TEAM ID: PNT2022TMID37165

TEAM LEAD: SUTHARSHAN.V

TEAM MEMBERS: VINOTHKUMAR.S , SASIRAJAN.M , YUVARAJ.N

PROJECT REPORT

CONTAINMENT ZONEALERTING SYSTEM

1. **INTRODUCTION**

a. Project Overview

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.

b.Purpose

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 bestored in the Database.Alerts are sent using the notification service.

2. LITERATURE SURVEY

a. Existing problem

S. NO	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHMS	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
1.	COVID-19 Mobile Apps	This systematic review aims to shed light into studies found in the scientific literature that have used and evaluated mobile apps for the prevention, management, treatment, or follow-up of COVID-19.	1. EPHPP tool 2. geolocation tracking 3. research database	1. Geofence Technology 2. Mobile networks	The quality of the study might not reflect the quality or the effectiveness of the developed mobile app.

2.	Development of An Android Application for Viewing Covid-19 Containment Zones and Monitoring Violators Who are Trespassing into It	This Android application updates the locations of the areas in a Google map which are identified to be the containment zones. The application also notifies the users if they have entered a containment zone and uploads the user's IMEI number to the online database	3. Geofencing 4. Firebase API 5. Location Tracking 6. IMEI Number	7. Geofencing Technology 8. Firebase Cloud	The application provides an efficient way of showing the identified Covid-19 containment zones to the users in a Google map. This application further tracks the user's location and checks whether it is present in the list of identified containment zones.
3.	Mobile Geo-Fencing Triggers for Alerting Entries Into COVID-19 Containment Zones Using IoT	This chapter 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	9. A.I 10. Database 11. Location Tracking 12. Sensors	13. IOT Devices 14. Cloud services 15. Sensors 16. Cognitive Technology	It deliver's info 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)

		containment zone .			
4.	MoveInSync's Containment Zone Tracker Aims At Democratising Information Flow	This Paper proposes about tapping on one of the locality names will pull it up on the map, so one can have a better understanding of the area that is marked on selective of 15 cities.	17. Partnered with geoIQ 18. Spring Thymeleaf 19. Dynamic OG tags	20. MoveInSync leverages REST API 21. Amazon Aurora Postgres SQL 22. Cloudwatch	They use sertified SAAS technology And they store anonymized geocode data on Google's Firebase application.
5.	Kovai Care app to alert public on containment zones	All details of the containment areas have been fed into the app to alert the public and	23. Bluetooth 24. GPS 25. Digital iD	26. Geofecing 27. Mobile Tracking	The major issue in the Bluetooth using devices is latency issue and battery consumption

		ensure their safety.			

b. References

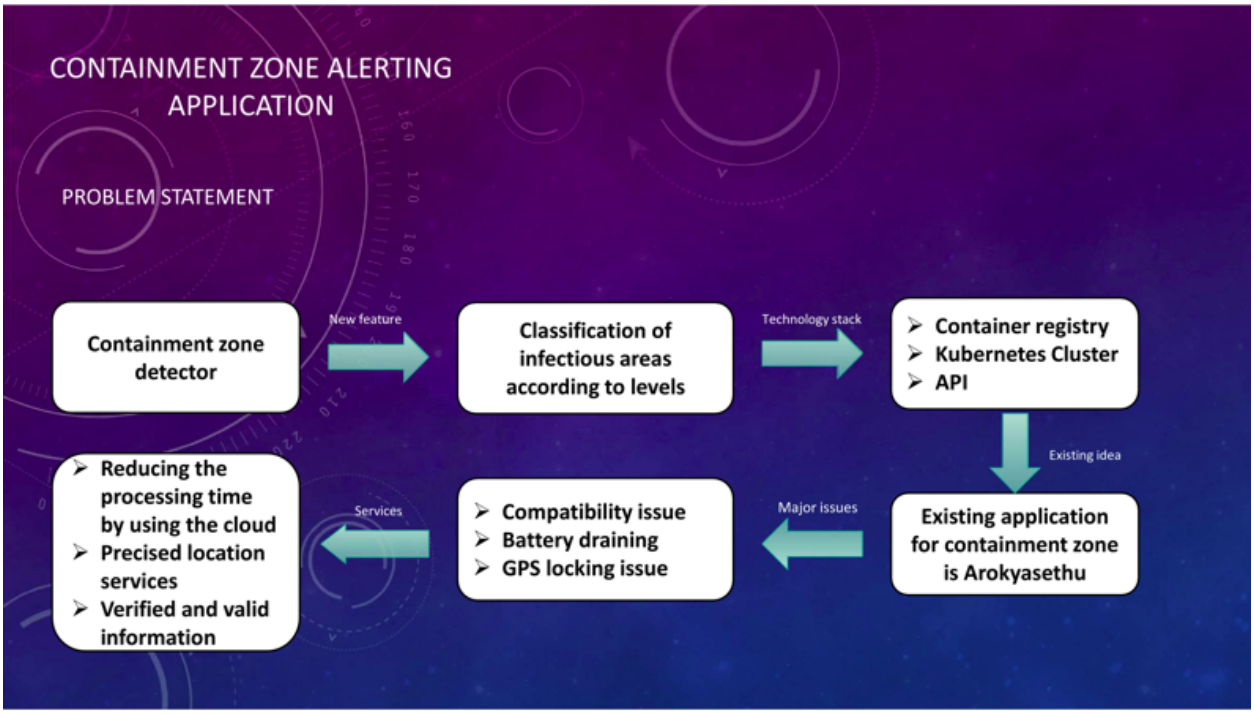
https://www.researchgate.net/publication/341298994_Development_of_an_Android_application_for_viewing_Covid19_containment_zones_and_monitoring_violators_who_are_trespassing_into_it_using_Firebase_and_Geofencing

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

https://link.springer.com/article/10.1007/s41403-020-00137-3

https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019ncov/resource/pt/covidwho-620108

c. Problem Statement

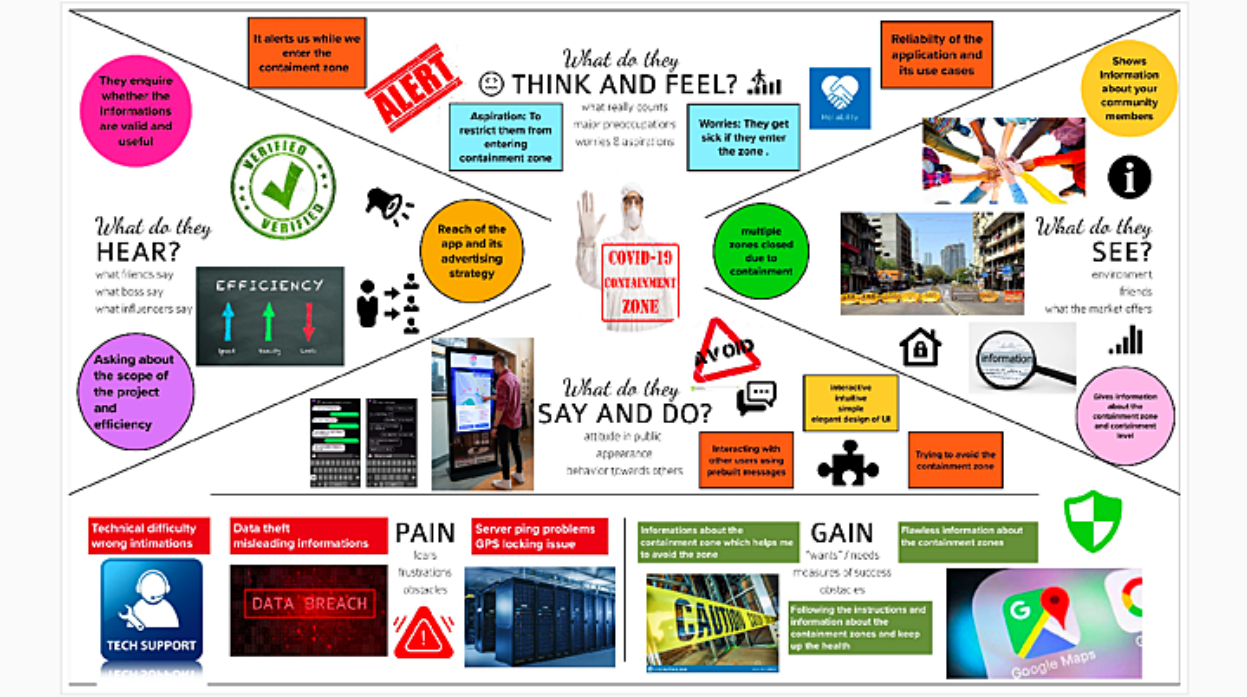


3. IDEATION & PROPOSED SOLUTION

d. Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that capturesknowledge about a user's behaviours andattitudes.

It is a useful tool to helpsteams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



e. Ideation & Brainstorming\:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

f. Proposed Solution

S.NO.	Parameter	Description
1.	Problem Statement (Problem to be solved)	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 using GPS service. Location of the individual must be stored in the Database. Alerts are sent using the notification service.
2.	Idea / Solution description	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
3.	Novelty / Uniqueness	In this App ,User receives notification while entering a containment zone. The zones are shown on a google map and statistics(levels of contamination) on a Dynamic floating window..
4.	Social Impact / Customer Satisfaction	The application provides an efficient way of showing the identified Containment zones to the users in a Google map and reroute them to their destination by alternative way.Also gives the user of safety measures if they are I

		the contained zones.
5.	Business Model (RevenueModel)	Using this application the containment diseases can be avoided effectively .tourism and transportation, which are significantly affected by the virus and the measures taken to contain it.If we contain the virus and the environment become normal which significantly increases the revenue for the country.
6.	Scalability of the Solution	This application can be further used for many purposes like not only for COVID-19 and also for future containment diseases(*after modified) and also pre-existing containment diseases. Factory safety to prevent users from entering restricted areas.

f.Problem Solution fit

4.REQUIREMENT ANALYSIS

a. Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User Registration**	Registration through own application Form Registration through Gmail Registration through LinkedIN Registration through Google Docs.
FR-2	**User Confirmation**	Confirmation via Email Confirmation via OTP /via Mobile number.
FR-3	**User Login**	Login through User name and password. Login through mail I'D and password. Login through OTP through mail I'd and password. Login through Phone number.
FR-4	**Records of the containment zones**	Zones name . Containment infections category in levels. Infected people count. Zone details .
FR-5	**Login details**	Login Details along with time through E-mail. Login Details along with time through phone number.
FR-6	**Updation of zones Details.**	Update through E-mail Update through User account.
FR-7	**Monitoring of zones**	Monitoring of zones through collecting data from trust worthy resources.
FR-8	**Database**	Usage of standard database for storing the data.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

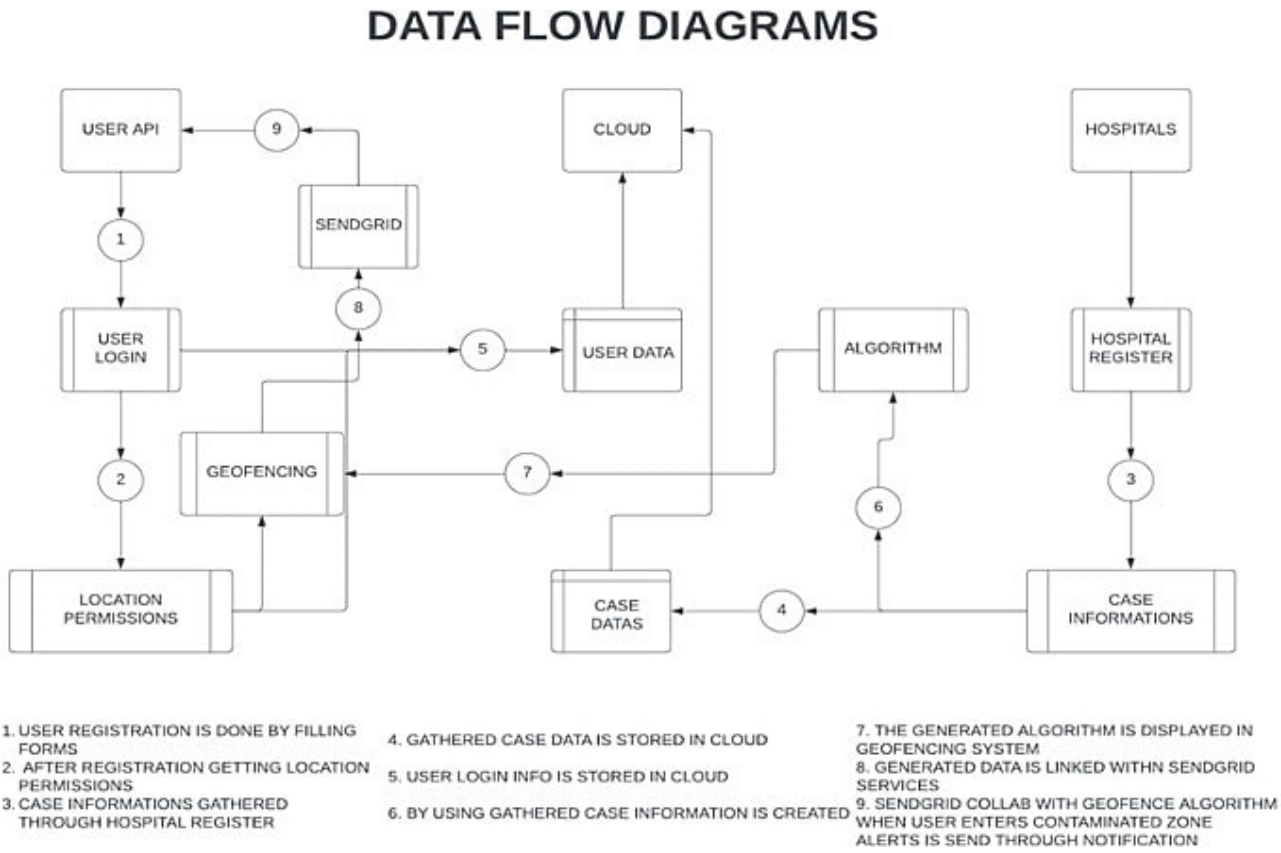
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• Once users successfully log in to the application they can update their zone details, also users will be able to add details about the containment zones submitting essential details related to the zones. They can view details of the current location. The System will automatically send an alert message to the users if they enter the containment zone. So that they can protect themselves from infection. • It can use by wide variety of users as it is very simple to learn and not complex to proceed . • Easy to use, User-friendly and Responsive.
NFR-2	**Security**	• Applications have been developed to help every common man. The System will ask users to create their accounts by providing essential details. Users can access their own accounts by logging into the application. With Registered Mail id only users can log into the application. So it provide authentication. • We are using login for the user and the information will be hashed so that it will be very secure to use.

NFR-3	**Reliability**	▯ It will be reliable that it can update with very time period so that the accuracy will be good.
NFR-4	**Performance**	• User can track the record of the containment zone locations available using the application. Containment zone tracking helps to improve containment zone allotment system and ensures that the data about the zones are accurate. Reduces manual searching and saves time. Acknowledgements will be sent automatically while zones are nearby the users. Makes the searching process more efficient and simple. Improves application's performance. • It will be perform fast and secure even at the lower bandwidth .
NFR-5	**Availability**	▯ The availability of information about the particular data of containment zone and about the users current zone will be much accurate and available for any place and locations specified by the user.

NFR-6	**Scalability**	▯ Scalability is an aspect or rather a functional quality of a system, software or solution. This proposed system for containment zone system can accommodate expansion without restricting the existing workflow and ensure an increase in the output or efficiency of the process. ▯ It is scalable that we are going to use data in kilobytes so that the quite amount of storage is satisfied .

5. PROJECT DESIGN

b. **Data Flow Diagrams**



c. Solution & Technical Architecture

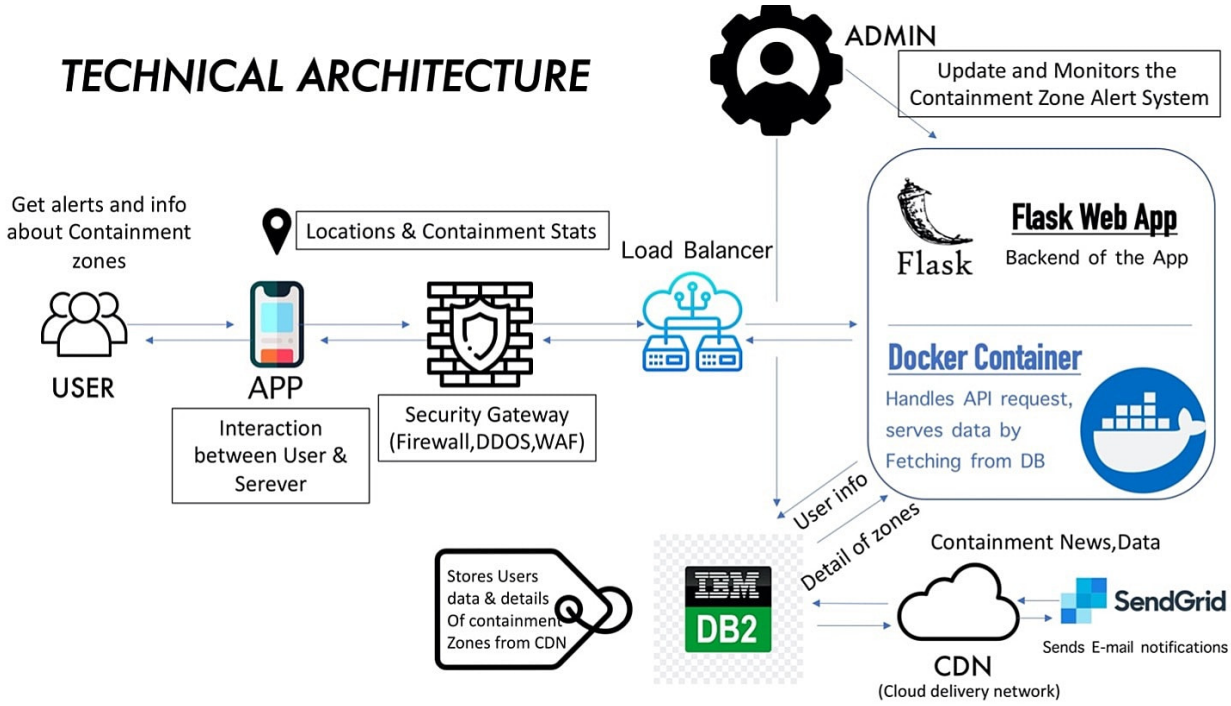


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, IBM Cloud,IBM Watson
2.	Application Logic-1	Logic for a process in the application	Flask,Docker
3.	Application Logic-2	Logic for a process in the application	IBM Watson,IBM Cluster
4.	Application Logic-3	Logic for a process in the application	IBM DB2
5.	Database	Data Type, Configurations etc.	IBM Cloud Container,IBM DB2

6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloud
7.	File Storage	Information storage requirements	IBM Block Storage,IBM DB2,Docker Container
8.	External API-1	SendGrid is used in application will send the mail alert to the user about Containent zones	SendGrid
9.	External API-2	Docker handles the API request and serves data by fetching the Data	Docker
10.	Cloud Storage Model	To store database	IBM Cloud
11.	Infrastructure (Server / Cloud)	Application Deployment on Cloud Local Server Configuration:NILL Cloud Server Configuration : IBM DB2,IBM Cloud	IBM Kubernetes Cloud

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Flask which providesthe framework for the total API structure,Docker which is used handle the API request and acts as container to store the Database,SendGrid used to send E-mail alerts to the user abiut	Docker,Flask,SendGrid

		Containment zone	
2.	Security Implementations	The Firewall is used Between the Clous Cluster and the User API server to secure the SSID of the server,The Users Login credentials are hashed.	SHA-256 Encryptions, Advanced Encryption Standard(API),Blowfish(E-mail encryption),Elliptic curve cryptography.
3.	Scalable Architecture	This API is scalable because the dtas are to be stored in the cloud storage ,So there will be no hassle in Users mobile to handle and processing the data.	Flask.Docker,IBM DB2,Kubernetes cloud storage.
4.	Availability	The availability of the API is wider in range.As in India 54% of people uses smart phones there is no hassle in it,rest of the peoples are using Feature phones Those peoples are provided with the options of Downloading the API via internet.	Java,HTML,Javascript,CSS,IBM Watson assistant.

5.	Performance	Here it takes less processing power in the mobile phones As the datas are processed by the cloud technology,As well as the Storage taken for an individual is also less.	Flask.Docker,IBM DB2,Kubernetes cloud cluster,IBM cloud Storage.

References:

https://www.aarogyasetu.gov.in/

https://www.dtnext.in/tamilnadu/2020/07/16/kovai-care-app-to-alert-public-on-containment-zones

https://www.ibm.com/cloud/architecture

6. PROJECT PLANNING & SCHEDULING

a. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Sasirajan.M
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Sasirajan.M

Sprint-1	Registration	USN-3	As a user, I can register for the application through Mobile number	2	Medium	Sasirajan.M
Sprint-1	Login	USN-4	As a user, I can log into the application by entering my email & password	5	High	Yuvaraj.N
Sprint-2	Dashboard	USN-5	As a user, I need to give permission to access My Contacts, Location.	5	High	Vinoth Kumar.S
Sprint-2	Dashboard	USN-6	As a user, I get access to the dashboard which shows a map with marked zones	5	High	Vinoth Kumar.S
Sprint-3	Services	USN-7	As an admin, I need to provide medical advice through a chatbot.	5	Medium	Sutharshan .V
Sprint-3	Services	USN-8	As an admin, I need to provide preventive measures when they travel through it.	5	High	Sutharshan .V
Sprint-4	Services	USN-9	As an admin, I need to provide premium services for users like monitoring health by their smart bands	5	Low	Yuvaraj.N
Sprint-4	Data collection	USN-10	As an admin, I need to store all the user information on the cloud	2	Medium	Vinoth Kumar.S
Sprint-4	Data collection	USN-11	As an admin, I need to collect the list of viruses & bacteria present in this world.	2	Low	Vinoth Kumar.S

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**

Sprint-4	Registration	USN-12	As a user, I can register for the application through Facebook	2	Low	Sutharshan .V
Sprint-4	Registration	USN-13	As a user, I can register for the application through Twitter.	1	Low	Yuvaraj.N
Sprint-4	Service	USN-14	As an admin, I need to alert the user when they enter pandemic zones	5	High	Sutharshan .V

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	9	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	11	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	13	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	14 Nov 2022	8	19 Nov 2022

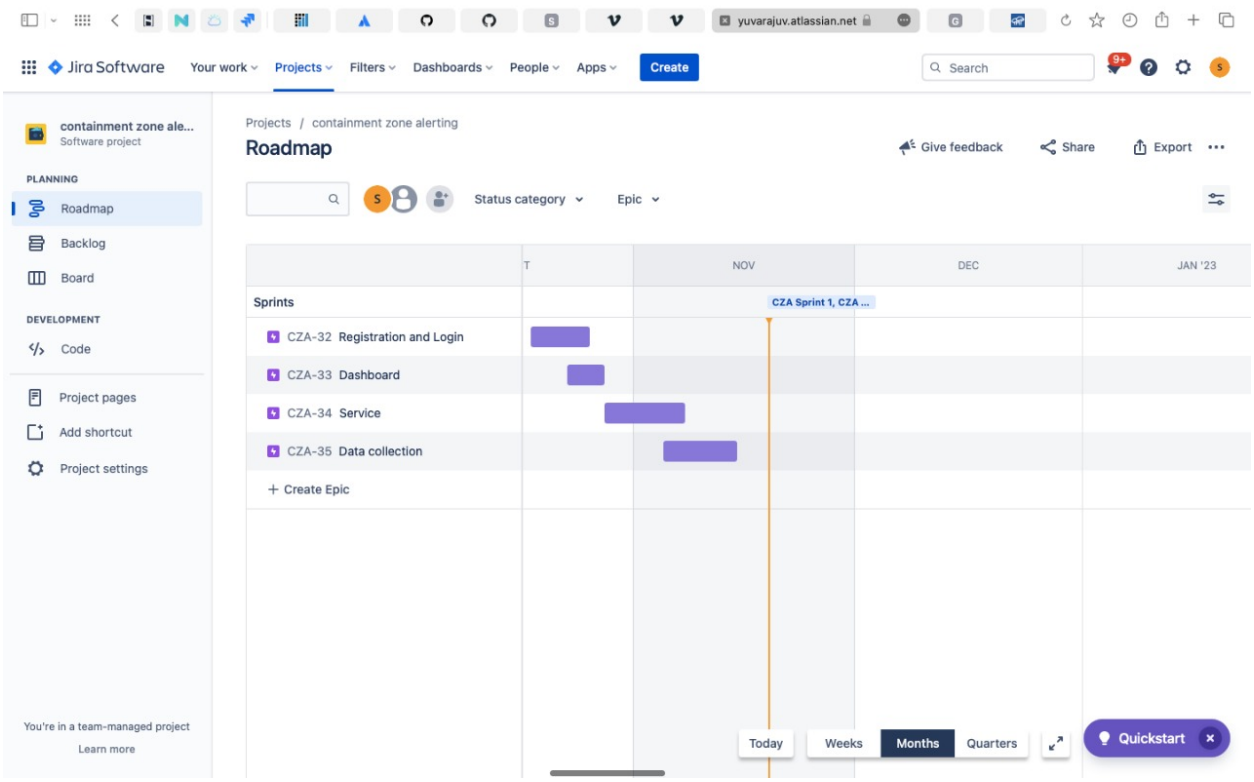
Velocity:

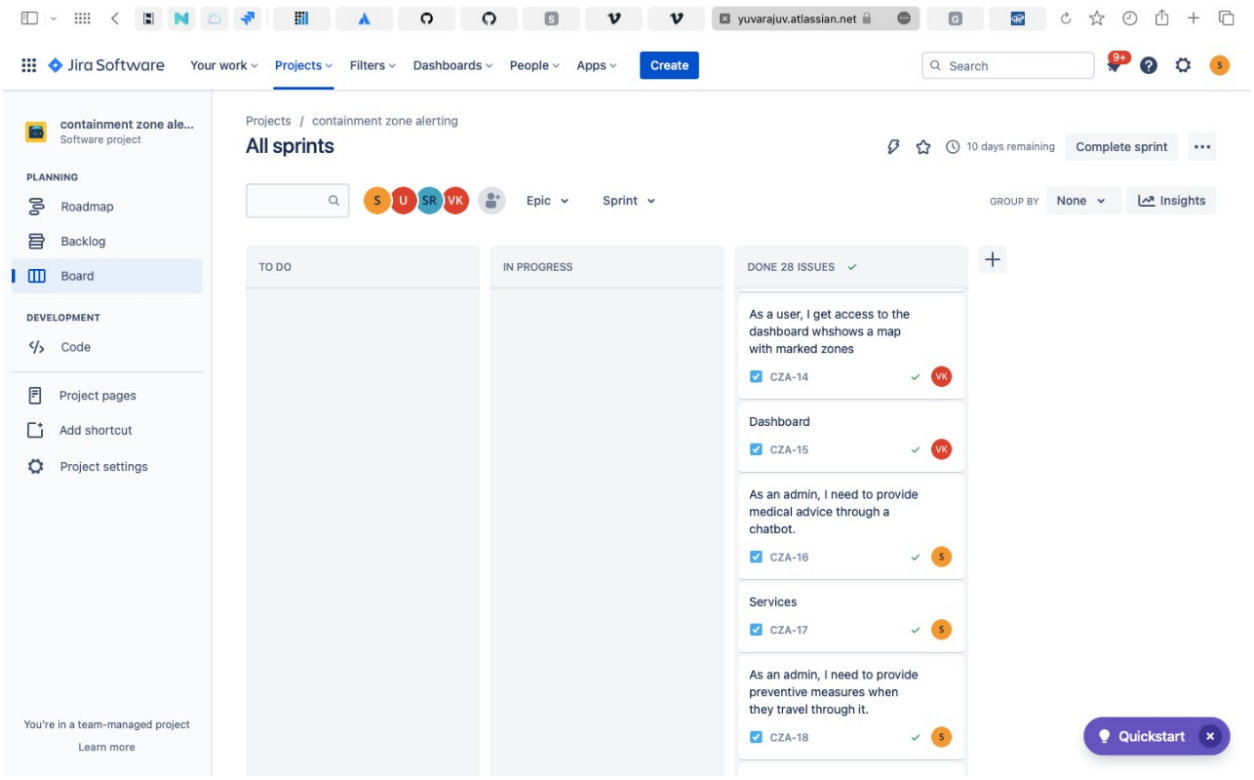
AV= Sprint Duration Velocity
= (9+11+13+8) 10

= 41 10

=4.1

b.Reports from JIRA

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Software project
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Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Projects / containment zone alerting
All sprints
10 days remaining
Complete sprint
Epic
Sprint
GROUP BY
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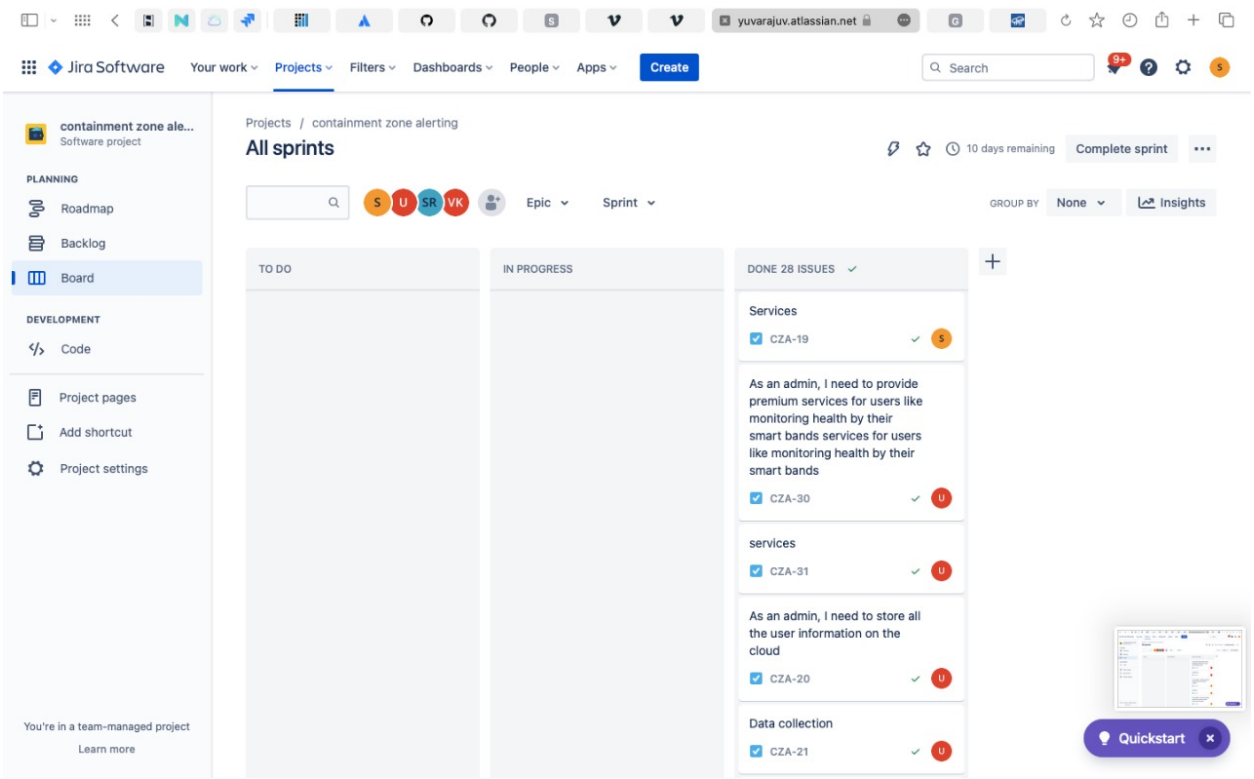
Insights
TO DO
IN PROGRESS
DONE 28 ISSUES
As a user, I get access to the dashboard whshows a map with marked zones
CZA-14
Dashboard
CZA-15
As an admin, I need to provide medical advice through a chatbot.
CZA-16
Services
CZA-17
As an admin, I need to provide preventive measures when they travel through it.
CZA-18
Quickstart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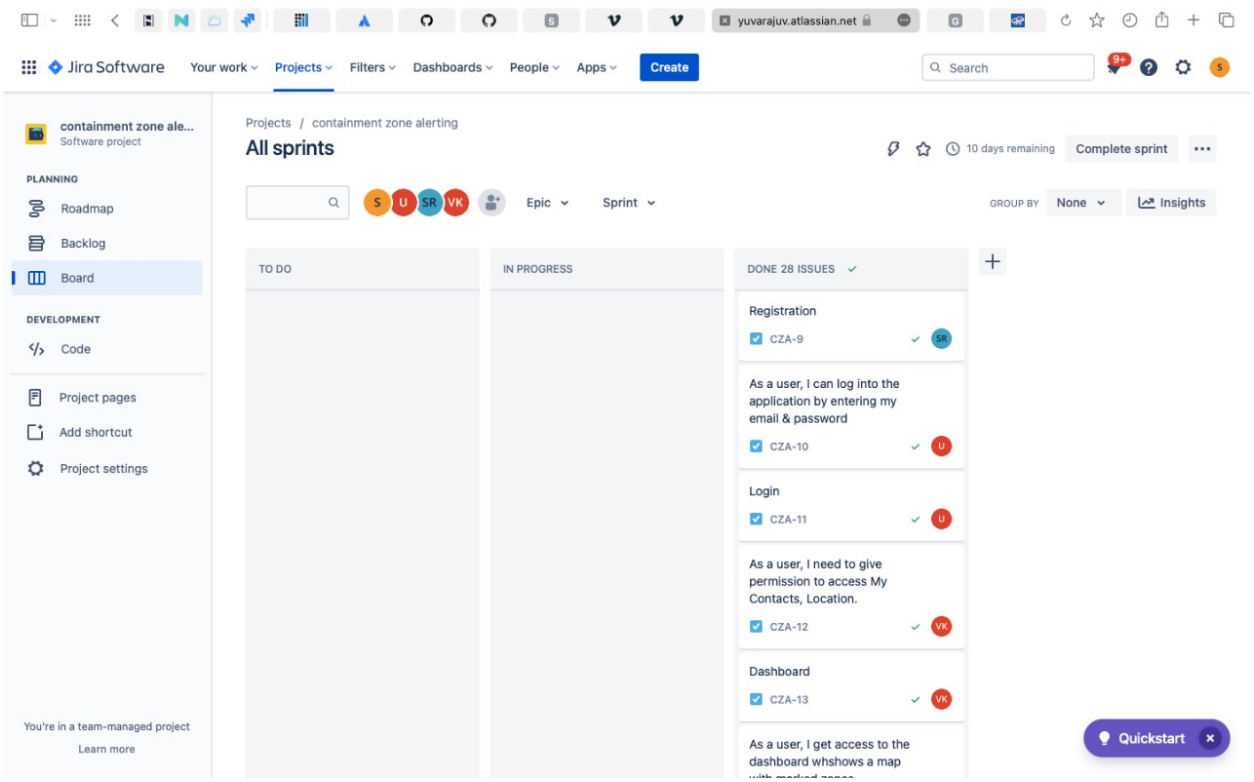
CZA-30
services
CZA-31
As an admin, I need to store all the user information on the cloud
CZA-20
Data collection
CZA-21
Quickstart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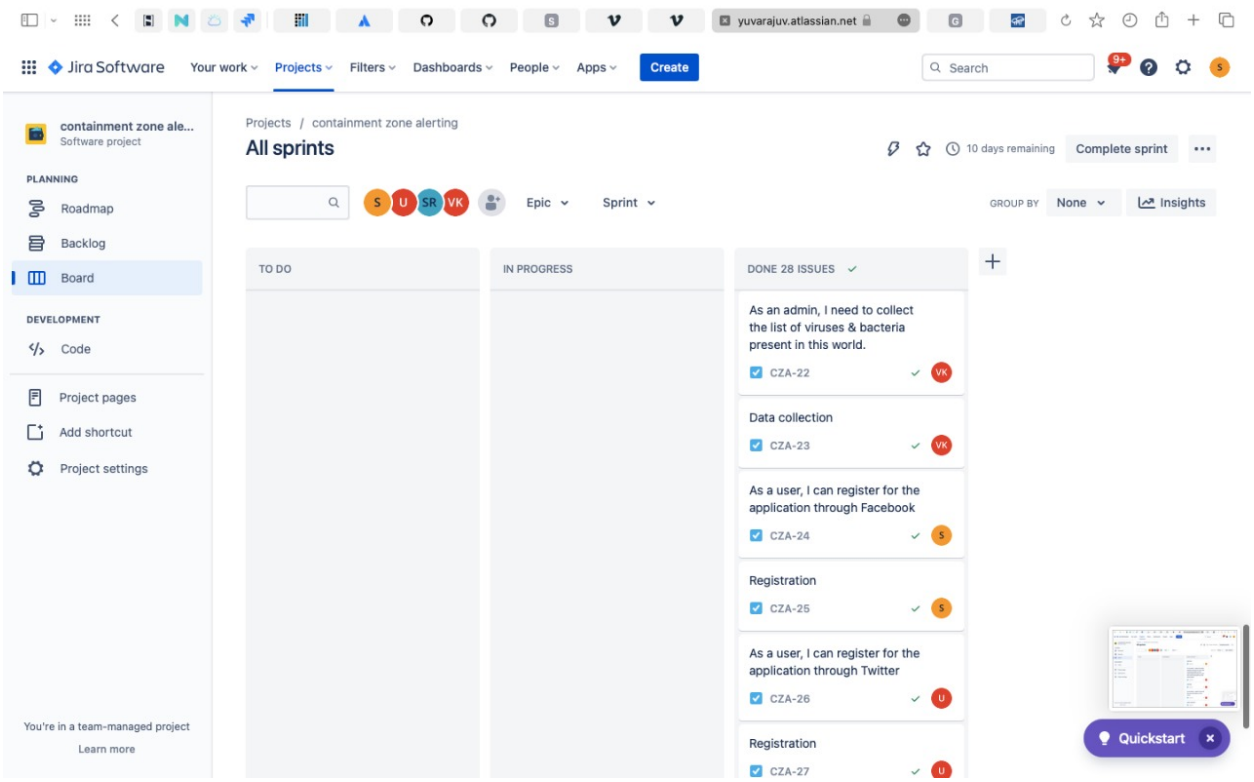
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CZA-24
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CZA-25
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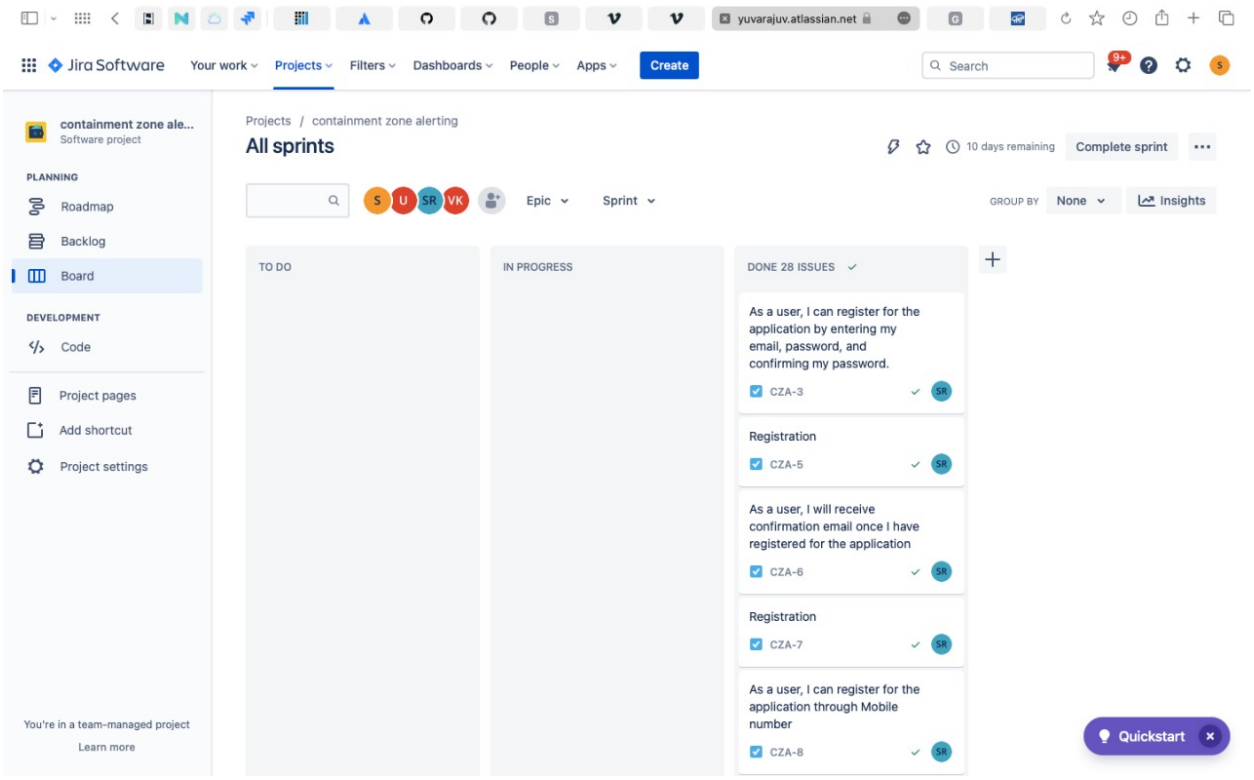
CZA-26
Registration
CZA-27
Quickstart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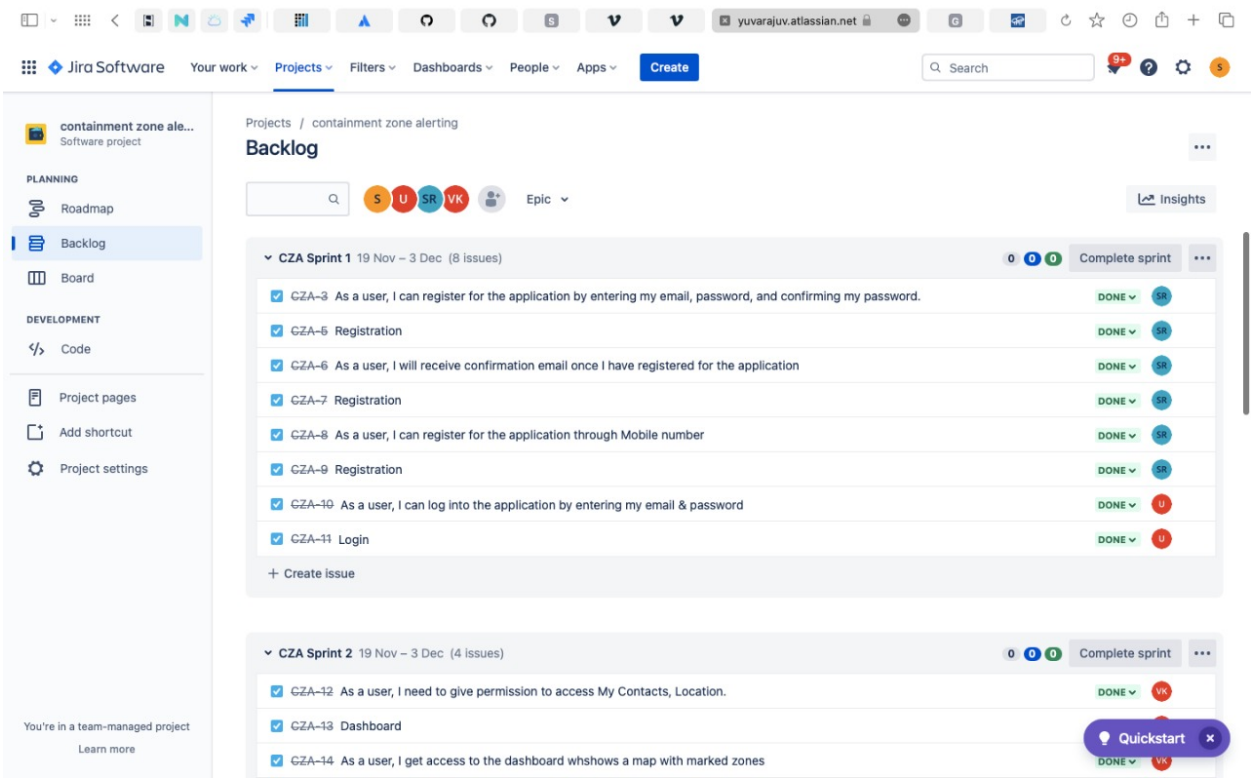
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CZA-5 Registration
CZA-6 As a user, I will receive confirmation email once I have registered for the application
CZA-7 Registration
CZA-8 As a user, I can register for the application through Mobile number
CZA-9 Registration
CZA-10 As a user, I can log into the application by entering my email & password
CZA-11 Login
DONE
Create issue
CZA Sprint 2 19 Nov – 3 Dec (4 issues)
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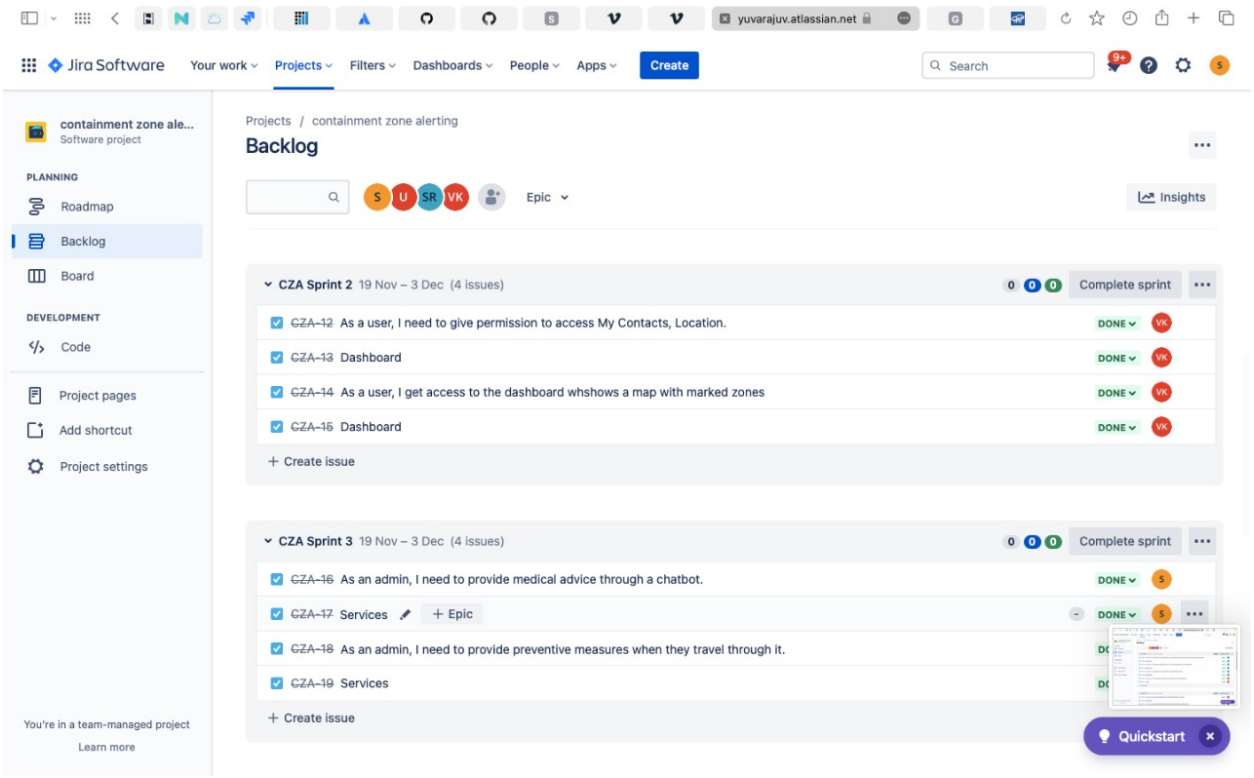


7.CODING & SOLUTIONING (Explain the features added in the project along with code)

b. **Feature 1**

Admin Web App (portal):

They should login to the app and update the containment zones locations in theportal. 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 thatzone.And to watch the updated database.

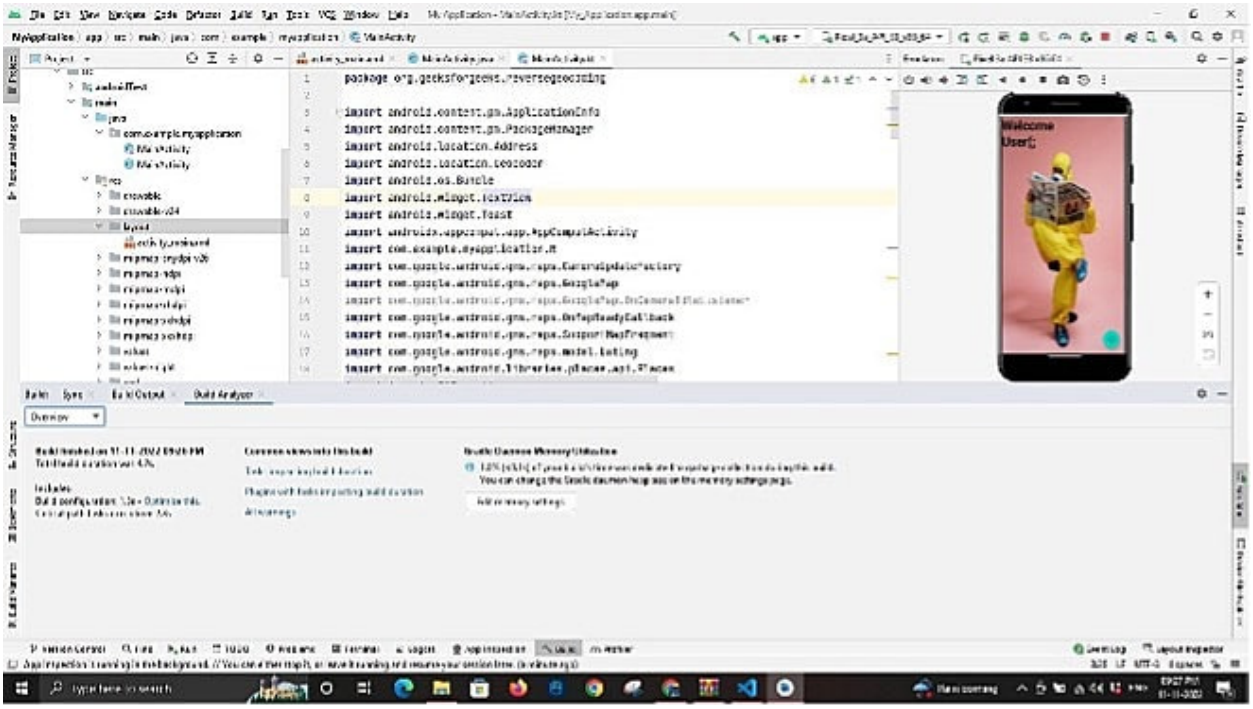
b. Feature 2

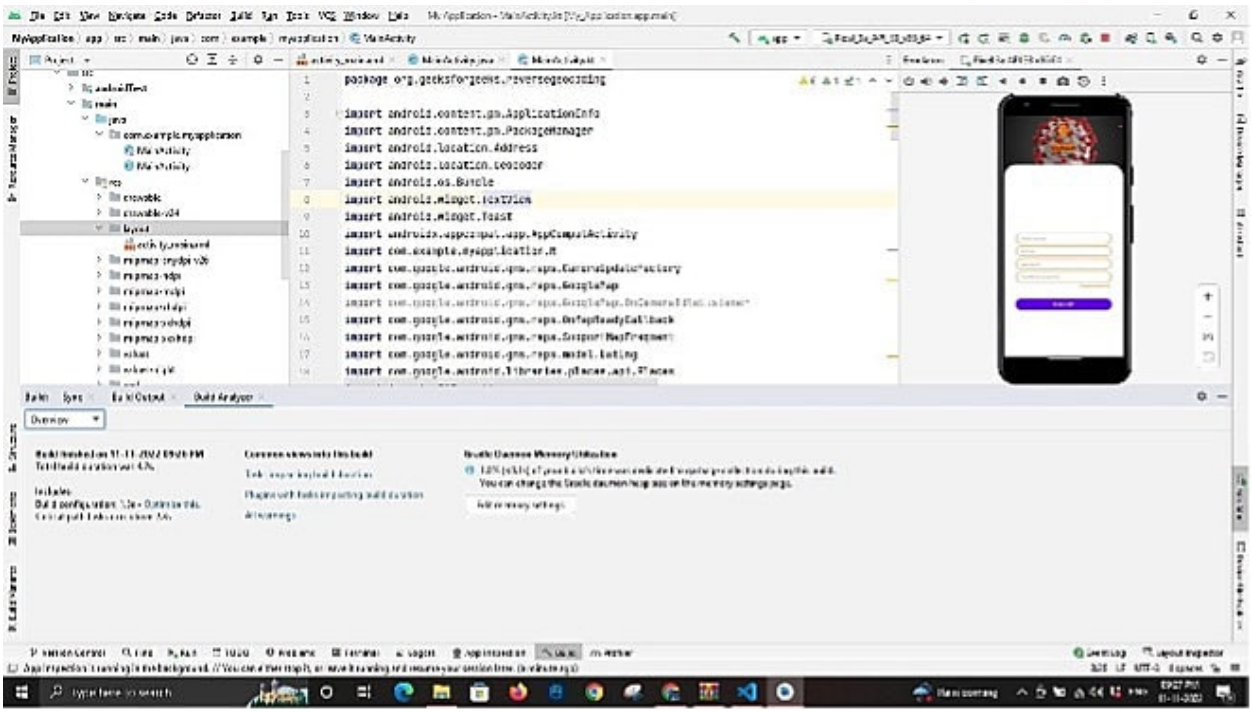
User App (Mobile App):

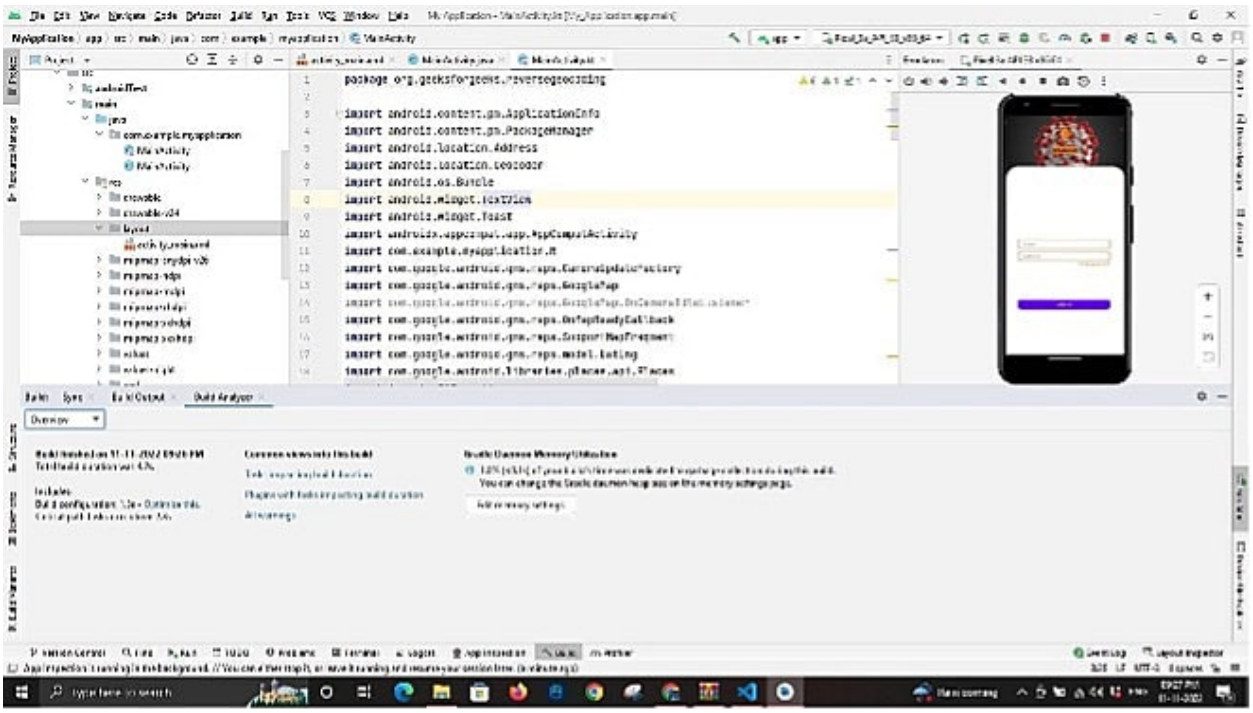
The app should have a user registration and login. After the user logged into the app it will track the user's location and update the database with the current location. If the user is visiting the containment zone he will get an alert notification and an alert through e-mail.

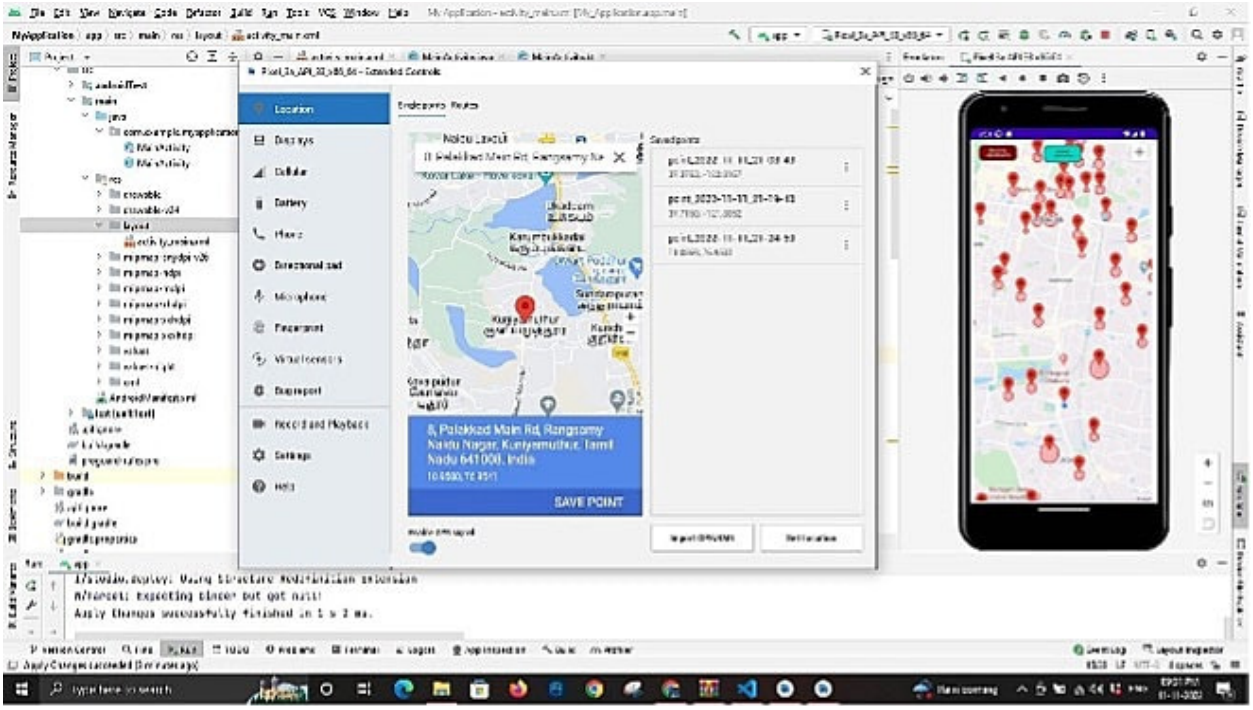
8. TESTING

c. Test Cases









9.RESULTS:

Tests have been carried out in various containment zones across Tamilnadu for the validation of the Android application. The identified containment zones chosen for the testing of the application were visited one by one. It shows various containment zones identified for conducting the test, the date, time of entry, time of receiving the notification alerts upon entering**.** It is highlighted that the application sends notification alertswithin 5–8 seconds on entering.

10.ADVANTAGES & DISADVANTAGES:

1) User Privacy Protection

Location tracking is enabled by the user and is informed to the user via a fixed notification. Before user tests positive for COVID-19 and uploads all his/her locations, the locations are stored in the device's local storage,none but the user has to give access to it. Once user tests positive for COVID-19 and uploads his/herlocations, the identity of the user is preserved and not accessible to any other user. However, administrativeaccess is enabled for tracking down false claims (not implemented yet) for taking legal actions.

2)Efficient Access to potential Huge Server Data Storage

Tracked location data of COVID-19 positive patients will evidently get very large, as the number of affectedpeople is rising each day. Moreover, in many areas people are still reluctant or don't have the luxury tomaintain social distancing. Tosomewhat make the query process of a possible huge data storage a hashingalgorithm is implemented. A particular tracked location is converted into its

corresponding square block/s of area 10 meters x 10 meters along with and hourly time frame.

The block generation is similar to hashing function by providing a key that is the particular index for a query, with the additional benefit that the block also definesa

radius of presence for any particular location. A block isdefined by its bottom left and top right diagonal coordinates.

3)Anonymous Relief Posts:

Through the app's global news feed, relief requests can be posted without directly sharing personal or familyinformation of a user. A contact button is attached to relief posts through which any other user can call and contact the relief request post's author and reach out for help. This feature especially targets the middle-class families that are suffering greatly in silence and cannot seek help publicly. A user is allowed to make only onerelief post every seven days, this is a measure taken to stop misuse of the feature.

11.CONCLUSION:

The application provides an efficient way of showing the identified Covid-19 containment zones to the users in a Google map. With the alarming increase of Covid-19 affected cases throughout the world, this developedapplication can be employed as a tool for creating further social awareness among the people. This application further tracks the user's location and checks whether it is present in the list of identified containment zones. It sends separate notification alerts to the user on entering. The developed android application further extracts theIMEI Number of the trespasser in the containment zones which can be useful to the local police to track and identify people who are frequently trespassing the containment zones. Thereby this application identifies the containment zones and highlights the need for taking

further precautionary measures for combating

Covid-19. The application has been tested in various locations and has beenfound to yield accurate results.

12.FUTURE SCOPE:

The application can be further used for many purposes like maritime and for forest fire region to prevent users from entering restricted areas.

14.APPENDIX:

Source Code

GitHub & Project Demo Link

Github:https://github.com/IBM-EPBL/IBM-Project-15072-1659593965

Demo video:https://www.youtube.com/embed/TVhINrOf9qo