NALAYA THIRAN

By

NAAN MUDHALVAN

CONTAINMENT ZONE ALERTING APPLICATION

A PROJECT REPORT

Submitted by

Team id: PNT2022TMID35229

SHAFEEQ UR RAHMAN P A	**2019103058**
PRASHANTH S	**2019103556**
BARATHRAJ T	**2019103511**
PRANAV CHANDHAR K R	**2019103046**
NAVVYA L	**2019103548**

Branch: COMPUTER SCIENCE ENGINEERING

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OF ENGINEERING

GUINDY – 600025

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ABSTRACT:

The novel Corona virus (covid-19) break out was declared as a global pandemic by the world health organization on 11th March 2020. Covid-19 spread has its origin from the wet markets of Wuhan city of China. Different strain of Vaccine has been developed by different countries.

In India two vaccines have been approved by the government of India. One is Covid shield by the Oxford University and other is CoVaxin by pharmaceutical company Bharat biotech. To supervises and monitor the vaccination administrator, the government of India has developed a mobile application called CoWin.

It will play an essential role in managing the entire vaccination process and help to record vaccine data. The cons and pros of this application are yet to be identified.

We are developing a similar app that notifies and alerts users about COVID Containment zone with the help of user's location data and Containment zone identification using collected data from CoWin App.

DELIVERABLES:

This application is intended to provide information about containment zones in a particular region by alerting people, through continuous monitoring of an individual's location. Key benefits of the application are monitoring people's activity and alerting them of their safety movements.

SOLUTION REQUIREMENT:

The project aims at building an application that provides information about the containment zones of a particular region by continuously monitoring an individual's location. Location of the individual must be stored in the Database. Alerts are sent using the notification service.

FEATURES OF THE APPLICATION:

- **Admin App (portal)**

They should login to the app and update the containment zone's locations in the portal. Based on the location a Geofence will be created within a 100 meters radius. They should be able to see how many people are visiting that zone.

- **User App (Mobile App)**

The app should have a user registration and login. After the user logged into the app it will track the user's location and update the database with the current location. If the user is visiting the containment zone, he will get an alert notification.

LITERATURE SURVEY:

- **Development of an android application for viewing Covid-19 Containment Zones and monitoring violators who are trespassing into it using Firebase and Geo fencing**

Source: Trans Indian Natl Academy

Authors: Ranajoy Mallik, Dilip Singh Sudarshana, Ghosh Dastidar

Website: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7328652/

About the Paper: This paper focuses on developing a mobile based application to provide information regarding the Covid-19 containment zones in West Bengal. The application further tracks the user's location and provides notification alert if the user has entered a containment zone. The application also provides daily Covid-19 case statistics to the users to keep them updated. The application is developed on Android SDK and uses Firebase Cloud Firestore to store the location data. Android's geofencing client is used to create geofences around the containment zones and notification manager is used to provide notifications. The application also uses RESTful web services to show the Covid-19 cases in West Bengal.

- **Mobile Geo-Fencing Triggers for Alerting Entries Into COVID-19 Containment Zones Using IoT**

Source: Handbook of Research on Innovations and Applications of AI, IoT, and Cognitive Technologies.

Authors: M. V. Ramana Rao (Osmania University, India), Thondepu Adilakshmi (Vasavi College of Engineering, India), M. Gokul Venkatesh (Sidhartha Medical College, India) and Jothikumar R (Department of Computer Science and Engineering, Shadan College of Engineering and Technology, India)

About the Paper: This paper focuses on informing the public about the containment zone when they are in travel and also sends an alert to the police when a person enters the containment zone without permission using the containment zone alert system. This paper suggests a containment zone alert system by means of geo-fencing technology to identify the movement of public, deliver information about the danger to the public in travel and also send an alert to the police when there is an entry or exit detected in the containment zone

by the use of location-based services (LBS). By creating a fence virtually called geo-fence at the containment zones established based on the government information, this system monitors public movements like entry and exit to fence.

- **MoveInSync's Containment Zone Tracker**

Source: Express Computer

Author: Radhika Udas

Website: MoveInSync's Containment Zone Tracker Aims At Democratizing Information Flow - Express Computer

About the Paper: This Covid-19 containment zone tracker is a quick and easy way to find out if a particular locality, home or office, lies in a containment zone. The tracker constitutes a dashboard that shows areas on the map that are currently containment zones. This is based on data gathered from public bulletins, and information from municipal governments, which is updated every hour. It also gathers and validates containment zone information from common citizens – thereby democratizing the information flow.

- **COVID-19 India Tracker Application using Flutter.**

Source: International Journal for Modern Trends in Science and Technology.

Authors: Sanju Kumar Sahu, M.L. Sharma, Krishna Chandra Tripathi

Website: https://www.ijmtst.com/volume7/issue01/3.IJMTST0612227.pdf

About the Paper: This paper had used all the promising technologies to build a mobile application as well as a web application. The dashboard of the application is capable to report cases at the state level, city level and at the country level in India. The COVID-19 related data published on the dashboard aligns with the WHO situation reports and the Ministry of Health and Family Welfare, Govt. of India for within and outside of INDIA, particularly. This dashboard is featured with all the real-time attributes about the novel coronavirus disease and its measures and controls. The system purposely aims to maintain the digital protection of the society, create public awareness, and not create any agitation situation among the individuals of the society. The speed and security of the app are also enhanced by using decoupled cloud architecture for the entire system (i.e., separating the client-side cloud and the server-side cloud).

- **Kovai Care app to alert public on containment zones**

Source: DTNext

About the Paper: This application enables the public to know if they are in a safe zone or in a containment area. All details of the containment areas have been fed into the app to alert the public and ensure their safety. The app also has a facility to track people going out

of containment zones in violation. If someone leaves the containment zone, an alert will be generated informing the person of his violation. Also, a message will be sent to the team involved in monitoring work. So immediately, the person would be called and ensured that they do not cause a potential risk to others.

- **Tracking the Covid zones through geo-fencing technique**

  Source: International Journal of Pervasive Computing and Communications

  Website: Tracking the Covid zones through geo-fencing technique | Emerald Insight

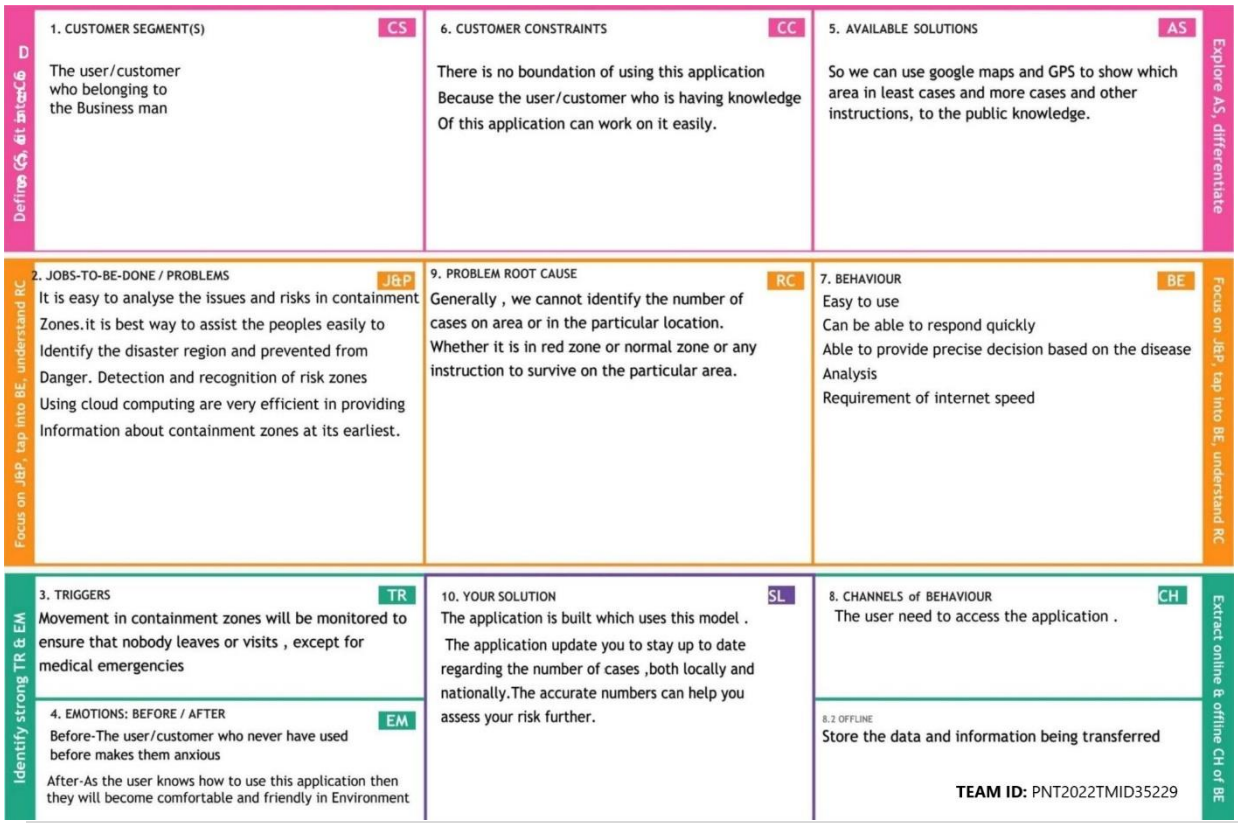
  About the paper: The purpose of this paper is to propose a methodology to track the Covid zones, to enhance and tighten the security measures. A geofence is created for the containment zone. The person who enters or exits out of that particular zone will be monitored and alert message will be sent to that person's mobile. Using modern technology, it is so easy to crack the individual gadgets and with Bluetooth enabling it makes things even worse. Thus, it is important to maintain the tracking a safer and secure one, and another issue with those Bluetooth-based applications is that tracking can be done only if the user enabled the Bluetooth option, if not the entire functioning would become a mess. The proposed methodology of tracking without Bluetooth will ensure data security also.

PROPOSED SOLUTION:

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	To create an application to monitor and alert users when they enter Covid containment zones and provide information about the same
2.	Idea / Solution description	Provide information about the same. 2. Idea / Solution description Create an easy-to-use mobile application to alert the user when they enter a Covid containment zone by using their location and creating geofences (radius about 100m) for the containment zones. When the users' location is within any of the geofence, an alert is sent immediately to the user. This is done with the help of Google Maps by integrating with the application. Also, provide information about the containment zones.

3.	Novelty / Uniqueness	Efficient community surveillance. Contact tracing Report generation about the areas that are in high risk of being converted into covid hotspots based on the nearby containment zones.
4.	Social Impact / Customer Satisfaction	Reduces the risk of spreading of the disease by actively providing information about the containment zones. Alerts the user when they enter any containment zone which reduces their risk of getting in contact with the virus. Also shows preventive measures for the disease.
5.	Business Model (Revenue Model)	Organizations can pay money and get report (includes travel history, contact history to containment zones, history of infections, etc.,) of their employees by providing appropriate details and employees' consent. Donations from volunteers.
6.	Scalability of the Solution	The application works good even when the number of containment zones increase and the number of users increase

PROPOSED SOLUTION FIT:



SOLUTION ARCHITECTURE:

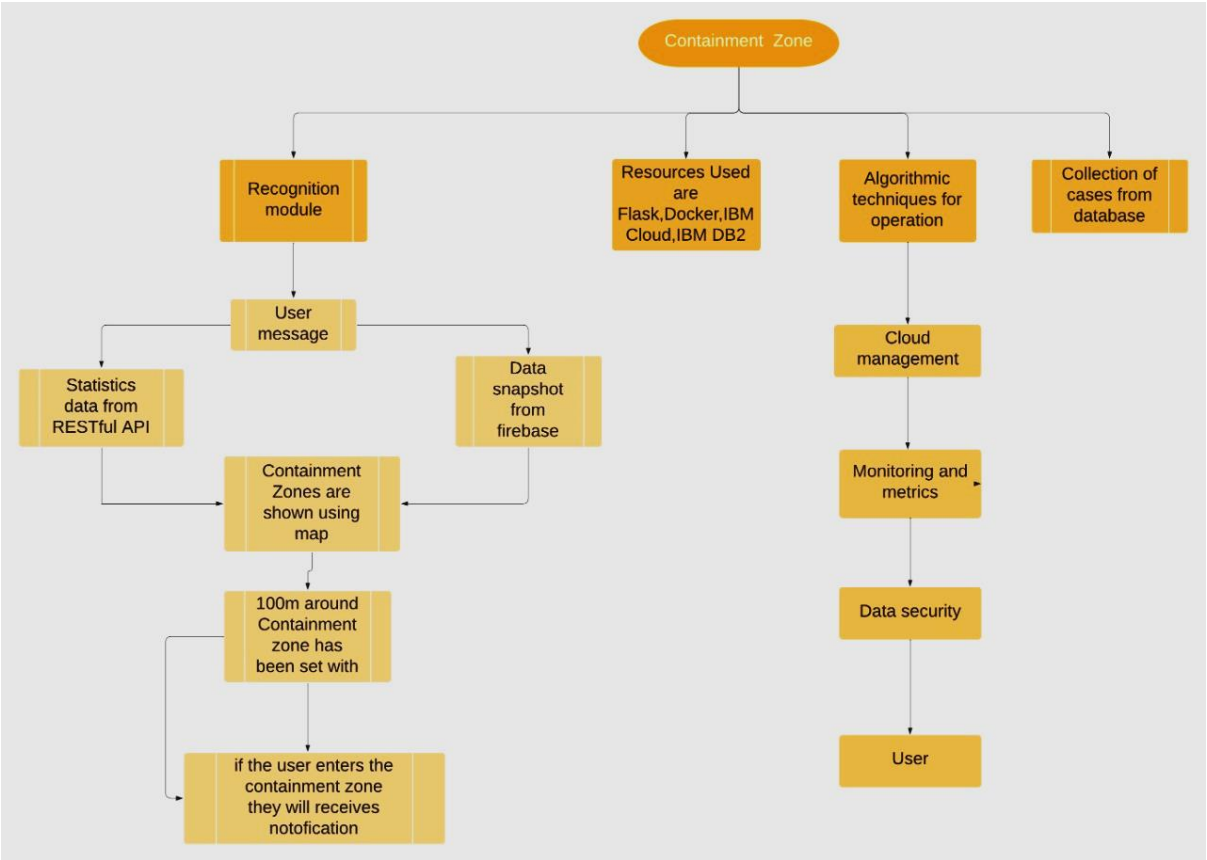
Solution Architecture is a complex process with many sub processes that bridges the gap between business problems and technology solutions. The project aims at building an application that provides information about the containment zones of a particular region by continuously monitoring an individual's location. The location of the individual must be stored in the Database. Alerts are sent using the notification service.

The app should have a user registration and login. After the user logged into the app it will track the user's location and update the database with the current location. If the user is visiting the containment zone, he will get an alert notification. They should login to the app and update the containment zone's locations in the portal. Based on the location a Geofence will be created within a 100 meters radius. They should be able to see how many people are visiting that zone.

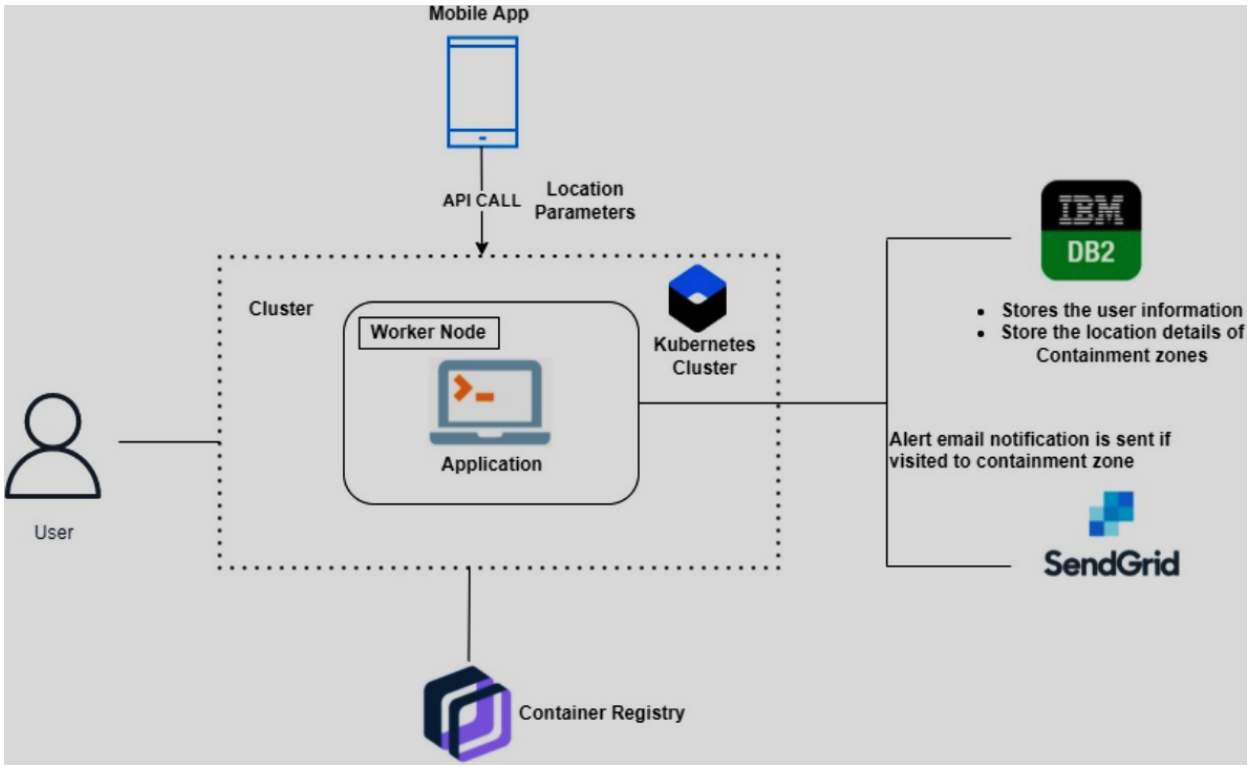
Its goals are:

1. Find the best tech solution to solve existing problems.
2. Describe the structure, characteristics, behavior and other aspects of the software the project takes holders.
3. Define the features, development phases, and solution requirement.
4. Provides specification according to which the solution is defined, managed and delivered.

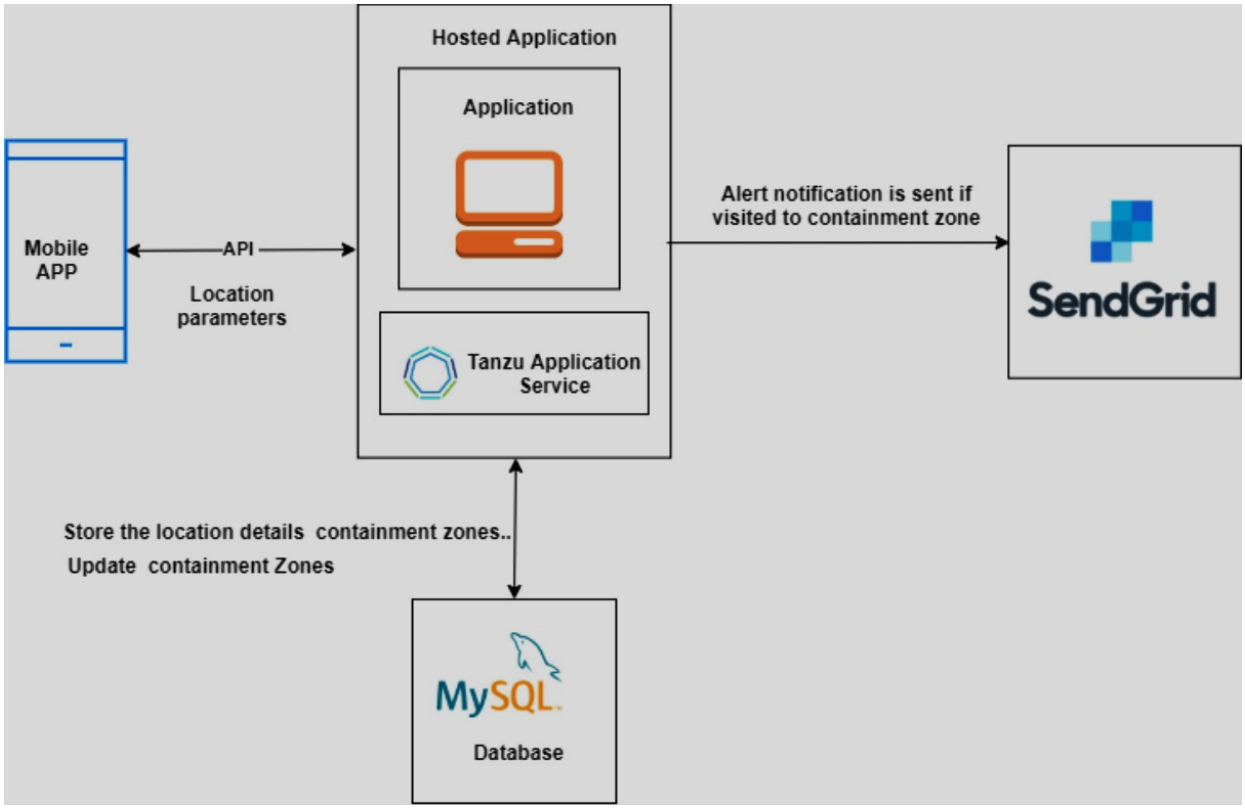
SOLUTION ARCHITECTURE DIAGRAM:



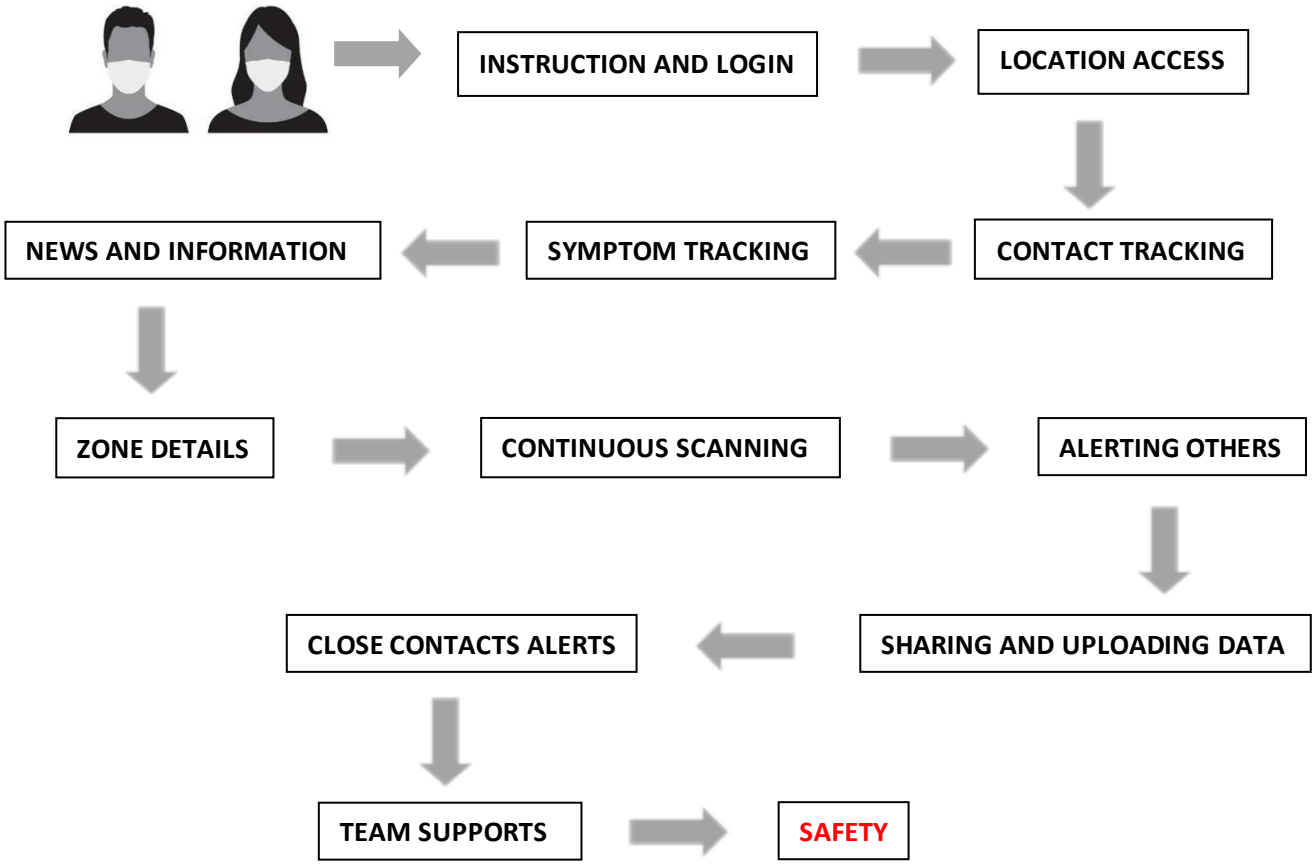
- **Solution Architecture Model 1**



- **Solution Architecture Model 2**



CUSTOMER JOURNEY:



SOLUTION REQUIREMENTS:

The project aims at building an application that provides information about the containment zones of a particular region by continuously monitoring an individual's location. Location of the individual must be stored in the Database. Alerts are sent using the notification service.

- **Functional Requirements**

FR No.	Functional Requirements	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Mobile number Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	App Permissions	Enabling location Access (Mandatory) Permission to Media Access

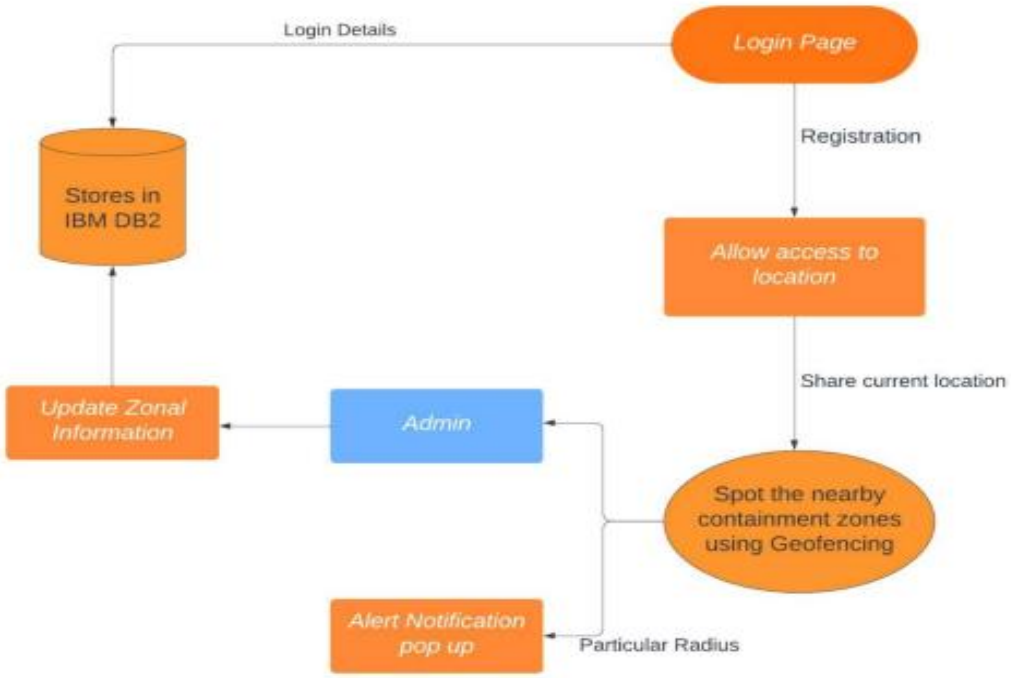
		Permission to Camera
FR-4	Connectivity	The user and server were connected through the internet.
FR-5	Data fetching	The Users Personal data and a result of self-analysis updated with app server.
FR-6	Support functions	The Users gets teleconsultation using helpline and supports by chatbot.
FR-7	End user benefits	To protect the people from the disease spread by knowing containment zones using contact tracing.

- **Non-Functional Requirements**

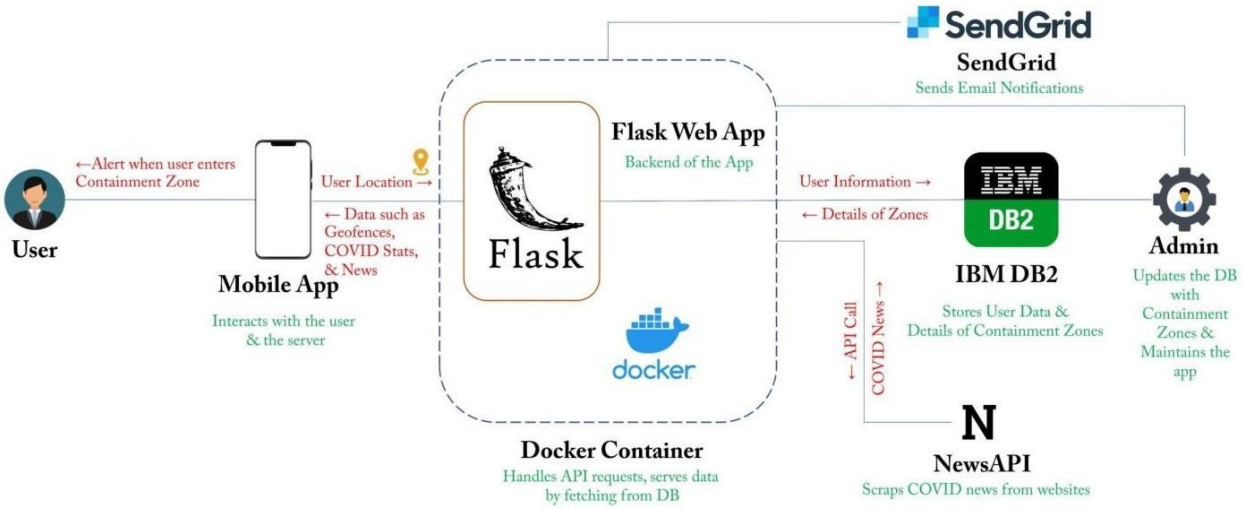
NFR No.	Non-Functional Requirements	Description
NFR-1	Usability	It is an effective way to find a containment zone. It can easily access by everyone.
NFR-2	Security	It is secured because confirmation through User own Email or OTP and also the data were stored in encrypted format to main anonymity.
NFR-3	Reliability	It is a high reliability based on development and deployment.
NFR-4	Performance	High efficiency outcomes with respect to simple user Interface.
NFR-5	Availability	Anyone from anywhere can access it through internet.
NFR-6	Scalability	It has ability to handle a growing user base without affecting the user experience and app performance.

DATA FLOW DIAGRAM:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



TECHNOLOGY ARCHITECTURE:



- **Components and Technologies:**

S.No	Component	Description	Technology
1.	User Interface	Interaction of user to the mobile interface (i.e.- developers).	HTML, CSS, JavaScript / Angular Js / React Jsetc.
2.	Application Logic- 1	Logic that has been kickstarted first, for the process inthe application.	Java / Python
3.	Application Logic- 2	Intermediate Logic for the process in the application.	IBM Watson STT service
4.	Application Logic- 3	Logic which came Last but not least for the process inthe application.	IBM Watson Assistant
5.	Database	Storing purposes.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on IBM Cloud.	IBM DB2, IBM Cloud etc.
7.	File Storage	Storage requirements.	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API - 1	API used external in the application.	Google API, etc.
9.	External API - 2	API used external in the application.	Aadhar API, etc.
10.	Machine Learning Model	Machine learning is mostly used for AI purposes (i.e.:Recognition).	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System/ Cloud LocalServer Configuration. Cloud Server Configuration.	Local, Cloud Foundry, Kubernetes etc.

- **Application Characteristics:**

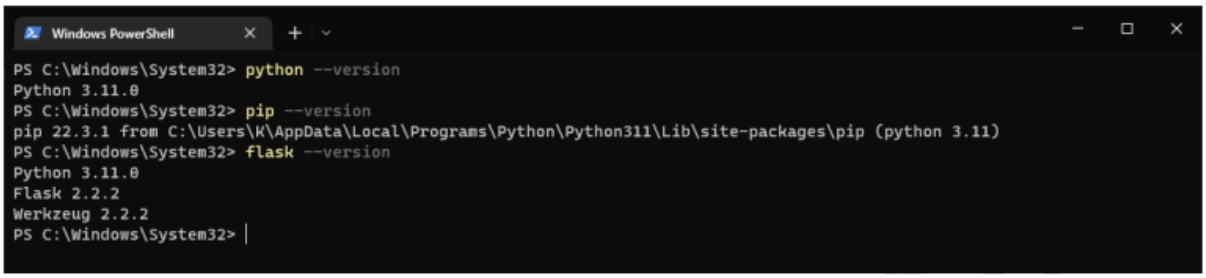
S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Software designed to be publicly accessible in decentralized and collaborative way.	Technology of Open-source framework
2.	Security Implementations	It is used to provide security for the user by providing various technologies (i.e.: signature for text or data files)	e.g., SHA- 256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Scalability is provided (Micro- services) .	Cloud, IBM object storage
4.	Availability	Use of cloud makes it available on the go, anywhere and anyplace.	Cloud
5.	Performance	Design consideration is must because there are numerous apps but in what way our app should be known is mandatory (Speed, number of requests persec, use of Cache, use of CDN's) etc.	SendGrid

SETTING APPLICATION ENVIRONMENT:

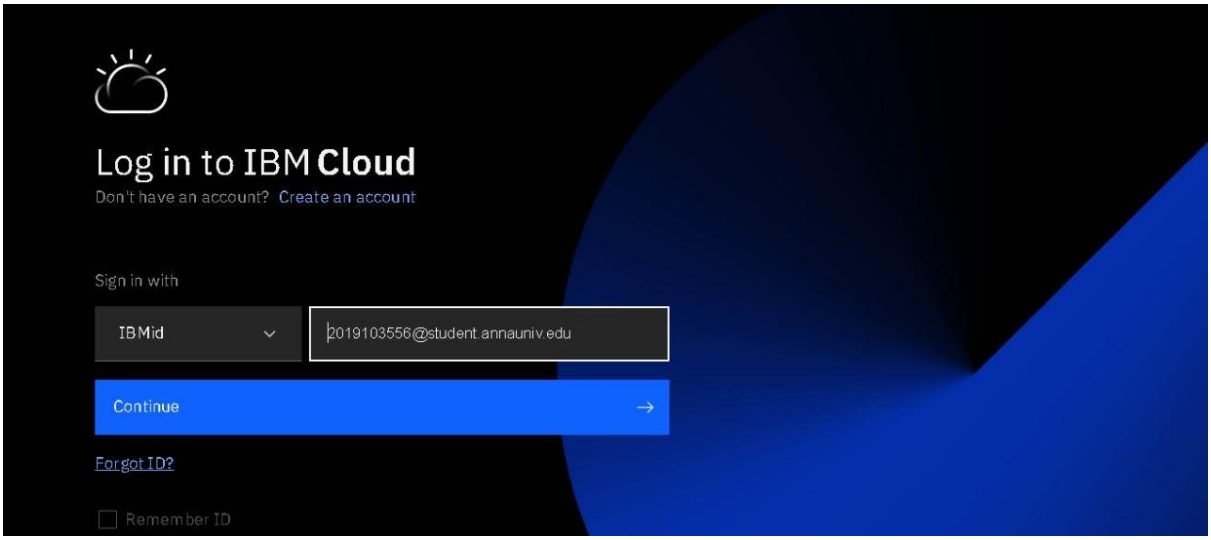
Various application needed for development and implementation should be set up.

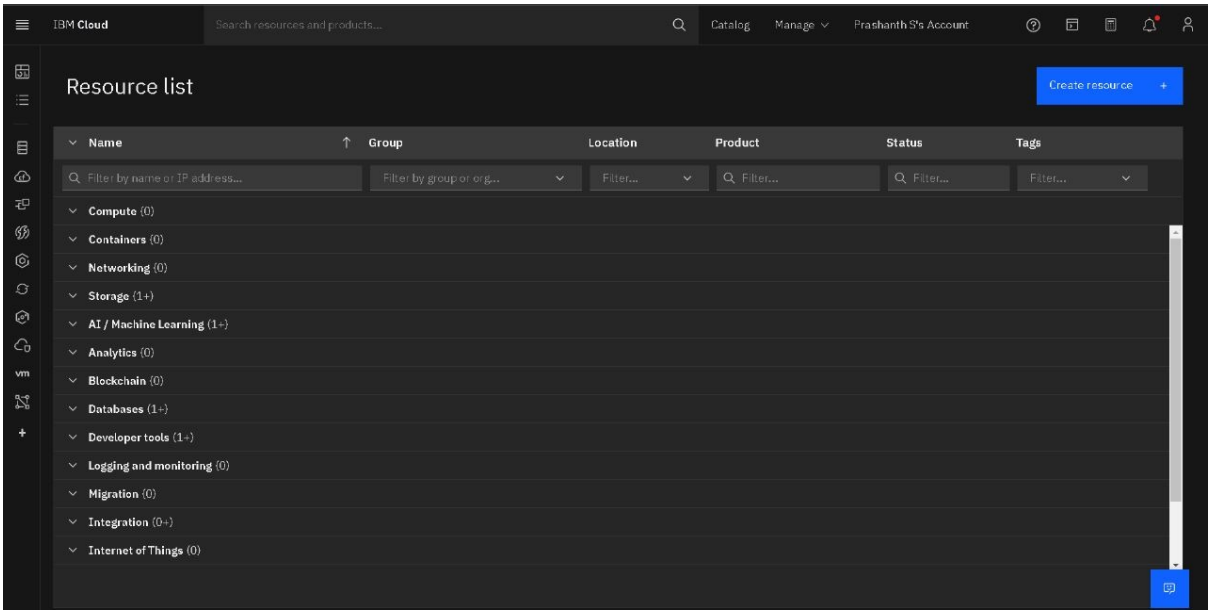
➢ APPLICATION ENVIRONMENT FOR WebApp:

- **Setting up Flask:**

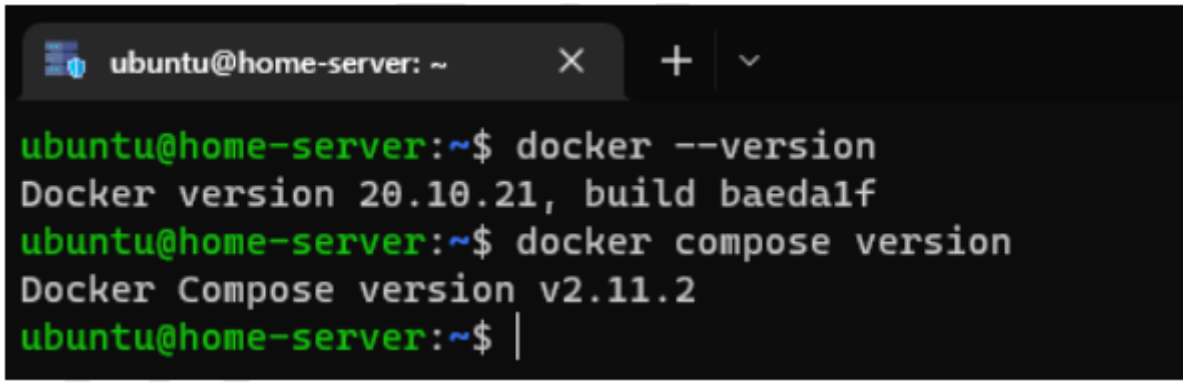


- **IBM cloud account creation:**





- **Docker Installation:**



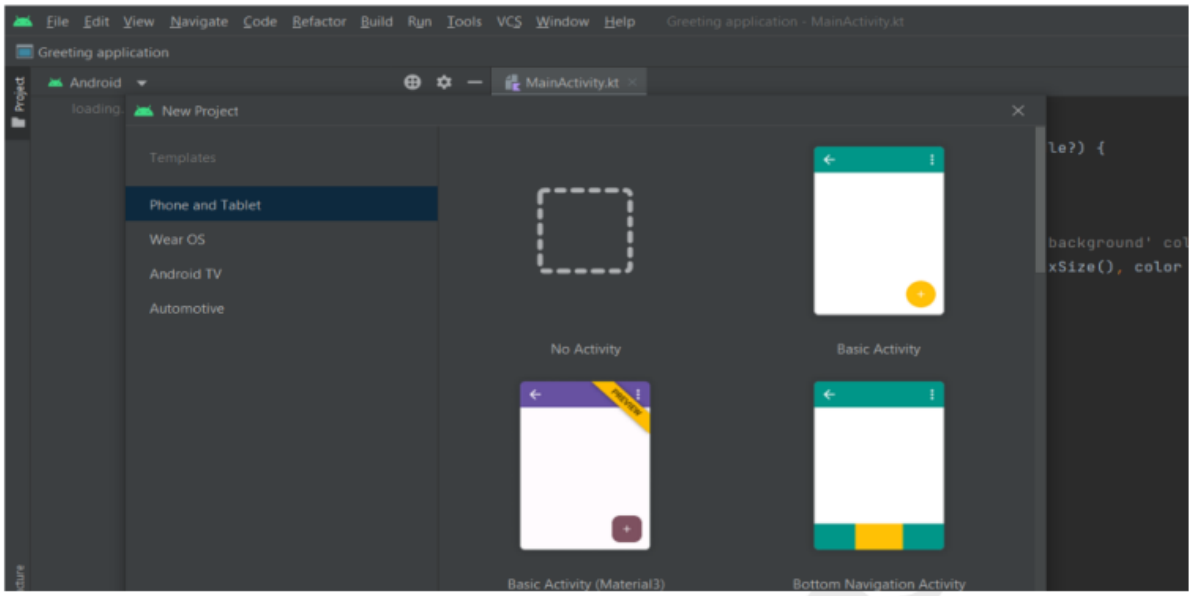
- **SendGrid account creation:**

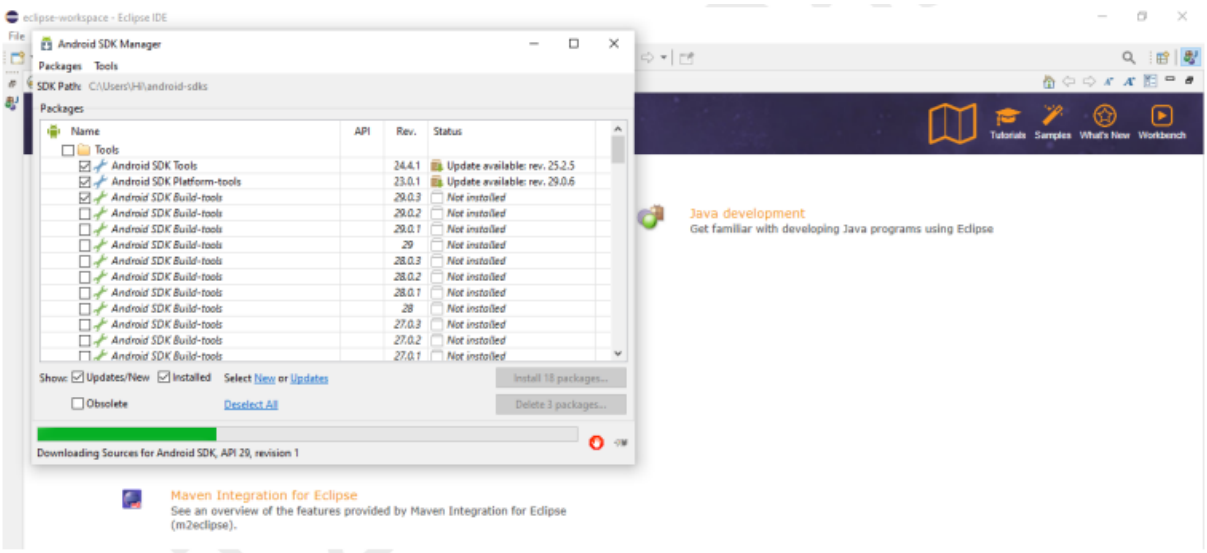
Username

2019103556@student.annauniv.edu

➢ APPLICATION ENVIRONMENT FOR ANDROID DEV:

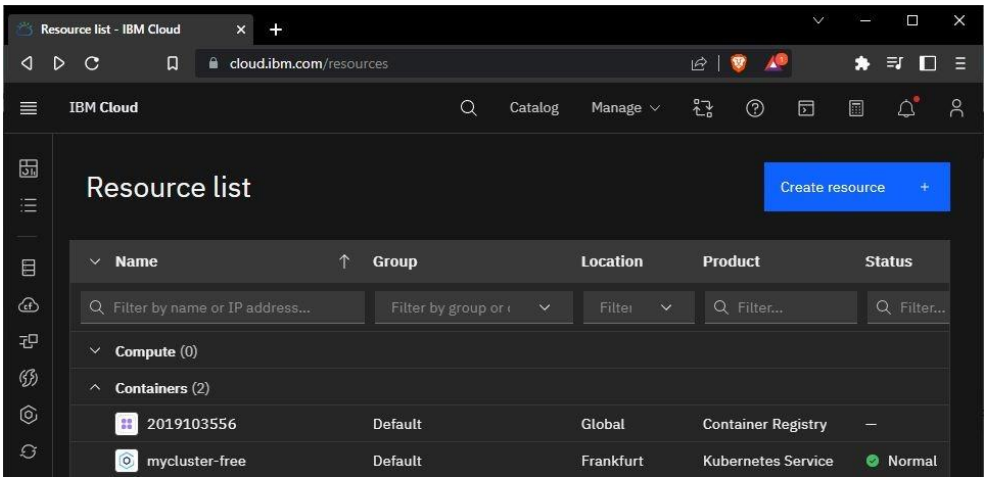
- **Android Studio Installation:**

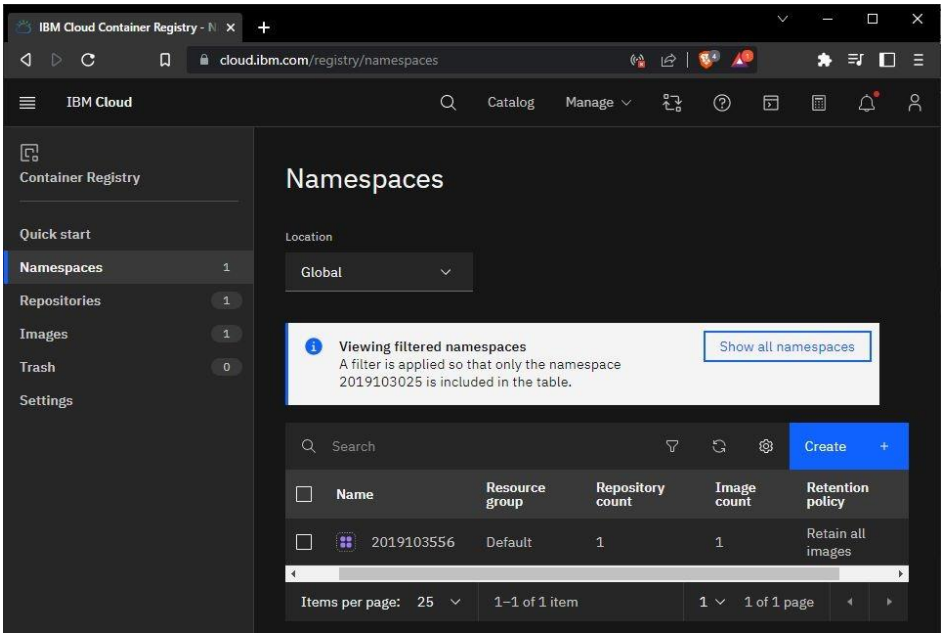


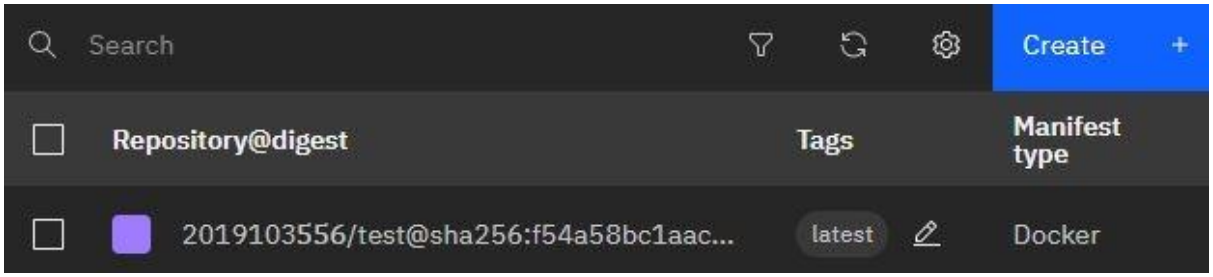


➢ APPLICATION DEPLOYMENT IN IBM CLOUD:

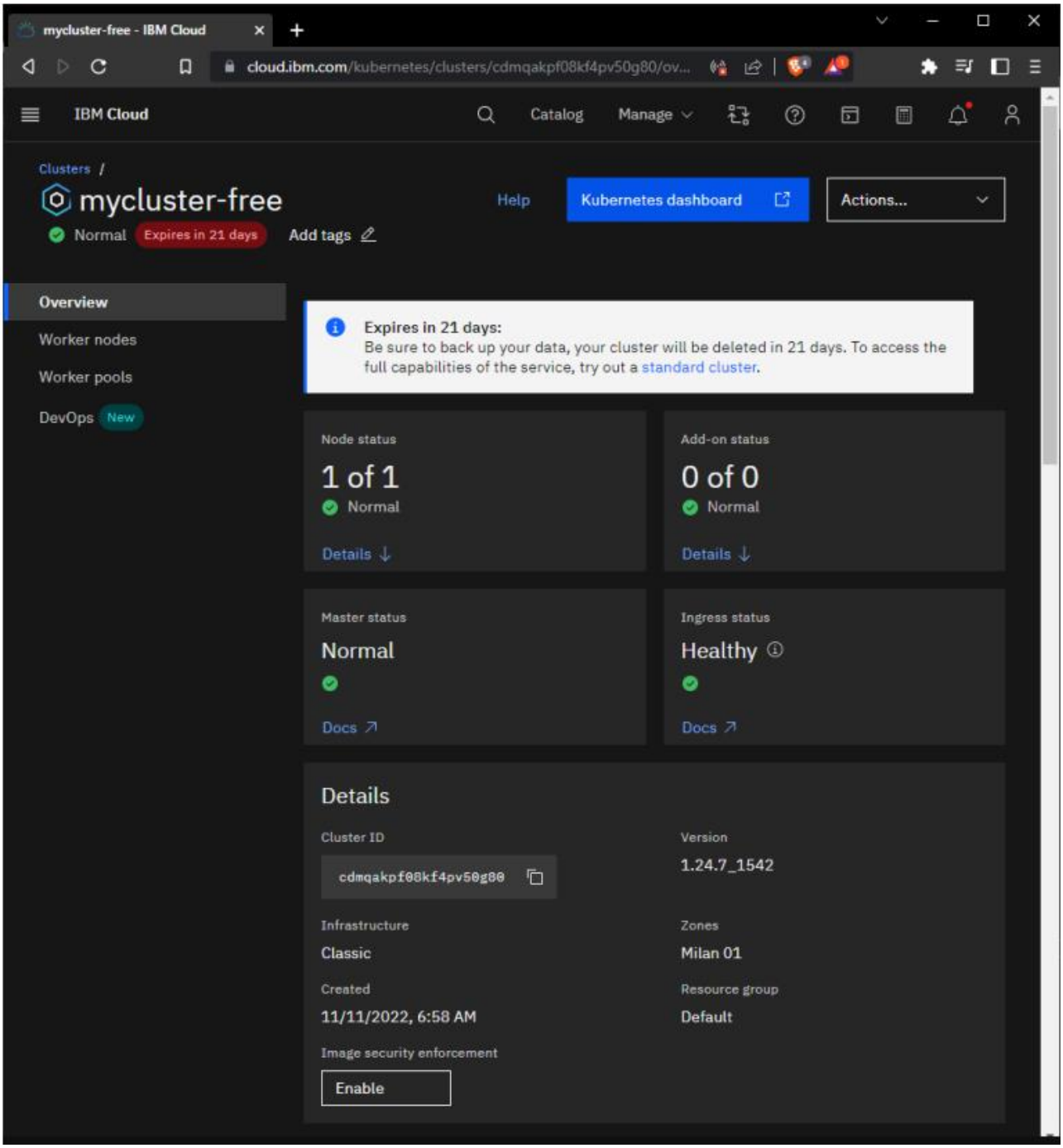
- **Upload image to Container Registry:**





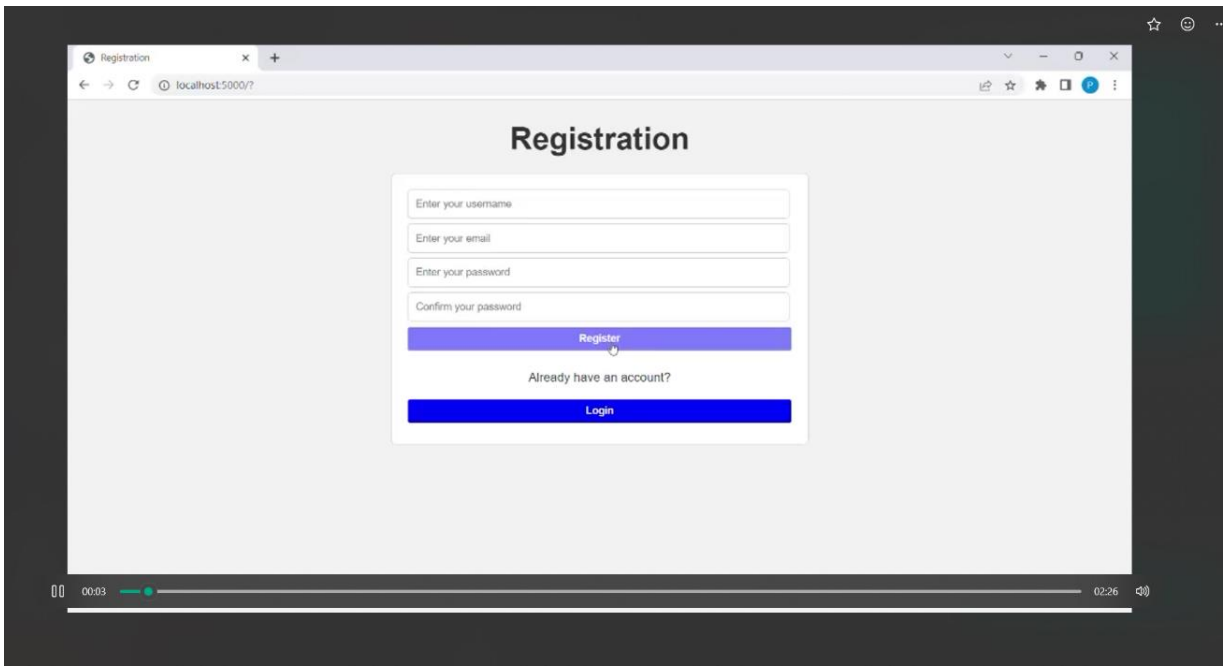


- **Deployment in Kubernetes Cluster:**

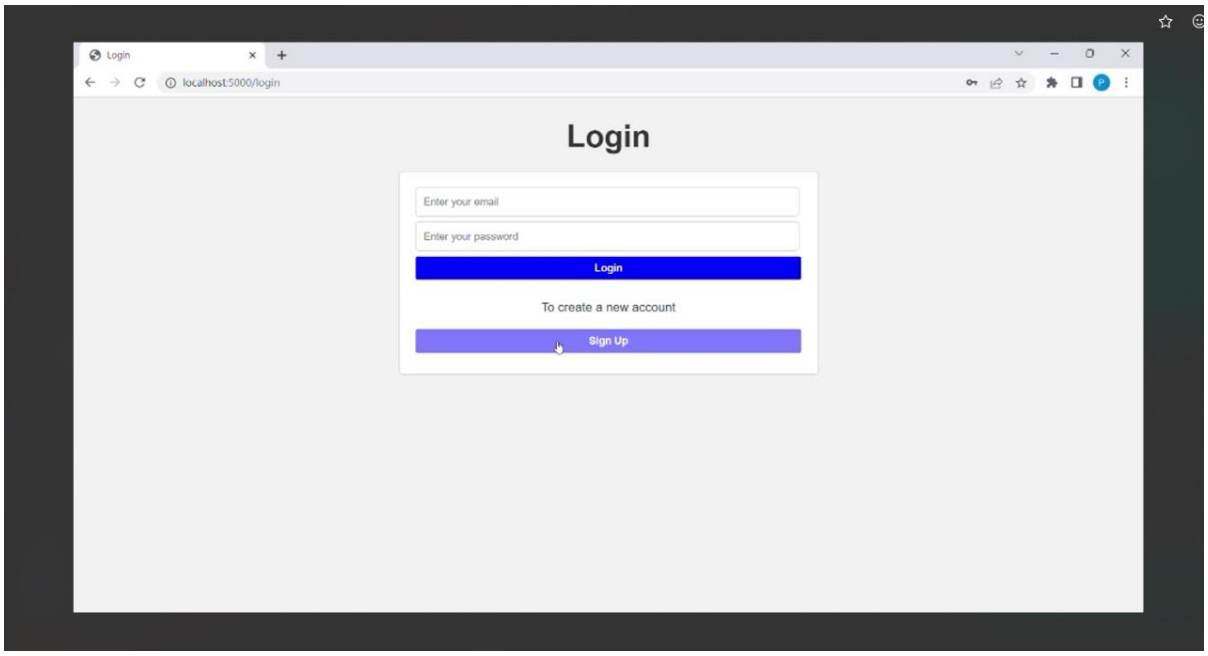


➢ **RESULTS:**

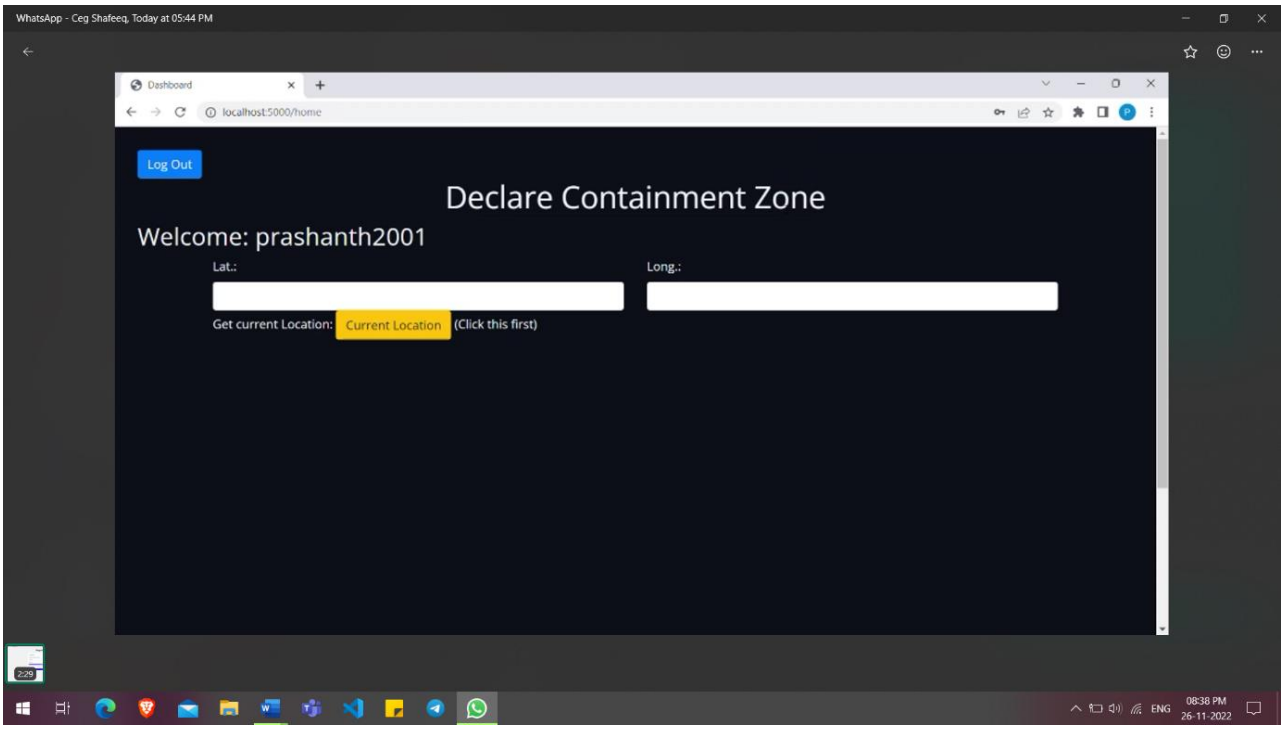
- **Registration page:**



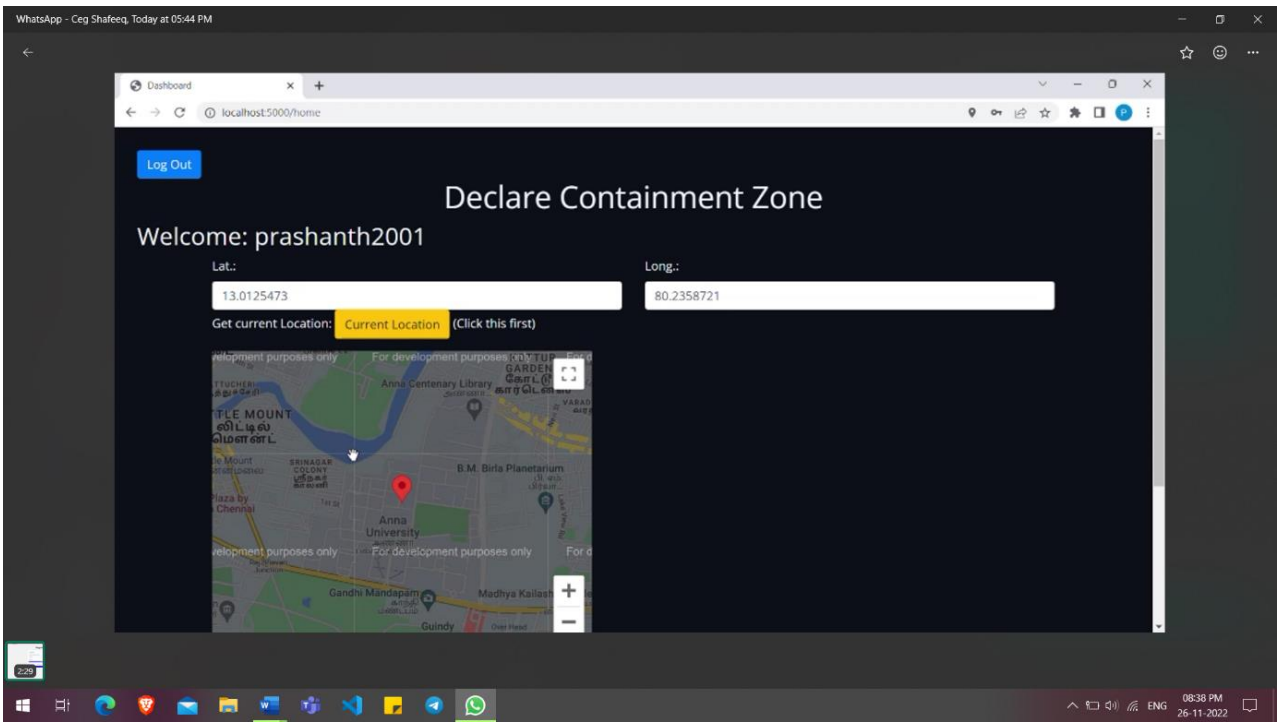
- **Login Page:**



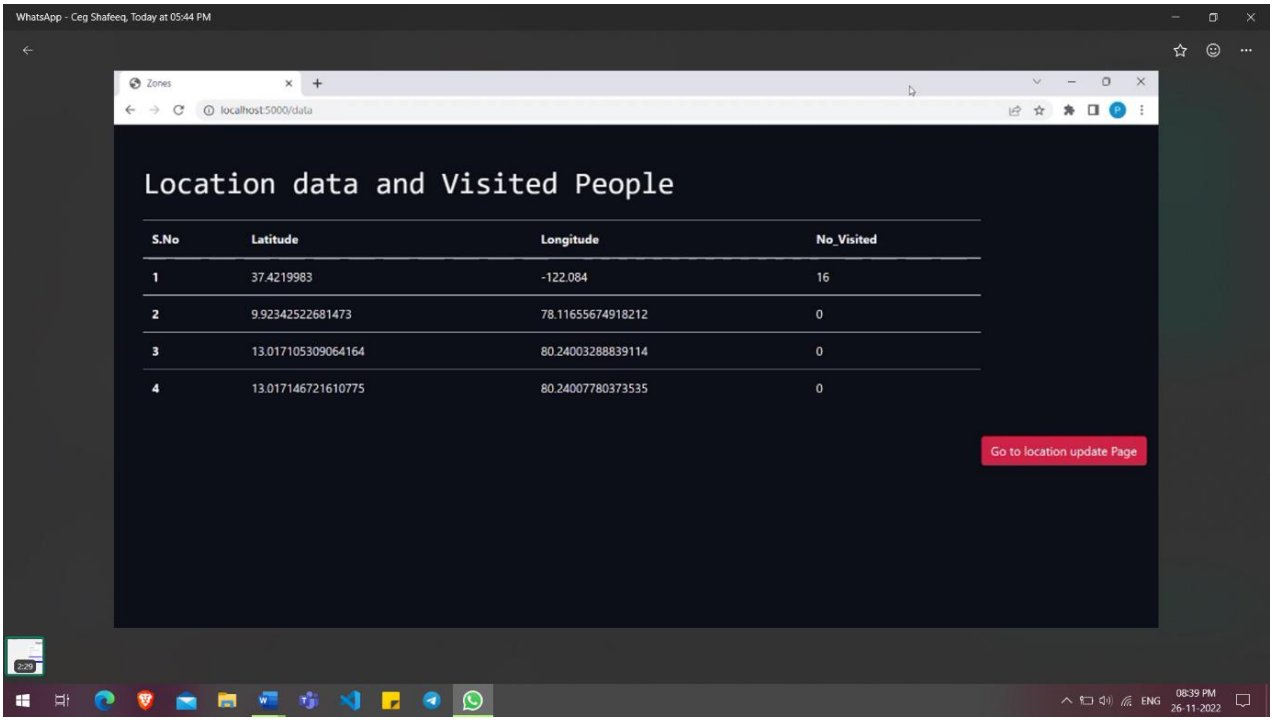
- **Declaring containment zone:**



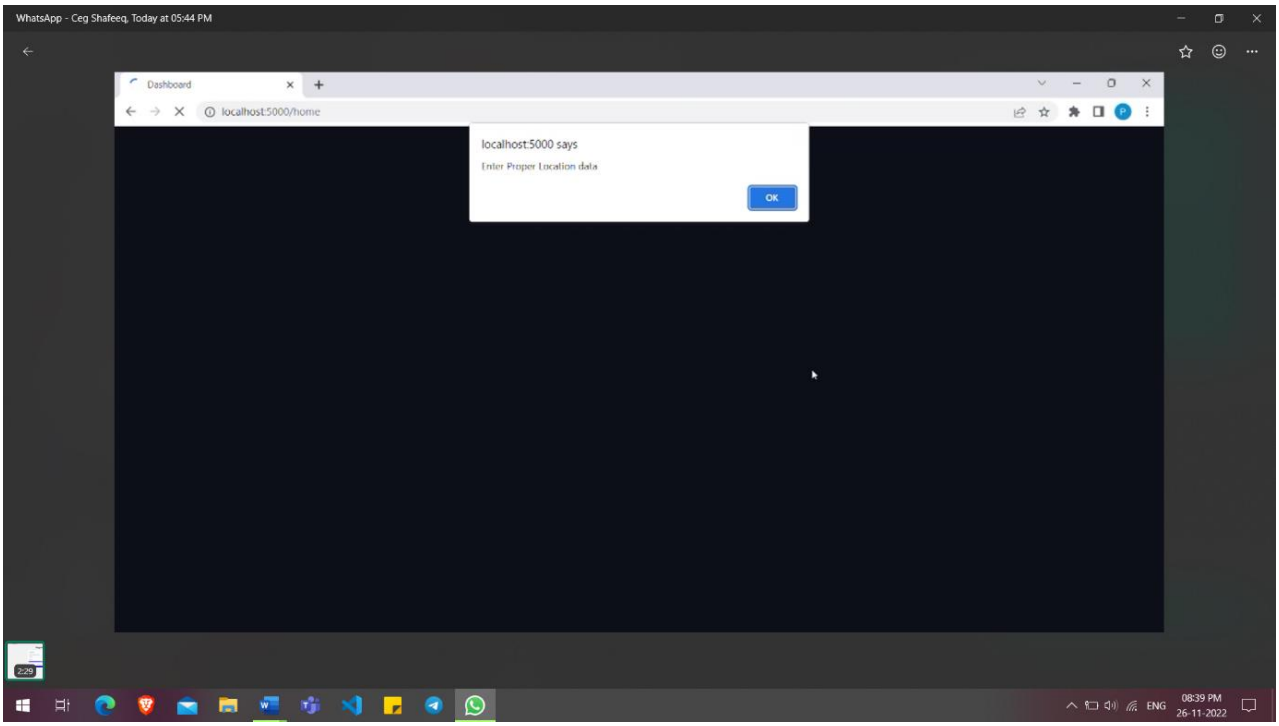
- **Selecting containment zone**



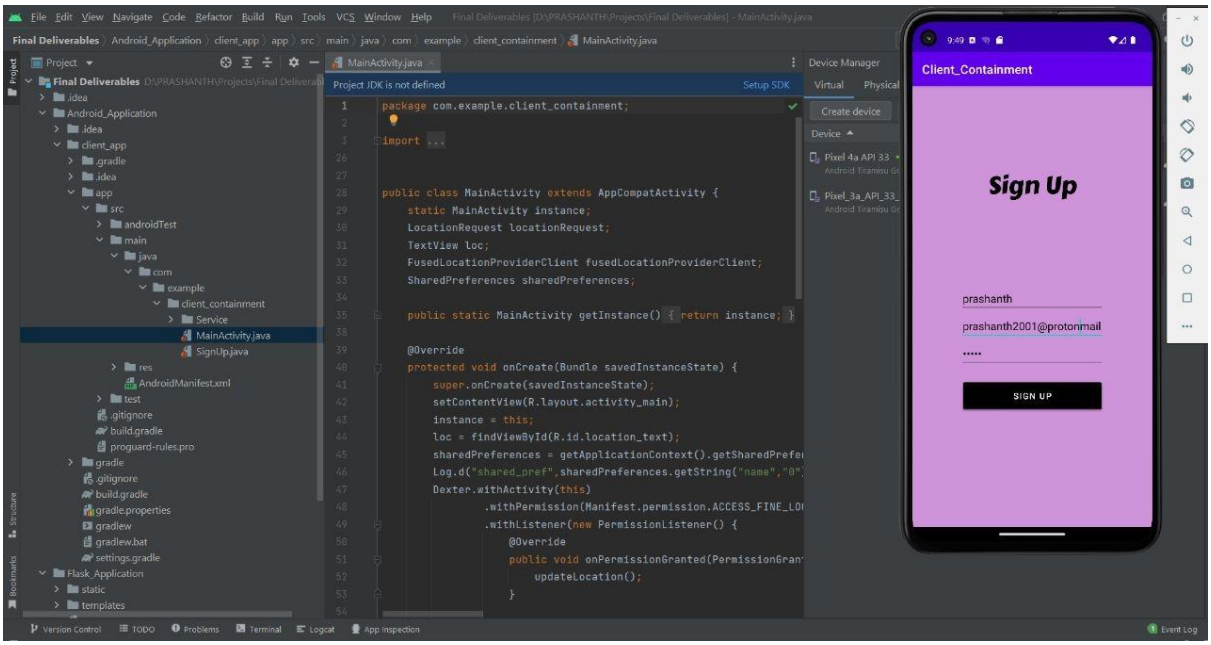
- **Details of the location:**



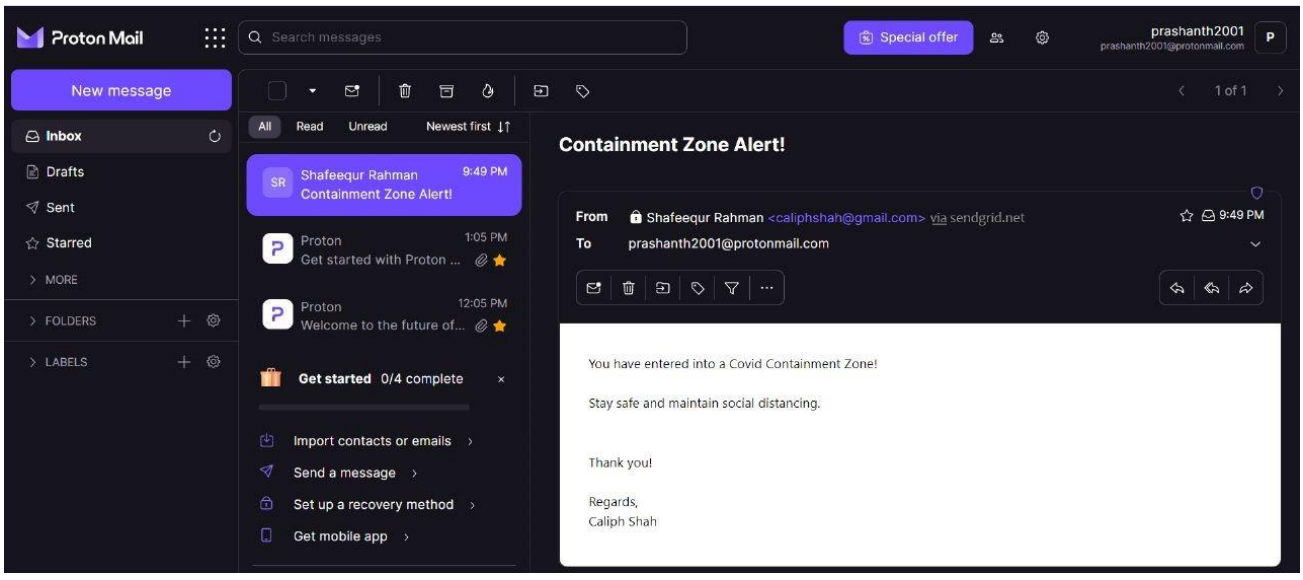
- **Wrong location:**



- **Android app emulator:**



- **Mail alert being triggered:**



VIDEO LINK:

This is the link to the demo video of our project -

https://drive.google.com/file/d/16ctddV5t5oFz7yCYHEIh5Y_iQdmy-ZML/view?usp=drivesdk

THANK YOU!