Project Title:

Empowerment Hub: A Flask-Based Motivational Web Application Featuring DevOps Practices.

Project Objective:

To develop, containerize, and deploy a Flask-based web app with a focus on implementing **DevOps methodologies**, including:

- Version control
- Docker-based containerization
- Infrastructure as Code (IaC) via Terraform
- Kubernetes deployment
- CI/CD pipelines using jenkins
- Cloud observability and monitoring

Technologies used:-

Component	**Tools / Frameworks**
Web Framework	Flask (Python)
UI/Styling	HTML5, CSS3, JavaScript
Containerization	Docker
container registry	Docker hub
Orchestration	Kubernetes (Minikube)
CI/CD	Jenkins
Cloud Platform	AWS EC2, CloudWatch
IaC	Terraform
Monitoring Tools	CloudWatch
Version control system & IDE	Git, GitHub, VS Code

Application Structure

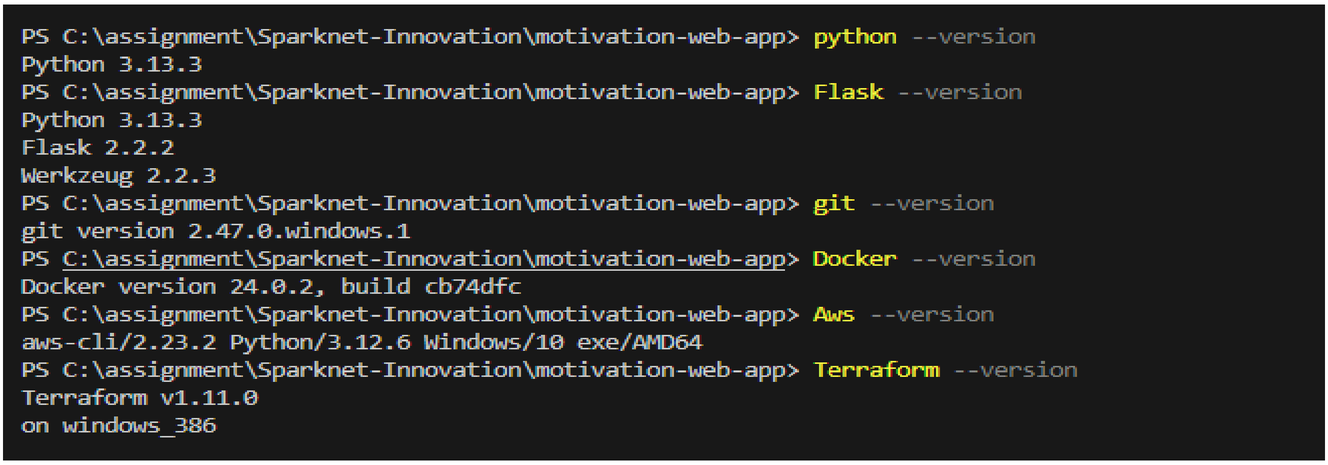
Pages:

- Home: Landing page with motivational messaging.
- About: Overview of the application's purpose.
- Quotes: Inspirational quotes collection.
- Blog: Articles on growth and self-development.
- Contact: Form for user interaction- feedback or suggestions.

Github url : https://github.com/jyotiraul/sparknet-motivation-web-app.git

Phase 1 : Application Setup and cloud Deployment.

1. Local Environment Setup



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app> python --version
Python 3.13.3
PS C:\assignment\Sparknet-Innovation\motivation-web-app> Flask --version
Python 3.13.3
Flask 2.2.2
Werkzeug 2.2.3
PS C:\assignment\Sparknet-Innovation\motivation-web-app> git --version
git version 2.47.0.windows.1
PS C:\assignment\Sparknet-Innovation\motivation-web-app> Docker --version
Docker version 24.0.2, build cb74dfc
PS C:\assignment\Sparknet-Innovation\motivation-web-app> Aws --version
aws-cli/2.23.2 Python/3.12.6 Windows/10 exe/AMD64
PS C:\assignment\Sparknet-Innovation\motivation-web-app> Terraform --version
Terraform v1.11.0
on windows_386
```

1.Clone the Repository

git clone https://github.com/sparknet-innovations/motivation-web-app.git

cd motivation-web-app

2.Create a Virtual Environment

python -m venv venv

3. **Activate the Virtual Environment**

venv\Scripts\activate

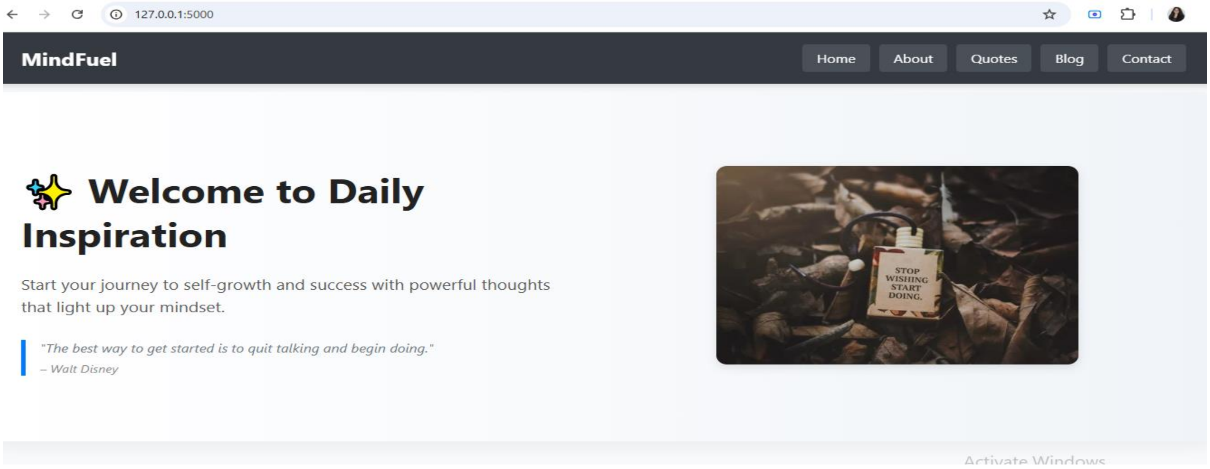
4.Install Dependencies

pip install -r requirements.txt

5.Run the Application

python run.py

6. Access the Application Open your web browser and go to http://127.0.0.1:5000



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> *"The best way to get started is to quit talking and begin doing."*
> *– Walt Disney*

2.Create a New Git Repository on GitHub and Push Your Code

-Go to GitHub and create a new repository.

-Copy the repository URL (e.g., https://github.com/your-username/your-repo.git).

-In your local project directory, run the following commands:

git init

git add .

git commit -m "Initial commit"

git remote add origin <your-repo-url>

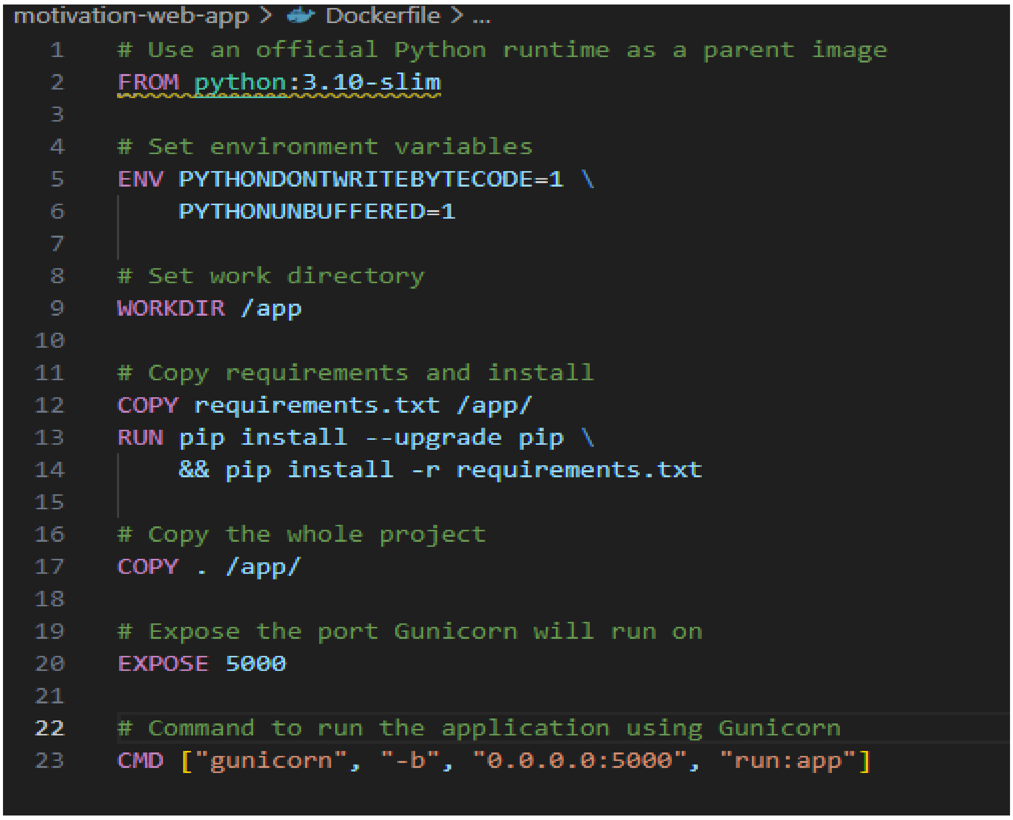
git push -u origin main

2. Dockerization of the Flask Application

- Docker Desktop is up and running on your laptop.

-Create a Dockerfile

This Dockerfile builds a lightweight container image for a Python web application running with Gunicorn on port 5000.



```
# Use an official Python runtime as a parent image
FROM python:3.10-slim

# Set environment variables
ENV PYTHONDONTWRITEBYTECODE=1 \
    PYTHONUNBUFFERED=1

# Set work directory
WORKDIR /app

# Copy requirements and install
COPY requirements.txt /app/
RUN pip install --upgrade pip \
    && pip install -r requirements.txt

# Copy the whole project
COPY . /app/

# Expose the port Gunicorn will run on
EXPOSE 5000

# Command to run the application using Gunicorn
CMD ["gunicorn", "-b", "0.0.0.0:5000", "run:app"]
```

Explanation of Dockerfile:

1. Base Image FROM python:3.10-slim

- Uses the official Python 3.10 slim image as the base.

- The slim variant keeps the image small by excluding unnecessary tools.

2. Environment Variables

PYTHONDONTWRITEBYTECODE=1
Prevents Python from writing .pyc files, reducing unnecessary files in the container.

PYTHONUNBUFFERED=1
Ensures Python output is sent straight to the terminal without buffering, useful for real-time logging.

3. **Working Directory** WORKDIR /app

Sets /app as the working directory inside the container.

All subsequent commands run relative to this directory.

4. **Copy and Install Dependencies**

COPY requirements.txt /app/ →Copies the requirements.txt file to /app.

RUN pip install --upgrade pip \ → -Upgrades pip to the latest version.

&& pip install -r requirements.txt → Installs all Python dependencies listed in requirements.txt

5. **Copy Application Code**

COPY . /app/ → Copies the entire project directory into /app inside the container.

6. **Expose Port** EXPOSE 5000

Declares that the container listens on port 5000.

This is the port Gunicorn will bind to and serve the app on.

7. Run the Application

Gunicorn (Green Unicorn) is a Python Web Server Gateway Interface (WSGI) HTTP server for running Python web applications). Gunicorn is a production-ready server that can serve Python web apps efficiently. Gunicorn is designed to handle multiple concurrent requests and is more stable.

CMD ["gunicorn", "-b", "0.0.0.0:5000", "run:app"]

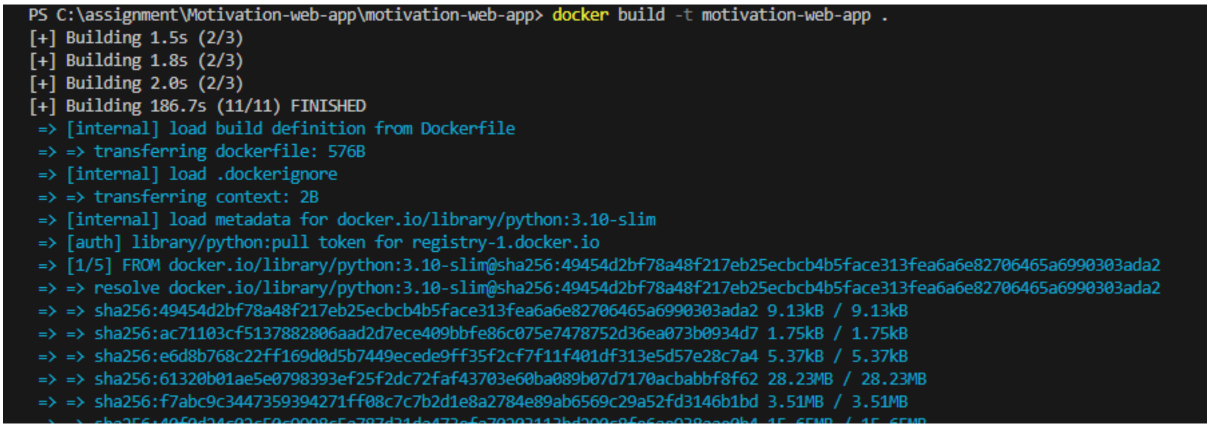
-Runs the app using Gunicorn WSGI HTTP server.

-Binds Gunicorn to all network interfaces (0.0.0.0) on port 5000.

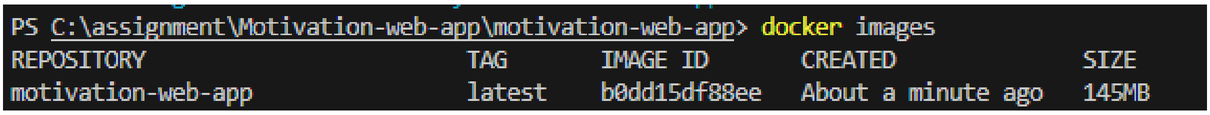
-Assumes the Flask app instance is called app inside the Python module/file named run.py.

Build Docker image –> creates a Docker image for your web application based on the instructions defined in your Dockerfile.

-- docker build -t motivation-web-app .



```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker build -t motivation-web-app .
[+] Building 1.5s (2/3)
[+] Building 1.8s (2/3)
[+] Building 2.0s (2/3)
[+] Building 186.7s (11/11) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 576B
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load metadata for docker.io/library/python:3.10-slim
 => [auth] library/python:pull token for registry-1.docker.io
 => [1/5] FROM docker.io/library/python:3.10-slim@sha256:49454d2bf78a48f217eb25ecbcb4b5face313fea6a6e82706465a6990303ada2
 => => resolve docker.io/library/python:3.10-slim@sha256:49454d2bf78a48f217eb25ecbcb4b5face313fea6a6e82706465a6990303ada2
 => => sha256:49454d2bf78a48f217eb25ecbcb4b5face313fea6a6e82706465a6990303ada2 9.13kB / 9.13kB
 => => sha256:ac71103cf5137882806aad2d7ece409bbfe86c075e7478752d36ea073b0934d7 1.75kB / 1.75kB
 => => sha256:e6d8b768c22ff169d0d5b7449ecede9ff35f2cf7f11f401df313e5d57e28c7a4 5.37kB / 5.37kB
 => => sha256:61320b01ae5e0798393ef25f2dc72faf43703e60ba089b07d7170acbabbf8f62 28.23MB / 28.23MB
 => => sha256:f7abc9c3447359394271ff08c7c7b2d1e8a2784e89ab6569c29a52fd3146b1bd 3.51MB / 3.51MB
```



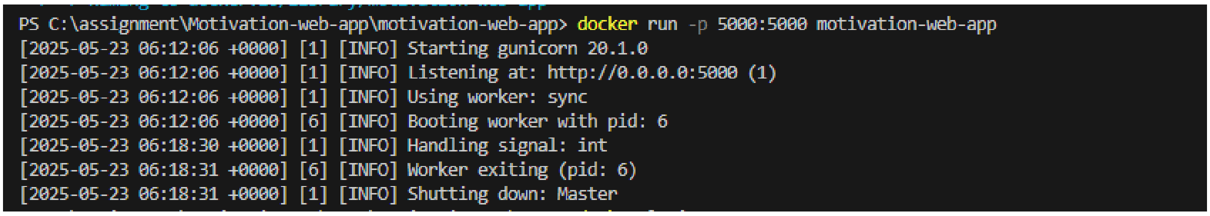
```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker images
REPOSITORY                         TAG       IMAGE ID       CREATED              SIZE
motivation-web-app                 latest    b0dd15df88ee   About a minute ago   145MB
```

Run the application on -- **docker run -p 5000:5000 motivation-web-app**

→ docker run: Runs a new container from an image.

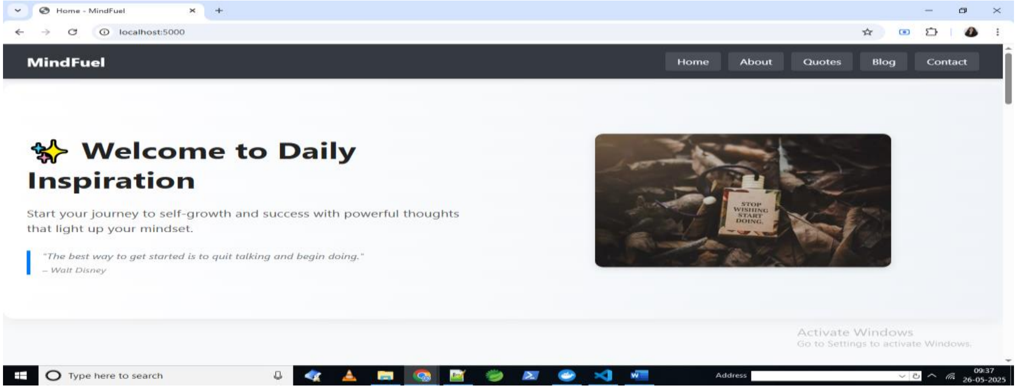
→ -p 5000:5000: Maps port 5000 on your host to port 5000 inside the container.
This allows you to access the web app from your browser at http://localhost:5000.

→ motivation-web-app: The name (tag) of the Docker image.



```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker run -p 5000:5000 motivation-web-app
[2025-05-23 06:12:06 +0000] [1] [INFO] Starting gunicorn 20.1.0
[2025-05-23 06:12:06 +0000] [1] [INFO] Listening at: http://0.0.0.0:5000 (1)
[2025-05-23 06:12:06 +0000] [1] [INFO] Using worker: sync
[2025-05-23 06:12:06 +0000] [6] [INFO] Booting worker with pid: 6
[2025-05-23 06:18:30 +0000] [1] [INFO] Handling signal: int
[2025-05-23 06:18:31 +0000] [6] [INFO] Worker exiting (pid: 6)
[2025-05-23 06:18:31 +0000] [1] [INFO] Shutting down: Master
```

Output: localhost:5000



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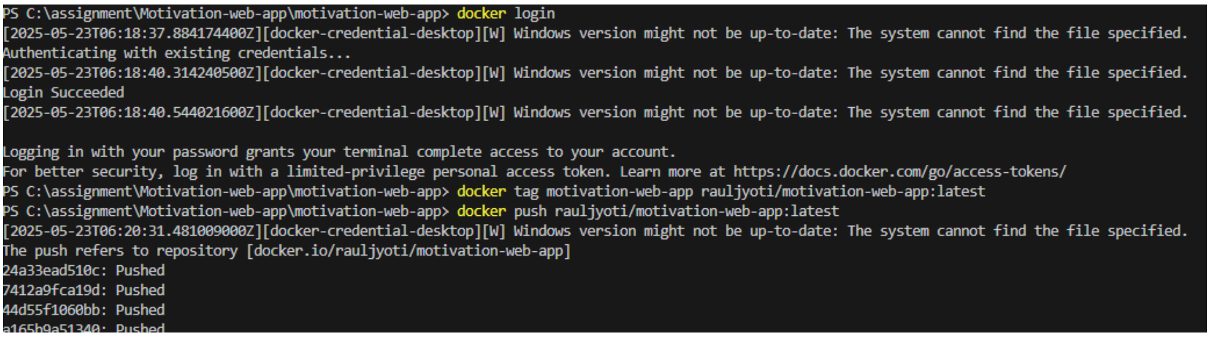
– Walt Disney

Push image to docker hub-

docker login

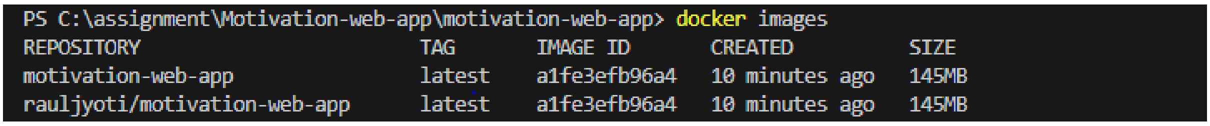
docker tag motivation-web-app rauljyoti/motivation-web-app:latest

docker push rauljyoti/motivation-web-app:latest



```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker login
[2025-05-23T06:18:37.884174400Z][docker-credential-desktop][W] Windows version might not be up-to-date: The system cannot find the file specified.
Authenticating with existing credentials...
[2025-05-23T06:18:40.314240500Z][docker-credential-desktop][W] Windows version might not be up-to-date: The system cannot find the file specified.
Login Succeeded
[2025-05-23T06:18:40.544021600Z][docker-credential-desktop][W] Windows version might not be up-to-date: The system cannot find the file specified.

Logging in with your password grants your terminal complete access to your account.
For better security, log in with a limited-privilege personal access token. Learn more at https://docs.docker.com/go/access-tokens/
PS C:\assignment\Motivation-web-app\motivation-web-app> docker tag motivation-web-app rauljyoti/motivation-web-app:latest
PS C:\assignment\Motivation-web-app\motivation-web-app> docker push rauljyoti/motivation-web-app:latest
[2025-05-23T06:20:31.481009000Z][docker-credential-desktop][W] Windows version might not be up-to-date: The system cannot find the file specified.
The push refers to repository [docker.io/rauljyoti/motivation-web-app]
24a33ead510c: Pushed
7412a9fca19d: Pushed
44d55f1060bb: Pushed
a165b9a51340: Pushed
```

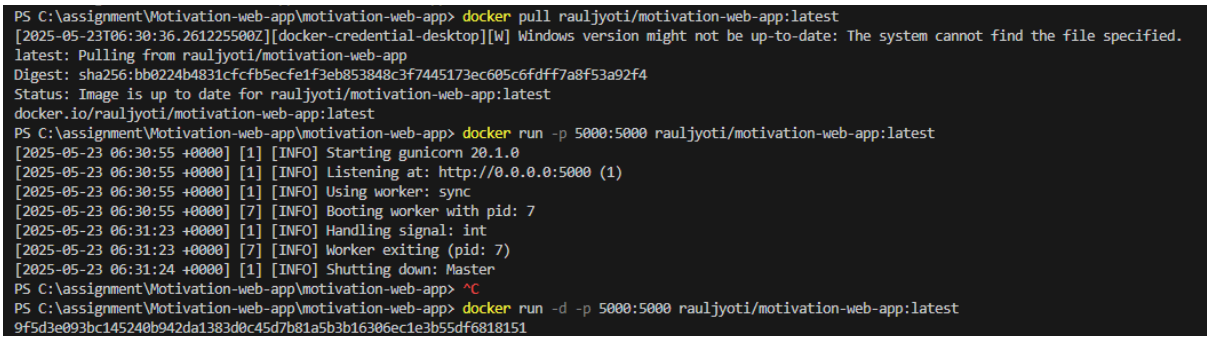


```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker images
REPOSITORY                     TAG       IMAGE ID       CREATED          SIZE
motivation-web-app             latest    a1fe3efb96a4   10 minutes ago   145MB
rauljyoti/motivation-web-app   latest    a1fe3efb96a4   10 minutes ago   145MB
```

Pull the image from Docker Hub and verify that it's working correctly

Docker pull rauljyoti/motivation-web-app:latest

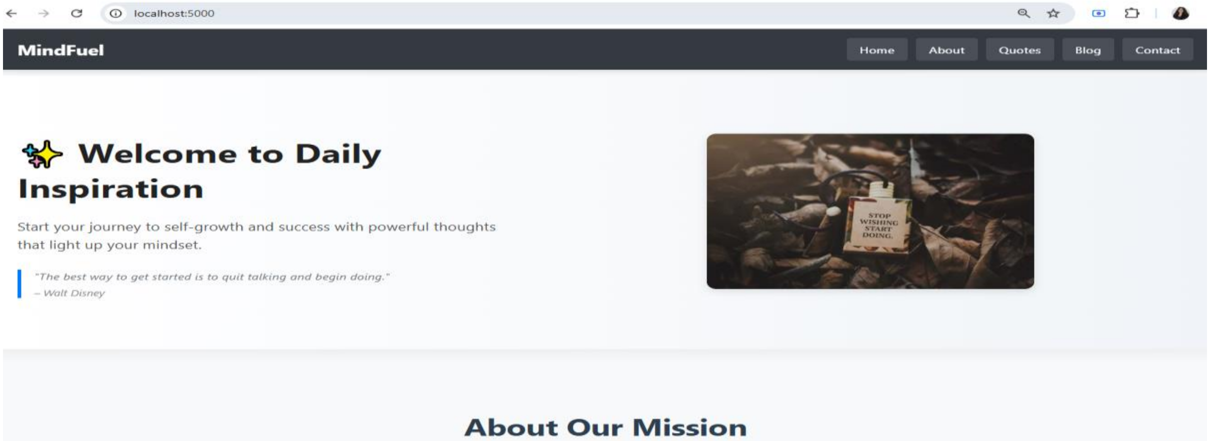
docker run -d -p 5000:5000 rauljyoti/motivation-web-app:latest



```
PS C:\assignment\Motivation-web-app\motivation-web-app> docker pull rauljyoti/motivation-web-app:latest
[2025-05-23T06:30:36.261225500Z][docker-credential-desktop][W] Windows version might not be up-to-date: The system cannot find the file specified.
latest: Pulling from rauljyoti/motivation-web-app
Digest: sha256:bb0224b4831cfcfb5ecfe1f3eb853848c3f7445173ec605c6fdff7a8f53a92f4
Status: Image is up to date for rauljyoti/motivation-web-app:latest
docker.io/rauljyoti/motivation-web-app:latest
PS C:\assignment\Motivation-web-app\motivation-web-app> docker run -p 5000:5000 rauljyoti/motivation-web-app:latest
[2025-05-23 06:30:55 +0000] [1] [INFO] Starting gunicorn 20.1.0
[2025-05-23 06:30:55 +0000] [1] [INFO] Listening at: http://0.0.0.0:5000 (1)
[2025-05-23 06:30:55 +0000] [1] [INFO] Using worker: sync
[2025-05-23 06:30:55 +0000] [7] [INFO] Booting worker with pid: 7
[2025-05-23 06:31:23 +0000] [1] [INFO] Handling signal: int
[2025-05-23 06:31:23 +0000] [7] [INFO] Worker exiting (pid: 7)
[2025-05-23 06:31:24 +0000] [1] [INFO] Shutting down: Master
PS C:\assignment\Motivation-web-app\motivation-web-app> ^C
PS C:\assignment\Motivation-web-app\motivation-web-app> docker run -d -p 5000:5000 rauljyoti/motivation-web-app:latest
9f5d3e093bc145240b942da1383d0c45d7b81a5b3b16306ec1e3b55df6818151
```

Application is running on : localhost:5000

Screenshots of each implemented route/pages--



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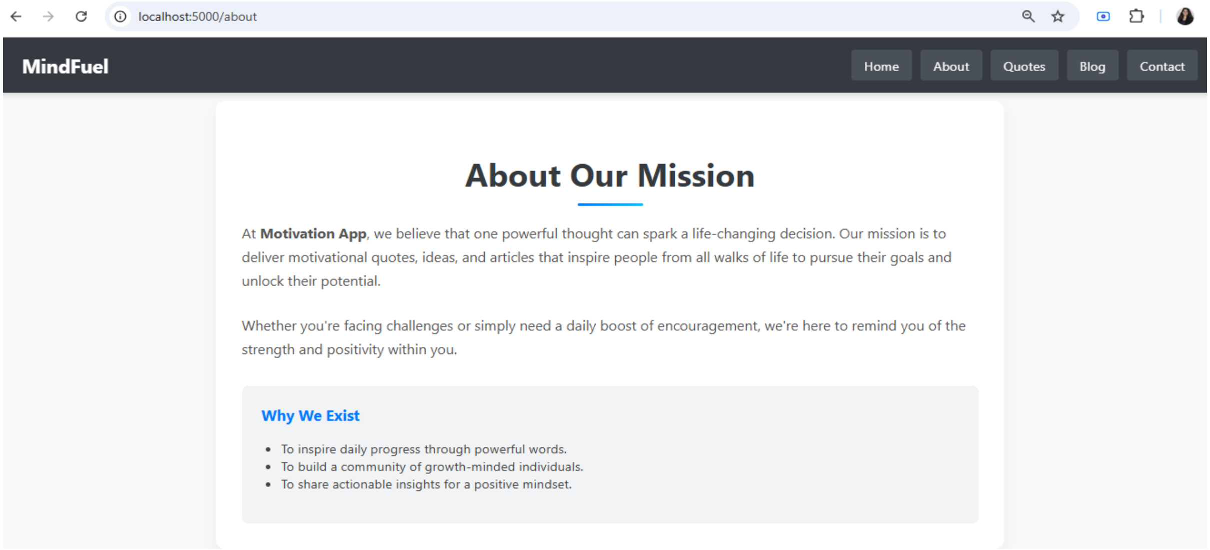
– Walt Disney

About Our Mission



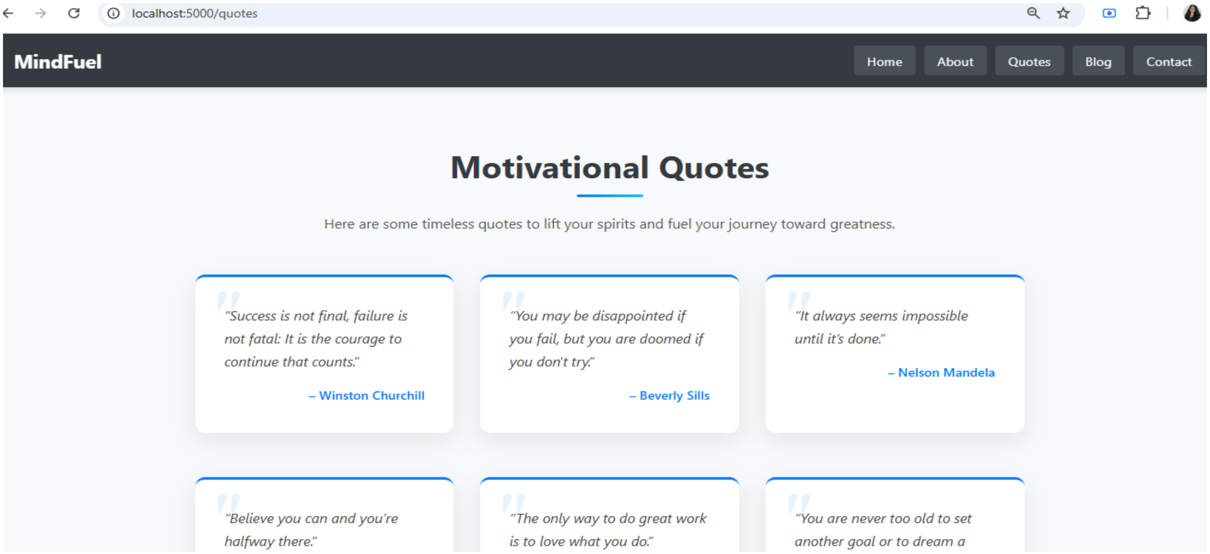
About Our Mission

At **Motivation App**, we believe that one powerful thought can spark a life-changing decision. Our mission is to deliver motivational quotes, ideas, and articles that inspire people from all walks of life to pursue their goals and unlock their potential.

Whether you're facing challenges or simply need a daily boost of encouragement, we're here to remind you of the strength and positivity within you.

Why We Exist

- To inspire daily progress through powerful words.
- To build a community of growth-minded individuals.
- To share actionable insights for a positive mindset.



Motivational Quotes

Here are some timeless quotes to lift your spirits and fuel your journey toward greatness.

"Success is not final, failure is not fatal: It is the courage to continue that counts."

– Winston Churchill

"You may be disappointed if you fail, but you are doomed if you don't try."

– Beverly Sills

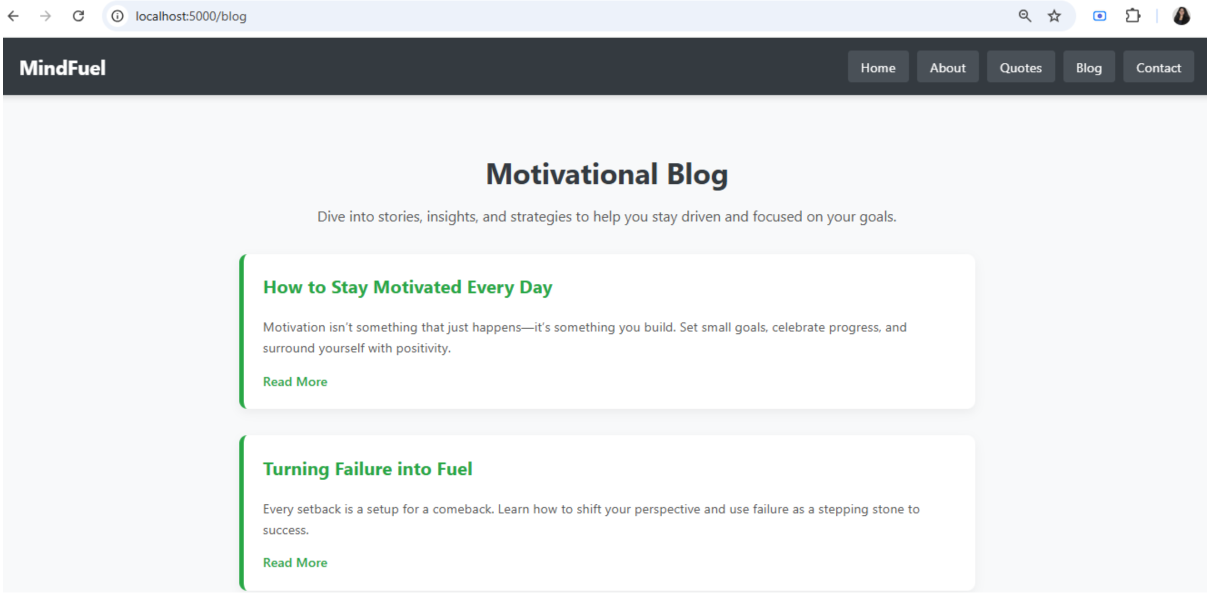
"It always seems impossible until it's done."

– Nelson Mandela

"Believe you can and you're halfway there."

"The only way to do great work is to love what you do."

"You are never too old to set another goal or to dream a



Motivational Blog

Dive into stories, insights, and strategies to help you stay driven and focused on your goals.

How to Stay Motivated Every Day

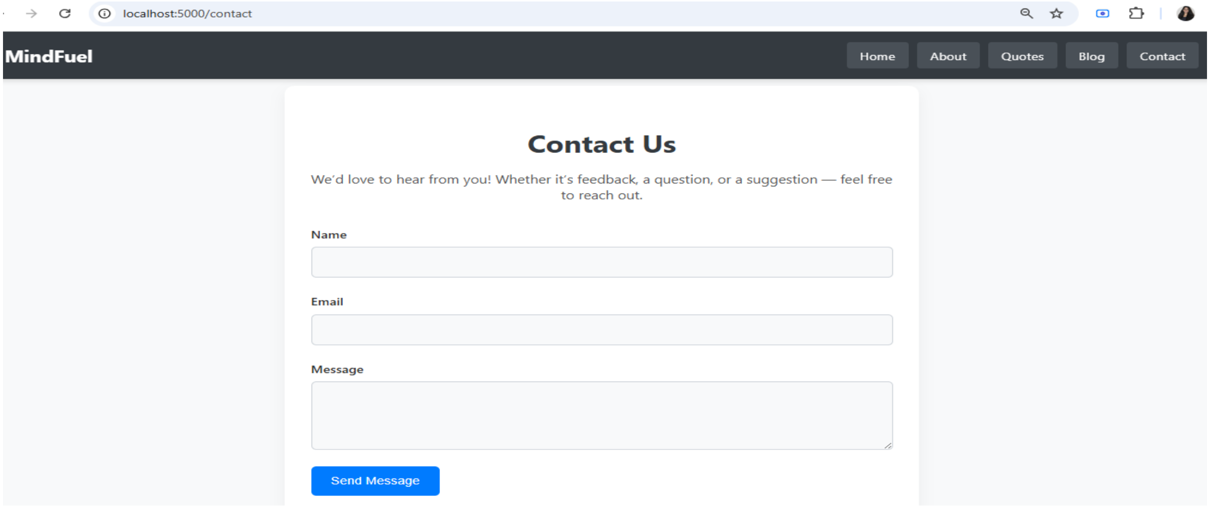
Motivation isn't something that just happens—it's something you build. Set small goals, celebrate progress, and surround yourself with positivity.

Read More

Turning Failure into Fuel

Every setback is a setup for a comeback. Learn how to shift your perspective and use failure as a stepping stone to success.

Read More



Contact Us

We'd love to hear from you! Whether it's feedback, a question, or a suggestion — feel free to reach out.

Name

Email

Message

3. Deployment using Kubernetes

Deployment using minikube for local orchestration.

1.deployment.yml - Defines the desired state for a set of Pods running your application. It manages updates, scaling, and ensures the specified number of replicas are always running.

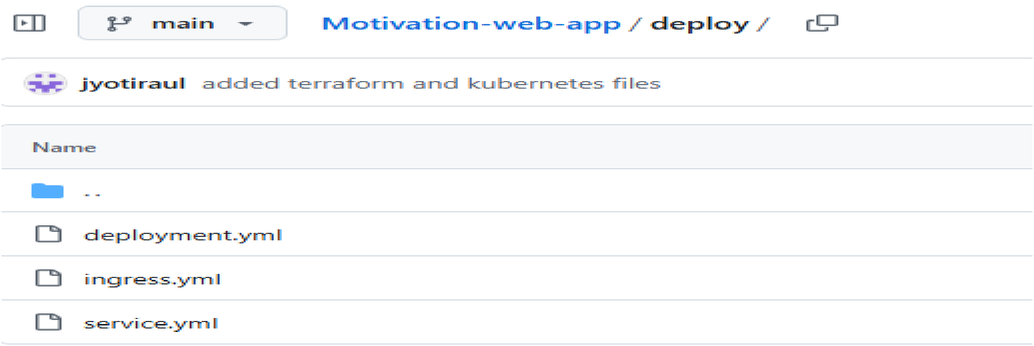
Purpose: Automates the creation and management of application Pods.

2.service.yml - Exposes your deployment internally (ClusterIP) or externally (NodePort/LoadBalancer) so other components or users can access it.

Purpose: Provides stable networking and load balancing for your Pods.

3.ingress.yml - Manages external access to your services, typically via HTTP/HTTPS. It defines routing rules, hostnames, and TLS configurations.

Purpose: Acts as an entry point for external traffic, routing requests to the appropriate services.



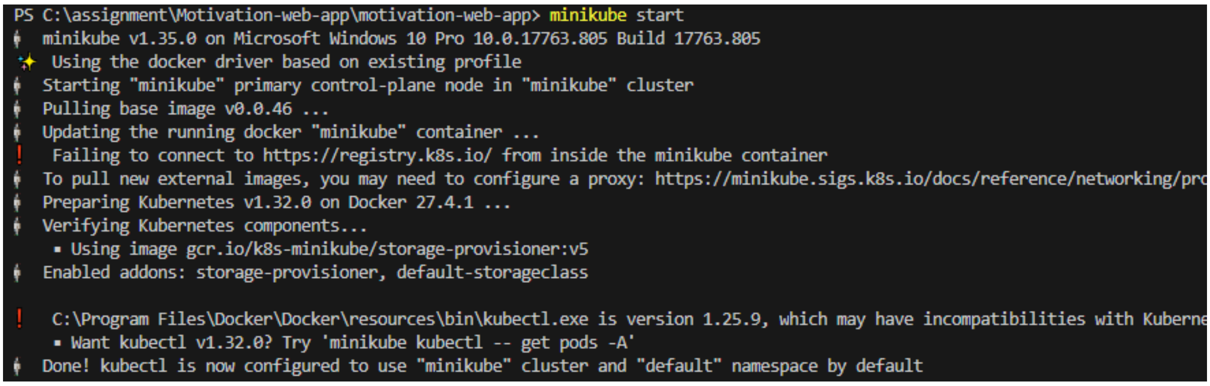
jyotiraul added terraform and kubernetes files

Name
..
deployment.yml
ingress.yml
service.yml

Note: Ensure Docker Desktop is running

Install minikube https://minikube.sigs.k8s.io/docs/start/?arch=%2Fwindows%2Fx86-64%2Fstable%2F.exe+download

minikube start



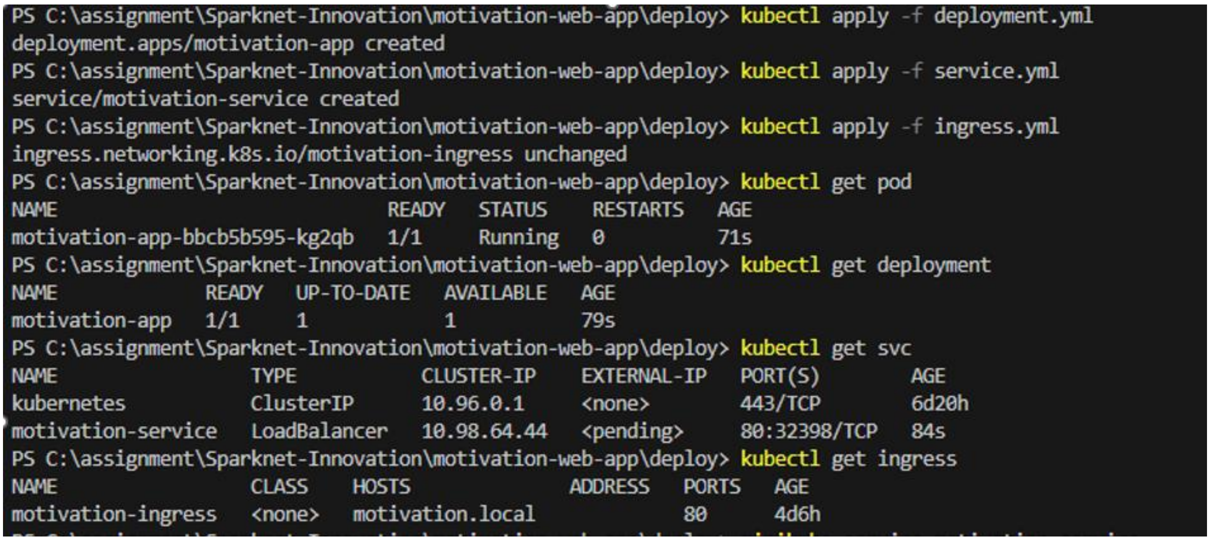
```
PS C:\assignment\Motivation-web-app\motivation-web-app> minikube start
   minikube v1.35.0 on Microsoft Windows 10 Pro 10.0.17763.805 Build 17763.805
✨  Using the docker driver based on existing profile
   Starting "minikube" primary control-plane node in "minikube" cluster
   Pulling base image v0.0.46 ...
   Updating the running docker "minikube" container ...
!   Failing to connect to https://registry.k8s.io/ from inside the minikube container
   To pull new external images, you may need to configure a proxy: https://minikube.sigs.k8s.io/docs/reference/networking/pro
   Preparing Kubernetes v1.32.0 on Docker 27.4.1 ...
   Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
   Enabled addons: storage-provisioner, default-storageclass

!   C:\Program Files\Docker\Docker\resources\bin\kubectl.exe is version 1.25.9, which may have incompatibilities with Kuberne
    ▪ Want kubectl v1.32.0? Try 'minikube kubectl -- get pods -A'
   Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

kubectl apply -f deployment.yml

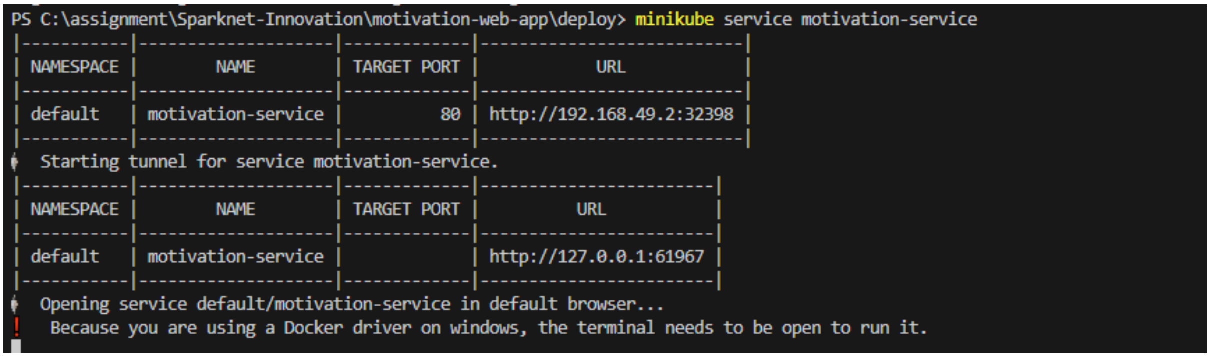
kubectl apply -f service.yml

kubectl apply -f ingress.yml

minikube service motivation-service

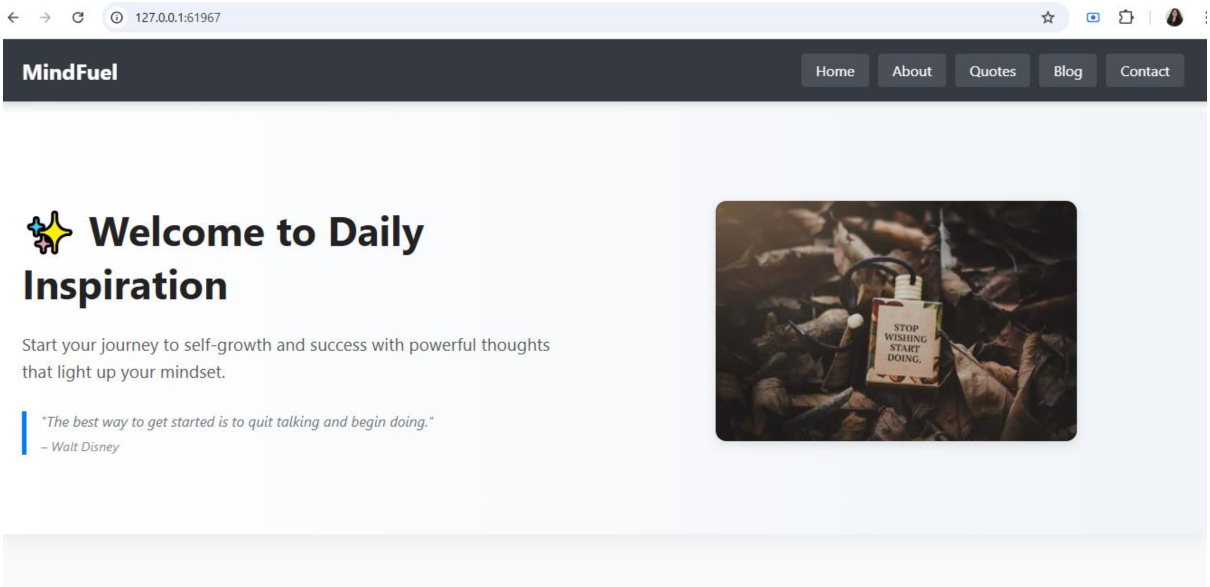


```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl apply -f deployment.yml
deployment.apps/motivation-app created
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl apply -f service.yml
service/motivation-service created
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl apply -f ingress.yml
ingress.networking.k8s.io/motivation-ingress unchanged
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl get pod
NAME                              READY   STATUS    RESTARTS   AGE
motivation-app-bbcb5b595-kg2qb   1/1     Running   0          71s
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl get deployment
NAME             READY   UP-TO-DATE   AVAILABLE   AGE
motivation-app   1/1     1            1           79s
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl get svc
NAME                 TYPE           CLUSTER-IP    EXTERNAL-IP   PORT(S)        AGE
kubernetes           ClusterIP      10.96.0.1     <none>        443/TCP        6d20h
motivation-service   LoadBalancer   10.98.64.44   <pending>     80:32398/TCP   84s
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> kubectl get ingress
NAME                 CLASS    HOSTS              ADDRESS   PORTS   AGE
motivation-ingress   <none>   motivation.local             80      4d6h
```



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\deploy> minikube service motivation-service
|-----------|--------------------|-------------|---------------------------|
| NAMESPACE |        NAME        | TARGET PORT |            URL            |
|-----------|--------------------|-------------|---------------------------|
| default   | motivation-service |          80 | http://192.168.49.2:32398 |
|-----------|--------------------|-------------|---------------------------|
   Starting tunnel for service motivation-service.
|-----------|--------------------|-------------|------------------------|
| NAMESPACE |        NAME        | TARGET PORT |          URL           |
|-----------|--------------------|-------------|------------------------|
| default   | motivation-service |             | http://127.0.0.1:61967 |
|-----------|--------------------|-------------|------------------------|
   Opening service default/motivation-service in default browser...
!   Because you are using a Docker driver on windows, the terminal needs to be open to run it.
```

http://127.0.0.1:61967/



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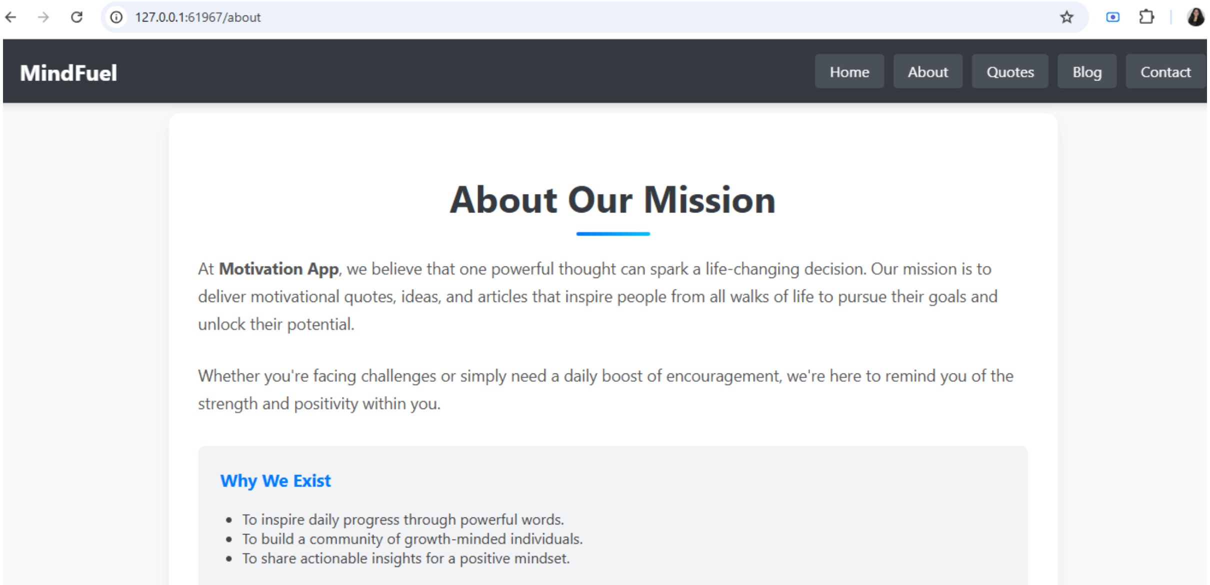


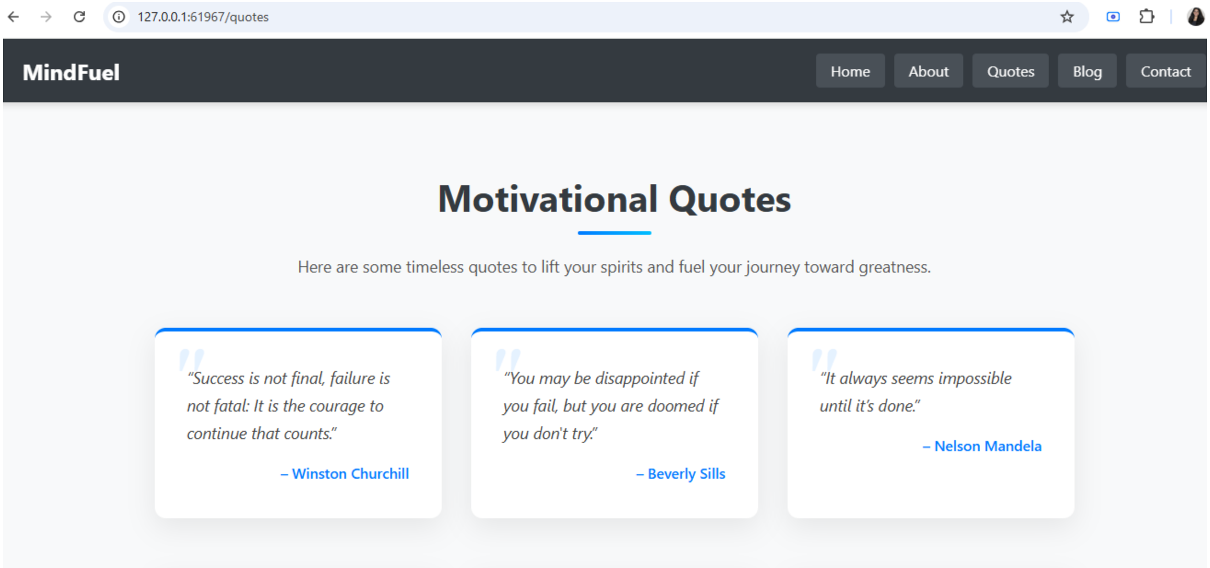
About Our Mission

At **Motivation App**, we believe that one powerful thought can spark a life-changing decision. Our mission is to deliver motivational quotes, ideas, and articles that inspire people from all walks of life to pursue their goals and unlock their potential.

Whether you're facing challenges or simply need a daily boost of encouragement, we're here to remind you of the strength and positivity within you.

Why We Exist

- To inspire daily progress through powerful words.
- To build a community of growth-minded individuals.
- To share actionable insights for a positive mindset.



Motivational Quotes

Here are some timeless quotes to lift your spirits and fuel your journey toward greatness.

"Success is not final, failure is not fatal: It is the courage to continue that counts."

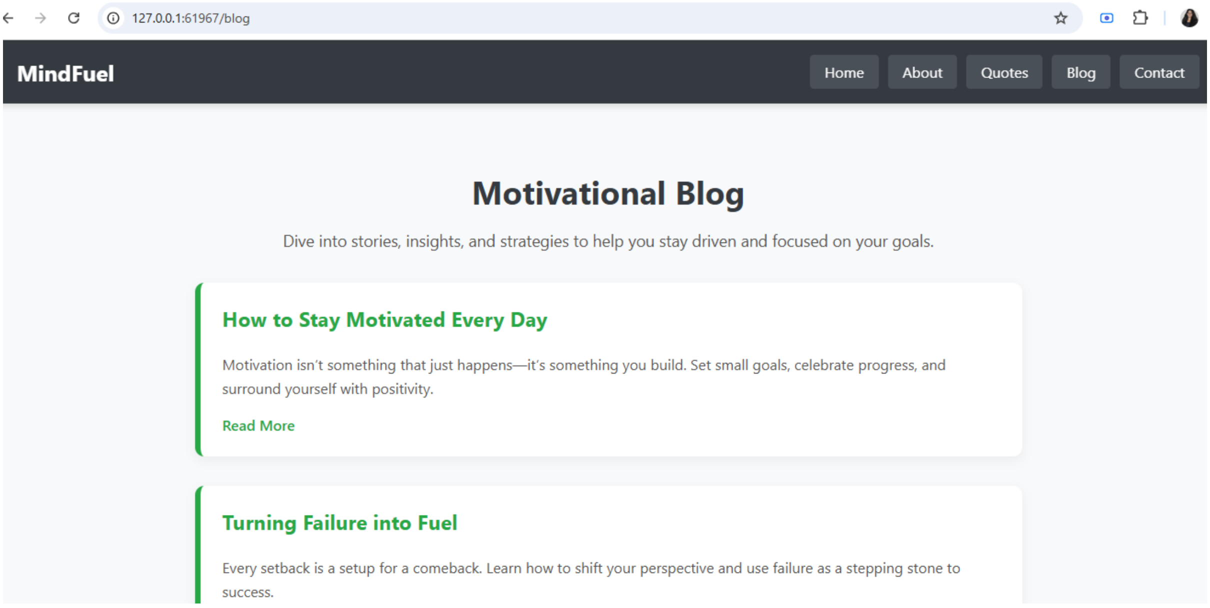
– Winston Churchill

"You may be disappointed if you fail, but you are doomed if you don't try."

– Beverly Sills

"It always seems impossible until it's done."

– Nelson Mandela



Motivational Blog

Dive into stories, insights, and strategies to help you stay driven and focused on your goals.

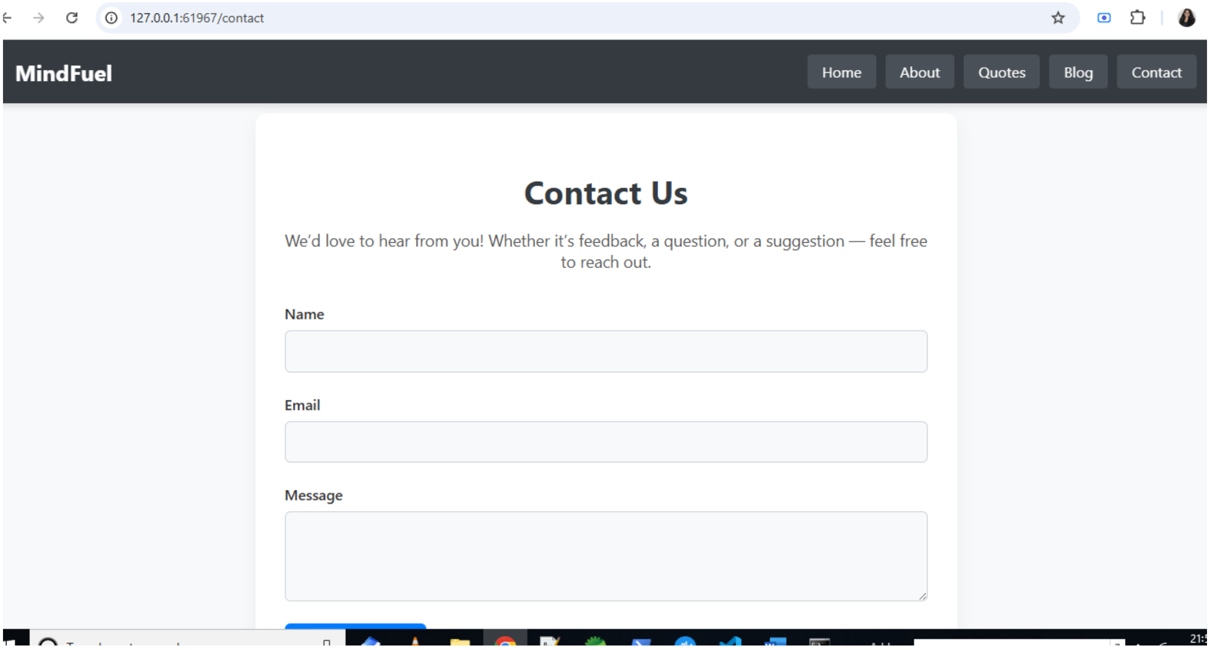
How to Stay Motivated Every Day

Motivation isn't something that just happens—it's something you build. Set small goals, celebrate progress, and surround yourself with positivity.

Read More

Turning Failure into Fuel

Every setback is a setup for a comeback. Learn how to shift your perspective and use failure as a stepping stone to success.



Contact Us

We'd love to hear from you! Whether it's feedback, a question, or a suggestion — feel free to reach out.

Name

Email

Message

Phase 2: Implementing CI/CD, Observability

4. Establishing CI/CD Workflows

Terraform IaC script-

I implemented Infrastructure as Code (IaC) for AWS, including configuration to retrieve the EC2 public IP and set up CloudWatch for monitoring.

1. main.tf - Defines the main infrastructure resources. This is where you declare **what** you want to create—like servers, networks, databases, etc.—using Terraform.

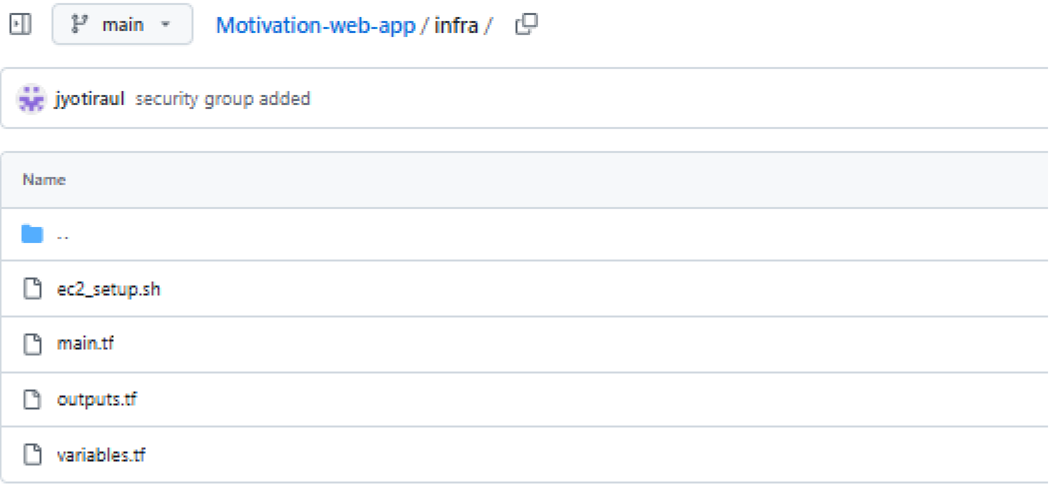
Purpose: Core configuration file that contains the actual infrastructure definitions (e.g., AWS EC2 instances, Cloudwatch).

2. variables.tf - Declares input variables that allow you to customize values without changing the core logic in main.tf.

Purpose: Makes your Terraform code reusable and configurable by defining variable names, types, and default values.

3.**outputs.tf -** Specifies the values Terraform should output after execution, such as IP addresses, URLs, or resource IDs.

Purpose: Provides useful information after a successful deployment, often used for referencing in other modules or scripts.



jyotiraul security group added

Name

..

ec2_setup.sh

main.tf

outputs.tf

variables.tf

Terraform init

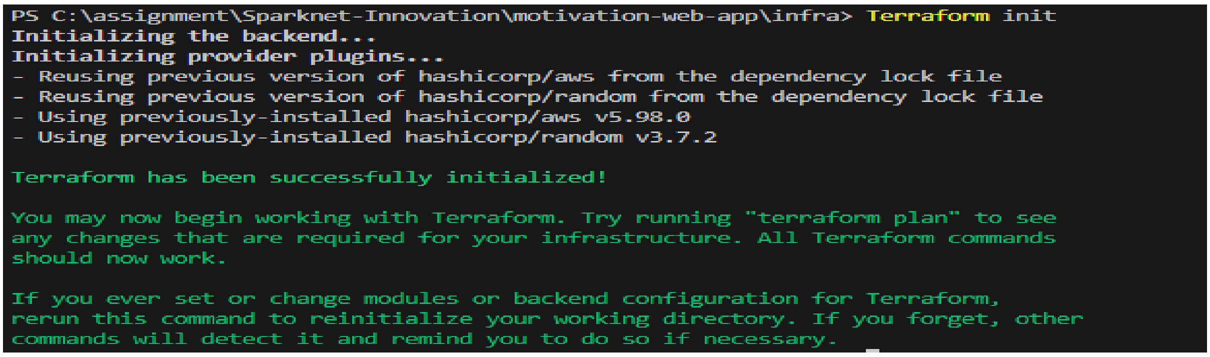
Terraform init does –

1. Sets up where Terraform will store state files (local or remote like S3).

2. Installs necessary providers like aws, azurerm, etc. based on your .tf files.

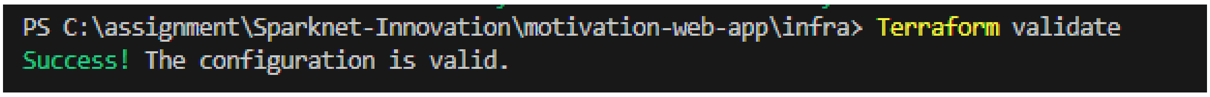
3. Makes the .terraform/ directory.

4. Caches plugins and modules.



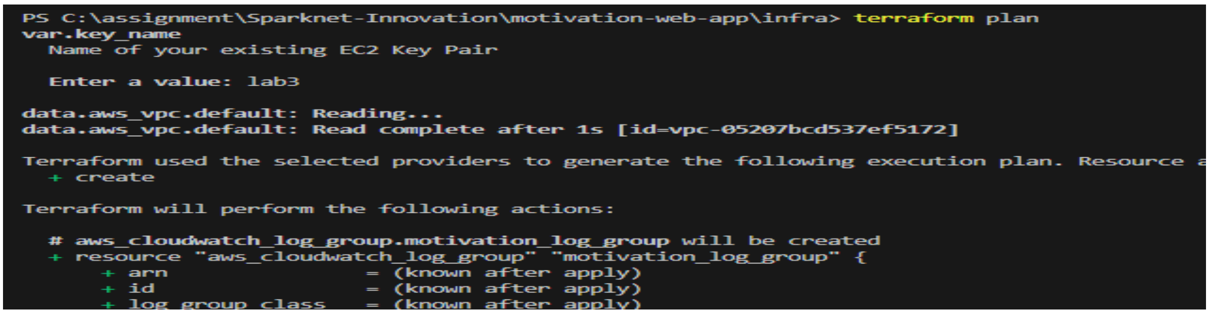
```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\infra> Terraform init
Initializing the backend...
Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Reusing previous version of hashicorp/random from the dependency lock file
- Using previously-installed hashicorp/aws v5.98.0
- Using previously-installed hashicorp/random v3.7.2

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
```

Terraform validate- This command checks if your Terraform files are written correctly and make sense together.



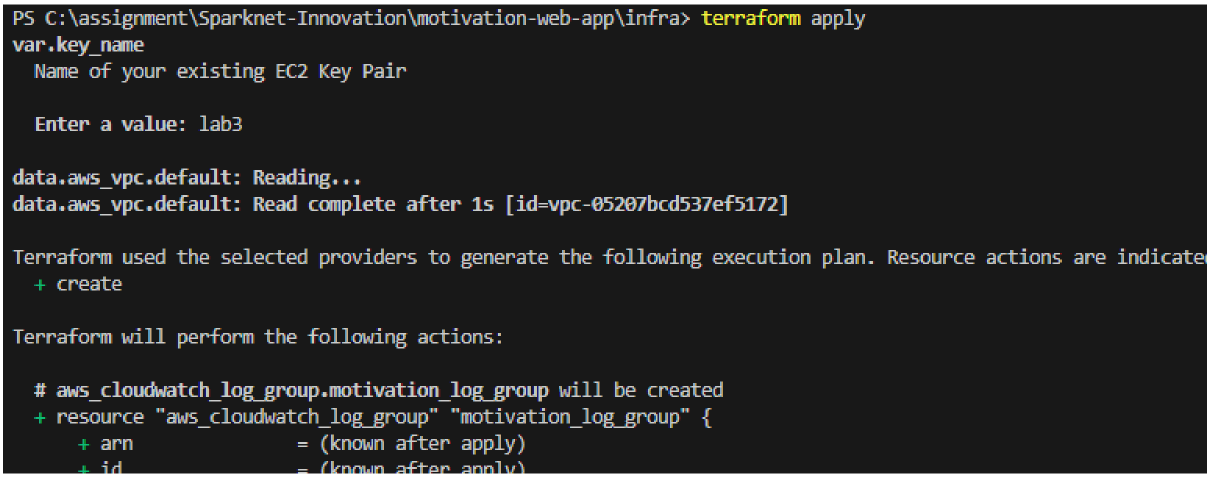
```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\infra> Terraform validate
Success! The configuration is valid.
```

Terraform plan - This command shows you **what Terraform will do** before it actually makes any changes.



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\infra> terraform plan
var.key_name
  Name of your existing EC2 Key Pair

  Enter a value: lab3

data.aws_vpc.default: Reading...
data.aws_vpc.default: Read complete after 1s [id=vpc-05207bcd537ef5172]

Terraform used the selected providers to generate the following execution plan. Resource a
  + create

Terraform will perform the following actions:

  # aws_cloudwatch_log_group.motivation_log_group will be created
  + resource "aws_cloudwatch_log_group" "motivation_log_group" {
      + arn               = (known after apply)
      + id                = (known after apply)
      + log_group_class   = (known after apply)
```

Terraform apply- This command **executes the actions** proposed in the Terraform plan to **create, update, or delete infrastructure**.



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\infra> terraform apply
var.key_name
  Name of your existing EC2 Key Pair

  Enter a value: lab3

data.aws_vpc.default: Reading...
data.aws_vpc.default: Read complete after 1s [id=vpc-05207bcd537ef5172]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicate
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      + arn                = (known after apply)
      + id                 = (known after apply)
```
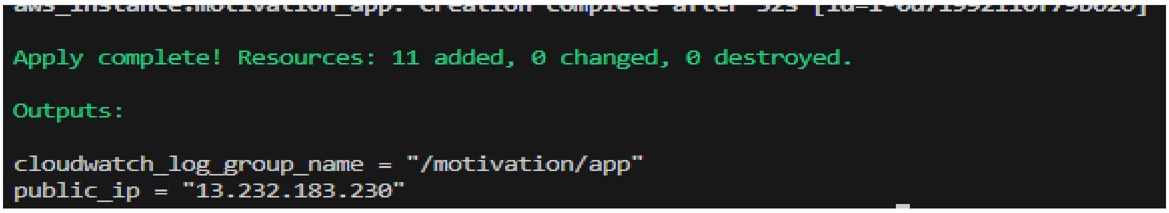
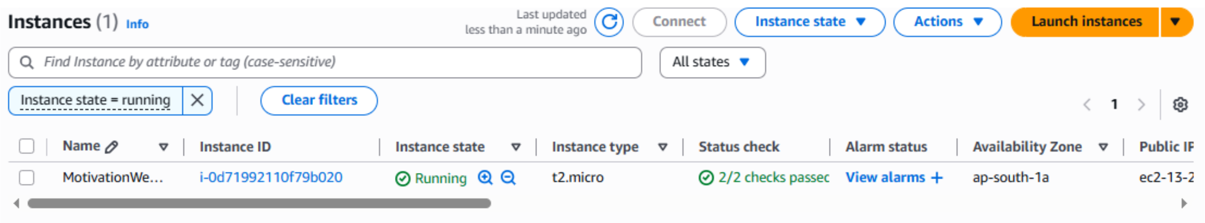



```
aws_instance.motivation_app: Creation complete after 32s [id=i-0d71992110f79b020]

Apply complete! Resources: 11 added, 0 changed, 0 destroyed.

Outputs:

cloudwatch_log_group_name = "/motivation/app"
public_ip = "13.232.183.230"
```

Logged in to the AWS account and verified the instance.



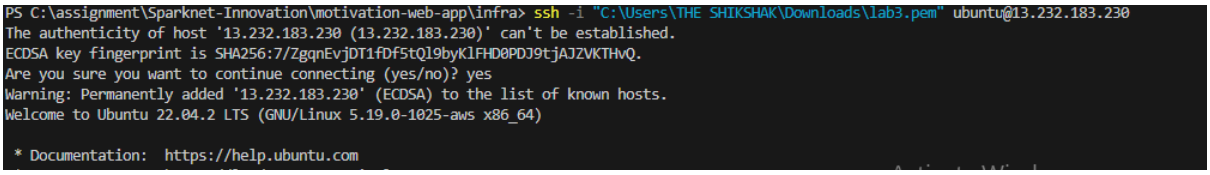
Instances (1) Info

Last updated less than a minute ago

Connect
Instance state ▼
Actions ▼
Launch instances ▼
Find Instance by attribute or tag (case-sensitive)
All states ▼
Instance state = running ✕
Clear filters
1

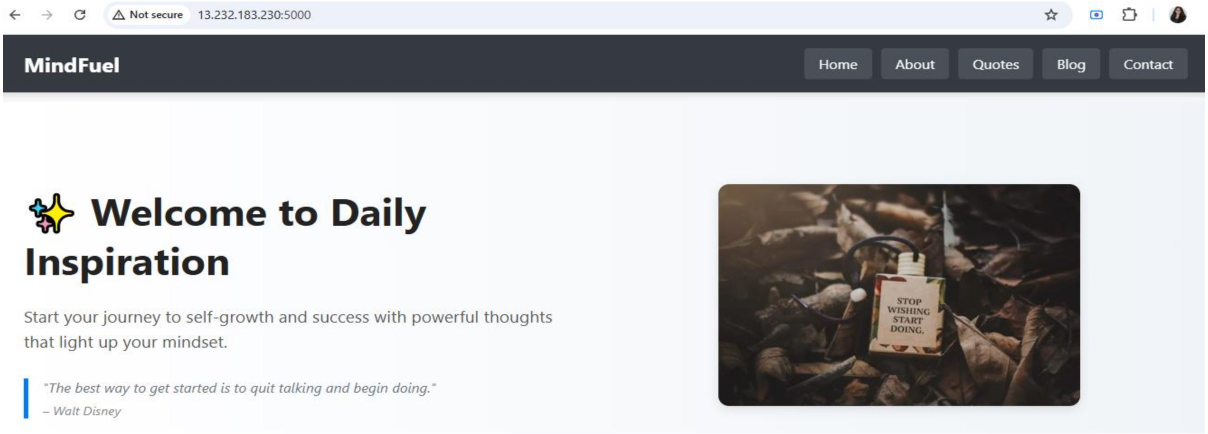
	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IF
□	MotivationWe...	i-0d71992110f79b020	✓ Running	t2.micro	✓ 2/2 checks passec	View alarms +	ap-south-1a	ec2-13-2

ssh -i "my-key.pem" ubuntu@ipAddress



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\infra> ssh -i "C:\Users\THE SHIKSHAK\Downloads\lab3.pem" ubuntu@13.232.183.230
The authenticity of host '13.232.183.230 (13.232.183.230)' can't be established.
ECDSA key fingerprint is SHA256:7/ZgqnEvjDT1fDf5tQl9byKlFHD0PDJ9tjAJZVKTHvQ.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '13.232.183.230' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.19.0-1025-aws x86_64)

 * Documentation:  https://help.ubuntu.com
```

Application successfully running on http://13.232.183.230:5000/



✨ Welcome to Daily Inspiration

Start your journey to self-growth and success with powerful thoughts that light up your mindset.

"The best way to get started is to quit talking and begin doing."
– Walt Disney

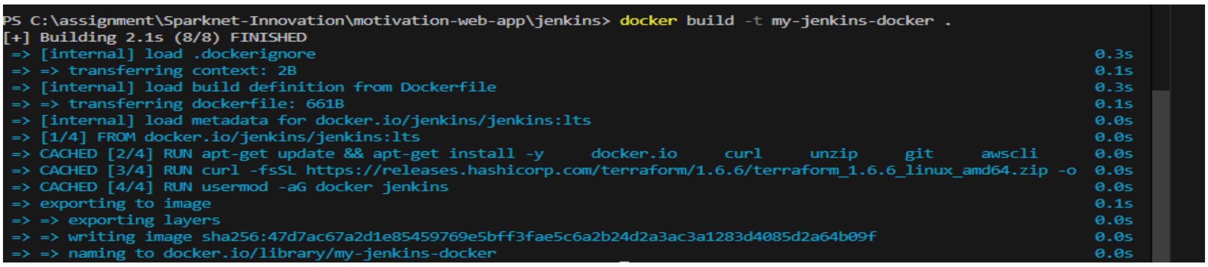
***Automate the deployment process utilizing Jenkins

-Running Jenkins on docker.

-Build the Jenkins image using the provided Dockerfile, which includes all the necessary tools. The Dockerfile is located in the jenkins folder at jenkins/Dockerfile.

Build image->

docker build -t my-jenkins-docker .



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> docker build -t my-jenkins-docker .
[+] Building 2.1s (8/8) FINISHED
 => [internal] load .dockerignore                                                                         0.3s
 => => transferring context: 2B                                                                           0.1s
 => [internal] load build definition from Dockerfile                                                      0.3s
 => => transferring dockerfile: 661B                                                                      0.1s
 => [internal] load metadata for docker.io/jenkins/jenkins:lts                                            0.0s
 => [1/4] FROM docker.io/jenkins/jenkins:lts                                                              0.0s
 => CACHED [2/4] RUN apt-get update && apt-get install -y     docker.io     curl     unzip     git     awscli  0.0s
 => CACHED [3/4] RUN curl -fsSL https://releases.hashicorp.com/terraform/1.6.6/terraform_1.6.6_linux_amd64.zip -o  0.0s
 => CACHED [4/4] RUN usermod -aG docker jenkins                                                           0.0s
 => exporting to image                                                                                    0.1s
 => => exporting layers                                                                                   0.0s
 => => writing image sha256:47d7ac67a2d1e85459769e5bff3fae5c6a2b24d2a3ac3a1283d4085d2a64b09f              0.0s
 => => naming to docker.io/library/my-jenkins-docker                                                      0.0s
```

Run docker image-

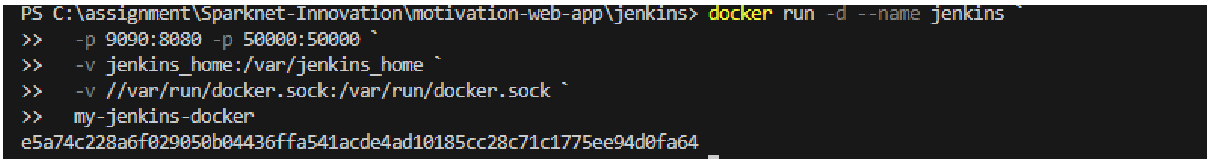
docker run -d --name jenkins `

  -p 9090:8080 -p 50000:50000 `

  -v //var/run/docker.sock:/var/run/docker.sock `

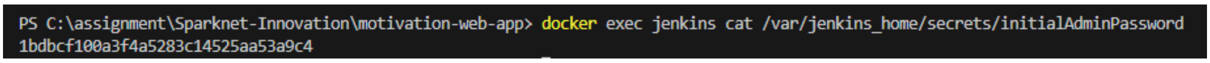
  -v jenkins_home:/var/jenkins_home `

  my-jenkins-docker

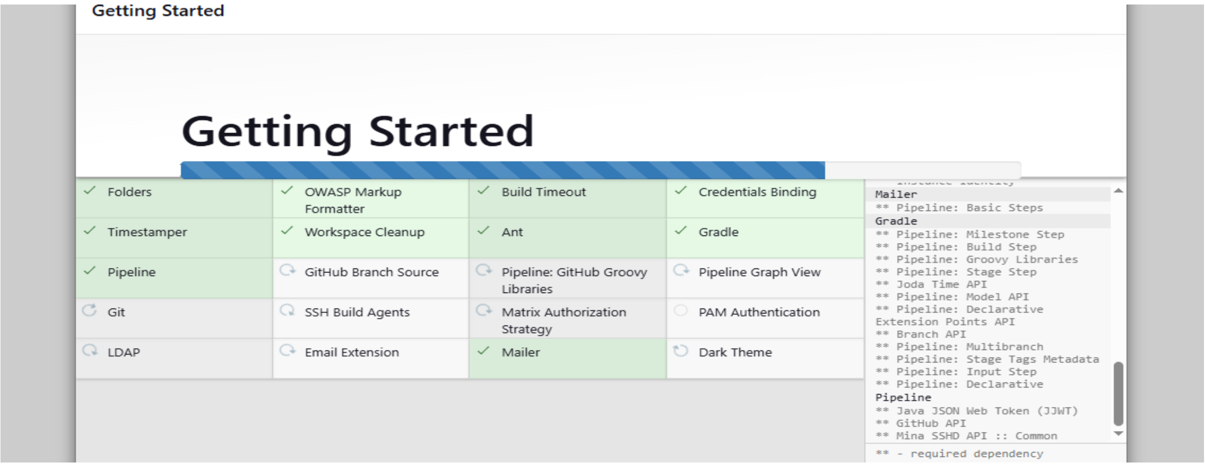


```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> docker run -d --name jenkins `
>>    -p 9090:8080 -p 50000:50000 `
>>    -v jenkins_home:/var/jenkins_home `
>>    -v //var/run/docker.sock:/var/run/docker.sock `
>>    my-jenkins-docker
e5a74c228a6f029050b04436ffa541acde4ad10185cc28c71c1775ee94d0fa64
```

Jenkins started on localhost:9090



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app> docker exec jenkins cat /var/jenkins_home/secrets/initialAdminPassword
1bdbcf100a3f4a5283c14525aa53a9c4
```



Getting Started

Getting Started

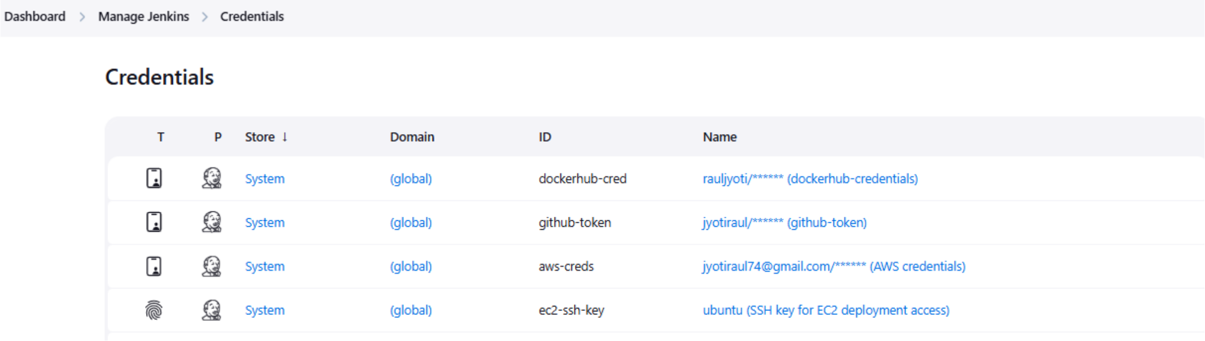
✓ Folders	✓ OWASP Markup Formatter	✓ Build Timeout	✓ Credentials Binding
✓ Timestamper	✓ Workspace Cleanup	✓ Ant	✓ Gradle
✓ Pipeline	⟳ GitHub Branch Source	⟳ Pipeline: GitHub Groovy Libraries	⟳ Pipeline Graph View
⟳ Git	⟳ SSH Build Agents	⟳ Matrix Authorization Strategy	○ PAM Authentication
⟳ LDAP	⟳ Email Extension	✓ Mailer	⟳ Dark Theme

```
Instance Identity
Mailer
** Pipeline: Basic Steps
Gradle
** Pipeline: Milestone Step
** Pipeline: Build Step
** Pipeline: Groovy Libraries
** Pipeline: Stage Step
** Joda Time API
** Pipeline: Model API
** Pipeline: Declarative
Extension Points API
** Branch API
** Pipeline: Multibranch
** Pipeline: Stage Tags Metadata
** Pipeline: Input Step
** Pipeline: Declarative
Pipeline
** Java JSON Web Token (JJWT)
** GitHub API
** Mina SSHD API :: Common
** - required dependency
```

Install Plugins:-   Dashboard-> Manage Jenkins-> Plugins

- **Git Plugin** - This plugin integrates Git with Jenkins**.**
- **Docker Pipeline -** Build and use Docker containers from pipelines.
- **Pipeline Utility Steps -** Utility steps for pipeline jobs**.**
- **AWS Credentials plugin** - Allows storing Amazon IAM credentials within the Jenkins Credentials API. Store Amazon IAM access keys (AWSAccessKeyId and AWSSecretKey) within the Jenkins Credentials API. Also support IAM Roles and IAM MFA Token.
- **Workspace Cleanup Plugin**- This plugin deletes the project workspace when invoked.
- **SSH Agent Plugin**- This plugin allows you to provide SSH credentials to builds via a ssh-agent in Jenkins.

Store Credentials:-   Dashboard-> Manage Jenkins-> Credentials ->



Dashboard > Manage Jenkins > Credentials

Credentials

T	P	Store ↓	Domain	ID	Name
		System	(global)	dockerhub-cred	rauljyoti/****** (dockerhub-credentials)
		System	(global)	github-token	jyotiraul/****** (github-token)
		System	(global)	aws-creds	jyotiraul74@gmail.com/****** (AWS credentials)
		System	(global)	ec2-ssh-key	ubuntu (SSH key for EC2 deployment access)

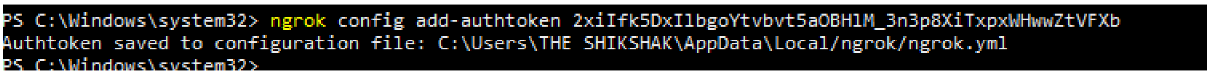
***Integration of webhook to automate continuous delivery pipeline**:-

-As Jenkins is running on port 9090 locally and GitHub webhooks don't support localhost, ngrok is required to expose the service externally.

choco install ngrok

sign in to ngrok account

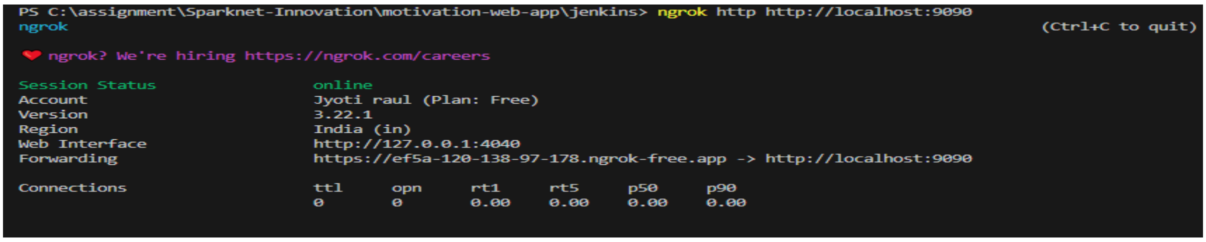
ngrok config add-authtoken $YOUR_AUTHTOKEN



```
PS C:\Windows\system32> ngrok config add-authtoken 2xiIfk5DxIlbgoYtvbvt5aOBHlM_3n3p8XiTxpxWHwwZtVFXb
Authtoken saved to configuration file: C:\Users\THE SHIKSHAK\AppData\Local/ngrok/ngrok.yml
PS C:\Windows\system32>
```

On powershell type : ngrok http http://localhost:9090

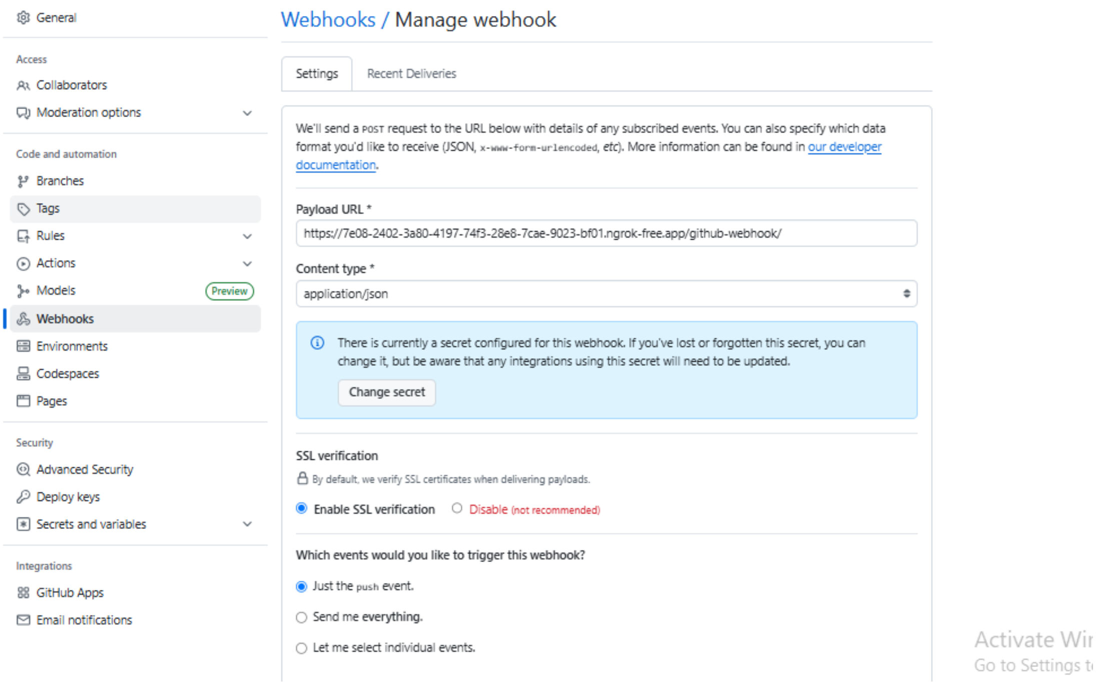
Getting output like this –



```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> ngrok http http://localhost:9090
ngrok                                                                                      (Ctrl+C to quit)

❤ ngrok? We're hiring https://ngrok.com/careers

Session Status                online
Account                       Jyoti raul (Plan: Free)
Version                       3.22.1
Region                        India (in)
Web Interface                 http://127.0.0.1:4040
Forwarding                    https://ef5a-120-138-97-178.ngrok-free.app -> http://localhost:9090

Connections                   ttl     opn     rt1     rt5     p50     p90
                              0       0       0.00    0.00    0.00    0.00
```

Select project on github-> go to setting -> select webhook-> add webhook->

Payload url & content type -> click on add webhook



Webhooks / Manage webhook

We'll send a POST request to the URL below with details of any subscribed events. You can also specify which data format you'd like to receive (JSON, x-www-form-urlencoded, etc). More information can be found in our developer documentation.

Payload URL *

https://7e08-2402-3a80-4197-74f3-28e8-7cae-9023-bf01.ngrok-free.app/github-webhook/

Content type *

application/json

There is currently a secret configured for this webhook. If you've lost or forgotten this secret, you can change it, but be aware that any integrations using this secret will need to be updated.

SSL verification

By default, we verify SSL certificates when delivering payloads.

● Enable SSL verification ○ Disable (not recommended)

Which events would you like to trigger this webhook?

● Just the push event.

○ Send me everything.

○ Let me select individual events.

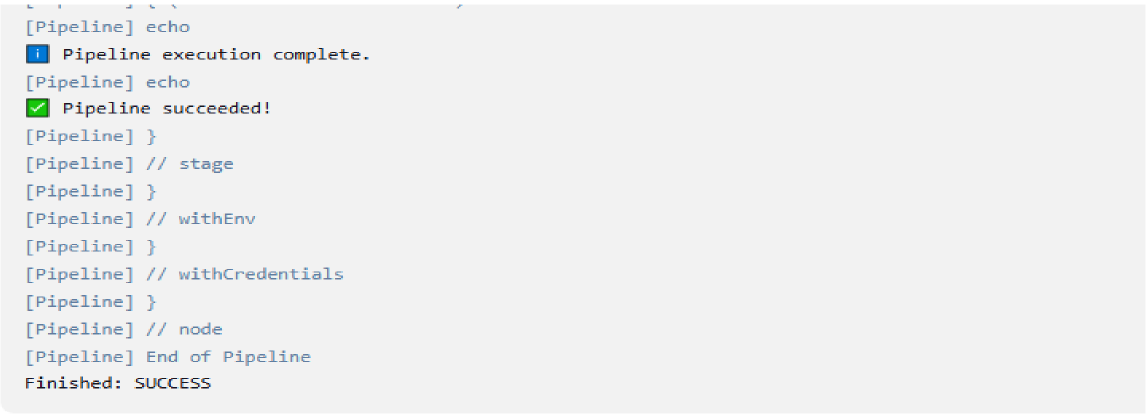
**Creating project on jenkins:

A **Jenkinsfile** is a text file that contains the **definition of a Jenkins pipeline** — it tells Jenkins how to build, test, and deploy your code automatically.

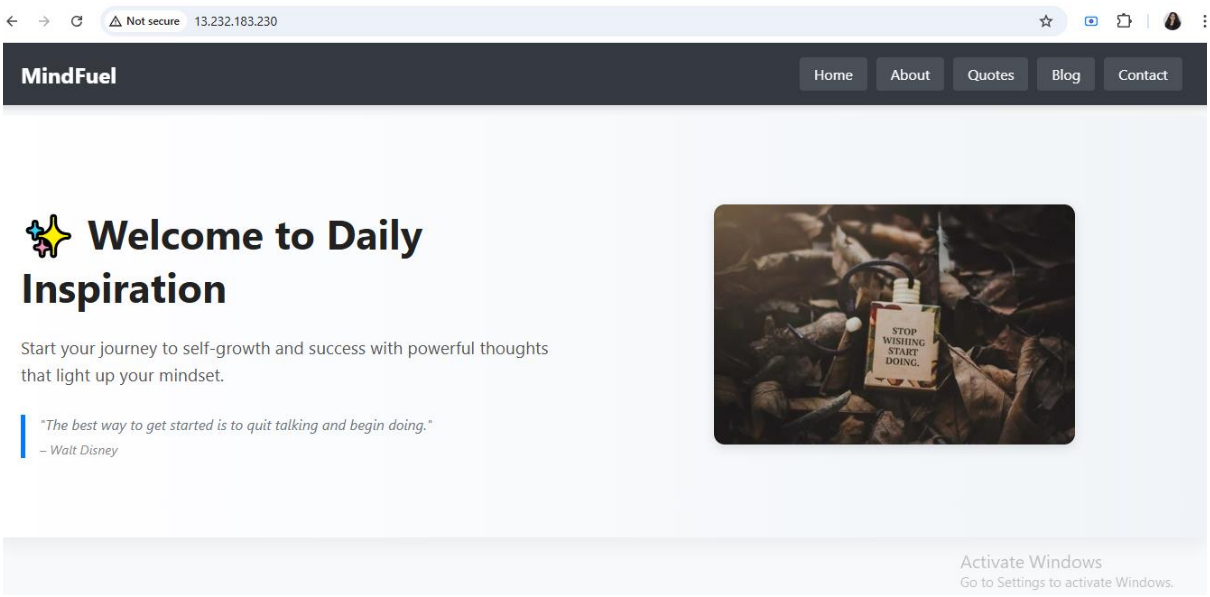
Click on new item-> select Pipeline -> add decription, click on GitHub hook trigger for GITScm polling, pipeline script- add code which is present in jenkins/Jenkinsfile (Note: Copy the EC2 public IP obtained from Terraform and paste it into the EC2_PUBLIC_IP = '' field in the Jenkinsfile.)

-> save and apply.

Click on build now.



```
[Pipeline] echo
ℹ Pipeline execution complete.
[Pipeline] echo
✅ Pipeline succeeded!
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withCredentials
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```



✨ Welcome to Daily Inspiration

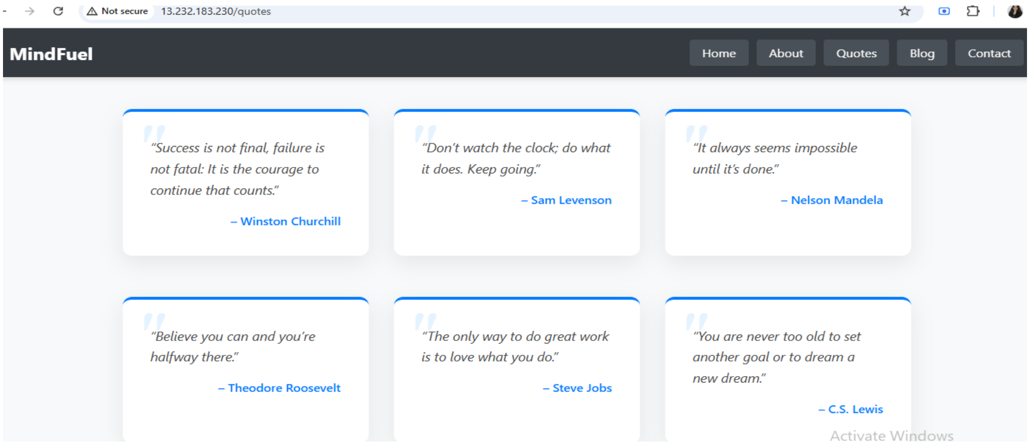
Start your journey to self-growth and success with powerful thoughts that light up your mindset.

> *"The best way to get started is to quit talking and begin doing."*
> *– Walt Disney*

For CI & CD testing →

Changes in any file and push into the main branch. It will automatically trigger.

Current Quote page



"Success is not final, failure is not fatal: It is the courage to continue that counts."
– Winston Churchill

"Don't watch the clock; do what it does. Keep going."
– Sam Levenson

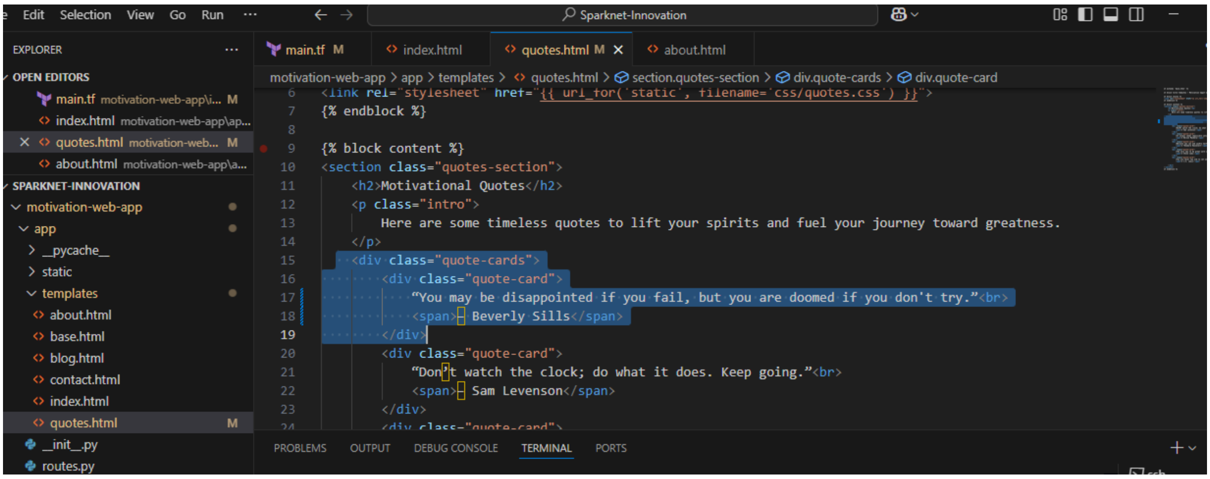
"It always seems impossible until it's done."
– Nelson Mandela

"Believe you can and you're halfway there."
– Theodore Roosevelt

"The only way to do great work is to love what you do."
– Steve Jobs

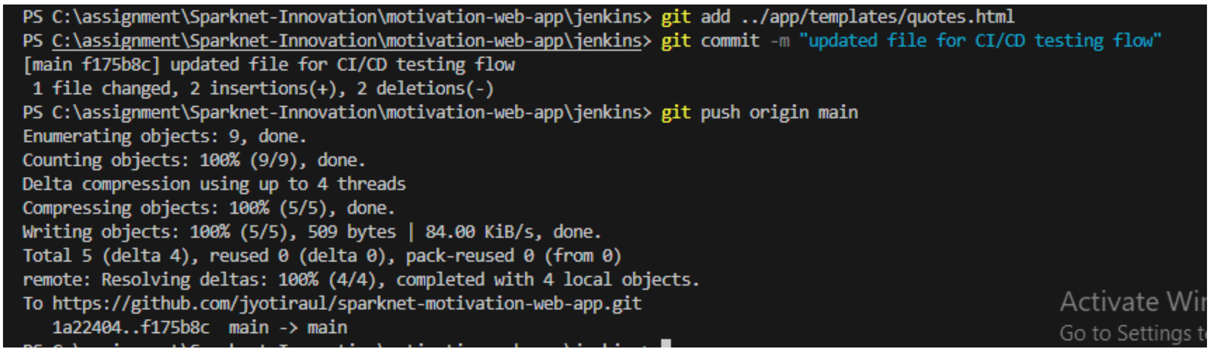
"You are never too old to set another goal or to dream a new dream."
– C.S. Lewis

Changes in quote.html


Edit Selection View Go Run ···
Sparknet-Innovation
EXPLORER
OPEN EDITORS
main.tf motivation-web-app\i... M
index.html motivation-web-app\ap...
quotes.html motivation-web... M
about.html motivation-web-app\a...
SPARKNET-INNOVATION
motivation-web-app
app
pycache
static
templates
about.html
base.html
blog.html
contact.html
index.html
quotes.html M
init.py
routes.py
main.tf M
index.html
quotes.html M
about.html
motivation-web-app > app > templates > quotes.html > section.quotes-section > div.quote-cards > div.quote-card
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

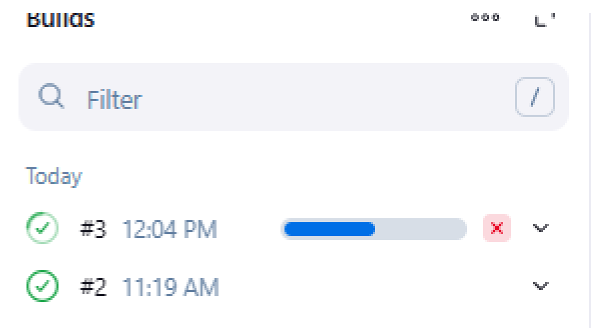
```
    <link rel="stylesheet" href="{{ url_for('static', filename='css/quotes.css') }}">
{% endblock %}

{% block content %}
<section class="quotes-section">
    <h2>Motivational Quotes</h2>
    <p class="intro">
        Here are some timeless quotes to lift your spirits and fuel your journey toward greatness.
    </p>
    <div class="quote-cards">
        <div class="quote-card">
            "You may be disappointed if you fail, but you are doomed if you don't try."<br>
            <span>– Beverly Sills</span>
        </div>
        <div class="quote-card">
            "Don't watch the clock; do what it does. Keep going."<br>
            <span>– Sam Levenson</span>
        </div>
        <div class="quote-card">
```

Push code on main branch—

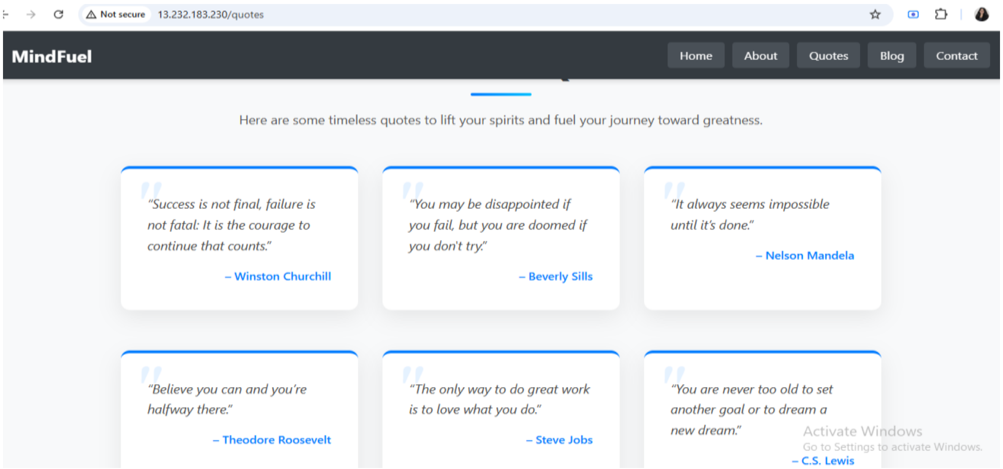


```
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> git add ../app/templates/quotes.html
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> git commit -m "updated file for CI/CD testing flow"
[main f175b8c] updated file for CI/CD testing flow
 1 file changed, 2 insertions(+), 2 deletions(-)
PS C:\assignment\Sparknet-Innovation\motivation-web-app\jenkins> git push origin main
Enumerating objects: 9, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 4 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (5/5), 509 bytes | 84.00 KiB/s, done.
Total 5 (delta 4), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (4/4), completed with 4 local objects.
To https://github.com/jyotiraul/sparknet-motivation-web-app.git
   1a22404..f175b8c  main -> main
```

Auto started pipeline-



Changes reflected on page



Here are some timeless quotes to lift your spirits and fuel your journey toward greatness.

"Success is not final, failure is not fatal: It is the courage to continue that counts."
– Winston Churchill

"You may be disappointed if you fail, but you are doomed if you don't try."
– Beverly Sills

"It always seems impossible until it's done."
– Nelson Mandela

"Believe you can and you're halfway there."
– Theodore Roosevelt

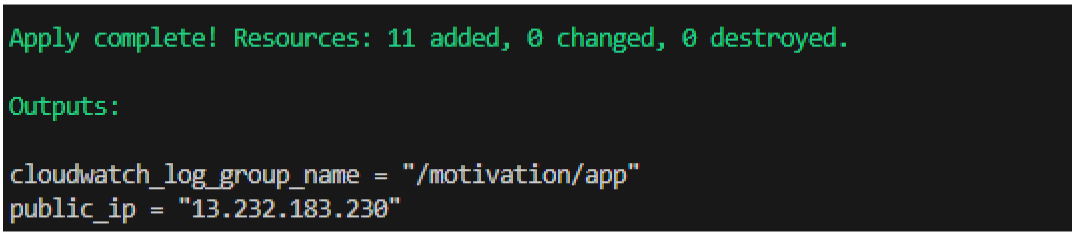
"The only way to do great work is to love what you do."
– Steve Jobs

"You are never too old to set another goal or to dream a new dream."
– C.S. Lewis

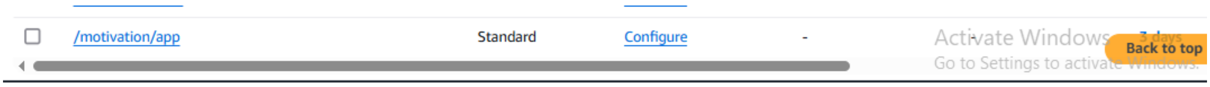
5. Application Monitoring & Log Management

AWS CloudWatch is integrated to provide real-time log monitoring, error detection, and performance analysis.

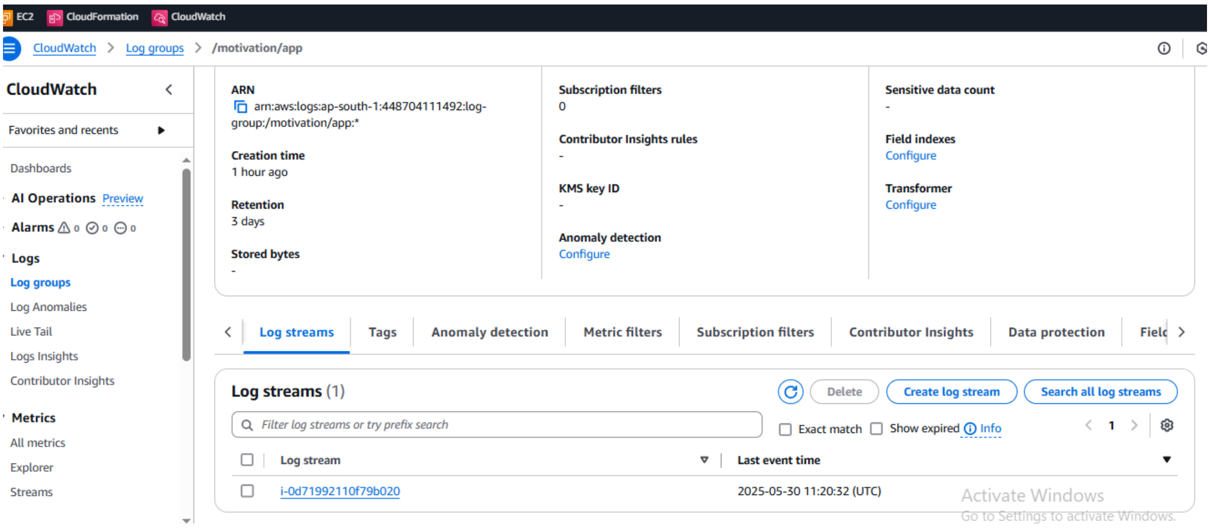
Cloudwatch -> logs -> Log groups



```
Apply complete! Resources: 11 added, 0 changed, 0 destroyed.

Outputs:

cloudwatch_log_group_name = "/motivation/app"
public_ip = "13.232.183.230"
```



□	/motivation/app	Standard	Configure	-	3 days



ARN
arn:aws:logs:ap-south-1:448704111492:log-group:/motivation/app:*

Creation time
1 hour ago

Retention
3 days

Stored bytes
-

Subscription filters
0

Contributor Insights rules
-

KMS key ID
-

Anomaly detection
Configure

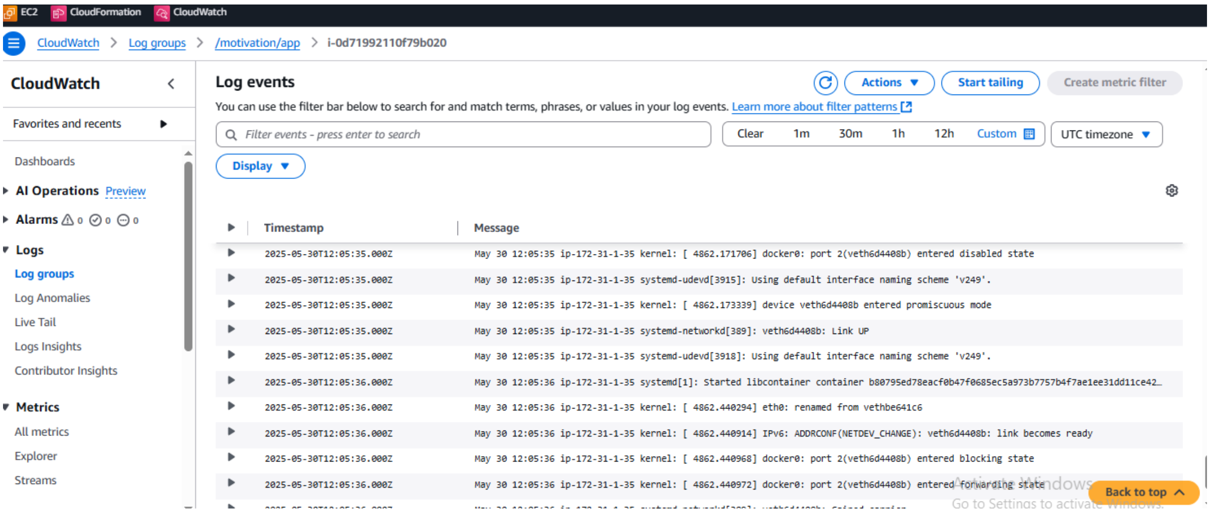
Sensitive data count
-

Field indexes
Configure

Transformer
Configure

Log streams (1)

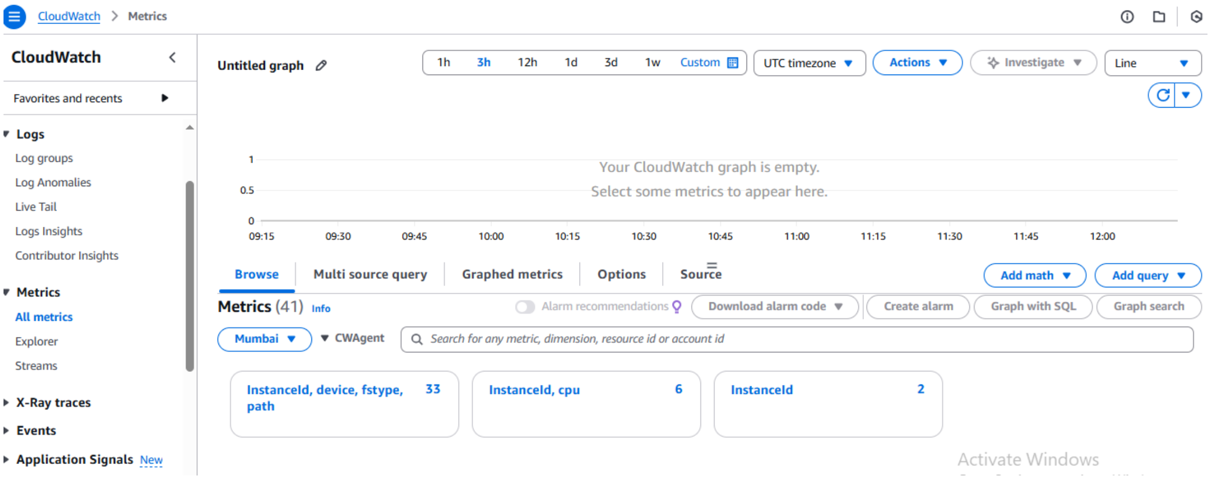
□	Log stream	Last event time
□	i-0d71992110f79b020	2025-05-30 11:20:32 (UTC)



Log events

You can use the filter bar below to search for and match terms, phrases, or values in your log events. Learn more about filter patterns

```
Timestamp                  Message
2025-05-30T12:05:35.000Z   May 30 12:05:35 ip-172-31-1-35 kernel: [ 4862.171706] docker0: port 2(veth6d4408b) entered disabled state
2025-05-30T12:05:35.000Z   May 30 12:05:35 ip-172-31-1-35 systemd-udevd[3915]: Using default interface naming scheme 'v249'.
2025-05-30T12:05:35.000Z   May 30 12:05:35 ip-172-31-1-35 kernel: [ 4862.173339] device veth6d4408b entered promiscuous mode
2025-05-30T12:05:35.000Z   May 30 12:05:35 ip-172-31-1-35 systemd-networkd[389]: veth6d4408b: Link UP
2025-05-30T12:05:35.000Z   May 30 12:05:35 ip-172-31-1-35 systemd-udevd[3918]: Using default interface naming scheme 'v249'.
2025-05-30T12:05:36.000Z   May 30 12:05:36 ip-172-31-1-35 systemd[1]: Started libcontainer container b80795ed78eacf0b47f0685ec5a973b7757b4f7ae1ee31dd11ce42…
2025-05-30T12:05:36.000Z   May 30 12:05:36 ip-172-31-1-35 kernel: [ 4862.440294] eth0: renamed from vethbe641c6
2025-05-30T12:05:36.000Z   May 30 12:05:36 ip-172-31-1-35 kernel: [ 4862.440914] IPv6: ADDRCONF(NETDEV_CHANGE): veth6d4408b: link becomes ready
2025-05-30T12:05:36.000Z   May 30 12:05:36 ip-172-31-1-35 kernel: [ 4862.440968] docker0: port 2(veth6d4408b) entered blocking state
2025-05-30T12:05:36.000Z   May 30 12:05:36 ip-172-31-1-35 kernel: [ 4862.440972] docker0: port 2(veth6d4408b) entered forwarding state
```



Your CloudWatch graph is empty.
Select some metrics to appear here.

Metrics (41) Info

InstanceId, device, fstype, path	33
InstanceId, cpu	6
InstanceId	2