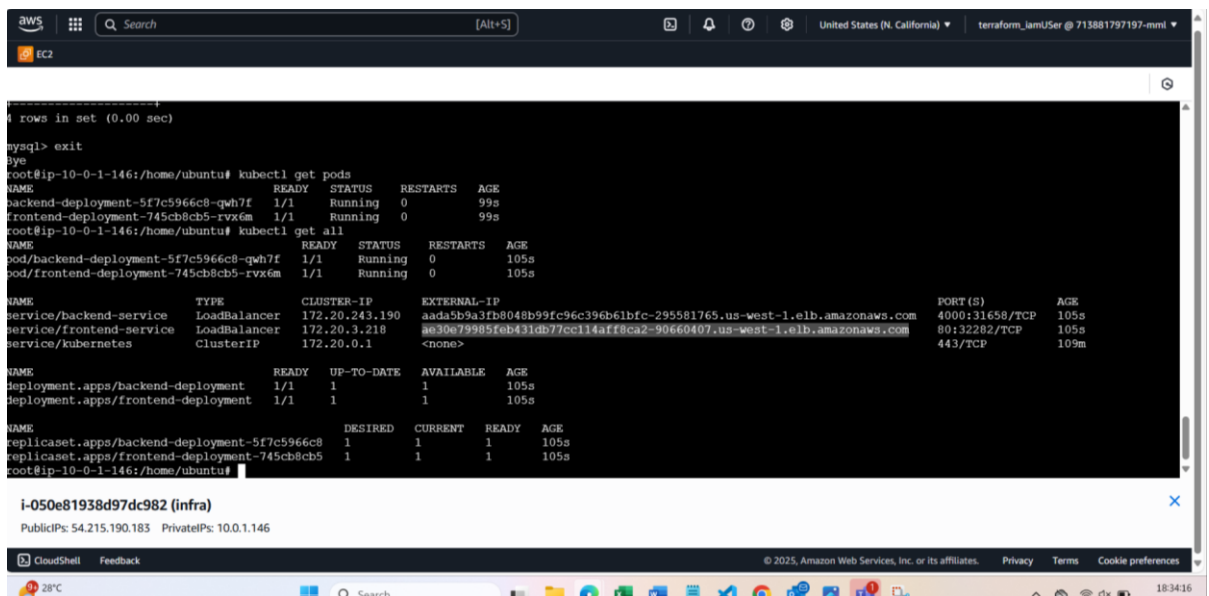
Search

14:36:04 22-06-2025

SonarQube – added in buildspec.yml



4. Check in ec2 instance everything pod and load balancer external dns to access the link



5. Application access through external-ip of frontend-service

Browser address bar: Not Secure ac58e3261614f4f909fdb2190713bb22-939646172.us-east-1.elb.amazonaws.com

Inventory Items

- pen - Quantity: 12
- books - Quantity: 3
- Juhi - Quantity: 3

7. Access through backend database

```
mysql> use inventory;
Database changed
mysql> show tables;
+-----+
| Tables_in_inventory |
+-----+
| clients              |
| items                |
+-----+
2 rows in set (0.01 sec)

mysql> select * from items;
+----+-----+-----+-----+
| id | name  | quantity | created_at |
+----+-----+-----+-----+
| 1  | pen   | 12      | 2025-06-19 14:20:33 |
| 2  | books | 3        | 2025-06-19 14:26:17 |
| 3  | Juhi  | 3        | 2025-06-19 14:29:03 |
+----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> 
```

Terraform (us-east-2)

1. pipeline – terraform infra

The screenshot displays the AWS CodePipeline console for a pipeline named 'juhi-terraform-infra'. The pipeline is in a successful state, indicated by green checkmarks. It consists of two stages: 'Source' and 'Build'. The 'Source' stage uses the 'GitHub (via GitHub App)' provider and has completed successfully. The 'Build' stage uses the 'AWS CodeBuild' provider and has also completed successfully. The console shows the pipeline's history, settings, and tags. The left sidebar contains navigation links for various AWS services and the CodePipeline console. The bottom of the screen shows the Windows taskbar with the date and time.

2. Terraform pipeline deployment application

The screenshot displays the AWS CodePipeline console for a pipeline named 'juhi-terraform-project'. The pipeline is in a successful state, indicated by green checkmarks. It consists of three stages: 'Source', 'Build', and 'Deploy'. The 'Source' stage uses the 'GitHub (via GitHub App)' provider and has completed successfully. The 'Build' stage uses the 'AWS CodeBuild' provider and has also completed successfully. The 'Deploy' stage uses the 'Amazon EKS' provider and has completed successfully. The console shows the pipeline's history, settings, and tags. The left sidebar contains navigation links for various AWS services and the CodePipeline console. The bottom of the screen shows the Windows taskbar with the date and time.

Application access through external-ip of frontend-service

And we can see the data from backend what items added

```
mysql> use inventory;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> select * from items;
+----+-----+-----+
| id | name      | quantity |
+----+-----+-----+
| 1  | test      | 5         |
| 2  | Sample Item | 3         |
| 3  | testUU     | 2345      |
| 4  | JBNHBYHGBG | 2345678   |
| 5  | books      | 5         |
| 6  | bags       | 5         |
| 7  | Shoes      | 3         |
| 8  | Phone      | 1         |
| 9  | Baggg      | 8         |
| 10 | Laptop     | 2         |
| 11 | Card       | 2         |
| 12 | Chair      | 3         |
| 13 | Mouse      | 9         |
| 14 | Balls      | 5         |
+----+-----+-----+
14 rows in set (0.00 sec)
```

setup monitoring on Kubernetes Cluster using Prometheus and Grafana

region – us-east-1

Pod

```
root@ip-10-0-11-146:/home/ubuntu# kubectl get pods -n prometheus
NAME                                                    READY   STATUS    RESTARTS   AGE
alertmanager-stable-kube-prometheus-sta-alertmanager-0 2/2     Running   0          3m19s
prometheus-stable-kube-prometheus-sta-prometheus-0     2/2     Running   0          3m19s
stable-grafana-56bdbb9b4b-gr9w9                        3/3     Running   0          3m23s
stable-kube-prometheus-sta-operator-66847554f8-4z7l6    1/1     Running   0          3m23s
stable-kube-state-metrics-7fc6b5c5d4-wdbfq             1/1     Running   0          3m23s
stable-prometheus-node-exporter-kdkzd                  1/1     Running   0          3m23s
stable-prometheus-node-exporter-wrxz7                  1/1     Running   0          3m23s
```

Svc

```
root@ip-10-0-11-146:/home/ubuntu# kubectl get svc -n prometheus
NAME                                TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)                                AGE
alertmanager-operated               ClusterIP    None          <none>         9093/TCP,9094/TCP,9094/UDP             3m25s
prometheus-operated                 ClusterIP    None          <none>         9090/TCP                                3m25s
stable-grafana                      ClusterIP    172.20.215.19 <none>         80/TCP                                  3m29s
stable-kube-prometheus-sta-alertmanager ClusterIP    172.20.254.168 <none>         9093/TCP,8080/TCP                      3m29s
stable-kube-prometheus-sta-operator ClusterIP    172.20.77.48   <none>         443/TCP                                              3m29s
stable-kube-prometheus-sta-prometheus ClusterIP    172.20.60.96   <none>         9090/TCP,8080/TCP                      3m29s
stable-kube-state-metrics            ClusterIP    172.20.166.118 <none>         8080/TCP                                      3m29s
stable-prometheus-node-exporter      ClusterIP    172.20.211.46  <none>         9100/TCP                                           3m29s
```

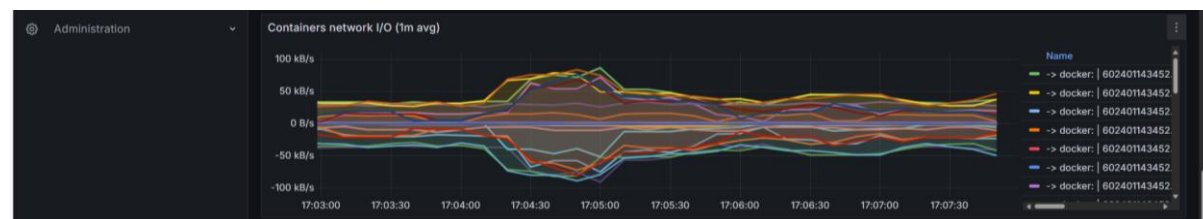
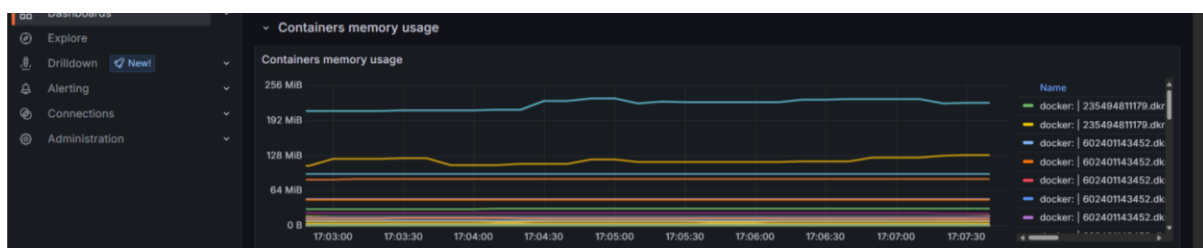
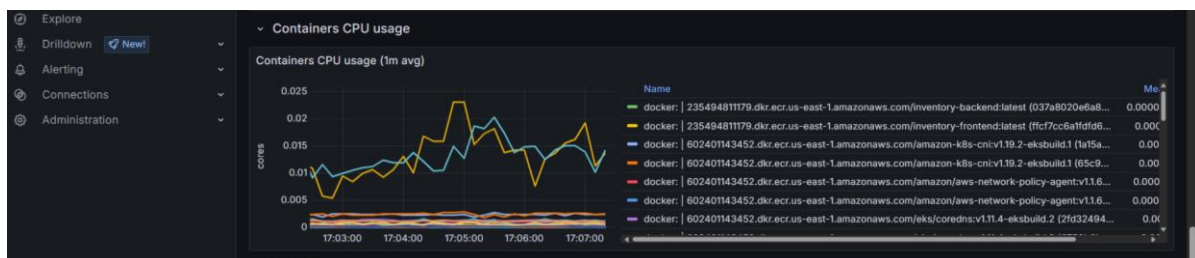
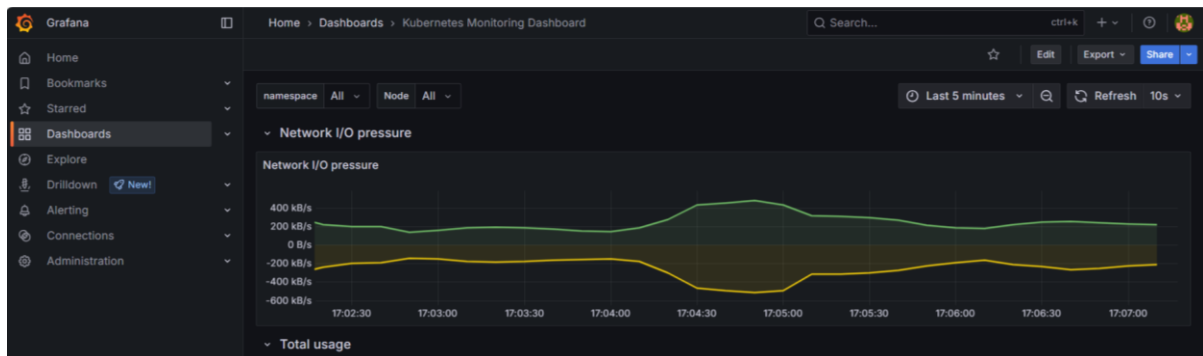

Load balancer

```
root@ip-10-0-11-146:/home/ubuntu# kubectl edit svc stable-grafana -n prometheus
service/stable-grafana edited
root@ip-10-0-11-146:/home/ubuntu# kubectl get svc -n prometheus
```

NAME	AGE	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)
alertmanager-operated	6m20s	ClusterIP	None	<none>	9093/TCP, 9094/TCP, 9094/UDP
prometheus-operated	6m20s	ClusterIP	None	<none>	9090/TCP
stable-grafana	6m24s	LoadBalancer	172.20.215.19	a432af93c9ab946f6843a810ec4caadf-1255529578.us-east-1.elb.amazonaws.com	80:32273/TCP
stable-kube-prometheus-sta-alertmanager	6m24s	ClusterIP	172.20.254.168	<none>	9093/TCP, 8080/TCP
stable-kube-prometheus-sta-operator	6m24s	ClusterIP	172.20.77.48	<none>	443/TCP
stable-kube-prometheus-sta-prometheus	6m24s	LoadBalancer	172.20.60.96	a7be0f946f8af4be785bbbd138900766-1896687863.us-east-1.elb.amazonaws.com	9090:31896/TCP, 8080/TCP
stable-kube-state-metrics	6m24s	ClusterIP	172.20.166.118	<none>	8080/TCP
stable-prometheus-node-exporter	6m24s	ClusterIP	172.20.211.46	<none>	9100/TCP

```
root@ip-10-0-11-146:/home/ubuntu#
```

Kubernetes Monitoring Dashboard - Dashboards - Grafana





Cloud watch - In us-east-2

1. (One-Time) Enable IAM OIDC Provider for Your EKS Cluster

```
eksctl utils associate-iam-oidc-provider \
  --cluster MyEKSCluster \
  --region us-east-2 \
  --approve
```

2. Create the IAM Policy for the Agent (One-Time Per Account)

```
cat <<EOF > cwagent-policy.json
```

```
{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": [
      "logs:PutLogEvents",
      "logs:DescribeLogStreams",
      "logs:DescribeLogGroups",
      "logs:CreateLogStream",
      "logs:CreateLogGroup",
      "logs:PutRetentionPolicy",
```

```

    "cloudwatch:PutMetricData"
  ],
  "Resource": "*"
}
EOF

```

```

aws iam create-policy \
  --policy-name CloudWatchAgentServerPolicy \
  --policy-document file://cwagent-policy.json

```

3. Create the IAM Service Account for the Agent

```

eksctl create iamserviceaccount \
  --cluster MyEKSCluster \
  --namespace amazon-cloudwatch \
  --name cloudwatch-agent \
  --attach-policy-arn arn:aws:iam::<your-account-id>:policy/CloudWatchAgentServerPolicy \
  --approve \
  --region us-east-2

```

4. Install the CloudWatch Observability EKS Add-on (This is the AWS-recommended, auto-managed way!)

```

aws eks create-addon \
  --cluster-name MyEKSCluster \
  --addon-name amazon-cloudwatch-observability \
  --resolve-conflicts OVERWRITE \
  --region us-east-2

```

5. Watch for Pod Readiness

```
kubectl get pods -n amazon-cloudwatch -w
```

```

aws iam attach-role-policy \
  --role-name EKSNodeGroupRole-v2 \
  --policy-arn arn:aws:iam::aws:policy/CloudWatchAgentServerPolicy

```

pods

```

root@ip-10-0-2-225:/home/ubuntu# kubectl get pods -n amazon-cloudwatch

```

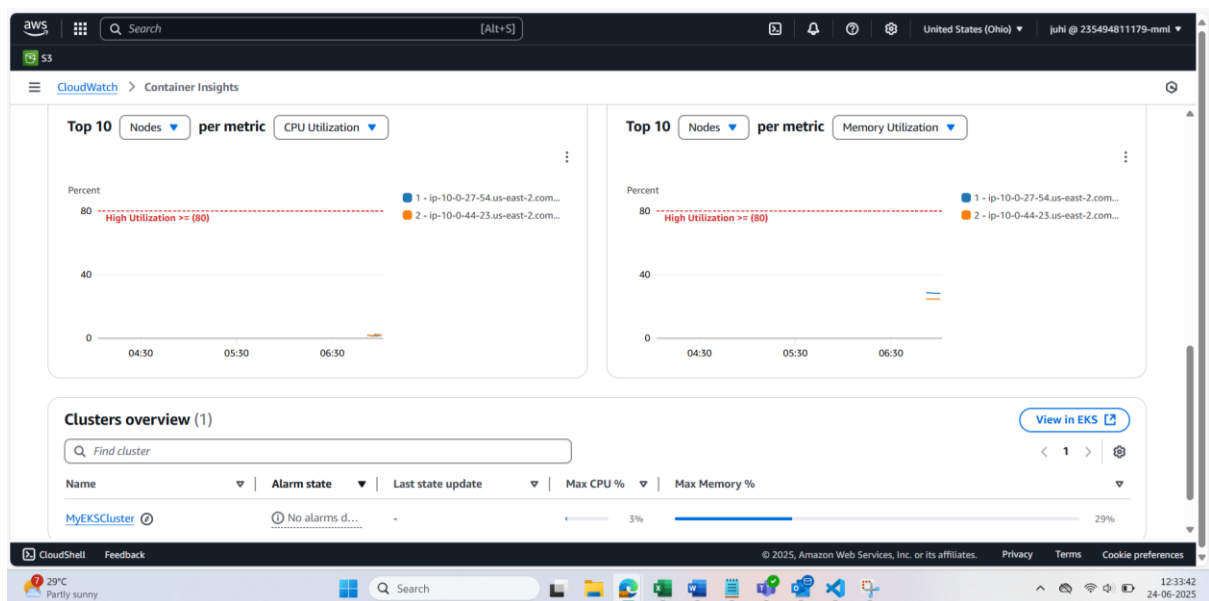
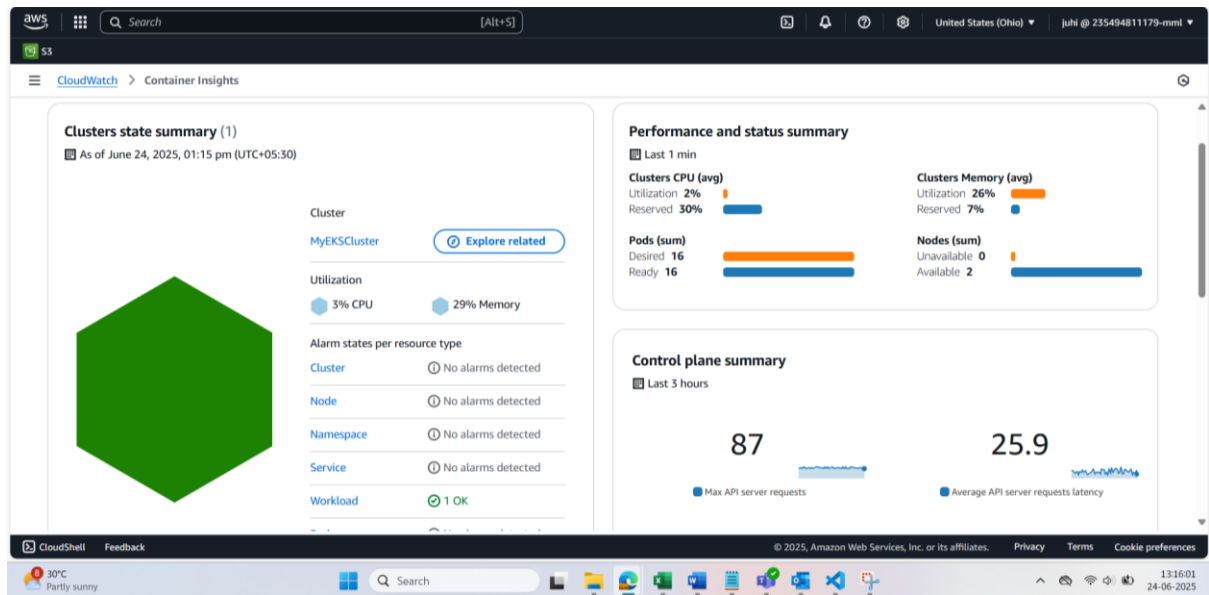
NAME	READY	STATUS	RESTARTS	AGE
amazon-cloudwatch-observability-controller-manager-666d994jpspc	1/1	Running	0	20m
cloudwatch-agent-69z7k	1/1	Running	0	20m
cloudwatch-agent-gq2sx	1/1	Running	0	20m
fluent-bit-2k65f	1/1	Running	0	20m
fluent-bit-9xws7	1/1	Running	0	20m

```

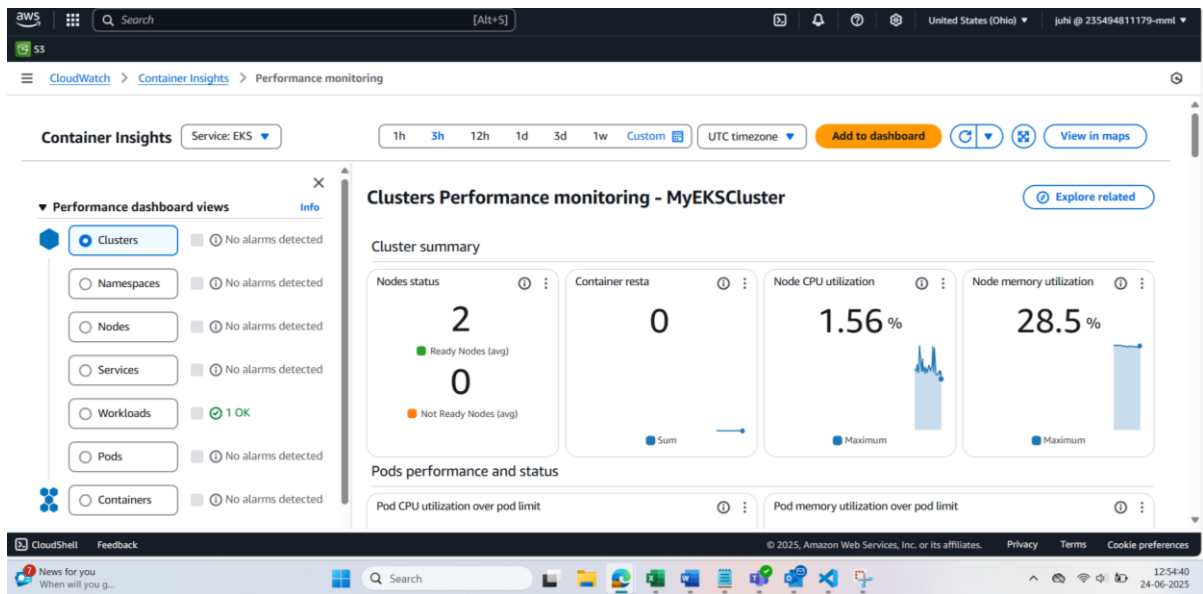
root@ip-10-0-2-225:/home/ubuntu#

```

Database – container insights

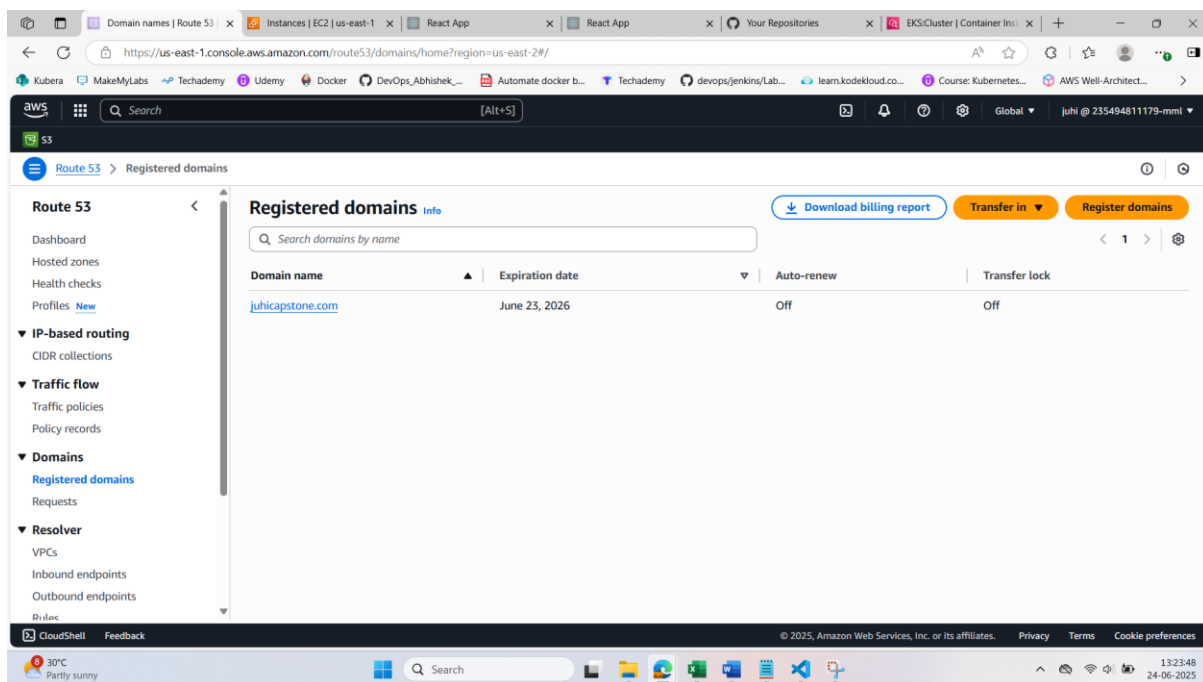


Performances



Route 53 for disaster recovery and high availability

- Domain juhicapstone.com



Health checks for both frontend load balancer

The screenshot shows the AWS Route 53 Health Checks console. The left sidebar contains navigation links for Route 53, Dashboard, Hosted zones, Health checks, Profiles, IP-based routing, Traffic flow, Domains, and Resolver. The main content area is titled "Health checks (4)" and includes a search bar and a "Create health check" button. Below this is a table listing the health checks:

ID	Name	Details	Status in last 24 hours	Current s...	Alarm	Actions
1ac19ca8-6a9...	secondary-fron...	http://a1fbc10...		Healthy	None, ...	⋮
3f8f1967-291a...	instance-2	http://44.219...		Unhealthy	None, ...	⋮
7fd0f7c4-0eb5...	instance-1	http://34.231...		Unhealthy	None, ...	⋮
8719bc09-b9c...	primary-fronte...	http://a14589...		Healthy	None, ...	⋮

At the bottom, it states "2 health checks selected".

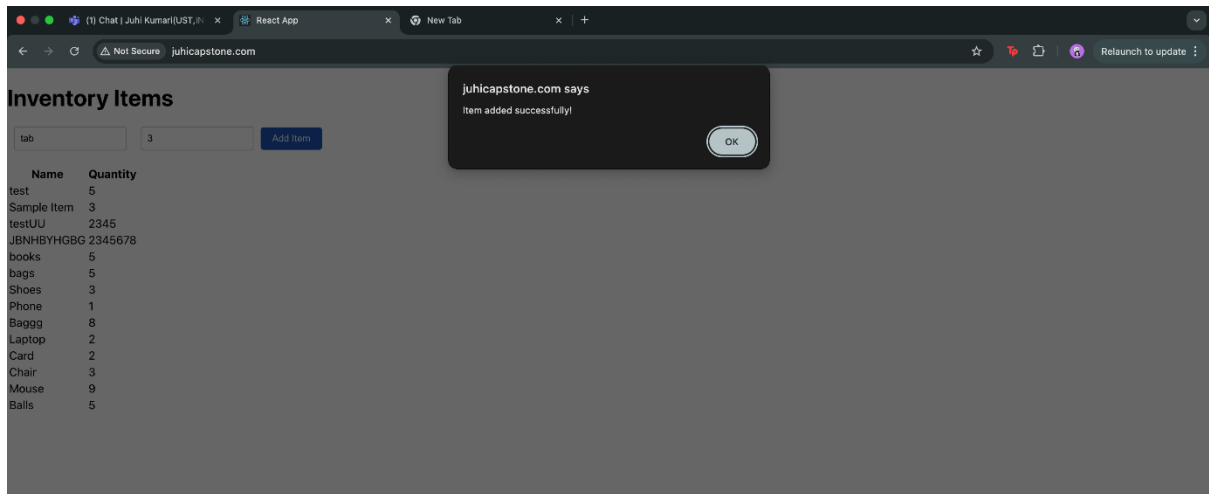
Records added for both primary and secondary

The screenshot shows the AWS Route 53 Hosted Zones console for the domain "juhicapstone.com". The left sidebar is the same as the previous screenshot. The main content area is titled "Hosted zone details" and includes buttons for "Delete zone", "Test record", "Configure query logging", and "Edit hosted zone". Below this is a section for "Records (4)" with a search bar and filters for "Type", "Routing p...", and "Alias". The table lists the DNS records:

Record ...	Type	Routin...	Differ...	Alias	Value/Route traffic to	TTL (s...	Health ...	Evalua...
juhicapsto...	A	Failover	Primary	Yes	dualstack.a145896a22ef54f...	-	8719bc09...	Yes
juhicapsto...	A	Failover	Secondary	Yes	dualstack.a1fbc10898dd14fe...	-	1ac19ca8-...	Yes
juhicapsto...	NS	Simple	-	No	ns-451.awsdns-56.com. ns-893.awsdns-47.net. ns-1296.awsdns-34.org. ns-1577.awsdns-05.co.uk.	172800	-	-
juhicapsto...	SOA	Simple	-	No	ns-451.awsdns-56.com. awsd...	900	-	-

Application is only we can access

Added items



Items visible

