

ECS Fargate Nginx Server Deployment with ALB And EFS using CodePipeline (Task 7)



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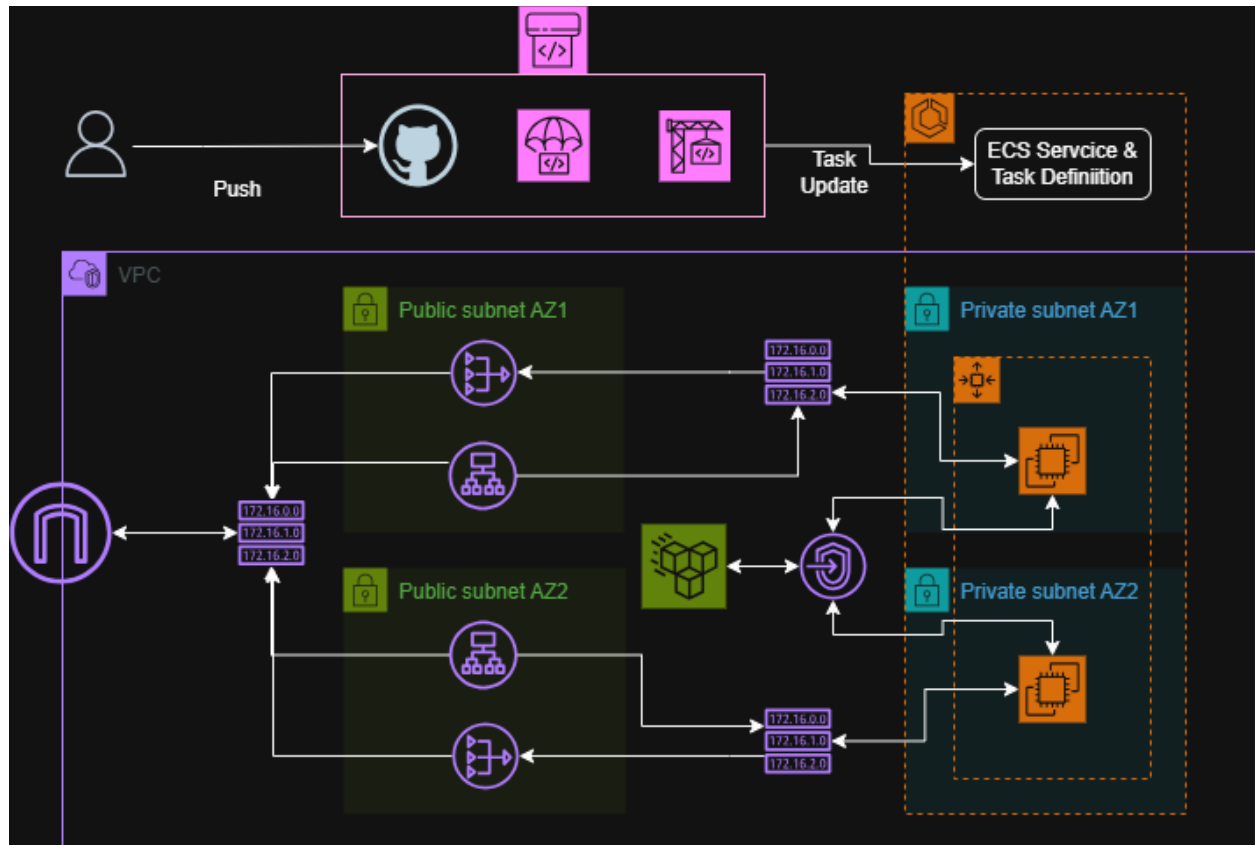
Task Description:

This task will be a guide on setting up a Node Application server with a highly available architecture on AWS ECS Cluster Spread over multiple availability zones. An internet facing Load Balancer will be set up in front of the ECS cluster to listen to traffic and balance it upon tasks. AWS EFS will be used for persistence in shared storage to prevent data loss. The application will automatically be deployed using the AWS CodePipeline.

Architecture Diagram: 2

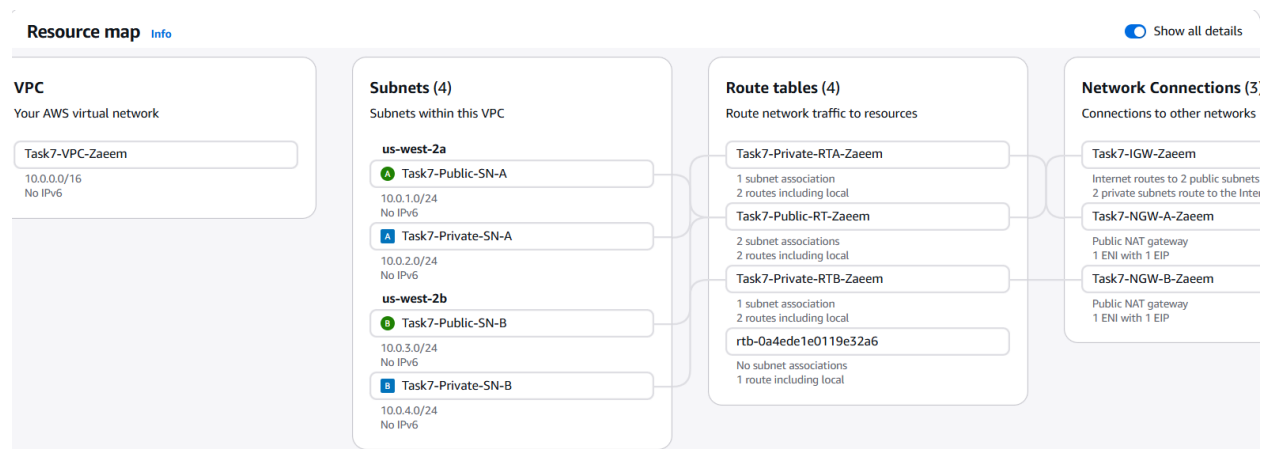
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Architecture Diagram:



Task7.1: Create basic networking infrastructure

- Create and configure a VPC
 - CIDR Block: 10.0.0.0/16
- Create and configure Subnets
 - Public Subnet A (us-west-2a), CIDR: 10.0.1.0/24
 - Private Subnet A (us-west-2a), CIDR: 10.0.2.0/24
 - Public Subnet B (us-west-2b), CIDR: 10.0.3.0/24
 - Private Subnet A (us-west-2a), CIDR: 10.0.4.0/24
- Create and configure NAT Gateways
 - NAT Gateway A in Public Subnet A
 - NAT Gateway B in Public Subnet B
- Create and configure Internet Gateway
 - Create and attach to the project's VPC
- Create and configure Route Tables
 - Public Route Table, Outbound rule: 0.0.0.0/0 -> IGW, attach to Public SN A&B
 - Private Route Table A, Outbound Rule: 0.0.0.0/0 -> NGW attach to Private SN A
 - Private Route Table B, Outbound Rule: 0.0.0.0/0 -> NGW attach to Private SN B



Task7.2: Create EFS File System and Mount Points

- Create File System:
 - Name: Task7-EFS-Zaeem
 - Encryption: Yes
- Create Access Points:
 - File System: Task7-EFS-Zaeem
 - Name: Task7-EFS-AP-Zaeem
 - Root Directory: /
 - POSIX UID 1000, GID 1000
 - Owner UID 1000, Owner GID: 1000
 - AP Permissions: 0755
- Create Mount Points:
 - AZ us-west-2a, Subnet Private, SG Task7-EFS-SG-Zaeem
 - AZ us-west-2b, Subnet Private, SG Task7-EFS-SG-Zaeem

Task7-EFS-Zaeem (fs-04cc00938133363d8)

Delete Attach

General

Edit

Amazon resource name (ARN)

arn:aws:elasticfilesystem:us-west-2:504649076991:file-system/fs-04cc00938133363d8

Performance mode

General Purpose

Throughput mode

Elastic

Lifecycle management

Transition into Infrequent Access (IA): 30 day(s) since last access

Transition into Archive: 90 day(s) since last access

Transition into Standard: None

Availability zone

Regional

Automatic backups

Enabled

Encrypted

745bede3-4d17-4e30-84fc-db434ebff4dd (aws/elasticfilesystem)

File system state

Available

DNS name

fs-04cc00938133363d8.efs.us-west-2.amazonaws.com

Replication overwrite protection

Enabled

Metered size Monitoring Tags File system policy Access points Network Replication

Network

Manage

Availability zone (AZ-ID)	Mount target ID	Subnet ID	VPC ID	Mount target state	IPv4 address	IPv6 address	Network interface ID	Security groups
us-west-2a (usw2-az1)	fsmt-Occdf81d0be3b743	subnet-0782f9eb2fa43c008	VPC-0433be6a79e22a9cd	Available	10.0.2.108	N/A	eni-0a03ace4dbb757da5	sg-0c5437c8d99adda51 (Task7-EFS-SG-Zaeem)

Task7.3: Build Docker Image and push to ECR

- Build Docker Image:
 - Got to source code directory.
 - Create DockerFile.yaml and write instructions
 - Use command to build image: *docker image -t nodejs:latest -f DockerFile.yaml .*
 - Use to tag image: *docker tag nodejs:latest <ecr uri>/zaem/task7:latest*
 - Use command to push to ECR: *docker push <ecr uri>/zaem/task7:latest*

```
PS C:\Users\zaem\Documents\Innovation Lab - Cloudeelligent\Task7\node-js-sample-master> aws ecr get-login-password --region us-west-2 | docker login --username AWS --password stdin 504649076991.dkr.ecr.us-west-2.amazonaws.com
Login Succeeded
PS C:\Users\zaem\Documents\Innovation Lab - Cloudeelligent\Task7\node-js-sample-master> docker build -t zaem/task7 -f .\DockerFile.yaml .
[+] Building 1.9s (10/10) FINISHED
-> [internal] load build definition from DockerFile.yaml
-> => transferring dockerfile: 199B 0.0s
-> [internal] load metadata for docker.io/library/node:18-alpine 0.8s
-> [internal] load .dockerignore 0.0s
-> => transferring context: 2B 0.0s
-> [1/5] FROM docker.io/library/node:18-alpine@sha256:8d6421d663bdc28fd3ebc498332f249011d11894558840a35cb9bc4b8ca09d9e 0.1s
-> => resolve docker.io/library/node:18-alpine@sha256:8d6421d663bdc28fd3ebc498332f249011d11894558840a35cb9bc4b8ca09d9e 0.1s
-> [internal] load build context 0.1s
-> => transferring context: 41.69kB 0.1s
-> CACHED [2/5] WORKDIR /usr/src/app 0.0s
-> CACHED [3/5] COPY package*.json ./ 0.0s
-> CACHED [4/5] RUN npm install --production 0.0s
-> CACHED [5/5] COPY . . 0.0s
-> exporting to image 0.7s
-> => exporting layers 0.0s
-> => exporting manifest sha256:5fd261775cbca9c4c003335a6079530c64cfc9660818527c9fb229c3dbffed2c 0.0s
-> => exporting config sha256:8bac0da5511541294c8b506ca4f45c3c28c7bd2e1b027897e914e30c7779dace 0.0s
-> => exporting attestation manifest sha256:1fd7b12cde085e2049395a83d33e53fc300c5e6413132dac4eeefb92ae836a6 0.0s
-> => exporting manifest list sha256:730e95da8cf21f547b178ffa99695da51324667e6b5b17c8d81335f30b942ed8 0.0s
-> => naming to docker-desktop://dashboard/build/desktop-linux/desktop-linux/8m81chhrz9cw6bzn42bbeqo6m (ctrl + click) 0.0s
View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/8m81chhrz9cw6bzn42bbeqo6m
PS C:\Users\zaem\Documents\Innovation Lab - Cloudeelligent\Task7\node-js-sample-master> docker tag zaem/task7:latest 504649076991.dkr.ecr.us-west-2.amazonaws.com/zaem/task7:latest
PS C:\Users\zaem\Documents\Innovation Lab - Cloudeelligent\Task7\node-js-sample-master> docker push 504649076991.dkr.ecr.us-west-2.amazonaws.com/zaem/task7:latest
The push refers to repository [504649076991.dkr.ecr.us-west-2.amazonaws.com/zaem/task7]
79b00165671e: Pushed
a2a0fd246c4ff: Pushed
1e5a4c89cee5: Pushed
25ff2da83641: Pushed
96895a348ee2: Pushed
d071dde83405: Pushed
779b8e4cf363: Pushed
8c0c28931c7: Pushed
f18232174bc9: Pushed
latest: digest: sha256:730e95da8cf21f547b178ffa99695da51324667e6b5b17c8d81335f30b942ed8 size: 856
PS C:\Users\zaem\Documents\Innovation Lab - Cloudeelligent\Task7\node-js-sample-master>
```

Task7.4: Create an ECS + EC2 Cluster and dependencies

- Create and Configure a Launch Template
 - Name: Task7-EC2-LT-Zaeem
 - Container instance AMI: Amazon Linux 2023
 - Instance Type: t3.micro
 - SSH Key pair: Task7-EC2
 - Subnet: Do not include
 - Availability Zone: Do not include
 - Security Group: Task7-EC2-SG-Zaeem
 - Storage Volume: 8GiB Default EBS volume

Task7-EC2-LT-Zaeem (lt-077e5c92913adb9f93) Actions Delete template

Launch template details

Launch template ID lt-077e5c92913adb9f93	Launch template name Task7-EC2-LT-Zaeem	Default version 11	Owner arn:aws:sts::504649076991:assumed-role/IAMReservedSQ_AdministratorAccess_d0a7cfeb88c39771/zaeem
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Launch template version details Actions Delete template version

Version: 11 (Default) | Description: Task7-EC2-LT-Zaeemv11 | Date created: 2025-11-27T18:33:47.000Z | Created by: arn:aws:sts::504649076991:assumed-role/IAMReservedSQ_AdministratorAccess_d0a7cfeb88c39771/zaeem

Instance details | Storage | Resource tags | Network interfaces | Advanced details

AMI ID ami-07b09ad3acff070f5f	Instance type t2.small	Availability Zone -	Availability Zone ID -
Key pair name -	Security groups -	Security group IDs sg-04aa2d576725cbbaf	

- Create and Configure Application Load Balancer
 - Name: Task7-ALB-Zaeem
 - Scheme: Internet Facing
 - Load Balancer IP: IPv4
 - VPC: Task7-VPC-Zaeem
 - AZ and Subnets: AZ1 Public SN & AZ2 Public SN
 - Security Groups: Task7-ALB-SG-Zaeem
 - Listener Protocol HTTP, Port 80
 - Routing Action: Forward to TG
 - Register Targets: None

Task7-ALB-Zaeem Actions

Details

Load balancer type Application	Status Active	VPC vpc-0433b6fa79e22a9cd	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z1H1FLSHABSF5	Availability Zones subnet-051ea1befe4a66111 us-west-2b (usw2-az2) subnet-009c5176c4efa3d45 us-west-2a (usw2-az1)	Date created November 27, 2025, 00:21 (UTC+05:00)
Load balancer ARN arn:aws:elasticloadbalancing:us-west-2:504649076991:loadbalancer/app/Task7-ALB-Zaeem/a40289be568abcc2	DNS name Task7-ALB-Zaeem-856788729.us-west-2.elb.amazonaws.com (A Record)		

Listeners and rules | Network mapping | Resource map | Security | Monitoring | Integrations | Attributes | Capacity | Tags

Listeners and rules (1) Manage rules Manage listener Add listener

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Protocol/Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS	Trust store
HTTP:8000	Forward to target group Task7-TG-Zaeem 1 (100%) Target group stickiness: Off	1 rule	ARN	Not applicable	Not applicable	Not applicable	Not applicable

- Create and Configure Auto Scaling Group
 - Name: Task7-ASG-Zaeem
 - Launch Template: Task7-EC2-LT-Zaeem
 - VPC: Task7-VPC-Zaeem
 - AZ: Private SN A & Private SN B
 - Load Balancer: Attach to existing
 - Attach to an Existing Target Group
 - Group Size: Desired capacity 2, min 1, max 3
 - No scing policies

Task7-ASG-Zaeem Capacity overview

arn:aws:autoscaling:us-west-2:504649076991:autoScalingGroup:1b960b70-f4c8-4432-a1f9-175783d7d963:autoScalingGroupName/Task7-ASG-Zaeem

Desired capacity

2

Scaling limits (Min - Max)

1 - 3

Desired capacity type

Units (number of instances)

Status

-

Date created

Thu Nov 27 2025 23:46:33 GMT+0500 (Pakistan Standard Time)

Details

Integrations

Automatic scaling

Instance management

Instance refresh

Activity

Monitoring

Tags - moved

Launch template

Launch template

lt-077e5c92913adb9f93

Task7-EC2-LT-Zaeem

Version

Default

Description

Task7-EC2-LT-Zaeemv11

View details in the launch template console

AMI ID

ami-07b09ad3acff070f5f

Instance type

t2.small

Owner

arn:aws:sts::504649076991:assumed-role/AWSReservedSSO_AdministratorAccess_d0a7cfeb8c39771/zaeem

Security groups

-

Security group IDs

sg-04aa2d576725c8baaf

Create time

Thu Nov 27 2025 23:33:47 GMT+0500 (Pakistan Standard Time)

Storage (volumes)

-

Key pair name

-

Request Spot Instances

No

Network

Availability Zones

usw2-az1 (us-west-2a)
usw2-az2 (us-west-2b)

Subnet ID

subnet-0782f9eb2fa43c008

subnet-0616bd5d5b0b48b225

Availability Zone distribution

Balanced best effort

- Create and Configure ECS Cluster
 - Name: Task7-ECS-Cluster-Zaeem
 - Infrastructure: Fargate and self-managed instances
 - Select Task7-ASG-Zaeem Auto Scaling Group

Task7-ECS-Cluster-Zaeem

ASG

Last updated

November 28, 2025, 01:46 (UTC-5:00)

Actions

Create with Express Mode

Cluster overview

ARN

arn:aws:ecs:us-west-2:504649076991:cluster/Task7-EC-S-Cluster-Zaeem

Status

Active

CloudWatch monitoring

Container Insights with enhanced observability

View in CloudWatch

Registered container instances

2

Services

Draining

-

Active

1

Tasks

Pending

-

Running

2

Services

Tasks

Infrastructure

Metrics

Scheduled tasks

Configuration

Event history

Tags

Services (1) info

Filter services by value

Filter launch type

Any launch type

Filter scheduling strategy

Any scheduling strategy

Filter resource management type

Any resource management type

Service name

ARN

Status

Scheduling strategy

Task definition

Deployments and tasks

Task7-NodeJS-Zaeem-service-4mwnlttv

arn:aws:ecs:us-west-2:504649076991:cluster/Task7-EC-S-Cluster-Zaeem

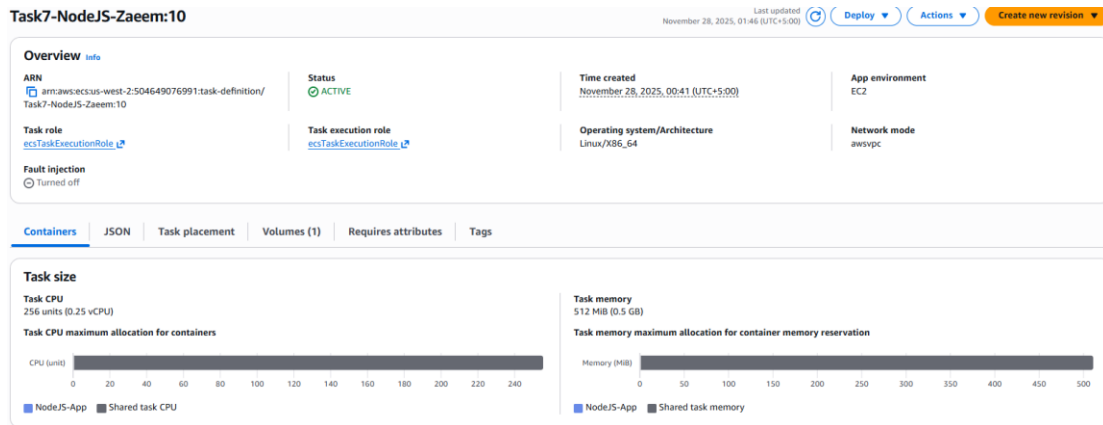
Active

REPLICA

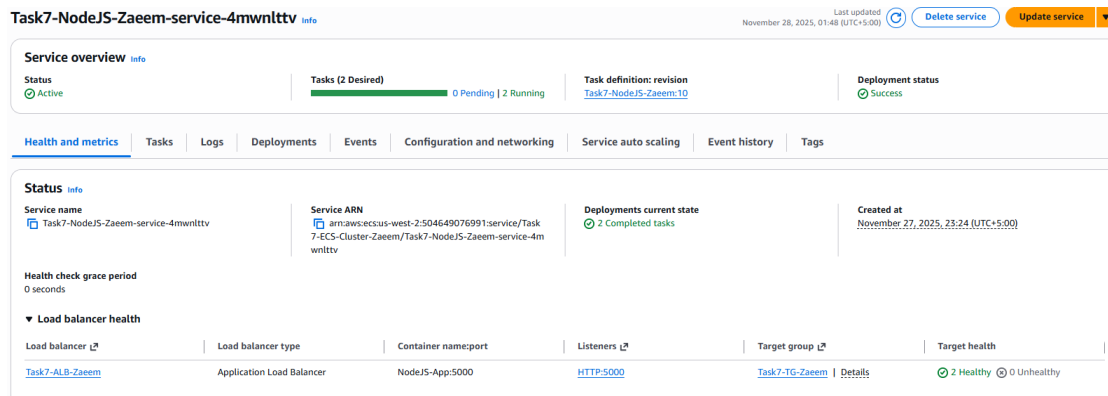
Task7-NodeJS-Zaeem:10

2/2 Tasks running

- Create a Task Definition for the ECS Cluster
 - Name: Task7-NodeJS-Zaeem
 - Infrastructure Requirements: Amazon EC2 Instances
 - OS&Arch: Linux/x64, Network Mode: bridge
 - vCPU: 1, Memory: 3GB
 - Select Task role and Task Execution Roles
 - Container 1 (essential): Name NodeJS-App, ECR Image URI, Port Mapping 3000 to 80 for accessing the nodejs application
 - Storage: Configure at task definition, Vol Type: EFS, Enter EFS ID, Enter AP ID

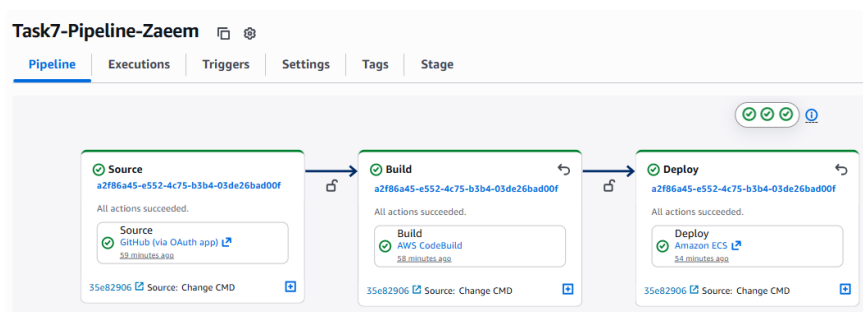


- Create ECS Service to run Task Definition:
 - Family: Task7-NodeJS-Zaeem
 - Svc Name: Task7-NodeJS-Zaeem-Service
 - Compute option: Capacity Provider Strategy, custom: base 2, weight 1
 - Scheduling Strategy: Replica
 - Desired Task: 2
 - Load Balancer: Task7-VPC-Zaeem, Type: ALB, Container: NodeJS-App, Load Balancer: Task7-ALB-Zaeem



Task7.5: Creating the CodePipeline

- Basic Pipeline Configuration:
 - Use the Build Pipeline button to create a new pipeline.
 - Category: Custom Pipeline
 - Pipeline Name: Task7-Pipeline-Zaeem
 - Execution mode: Queued
 - Service Role: Create new
- Source Stage:
 - Source Provider: GitHub (OAuth via app)
 - Connect to GitHub and allow the pipeline connection
- Build Stage:
 - Build Provider: Other (AWS CodeBuild)
 - Create a new project
 - Set Environment Variables:
 - REGION="us-west-2"
 - ACCOUNT_ID="504649076991"
 - REPO_NAME="zaem/task7"
 - IMAGE_TAG="latest"
 - Build Type: Single Build
 - Region: United States Oregon
 - Input Artifacts: SourceArtifact
 - Place the buildspec.yml file in the root of repo
- Deploy Stage (skipping the test stage):
 - Deploy Provider: Amazon ECS
 - Region: United States (Ohio)
 - Input Artifacts: BuildArtifact
 - Place the buildspec.yml file in the root of repo
 - Cluster Name: Task7-ECS-Cluster-Zaeem
 - Service Name: Task7-NodeJS-Zaeem-Service
 - Deployment Time Out: 15 min
 - Create Pipeline



Task7.6: Verification and Testing

- Any commits to the GitHub code repository will trigger the pipeline

a2f86a45	✔ Succeeded	Source - 35e82906_e8* Change CMD to use index.js instead of app.js	Webhook - am:aws:codepipeline:us-west-2:504649076991:webhook:Task7PipelineZaeem--Source- -zaemattqueInnovationLabTa--1246274366	Nov 28, 2025 11:55 PM (UTC+5:00)	4 minutes 46 seconds	Nov 29, 2025 12:00 AM (UTC+5:00)
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- The tasks deployed can be seen under the ECS Service

Task7-ECS-Cluster-Zaeem ASG Last updated November 29, 2025, 00:57 (UTC+5:00) Actions Create with Express Mode

Cluster overview

ARN arn:aws:ecs:us-west-2:504649076991:cluster/Task7-EC5-Cluster-Zaeem	Status ✔ Active	CloudWatch monitoring ✔ Container Insights with enhanced observability View in CloudWatch	Registered container instances 2
Services	Tasks		
Draining -	Pending -	Running 2	

Services (1) Info

Filter services by value

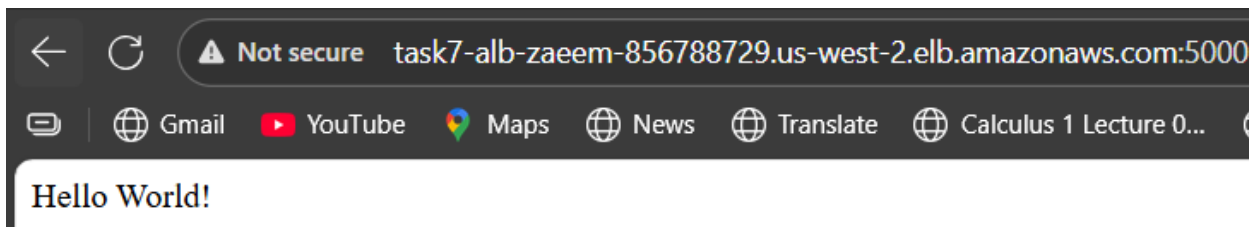
Filter launch type: Any launch type

Filter scheduling strategy: Any scheduling strategy

Filter resource management type: Any resource management type

Service name	ARN	Status	Scheduling strategy	Task definition	Deployments and tasks	Last
Task7-NodeJS-Zaeem-Service	arn:aws:ecs:us-west-2:504649076991:cluster/Task7-EC5-Cluster-Zaeem:service/Task7-NodeJS-Zaeem-Service	✔ Active	REPLICA	Task7-NodeJS-Zaeem:13	2/2 Tasks running	✔

- The webpage of the NodeJS application can be accessed at the DNS of the ALB



Task7.7: Problems Faced

- The resources of the containers in the task definition should be less than that of the resources set in the Launch Template for the instances otherwise the containers will not be placed and will be stuck in the pending state.
- We must specify artifacts output in the buildspec.yml file to make sure that they are saved in the S3 bucket and passed onto the Deploy Stage otherwise we get an S3 permission error which is not related to permissions at all.
- The pipeline role must have the correct policies attached to carry out all the stages.