International Institute of Information Technology, Bangalore.

SOFTWARE PRODUCTION ENGINEERING - FINAL PROJECT

Group - 23

Kisaan Portal

A one stop solution to farm produce

In the supervision of :- **Prof B.Thangaraju**

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1. ABSTRACT

In the wake of COVID-19, everything came to a stop. All shops were shut, everything was closed, this affected the farmers too. It became too difficult for them to sell their produce given lockdown and social gathering restrictions.

As all the offices were moving online, we thought why not bring the farmers online too, and sell authentic farm produce directly from the farm to the consumers. This ends the corruption and supremacy of the mediators and the entire amount directly goes to the farmer.

To make this into reality, we built an online portal where the user (Farmer/Consumer) has to first register and then enter the portal. Farmers can upload all their produce and decide at what amount to sell. We provide a dashboard to each farmer to compare his prices with the mandi rates of his locality and set the price accordingly.

The consumer can login and get a list of all the produce, he/she can select as many as needed and add to his/her cart and proceed to checkout once done.

To implement this we have used the MERN stack, React.js is used for the development of the front end. Express library on top of Node.js. was used for the backend and the Database used was MongoDB where the data was stored. Mongoose was used for connecting to MongoDB.

2. INTRODUCTION

a. OVERVIEW

Kisaan Portal is a one stop solution for all farmers to sell their produce directly to consumers from all the different cities of the country. The farmers can access this portal and get the prices of different items of their local markets, and set the selling price accordingly.

Consumers can get a variety of items directly from the website to their homes. All the users need to do is register and set up the payment

b. FEATURES

Farmer :

i. Register/LogIn
ii. Update personal information
iii. Fetch Market Data
iv. Get weather information of upcoming five days
v. Upload produce and fix price

Consumer

vi. Register/LogIn
vii. Check prices for different items
viii. Fetch Market Data
ix. Add produce to cart
x. Checkout after payment

c. WHY DEVOPS ?

DevOps is a set of tools that automate software development and IT operations. It focuses on shortening the systems development life cycle and providing continuous delivery with high software quality.

DevOps is one up on Agile software development; multiple DevOps aspects came from the Agile methodology.

- It optimizes the overall business by increasing efficiency through automation.
- Improves software development and deployment speed and stability.
- Deployment failures, rollbacks, and recovery time are all reduced.
- Improved collaboration and communication; lower costs and IT headcount

3. TOOLS USED

1. Version Control System : Git and GitHub
   https://github.com/NirajGujarathi/Kisaan_Portal
2. Continuous Integration/Continuous Delivery : **Jenkins**
3. Building Tool : **NPM** (Node Package Manager)
4. Testing : **Mocha framework**
5. Containerization : **Docker**
6. Deployment : **Ansible**
7. Log creation, monitoring and visualization : **ELK** (Elasticsearch, Logstash, Kibana)
8. Frontend Development : **React.js**
9. Backend Development : **Node.js, Express.js**
10. Database : **MongoDB**

4. SYSTEM CONFIGURATION

1. Operating System - Linux Ubuntu 20
2. CPU & RAM - 4 core processor and 8GB RAM
3. Kernel Version - 5.4.0-89-generic
4. Database - MongoDB 4.4.5

5. SOFTWARE DEVELOPMENT LIFECYCLE - SDLC

i. INSTALLATIONS

The frontend(client) of the project uses React.js and the backend(server) is built using Node.js, Express.js and the database is using MongoDB. To begin with, install nodejs on the system.

ii. NODEJS INSTALLATION

Node.js is a javascript programming package management. It is the JavaScript runtime environment Node.js' default package manager. It comes pre-installed with Node.js. The package.json file contains the definitions for all npm packages. Package.json's content must be in JSON format. The definition file must have at least two fields. The names and variants are as follows. It is capable of managing dependencies. It installs all of the project's dependencies in a single command line. The package.json file also defines dependencies.

Command : npm install

Run npm install command inside the frontend and backend folder to install all the necessary dependencies of the project.

```
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal$ cd frontend/
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal/frontend$ npm install

up to date, audited 1486 packages in 10s
```

Fig. Frontend npm install

```
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal$ cd backend/
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal/backend$ npm install

up to date, audited 272 packages in 2s
```

Fig. Backend npm install

Fig. package.json server file

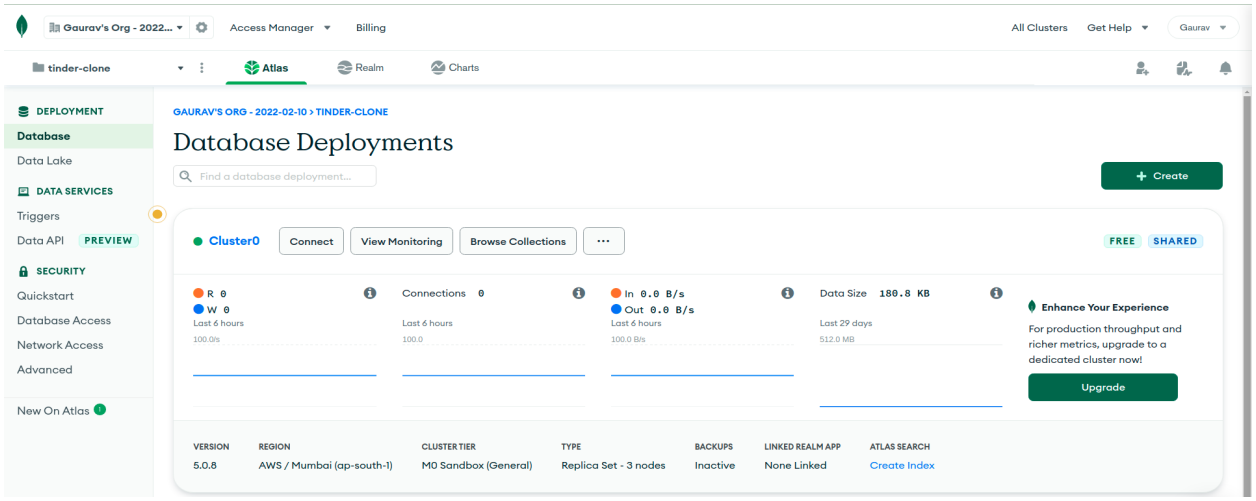
Fig. package.json client file

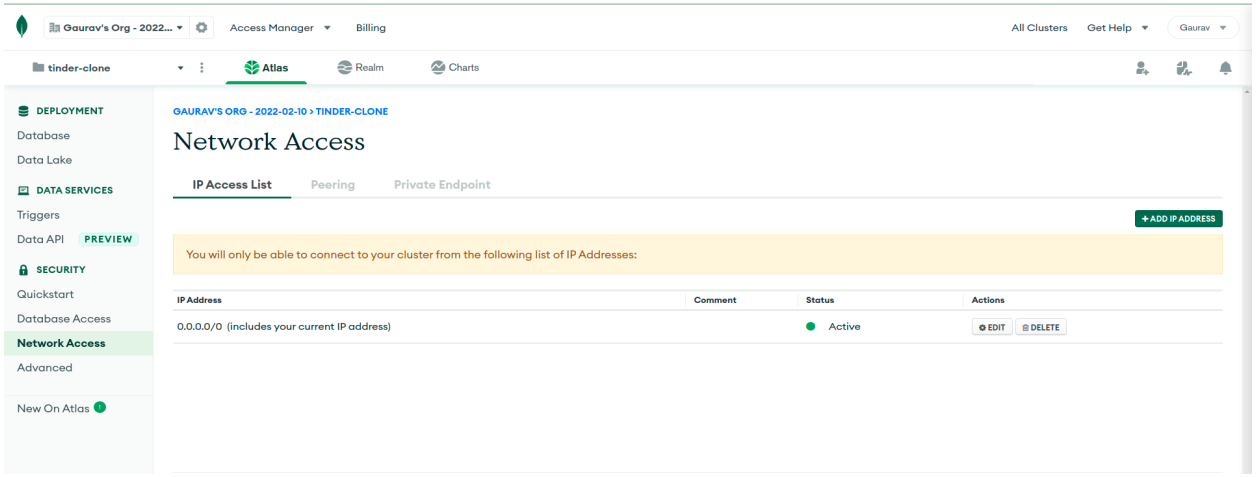
iii. MONGODB

We create a mongodb database on atlas to store all the user and farmer information. To set this database with our project use create URI and store it in the .env file

```
.env  M
backend > .env
1  ONLINE_DATABASE=mongodb+srv://niraj:niraj123@cluster0.xzfpt.mongodb.net/kissanportal?retryWrites=true&w=majority
```

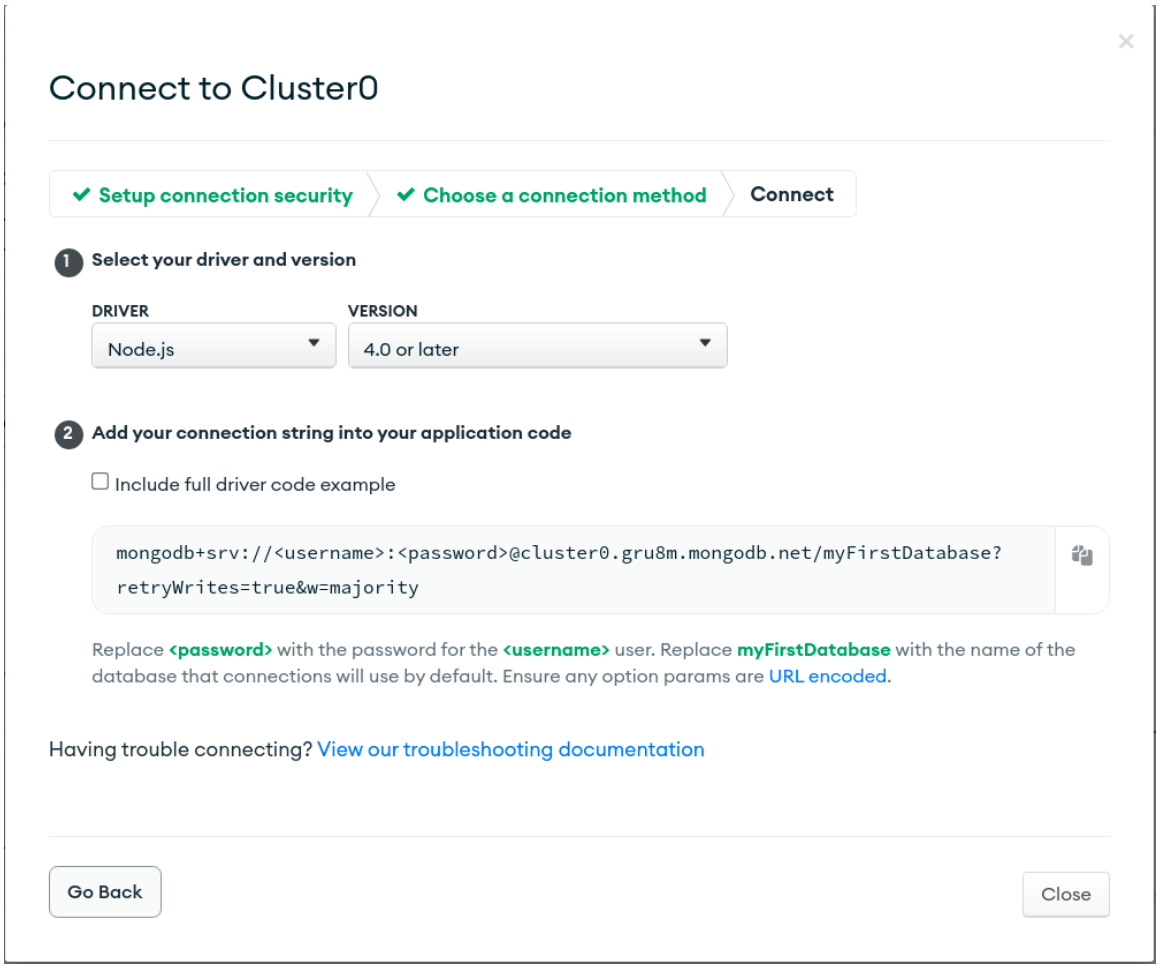
iv. Create a cluster on MONGO-DB Atlas





Set Network Access to 0.0.0.0/0 so that the website can be accessed from all IP addresses. This is ideal for real time development project, for development we can set a few specific addresses.

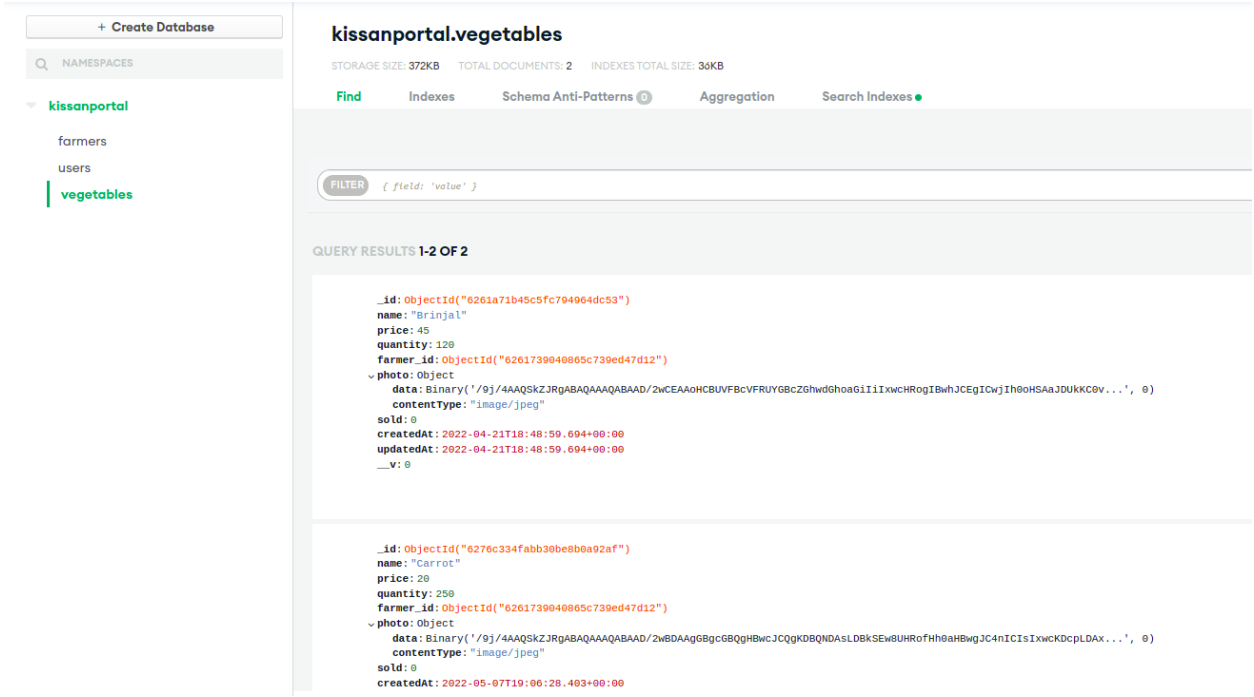
v. Connect app to database



Add the above URL to .env to connect to the database. Replace the username with mongodb's username and set the password for the same.

Change the database name at myFirstDatabase, to your specific database name.

Database Entries from - Browse Collections



vi. Store MongoDB URL in .env file

By creating a.env file in the api (backend) subdirectory, you can save the cluster's URL. In that URL, provide all of the MongoDB Atlas' credentials (password). This.env file is part of.gitignore. Furthermore, Mongoose uses the variable used to store this URL to connect to MongoDB.

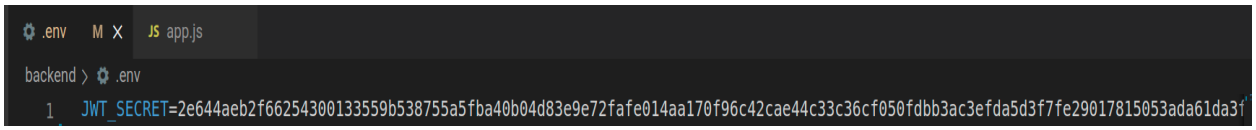
```
//database
mongoose.connect(process.env.ONLINE_DATABASE,{
    useNewUrlParser:true,
    useCreateIndex:true,
    useUnifiedTopology:true

}).then(()=>console.log("DB Connected"));
```

vii. JWT Authentication

JSON Web Tokens (JWT) are an RFC 7519 open industry standard for representing claims between two parties. For example, you can use jwt.io to decode, verify, and produce JWT.

JWT defines a concise and self-contained way for transmitting information between two parties as a JSON object. This information may be reviewed and trusted because it is signed. A secret (using the HMAC algorithm) or an RSA or ECDSA public/private key pair can be used to sign JWTs.

We create the JWT token and add it to .env file for performing authentication.



viii. Source Code Management

Source code management (SCM) is used to keep a track of all the modifications done to a source code repository. SCM tracks a current history of changes to a code base and helps resolve conflicts when merging updates from multiple contributors. SCM is very similar to Version control.

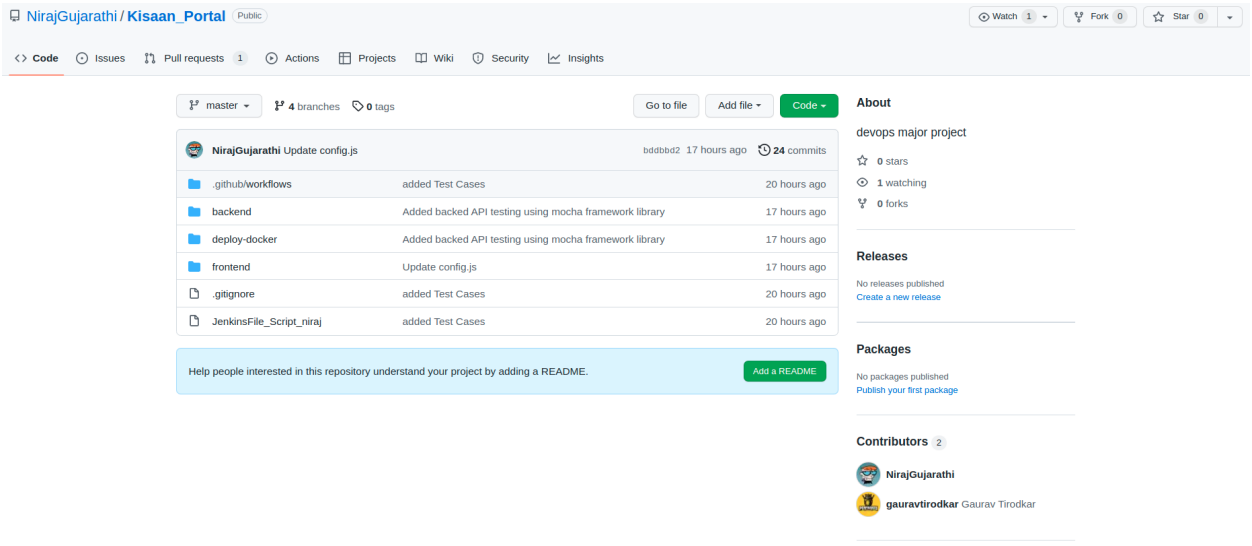


Fig . Create GitHub repository

To integrate project with GitHub we do the following steps :

- **git init**
  - ➔ Initializes the project as a github repository locally.
- **git remote add origin**
  - ➔ Add the details of the remote branch.
- **git add**
  - ➔ This command stages all the changes of local repo.
- **git commit**
  - ➔ Commit command commits the changes to the respective branch in the current repository.
- **git push**
  - ➔ Push command will push the changes to the remote repository on GitHub.

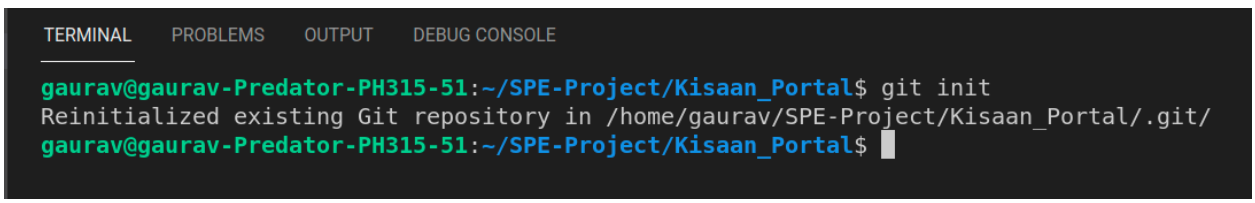


Fig. Initialize git repository from terminal

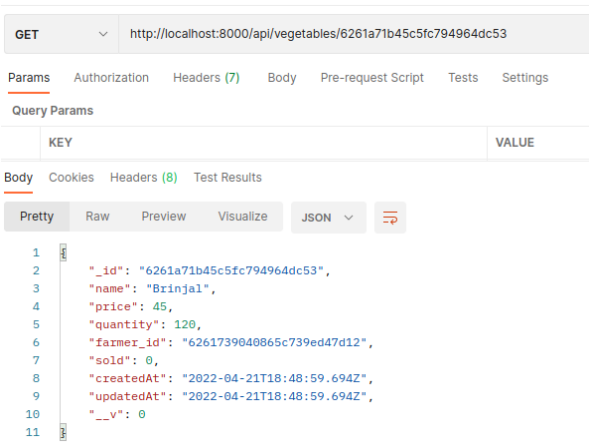
```
TERMINAL  PROBLEMS  OUTPUT  DEBUG CONSOLE

gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal$ git add .
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal$ git commit -m "final commit"
[gaurav-working 2c0e406] final commit
 2 files changed, 526 insertions(+), 422 deletions(-)
 rewrite backend/.env (66%)
 rewrite frontend/src/user/FarmerDashboard.js (91%)
gaurav@gaurav-Predator-PH315-51:~/SPE-Project/Kisaan_Portal$ git push origin master
```

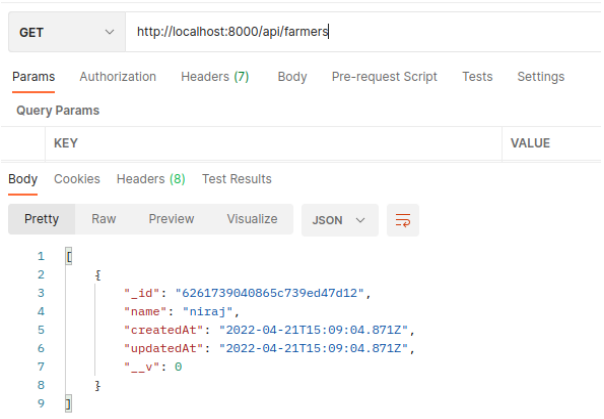
Fig. Add to staging area and push to GitHub remote

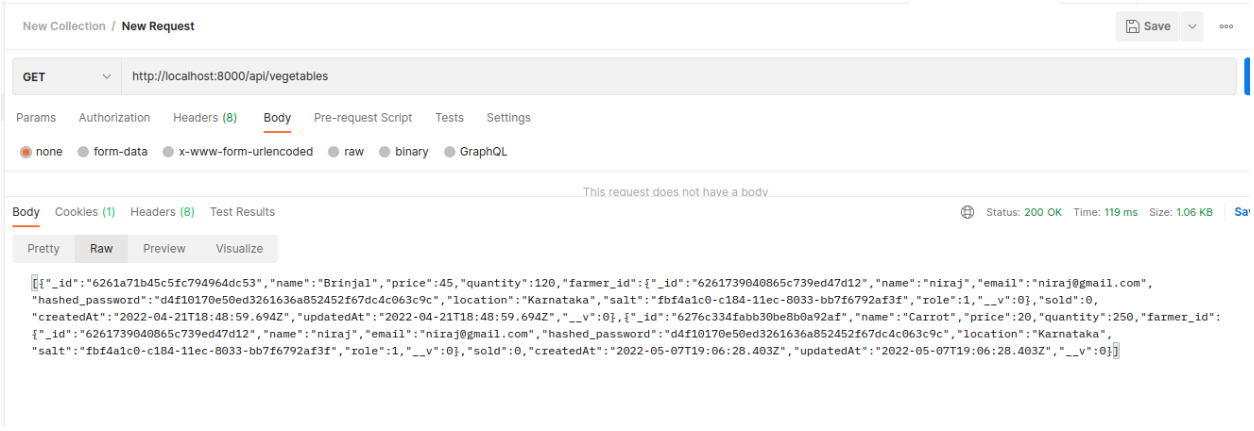
ix. API Documentation

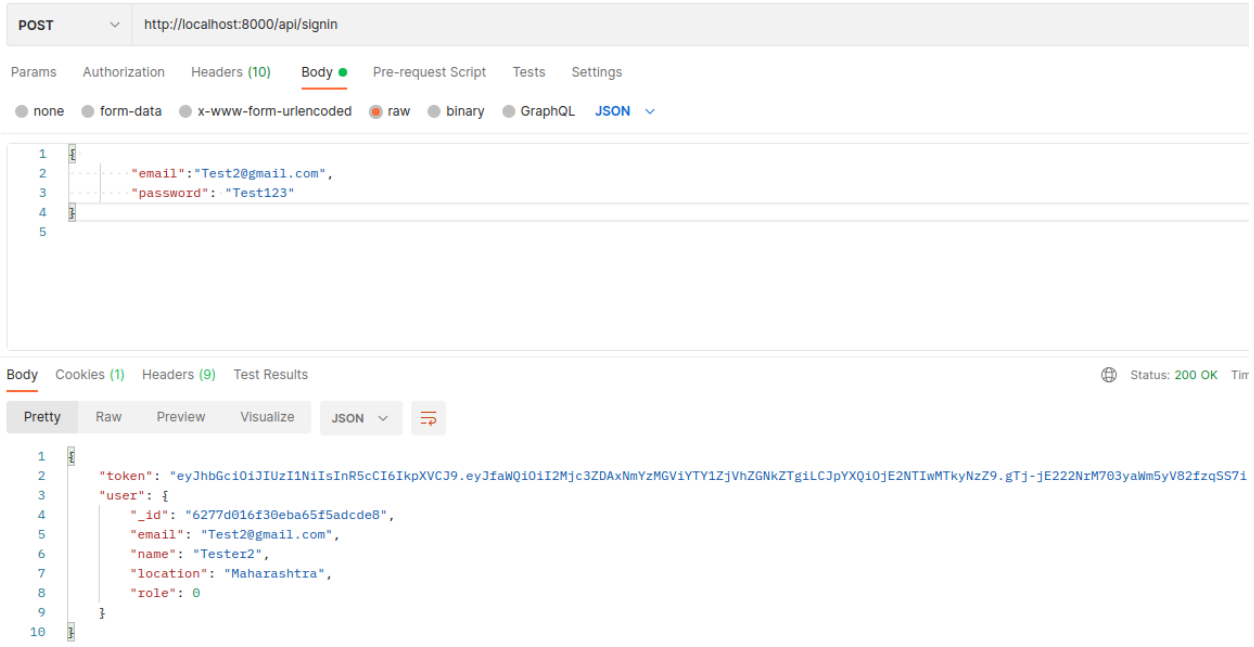
API	Details
GET : http://localhost:8000/api/vegetables https://kisaan-portal.herokuapp.com/api/vegetables	Details all available vegetables by all farmers
GET : http://localhost:8000/api/vegetables/6261a71b45c5fc794964dc53 https://kisaan-portal.herokuapp.com/api/vegetables/6261a71b45c5fc794964dc53	Get specific vegetable details
GET : http://localhost:8000/api/farmers https://kisaan-portal.herokuapp.com/api/farmers	Details of all farmers
GET : http://localhost:8000/api/farmer/6261739040865c739ed47d12 https://kisaan-portal.herokuapp.com/api/farmer/6261739040865c739ed47d12	Get specific farmer details giving farmer ID
POST : http://localhost:8000/api/signin BODY : { "email":"Test2@gmail.com", "password": "Test123" }	SignIn API for user
POST : http://localhost:8000/api/signup BODY : { "name": "Tester2" , "email":"Test2@gmail.com", "password":"Test123", "location":"Maharashtra", "role": "0" }	SignUP API for User
DELETE : http://localhost:8000/api/vegetables/6276c334fabb30be8b0a92af/6261739040865c739ed47d12	Delete vegetable from specific userID

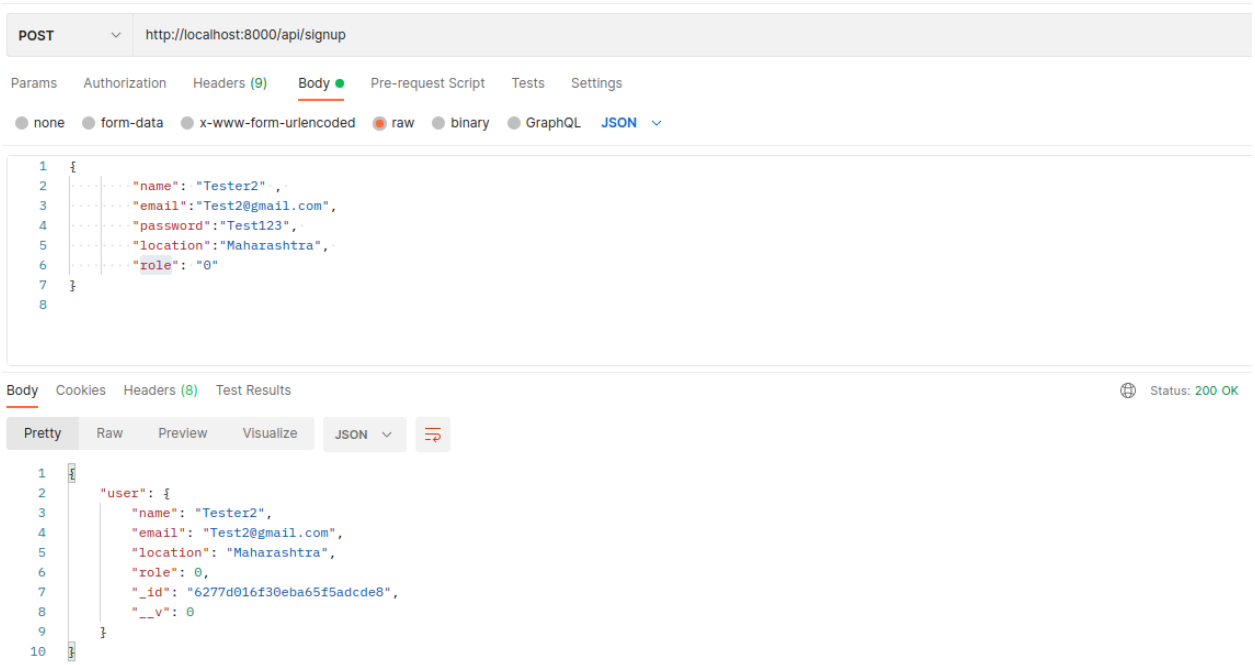
x. Screenshots from POSTMAN API testing











External API integrations with application

We have used mainly 2 external API to track weather conditions of farmer's location as well as farmer and customer gets access to current vegetable market (mandi) prices at currant day

- Market - mandi prices
    - https://tn.data.gov.in/resources/current-daily-price-various-commodities-various-markets-mandi/api
    - https://api.data.gov.in/resource/9ef84268-d588-465a-a308-a864a43d0070?api-key=579b464db66ec23bdd000001a91006a69a344a2f5750f6bda75532d8&format=json&offset=0&limit=1000

```
{
    "created": 1627939168,
    "updated": 1652064920,
    "created_date": "2021-08-02T21:19:28Z",
    "updated_date": "2022-05-09T08:25:20Z",
    "active": "1",
    "index_name": "9ef84268-d588-465a-a308-a864a43d0070",
    "org": [
        "Ministry of Agriculture and Farmers Welfare",
        "Department of Agriculture and Farmers Welfare"
    ],
    "org_type": "Central",
    "source": "data.gov.in",
    "title": "Current Daily Price of Various Commodities from Various Markets (Mandi)",
    "external_ws_url": "",
    "visualizable": "1",
    "field": [
        {
            "name": "State",
            "id": "state",
            "type": "keyword"
        },
        {
            "name": "District",
            "id": "district",
            "type": "keyword"
        },
        {
            "name": "Market",
            "id": "market",
            "type": "keyword"
        },
        {
            "name": "Commodity",
            "id": "commodity",
            "type": "keyword"
        },
        {
            "name": "Variety",
            "id": "variety",
            "type": "keyword"
        },
        {
            "name": "Arrival_Date",
            "id": "arrival_date",
            "type": "date"
        },
        {
            "name": "Min_x0020_Price",
            "id": "min_price",
            "type": "double"
        },
        {
            "name": "Max_x0020_Price",
            "id": "max_price",
            "type": "double"
        },
        {
            "name": "Modal_x0020_Price",
            "id": "modal_price",
```

```
,,
"desc": "Current Daily Price of Various Commodities from Various Markets (Mandi)",
"message": "Resource lists",
"version": "2.2.0",
"status": "ok",
"total": 277,
"count": 277,
"limit": "1000",
"offset": "0",
"records": [
    {
        "state": "Karnataka",
        "district": "Bagalkot",
        "market": "Mhalingapur",
        "commodity": "Gur(Jaggery)",
        "variety": "Nizamabad",
        "arrival_date": "08\/05\/2022",
        "min_price": "2575",
        "max_price": "3750",
        "modal_price": "3455"
    },
    {
        "state": "Karnataka",
        "district": "Bangalore",
        "market": "Ramanagara",
        "commodity": "Beans",
        "variety": "Beans (Whole)",
        "arrival_date": "08\/05\/2022",
        "min_price": "4000",
        "max_price": "6000",
        "modal_price": "5000"
    },
    {
        "state": "Karnataka",
        "district": "Bangalore",
        "market": "Ramanagara",
        "commodity": "Beetroot",
        "variety": "Beetroot",
        "arrival_date": "08\/05\/2022",
        "min_price": "1000",
        "max_price": "1500",
        "modal_price": "1200"
    },
    {
        "state": "Karnataka",
        "district": "Bangalore",
        "market": "Ramanagara",
        "commodity": "Bhindi(Ladies Finger)",
        "variety": "Bhindi",
        "arrival_date": "08\/05\/2022",
        "min_price": "1600",
        "max_price": "2400",
        "modal_price": "2000"
    },
```


Above API fetches market mandi prices and following fields are present in API which includes max - min prices of vegetable item, its category

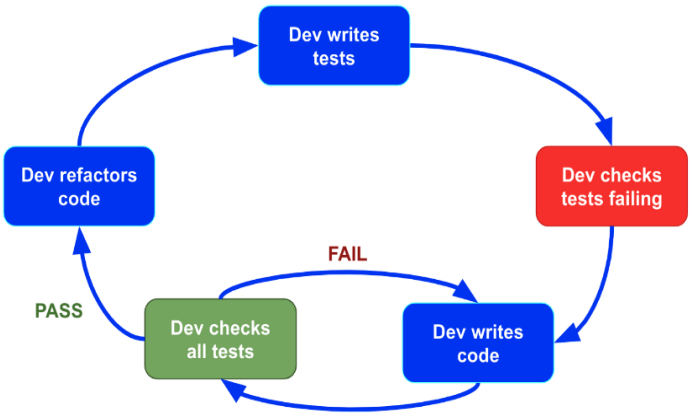
- Open weather Api which will track next 5 days weather predictions
    - https://openweathermap.org/forecast16
    - https://api.openweathermap.org/data/2.5/forecast?q=Karnataka&units=metric&cnt=50&appid=44aef6ede898ea08ff2f4d21eea9762c

api.openweathermap.org/data/2.5/forecast?q=Karnataka&units=metric&cnt=50&appid=44aef6ede898ea08ff2f4d21eea9762c

```
{"cod":"200","message":0,"cnt":40,"list":[{"dt":1652086800,"main":
{"temp":32.2,"feels_like":32.21,"temp_min":32.2,"temp_max":33.45,"pressure":1005,"sea_level":1005,"grnd_level":921,
"humidity":38,"temp_kf":-1.25},"weather":[{"id":804,"main":"Clouds","description":"overcast
clouds","icon":"04d"}],"clouds":{"all":95},"wind":
{"speed":5.61,"deg":304,"gust":5.6},"visibility":10000,"pop":0.24,"sys":{"pod":"d"},"dt_txt":"2022-05-09
09:00:00"},{"dt":1652097600,"main":
{"temp":27.4,"feels_like":28.87,"temp_min":25.31,"temp_max":27.4,"pressure":1005,"sea_level":1005,"grnd_level":920,
"humidity":63,"temp_kf":2.09},"weather":[{"id":500,"main":"Rain","description":"light
rain","icon":"10d"}],"clouds":{"all":94},"wind":
{"speed":8.24,"deg":327,"gust":11},"visibility":4190,"pop":0.6,"rain":{"3h":2.88},"sys":{"pod":"d"},"dt_txt":"2022-
05-09 12:00:00"},{"dt":1652108400,"main":
{"temp":25.31,"feels_like":25.67,"temp_min":25.31,"temp_max":25.31,"pressure":1006,"sea_level":1006,"grnd_level":92
1,"humidity":68,"temp_kf":0},"weather":[{"id":500,"main":"Rain","description":"light rain","icon":"10n"}],"clouds":
{"all":100},"wind":{"speed":3.93,"deg":211,"gust":6.4},"visibility":10000,"pop":0.68,"rain":{"3h":2.88},"sys":
{"pod":"n"},"dt_txt":"2022-05-09 15:00:00"},{"dt":1652119200,"main":
{"temp":24.6,"feels_like":25.2,"temp_min":24.6,"temp_max":24.6,"pressure":1006,"sea_level":1006,"grnd_level":921,"h
umidity":80,"temp_kf":0},"weather":[{"id":804,"main":"Clouds","description":"overcast
clouds","icon":"04n"}],"clouds":{"all":100},"wind":
{"speed":3.14,"deg":251,"gust":4.51},"visibility":10000,"pop":0.64,"sys":{"pod":"n"},"dt_txt":"2022-05-09
18:00:00"},{"dt":1652130000,"main":
```


xi. Testing

To make sure the project is running alright we provide a set of test cases. We use a library called ‘Chai Mocha’. Mocha is a JavaScript test framework running on Node. js and in the browser. Mocha allows asynchronous testing, test coverage reports, and use of any assertion library. Chai is a BDD / TDD assertion library for NodeJS and the browser that can be delightfully paired with any javascript testing framework.



xii. Backend API testing using Mocha framework

Mocha is a testing framework for Node.js . It is useful for unit and integration testing. Mocha provides the describe functionality which helps in implementing test cases based on the description. Inside each describe section, specific details about each feature can be tested using the it handle.

```
describe("Vegetables API Testing", function(){

    global.id="";

    describe("Testing - Vegetables Details Fetch", function(){
        var url = "https://kisaan-portal.herokuapp.com/api/vegetables";

        it("returns status http-code 200", function(done){
            request({
                url: url,
                method: "GET",

            }, function(error, response, body){
                //console.log(body);
                //console.log(response.statusCode);
                expect(response.statusCode).to.equal(200);
                done();
            })
        })

    })
```

```
describe("Testing - SignIn", function(){
    var url = "https://kisaan-portal.herokuapp.com/api/signin";

    it("returns status http-code 200", function(done){
        request({
            url: url,
            method: "POST",
            headers: {'Content-Type': 'application/json'},
            body: {email: "niraj@gmail.com", password: "niraj123"},
            json: true
        }, function(error, response, body){
            expect(response.statusCode).to.equal(200);
            done();
        })
    })

    it("New Login", function(done){
        request({
            url: url,
            method: "POST",
            headers: {'Content-Type': 'application/json'},
            body: {email: "niraj@gmail.com", password: "niraj123"},
            json: true
        }, function(error, response, body){
            //console.log(body);
            expect(response.statusCode).to.equal(200);
            done();
        })
    })

})
```

Fig. SignIn authentication and Fetch details from vegetables list

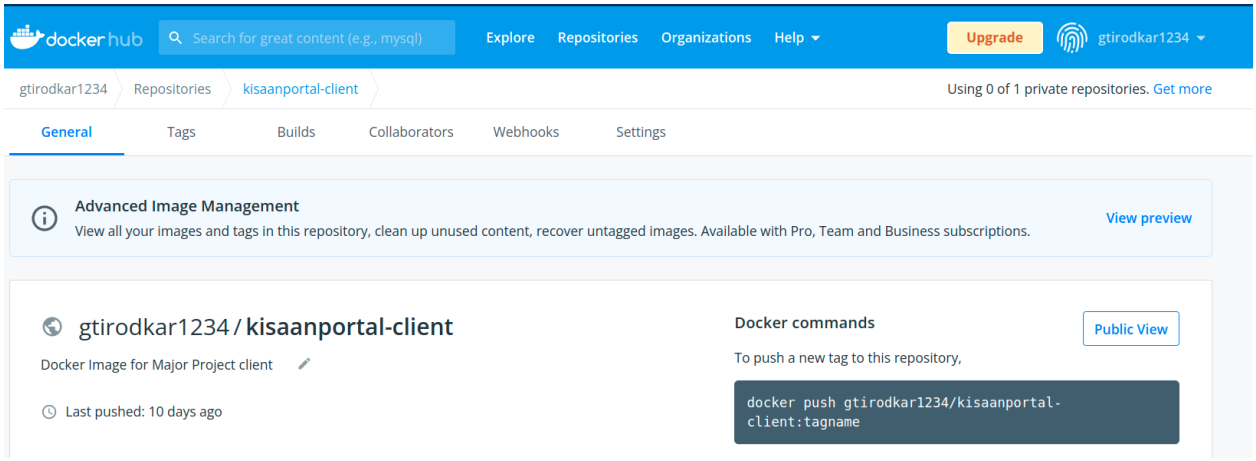
In the above example, the SignIn / SignUp as well as various GET methods for vegetables and farmers are tested by first encapsulating it using **describe**. Then positive and negative test cases are designed to test functionalities based on different parameters.

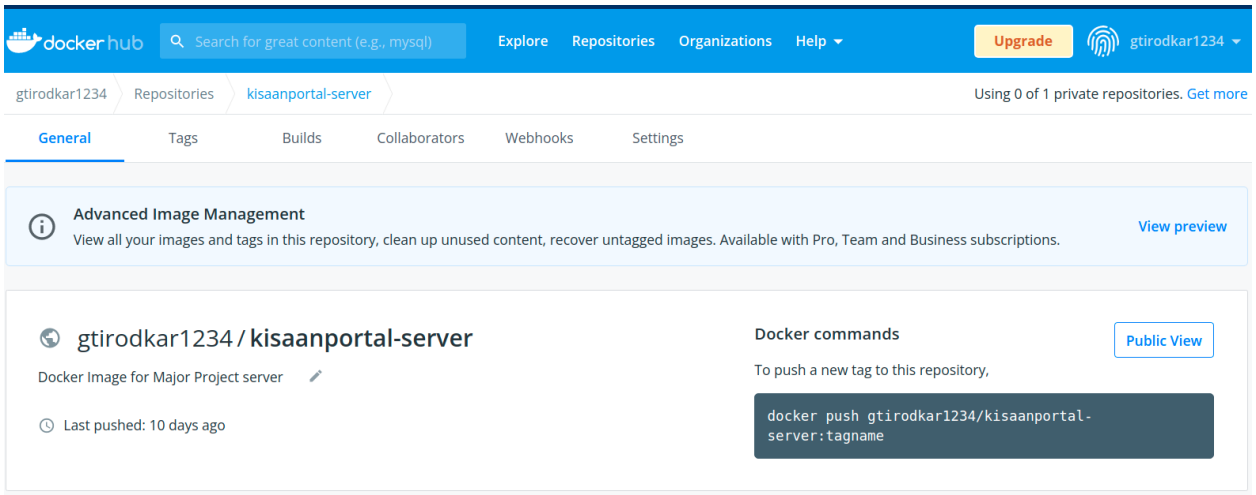
xiii. Containerization

Docker is an open source platform for developing, shipping, and running applications. Docker enables users to separate your applications from your infrastructure so you can deliver software quickly. This allows us to deploy products directly to users' computers without installing each software one-by-one.

We need to create an account on DockerHub, which is a public registry.

We then push our created image on this repository, this is publicly available and can be pulled by any user and deployed on a local machine.





xiv. Create repository on docker-hub

Link :

a. https://hub.docker.com/repository/docker/gtirodkar1234/kisaanportal-server
b. https://hub.docker.com/repository/docker/gtirodkar1234/kisaanportal-client
c. https://hub.docker.com/repositories

xv. Create DockerFile (Frontend v/s Backend)

backend > Dockerfile > FROM

```
1   FROM node:latest
2
3   WORKDIR /usr/src/app
4
5   COPY ./package.json ./
6   COPY ./package-lock.json ./
7
8   RUN npm install
9   COPY . .
10
11  EXPOSE 8000
12  CMD ["npm", "start"]
13
```

frontend > Dockerfile > FROM

```
1   FROM node:latest
2
3   WORKDIR /usr/src/app
4
5   COPY ./package.json ./
6   COPY ./package-lock.json ./
7
8   RUN npm install
9
10  COPY . .
11
12  EXPOSE 3000
13  CMD [ "npm", "start" ]
14
```

Docker holds a set of all the commands a user could call on the command line to assemble an image. For our node project we set to copy the package.json and package-lock.json to the container and then run npm install to install all the packages there.

xvi. CI/CD Pipeline

Continuous Integration : Continuous integration (CI) is the practice of automating the integration of code changes from multiple contributors into a single software project.

Continuous Delivery : Continuous Delivery is the ability to get changes of all types such as including new features, configuration changes, bug fixes and experiments into production, or into the hands of users, safely and quickly in a sustainable way.

We use Jenkins to build our CI/CD pipeline. Jenkins is an open source automation server. It helps automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery. It is a server-based system that runs in

servlet containers such as Apache Tomcat.

a. Manage Plugins

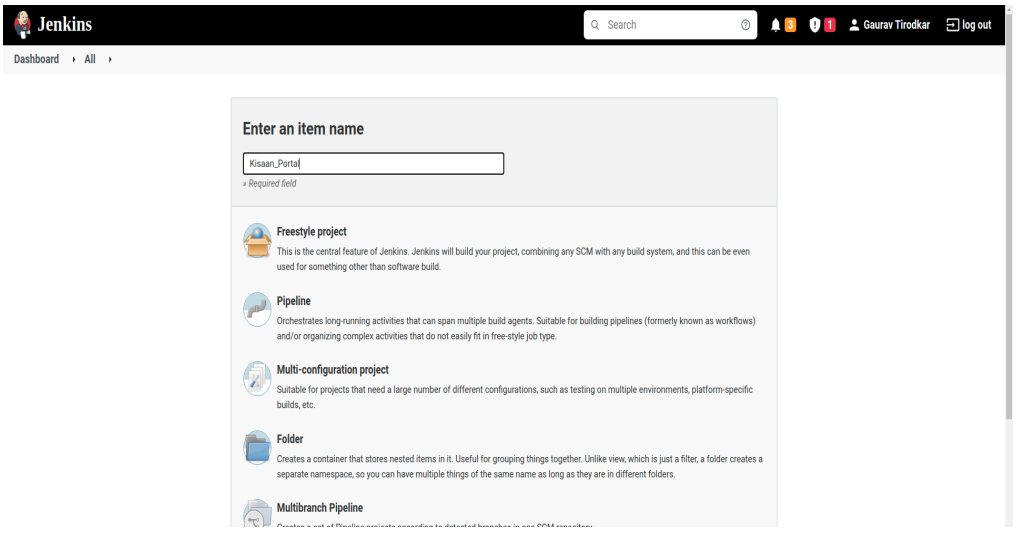
We use Jenkins to automate Building, Testing and Deployment of the entire project with just a single click. To begin with we first need to install various plugins.

We install Docker Pipeline, GitHub, Ansible , Maven Integration, etc. plugins by going to Manage Jenkins -> Manage Plugins. After all the plugins are installed, we need to restart our Jenkins and then add Docker credentials.

To connect our project with the Docker Hub repository we need to add credentials to the Docker Hub repository and also set up an unique id which is equal to docker with Registry credentials id in pipeline script.

b. Create a new pipeline in Jenkins

To set up our project, we create a project with Kisaan Portal as name and configure it. This type of a project is called a pipeline project as opposed to the regular project as we write a pipeline script ,i.e. A list of steps to be followed for project execution.



c. Pipeline script in Jenkins

Before we set up the pipeline we declare environment variables to use in the pipeline in the future. We add variables for server and client image and docker credentials.

JenkinsFile_Script_niraj

```
pipeline{
    environment{
            server_image = ""
            client_image= ""
            registryCredential='docker'
    }
    agent any
    stages{
        stage('Stage 1: Git Clone'){
            steps{
                git branch: 'niraj-working', url: 'https://github.com/NirajGujarathi/Kisaan_Portal.git'
            }
        }
```

Stage 1 : Clone the repository from GitHub

```
stage('Stage 2: Build Docker Server'){
    steps{
        dir("backend"){
            script{
                server_image= docker.build "nirajg/kisaan_portal_server:latest"
            }
        }
    }
}
stage('Stage 3: Build Docker Client'){
    steps{
        dir("frontend"){
            script{
                client_image= docker.build "nirajg/kisaan_portal_client:latest"
            }
        }
    }
}
```

Step 2 : Build Docker Image using specified tag

```
33      stage('Stage : npm testing'){
34          steps{
35              dir("backend"){
36                  sh 'npm i'
37                  sh 'npm run test'
38              }
39          }
40      }
41
42
```

npm mocha testing

```
stage('Stage 4: Push Server Docker Image to DockerHub') {
    steps {
        script {
            docker.withRegistry('', 'docker') {
                server_image.push()
            }
        }
    }
}
stage('Stage 5: Push Client Docker Image to DockerHub') {
    steps {
        script {
            docker.withRegistry('', 'docker') {
                client_image.push()
            }
        }
    }
}
```

Step 3 : Now we upload these built images to docker hub

To upload this to docker hub we need docker credentials, here the pre defined environment variables come in use.

```
stage('Stage 6: Ansible Deployment to machine'){
    steps{

        ansiblePlaybook becomeUser: 'null', colorized: true, credentialsId: 'docker',
        installation: 'Ansible', inventory: 'deploy-docker/inventory',
        playbook: 'deploy-docker/deploy-app.yml', sudoUser: 'null'

    }
}
```

Step 4 : Ansible Deployment

Ansible is used to pull images from Docker Hub public registry. The name tag in the docker image section defines which image to be pulled. The ansible user is defined in the inventory file.

deploy-docker > inventory

```
1   [ubuntu]
2   localhost ansible_user=gaurav
```

xvii. Ansible Deployment

Ansible is an open-source software provisioning, configuration management, and application-deployment tool enabling infrastructure as code. It runs on many Unix-like systems, and can configure both Unix-like systems as well as Microsoft Windows.

To perform configuration management using Ansible we need to create a playbook that has a docker compose file.

Docker compose is used to spin up multiple services together, it is used in multi-container applications. A single command is needed to run this compose file.

deploy-docker > docker-compose.yml

```yaml
version: "3"
services:
  react-app:
    image: gtirodkar1234/kisaanportal-client:latest
    stdin_open: true
    ports:
      - "3000:3000"
    networks:
      - mern-app
  api-server:
    image: gtirodkar1234/kisaanportal-server:latest
    ports:
      - "8000:8000"
    networks:
      - mern-app
    depends_on:
      - mongo
```

To begin with we set a schema version, it's best practice to go with the latest schema version but a fairly recent one will also do.

Next is to set up the services, first is the react-app service which is used for

the frontend of the application and api-server for the backend. The names are custom defined and will become their alias in the future.

Along with this we need a mongo image as well, we pull the `mongo:3.6.23-xenial` version to run.

The *"depends_on"* option is used here as the backend will not run before the mongo container is built as the app may crash without the help of mongo. *"depends_on"* ensures that the backend service is executed only after mongoose is ready.

```
mongo:
  image: mongo:3.6.23-xenial
  networks:
    - mern-app
```

We have connected all this on a single network called ***"mern-app"***, which allows intra network communication between the containers.

To run docker compose we create a playbook file called docker.yml

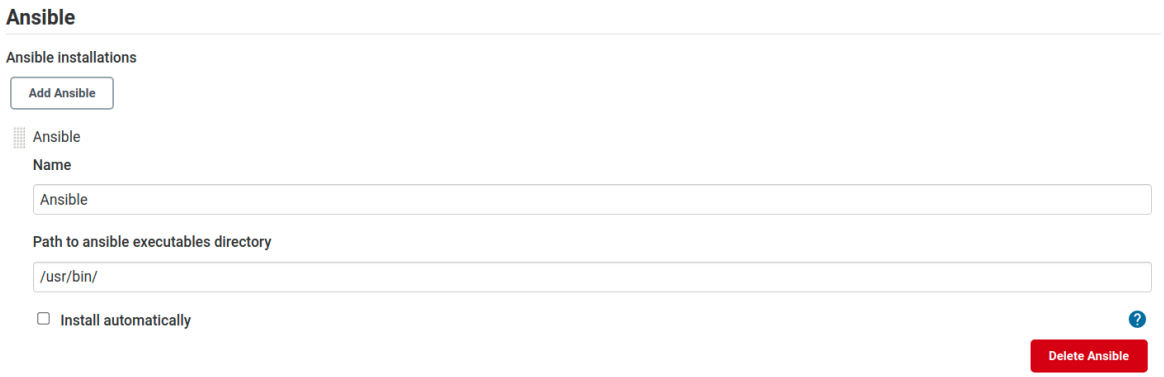
deploy-docker > ! deploy-app.yml

```
1   ---
2   - name: Pull and Run docker image
3     hosts: all
4     tasks:
5       - name: copy docker compose file from folder to remote host
6         copy:
7           src: ./docker-compose.yml
8           dest: ./
9       - name: pull images specifed in docker-compose
10        command: docker-compose -f ./docker-compose.yml pull
11      - name: run the pulled docker images in detached mode
12        command: docker-compose -f ./docker-compose.yml up -d
```

This will copy the compose file to the remote host and run two commands, first to pull all the specified docker images and second to run all of them.

Configure Ansible in Jenkins

We need to go to Jenkins -> Dashboard -> Manage Jenkins -> Global Tool Configuration and add Ansible there. Here, we also need to give the correct path to Ansible.



After jenkins configuration, you can run this ansible playbook directly.

xviii. Log Management

Logging is a process of recording information generated by application activities into log files. Messages saved in the log file are called logs. A log is a single instance recorded in the log file.

To keep a track on the application process we need log management. At every step we add logger comments so that it becomes easier for problem identification while resolving any bugs.

To perform log management we use **winston**, which is a logger for node.js

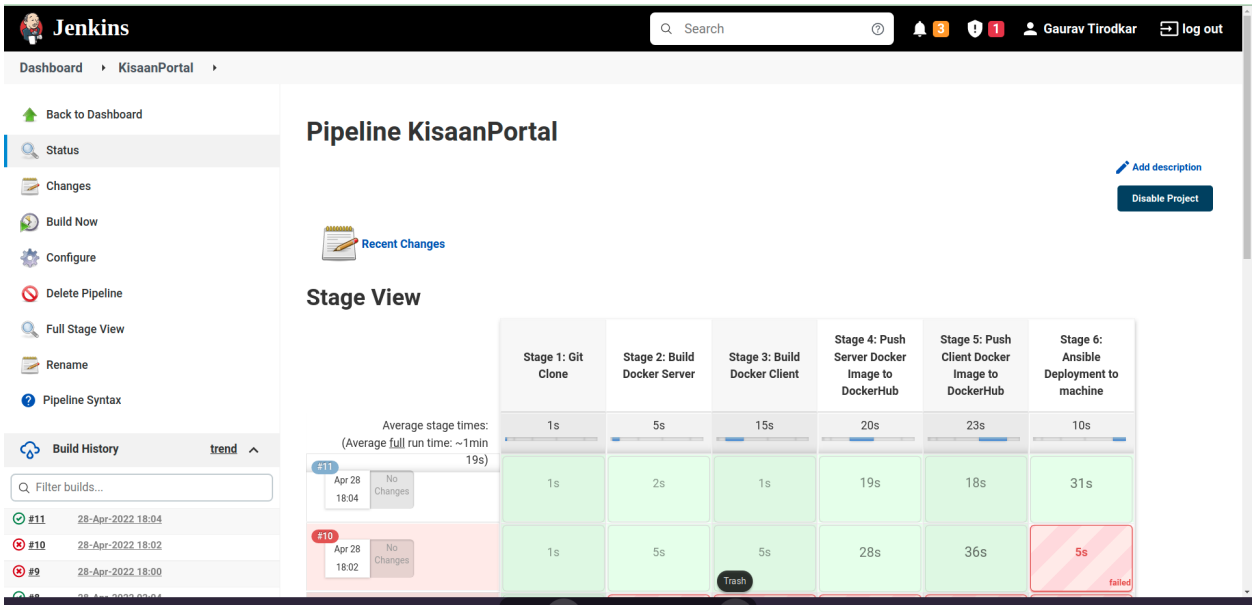
backend > logger > JS index.js > ...

```
const winston = require('winston');
const logConfiguration = {
    'transports': [
        new winston.transports.File({
            filename: './logs.log'
        })
    ],
    format: winston.format.combine(
        // winston.format.label({
        //     label: `Label🏷️`
        // }),
        winston.format.timestamp({
            format: 'YYYY-MM-DD HH:mm:ss'
        }),
        //${info.level}: ${info.label}:
        winston.format.printf(info => `${[info.timestamp]}, ${info.level}, ${info.message}`),
    )
};
const logger = winston.createLogger(logConfiguration);
module.exports = logger;
```

To add any logger information we can run a simple command.

```
logger.info("Logger comment");
```

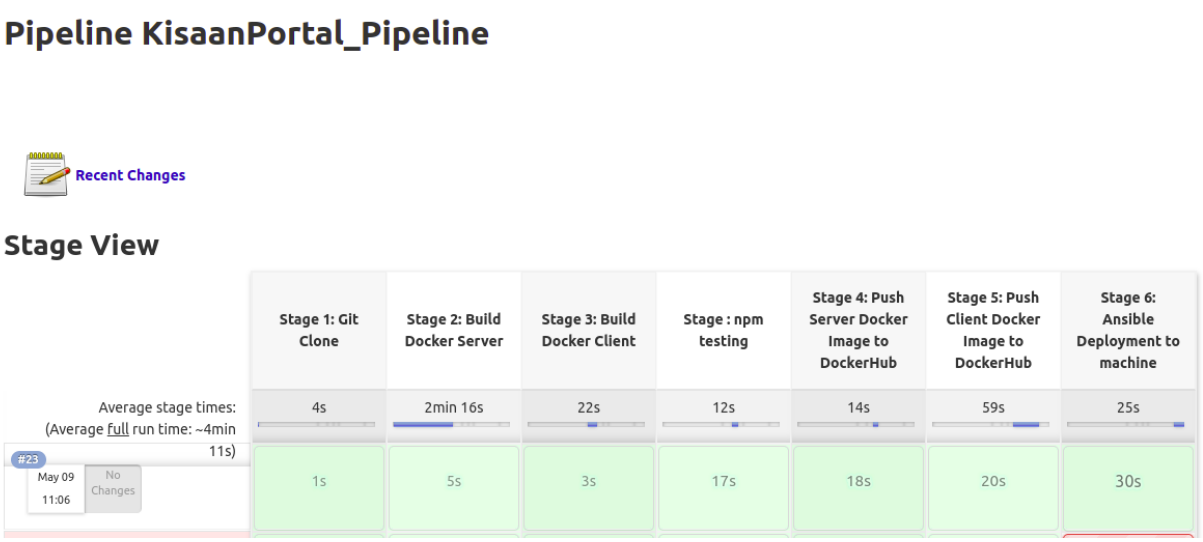
xix. Building Jenkins Pipeline



The project builds in 6 stages :

1. Git Clone
2. Build Docker Server
3. Build Docker Client
4. npm testing
5. Push Server Docker Image to DockerHub
6. Push Client Docker Image to DockerHub
7. Ansible Deployment to machine

Once everything is done, the image is pulled to the local repository. We need to run this image to create a container. This container will deploy the jar file and the calculator will be executed.



xx. Running image on local machine

```
niraj@niraj-iiitb:~$ docker images
REPOSITORY                    TAG                 IMAGE ID            CREATED             SIZE
nirajg/kisaan_portal_client   latest              2c681f4ad291        24 minutes ago      1.32GB
nirajg/kisaan_portal_server   latest              11ce443ac048        25 minutes ago      1.07GB
```

```
niraj@niraj-iiitb:~$ docker run -it nirajg/kisaan_portal_server

> backend@1.0.0 start
> nodemon app.js

[nodemon] 2.0.15
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,json
[nodemon] starting `node app.js`
Server is running on 8000
DB Connected
```

Starting docker server container

```
niraj@niraj-iiitb:~$ docker run -it nirajg/kisaan_portal_client

> kisaanportal@0.1.0 start
> react-scripts start
```

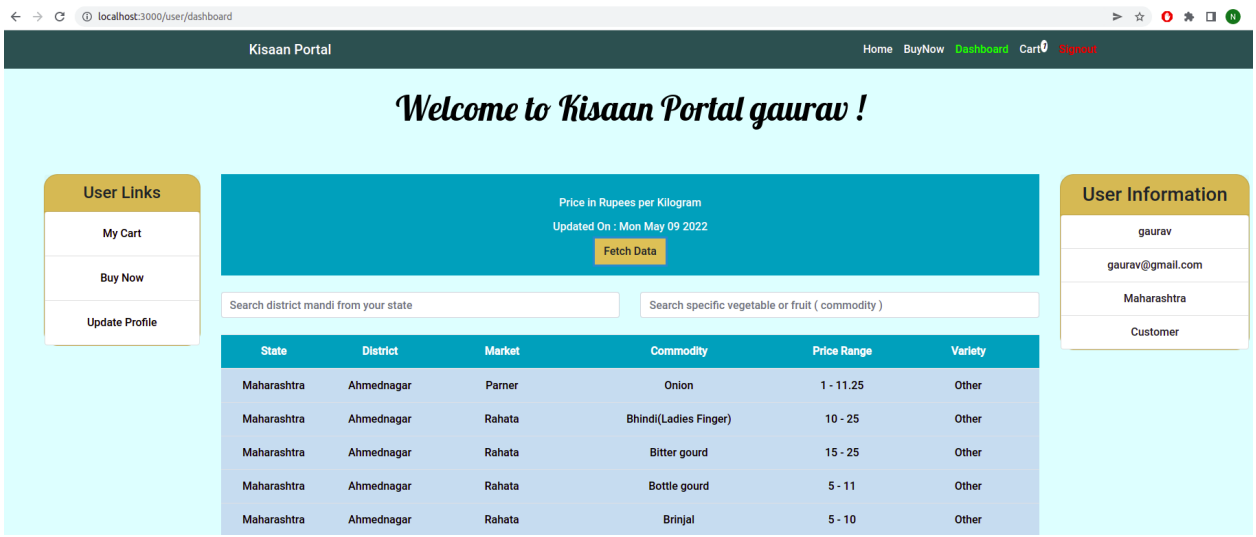
```
Compiled successfully!

You can now view kisaanportal in the browser.

  http://localhost:3000

Note that the development build is not optimized.
To create a production build, use yarn build.

webpack compiled successfully
```

Starting docker client container

```
9d2386bc2653   nirajg/kisaan_portal_server:latest   "docker-entrypoint.s…"   About an hour ago   Exited (1) 17 seconds ago                niraj_api-serve
r_1
f3278d1be8a9   nirajg/kisaan_portal_client:latest   "docker-entrypoint.s…"   About an hour ago   Exited (1) 10 seconds ago                niraj_react-app
_1
```

```
OPTIONS /api/vegetables/by/search 204 0.546 ms - 0
GET /api/farmers 304 5413.703 ms - -
GET /api/farmers 304 2177.601 ms - -
POST /api/vegetables/by/search 200 7634.366 ms - 429
POST /api/vegetables/by/search 200 5859.108 ms - 429
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 6639.536 ms - -
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 708.680 ms - -
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 127.292 ms - -
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 3171.756 ms - -
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 278.748 ms - -
GET /api/vegetables/photo/6261a71b45c5fc794964dc53 304 204.440 ms - -
GET /api/signout 304 4.513 ms - -
GET /api/vegetables?sortBy=createdAt&order=desc&limit6 304 339.700 ms -
GET /api/vegetables?sortBy=sold&order=desc&limit6 304 683.923 ms - -
OPTIONS /api/signin 204 0.359 ms - 0
POST /api/signin 200 40.414 ms - 278
OPTIONS /api/vegetables/by/search 204 0.447 ms - 0
POST /api/vegetables/by/search 200 641.747 ms - 429
POST /api/vegetables/by/search 200 3830.270 ms - 429
```

Backend API logs

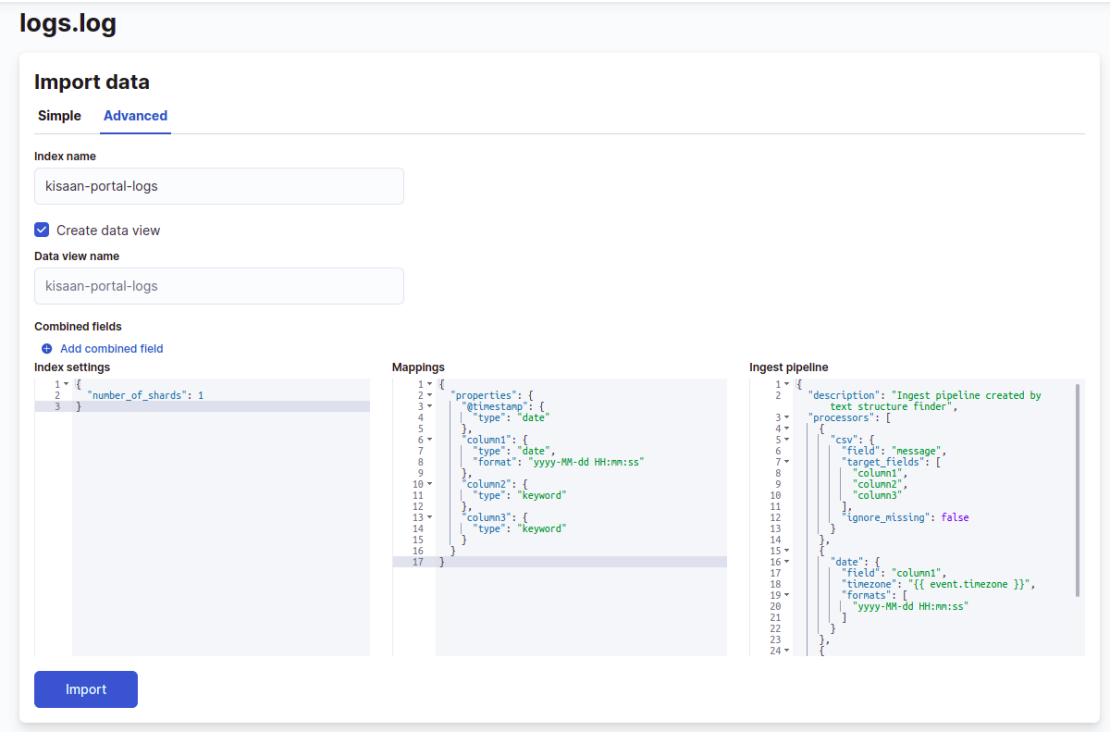


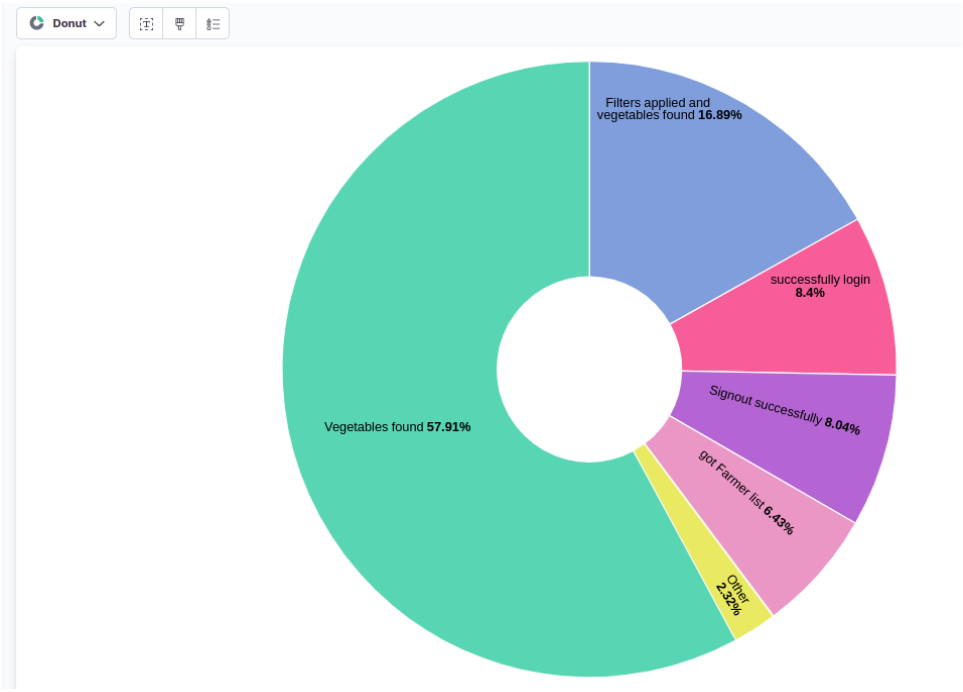
xxi. Continuous Monitoring

"ELK" is the acronym for three open source projects: Elasticsearch, Logstash, and Kibana. ELK stack gives us the ability to aggregate logs from all the systems and applications, analyze these logs, and create visualizations for application and infrastructure monitoring, faster troubleshooting, security analytics, and more.

Logger File -

```
2022-04-21 16:16:54, info, got Farmer list
2022-04-21 16:16:55, info, got Farmer list
2022-04-21 16:16:55, info, Filters applied and vegetables found
2022-04-21 16:17:00, info, Filters applied and vegetables found
2022-04-21 16:17:02, info, Filters applied and vegetables found
2022-04-21 16:18:00, info, got Farmer list
2022-04-21 16:18:00, info, got Farmer list
2022-04-21 16:18:00, info, Filters applied and vegetables found
2022-04-21 16:18:26, info, got Farmer list
2022-04-21 16:18:26, info, Filters applied and vegetables found
2022-04-21 16:18:26, info, got Farmer list
2022-04-21 16:18:30, info, Filters applied and vegetables found
2022-04-21 16:18:32, info, Filters applied and vegetables found
2022-04-21 16:18:41, info, got Farmer list
2022-04-21 16:18:41, info, Filters applied and vegetables found
2022-04-21 16:18:41, info, got Farmer list
2022-04-21 16:19:02, info, Filters applied and vegetables found
2022-04-21 16:19:11, info, Filters applied and vegetables found
2022-04-21 16:19:45, info, Vegetables found
2022-04-21 16:19:45, info, Vegetables found
2022-04-21 16:19:55, info, Signout successfully
2022-04-21 16:24:08, info, successfully login
2022-04-21 16:24:30, info, Signout successfully
2022-04-21 16:24:30, info, Vegetables found
2022-04-21 16:24:30, info, Vegetables found
2022-04-21 16:25:47, info, successfully login
2022-04-21 16:47:37, info, Vegetables found
2022-04-21 16:47:37, info, Vegetables found
2022-04-21 16:47:47, info, Signout successfully
```

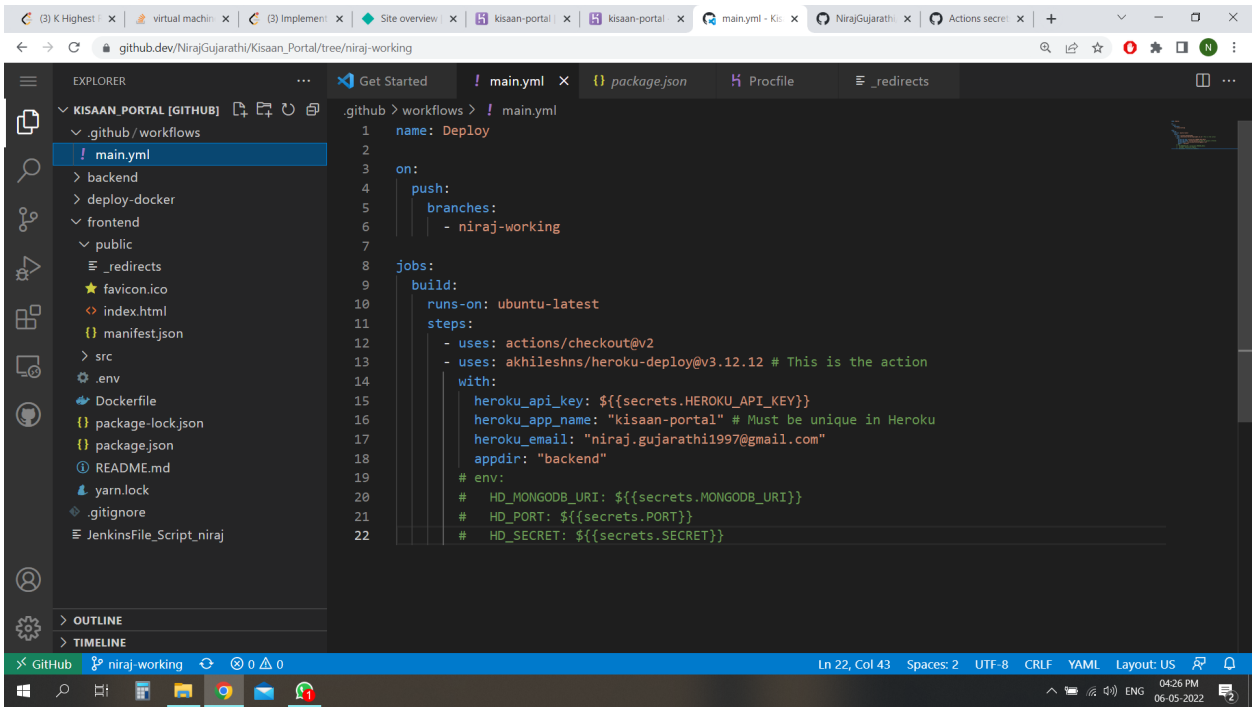




Data visualization using ELK

6. Deployment - heroku and netlify -

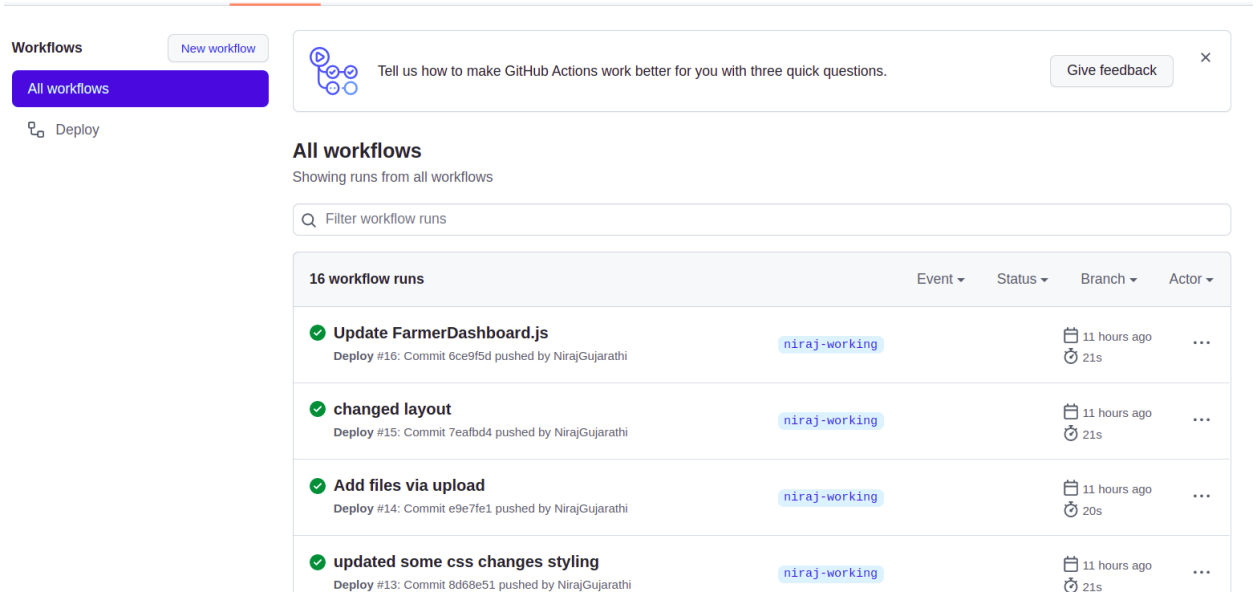
We used **Github actions** as a Continuous Integration tool, to automate the workflow actions. We have the following stages/steps in our workflow. The workflows in Github Actions can be defined as jobs, each of these jobs in turn have multiple steps, which execute sequentially.

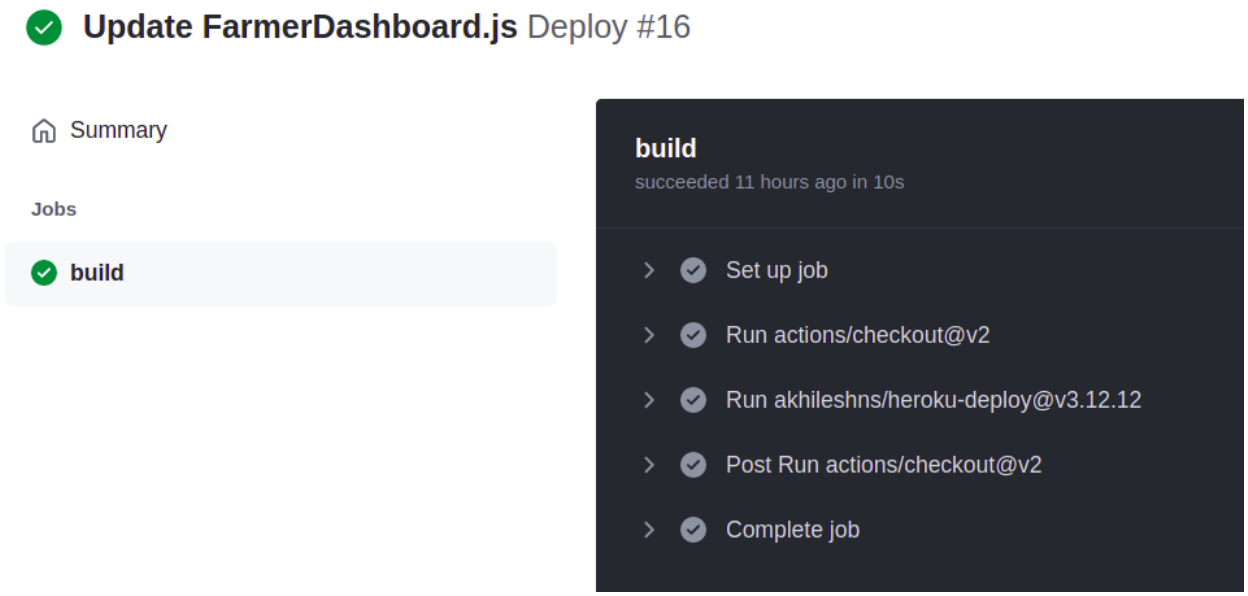


Main.yml file for backend deployment on heroku - using CI / CD whenever new changes are triggered on niraj-working branch application is automatically deployed to cloud

```
name: Deploy
on:
  push:
    branches:
      - niraj-working

jobs:
  build:
    runs-on: ubuntu-latest
    steps:
```

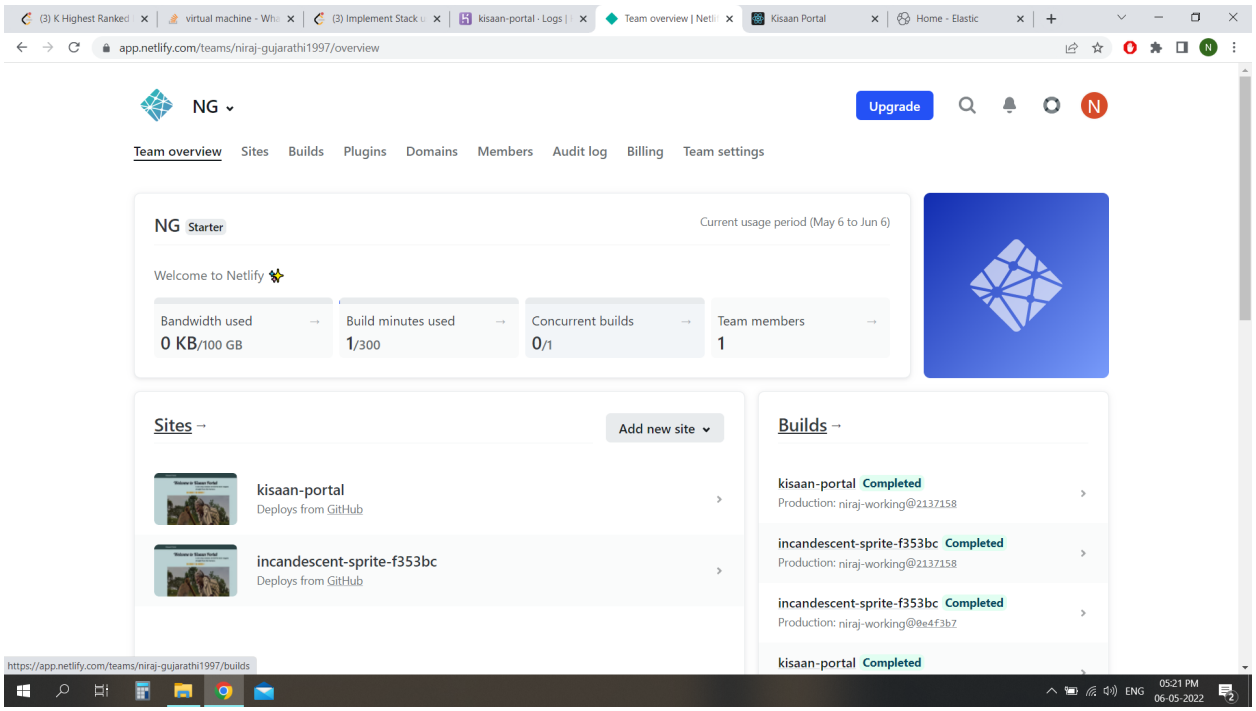
```
- uses: actions/checkout@v2
- uses: akhileshns/heroku-deploy@v3.12.12 # This is the action
  with:
    heroku_api_key: ${{secrets.HEROKU_API_KEY}}
    heroku_app_name: "kisaan-portal" # Must be unique in Heroku
    heroku_email: "niraj.gujarathi1997@gmail.com"
    appdir: "backend"
```

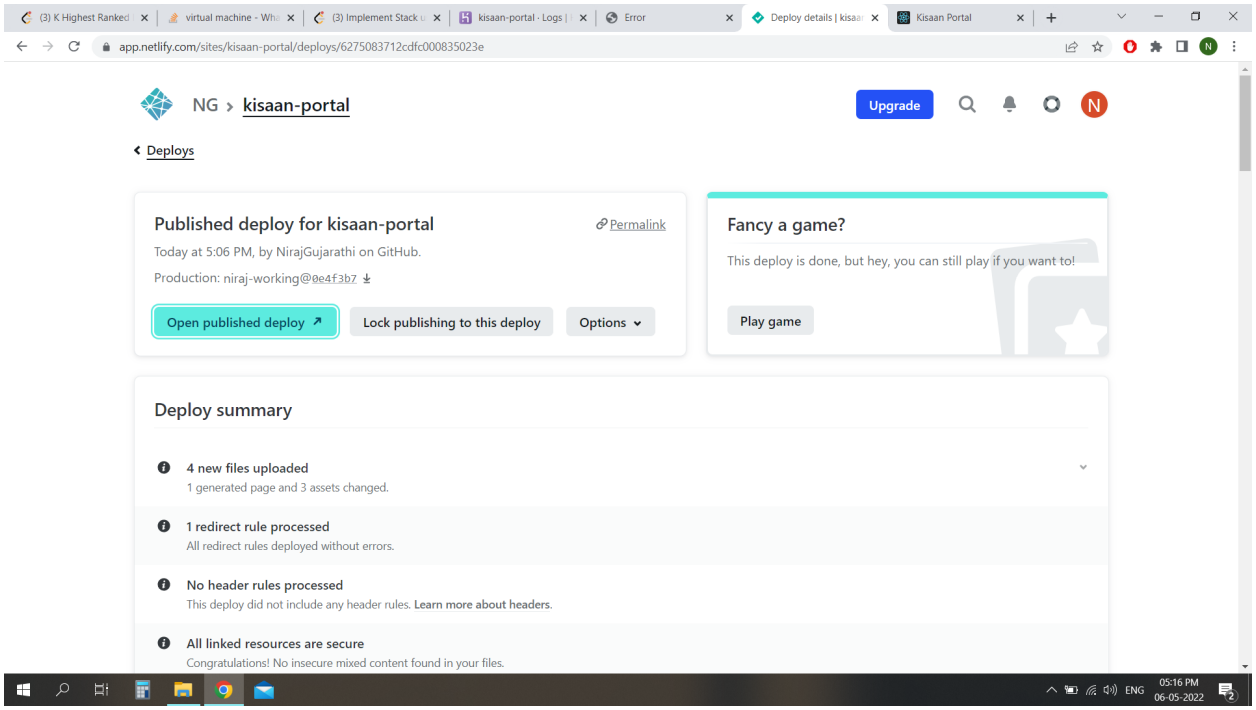


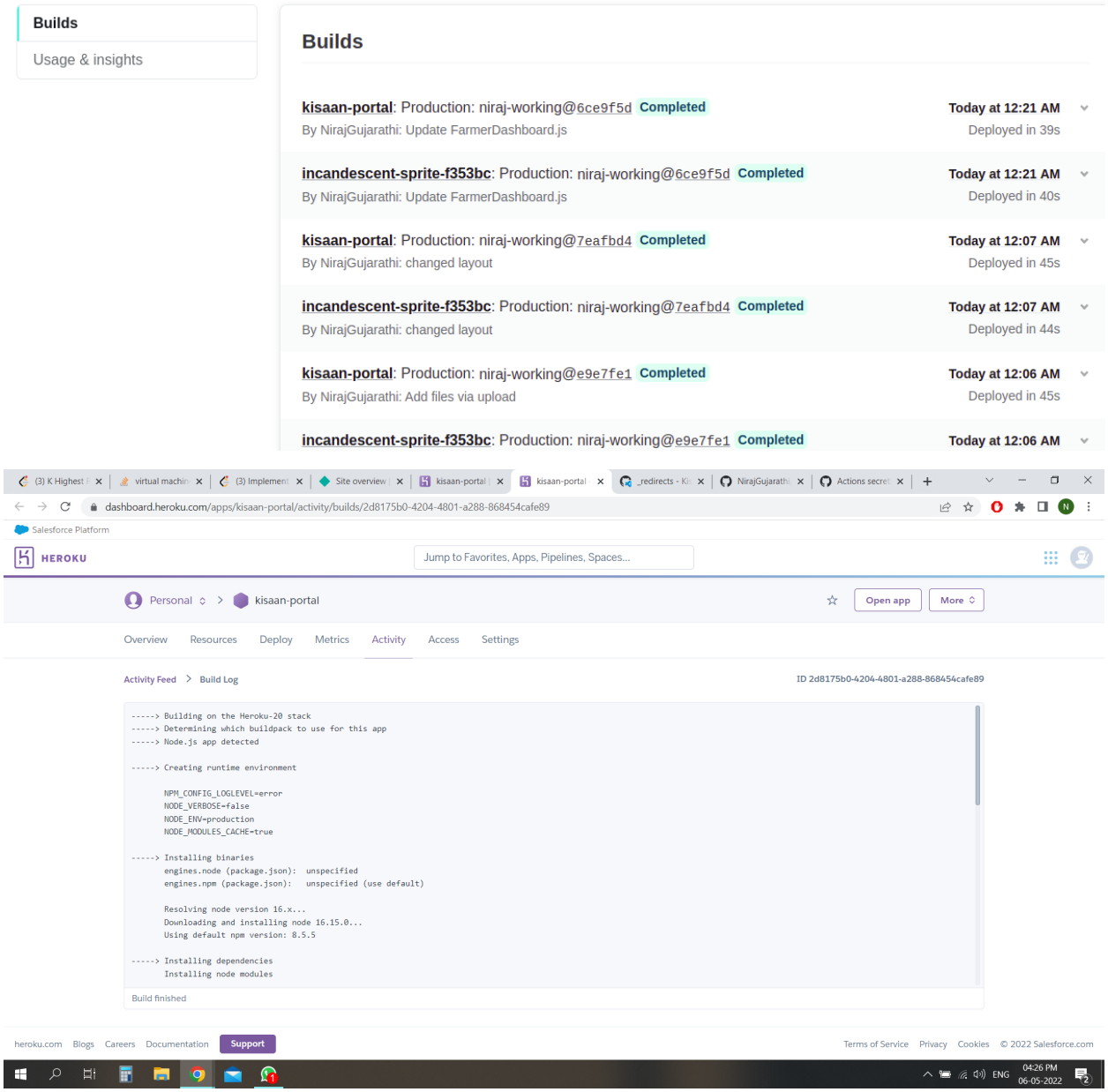


7. App Deployment

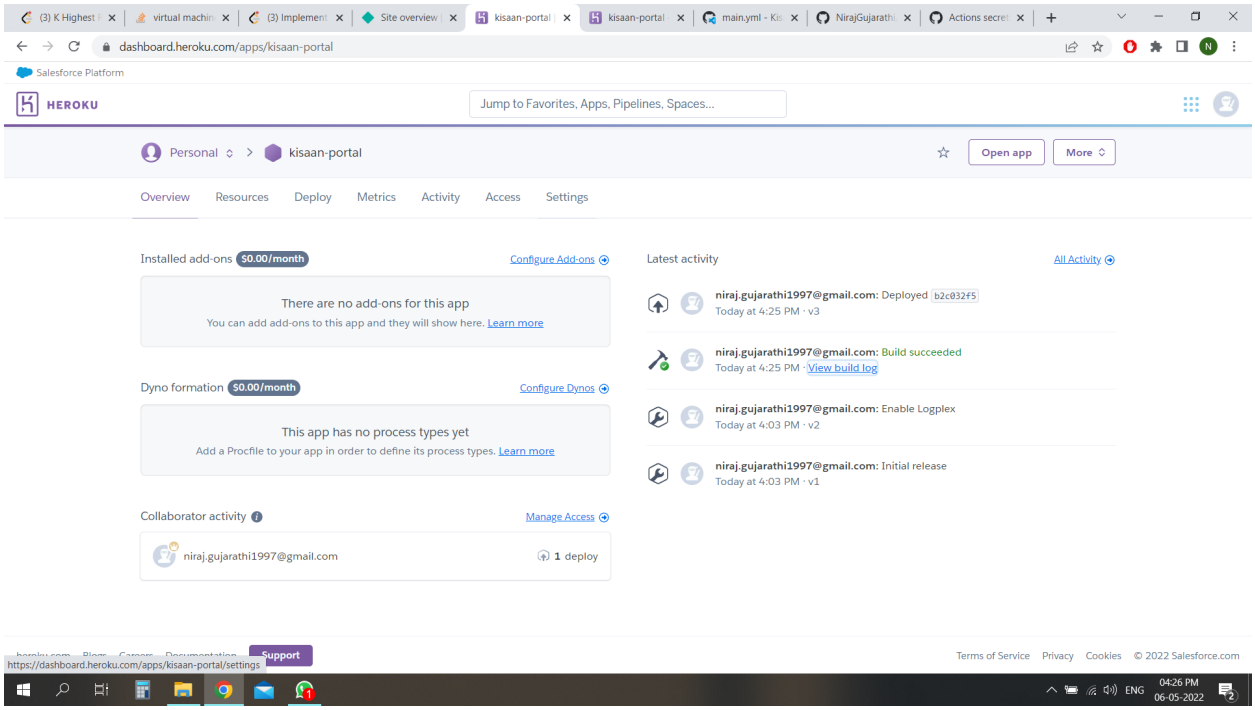
The entire website is deployed on two services, Netlify and Heroku. Netlify hosts the front end and heroku hosts the backend of the app.

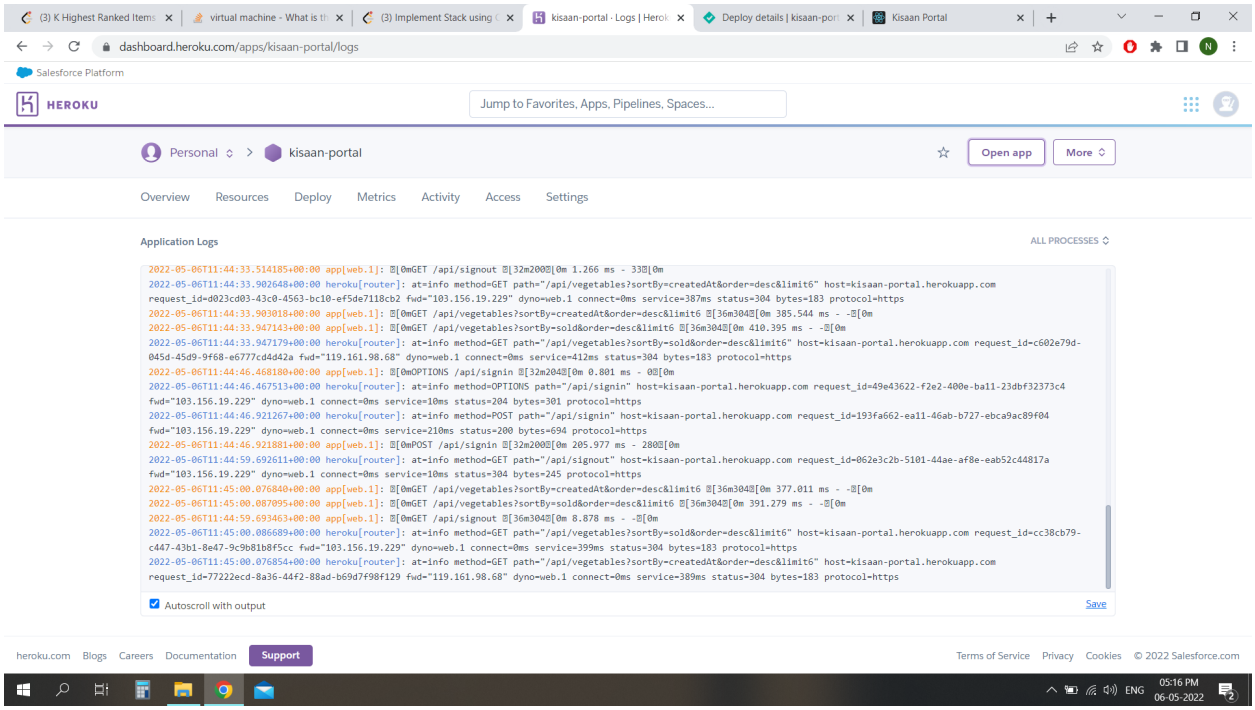






Heroku deployment logs


dashboard.heroku.com/apps/kisaan-portal
HEROKU
Jump to Favorites, Apps, Pipelines, Spaces...
Personal
kisaan-portal
Open app
More
Overview
Resources
Deploy
Metrics
Activity
Access
Settings
Installed add-ons
$0.00/month
Configure Add-ons
There are no add-ons for this app
You can add add-ons to this app and they will show here. Learn more
Dyno formation
$0.00/month
Configure Dynos
This app has no process types yet
Add a Procfile to your app in order to define its process types. Learn more
Collaborator activity
Manage Access
niraj.gujarathi1997@gmail.com
1 deploy
Latest activity
All Activity
niraj.gujarathi1997@gmail.com: Deployed b2c032f5
Today at 4:25 PM · v3
niraj.gujarathi1997@gmail.com: Build succeeded
Today at 4:25 PM · View build log
niraj.gujarathi1997@gmail.com: Enable Logplex
Today at 4:03 PM · v2
niraj.gujarathi1997@gmail.com: Initial release
Today at 4:03 PM · v1
Support
Terms of Service
Privacy
Cookies
© 2022 Salesforce.com
https://dashboard.heroku.com/apps/kisaan-portal/settings
ENG
04:26 PM
06-05-2022


dashboard.heroku.com/apps/kisaan-portal/logs
HEROKU
Jump to Favorites, Apps, Pipelines, Spaces...
Personal
kisaan-portal
Open app
More
Overview
Resources
Deploy
Metrics
Activity
Access
Settings
Application Logs
ALL PROCESSES
2022-05-06T11:44:33.514185+00:00 app[web.1]: [0mGET /api/signout [32m200[0m 1.266 ms - 33[0m
2022-05-06T11:44:33.902648+00:00 heroku[router]: at=info method=GET path="/api/vegetables?sortBy=createdAt&order=desc&limit6" host=kisaan-portal.herokuapp.com
request_id=d023cd03-43c0-4563-bc10-ef5de7118cb2 fwd="103.156.19.229" dyno=web.1 connect=0ms service=387ms status=304 bytes=183 protocol=https
2022-05-06T11:44:33.903018+00:00 app[web.1]: [0mGET /api/vegetables?sortBy=createdAt&order=desc&limit6 [36m304[0m 385.544 ms - -[0m
2022-05-06T11:44:33.947143+00:00 app[web.1]: [0mGET /api/vegetables?sortBy=sold&order=desc&limit6 [36m304[0m 410.395 ms - -[0m
2022-05-06T11:44:33.947179+00:00 heroku[router]: at=info method=GET path="/api/vegetables?sortBy=sold&order=desc&limit6" host=kisaan-portal.herokuapp.com request_id=c602e79d-
045d-45d9-9f68-e6777cd4d42a fwd="119.161.98.68" dyno=web.1 connect=0ms service=412ms status=304 bytes=183 protocol=https
2022-05-06T11:44:46.468180+00:00 app[web.1]: [0mOPTIONS /api/signin [32m204[0m 0.801 ms - 0[0m
2022-05-06T11:44:46.467513+00:00 heroku[router]: at=info method=OPTIONS path="/api/signin" host=kisaan-portal.herokuapp.com request_id=49e43622-f2e2-400e-ba11-23dbf32373c4
fwd="103.156.19.229" dyno=web.1 connect=0ms service=10ms status=204 bytes=301 protocol=https
2022-05-06T11:44:46.921267+00:00 heroku[router]: at=info method=POST path="/api/signin" host=kisaan-portal.herokuapp.com request_id=193fa662-ea11-46ab-b727-ebca9ac89f04
fwd="103.156.19.229" dyno=web.1 connect=0ms service=210ms status=200 bytes=694 protocol=https
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2022-05-06T11:44:59.692611+00:00 heroku[router]: at=info method=GET path="/api/signout" host=kisaan-portal.herokuapp.com request_id=062e3c2b-5101-44ae-af8e-eab52c44817a
fwd="103.156.19.229" dyno=web.1 connect=0ms service=10ms status=304 bytes=245 protocol=https
2022-05-06T11:45:00.076840+00:00 app[web.1]: [0mGET /api/vegetables?sortBy=createdAt&order=desc&limit6 [36m304[0m 377.011 ms - -[0m
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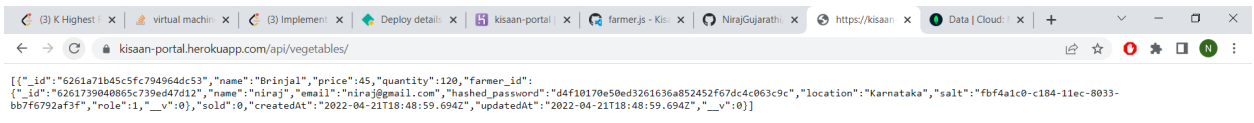
2022-05-06T11:44:59.693463+00:00 app[web.1]: [0mGET /api/signout [36m304[0m 8.878 ms - -[0m
2022-05-06T11:45:00.086689+00:00 heroku[router]: at=info method=GET path="/api/vegetables?sortBy=sold&order=desc&limit6" host=kisaan-portal.herokuapp.com request_id=cc38cb79-
c447-43b1-8e47-9c9b81b8f5cc fwd="103.156.19.229" dyno=web.1 connect=0ms service=399ms status=304 bytes=183 protocol=https
2022-05-06T11:45:00.076854+00:00 heroku[router]: at=info method=GET path="/api/vegetables?sortBy=createdAt&order=desc&limit6" host=kisaan-portal.herokuapp.com
request_id=77222ecd-8a36-44f2-88ad-b69d7f98f129 fwd="119.161.98.68" dyno=web.1 connect=0ms service=389ms status=304 bytes=183 protocol=https
Autoscroll with output
Save
heroku.com
Blogs
Careers
Documentation
Support
Terms of Service
Privacy
Cookies
© 2022 Salesforce.com
ENG
05:16 PM
06-05-2022


kisaan-portal.herokuapp.com/api/vegetables/
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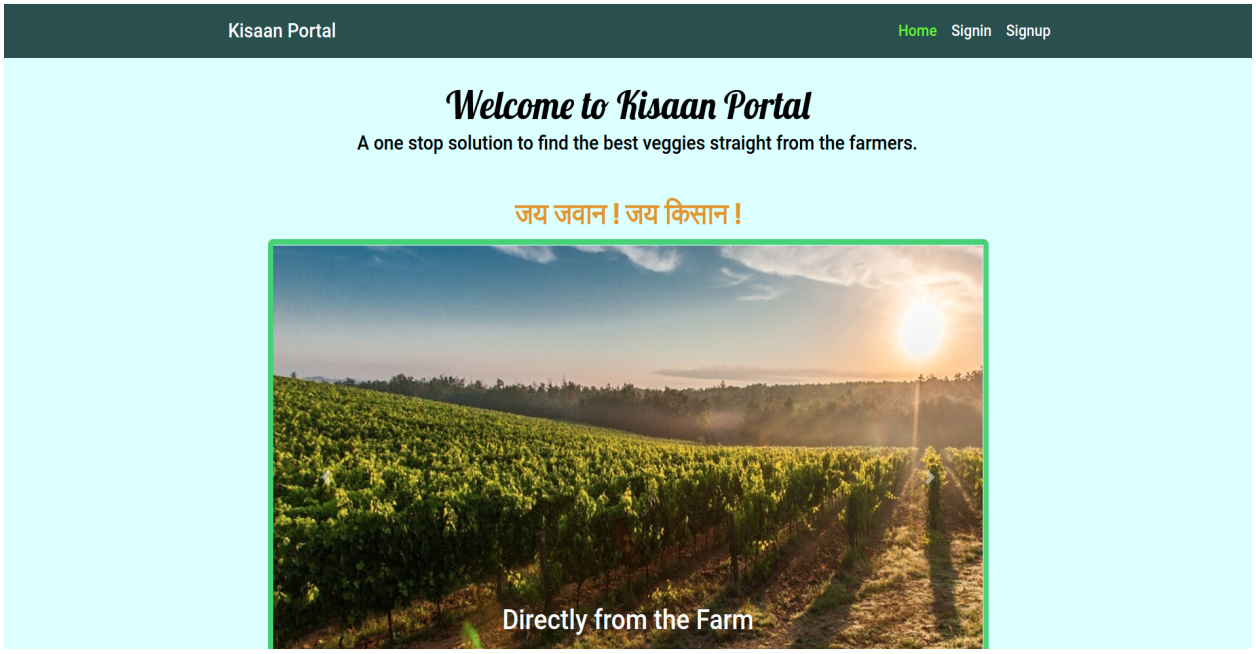
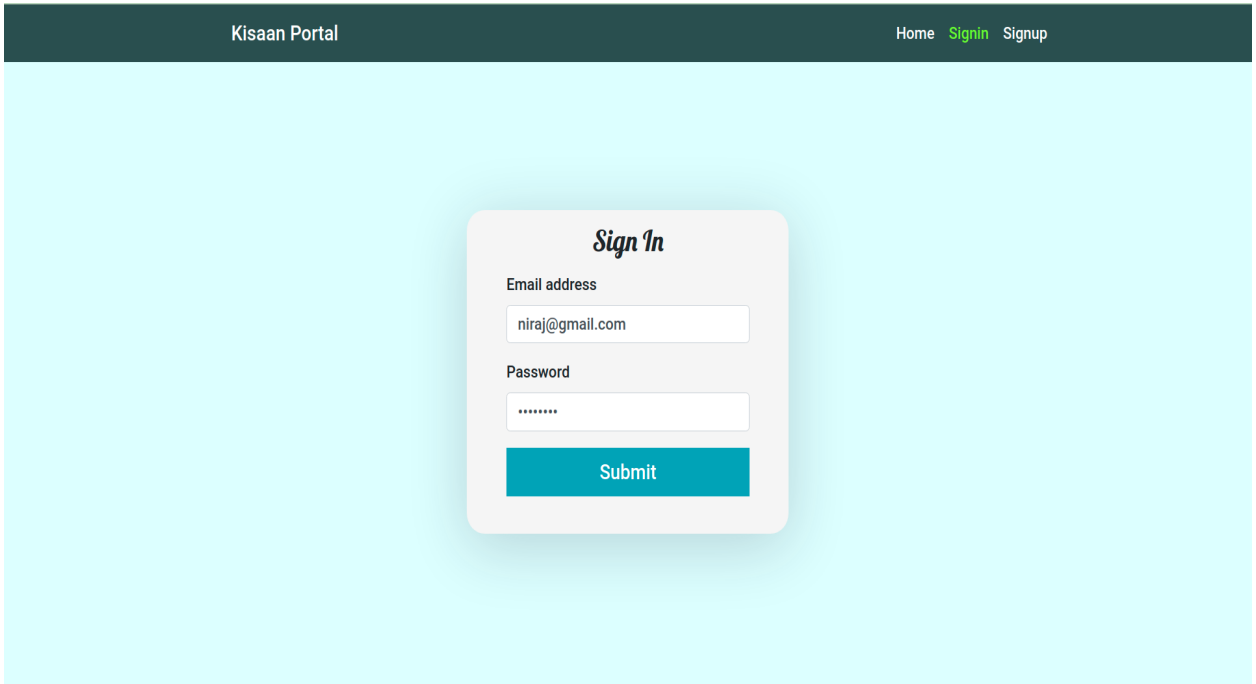
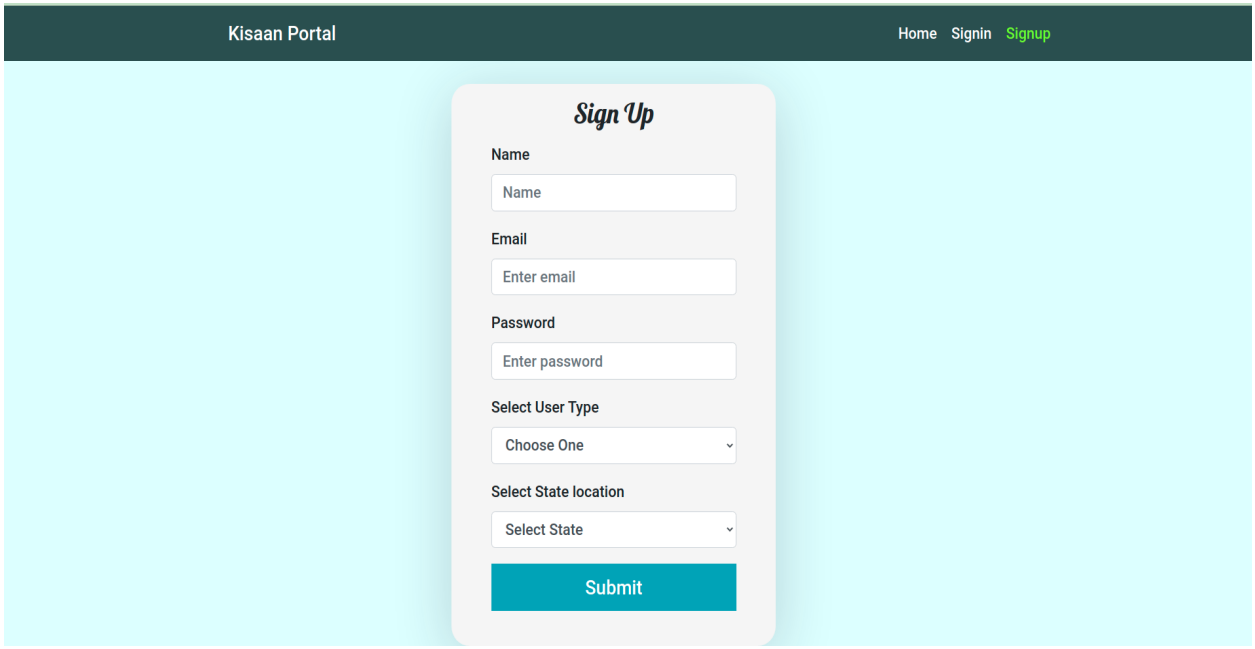
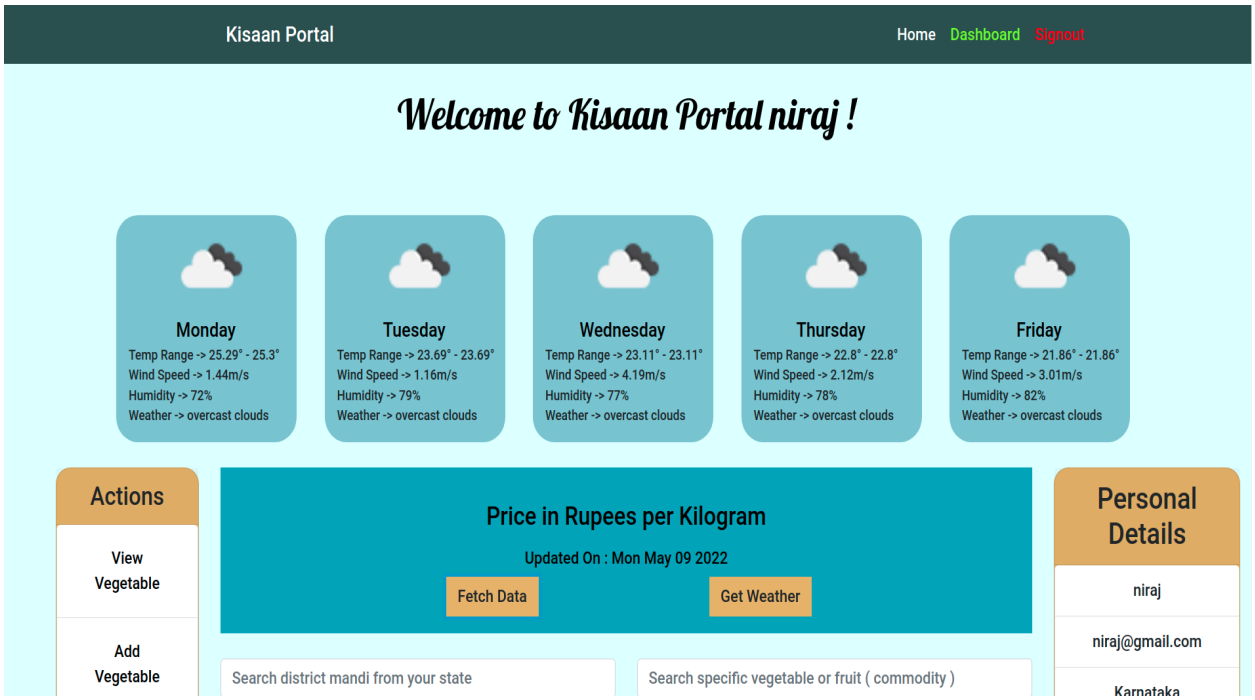
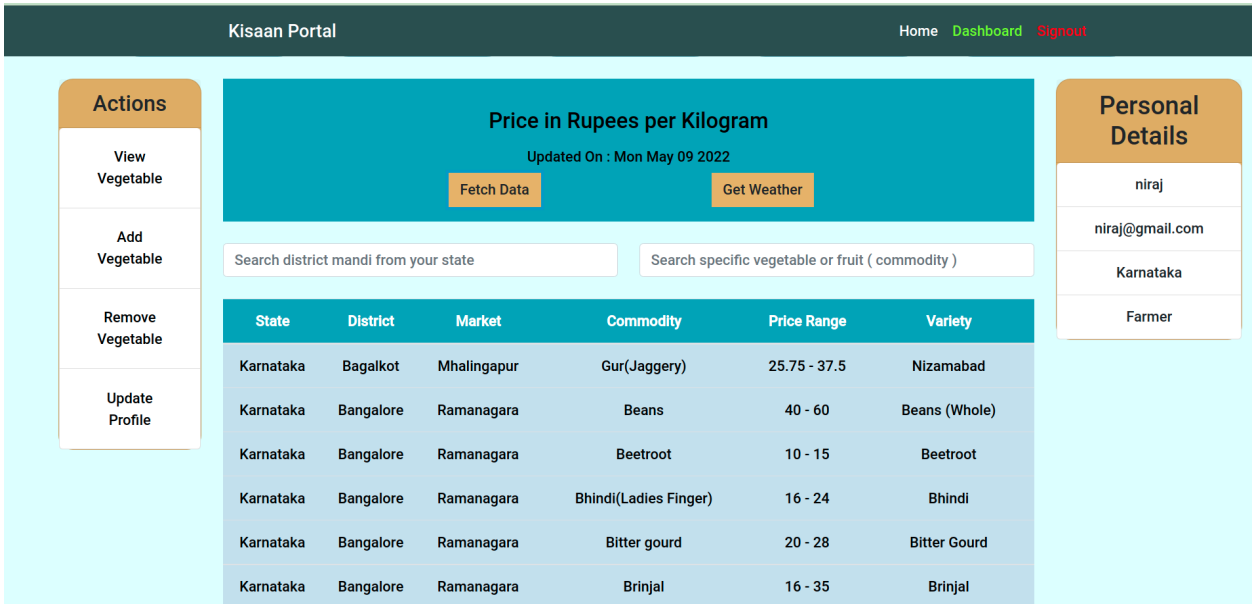
Screenshots of application






Kisaan Portal
Home Signin Signup
Sign Up
Name
Name
Email
Enter email
Password
Enter password
Select User Type
Choose One
Select State location
Select State
Submit


Kisaan Portal
Home Dashboard Signout
Welcome to Kisaan Portal niraj !
Monday
Temp Range -> 25.29° - 25.3°
Wind Speed -> 1.44m/s
Humidity -> 72%
Weather -> overcast clouds
Tuesday
Temp Range -> 23.69° - 23.69°
Wind Speed -> 1.16m/s
Humidity -> 79%
Weather -> overcast clouds
Wednesday
Temp Range -> 23.11° - 23.11°
Wind Speed -> 4.19m/s
Humidity -> 77%
Weather -> overcast clouds
Thursday
Temp Range -> 22.8° - 22.8°
Wind Speed -> 2.12m/s
Humidity -> 78%
Weather -> overcast clouds
Friday
Temp Range -> 21.86° - 21.86°
Wind Speed -> 3.01m/s
Humidity -> 82%
Weather -> overcast clouds
Actions
View Vegetable
Add Vegetable
Price in Rupees per Kilogram
Updated On : Mon May 09 2022
Fetch Data
Get Weather
Search district mandi from your state
Search specific vegetable or fruit (commodity)
Personal Details
niraj
niraj@gmail.com
Karnataka



Search by vegetable

indo

Search specific vegetable or fruit (commodity)

State	District	Market	Commodity	Price Range	Variety
Madhya Pradesh	Indore	Indore(F&V)	Banana	6 - 14	Other
Madhya Pradesh	Indore	Indore(F&V)	Bhindi(Ladies Finger)	5 - 20	Bhindi
Madhya Pradesh	Indore	Indore(F&V)	Bitter gourd	6 - 15	Bitter Gourd
Madhya Pradesh	Indore	Indore(F&V)	Bottle gourd	10 - 20	Bottle Gourd
Madhya Pradesh	Indore	Indore(F&V)	Brinjal	4 - 8	Arkasheela Mattigulla
Madhya Pradesh	Indore	Indore(F&V)	Cabbage	2 - 6	Cabbage

Search by district

Kisaan Portal

Home Dashboard Signout

Your Vegetables

Click here

View Items

Filter (Price Range)

- Any
- Rs. 0 to Rs. 9
- Rs. 10 to Rs. 19
- Rs. 20 to Rs. 29
- Rs. 30 to Rs. 39
- More than Rs. 40

Carrot

Rs. 20 per kg

Added on a day ago

0 kgs sold

In Stock

250 kgs Left

Brinjal

Rs. 45 per kg

Added on 17 days ago

0 kgs sold

In Stock

120 kgs Left

Kisaan Portal

Home Dashboard Signout

Add a new vegetable

Hello niraj, ready to add a new vegetable?

Item name

Cucumber

Price

60

Quantity

100

Upload Photo

Choose file far3.jpg

Confirm

Add Vegetable

Kisaan Portal

Home Dashboard Signout

Click here

View Items

Filter by price range

- Any
- Rs. 0 to Rs. 9
- Rs. 10 to Rs. 19
- Rs. 20 to Rs. 29
- Rs. 30 to Rs. 39
- More than Rs. 40

Vegetables

Carrot

Rs. 20 per kg

Added on a day ago

0 kgs sold

In Stock

250 kgs Left

Remove Vegetable

Brinjal

Rs. 45 per kg

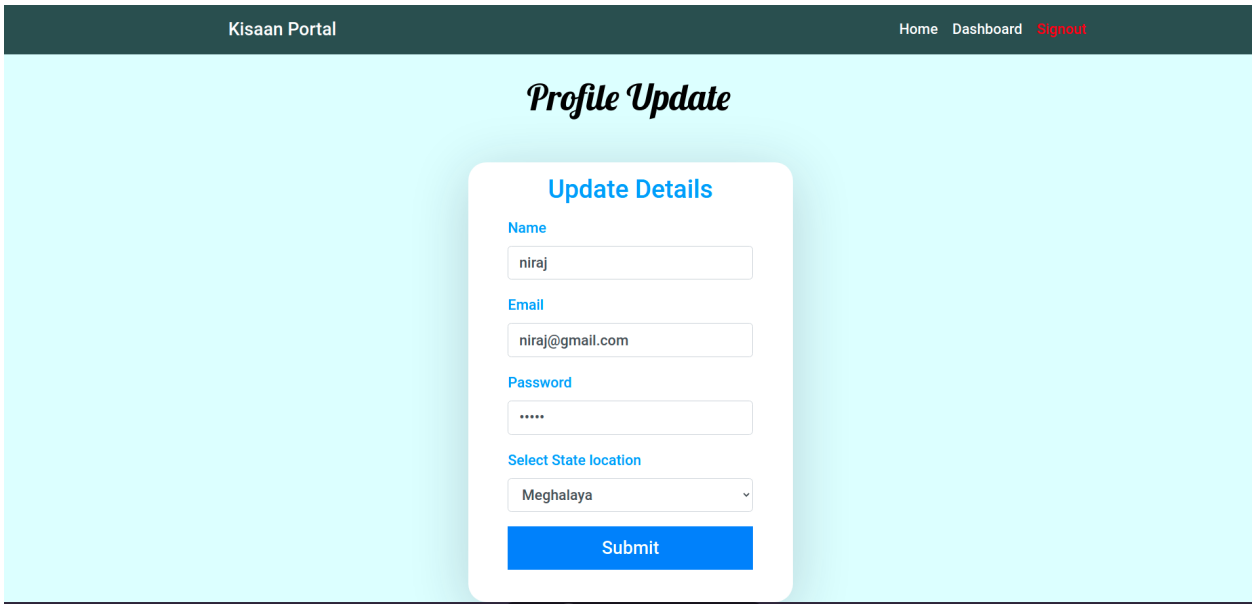
Added on 17 days ago

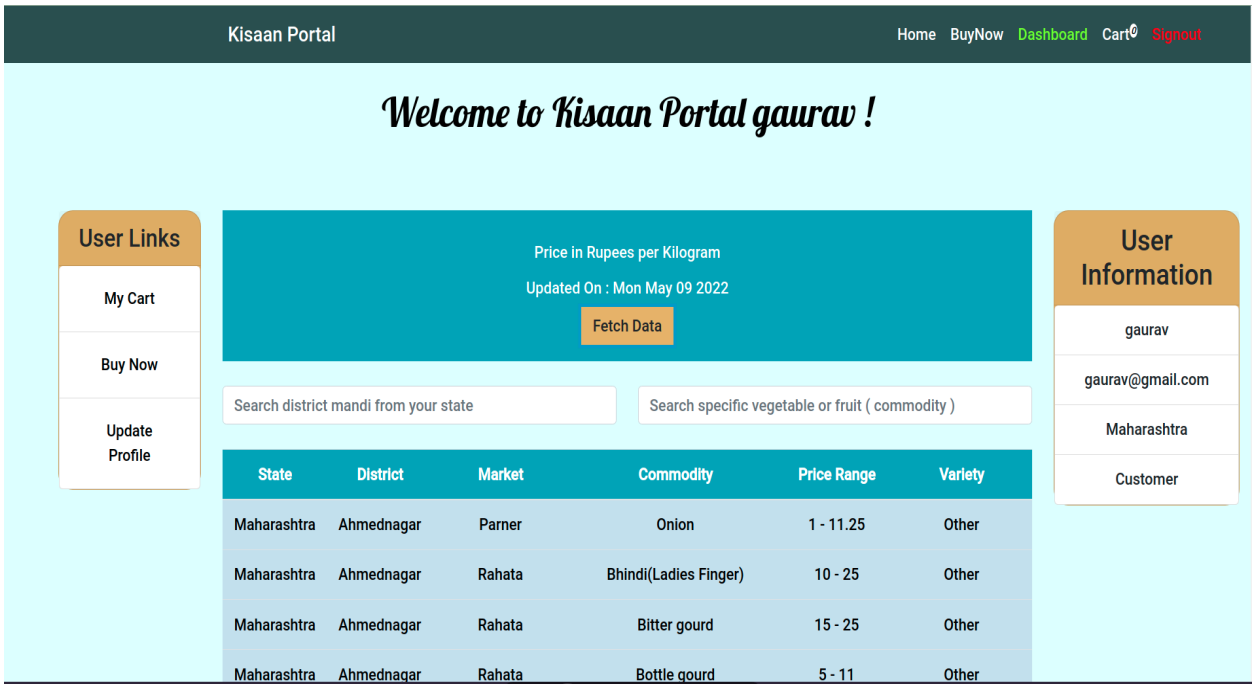
0 kgs sold

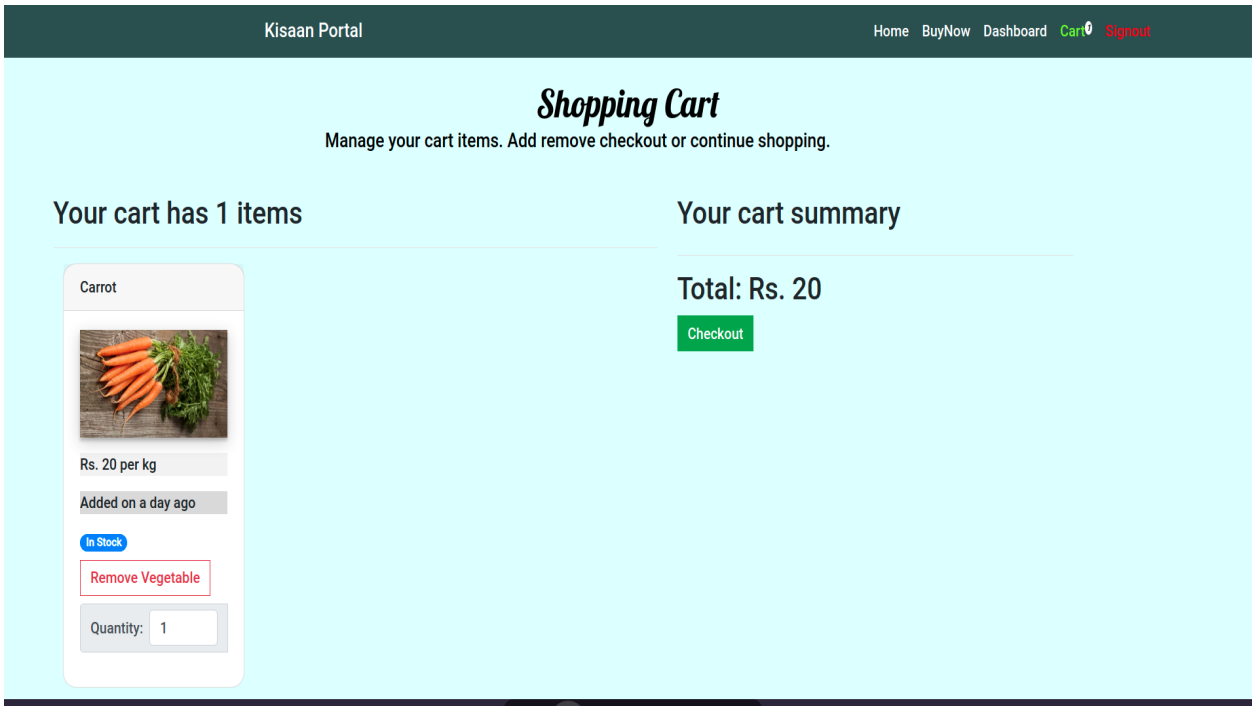
In Stock

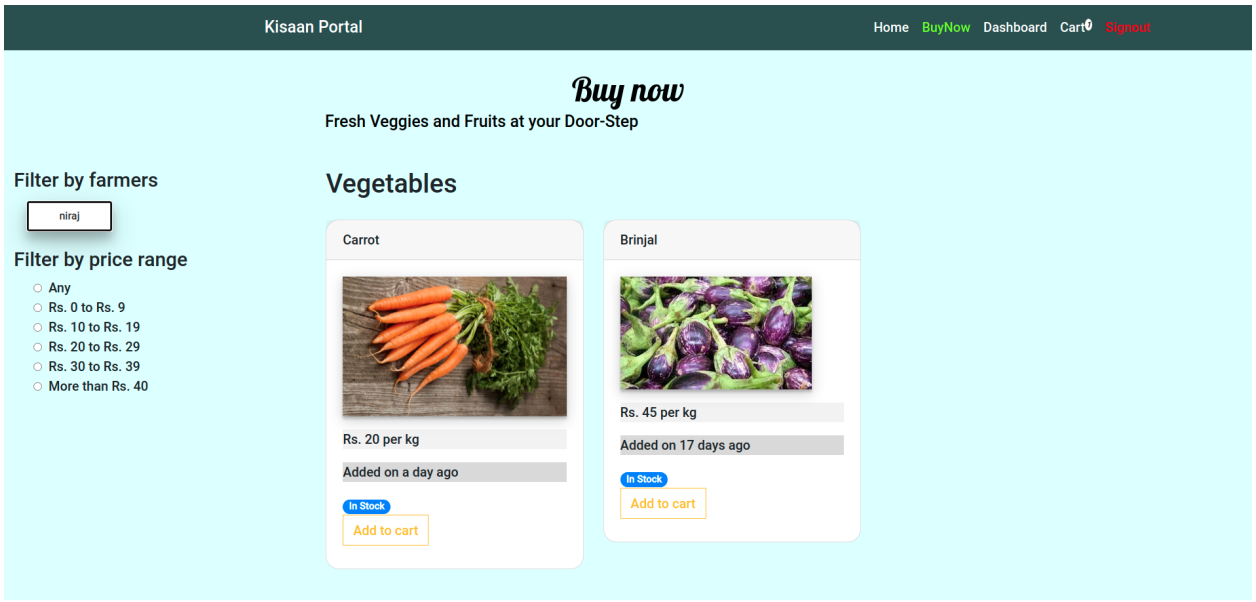
120 kgs Left

Remove Vegetable


Kisaan Portal
Home Dashboard Signout
Profile Update
Update Details
Name
niraj
Email
niraj@gmail.com
Password
•••••
Select State location
Meghalaya
Submit


Kisaan Portal
Home BuyNow Dashboard Cart0 Signout
Welcome to Kisaan Portal gaurav !
User Links
My Cart
Buy Now
Update Profile
Price in Rupees per Kilogram
Updated On : Mon May 09 2022
Fetch Data
Search district mandi from your state
Search specific vegetable or fruit (commodity)
State District Market Commodity Price Range Variety
Maharashtra Ahmednagar Parner Onion 1 - 11.25 Other
Maharashtra Ahmednagar Rahata Bhindi(Ladies Finger) 10 - 25 Other
Maharashtra Ahmednagar Rahata Bitter gourd 15 - 25 Other
Maharashtra Ahmednagar Rahata Bottle gourd 5 - 11 Other
User Information
gaurav
gaurav@gmail.com
Maharashtra
Customer


Kisaan Portal
Home BuyNow Dashboard Cart0 Signout
Shopping Cart
Manage your cart items. Add remove checkout or continue shopping.
Your cart has 1 items
Your cart summary
Carrot
Rs. 20 per kg
Added on a day ago
In Stock
Remove Vegetable
Quantity: 1
Total: Rs. 20
Checkout


Kisaan Portal
Home BuyNow Dashboard Cart0 Signout
Buy now
Fresh Veggies and Fruits at your Door-Step
Filter by farmers
niraj
Filter by price range
Any
Rs. 0 to Rs. 9
Rs. 10 to Rs. 19
Rs. 20 to Rs. 29
Rs. 30 to Rs. 39
More than Rs. 40
Vegetables
Carrot
Rs. 20 per kg
Added on a day ago
In Stock
Add to cart
Brinjal
Rs. 45 per kg
Added on 17 days ago
In Stock
Add to cart

8. Conclusion

The webapp for buying and selling vegetables directly from farmers to consumers is built using MERN stack and integrated with Jenkins,Docker,Ansible,GitHub,etc. to perform CI/CD development pipeline.

The complete Jenkins pipeline is automated through Jenkins.

9. Future Work -

- We can add payment portal at the time of checkout
- Also can predict yield predictions in locations based on soil data and weather conditions in the locality

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THANK YOU