

Project Report

CONTAINMENT ZONE ALERTING APPLICATION

1. INTRODUCTION

a. Project Overview

The World Health Organization has declared the outbreak of the novel coronavirus, Covid-19 as pandemic across the world. With its alarming surge of affected cases worldwide, lockdown, and awareness (social distancing, use of masks etc.) among people are found to be the only means for restricting community transmission. In a densely populated country like India, it is complicated to prevent community transmission even during lockdown without social awareness and precautionary measures taken by the people. Recently, several containment zones had been identified throughout the country and divided into red, orange and green zones, respectively. The red zones indicate the infection hotspots, orange zones denote some infection and green zones indicate an area with no infection. This paper mainly focuses on development of an Android application which can inform people of the Covid-19 containment zones and prevent trespassing into these zones. 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. To achieve all these functionalities, many tools, and APIs from Google like Firebase and Geo fencing API are used in this application. Therefore, this application can be used as a tool for creating further social awareness about the arising need for precautionary measures to be taken by the people of India.

b. Purpose

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 worldwide, this developed application can be employed as a tool for creating further social awareness among 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 the IMEI 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 been found to yield accurate results.

2. LITERATURE SURVEY

a. Existing problem

Existing network community detection methods cannot reflect the regularity of the flow of people, this study aims to incorporate the regularity of urban human mobility within a city into network community detection to delineate better containment zones for disease control. We propose a novel network community detection method, the Human Mobility Regularity-based Zoning (HuMoRZ) algorithm, for considering urban-scale daily routines. It is based on the map equation algorithm, a commonly used community detection method for directed and weighted graphs (Rosvall & Bergstrom, 2008). We use the population flow of the Taipei metropolitan area, one of the major East Asian cities, as a case study to demonstrate the effectiveness and feasibility of the proposed algorithm. An epidemic diffusion model is used to simulate the spatial dynamics of disease transmission with different movement restriction scenarios to compare the performance of zoning algorithms. As delineating containment zones for movement restrictions are usually considered to be implemented to block the spread of high-infectivity diseases, our simulation focuses on the intervention scenarios of high-infectivity disease transmission.

b. References

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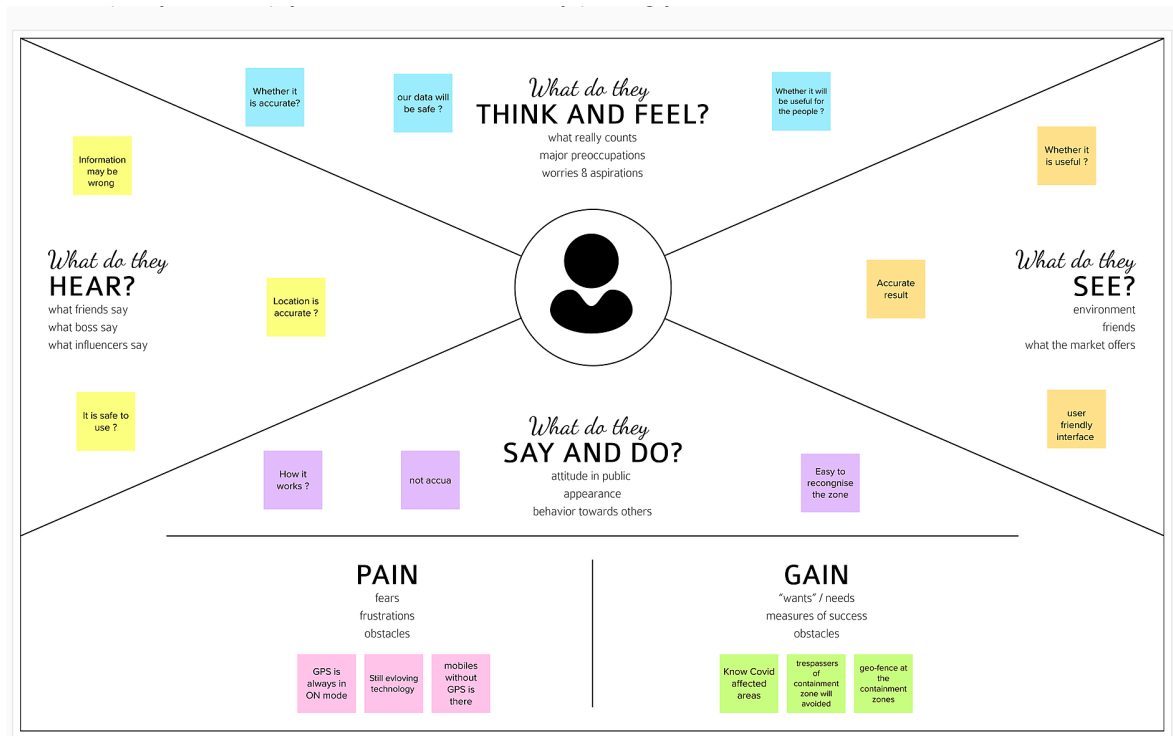
c. **Problem Statement Definition**

Now-a-days, all of us have to move from somewhere to somewhere. In spite of work pressure we didn't consider about the containment zone. We need some third person to intimate us when we entered into unsafe zone

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. IDEATION & PROPOSED SOLUTION

a. Empathy Map Canvas



b. Ideation & Brainstorming

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing

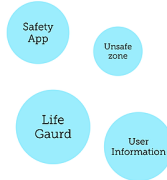
MAHENDRA PRAKASH R



RAJESHWARAN R



NAVEEN AJAYKUMAR T



BALAJI S



3

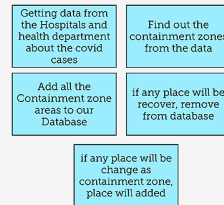
Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

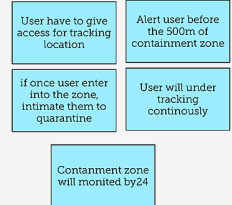
20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mind.

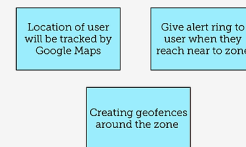
DATA ANALYSIS



USERS UNDER SURVEILLANCE



INTERFACE BETWEEN USER AND BACKEND



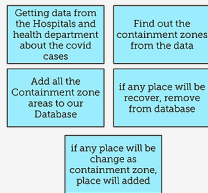
3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

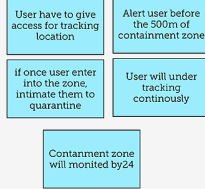
DATA ANALYSIS



INTERFACE BETWEEN USER AND BACKEND



USERS UNDER SURVEILLANCE



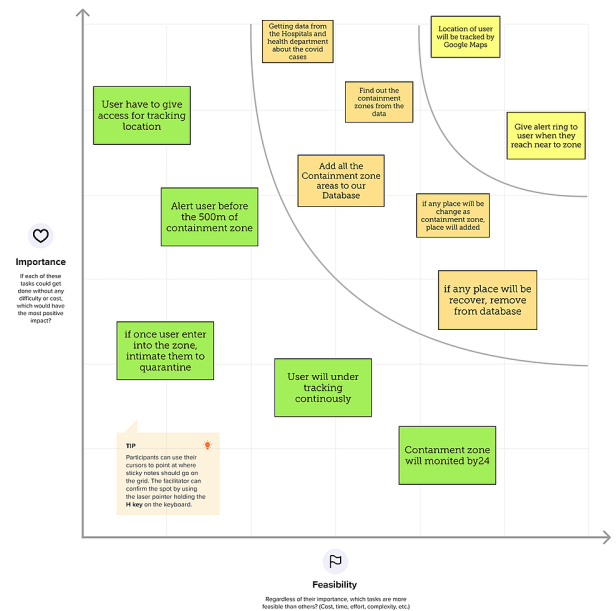
TIP
Add customizable tags to sticky notes to make it easier to find, browse, explore, and compare important ideas as themes within your mind.

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

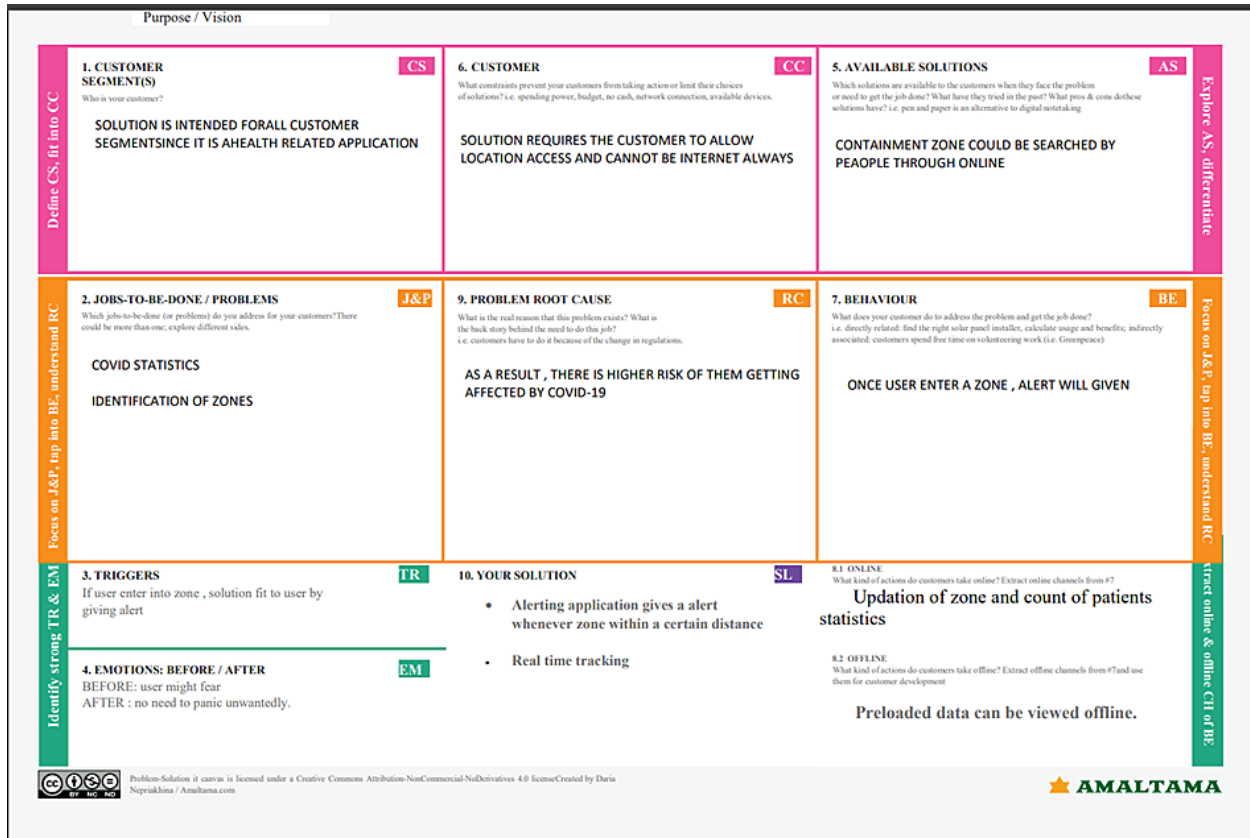


c. Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Now-a-days, all of us have to move from somewhere to somewhere. In spite of work pressure we didn't consider about the containment zone. We need some third person to intimate us when we entered into unsafe zone
2.	Idea / Solution description	The parameters used are similar, but the exact criteria applied varies, and usually depends on local conditions. These have also evolved with time, and are under constant review. In general, containment zones are getting smaller with time as the number of cases are increasing — from entire localities, to colonies or neighbourhood, to streets and lanes, to particular buildings, and now just particular floors.
3.	Novelty / Uniqueness	This app efficiently provided the service that if you were nearer to the zone, it will send you message or make alert through mobile
4.	Social Impact/ Customer Satisfaction	This assists the user in resolving issues such as avoid the entry into containment zone and it will not consider all the places as unsafe. I consider only certain kms of surroundings
5.	Business Model (Revenue Model)	The application can be provided based on the features requested by the user, and the cost is determined by usage

6.	Scalability of the Solution	Containment zone tracker is infinitely scalable because it is based on the location of the person who give the access to track the solution
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d. Problem Solution fit



4. REQUIREMENT ANALYSIS

a. Functional requirement

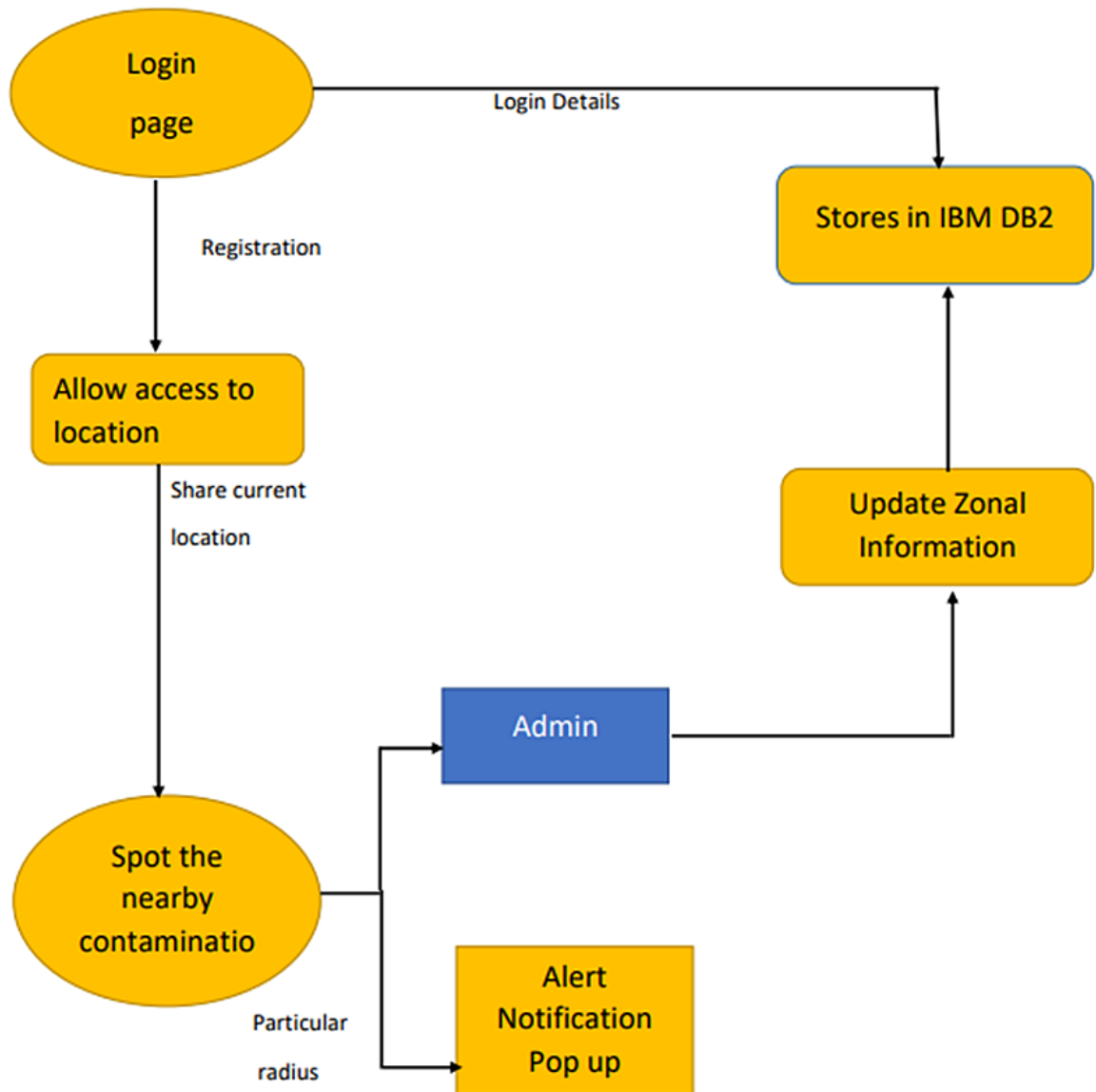
FR No.	Non-Functional Requirement	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	User has to register either by E-mail id or phone number.
FR-2	User Confirmation	Confirmation done through mail or OTP by sending verification code.
FR-3	Track the location	Trace the trespassers by using Google map API.
FR-4	Affected areas are shown	Containment zones were marked and trespassers are indicated by geofencing.
FR-5	Alert notification	By tracking their location using GPS system, notification or message will be sent if the user enters the containment zone.

b. Non-Functional requirements

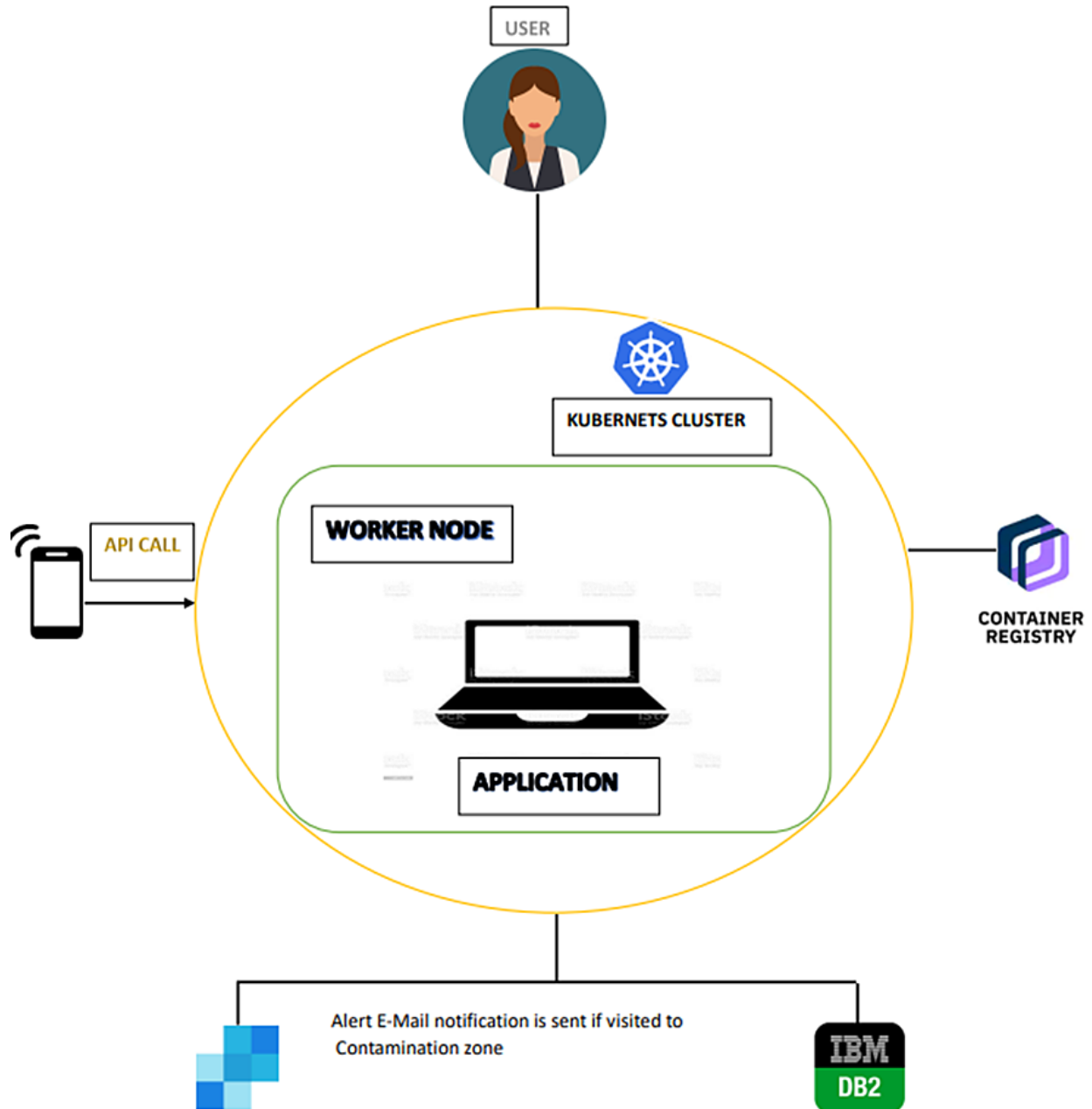
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	User interface is very effective to use when compared with other.
NFR-2	Security	Data from the user will be secured properly.
NFR-3	Reliability	User can trust this application and travels safely.
NFR-4	Performance	Most appropriate results can be achieved due to using the Geofencing and GPS.
NFR-5	Availability	The application uses the network to load the google maps to retrieve containment zones. It is available for good range of network bandwidth.
NFR-6	Scalability	This application can be accessed from any place and information about the zones are up to date.

5. PROJECT DESIGN

a. Data Flow Diagrams



b. Solution & Technical Architecture



c. **User Stories**

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task
Sprint-1	Registration	USN-1	User: I can register for the application by entering my email, password and verifying password.
		USN-2	User: I will receive a confirmation email once I have registered for the application
		USN-3	User: I can register for the application through Gmail
		USN-4	Management: I need to register my hospitals on the site

	Login	USN-5	User: I can log into the application by entering my email & password
		USN-6	Management: I need to login into my dashboard with my given hospital id and password.
Sprint-2	Dashboard	USN-7	User: I need to give permission to access my Contacts, Location, and Storage
		USN-8	User: I get access to the dashboard which shows a map with containment zones
		USN-9	Management: I need to enter the case information of the patient that visits our hospital.
	Services	USN-10	Admin: I need to provide valid information about the pandemic out there.

Sprint-3	Dashboard	USN-11	Management: I need to store all the patient information on the cloud
	Services	USN-12	Admin: I need to provide medical advice through a chatbot
		USN-13	Admin: I need to provide medical recommendations by collaborating with top hospitals.
		USN-14	Admin: I need to provide preventive measures when they travel through it.

Sprint-4	Registration	USN-15	User: I can register for the application through Facebook.
		USN-16	User: I can register for the application through Twitter
	Services	USN-17	Admin: I need to alert the user when they enter pandemic zones
		USN-18	Admin: I need to provide special services for premium users by giving services like monitoring health by their smart bands
	Data Collections	USN-19	Admin: I need to store all the user information on the cloud
		USN-20	Admin: I need to collect the recent list of diseases in the world.

6. PROJECT PLANNING & SCHEDULING

a. Sprint Planning & Estimation

Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Registration	USN-1	User: I can register for the application by entering my email, password and verifying password.	3	High	RAJESHWARAN
	USN-2	User: I will receive a confirmation email once I have registered for the application	2	High	
	USN-3	User: I can register for the application through Gmail	5	Medium	
	USN-4	Management: I need to register my hospitals on the site	2	High	

Login	USN-5	User: I can log into the application by entering my email & password	3	High	
	USN-6	Management: I need to login into my dashboard with my given hospital id and password.	5	Medium	
Dashboard	USN-7	User: I need to give permission to access my Contacts, Location, and Storage	5	High	MAHENDRA PRAKASH R
	USN-8	User: I get access to the dashboard which shows a map with containment zones	5	High	
	USN-9	Management: I need to enter the case information of the patient that visits our hospital.	5	High	
Services	USN-10	Admin: I need to provide valid information about the pandemic out there.	5	High	

Dashboard	USN-11	Management: I need to store all the patient information on the cloud	5	High	NAVEEN AJAYKUMAR T
Services	USN-12	Admin: I need to provide medical advice through a chatbot	5	Medium	
	USN-13	Admin: I need to provide medical recommendations by collaborating with top hospitals.	5	Low	
	USN-14	Admin: I need to provide preventive measures when they travel through it.	5	High	

Registration	USN-15	User: I can register for the application through Facebook.	2	Low	BALAJIS
	USN-16	User: I can register for the application through Twitter	2	Low	
Services	USN-17	Admin: I need to alert the user when they enter pandemic zones	3	Medium	
	USN-18	Admin: I need to provide special services for premium users by giving services like monitoring health by their smart bands	3	Low	
Data Collections	USN-19	Admin: I need to store all the user information on the cloud	5	Medium	
	USN-20	Admin: I need to collect the recent list of diseases in the world.	5	Low	

b. Sprint Delivery Schedule

S.NO	MILESTONE	DESCRIPTION	DURATION
1.	Prerequisites	Prerequisites are all the requirements at the requirement level necessary for carrying out the various project phases.	1 WEEK
2.	Create & Configure IBM cloud services	Mission-critical workloads can be run on the IBM Cloud with solutions that provide higher level of compliance, security, and management. These solutions also have tried-and-true architecture patterns and delivery techniques for quick turnaround.	1 WEEK

3.	Develop the pythonscript	A Python script is a collection of instructions found in afileand designed to be executed similarly to a programme. It isintended that the file willbe executed from the command lineor from a Python interactive	3 WEEKS
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7. CODING & SOLUTIONING (Explain the features added in the project along with code)

a. Feature 1

```
package com.example.covid_19alertapp.extras;

import java.text.DateFormat;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Calendar;
import java.util.Date;
import java.util.concurrent.TimeUnit;

public class DateTimeHandler {

    public static String DateToday()
    {
        Calendar cal = Calendar.getInstance();
        SimpleDateFormat monthFormat = new SimpleDateFormat("MMM");
        SimpleDateFormat dateFormat = new SimpleDateFormat("dd");
        String today_date = dateFormat.format(cal.getTime()) + " " +
monthFormat.format(cal.getTime());
        return today_date;
    }

    public static String TimeNow()
    {
        Calendar cal = Calendar.getInstance();
        DateFormat timeFormat = new SimpleDateFormat("hh:mm a");
```

```

        String time = timeFormat.format(cal.getTime());
        return time;
    }

    public static long dayInterval(String firstDate)
    {
        firstDate = firstDate.replace(' ', '/');
        String secondDate = DateToday().replace(' ', '/');
        SimpleDateFormat sdf = new SimpleDateFormat("dd/MMM");
        Date first = new Date();
        Date second = new Date();

        try {
            first = sdf.parse(firstDate);
            second = sdf.parse(secondDate);
        } catch (ParseException e) {
            e.printStackTrace();
        }

        long diffMillies = Math.abs(second.getTime()-first.getTime());
        long diffDay = TimeUnit.DAYS.convert(diffMillies, TimeUnit.MILLISECONDS);

        return diffDay;
    }
}

```

b. Database Schema (if Applicable)

VISITED LOCATION:

```
package com.example.covid_19alertapp.roomdatabase;

import androidx.annotation.NonNull;
import androidx.room.Entity;
import androidx.room.Ignore;
import androidx.room.PrimaryKey;

@Entity
public class VisitedLocations {

    @PrimaryKey
    @NonNull
    private String containerDateTimeComposite;

    private long count;

    public VisitedLocations() {
        /*
        necessary for room(?)
        */
    }

    @Ignore
    public VisitedLocations(String containerDateTimeComposite, long count) {
```

```
        this.conatainerDateTimeComposite = conatainerDateTimeComposite;
        this.count = count;
    }
```

```
@Ignore
public String[] splitPrimaryKey(){
    /*
     * returns 'latLon' and 'dateTime'
     */
    return conatainerDateTimeComposite.split("_");
}
```

```
@Ignore
public String getATencodedlatlon(){
    /*
     * return latlon in firebase KEY format
     */

    String[] splited = conatainerDateTimeComposite.split("_");

    return splited[0].replaceAll("\\.", "@");
}
```

```
public void setConatainerDateTimeComposite(String conatainerDateTimeComposite)
{
    this.conatainerDateTimeComposite = conatainerDateTimeComposite;
}
```

```
public void setCount(long count) {  
    this.count = count;  
}
```

```
public String getConatainerDateTimeComposite() {  
    return conatainerDateTimeComposite;  
}
```

```
public long getCount() {  
    return count;  
}
```

```
}
```

```
}
```


VISITED LOCATION DATABASE:

```
package com.example.covid_19alertapp.roomdatabase;

import androidx.room.Dao;
import androidx.room.Delete;
import androidx.room.Insert;
import androidx.room.Query;
import java.util.List;

@Dao
public interface VisitedLocationsDao {

    @Insert
    void insertLocations(VisitedLocations visitedLocations);

    @Query("UPDATE visitedlocations SET count = count+1 WHERE conatinerDateTimeComposite = :primaryKey")
    void update(String primaryKey);

    @Query("SELECT * FROM visitedlocations")
    List<VisitedLocations> fetchAll();

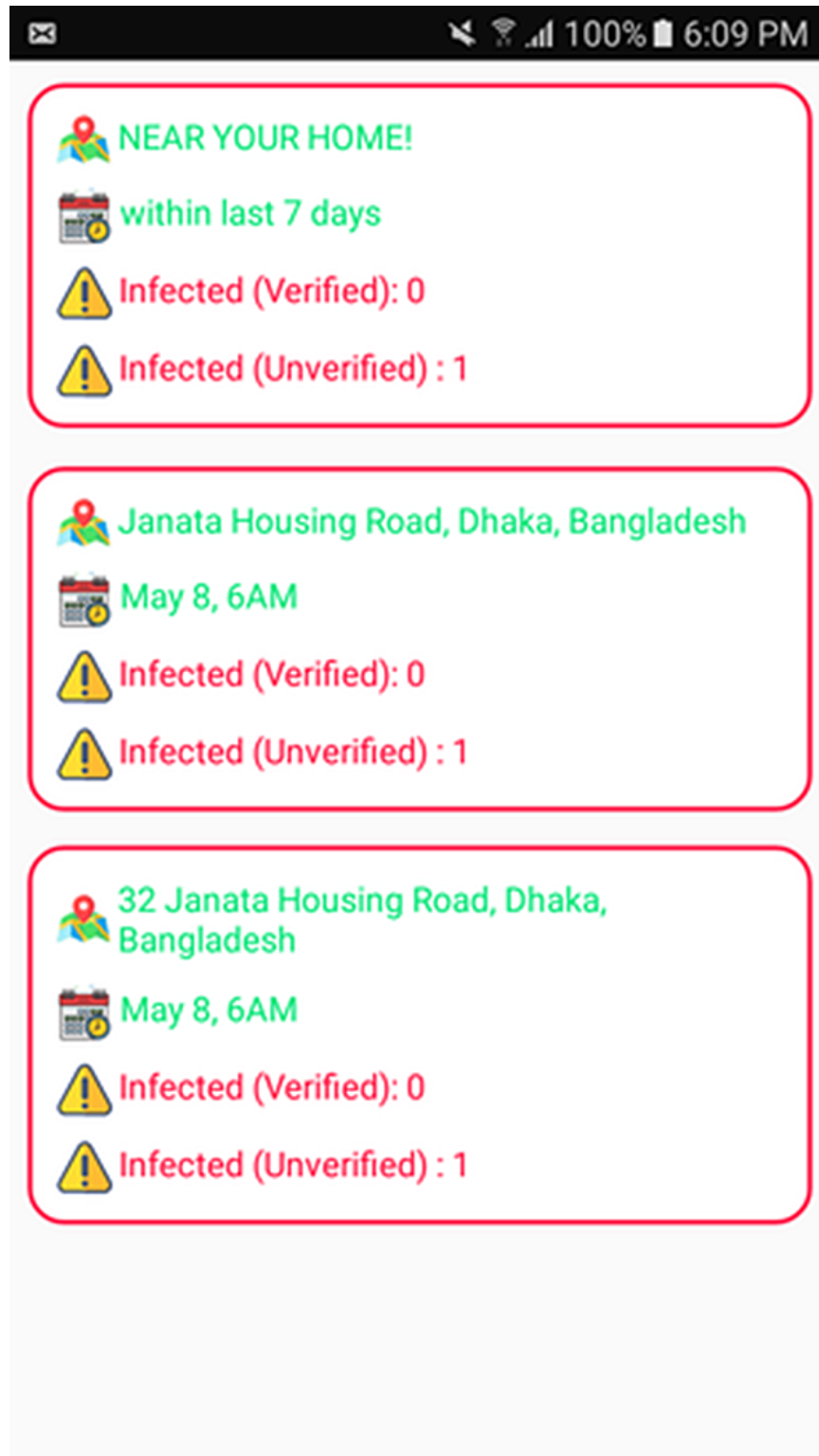
    @Query("DELETE FROM visitedlocations WHERE conatinerDateTimeComposite LIKE :sqlFormatsevenDayAgoDate")
    void deleteSevenDaysAgoVisitedLocations(String sqlFormatsevenDayAgoDate);

    @Query("DELETE FROM visitedlocations WHERE conatinerDateTimeComposite = :primaryKey")
    void deletebyPrimaryKey(String primaryKey);

    @Delete
    void deleteLocation(VisitedLocations visitedLocations);
}
```

8. TESTING

a. Test Cases





100% 6:10 PM



b. **User Acceptance Testing**

← New Post

I am in need of relief please help. You can contact me by pressing the bottom right button of this post. Thank you.

☐ Query ☒ Relief

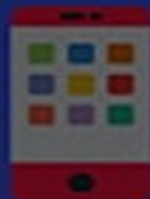
SUBMIT

7:07:20

3.72 19%



SIGN UP STEP 1/3



**Allow COVID-19 Alert App to
access this device's location?**

ALLOW ALL THE TIME

ALLOW ONLY WHILE USING THE APP

DENY

CONTINUE



72% 9:30 PM



SIGN UP STEP 1/3



Permissions Explanation

We need background location tracking. You can stop this anytime from app Settings. Your locations are being saved locally on your device. If and when you give us your explicit consent we will upload keeping your identity anonymous.

DENY

OK, I UNDERSTAND

Before proceeding, read the terms & conditons

CONTINUE



New Post

attempt to post relief request again.

**You Have to
Wait 3 Days to
Post Another
Relief Request!**



Query



Relief

SUBMIT



News Feed



Anonymous

Today, 04:16 PM

I am in need of relief please help. You can contact me by pressing the bottom right button of this post. Thank you.



Contact



Anonymous

Today, 03:30 AM

This is a relief request!



Contact



Omio Islam

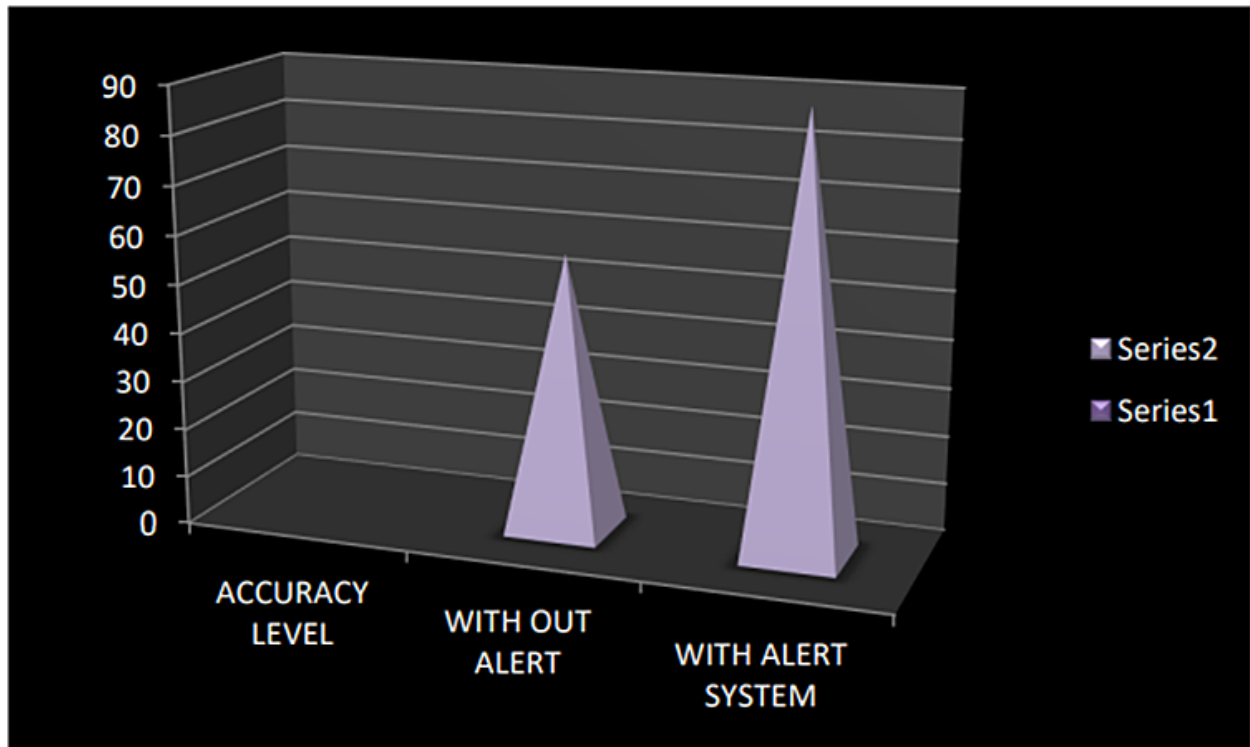
Today, 03:29 AM

Query Post!



9. RESULTS

a. Performance Metrics



10. ADVANTAGES & DISADVANTAGES

ADVANTAGE:

- Reduce the time.
- User can search the information very fast.
- Workload and manpower is reduced.
- Report generating is very fast.

DISADVANTAGE:

- The existing system is manual.
- The manual system is more error prone.
- Immediate response to the queries is difficult and time consuming.
- Difficult to maintain record and more paper work is required.
- It is not comfortable for user.

11. CONCLUSION

The programme offers customers an effective way to view the designated Covid-19 containment zones on a system. This developed application can be used as a tool to increase social awareness among the public in light of the worrisome rise of Covid-19 impacted patients around the world. The location of the user is also tracked by this application, which determines if it is among the designated containment zones. On entry, it notifies the user separately via alerts. The created Web application also extracts Number of the intruder in the containment zones, which might help the local police trace and identify persons who repeatedly enter the containment zones without permission. By doing so, this programme identifies the containment zones and emphasises the importance of taking further precautions to resist COVID-19. The application has undergone extensive testing and has shown to produce reliable results.

12. FUTURE SCOPE

The scope of the project is the system on which the software is installed, i.e. the project is developed as a desktop application, and it will work for a particular institute. But later on the project can be modified to operate it Containment Zone Application. In future we can develop this project in android application.

13. APPENDIX

GIT-HUB REPOSITORY LINK:

<https://github.com/IBM-EPBL/IBM-Project-42728-1660707986>