

**PROJECT REPORT ON**  
**“CONTAINMENT ZONE ALERTING APPLICATION”**

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**NH 48, MGR NAGAR,NATRAMPALI**  
**PINCODE-635854**

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# **1.INTRODUCTION**

An Android application that can inform people about the Covid-19 containment zones and prevent them from entering them. This Android app updates the locations of the areas in a Google map that have been identified as containment zones. The app also alerts users when they enter a containment zone and uploads the user's information to an online database. Many Google tools and APIs, such as Firebase and Geofencing API, are used in this application to achieve all of these functionalities. As a result, this application can be used to raise further social awareness about the need for precautionary measures to be taken by the people.

## **1.2 PURPOSE**

We focus on developing a mobile-based application to provide information about the Covid-19 containment zones in in this paper. The application also tracks the user's location and sends an alert if the user enters a containment zone. The application also provides users with daily Covid-19 case survey data to keep them up to date. The application is built with the Android SDK and stores location data in the Firebase Cloud Firestore. The geofencing client for Android is used to create geofences around containment zones, and the notification manager is used to provide notifications. Users can view the location of the containment zones via the Android application. It also alerts the user when he or she crosses the boundary of a containment zone or remains within it.

## 2.LITERATURE SURVEY

S.No	TITLE	PURPOSED WORK	APPARATUS/ ALGORITHM	TECHNOLOGY	MERITS & DEMERITS
1	Development of an Android Application for Viewing Covid-19 Containment Zones and Monitoring Violators Who are Trespassing into it using Firebase and Geofencing.	The primary goals of this project are to notify users whenever they enter a containment zone, update the position of the area on a Google map, alert users when they do, and upload the user's IMEI number to an online database..	1. Geofencing API 2. Firebase API 3. Location Tracking 4. IMEI Number 5. Android SDK	Cloud Technology	This application can be used as a tool for creating further social awareness about the arising need of precautionary to be taken by the people of India
2	Application for Covid-19 Real Time Counter.	Efficient way of showing the identified Covid-19 containment zone. Further more lie maritime and forest safety to prevent user from entering restricted areas.	<ul style="list-style-type: none"> <li>Time Series Analysis.</li> <li>Location Tracking</li> </ul>	<ul style="list-style-type: none"> <li>Cloud Technology</li> </ul>	The Application can include various government organization to help act faster.

S.NO	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
3	Aarogya Setu (COVID-19).	In this study, a methodology is given for displaying current Covid statistics..	<ul style="list-style-type: none"> <li>Bluetooth</li> <li>GPS</li> <li>Digital ID</li> </ul>	<ul style="list-style-type: none"> <li>Cloud Technology</li> </ul>	At a time user can see Covid-19 total cases, active cases and discharge cases.
4	Tracking the Covid Zone through Geo-fencing technique. - JULY 10 2020	In order to track the Covid Zones and improve and tighten security measures, this study will provide a methodology..	<ul style="list-style-type: none"> <li>Bluetooth Based Application.</li> <li>DRDO Netra.</li> <li>National Intelligence Grid(NATGRID).</li> </ul>	<ul style="list-style-type: none"> <li>Mobile Network</li> <li>Cloud Technology</li> </ul>	The major issue with those Bluetooth based application is that tracking can be done only if the enabled the Bluetooth option.

S.No	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
5	A Compact Wearable - IOT(W-IOT) system for Health Safety and Protection of Outgoers in the Post-Lockdown World(COVID-19 Lifeguard).	The primary emphasis of this work is an IOT-based health monitoring system that uses a variety of sensors to measure bodily parameters and issues alerts in case of emergencies..	<ul style="list-style-type: none"> <li>• Spo2 detector.</li> <li>• GPS</li> <li>• Bluetooth Module</li> <li>• GSM Modem</li> </ul>	<ul style="list-style-type: none"> <li>• IOT Technology</li> </ul>	The body temperature, heart rate, and oxygen saturation levels have to be monitored regularly.
6	Evaluating how smartphone contact tracing technology can reduce the spread of infectious diseases(COVID-19).	This essay argues that managing epidemics depends on being able to identify and stop the spread of infectious disorders like Covid-19.	<ul style="list-style-type: none"> <li>• Epidemic Model</li> <li>• Web Scrapping</li> <li>• Opportunistic Network(OPP NET)</li> <li>• Web scrapping</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile Computing</li> </ul>	Accurate technologies such as Bluetooth allow for greater selectivity when it comes to quarantining people.

## 2.1 EXISTING PROBLEM

According to the survey, several apps have been developed in the country to battle and contain COVID-19. Most states in our country have their own apps with specific features and functionality to assist their citizens in stopping the spread of COVID-19, obtaining medical assistance during a crisis, raising awareness, and understanding safety precautions.

## 2.2 REFERENCES

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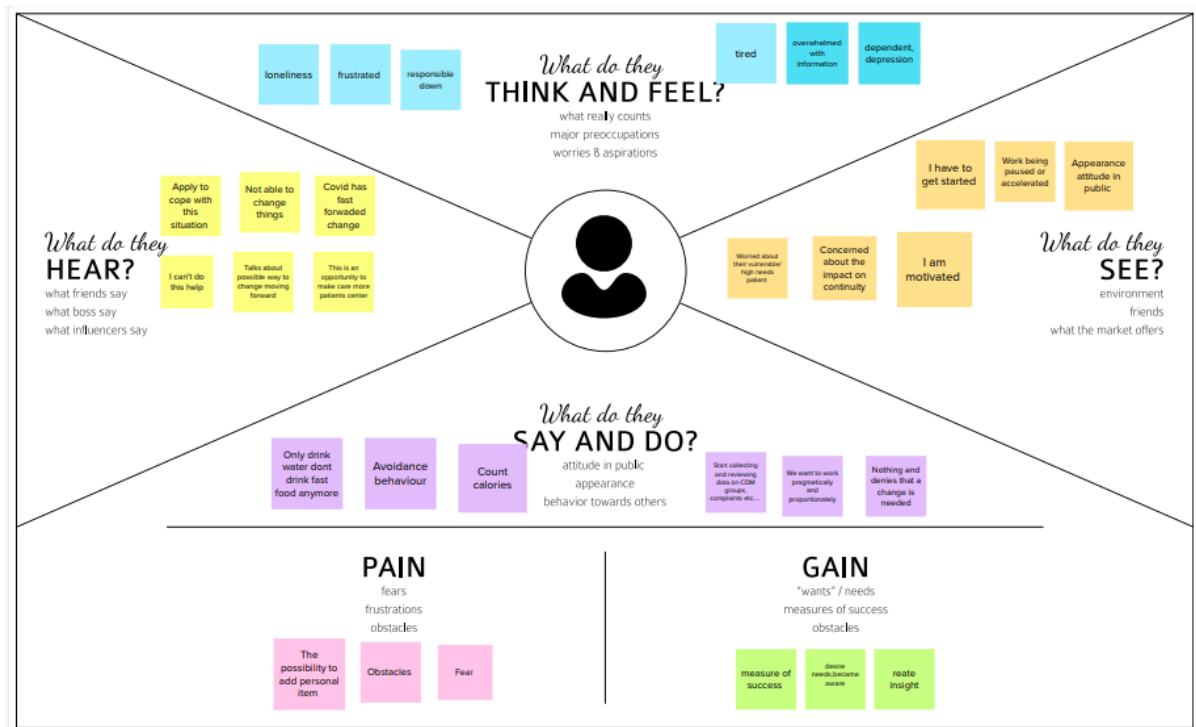
## **2.3 PROBLEM STATEMENT**

- ❖ Many users have found this app buggy and had reported with login issues.
- ❖ COVID Symptom Tracker App also falls short of being incredibly helpful to scientists and data analysts.
- ❖ This apps seems inadequate to find out symptoms in the patients who were affected by Coronavirus earlier and recovered later.

## **3.IDEATION & PROPOSED SOLUTION**

Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brainwriting, Worst Possible Idea, and a wealth of other ideation techniques. Ideation is also the third stage in the Design Thinking process. Proposed Solution means the technical solution to be provided by the Implementation agency in response to the requirements and the objectives of the Project.

## 3.1 Empathy Map Canvas




## 3.2 IDEATION & BRAINSTROMING





### 3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Statistics data from RESTful API.Data snapshot from firebase for new data or data snapshot from cache. Containment zones shown on a google map and covid 19 statistics on a bottom sheet. User receives notification on entering a containment zone.
2.	Idea / Solution description	1.Retrieving diagnosis 2.Retrieving Exposure configuration 3.Segmentation 4.Protocol documentation 5.Classification 6.Contributing
3.	Novelty / Uniqueness	1.Android application updates location of areas which are identified to be the containment zone. 2.Application further extract the IMEI number of the trespasser and upload to the online data base. 3.The application prompt background location service permission and if granted the geo fences get trigged even in application is not open in foreground.
4.	Social Impact / Customer Satisfaction	1.Medical Drone deliveries 2. Situational awareness lockdown curfew enforcement. 3.Broadcasting useful information.
5.	Business Model (Revenue Model)	 <pre> graph LR     MobileApp[Mobile APP] -- API --&gt; LocationParam[Location parameter]     LocationParam --&gt; HostedApp[Hosted Application]     subgraph HostedApp         Application[Application]         ServiceApp[Service Application]     end     ServiceApp --&gt; MySQL[MySQL Database]     MySQL --&gt; HostedApp     HostedApp -- "Email notification is sent if entered to containment zone" --&gt; SendGrid[SendGrid] </pre> <p>Store the location details, containment zones, update containment zones</p>
6.	Scalability of the Solution	The produce the vaccination scenarios and quantity the under reporting impact.Record identification Databases(n=380)Other source(n=10).Duplicate removed before record moved for reasons(n=14).

### 3.4 PROBLEM SOLUTION FIT

<b>Who is your customer?</b> 1.Users in the world. 2.Hospital check processing.	<b>Explore limitation to buy</b> 1.Litrarure search was conducted with a limited number of bibliographic	<b>Different from competitors</b> 1.Installation and ease of usability. -
<b>Focus on problem</b> 1.Understand the relevant information to be useful for user.	<b>Cause of problem</b> 1.Unrealistic expection unrelable estimate, internal issue.	<b>Existing behaviour</b> 1.System architect that aims to revolution's methods for synthesing evedence in real time and generate new insite.
<b>Design triggers</b> 1.Identifying evaluating creteria for evaluating and selecting the generator solution.	<b>Solution guess</b> 1.Monitoring,detection,da ta assessment, data analysis, predication ,informing.	<b>Where our customer</b> 1.Public users 2.socio healthcare centers.
<b>Adding emotions</b> 1.Anxiety, affective empathy, acceptance of lockdown, distress, depression.		

## 4.REQUIREMENT ANALYSIS

### 4.1 FUCTIONAL REQUIREMENTS

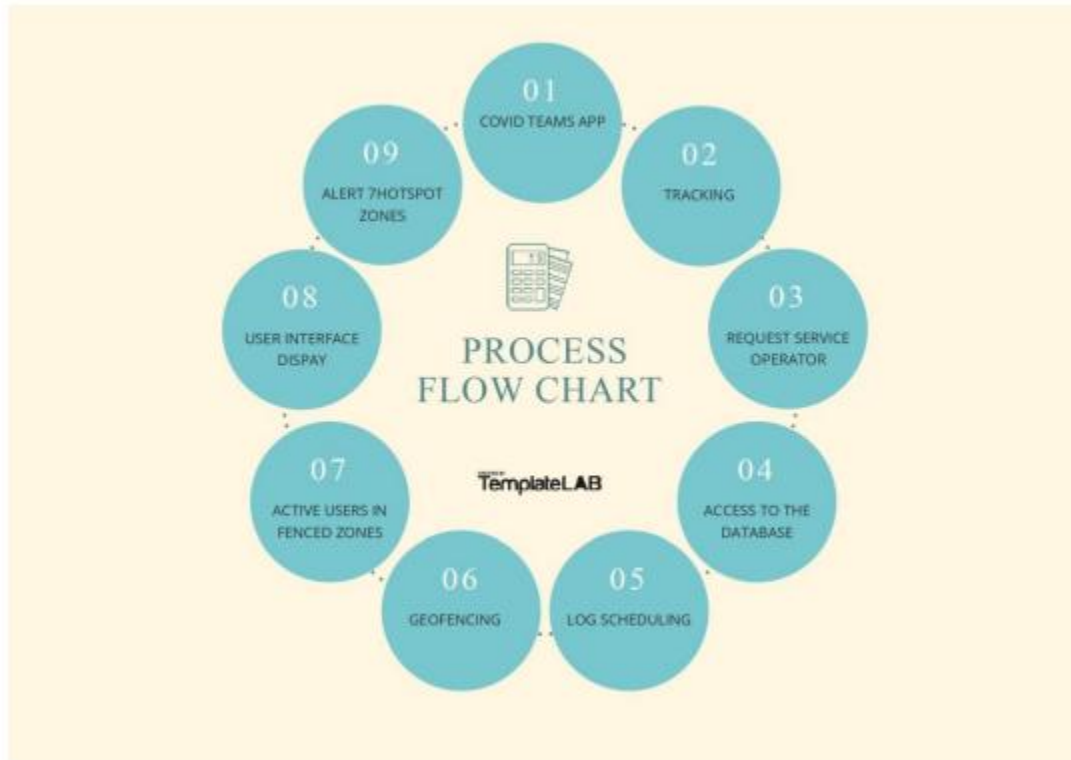
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Users can sign up using their email address or existing phone number.
FR-2	User Confirmation	Confirmation can be completed by sending a verification code via email or using an OTP.
FR-3	Track the location	Utilizing the Google map API, track the intruders and update the areas marked as containment zones on the Google map.
FR-4	Affected areas are shown	Geo fence serves as a warning for trespassers, and containment zones were labeled using zone colours.
FR-5	Alert notification	If the user enters the containment zone, a notification or message will be sent by tracking their location using GPS.

### 4.2 NON-FUNCTIONAL REQUIREMENTS

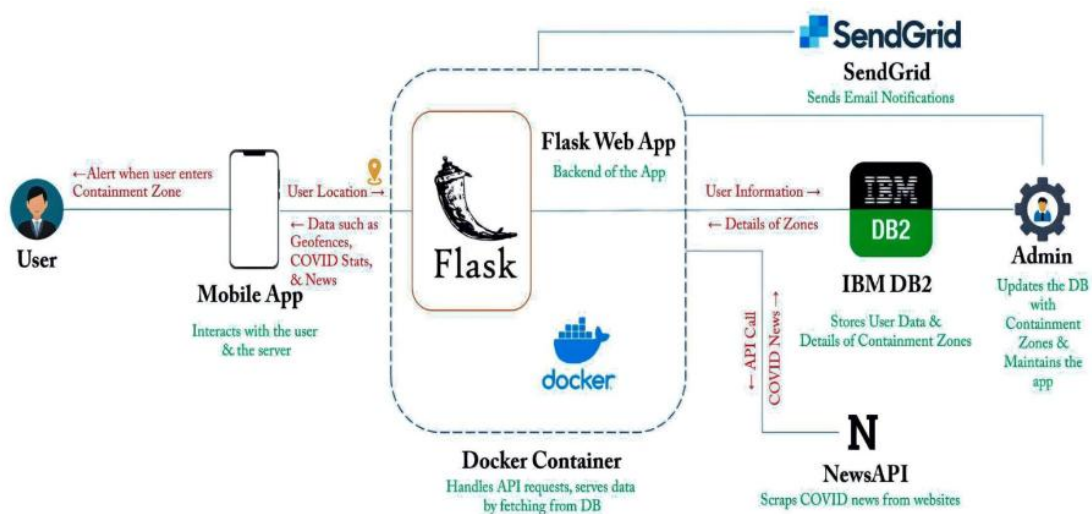
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The COVID-19 investigative process is more effective and thorough because to the user interface, which is particularly easy to use when compared to other interfaces.
NFR-2	Security	The user's data will be secured.
NFR-3	Reliability	The user may travel securely and rely on the information provided by the programme..
NFR-4	Performance	The Geofencing and GPS technologies can be used to produce the most suitable results.
NFR-5	Scalability	It is possible to access this application from anywhere, and the zone information is accurate.

## 5.PROJECT DESIGN

### 5.1 DATAFLOW DIAGRAM



### 5.2 SOLUTION & TECHNICAL ARCHITECTURE



## 5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (covid team app)	Registration	USN-1	As a user, I can register for the application by entering my email address, password, and password confirmation..	I can access my account/dashboard	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the application.	I can receive a confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook.	I can register & access the dashboard with Facebook Login	Low	Sprint-4
		USN-4	As a user, I can register for the application through Gmail.	I can register & access the dashboard with Google Login	Medium	Sprint-1
	Login	USN-5	As a user, I can register for the application through Twitter.	I can register & access the dashboard with Twitter Login	Low	Sprint 4
		USN-6	As a user, I can log into the application by entering my email & password	I can access it whenever I want its access.	High	Sprint-1
	Dashboard	USN-7	As a user, I need to give permission to access My Contacts, Location, and Storage.	I get access to their services	High	Sprint-2
		USN-8	As a user, I get access to the dashboard which shows a map with marked zones	I can see the zone information on the dashboard.	high	Sprint-2

Hospitals Administrator	Registration	USN-9	As a management, I need to register my hospitals on the site.	I can see the registered hospital in the hospital dashboard.	high	Sprint-1
	Login	USN-10	As a management, I need to login into my dashboard with my given hospital id and password.	I can see my dashboard after login.	medium	Sprint-1
	Dashboard	USN-11	As a management, I need to enter the case information of the patient that visits our hospital.	I can view the patient information on the dashboard.	high	Sprint-2
		USN-12	As a management, I need to store all the patient information on the cloud	-	high	Sprint-3
Administrator	Services	USN-13	As an admin, I need to provide valid information about the pandemic out there.	I can get the pandemic updates out there.	high	Sprint-2
		USN-14	As an admin, I need to provide medical advice through a chatbot.	I get medicinal recommendations through a chatbot.	medium	Sprint-3
		USN-15	As an admin, I need to provide medical recommendations by collaborating with top hospitals.	I get medical instruction through chief doctors.	low	Sprint-3
		USN-16	As an admin, I need to alert the user when they enter pandemic zones.	I got a notification when I am in the pandemic area.	Medium	Sprint-4
		USN-17	As an admin, I need to provide preventive measures when they travel through it.	I got a remedies notification when I am in the pandemic area.	high	Sprint-3
		USN18	As an admin, I need to provide special services for premium users by giving services like monitoring health by their smart bands.	I was treated special after becoming a premium member.	low	Sprint 4
	Data collections	USN-18	As an admin, I need to store all the user information on the cloud	I can access my information when I needed	Medium	Sprint-4

## 6.PROJECT PLANNING & SCHEDULING

'Project planning' is fundamentally about choosing and developing effective policies and methodologies to achieve project goals. While 'project scheduling' is a procedure for assigning tasks and completing them by allocating appropriate resources within an estimated budget and time frame.

### 6.1 SPRINT PLANNING & ESTIMATION

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc.	19 OCTOBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements	18 OCTOBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	18 OCTOBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	18 OCTOBER 2022
Problem Solution Fit	Prepare problem - solution fit document.	18 OCTOBER 2022

<b>Solution Architecture</b>	Prepare solution architecture document.	15 OCTOBER 2022
<b>Customer Journey</b>	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	24 OCTOBER 2022
<b>Functional Requirement</b>	Prepare the functional requirement document.	22 OCTOBER 2022
<b>Data Flow Diagrams</b>	Draw the data flow diagrams and submit for review.	26 OCTOBER 2022
<b>Technology Architecture</b>	Prepare the technology architecture diagram.	22 OCTOBER 2022
<b>Prepare Milestone &amp; Activity List</b>	Prepare the milestones & activity list of the project.	31 OCTOBER 2022
<b>Project Development - Delivery of Sprint-1, 2, 3 &amp; 4</b>	Develop & submit the developed code by testing it.	28 OCTOBER 2022



## 6.2 SPRINT DELIVERY SCHEDULE

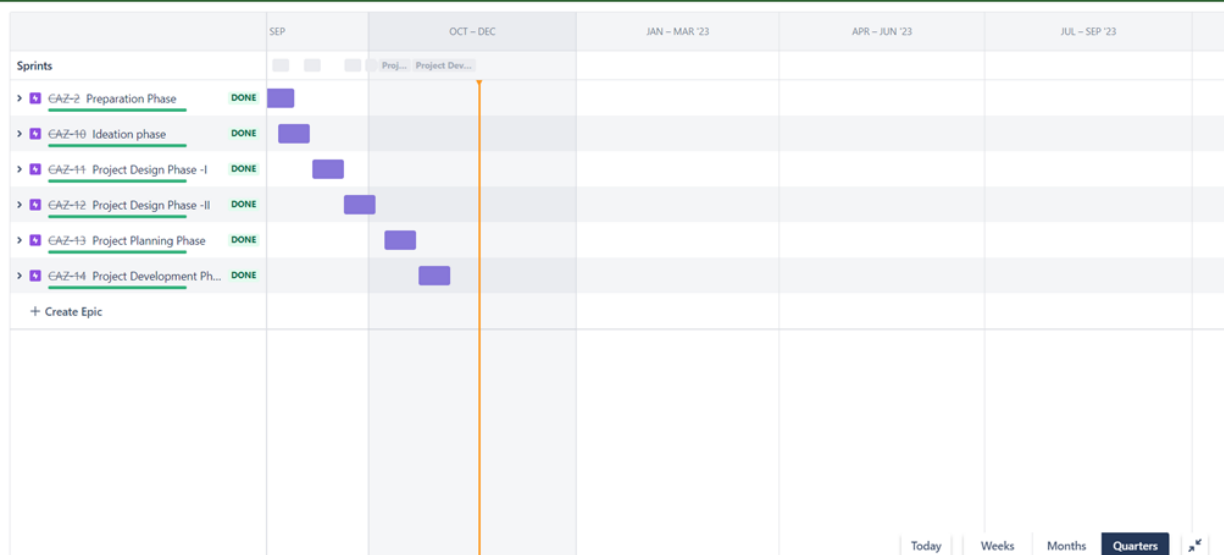
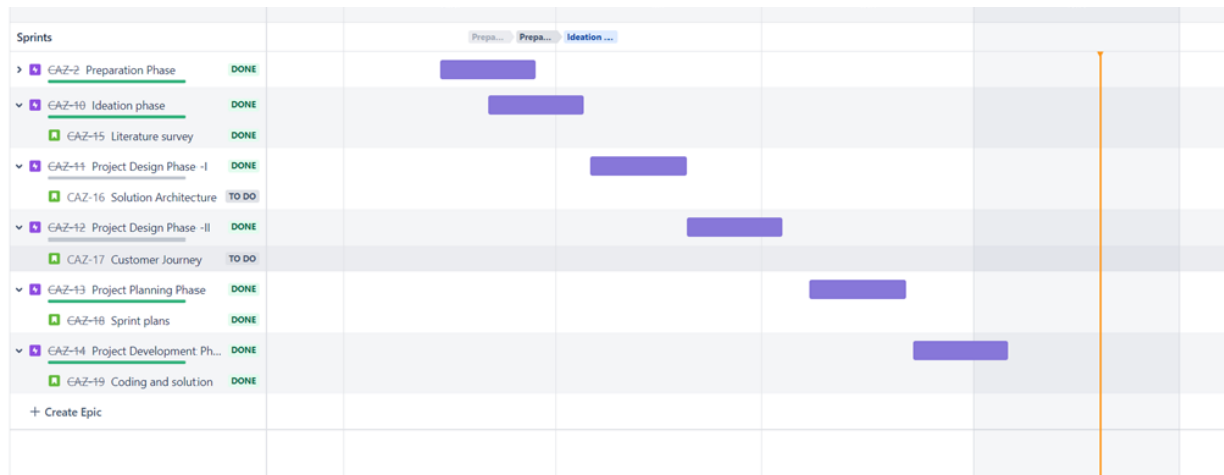
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	User: I can register for the application by entering my email, password and verifying password.	3	High	Ruchitha
		USN-2	User: I will receive a confirmation email once I have registered for the application.	2	High	Rubasri
		USN-3	User: I can register for the application through Gmail.	5	Medium	Preethi
		USN-4	Management: I need to register my hospitals on the site.	2	High	Gopika
		USN-5	User: I can log into the application by entering my email & password	3	High	Ruchitha
	Login	USN-6	Management: I need to login into my dashboard with my given hospital id and password.	5	Medium	Preethi
	Dashboard	USN-7	User: I need to give permission to access my Contacts, Location, and Storage	5	High	Ruchitha

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		USN-8	User: I get access to the dashboard which shows a map with containment zones	5	High	Gopika
		USN-9	Management: I need to enter the case information of the patient that visits our hospital.	5	High	Rubasri
	Services	USN-10	Admin: I need to provide valid information about the pandemic out there.	5	High	Preethi
Sprint-3	Dashboard	USN-11	Management: I need to store all the patient information on the cloud.	5	High	Ruchitha
	Services	USN-12	Admin: I need to provide medical advice through a chatbot.	5	Medium	Gopika
		USN-13	Admin: I need to provide medical recommendations by collaborating with top hospitals.	5	Low	Rubasri
		USN-14	Admin: I need to provide preventive measures when they travel through it.	5	High	Preethi
	Registration	USN-15	User: I can register for the application through Facebook.	2	Low	Gopika
Sprint-4	Services	USN-16	User: I can register for the application through Twitter.	2	Low	Rubasri
		USN-17	Admin: I need to alert the user when they enter pandemic zones.	3	Medium	Ruchitha
		USN-18	Admin: I need to provide special services for premium users by giving services like monitoring health by their smart bands.	3	Low	Gopika
	Data Collection	USN-19	Admin: I need to store all the user information on the cloud	5	Medium	Ruchitha

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
		USN-20	Admin: I need to collect the recent list of diseases in the world.	5	Low	Preethi



## 6.3 REPORTS FROM JIRA



## 7.CODING & SOLUTIONING

### 7.1 FEATURE 1

To track the Covid zones, to enhance and tighten the security measures. A firebase 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.

#### Add permissions in firebase

This permission allows the application to connect to the internet and save data.

```
<uses-permission android:name="android.permission.INTERNET"/>
```

Add the Google Maps location dependency.

```
implementation 'com.google.android.gms:play-services-location:17.0.0'
```

#### MapsActivity.kt

```
class MapsActivity : AppCompatActivity(), OnMapReadyCallback {

    private lateinit var map: GoogleMap

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_maps)
        // Obtain the SupportMapFragment and get notified when the map is ready
        to be used.
        val mapFragment = supportFragmentManager
            .findFragmentById(R.id.map) as SupportMapFragment
        mapFragment.getMapAsync(this)
        setupLocClient()
    }

    private lateinit var fusedLocClient: FusedLocationProviderClient
    // use it to request location updates and get the latest location

    override fun onMapReady(googleMap: GoogleMap) {
        map = googleMap //initialise map
    }
}
```

```

        getCurrentLocation()
    }
    private fun setupLocClient() {
        fusedLocClient =
            LocationServices.getFusedLocationProviderClient(this)
    }

    // prompt the user to grant/deny access
    private fun requestLocPermissions() {
        ActivityCompat.requestPermissions(this,
            arrayOf(Manifest.permission.ACCESS_FINE_LOCATION),
            //permission in the manifest
            REQUEST_LOCATION)
    }

    companion object {
        private const val REQUEST_LOCATION = 1 //request code to identify
        specific permission request
        private const val TAG = "MapsActivity" // for debugging
    }

    private fun getCurrentLocation() {
        // Check if the ACCESS_FINE_LOCATION permission was granted
        before requesting a location
        if (ActivityCompat.checkSelfPermission(this,
            Manifest.permission.ACCESS_FINE_LOCATION) !=
            PackageManager.PERMISSION_GRANTED) {

            // call requestLocPermissions() if permission isn't granted
            requestLocPermissions()
        } else {

            fusedLocClient.lastLocation.addOnCompleteListener {
                // lastLocation is a task running in the background
                val location = it.result //obtain location
                //reference to the database
                val database: FirebaseDatabase = FirebaseDatabase.getInstance()
                val ref: DatabaseReference = database.getReference("test")
                if (location != null) {

                    val latLng = LatLng(location.latitude, location.longitude)
                    // create a marker at the exact location
                    map.addMarker(MarkerOptions().position(latLng)

```

```

        .title("You are currently here!"))
    // create an object that will specify how the camera will be updated
    val update = CameraUpdateFactory.newLatLngZoom(latLng,
16.0f)

    map.moveCamera(update)
    //Save the location data to the database
    ref.setValue(location)
} else {
    // if location is null , log an error message
    Log.e(TAG, "No location found")
}

}
}
}

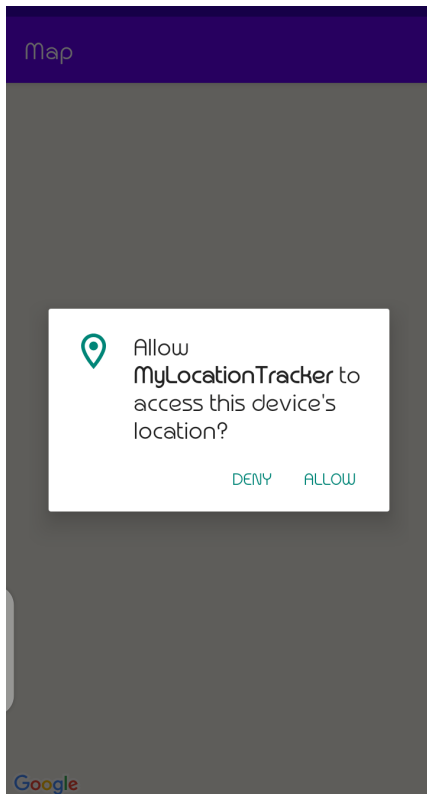
```

```

override fun onRequestPermissionsResult(
    requestCode: Int,
    permissions: Array<String>,
    grantResults: IntArray) {
    //check if the request code matches the REQUEST_LOCATION
    if (requestCode == REQUEST_LOCATION)
    {
        //check if grantResults contains PERMISSION_GRANTED.If it does,
call getCurrentLocation()
        if (grantResults.size == 1 && grantResults[0] ==
            PackageManager.PERMISSION_GRANTED) {
            getCurrentLocation()
        } else {
            //if it doesn't log an error message
            Log.e(TAG, "Location permission has been denied")
        }
    }
}

```

## RUN THE APP

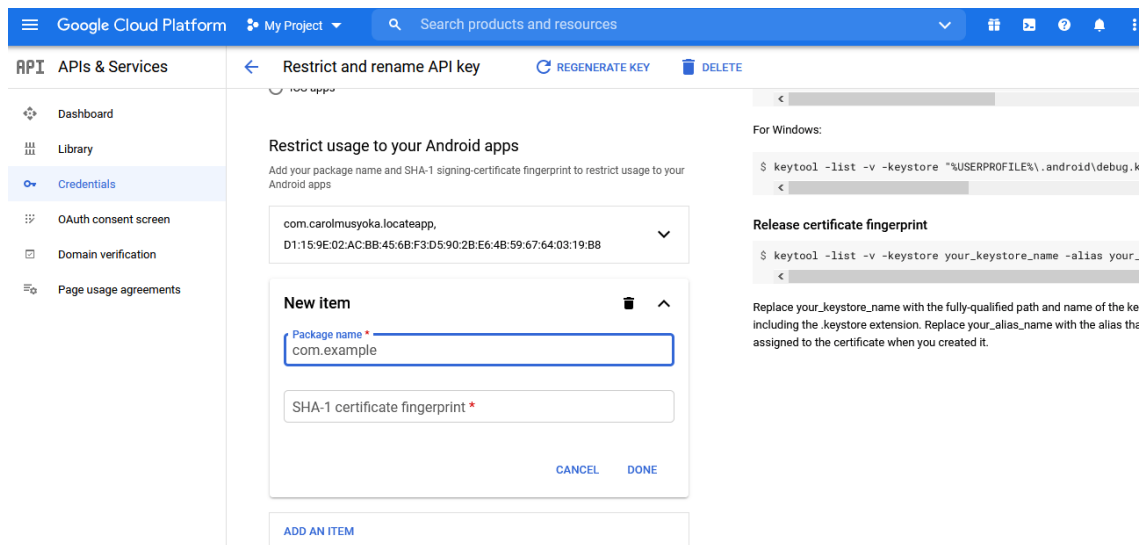


# Map

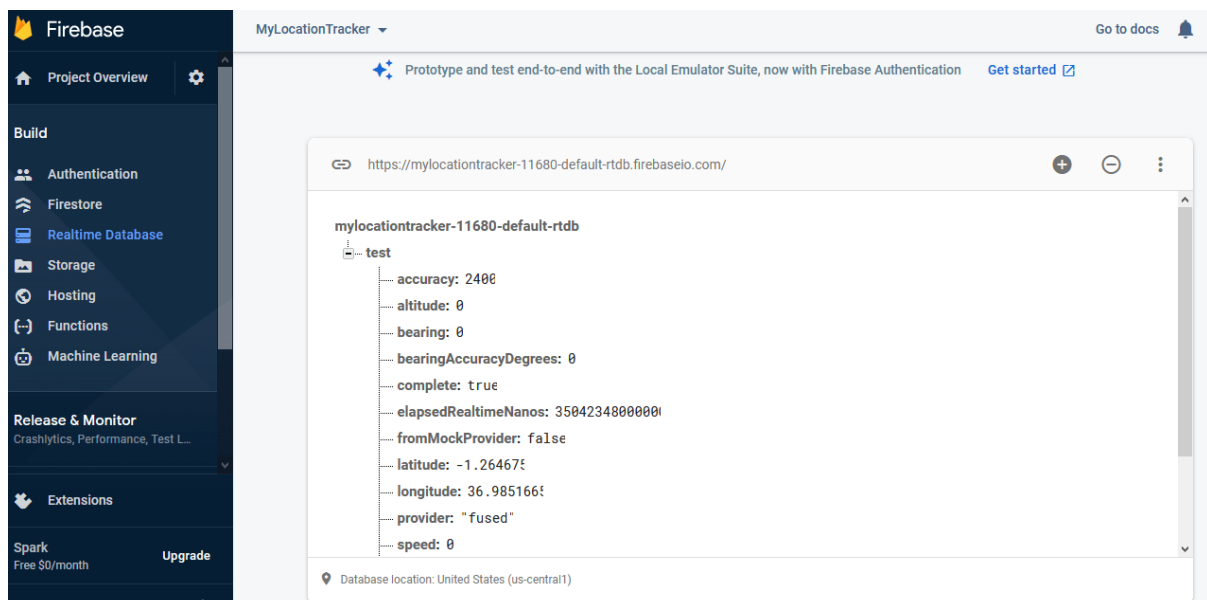


## FEATURE-2

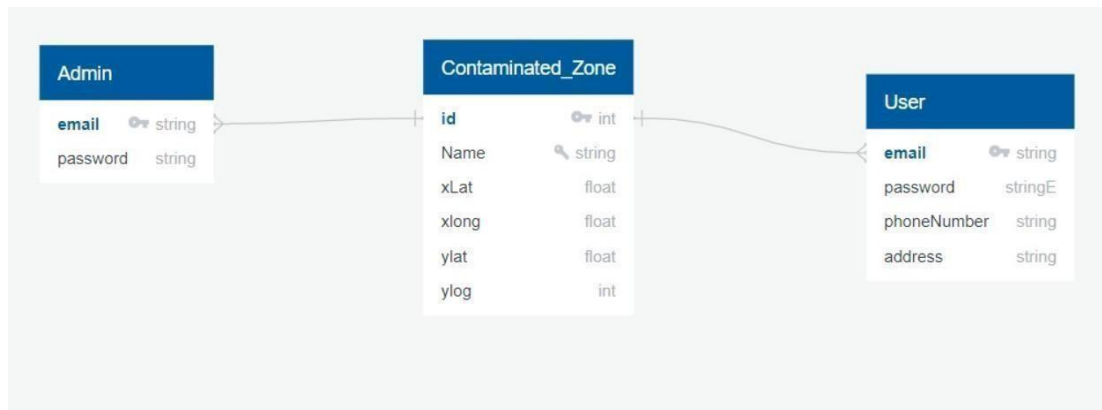
User uploads locally stored tracked locations and home address after testing positive for COVID-19. These locations are stored in cloud storage. Note that, no other user information except the locations are accessible by other users.



## DATABASE CONNECTION



## 7.3 DATABASE SCHEMA



## 8.TESTING

Testing is finding out how well something works. Testing in Software Engineering is defined as an activity to check whether the actual results match the expected results.

### 8.1 TEST CASES

A test case includes information such as test steps, expected results and data while a test scenario only includes the functionality to be tested.

1. Login button click with wrong credentials entered.
2. Signup with already registered mail ID.
3. Signup with wrong form data entered.
4. Entering home page with logged out session.
5. Clicking home page buttons with logged out session.
6. Invalid data entered in change password page and requested for change in password.



## 8.2 USER ACCEPTANCE TESTING

User Acceptance Testing (UAT) is a process to check whether the system accepts a user's requirements.

User acceptance testing is the final testing stage in software development before production. It's used to get feedback from users who test the software and its user interface (UI). UAT is usually done manually, with users creating real-world situations and testing how the software reacts and performs.

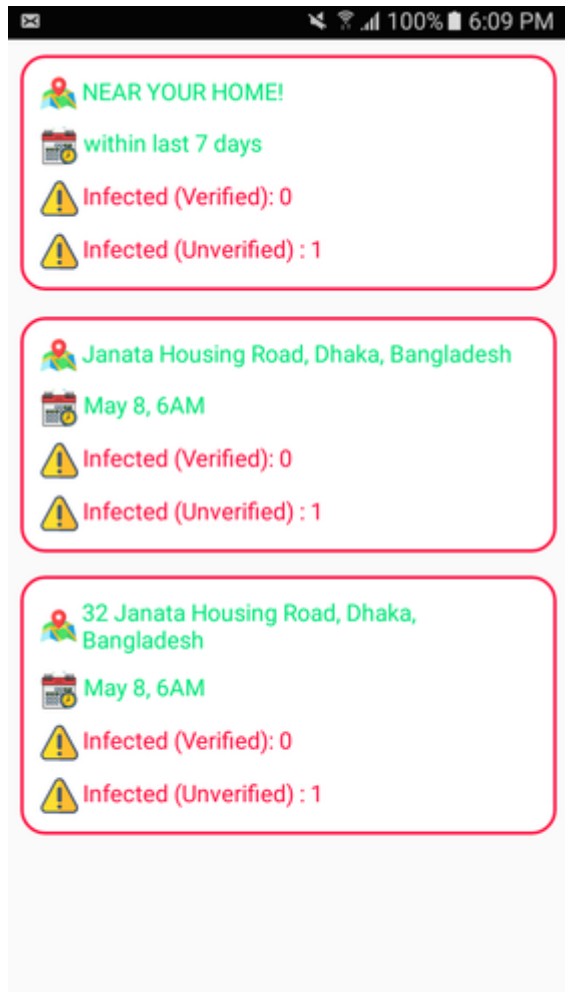
S.NO	TEST CASE	REQUIRED OUTPUT	RESULT OUTPUT	STATUS
1	Login button click with wrong credentials	Wrong credentials entered notification	Wrong credentials entered notification	ACCEPTED
2	Signup with already registered mail ID.	Email already registered notification	Email already registered notification	ACCEPTED
3	Signup with wrong form data entered.	Wrong credentials entered notification	Wrong credentials entered notification	ACCEPTED
4	Entering home page with logged out session.	Take user to login page	Take user to login page	ACCEPTED
5	Clicking home page buttons with logged out session.	Take user to login page	Take user to login page	ACCEPTED
6	Invalid data entered in change password page and requested for change in password.	Wrong form data entered notification	Wrong form data entered notification	ACCEPTED

Scenario	Test Step	Expected Result	Actual Outcome
Verify that the input field that can accept maximum of 10 characters	Login to application and key in 10 characters	Application should be able to accept all 10 characters.	Application accepts all 10 characters.
Verify that the input field that can accept maximum of 11 characters	Login to application and key in 11 characters	Application should NOT accept all 11 characters.	Application accepts all 10 characters.

## 9.RESULT

Result is an ideal result that the tester should get after the test case is performed. It's usually documented together with the test case. It's usually compared with actual result, and if the actual result differs from the expected one, the difference is documented and called a bug.

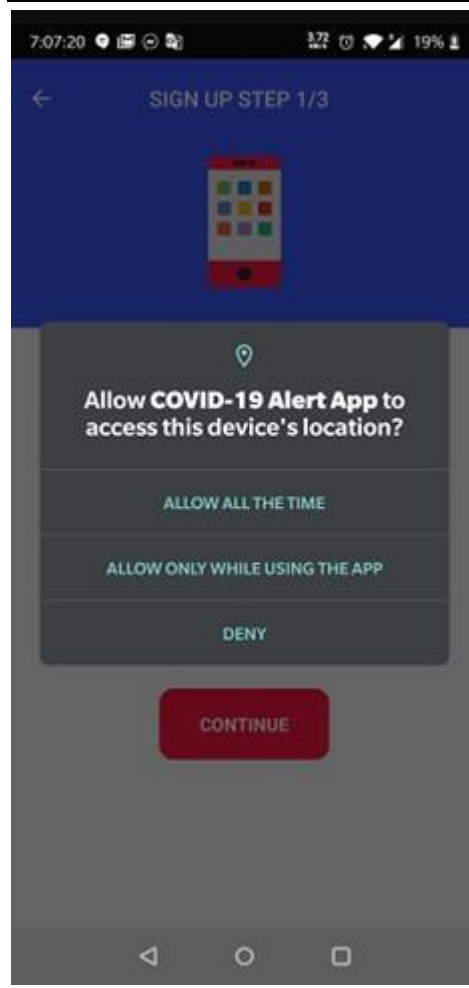
### Infected-locations



## map-boxed-area



## Permission for location access



## DB CONNECTION

2 on Cloud

Data objects | Saved objects

Filter objects

- GPZ48320
  - Tables
  - GEODATA
  - USERS
  - Views
  - MQTs
  - Aliases
  - Nicknames

History | Results | GEODATA

Result set 1

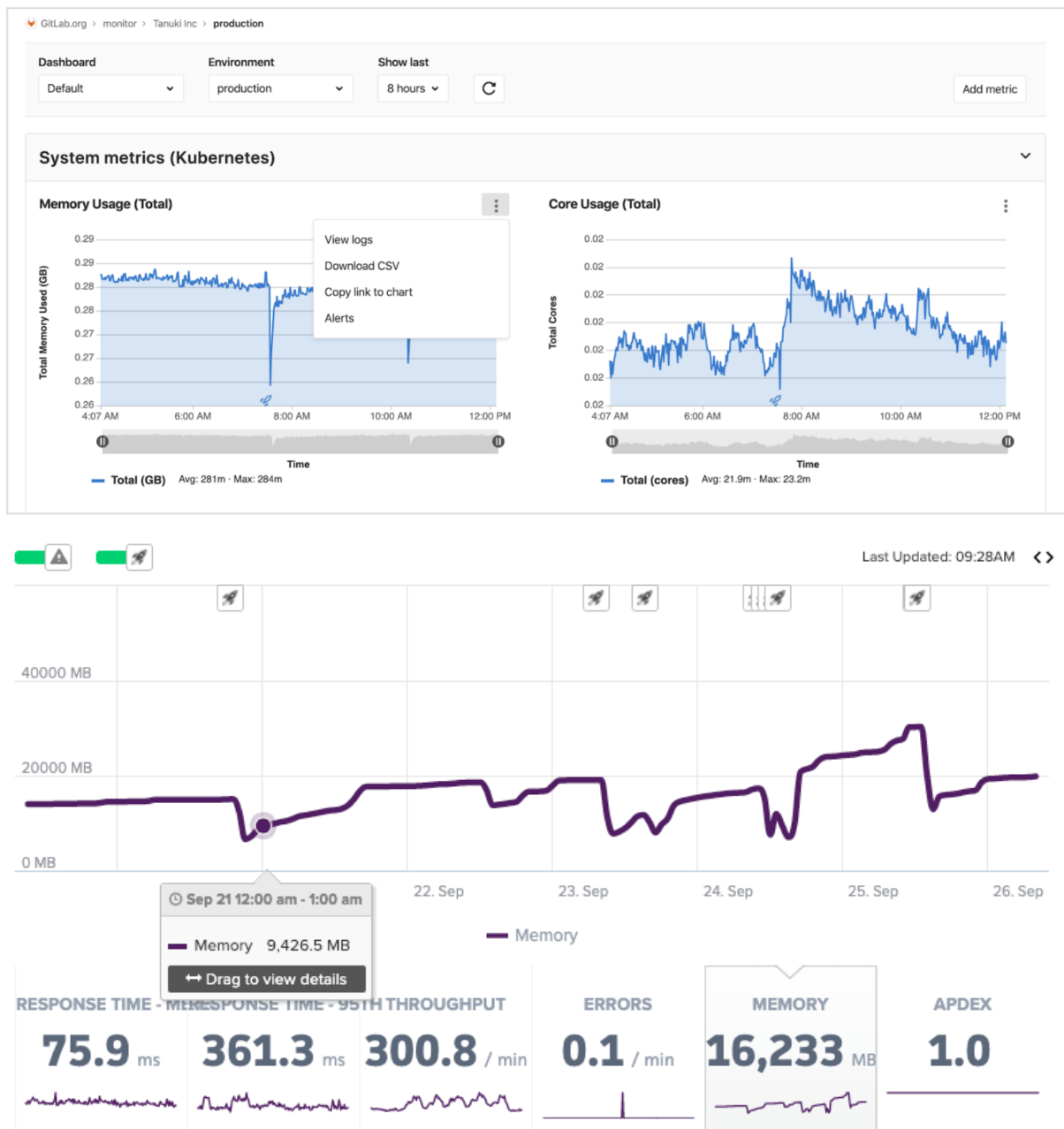
Filter table

LAT	LONG	VISITED
9.919071049449975	78.11084900839843	0
9.919071049449975	78.11084900839843	0
9.925454338240636	78.12059079154052	0
8.183853221617355	77.4111572359375	0
79.324724	77.234729384	234
89.3554	72.234229384	744

Total: 6

## 9.1 PERFORMANCE METRICES

The performance metrics definition refers to the measurement of behavior, activities, and overall performance of a business.



## **10.ADAVANTAGE & DISADVANTAGE**

### **ADVANTAGES**

- Users can know if they have been near a person suspected to be affected by COVID-19.
- It sends separate notification alerts to the user on entering.
- It is the easiest tool to predict COVID-19 Contaminant zones.
- Users will receive a real-time notification whenever they are in the same location as an infected user.
- Exposure notifications are delivered more effectively if the process is automatic. It makes sense – rather than having to call each person individually, an app may alert everyone that's been in close proximity to an infected person.

### **DISADVANTAGES**

There are some privacy concerns including: lack in privacy

- Access to personal information and geographical location.
- User's data exposure.
- Mostly regarding the centralisation vs. decentralisation of data. For the most part, though, academics agree that moving away from location-based contact tracing apps is essential for user privacy.

## **11.CONCLUSION**

This app is intended to alert people about containment zones in a specific region by continuously monitoring an individual's location. 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 the containment zones and notification manager is used to provide notifications. The application's key benefits include monitoring people's activity and alerting them to their safety movements. Through the app's global news feed, relief requests can be posted without directly sharing personal or family information 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

one relief post every seven days, this is a measure taken to stop misuse of the feature.

## 12.FUTURE SCOPE

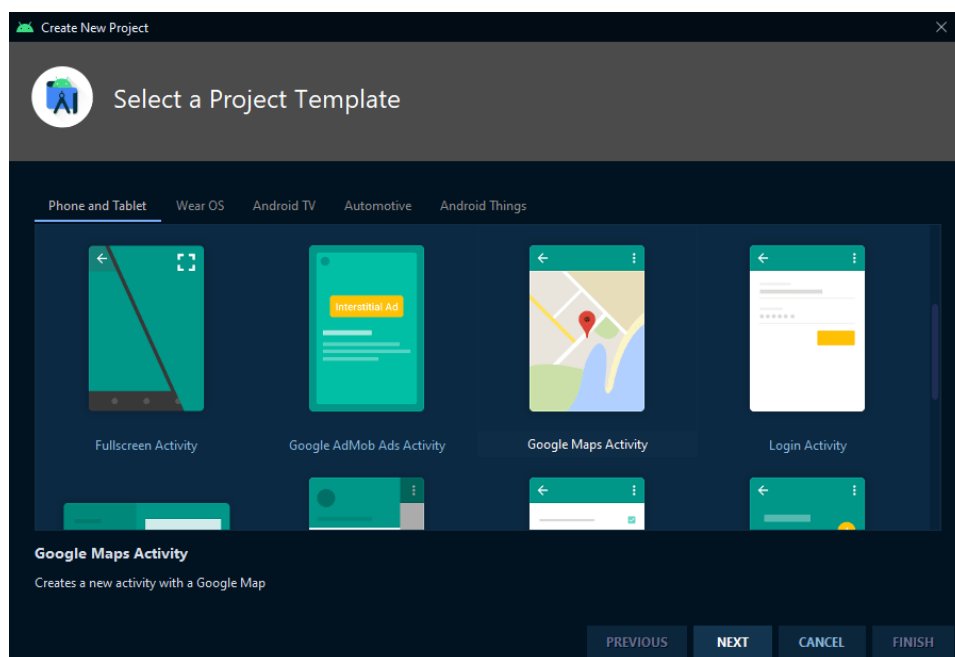
The application efficiently displays the identified Covid-19 containment zones to users in a Google map. With the alarming increase in Covid-19 affected cases around the world, this developed application can be used to raise social awareness among the general public. This application also monitors the user's location and determines whether it is in the list of identified containment zones. On entering, it sends the user separate notification alerts. The developed Android application also extracts the trespasser's email address in the containment zones, which can be used by to track and identify people who frequently trespass the containment zones. As a result, this application identifies the containment zones and emphasises the importance of taking additional precautionary measures to combat Covid-19. The application has been tested in several locations and has proven to produce accurate result.

## 9.APPENDIX

Creating a Location-tracking App using Firebase and Google Maps in Android.

### Step 1 - Creating a new project

Using thr google map template

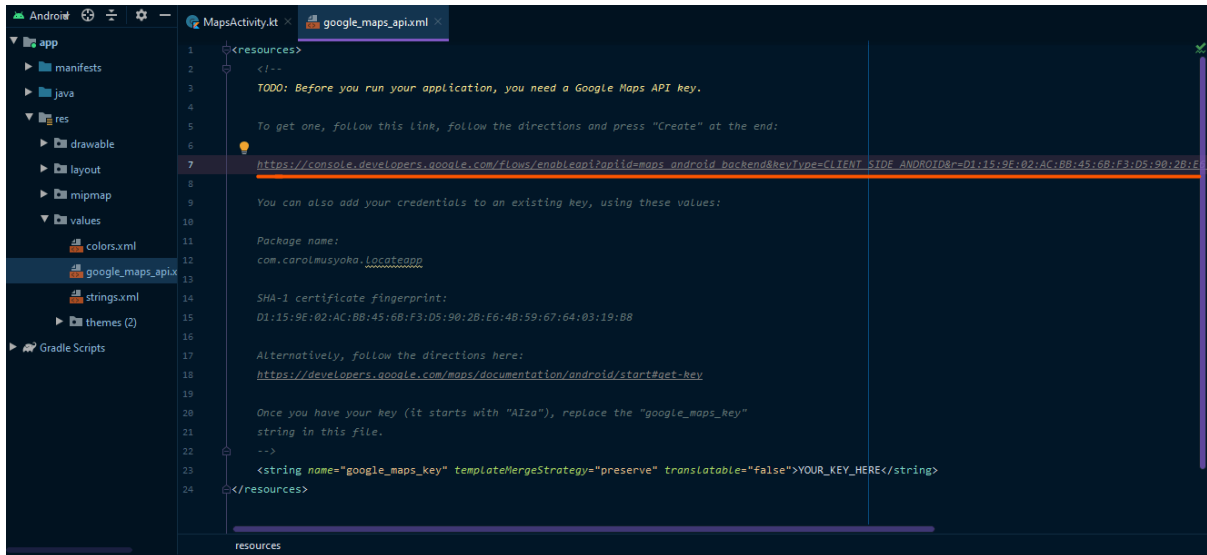


`com.google.android.geo.API_KEY` specifies the API key.

implementation '`com.google.android.gms:play-services-maps:17.0.0`'

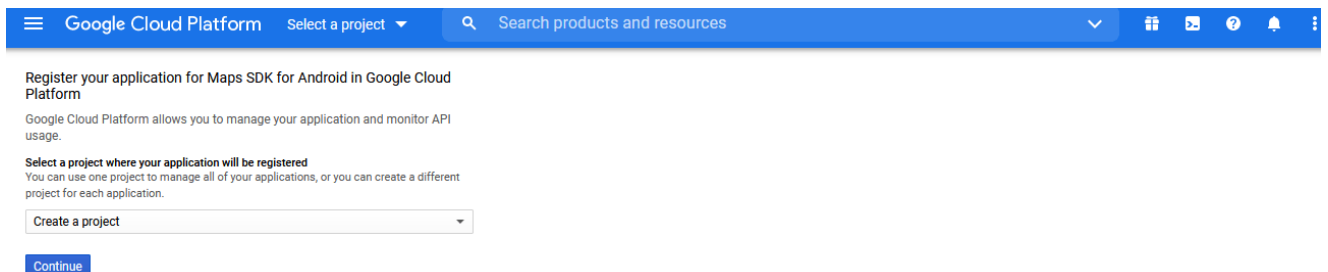
## Step-2 Create an API key

Open `res/values/google_maps_api.xml`.



```
1 <resources>
2 <!--
3  TODO: Before you run your application, you need a Google Maps API key.
4
5  To get one, follow this link, follow the directions and press "Create" at the end:
6
7  https://console.developers.google.com/flows/enablingapi?apiid=maps_android_backend&keyType=CLIENT_SIDE_ANDROID&r=D1:15:9E:02:AC:BB:45:6B:F3:D5:90:2B:E6:48:59:67:64:03:19:B8
8
9  You can also add your credentials to an existing key, using these values:
10
11  Package name:
12  com.carolmusyoka.locateapp
13
14  SHA-1 certificate fingerprint:
15  D1:15:9E:02:AC:BB:45:6B:F3:D5:90:2B:E6:48:59:67:64:03:19:B8
16
17  Alternatively, follow the directions here:
18  https://developers.google.com/maps/documentation/android/start#get-key
19
20  Once you have your key (it starts with "AIza"), replace the "google_maps_key"
21  string in this file.
22  -->
23  <string name="google_maps_key" templateMergeStrategy="preserve" translatable="false">YOUR_KEY_HERE</string>
24 </resources>
```

This file will contain your API key





## API key to call the API.

Google Cloud Platform Select a project Search products and resources

The API is enabled

The project has been created and Maps SDK for Android has been enabled.

Next, you'll need to create an API key in order to call the API.

Create API key

Google Cloud Platform My Project Search products and resources

APIs & Services

Credentials + CREATE CREDENTIALS DELETE

Create credentials to access your enabled APIs. [Learn more](#)

Remember to configure the OAuth consent screen with information about your application. [CONFIGURE CONSENT SCREEN](#)

API Keys

<input type="checkbox"/>	Name	Creation date ↓	Restrictions	Key		
<input type="checkbox"/>	API key 1	Apr 5, 2021	Android apps	AIzaSyCCVr...GHU101Pfa8		

OAuth 2.0 Client IDs

<input type="checkbox"/>	Name	Creation date ↓	Type	Client ID
No OAuth clients to display				

Service Accounts [Manage service accounts](#)

## Step 3 - Creating a Firebase project

Firestore

Go to docs

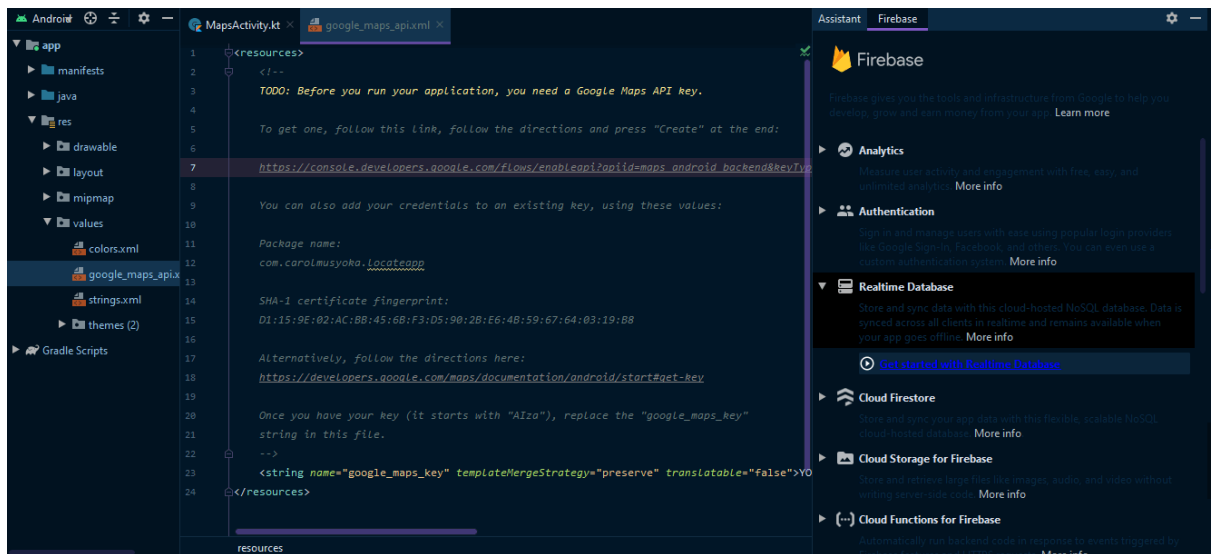
### Welcome to Firebase!

Tools from Google for building app infrastructure, improving app quality, and growing your business

Create a project View docs

## Step 4 - Connect the Firebase project to the app

- Go to tools>firebase



## Step 5 - Add permissions

- Add the internet permission.

This permission allows the application to connect to the internet and save data.

```
<uses-permission android:name="android.permission.INTERNET"/>
```

- Add the Google Maps location dependency.

```
implementation 'com.google.android.gms:play-services-location:17.0.0'
```

## Step 6 - The MapsActivity

### Navigate to MapsActivity.kt

```
class MapsActivity : AppCompatActivity(), OnMapReadyCallback {
```

```
    private lateinit var map: GoogleMap
```

```
    override fun onCreate(savedInstanceState: Bundle?) {
```

```
        super.onCreate(savedInstanceState)
```

```
        setContentView(R.layout.activity_maps)
```

```
        // Obtain the SupportMapFragment and get notified when the map is ready to be used.
```

```

        val mapFragment = supportFragmentManager
            .findFragmentById(R.id.map) as SupportMapFragment
        mapFragment.getMapAsync(this)
        setupLocClient()
    }

    private lateinit var fusedLocClient: FusedLocationProviderClient
    // use it to request location updates and get the latest location

    override fun onMapReady(googleMap: GoogleMap) {
        map = googleMap //initialise map
        getCurrentLocation()
    }
    private fun setupLocClient() {
        fusedLocClient =
            LocationServices.getFusedLocationProviderClient(this)
    }

    // prompt the user to grant/deny access
    private fun requestLocPermissions() {
        ActivityCompat.requestPermissions(this,
            arrayOf(Manifest.permission.ACCESS_FINE_LOCATION),
            //permission in the manifest
            REQUEST_LOCATION)
    }

    companion object {
        private const val REQUEST_LOCATION = 1 //request code to identify
        specific permission request
        private const val TAG = "MapsActivity" // for debugging
    }

    private fun getCurrentLocation() {
        // Check if the ACCESS_FINE_LOCATION permission was granted
        before requesting a location
        if (ActivityCompat.checkSelfPermission(this,
            Manifest.permission.ACCESS_FINE_LOCATION) !=
            PackageManager.PERMISSION_GRANTED) {

            // call requestLocPermissions() if permission isn't granted
            requestLocPermissions()
        } else {

```

```

fusedLocClient.lastLocation.addOnCompleteListener {
    // lastLocation is a task running in the background
    val location = it.result //obtain location
    //reference to the database
    val database: FirebaseDatabase = FirebaseDatabase.getInstance()
    val ref: DatabaseReference = database.getReference("test")
    if (location != null) {

        val latLng = LatLng(location.latitude, location.longitude)
        // create a marker at the exact location
        map.addMarker(MarkerOptions().position(latLng)
            .title("You are currently here!"))
        // create an object that will specify how the camera will be updated
        val update = CameraUpdateFactory.newLatLngZoom(latLng,

16.0f)

        map.moveCamera(update)
        //Save the location data to the database
        ref.setValue(location)
    } else {
        // if location is null , log an error message
        Log.e(TAG, "No location found")
    }

}
}
}

```

```

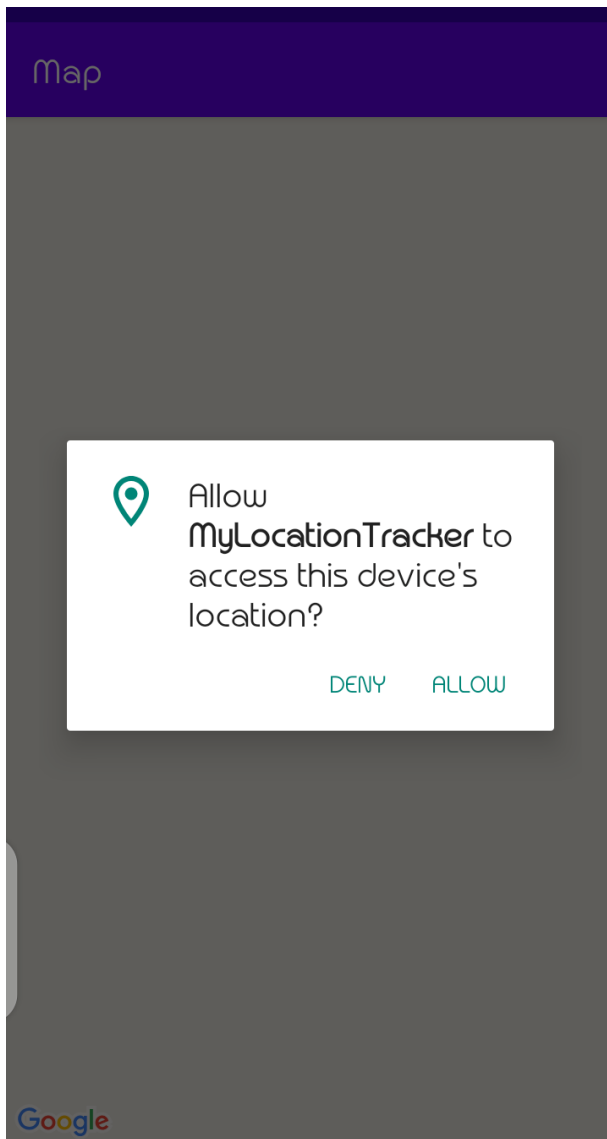
override fun onRequestPermissionsResult(
    requestCode: Int,
    permissions: Array<String>,
    grantResults: IntArray) {
    //check if the request code matches the REQUEST_LOCATION
    if (requestCode == REQUEST_LOCATION)
    {
        //check if grantResults contains PERMISSION_GRANTED.If it does,
        call getLocation()
        if (grantResults.size == 1 && grantResults[0] ==
            PackageManager.PERMISSION_GRANTED) {

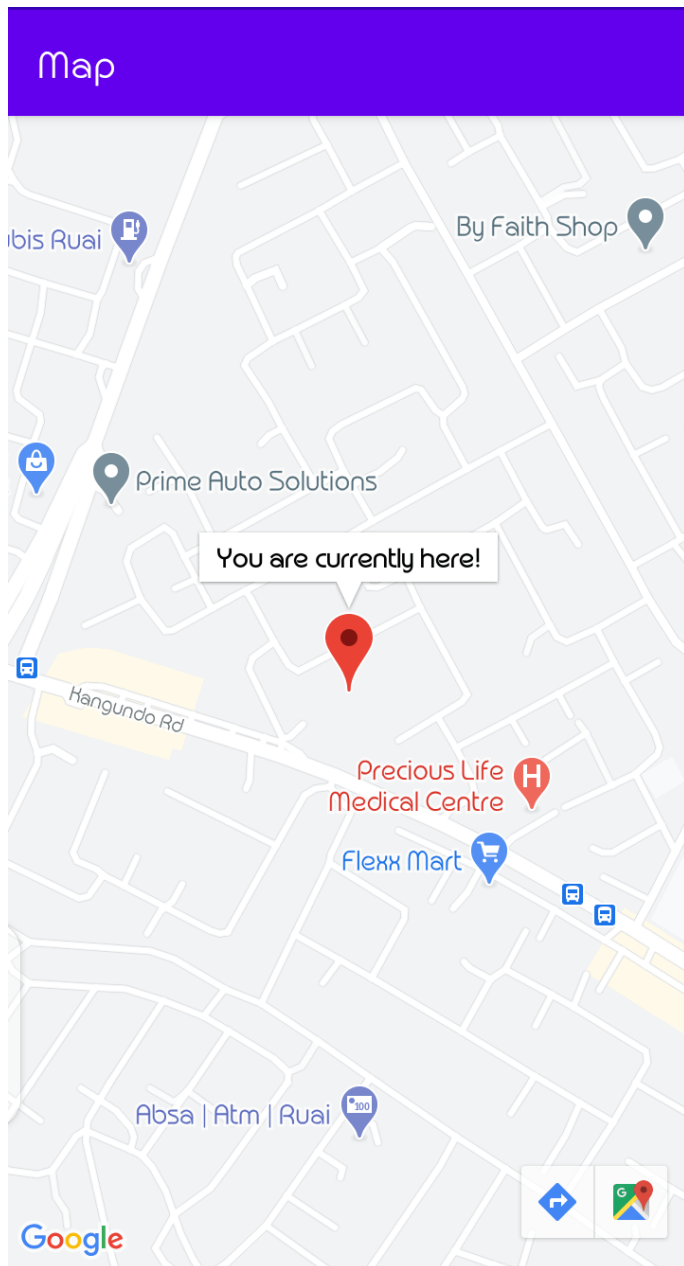
```

```
        getCurrentLocation()
    } else {
        //if it doesn't log an error message
        Log.e(TAG, "Location permission has been denied")
    }
}
}
}
```

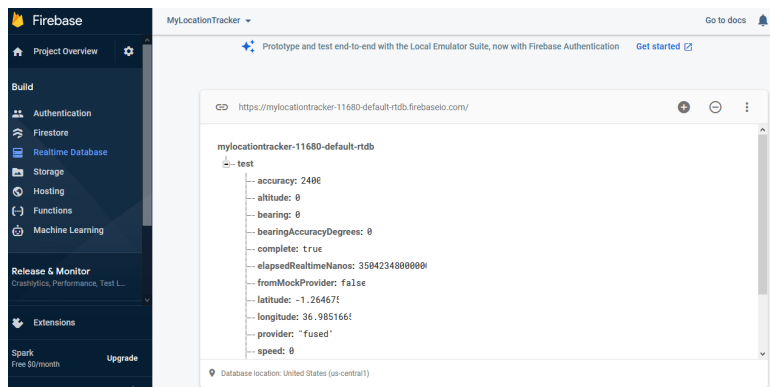
## Step 7 - Run the app

Run the app. This is will achieve (locations may differ). Give the app location permission.





**Successfully saved the user's location in a database. Navigate to the Firebase console and click on the project had created.**



## The LocationChecker app

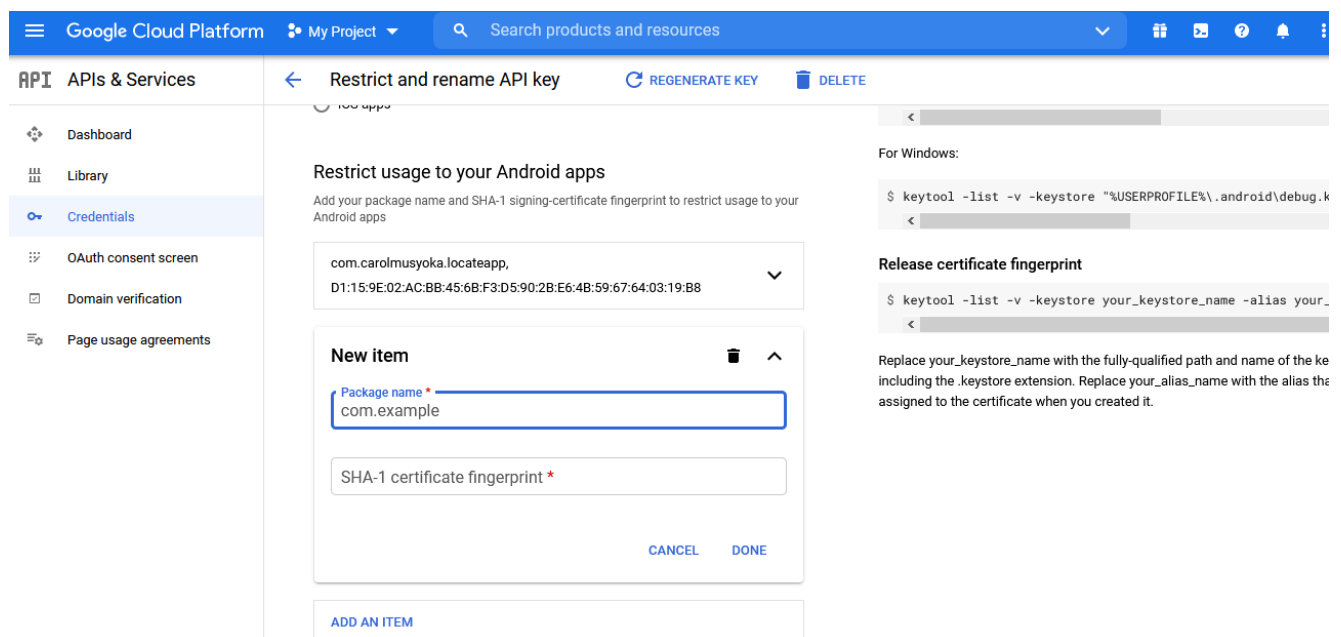
This second application allows you to retrieve the user's location from the database.

### Step 1: Creating a new project

Follow the process discussed above to create a new project. Make sure you select the Google Maps template and name it appropriately.

### Step 2: Add credentials to an existing key

Since we already have an API key, we can just include it in the console. Open your developer's console and click on the edit icon.



### Step 3: Adding a button

Here is the **activity\_maps.xml**:

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<androidx.constraintlayout.widget.ConstraintLayout
```

```
    xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    android:layout_width="match_parent"
```

```
xmlns:map="http://schemas.android.com/apk/res-auto"  
android:layout_height="match_parent"  
tools:context=".MapsActivity"  
xmlns:tools="http://schemas.android.com/tools">
```

```
<fragment
```

```
    android:id="@+id/map"  
    android:name="com.google.android.gms.maps.SupportMapFragment"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
    map:layout_constraintLeft_toLeftOf="parent"  
    map:layout_constraintRight_toRightOf="parent"  
    map:layout_constraintTop_toTopOf="parent"  
    map:layout_constraintBottom_toBottomOf="parent" />
```

```
<Button
```

```
    android:layout_width="wrap_content"  
    map:layout_constraintLeft_toLeftOf="parent"  
    map:layout_constraintRight_toRightOf="parent"  
    map:layout_constraintBottom_toBottomOf="parent"  
    android:padding="20dp"  
    android:id="@+id/btn_find_location"  
    android:text="@string/find_user_s_location"  
    android:layout_height="wrap_content" />
```

```
</androidx.constraintlayout.widget.ConstraintLayout>
```



## Step 4: Adding permissions

By default, the GoogleMaps activity template adds the ACCESS\_FINE\_LOCATION permission in the AndroidManifest.xml file. Since we need the internet to read from the database, add the internet permission, as shown below:

```
<uses-permission android:name="android.permission.INTERNET"/>
```

## Step 4: The model class

```
import com.google.firebase.database.IgnoreExtraProperties
```

```
@IgnoreExtraProperties
```

```
data class LocationInfo(
```

```
    var latitude: Double? = 0.0,
```

```
    var longitude: Double? = 0.0
```

```
)
```

## Step 5: The MapsActivity

**The following code:**

```
class MapsActivity : AppCompatActivity(), OnMapReadyCallback {  
    private lateinit var map: GoogleMap  
  
    private var database: FirebaseDatabase = FirebaseDatabase.getInstance()  
    private var dbReference: DatabaseReference = database.getReference("test")  
  
    private lateinit var find_location_btn: Button  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        setContentView(R.layout.activity_maps)  
  
        find_location_btn = findViewById(R.id.btn_find_location)
```

// Obtain the SupportMapFragment and get notified when the map is ready to be used.

```
val mapFragment = supportFragmentManager
    .findFragmentById(R.id.map) as SupportMapFragment
mapFragment.getMapAsync(this)
```

// Get a reference from the database so that the app can read and write operations

```
dbReference = Firebase.database.reference
dbReference.addValueEventListener(locListener)
```

```
}
```

```
val locListener = object : ValueEventListener {
```

```
    // @SuppressWarnings("LongLogTag")
```

```
    override fun onDataChange(snapshot: DataSnapshot) {
```

```
        if(snapshot.exists()){
```

```
            //get the exact longitude and latitude from the database "test"
```

```
            val location =
snapshot.child("test").getValue(LocationInfo::class.java)
```

```
            val locationLat = location?.latitude
```

```
            val locationLong = location?.longitude
```

```
            //trigger reading of location from database using the button
```

```
            find_location_btn.setOnClickListener {
```

```
                // check if the latitude and longitude is not null
```

```
                if (locationLat != null && locationLong != null) {
```

```
                    // create a LatLng object from location
```

```
                    val latLng = LatLng(locationLat, locationLong)
```

```

        //create a marker at the read location and display it on the map
        map.addMarker(MarkerOptions().position(latLng)
            .title("The user is currently here"))

        //specify how the map camera is updated
        val update = CameraUpdateFactory.newLatLngZoom(latLng,
16.0f)

        //update the camera with the CameraUpdate object
        map.moveCamera(update)
    }
    else {
        // if location is null , log an error message
        Log.e(TAG, "user location cannot be found")
    }
}

}

}

// show this toast if there is an error while reading from the database
override fun onCancelled(error: DatabaseError) {
    Toast.makeText(applicationContext, "Could not read from database",
Toast.LENGTH_LONG).show()
} }

override fun onMapReady(googleMap: GoogleMap) {
    map = googleMap //initialize map when the map is ready }

    companion object {

```

// TAG is passed into the Log.e methods used above to print information to the Logcat window

```
private const val TAG = "MapsActivity" // for debugging  
  
}
```

## **SOURCE CODE**

### **SignUpActivity.java**

```
package com.example.covid_19alertapp.activities;  
  
import androidx.annotation.NonNull;  
import androidx.annotation.Nullable;  
import androidx.appcompat.app.AppCompatActivity;  
import android.Manifest;  
import android.annotation.SuppressLint;  
import android.content.Context;  
import android.content.Intent;  
import android.content.SharedPreferences;  
import android.os.Bundle;  
import android.text.Editable;  
import android.text.TextWatcher;  
import android.util.Log;  
import android.view.View;  
import android.view.inputmethod.InputMethodManager;  
import android.widget.Button;  
import android.widget.EditText;  
import android.widget.TextView;  
import android.widget.Toast;  
  
  
import com.example.covid_19alertapp.R;  
import com.example.covid_19alertapp.extras.Constants;  
import com.example.covid_19alertapp.extras.LogTags;  
import com.example.covid_19alertapp.extras.Permissions;
```

```

import com.google.firebase.FirebaseException;
import com.google.firebase.auth.PhoneAuthCredential;
import com.google.firebase.auth.PhoneAuthProvider;

import java.util.concurrent.TimeUnit;

public class SignUpActivity extends AppCompatActivity {
    Button btnContinue,btnHomeSignup,btnForwardSignup;
    EditText phoneNumber;
    TextView textViewTermsCond;
    public static String PHONE_NUMBER,verification;
    public static boolean ISRETURNEDFROMVERLAYOUT;
    public static SharedPreferences loginSp,userInfo;
    PhoneAuthProvider.OnVerificationStateChangedCallbacks mCallbacks;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_sign_up);
        // ask permissions
        promptPermissions();
        phoneNumber = findViewById(R.id.editText_phoneNumber);
        btnContinue = findViewById(R.id.btn_continue);
        textViewTermsCond = findViewById(R.id.TextViewTerm);
        btnHomeSignup = findViewById(R.id.home_button_signup_page);
        btnForwardSignup = findViewById(R.id.forward_button_signup_page);
        loginSp=getSharedPreferences(Constants.USER_LOGIN_INFO_SHARED_PREFERENCES,MODE_PRIVATE);
        userInfo=getSharedPreferences(Constants.USER_INFO_SHARED_PREFERENCES,MODE_PRIVATE);
        if(loginSp.getBoolean(Constants.user_login_state_shared_preference
startActivity(new Intent(getApplicationContext(),
VerificationPageActivity.class));
        finish();

```

```

    }

    mCallbacks=new PhoneAuthProvider.OnVerificationStateChangedCallbacks()
    {

        @Override

        public void onVerificationCompleted(@NonNull PhoneAuthCredential
        phoneAuthCredential) {

            Toast.makeText(getApplicationContext(),"Successful",Toast.LENGTH_SHOR
            T).show();

            }@Override

            public void onVerificationFailed(@NonNull FirebaseException e) {
            Toast.makeText(getApplicationContext(),"Check Your Internet
            Connection",Toast.LENGTH_SHORT).show();

                btnContinue.setEnabled(true); }

            @Override

            public void onCodeSent(@NonNull String s, @NonNull
            PhoneAuthProvider.ForceResendingToken forceResendingToken) {

                super.onCodeSent(s, forceResendingToken);

                verification=sToast.makeText(getApplicationContext(),"Code Sent to
                the Number",Toast.LENGTH_SHORT).show();

                startActivity(new Intent(getApplicationContext(),
                VerificationPageActivity.class));

            loginSp.edit().putBoolean(Constants.user_login_state_shared_preference,true).a
            pply();

                btnContinue.setEnabled(true)

            finish();

            } };

            if(ISRETURNEDFROMVERLAYOUT)

            {

                PHONE_NUMBER=PHONE_NUMBER.substring(0,4)+"

                "+PHONE_NUMBER.substring(4);

                phoneNumber.setText(PHONE_NUMBER);

                ISRETURNEDFROMVERLAYOUT = false;

```

```

        btnHomeSignup.setVisibility(View.INVISIBLE);
        btnForwardSignup.setVisibility(View.VISIBLE);
        btnForwardSignup.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                startActivity(new Intent(getApplicationContext(),
VerificationPageActivity.class));
loginSp.edit().putBoolean(Constants.user_login_state_shared_preference,true).a
pply();
finish();
            }
        });
    }

    phoneNumber.clearFocus();
    phoneNumber.setSelection(phoneNumber.getText().toString().length());
    phoneNumber.addTextChangedListener(new TextWatcher() {
        @Override
        public void beforeTextChanged(CharSequence s, int start, int count, int
after) {
        }
        //1
        int countB=phoneNumber.getText().toString().length(),countA=0;
        @SuppressWarnings("SetTextI18n")
        @Override
        public void onTextChanged(CharSequence s, int start, int before, int
count) {
if(phoneNumber.getText().toString().length()<5)
        {
            phoneNumber.setText("+880 ");

phoneNumber.setSelection(phoneNumber.getText().toString().length());
        }
    }

```

```

        countA = phoneNumber.getText().toString().length();
        if(phoneNumber.getText().toString().length()==9 &&
countA>countB)
        {
            phoneNumber.setText(phoneNumber.getText().toString()+"-");

phoneNumber.setSelection(phoneNumber.getText().toString().length());
        }
        countB = countA;
        if(phoneNumber.getText().toString().length()==16)
        {
            hideSoftInput();
        }
    }
    @Override
    public void afterTextChanged(Editable s) { }
});

phoneNumber.setOnFocusChangeListener(new
View.OnFocusChangeListener() {
    @Override
    public void onFocusChange(View v, boolean hasFocus) {
        if(hasFocus) phoneNumber.setCursorVisible(true);
        else phoneNumber.setCursorVisible(false);
    }
});

btnContinue.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        if(phoneNumber.getText().toString().length()==16) //Write a
function to check phone number validity
        {
            PHONE_NUMBER = phoneNumber.getText().toString();

```



```

        PHONE_NUMBER=PHONE_NUMBER.replaceAll("\\s+", "");
        System.out.println(PHONE_NUMBER);

userInfo.edit().putString(Constants.user_phone_no_preference,PHONE_NUMBER).apply();
        sendSms(PHONE_NUMBER);
        btnContinue.setEnabled(false);

    }
    else
    {
        phoneNumber.setError("Invalid Number!");
    }
}
});

textViewTermsCond.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        //Write Terms and Condition Page Function

textViewTermsCond.setTextColor(getResources().getColor(R.color.colorInactive));
    }
});

btnHomeSignup.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        finish();
    }
}); }

public void hideSoftInput() {

```

```

View view1 = this.getCurrentFocus();
if(view1!= null){
    InputMethodManager imm = (InputMethodManager)
getSystemService(Context.INPUT_METHOD_SERVICE);
    imm.hideSoftInputFromWindow(view1.getWindowToken(), 0);
}
}

public void sendSms(String phoneNo){
PhoneAuthProvider.getInstance().verifyPhoneNumber(
    phoneNo,      // Phone number to verify
    60,           // Timeout duration
    TimeUnit.SECONDS, // Unit of timeout
    this,        // Activity (for callback binding)
    mCallbacks   // OnVerificationStateChangedCallbacks
);
}
/*
permission needed at start of app
*/
private Permissions permissions;
private static final String[] permissionStrings = {
    Manifest.permission.ACCESS_FINE_LOCATION,
    Manifest.permission.ACCESS_BACKGROUND_LOCATION,
    Manifest.permission.ACCESS_WIFI_STATE,
    Manifest.permission.CALL_PHONE
};

private void promptPermissions() {
permissions = new Permissions(this, permissionStrings,
Constants.PERMISSION_CODE);
if(!permissions.checkPermissions())
    permissions.askPermissions();
}

```

```

@Override

    public void onRequestPermissionsResult(int requestCode, @NonNull
String[] permissions, @NonNull int[] grantResults) {
        //resolve unresolved permission
switch (requestCode){
    case Constants.PERMISSION_CODE:
        try {
            this.permissions.resolvePermissions(permissions, grantResults);
        }catch (Exception e){
            Log.d(LogTags.Permissions_TAG, "onRequestPermissionsResult:
"+e.getMessage());
        }
        break;
    } }}

```

### **UserInfoFormActivity.java**

```

package com.example.covid_19alertapp.activities;

import androidx.annotation.Nullable;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Context;

import android.content.Intent;

import android.content.SharedPreferences;

import android.graphics.drawable.Drawable;

import android.os.Bundle;

import android.os.Handler;

import android.util.Log;

import android.view.View;

```

```
import android.view.inputmethod.InputMethodManager;

import android.widget.Button;

import android.widget.EditText;

import android.widget.TextView;

import android.widget.Toast;

import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.extras.AddressReceiver;

import com.example.covid_19alertapp.models.UserInfoData;

import com.example.covid_19alertapp.extras.Constants;

import com.example.covid_19alertapp.extras.LogTags;

import com.google.firebase.auth.FirebaseAuth;

import com.google.firebase.database.DatabaseReference;

import com.google.firebase.database.FirebaseDatabase;

public class UserInfoFormActivity extends AppCompatActivity implements
AddressReceiver.AddressView {

    EditText dobText,userName;

    TextView workAddress,homeAddress;

    Button save_profile;

    UserInfoData userInfoData;

    FirebaseDatabase database;

    DatabaseReference userInfoRef;

    String uid= FirebaseAuth.getInstance().getCurrentUser().getUid();

    String path="UserInfo";
```

```

public static SharedPreferences userInfo;

private String homeLatLng = "", workLatLng = "", homeAddressVariable =
"", workAddressVariable = "";

// address picker keys

private static final int HOME_ADDRESS_PICKER = 829;

private static final int WORK_ADDRESS_PICKER = 784;

// address picker icon

Drawable checkedIcon;

// latLng to address fetcher

AddressReceiver addressReceiver = new AddressReceiver(new Handler(),
this);

@Override

protected void onCreate(Bundle savedInstanceState) {

super.onCreate(savedInstanceState);

setContentView(R.layout.activity_user_info_form);

dobText= findViewById(R.id.dateOfBirth);

userName = findViewById(R.id.userName);

workAddress = findViewById(R.id.workAddress);

homeAddress = findViewById(R.id.homeAddress);

save_profile = findViewById(R.id.SaveProfButton);


userInfo=getSharedPreferences(Constants.USER_INFO_SHARED_PREFERE
NCES,MODE_PRIVATE);

checkedIcon=getApplicationContext().getResources().getDrawable(R.drawable.
ic_check_black_24dp);

```

```

homeAddress.setOnClickListener(new View.OnClickListener() {

    @Override

    public void onClick(View v) {

// home address click

        Intent    homeIntent    =    new    Intent(UserInfoFormActivity.this,
AddressPickerMapsActivity.class);

        startActivityForResult(homeIntent,HOME_ADDRESS_PICKER); }

});

workAddress.setOnClickListener(new View.OnClickListener() {

    @Override

    public void onClick(View v) {

// work address click

Intent        workIntent        =        new        Intent(UserInfoFormActivity.this,
AddressPickerMapsActivity.class);

        startActivityForResult(workIntent, WORK_ADDRESS_PICKER);

    }

} save_profile.setOnClickListener(new View.OnClickListener() {

    @Override

    public void onClick(View v) {

        if(homeLatLng.equals("") || homeAddressVariable.equals("") ||
RequiredEditText(userName) || RequiredEditText(dobText))

        {

```

```

        if(homeLatLng.equals(""))
            homeAddress.setError("Required");
        else if(homeAddressVariable.equals("")) {
            Toast.makeText(UserInfoFormActivity.this,
                "please wait as we fetch your address",
                Toast.LENGTH_LONG)
                .show();
        }

        return;
    }

    final String name,day,month,year,dateOfBirth,contactNumber;

    name=userName.getText().toString();

    dateOfBirth=dobText.getText().toString()

    contactNumber=userInfo.getString(Constants.user_phone_no_preference,"Not
    Defined

    if(workLatLng.equals("")){

        userInfoData=new
        UserInfoData(name,dateOfBirth,homeLatLng,contactNumber,
        homeAddressVariable)

    }

    else {

```

```
userInfoData = new UserInfoData(name, dateOfBirth, workLatLng,
homeLatLng, contactNumber, homeAddressVariable, workAddressVariable);
```

```
userInfo.edit().putString(Constants.user_work_address_latlng_preference,work
LatLng).apply();
```

```
userInfo.edit().putString(Constants.user_work_address_preference,workAddres
sVariable).apply();
```

```
}
```

```
//applying values to the info names Shared Preference
```

```
userInfo.edit().putString(Constants.username_preference,name).apply();
```

```
userInfo.edit().putString(Constants.username_preference,name).apply();
```

```
userInfo.edit().putString(Constants.user_dob_preference,dateOfBirth).apply();
```

```
userInfo.edit().putString(Constants.user_home_address_latlng_preference,home
LatLng).apply();
```

```
userInfo.edit().putString(Constants.uid_preference,uid).apply();
```

```
//userInfo.edit().putString(Constants.user_phone_no_preference,PHONE_NUM
BER).apply();
```

```
userInfo.edit().putBoolean(Constants.user_exists_preference,true).apply();
```

```
// set the home address fetched using intent service
```

```
userInfo.edit().putString(Constants.user_home_address_preference,
homeAddressVariable).apply();
```



```
database = FirebaseDatabase.getInstance();

userInfoRef = database.getReference(path).child(uid);

userInfoRef.setValue(userInfoData);
```

```
startActivity(new Intent(getApplicationContext(),
MenuActivity.class));

finish();

}
```

```
//Home Address field's onClick function
```

```
public void setHomeAddress(View v)

}
```

```
//Work ADDRESS field's onclick funcion
```

```
public void setWorkAddress(View v){

}
```

```
@Override
```

```
protected void onActivityResult(int requestCode, int resultCode, @Nullable
Intent data) {
```

```
super.onActivityResult(requestCode, resultCode, data);
```

```
/*
```

```
receive latLong picked from map
```

```
*/
```

```
switch (requestCode){
```

```
case (HOME_ADDRESS_PICKER):

    if(resultCode == RESULT_OK){

        // set the home LatLng

        homeLatLng = data.getStringExtra("latitude-longitude");

        Log.d(LogTags.Map_TAG, "onActivityResult:  home  latLng
        fetched = "+homeLatLng);

        // start address fetch intent service

        String[] latLng = homeLatLng.split(",");

        addressReceiver.startAddressFetchService(

            this,

            Double.valueOf(latLng[0]),

            Double.valueOf(latLng[1]),

            0

        );

        //onSuccess

        homeAddress.setText(getText(R.string.address_fetching_text));

        homeAddress.setCompoundDrawables(null,null,checkedIcon,null);

    }
```

```

break;

case (WORK_ADDRESS_PICKER):

    if(resultCode == RESULT_OK){

        // set the work address

        workLatLng = data.getStringExtra("latitude-longitude");

        Log.d(LogTags.Map_TAG, "onActivityResult:   work   latLng
        fetched = "+workLatLng);

        // start address fetch intent service

        String[] latLng = workLatLng.split(",");

        addressReceiver.startAddressFetchService(

            this,

            Double.valueOf(latLng[0]),

            Double.valueOf(latLng[1]),

            1

        );

        //onSuccess

        workAddress.setCompoundDrawables(null,null,checkedIcon,null);

        workAddress.setText(getText(R.string.address_fetching_text));

```

```

    }
    break;
}

private boolean RequiredEditText(EditText e)
{
    if(e.getText().toString().length()==0)
    {
        e.setError("Required");
        return true;
    }
    return false;
}

@Override

public void updateAddress(String address, int type) {

    /*
    address received callback
    */

    if(type == 0) {

        // home address

        homeAddressVariable = address;
        homeAddress.setText(homeAddressVariable);
    }

    else if(type==1){

```

```
// work address

workAddressVariable = address;

workAddress.setText(workAddressVariable);

}}}
```

### **VerificationPageActivity.java**

```
package com.example.covid_19alertapp.activities;

import androidx.annotation.NonNull;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Context;

import android.content.Intent;

import android.content.SharedPreferences;

import android.os.Bundle;

import android.os.Handler;

import android.text.Editable;

import android.text.TextWatcher;

import android.view.View;

import android.view.inputmethod.InputMethodManager;

import android.widget.Button;

import android.widget.EditText;

import android.widget.TextView;
```

```

import android.widget.Toast;

import androidx.appcompat.widget.Toolbar;


import com.example.covid_19alertapp.R;
import com.example.covid_19alertapp.extras.Constants;
import com.example.covid_19alertapp.models.UserInfoData;
import com.google.android.gms.tasks.OnCompleteListener;
import com.google.android.gms.tasks.Task;
import com.google.firebase.auth.AuthResult;
import com.google.firebase.auth.FirebaseAuth;
import com.google.firebase.auth.FirebaseUser;
import com.google.firebase.auth.PhoneAuthCredential;
import com.google.firebase.auth.PhoneAuthProvider;
import com.google.firebase.auth.UserInfo;
import com.google.firebase.database.DataSnapshot;
import com.google.firebase.database.DatabaseError;
import com.google.firebase.database.DatabaseReference;
import com.google.firebase.database.FirebaseDatabase;
import com.google.firebase.database.ValueEventListener;


import                                                                    static
com.example.covid_19alertapp.activities.SignUpActivity.verification;

public class VerificationPageActivity extends AppCompatActivity {

```

Toolbar toolbar;

Button homeButton,confirmButton,editNumberButton;

TextView textViewResendOTP;

EditText digit1,digit2,digit3,digit4,digit5,digit6;

String verificationCode,uid;

FirebaseAuth auth;

SharedPreferences sp,userInfoCheck,signUpSp;

@Override

protected void onCreate(Bundle savedInstanceState) {

    super.onCreate(savedInstanceState);

    setContentView(R.layout.activity\_verification\_page);

homeButton = findViewById(R.id.home\_button\_verification\_page);

toolbar = findViewById(R.id.verification\_page\_toolbar);

digit1=findViewById(R.id.editTextDigit1);

digit2=findViewById(R.id.editTextDigit2);

digit3=findViewById(R.id.editTextDigit3);

digit4=findViewById(R.id.editTextDigit4);

digit5=findViewById(R.id.editTextDigit5);

digit6=findViewById(R.id.editTextDigit6);

auth=FirebaseAuth.getInstance();

setSupportActionBar(toolbar);

sp = getSharedPreferences("verify",MODE\_PRIVATE);

userInfoCheck=getSharedPreferences("info",MODE\_PRIVATE);

```

        signUpSp =
getSharedPreferences(Constants.USER_LOGIN_INFO_SHARED_PREFEREN
CES,MODE_PRIVATE);

if(sp.getBoolean("logged",false)){

if(userInfoCheck.getBoolean(Constants.user_exists_preference,false)) {

        GoToMainActivity();

        finish();

    else

        checkIfUserInfoExist();

}

homeButton.setOnClickListener(new View.OnClickListener() {

    @Override

    public void onClick(View v) {

        SignUpActivity.ISRETURNEDFROMVERLAYOUT = true;

startActivity(new Intent(getApplicationContext(),SignUpActivity.class)

finish();

    }

});

((EditText)findViewById(R.id.editTextDigit1)).setCursorVisible(false);

        findViewById(R.id.editTextDigit1).setOnClickListener(new
View.OnClickListener() {

    @Override

    public void onClick(View v) {

```



```
        ((EditText)
findViewById(R.id.editTextDigit1)).setCursorVisible(true); } });
```

```
((EditText)findViewById(R.id.editTextDigit1)).addTextChangedListener(new
TextWatcher() {
```

```
    @Override
```

```
{
```

```
    findViewById(R.id.editTextDigit2).clearFocus();
```

```
    findViewById(R.id.editTextDigit2).requestFocus();
```

```
        ((EditText)
```

```
findViewById(R.id.editTextDigit2)).setCursorVisible(true);
```

```
    }
```

```
}
```

```
@Override
```

```
public void afterTextChanged(Editable s) { }
```

```
});
```

```
((EditText)findViewById(R.id.editTextDigit2)).addTextChangedListener(new
TextWatcher() {
```

```
    @Override
```

```
    public void beforeTextChanged(CharSequence s, int start, int count, int
after) { }
```

```
    @Override
```

```
    public void onTextChanged(CharSequence s, int start, int before, int
count) { }
```

```
if(((EditText)findViewById(R.id.editTextDigit2)).getText().toString().length()==1)
```

```
{
```

```
    findViewById(R.id.editTextDigit3).clearFocus();
```

```
    findViewById(R.id.editTextDigit3).requestFocus();
```

```
    ((EditText)
```

```
findViewById(R.id.editTextDigit3)).setCursorVisible(true);
```

```
}
```

```
}
```

```
@Override
```

```
public void afterTextChanged(Editable s) { }
```

```
});
```

```
((EditText)findViewById(R.id.editTextDigit3)).addTextChangedListener(new  
TextWatcher() {
```

```
    @Override
```

```
    public void beforeTextChanged(CharSequence s, int start, int count, int  
after) { }
```

```
    @Override
```

```
    public void onTextChanged(CharSequence s, int start, int before, int  
count) {
```

```
if(((EditText)findViewById(R.id.editTextDigit3)).getText().toString().length()==1)
```

```
{
```

```

        findViewById(R.id.editTextDigit4).clearFocus();

        findViewById(R.id.editTextDigit4).requestFocus();

        ((EditText)
findViewById(R.id.editTextDigit4)).setCursorVisible(true);
    }

}

@Override

public void afterTextChanged(Editable s) { }

});

((EditText)findViewById(R.id.editTextDigit4)).addTextChangedListener(new
TextWatcher() {

    @Override

    public void beforeTextChanged(CharSequence s, int start, int count, int
after) { }

    @Override

    public void onTextChanged(CharSequence s, int start, int before, int
count) {

if(((EditText)findViewById(R.id.editTextDigit4)).getText().toString().length()==1)

    {

        findViewById(R.id.editTextDigit5).clearFocus();

        findViewById(R.id.editTextDigit5).requestFocus();

        ((EditText)
findViewById(R.id.editTextDigit5)).setCursorVisible(true);

```

```

    }

}

@Override

public void afterTextChanged(Editable s) { }

});

((EditText)findViewById(R.id.editTextDigit5)).addTextChangedListener(new
TextWatcher() {

    @Override

    public void beforeTextChanged(CharSequence s, int start, int count, int
after) { }

    @Override

    public void onTextChanged(CharSequence s, int start, int before, int
count) {

if(((EditText)findViewById(R.id.editTextDigit5)).getText().toString().length()==1)

    {

        findViewById(R.id.editTextDigit6).clearFocus();

        findViewById(R.id.editTextDigit6).requestFocus();

        ((EditText)
findViewById(R.id.editTextDigit6)).setCursorVisible(true);

    }

}

@Override

```

```

        public void afterTextChanged(Editable s) { }

    });

    ((EditText)findViewById(R.id.editTextDigit6)).addTextChangedListener(new
    TextWatcher() {

        @Override

        public void beforeTextChanged(CharSequence s, int start, int count, int
        after) { }

        @Override

        public void onTextChanged(CharSequence s, int start, int before, int
        count) {

            if(((EditText)findViewById(R.id.editTextDigit6)).getText().toString().length()==
            =1)

                {

                    ((EditText)
                    findViewById(R.id.editTextDigit6)).setCursorVisible(false);

                    findViewById(R.id.btn_continue).clearFocus();

                    findViewById(R.id.btn_continue).requestFocus();

                    hideSoftInput();

                }

            }

            @Override

            public void afterTextChanged(Editable s) { }

        });

```

```

textViewResendOTP = findViewById(R.id.TextViewResendOTP);

        textViewResendOTP.setOnClickListener(new View.OnClickListener() {

@Overr

public void onClick(View v) {

            Toast.makeText(getApplicationContext(),"RESENDING
OTP",Toast.LENGTH_SHORT).show();

            textViewResendOTP.setEnabled(false);

textViewResendOTP.setTextColor(getResources().getColor(R.color.colorInacti
ve));

            ToggleResendTextView(textViewResendOTP);

            //Write ResendOTP Function Here

        }

    });

ToggleResendTextView(textViewResendOTP);

confirmButton = findViewById(R.id.btn_continue);

editNumberButton = findViewById(R.id.btn_change_number);

confirmButton.setOnClickListener(new View.OnClickListener() {

    @Override

    public void onClick(View v) {

        //Write OTP Submission Function Here

verificationCode=digit1.getText().toString().trim()+""+digit2.getText().toString
().trim()+""+digit3.getText().toString().trim()+""+digit4.getText().toString().tri
m()+""+digit5.getText().toString().trim()+""+digit6.getText().toString().trim();

```

```
        System.out.println(verificationCode+"          sdf"+  
digit1.getText().toString());
```

```
        verify(verificationCode);
```

```
    }
```

```
});
```

```
editNumberButton.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
```

```
    public void onClick(View v) {
```

```
        startActivity(new  
Intent(getApplicationContext(),SignUpActivity.class));
```

```
        SignUpActivity.ISRETURNEDFROMVERLAYOUT = true;
```

```
signUpSp.edit().putBoolean(Constants.user_login_state_shared_preference,false).apply();
```

```
        finish();
```

```
    }
```

```
});
```

```
}
```

```
//Methods
```

```
public void hideSoftInput() {
```

```
    View view1 = this.getCurrentFocus();
```

```
    if(view1 != null){
```

```
        InputMethodManager imm = (InputMethodManager)
        getSystemService(Context.INPUT_METHOD_SERVICE);
```

```
        imm.hideSoftInputFromWindow(view1.getWindowToken(), 0);
```

```
    }
```

```
}
```

```
public void ToggleResendTextView(final TextView textView)
```

```
{
```

```
    final Handler handler = new Handler();
```

```
    handler.postDelayed(new Runnable() {
```

```
        @Override
```

```
        public void run() {
```

```
            textView.setEnabled(true);
```

```
textView.setTextColor(getResources().getColor(R.color.colorActive));
```

```
    }
```

```
    }, 20000);
```

```
}
```



```

public void verify(String verificationCode){

    System.out.println(verification+" verify");

    verifyPhoneNumber(verification,verificationCode);

}

```

```

private void verifyPhoneNumber(String verification, String
enteredCodeString) {

    System.out.println(verification+" credential "+enteredCodeString);

    PhoneAuthCredential phoneAuthCredential=
PhoneAuthProvider.getCredential(verification,enteredCodeString);

    signInWithPhoneAuthCredential(phoneAuthCredential);

}

```

```

private void signInWithPhoneAuthCredential(PhoneAuthCredential
credential) {

    auth.signInWithCredential(credential)

        .addOnCompleteListener(this, new
OnCompleteListener<AuthResult>() {

            @Override

            public void onComplete(@NonNull Task<AuthResult> task) {

                if (task.isSuccessful()) {

                    // Sign in success, update UI with the signed-in user's
information

                    //Log.d(TAG, "signInWithCredential:success");

```

```

        //System.out.println("Successful");

        FirebaseUser user = task.getResult().getUser();

        uid= FirebaseAuth.getInstance().getCurrentUser().getUid();

if(userInfoCheck.getBoolean(Constants.user_exists_preference,false)) {

        GoToMainActivity();

        finish();

    }

    else

        checkIfUserInfoExist();


        sp.edit().putBoolean("logged",true).apply();

        Toast.makeText(getApplicationContext(),"User Signed In
Successfully",Toast.LENGTH_SHORT).show();


    } else {

        //System.out.println(task.getException()+" task exception");

        Toast.makeText(getApplicationContext(),"Please use the valid
code",Toast.LENGTH_SHORT).show();

        // Sign in failed, display a message and update the UI


    }

}

```

```
});  
}
```

```
public void checkIfUserInfoExist(){
```

```
    FirebaseDatabase database = FirebaseDatabase.getInstance();
```

```
    uid=FirebaseAuth.getInstance().getUid();
```

```
    DatabaseReference ref =  
    database.getReference().child("UserInfo").child(uid);
```

```
    ValueEventListener valueEventListener = new ValueEventListener() {
```

```
        @Override
```

```
        public void onDataChange(DataSnapshot dataSnapshot) {
```

```
            if(dataSnapshot.exists()){
```

```
                UserInfoData user = dataSnapshot.getValue(UserInfoData.class);
```

```
                userInfoCheck.edit().putString(Constants.username_preference,  
                user.getName()).apply();
```

```
                userInfoCheck.edit().putString(Constants.user_dob_preference,  
                user.getDob()).apply();
```

```
userInfoCheck.edit().putString(Constants.user_home_address_preference,  
user.getHomeAddress()).apply();
```

```
userInfoCheck.edit().putString(Constants.user_home_address_latlng_preference  
, user.getHomeLatLng()).apply();
```

```
userInfoCheck.edit().putString(Constants.uid_preference,uid).apply();
```

```
userInfoCheck.edit().putString(Constants.user_phone_no_preference,  
user.getContactNumber()).apply();
```

```
userInfoCheck.edit().putBoolean(Constants.user_exists_preference,true).apply()  
;
```

```
if(String.valueOf(dataSnapshot.child(Constants.userInfo_node_workAddress).g  
etValue())!=null) {
```

```
userInfoCheck.edit().putString(Constants.user_work_address_preference,  
user.getWorkAddress()).apply();
```

```
userInfoCheck.edit().putString(Constants.user_work_address_latlng_preference  
, user.getWorkLatLng()).apply();
```

```
    }
```

```
        GoToMainActivity();
```

```
    }
```

```

        else {

            GotoUserInfoFormActivity();

        }finish();

    }

    @Override

    public void onCancelled(@NonNull DatabaseError databaseError) {

    }

    };

    ref.addListenerForSingleValueEvent(valueEventListener);

}

public void GoToMainActivity(){

    startActivity(new Intent(getApplicationContext(), MenuActivity.class));

}

public void GotoUserInfoFormActivity(){

    startActivity(nIntent(getApplicationContext(),
UserInfoFormActivity.class));

}

}

```

## **MenuActivity.java**

```
package com.example.covid_19alertapp.activities;

import androidx.annotation.Nullable;

import androidx.appcompat.app.AlertDialog;

import androidx.appcompat.app.AppCompatActivity;

import androidx.lifecycle.Observer;

import androidx.work.Constraints;

import androidx.work.PeriodicWorkRequest;

import androidx.work.WorkInfo;

import androidx.work.WorkManager;


import android.content.DialogInterface;

import android.content.Intent;

import android.os.Bundle;

import android.util.Log;

import android.view.View;

import android.widget.Button;


import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.extras.Constants;

import com.example.covid_19alertapp.extras.LogTags;

import com.example.covid_19alertapp.services.BackgroundWorker;
```

```
import
com.example.covid_19alertapp.sharedPreferences.MiscSharedPreferences;
```

```
import java.util.List;
```

```
import java.util.concurrent.TimeUnit;
```

```
public class MenuActivity extends AppCompatActivity {
```

```
    /*
```

```
    starter activity to test and get the permissions + all time running start worker
```

```
    overwrite or edit this later, keeping the permission codes
```

```
    */
```

```
    Button home_btn;
```

```
    @Override
```

```
    protected void onCreate(Bundle savedInstanceState) {
```

```
        super.onCreate(savedInstanceState);
```

```
        setContentView(R.layout.activity_main);
```

```
        home_btn = findViewById(R.id.home_button_menu);
```

```
        home_btn.setOnClickListener(new View.OnClickListener() {
```

```
            @Override
```

```
            public void onClick(View v) {
```

```

        finish();
    }

});

// start background worker for always
startWorker()

}

private void startWorker() {
if(!MiscSharedPreferences.getBgWorkerStatus(this)){
Constraints constraints = new Constraints.Builder()

    .setRequiresBatteryNotLow(true)

    .setRequiresCharging(false)

    .build();

PeriodicWorkRequest promptNotificationWork =

    NewPeriodicWorkRequest.Builder(BackgroundWorker.class,    30,
TimeUnit.MINUTES)

        .setConstraints(constraints)

        .addTag(Constants.background_WorkerTag)

        .build();

WorkManager.getInstance(getApplicationContext()).getWorkInfoByIdLiveData
(promptNotificationWork.getId())

    .observe(this, new Observer<WorkInfo>() {

        @Override

        public void onChanged(@Nullable WorkInfo workInfo) {

```



```

        if (workInfo != null && workInfo.getState() ==
WorkInfo.State.ENQUEUED) {

            Log.d(LogTags.Worker_TAG, "onChanged: worker is
enqueued");

            // set shared preference true

MiscSharedPreferences.setBgWorkerStatus(MenuActivity.this, true);

        }

if (workInfo != null && workInfo.getState() == WorkInfo.State.CANCELLED)
{

    Log.d(LogTags.Worker_TAG, "onChanged: worker was
stopped. why?");

    // set shared preference false

MiscSharedPreferences.setBgWorkerStatus(MenuActivity.this, false);

        }

    }

});

WorkManager.getInstance(getApplicationContext())

    .enqueue(promptNotificationWork);

} }

public void uploadClick(View view) {

if(!MiscSharedPreferences.getUploadStatus(this)) {

    Intent intent = new Intent(this, UploadLocationsActivity.class);

    startActivity(intent);

```

```

    }

    else{

        // show dialog and prevent

        AlertDialog.Builder builder = new AlertDialog.Builder(this);

        builder.setMessage(getText(R.string.cant_upload_twice_message))

            .setCancelable(false)

            .setPositiveButton(getText(R.string.permissions_dialogbox_positive),      new
DialogInterface.OnClickListener() {

                @Override

                public void onClick(DialogInterface dialog, int which) {

                    dialog.dismiss();

                }

            })

            .setNegativeButton("Override",      new
DialogInterface.OnClickListener() {

                @Override

                public void onClick(DialogInterface dialog, int which) {

                    dialog.dismiss();

                }

                // TODO: remove this

                Intent intent = new Intent(MenuActivity.this,
UploadLocationsActivity.class);

                startActivity(intent);

```

```
    }  
    });
```

```
AlertDialog alertDialog = builder.create();  
alertDialog.show();
```

```
    }  
}
```

```
public void startNewsFeed(View view)  
{  
    startActivity(new  
Intent(getApplicationContext(),NewsFeedActivity.class));  
}
```

```
public void openSettingsClick(View view) {
```

```
    Intent intent = new Intent(this, TrackerSettingsActivity.class);  
    startActivity(intent);
```

```
}
```

```
public void showMatchedLocationsClick(View view) {
```

```
Intent intent = new Intent(getApplicationContext(),
ShowMatchedLocationsActivity.class);

startActivity(intent); }

public void startMyLocationsMap(View view) {

startActivity( new Intent(this, MyLocationsMapsActivity.class) );

}

}
```

### **UploadLocationsActivity.java**

```
package com.example.covid_19alertapp.activities;

import androidx.annotation.NonNull;

import androidx.appcompat.app.AlertDialog;

import androidx.appcompat.app.AppCompatActivity;

import androidx.lifecycle.MutableLiveData;

import androidx.lifecycle.Observer;

import android.content.DialogInterface;

import android.os.Bundle;

import android.util.Log;

import android.view.View;

import android.widget.Button;

import android.widget.ProgressBar;

import android.widget.TextView;

import android.widget.Toast;
```

```
import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.extras.Constants;

import com.example.covid_19alertapp.extras.LogTags;

import com.example.covid_19alertapp.models.InfectedLocations;

import com.example.covid_19alertapp.roomdatabase.LocalDBContainer;

import com.example.covid_19alertapp.roomdatabase.VisitedLocations;

import com.example.covid_19alertapp.roomdatabase.VisitedLocationsDao;

import
com.example.covid_19alertapp.roomdatabase.VisitedLocationsDatabase;

import
com.example.covid_19alertapp.sharedPreferences.MiscSharedPreferences;

import
com.example.covid_19alertapp.sharedPreferences.UserInfoSharedPreferences;

import com.google.firebase.database.DataSnapshot;

import com.google.firebase.database.DatabaseError;

import com.google.firebase.database.DatabaseException;

import com.google.firebase.database.DatabaseReference;

import com.google.firebase.database.FirebaseDatabase;

import com.google.firebase.database.ValueEventListener;


import java.util.ArrayList;

import java.util.Calendar;

import java.util.List;
```

```

public class UploadLocationsActivity extends AppCompatActivity {

    /*
    upload locations from local db to firebase
    implement verification by medical report photo here
    */

    // firebase

    //private FirebaseDatabase firebaseDatabase;

    private DatabaseReference firebaseReference;


    // local db

    private VisitedLocationsDatabase roomDatabase;

    private VisitedLocationsDao visitedLocationsDao;


    // retrieved data from local db

    private List<VisitedLocations> retrievedDatas = new ArrayList<>();


    // retrieve and upload progress level

    private int dataSize, dataCount = 0;

    private double currProgress = 0;


    // models to store in firebase

```

```
private MutableLiveData<InfectedLocations> currentInfectedLocation = new  
MutableLiveData<>();
```

```
final Observer<InfectedLocations> newEntryObserver = new  
Observer<InfectedLocations>() {
```

```
    @Override
```

```
    public void onChanged(final InfectedLocations infectedLocations) {
```

```
        if(!infectedLocations.allFieldsSet()) {
```

```
            // exit if all values not set
```

```
            Log.d(LogTags.Upload_TAG, "onChanged: all fields not set");
```

```
            return;
```

```
        }
```

```
        // upload to firebase
```

```
        insertToFirebase("infectedLocations", infectedLocations.getKey(),  
infectedLocations.getDateTime(), infectedLocations.getCount());
```

```
        // blacklist user
```

```
        // get user uid
```

```
        String uid =  
UserInfoSharedPreferences.getUid(UploadLocationsActivity.this);
```

```
        insertToFirebase("blackList/"+uid+"/visitedLocations",
```

```
        infectedLocations.getKey(),        infectedLocations.getDateTime(),  
        infectedLocations.getCount());
```

```
    }
```

```
};
```

```
// UI stuff
```

```
ProgressBar uploadProgressBar;
```

```
TextView uploadProgressText;
```

```
Button uploadButton, home_btn;
```

```
// back press during uploading
```

```
boolean uploading = false;
```

```
@Override
```

```
protected void onCreate(Bundle savedInstanceState) {
```

```
    super.onCreate(savedInstanceState);
```

```
    setContentView(R.layout.activity_upload_locations);
```

```
    home_btn = findViewById(R.id.home_button_upload_locations);
```

```
    home_btn.setOnClickListener(new View.OnClickListener() {
```

```
        @Override
```

```
        public void onClick(View v) {
```

```
            finish();
```



```

    }
});

setUpUI();

// set firebase database offline capability, set firebase reference
if(firebaseReference == null) {
    FirebaseDatabase database = FirebaseDatabase.getInstance();
    try {
        database.setPersistenceEnabled(true);
    } catch (DatabaseException e){
        Log.d(LogTags.Upload_TAG, "onCreate: setPersistent issue. need to
fix this");
    }
    firebaseReference = database.getReference();
}

// set local db configs

roomDatabase =
VisitedLocationsDatabase.getDatabase(getApplicationContext());

visitedLocationsDao = roomDatabase.visitedLocationsDao();

// set InfectedLocation Live Data observer
currentInfectedLocation.observe(this, new EntryObserver);

```

```
}
```

```
@Override
```

```
public void onBackPressed() {
```

```
    if(uploading) {
```

```
        // show dialog
```

```
        Log.d(LogTags.Upload_TAG, "onBackPressed: back pressed during  
uploading");
```

```
        AlertDialog.Builder builder = new AlertDialog.Builder(this);
```

```
        builder.setMessage(getText(R.string.backPressed_during_upload))
```

```
            .setCancelable(false)
```

```
            .setPositiveButton(getText(R.string.backPressed_during_upload_positive), new  
DialogInterface.OnClickListener() {
```

```
                @Override
```

```
                public void onClick(DialogInterface dialog, int which) {
```

```
        dialog.dismiss();

        Log.d(LogTags.Upload_TAG, "onClick: uploading resumes");
    }

});
```

```
AlertDialog alertDialog = builder.create();

alertDialog.show();
```

```
}
```

```
else
```

```
    super.onBackPressed();
```

```
}
```

```
private void setUpUI() {
```

```
    uploadProgressBar = findViewById(R.id.uploadProgressBar);
```

```
    uploadProgressText = findViewById(R.id.uploadProgressText);
```

```
    uploadButton = findViewById(R.id.upload_btn);
```

```
}
```

```
private void uploadAndDeleteLocal() {
```

```

/*
retrive from local database,
upload to firebase,
delete from local databse
*/

// save the uploading state
uploading = true;
uploadProgressText.setVisibility(View.VISIBLE);
uploadProgressBar.setVisibility(View.VISIBLE);

roomDatabase.databaseWriteExecutor.execute(new Runnable() {

    @Override
    public void run() {

        // fetch all from localDB
        retrievedDatas = visitedLocationsDao.fetchAll();

        Log.d(LogTags.Upload_TAG, "onCreate: local database retrieved");

        // retrieval from localDB done (50%)
        currProgress = 50;

        dataSize = retrievedDatas.size();

```

```

if(dataSize==0) {

    // notify on UI thread no data found locally

    runOnUiThread(new Runnable() {

        @Override

        public void run() {

            Toast.makeText(UploadLocationsActivity.this, "No locations
recorded, only home address uploaded", Toast.LENGTH_LONG)

                .show();

            uploadProgressText.setVisibility(View.GONE);

            uploadProgressBar.setVisibility(View.GONE);

        }

    });

    uploading = false;

    return;

}

for(VisitedLocations roomEntry: retrievedDatas){

    // splitData[0] = lat,lon

```

```

// splitData[1] = dateTime

String[] splitData = roomEntry.splitPrimaryKey();

Log.d(LogTags.Upload_TAG, "run: current retrieved data = "
    +splitData[0]+", "+roomEntry.getCount()+", "+splitData[1]);

// set the LiveData object

currentInfectedLocation.postValue(new
InfectedLocations(splitData[0], roomEntry.getCount(), splitData[1]));

// delete current entry from local database

visitedLocationsDao.deleteLocation(roomEntry);

Log.d(LogTags.Upload_TAG, "onCreate: deleting room entry = "
    +roomEntry.getConatainerDateTimeComposite());

// keep track of upload progress (50%-100%)

currProgress += (double) 50/dataSize;

uploadProgressBar.setProgress((int) currProgress);

dataCount++;

if(dataCount==dataSize){

    runOnUiThread(new Runnable() {

```

```
@Override

public void run() {

    // remove progressbar

uploadProgressText.setText(getText(R.string.uploadFinished_progressbar_text)
);

    uploadProgressBar.setVisibility(View.GONE);

}

});

// uploading done

uploading = false;

// set upload status shared preference true

MiscSharedPreferences.setUploadStatus(UploadLocationsActivity.this, true);

}

// sleep, give time to upload properly?

try {

    Thread.sleep(100);

} catch (InterruptedException e) {
```

```
        Log.d(LogTags.Upload_TAG, "run: thread just had coffee and  
isn't tired rn");
```

```
        e.printStackTrace();
```

```
    }
```

```
}
```

```
}
```

```
});
```

```
}
```

```
private void uploadHomeLocation(){
```

```
    List<String> entries;
```

```
    String homeLatLng = UserInfoSharedPreferences.getHomeLatLng(this);
```

```
    if(homeLatLng.equals("")){
```

```
        Log.d(LogTags.Upload_TAG, "uploadHomeLocation: why the hell is  
home null");
```

```
        return;
```

```
    }
```

```
    String[] latLng = homeLatLng.split(",");
```



```

        entries
LocalDBContainer.calculateContainer(Double.parseDouble(latLng[0]),
Double.parseDouble(latLng[1]), "Bangladesh");

// get current time

Calendar cal = Calendar.getInstance();

//TODO: add year

final String dateTime = (cal.get(Calendar.MONTH)+1) + "-" //
Calender.MONTH is 0 based -- why tf?

    + cal.get(Calendar.DATE) + "-"

    + cal.get(Calendar.HOUR_OF_DAY);

for (String entry: entries) {

    // need '@' instead of '.'

    entry = entry.replaceAll("\\.", "@");

    // upload home address

    insertToFirebase("infectedHomes", entry, dateTime, 1);

    // blacklist user

    // get user uid

    String uid = UserInfoSharedPreferences.getUid(this);

```

```
insertToFirebase("blackList/"+uid+"/home", entry, dateTime, 1);
```

```
}
```

```
}
```

```
private void insertToFirebase(final String node, String latLon, String  
dateTime, final long count){
```

```
    final DatabaseReference currentReference =  
    firebaseReference.child(node).child(latLon).child(dateTime);
```

```
    currentReference.addListenerForSingleValueEvent(new  
    ValueEventListener() {
```

```
        @Override
```

```
        public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
```

```
            if(dataSnapshot.child("unverifiedCount").getValue()!=null){
```

```
                // data already exists
```

```
                Log.d(LogTags.Upload_TAG, "onDataChange: location already  
exists at "+node);
```

```
        long existingCount =  
(long)dataSnapshot.child("unverifiedCount").getValue();
```

```
        currentReference.child("unverifiedCount").setValue(count +  
existingCount);
```

```
    }
```

```
    else{
```

```
        // no such data exists
```

```
        Log.d(LogTags.Upload_TAG, "onDataChange: new location at  
"+node);
```

```
        currentReference.child("unverifiedCount").setValue(count);
```

```
    }
```

```
    if(dataSnapshot.child("verifiedCount").getValue()==null)
```

```
        currentReference.child("verifiedCount").setValue(0);
```

```
    }
```

```
@Override
```

```
public void onCancelled(@NonNull DatabaseError databaseError) {
```

```
Log.d(LogTags.Upload_TAG, "onCancelled: firebase e somossa ki korbo?"
"+databaseError.getMessage() +", "+databaseError.getDetails());
```

```
Toast.makeText(getApplicationContext(),
    getApplicationContext().getString(R.string.no_internet_toast),
        Toast.LENGTH_LONG)
    .show();
```

```
}
```

```
});
```

```
}
```

```
public void uploadClicked(View view) {
```

```
    /*
```

```
    upload button click
```

```
    */
```

```
    // show dialog before uploading
```

```
    AlertDialog.Builder builder = new AlertDialog.Builder(this);
```

```
    builder.setTitle(getText(R.string.upload_confirmation_title))
```

```

        .setMessage(getText(R.string.upload_confirmation_message))

        .setCancelable(false)

        .setPositiveButton(getText(R.string.upload_confirmation_positive),
new DialogInterface.OnClickListener() {

            @Override

            public void onClick(DialogInterface dialog, int which) {

                dialog.dismiss();

                Log.d(LogTags.Upload_TAG, "onClick: uploading starts");

                // upload home location

                uploadHomeLocation();

                // start uploading process

                uploadButton.setEnabled(false);

                uploadAndDeleteLocal();

            }

        })

        .setNegativeButton(getText(R.string.upload_confirmation_negative),
new DialogInterface.OnClickListener() {

            @Override

            public void onClick(DialogInterface dialog, int which) {

```

```
        dialog.dismiss();

        // close the activity

        UploadLocationsActivity.this.finish();

        Log.d(LogTags.Upload_TAG, "onClick: not gonna upload");
    }

});
```

```
        AlertDialog alertDialog = builder.create();

        alertDialog.show();

    }

}
```

### **ShowMatchedLocationsActivity.java**

```
package com.example.covid_19alertapp.activities;

import androidx.annotation.NonNull;

import androidx.appcompat.app.AppCompatActivity;

import androidx.recyclerview.widget.LinearLayoutManager;

import androidx.recyclerview.widget.RecyclerView;

import android.os.Bundle;

import android.os.Handler;
```

```
import android.util.Log;

import android.view.View;

import android.widget.Button;

import android.widget.ProgressBar;

import android.widget.TextView;

import android.widget.Toast;


import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.adapters.LocationListAdapter;

import com.example.covid_19alertapp.extras.AddressReceiver;

import com.example.covid_19alertapp.extras.Constants;

import com.example.covid_19alertapp.extras.Internet;

import com.example.covid_19alertapp.extras.LogTags;

import com.example.covid_19alertapp.extras.Notifications;

import com.example.covid_19alertapp.models.MatchedLocation;

import com.example.covid_19alertapp.roomdatabase.LocalDBContainer;

import com.example.covid_19alertapp.roomdatabase.VisitedLocations;

import com.example.covid_19alertapp.roomdatabase.VisitedLocationsDao;

import
com.example.covid_19alertapp.roomdatabase.VisitedLocationsDatabase;

import
com.example.covid_19alertapp.sharedPreferences.UserInfoSharedPreferences;

import com.google.firebase.database.DataSnapshot;

import com.google.firebase.database.DatabaseError;
```

```
import com.google.firebase.database.DatabaseReference;
```

```
import com.google.firebase.database.FirebaseDatabase;
```

```
import com.google.firebase.database.ValueEventListener;
```

```
import java.util.ArrayList;
```

```
import java.util.List;
```

```
public class ShowMatchedLocationsActivity extends AppCompatActivity  
implements AddressReceiver.AddressView {
```

```
    // matched locations model (for recycler-view)
```

```
    ArrayList<MatchedLocation> matchedLocations = new ArrayList<>();
```

```
    int matchedLocationPosition = 0, locationQueryCount = 0;
```

```
    // matched home locations model (for another(?) recycler-view)
```

```
    ArrayList<MatchedLocation> matchedHomeLocations = new ArrayList<>();
```

```
    int homeQueryCount = 0;
```

```
    // firebase
```

```
    private DatabaseReference firebaseReference;
```

```
    // local db
```

```
    private VisitedLocationsDatabase roomDatabase;
```



```
private VisitedLocationsDao visitedLocationsDao;

// retrieved data from local db

private List<VisitedLocations> retrievedDatas = new ArrayList<>();

private int dataSize;


// Address Fetch

AddressReceiver addressReceiver = new AddressReceiver(new Handler(),
this);


// UI stuff

private ProgressBar progressBar;

private TextView progressBarText;

private Button retryButton;

private RecyclerView locationRecyclerView, homeLocationRecyclerView;

private LocationListAdapter locationListAdapter, homeLocationListAdapter;

private boolean internetAvailable = true;


// flags

private boolean localDbEmptyFlag = false;

private boolean homeLocationsFetchFinishedFlag = false;

private boolean locationsFetchFinishedFlag = false;
```

@Override

protected void onCreate(Bundle savedInstanceState) {

super.onCreate(savedInstanceState);

setContentView(R.layout.activity\_show\_matched\_locations);

setUI();

Notifications.removeNotification(Constants.DangerNotification\_ID, this);

// set local db configs

roomDatabase

=

VisitedLocationsDatabase.getDatabase(getApplicationContext());

visitedLocationsDao = roomDatabase.visitedLocationsDao();

// firebase

firebaseReference = FirebaseDatabase.getInstance().getReference();

findHomeMatchedLocations();

findMatchedLocations();

}

```
private void setUI() {

    progressBar = findViewById(R.id.progressBar);
    progressBarText = findViewById(R.id.progressBarText);
    retryButton = findViewById(R.id.retry_btn);

    homeLocationRecyclerView = findViewById(R.id.homeRecyclerView);
    homeLocationRecyclerView.setLayoutManager(new
LinearLayoutManager(this));

    locationRecyclerView = findViewById(R.id.locationRecyclerView);
    locationRecyclerView.setLayoutManager(new
LinearLayoutManager(this));

}

private void findHomeMatchedLocations() {

    homeLocationsFetchFinishedFlag = false;
    matchedHomeLocations.clear();

    homeQueryCount = 0;

    homeLocationListAdapter = new LocationListAdapter(this,
matchedHomeLocations);

    homeLocationRecyclerView.setAdapter(homeLocationListAdapter);
```

```

List<String> queryKeys;

final String homeLatLng =
UserInfoSharedPreferences.getHomeLatLng(this);

if(homeLatLng.equals("")){

    Log.d(LogTags.Worker_TAG, "queryHomeAddress: why the hell is
home null");

    return;

}

final String[] latLng = homeLatLng.split(",");

queryKeys =

LocalDBContainer.calculateContainer(Double.parseDouble(latLng[0]),
Double.parseDouble(latLng[1]), "Bangladesh");

final int querySize = queryKeys.size();

for (String query: queryKeys) {

    if(!Internet.isInternetAvailable(getApplicationContext())){

        runOnUiThread(new Runnable() {

```

```

@Override

public void run() {

    internetDisconncetedUI();

}

});

return;

}

// need '@' instead of '.'
query = query.replaceAll("\\.", "@");

firebaseReference.child("infectedHomes").child(query)

    .addListenerForSingleValueEvent(new ValueEventListener() {

        @Override

        public void onDataChange(@NonNull DataSnapshot
dataSnapshot) {

            if(dataSnapshot.getValue()!=null){

                long verifiedCount = 0, unverifiedCount = 0;

                for (DataSnapshot snapshot: dataSnapshot.getChildren()) {

```

```
verifiedCount+=(long)snapshot.child("verifiedCount").getValue();

        unverifiedCount+=(long)
snapshot.child("unverifiedCount").getValue();

    }
```

```
MatchedLocation homeLocation = new MatchedLocation(

    Double.parseDouble(latLng[0]),

    Double.parseDouble(latLng[1]),

    "NEAR YOUR HOME!",

    verifiedCount,

    unverifiedCount

);
```

```
if(matchedHomeLocations.isEmpty()) {

    // only find one match for home
```

```
    matchedHomeLocations.add(homeLocation);
```

```
homeLocationListAdapter.notifyItemInserted(matchedHomeLocations.size() -
1);
```

```
homeLocationsFetchFinishedFlag = true;
```

```
        if(locationsFetchFinishedFlag)

            dataFetchFinishedUI();

        else if(localDbEmptyFlag)

            localDbEmptyUI();

    }

    Log.d(LogTags.MatchFound_TAG, "onDataChange: home
location matched: "+homeLocation.toString());

}

homeQueryCount++;

if(homeQueryCount>=querySize){

    homeLocationsFetchFinishedFlag = true;

    if(locationsFetchFinishedFlag)

        dataFetchFinishedUI();

    else if(localDbEmptyFlag)

        localDbEmptyUI();

}

}
```

```

        @Override

        public void onCancelled(@NonNull DatabaseError
databaseError) {

            internetDisconncetedUI();

            Log.d(LogTags.MatchFound_TAG, "onCancelled: home
location query failed "+databaseError.getMessage());

        }

    });

}

}

private void findMatchedLocations() {

    localDbEmptyFlag = false;

    locationsFetchFinishedFlag = false;

    matchedLocationPosition = 0;

    locationQueryCount = 0;

    if(internetAvailable) {

```



```
retryButton.setVisibility(View.GONE);

retryButton.setEnabled(false);
}

matchedLocations.clear();

locationListAdapter = new LocationListAdapter(this, matchedLocations);
locationRecyclerView.setAdapter(locationListAdapter);


roomDatabase.databaseWriteExecutor.execute(new Runnable() {

    @Override

    public void run() {


        // fetch from local db and query firebase

        retrievedDatas = visitedLocationsDao.fetchAll();


        dataSize = retrievedDatas.size();


        if(dataSize==0){

            // local database empty


            localDbEmptyFlag = true;
```

```

if(homeLocationsFetchFinishedFlag) {

    runOnUiThread(new Runnable() {

        @Override

        public void run() {

            localDbEmptyUI();

        }

    });

}

return;

}

for (VisitedLocations currentEntry: retrievedDatas)
{

    // format = "latLon_dateTime"

    String[] splitter = currentEntry.splitPrimaryKey();

    // firebase query values

    final String key = currentEntry.getATencodedlatlon();

    final String dateTime = splitter[1];

```

```
Log.d(LogTags.MatchFound_TAG, "run: query key = "+key +"  
date time = "+dateTime);
```

```
if(!Internet.isInternetAvailable(getApplicationContext())){
```

```
    runOnUiThread(new Runnable() {
```

```
        @Override
```

```
        public void run() {
```

```
            internetDisconnctedUI();
```

```
        }
```

```
    });
```

```
    return;
```

```
}
```

```
// query in firebase
```

```
firebaseReference =  
FirebaseDatabase.getInstance().getReference().child("infectedLocations").child(  
key).child(dateTime);
```

```
firebaseReference.addListenerForSingleValueEvent(new  
ValueEventListener() {
```

```

@Override

    public void onDataChange(@NonNull DataSnapshot
dataSnapshot) {

        if(dataSnapshot.getValue()!=null){

            // INFECTED LOCATION MATCH FOUND!


            String latLon = key;

            long verifiedCount = (long)
dataSnapshot.child("verifiedCount").getValue();

            long unverifiedCount = (long)
dataSnapshot.child("unverifiedCount").getValue();


            MatchedLocation matchedLocation = new
MatchedLocation(latLon, dateTime, verifiedCount, unverifiedCount);

            matchedLocations.add(matchedLocation);


locationListAdapter.notifyItemInserted(matchedLocationPosition);


            // start address fetch service

            addressReceiver.startAddressFetchService(

                ShowMatchedLocationsActivity.this,

                matchedLocation.getBILatitude(),

                matchedLocation.getBILongitude(),

                matchedLocationPosition

```

```
);
```

```
matchedLocationPosition++;
```

```
}
```

```
locationQueryCount++;
```

```
if(locationQueryCount>=dataSize){
```

```
    if(matchedLocations.isEmpty()){
```

```
        // no locations match
```

```
        locationsFetchFinishedFlag = true;
```

```
        if(matchedHomeLocations.isEmpty()) {
```

```
            // no home locations match either
```

```
            // show no match found
```

```
        runOnUiThread(new Runnable() {
```

```
            @Override
```

```
            public void run() {
```

```
                noMatchFoundUI();
```

```
    }  
    });  
}
```

```
else {
```

```
    // no location match
```

```
    // but home location matched show finish UI
```

```
    runOnUiThread(new Runnable() {
```

```
        @Override
```

```
        public void run() {
```

```
            dataFetchFinishedUI();
```

```
        }
```

```
    });
```

```
}
```

```
}
```

```
}
```

```

    }

    @Override
    public void onCancelled(@NonNull DatabaseError
databaseError) {

        // internet connection lost

        runOnUiThread(new Runnable() {

            @Override

            public void run() {

                internetDisconnctedUI();

            }

        }); }

    }); } }

});}

private void internetDisconnctedUI()

internetAvailable = false;

progressBar.setVisibility(View.INVISIBLE);

    //linearLayout.setVisibility(View.INVISIBLE);

progressBarText.setText(getText(R.string.internet_disconnected_text));

progressBarText.setVisibility(View.VISIBLE);

```

```

        retryButton.setEnabled(true);

        retryButton.setVisibility(View.VISIBLE);

        Log.d("removethis", "internetDisconnctedUI: visible");


        Toast.makeText(this,getText(R.string.no_internet_toast),
Toast.LENGTH_LONG)

            .show();

    }


    private void dataFetchFinishedUI(){

        retryButton.setEnabled(false);

        progressBarText.setVisibility(View.GONE);

        progressBar.setVisibility(View.GONE);

        if(internetAvailable) {

            retryButton.setVisibility(View.GONE);

            retryButton.setEnabled(false);

        }

        Toast.makeText(this,            getText(R.string.finished_progressbar_text),
Toast.LENGTH_LONG)

            .show();

    }

```



```
private void noMatchFoundUI(){
```

```
    progressBar.setVisibility(View.INVISIBLE);
```

```
    if(internetAvailable) {
```

```
        retryButton.setVisibility(View.GONE);
```

```
        retryButton.setEnabled(false);
```

```
    }
```

```
    progressBarText.setVisibility(View.VISIBLE);
```

```
    progressBarText.setText(getText(R.string.no_match_found_text));
```

```
}
```

```
private void localDbEmptyUI(){
```

```
    progressBar.setVisibility(View.INVISIBLE);
```

```
    //linearLayout.setVisibility(View.INVISIBLE);
```

```
    if(internetAvailable) {
```

```
        retryButton.setVisibility(View.GONE);
```

```
        retryButton.setEnabled(false);
```

```
    }
```

```
    progressBarText.setVisibility(View.VISIBLE);
```

```
    progressBarText.setText(getText(R.string.local_db_empty_text));
```

```
}
```

```
public void retryClicked(View view) {
```

```
    internetAvailable = true;
```

```
    progressBar.setVisibility(View.VISIBLE);
```

```
    progressBarText.setVisibility(View.VISIBLE);
```

```
    progressBarText.setText(getText(R.string.loading_progressbar_text));
```

```
    findHomeMatchedLocations();
```

```
    findMatchedLocations();
```

```
}
```

```
private int updateCount = 0;
```

```
@Override
```

```
public void updateAddress(String address, int listPosition) {
```

```
    /*
```

```
    address received here
```

```
    */
```

```
    matchedLocations.get(listPosition).setAddress(address);
```

```
locationListAdapter.notifyItemChanged(listPosition);
```

```
Log.d(LogTags.MatchFound_TAG, "updateAddress: address =  
"+matchedLocations.get(listPosition).toString());
```

```
updateCount++;
```

```
if(updateCount>=matchedLocations.size()){
```

```
locationsFetchFinishedFlag = true;
```

```
updateCount = 0;
```

```
if(homeLocationsFetchFinishedFlag)
```

```
dataFetchFinishedUI();
```

```
}
```

```
}
```

```
}
```

### TrackerSettingsActivity.java

```
package com.example.covid_19alertapp.activities;
```

```
import androidx.annotation.NonNull;
```

```
import androidx.annotation.Nullable;

import androidx.appcompat.app.AppCompatActivity;

import androidx.appcompat.widget.Toolbar;


import android.Manifest;

import android.app.Activity;

import android.content.Intent;

import android.content.SharedPreferences;

import android.os.Build;

import android.os.Bundle;

import android.util.Log;

import android.view.View;

import android.widget.Button;

import android.widget.Switch;

import android.widget.Toast;


import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.extras.Constants;

import com.example.covid_19alertapp.extras.LocationFetch;

import com.example.covid_19alertapp.extras.LogTags;

import com.example.covid_19alertapp.extras.Notifications;

import com.example.covid_19alertapp.extras.Permissions;

import com.example.covid_19alertapp.services.BackgroundLocationTracker;
```

```
public class TrackerSettingsActivity extends AppCompatActivity {  
  
    /*  
    settings (currently only contains location on/off)  
    */  
  
    Button home_btn;  
  
    Switch notification_switch;  
  
    private static boolean switch_status;  
  
    // for location permission  
  
    private Permissions permissions;  
  
    private static final String[] permissionStrings = {  
        Manifest.permission.ACCESS_FINE_LOCATION,  
        Manifest.permission.ACCESS_BACKGROUND_LOCATION,  
        Manifest.permission.ACCESS_WIFI_STATE  
    };  
  
    @Override  
  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
  
        setContentView(R.layout.activity_tracker_settings);  
    }  
}
```

```
home_btn= findViewById(R.id.home_button_settings);
```

```
//start notification channel(do this is MainActivity
```

```
Notifications.createNotificationChannel(this);
```

```
notification_switch = findViewById(R.id.notification_switch);
```

```
home_btn.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
```

```
    public void onClick(View v) {
```

```
        finish();
```

```
    }
```

```
});
```

```
notification_switch.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
```

```
    public void onClick(View v) {
```

```
        save_preferences(notification_switch.isChecked());
```

```
        if(notification_switch.isChecked())
```

```
        {
```

```
            try {
```

```

LocationFetch.checkDeviceLocationSettings(TrackerSettingsActivity.this);

        if(LocationFetch.isLocationEnabled) {

            // location is enabled

            // start tracker service

            Log.d(LogTags.Location_TAG, "onClick: location found
enabled");

            // start BackgroundLocationTracker

            startTrackerService();

        }

        else{

            // location is not enabled

            Log.d(LogTags.Location_TAG, "onClick: location found
disabled");

            notification_switch.setChecked(false);

            Toast.makeText(getApplicationContext(), "Turn on location or
press again please", Toast.LENGTH_LONG)

                .show();

            save_preferences(false);

        }

    }catch (Exception e){

```

```

        // set switch off

        notification_switch.setChecked(false);

        // set shared preferences false

        save_preferences(false);

        // most probable reason for error is permission not granted

        promptPermissions();

        Log.d(LogTags.TrackerSettings_TAG, "onClick: error starting
background location service! permission taken?");
    }
}
else
{
    try {

        // stop location tracker

        stopService(new
Intent(getApplicationContext(),BackgroundLocationTracker.class));

    }catch (Exception e){

        Log.d(LogTags.TrackerSettings_TAG, "onClick: error
occured!");
    }
}

```



```
        }  
    }  
}  
});  
loadData();  
updateViews();  
}
```

```
private void startTrackerService(){  
  
    if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {  
        startForegroundService(new Intent(getApplicationContext(),  
BackgroundLocationTracker.class));  
        Log.d(LogTags.TrackerSettings_TAG, "onClick: newer version phones  
foreground service started");  
    } else  
        startService(new Intent(getApplicationContext(),  
BackgroundLocationTracker.class));  
  
}
```

```
private void promptPermissions() {
```

```
permissions = new Permissions(this, permissionStrings,
Constants.PERMISSION_CODE);
```

```
if(!permissions.checkPermissions())
```

```
permissions.askPermissions();
```

```
}
```

```
public void save_preferences(boolean state)
```

```
{
```

```
    SharedPreferences sharedPreferences =
```

```
getSharedPreferences(Constants.LOCATION_SETTINGS_SHARED_PREFER
ENCES, MODE_PRIVATE);
```

```
    SharedPreferences.Editor editor = sharedPreferences.edit();
```

```
    editor.putBoolean(Constants.location_tracker_state,state);
```

```
    editor.apply();
```

```
}
```

```
public void loadData()
```

```
{
```

```
    SharedPreferences sharedPreferences =
```

```
getSharedPreferences(Constants.LOCATION_SETTINGS_SHARED_PREFER
ENCES, MODE_PRIVATE);
```

```

        switch_status =
sharedPreferences.getBoolean(Constants.location_tracker_state,false);

        updateViews();
    }

    public void updateViews()
    {
        notification_switch.setChecked(switch_status);
    }

    @Override

    protected void onActivityResult(int requestCode, int resultCode, @Nullable
Intent data){

        super.onActivityResult(requestCode, resultCode, data);

        switch (requestCode){

            case Constants.LOCATION_CHECK_CODE:

                // user input from the dialogbox showed after checkLocation()

                if(Activity.RESULT_OK == resultCode){

                    // user picked yes

                    Log.d(LogTags.Location_TAG, "onActivityResult: user picked
yes. starting background location tracker");

```

```
startTrackerService();
```

```
// save settings preferences
```

```
save_preferences(true);
```

```
// set LocationFetch boolean
```

```
LocationFetch.isLocationEnabled = true;
```

```
//set the settings switch UI to true
```

```
notification_switch.setChecked(true);
```

```
}
```

```
else if(Activity.RESULT_CANCELED == resultCode){
```

```
// user picked no
```

```
Log.d(LogTags.Location_TAG, "onActivityResult: user picked no.  
setting boolean and preference to false");
```

```
save_preferences(false);
```

```
LocationFetch.isLocationEnabled = false;
```

```
}
```

```
break;
```

```

    }

}

@Override

    public void onRequestPermissionsResult(int requestCode, @NonNull
String[] permissions, @NonNull int[] grantResults) {

        //resolve unresolved permissions

switch (requestCode case Constants.PERMISSION_CODE:

try {

    this.permissions.resolvePermissions(permissions, grantResults);

        }catch (Exception e){

            Log.d(LogTags.Permissions_TAG, "onRequestPermissionsResult:
"+e.getMessage());

        }

break;

}}}
```

### **AddressPickerMapsActivity.java**

```

package com.example.covid_19alertapp.activities;

import androidx.annotation.NonNull;

import androidx.fragment.app.FragmentActivity;

import android.content.Context;
```

```
import android.content.Intent;

import android.location.Location;

import android.location.LocationManager;

import android.net.wifi.WifiManager;

import android.os.Bundle;

import android.util.Log;

import android.view.View;

import android.widget.Button;

import android.widget.TextView;

import android.widget.Toast;


import com.example.covid_19alertapp.R;

import com.example.covid_19alertapp.extras.AddressReceiver;

import com.example.covid_19alertapp.extras.Internet;

import com.example.covid_19alertapp.extras.LogTags;

import com.google.android.gms.common.api.Status;

import com.google.android.gms.maps.CameraUpdateFactory;

import com.google.android.gms.maps.GoogleMap;

import com.google.android.gms.maps.OnMapReadyCallback;

import com.google.android.gms.maps.SupportMapFragment;

import com.google.android.gms.maps.model.LatLng;

import com.google.android.gms.maps.model.Marker;

import com.google.android.gms.maps.model.MarkerOptions;
```

```
import com.google.android.libraries.places.api.Places;

import com.google.android.libraries.places.api.model.Place;

import com.google.android.libraries.places.api.model.TypeFilter;

import com.google.android.libraries.places.api.net.PlacesClient;

import com.google.android.libraries.places.widget.AutoCompleteFragment;

import
com.google.android.libraries.places.widget.AutoCompleteSupportFragment;

import
com.google.android.libraries.places.widget.listener.PlaceSelectionListener;


import java.util.Arrays;


public class AddressPickerMapsActivity extends FragmentActivity implements

    OnMapReadyCallback,

    GoogleMap.OnMyLocationButtonClickListener,

    GoogleMap.OnMyLocationClickListener,

    GoogleMap.OnMapLongClickListener {


    private GoogleMap mMap;

    private Button confirmButton;

    private Marker homeMarker = null;


    // home address location

    Location pickedLocation;
```

```

// places api client
PlacesClient placesClient;

@Override

protected void onCreate(Bundle savedInstanceState) {

    super.onCreate(savedInstanceState);

    setContentView(R.layout.activity_address_picker_maps);

    // Obtain the SupportMapFragment and get notified when the map is ready
    to be used.

    SupportMapFragment mapFragment = (SupportMapFragment)
    getSupportFragmentManager()

        .findFragmentById(R.id.map);

    mapFragment.getMapAsync(this);

    if(!Internet.isInternetAvailable(this)) {

        // no internet, map not visible

        Toast.makeText(this, "No internet! Failed to load map.",
        Toast.LENGTH_LONG)

            .show();

        TextView textView = findViewById(R.id.userHelperText);

        textView.setText(getString(R.string.map_no_internet_text));

```



```
}
```

```
initPlacesApi();
```

```
confirmButton = findViewById(R.id.confirm_button);
```

```
}
```

```
private void initPlacesApi() {
```

```
    Places.initialize(getApplicationContext(),  
getString(R.string.google_maps_key));
```

```
    placesClient = Places.createClient(this);
```

```
    // initialize fragment
```

```
    AutocompleteSupportFragment autocompleteFragment =  
        (AutocompleteSupportFragment)  
getSupportFragmentManager().findFragmentById(R.id.autocomplete_fragment  
);
```

```
    // specify place type (find out more)
```

```
    autocompleteFragment  
        .setPlaceFields(Arrays.asList(Place.Field.NAME,  
Place.Field.LAT_LNG))
```

```

        .setCountries("BD")

        .setTypeFilter(TypeFilter.GEOCODE);

// place selection listener

autocompleteFragment.setOnPlaceSelectedListener(new
PlaceSelectionListener() {

    @Override

    public void onPlaceSelected(@NonNull Place place) {

        // move camera to place

mMap.moveCamera(CameraUpdateFactory.newLatLngZoom(place.getLatLng(
), 16.0f));

        Log.d(LogTags.Map_TAG, "onPlaceSelected: place selected =
"+place.getName()+" "+place.getLatLng());

    }

    @Override

    public void onError(@NonNull Status status) {

        Toast.makeText(AddressPickerMapsActivity.this, "please try again",
Toast.LENGTH_LONG)

            .show();

```

```
        Log.d(LogTags.Map_TAG, "onError: place selection error =  
"+status.toString());
```

```
    }
```

```
});
```

```
}
```

```
@Override
```

```
public void onMapReady(GoogleMap googleMap) {
```

```
    mMap = googleMap;
```

```
    // Add a marker in Dhaka and move the camera
```

```
    LatLng dhaka = new LatLng(23.7805733, 90.2792376);
```

```
    mMap.moveCamera(CameraUpdateFactory.newLatLngZoom(dhaka,  
10.0f));
```

```
    // check if all are needed
```

```
    mMap.setMyLocationEnabled(true);
```

```
    mMap.getUiSettings().setMyLocationButtonEnabled(true);
```

```
    mMap.setOnMyLocationClickListener(this);
```

```

        mMap.setOnMyLocationButtonClickListener(this);

        mMap.setOnMapLongClickListener(this);

        Log.d(LogTags.Map_TAG, "onMapReady: map ready");
    }

    @Override

    public void onMapLongClick(LatLng latLng) {

        /*
        location selected by long press on map
        ask user to confirm

        */
        Log.d(LogTags.Map_TAG, "onMapLongClick: marker at =
"+latLng.toString());

        pickedLocation = new Location(getLocalClassName());
        pickedLocation.setLatitude(latLng.latitude);
        pickedLocation.setLongitude(latLng.longitude);

        if(homeMarker!=null){

            homeMarker.remove();

        }

        homeMarker=mMap.addMarker(new
        MarkerOptions().position(latLng).title("Home"));

        Toast.makeText(

            this,

            "press 'Confirm' to confirm or select another",

```

```

        Toast.LENGTH_LONG

    ).show();

    confirmButton.setEnabled(true);

}

@Override

public boolean onMyLocationButtonClick() {

    /*

    notify user if location and/or wifi is inactive

    */

    String toastText = "";

    if(!wifiEnabled() && !locationEnabled())

        toastText = "Turn On both WiFi & Location";

    else if(!locationEnabled())

        toastText = "Turn On Location";

    else if(!wifiEnabled())

        toastText = "Turn On WiFi";

    if(!toastText.equals(""))

        Toast.makeText(this

            , toastText + " to show your location"

            , Toast.LENGTH_LONG)

            .show();

```

```
    return false;
}
```

```
@Override
```

```
public void onMyLocationClick(@NonNull Location location) {
```

```
    if(location.getAccuracy()>150)
```

```
        Toast.makeText(
```

```
            this,
```

```
            "Location Accuracy is LOW. press again please!" + location,
            Toast.LENGTH_SHORT
```

```
        ).show();
```

```
    }public boolean wifiEnabled(){
```

```
        WifiManager wifi = (WifiManager) getApplicationContext()
```

```
            .getSystemService(Context.WIFI_SERVICE);
```

```
        return wifi.isWifiEnabled();
```

```
    }
```

```
public boolean locationEnabled(){
```

```
    LocationManager locationManager = (LocationManager)
    getSystemService(Context.LOCATION_SERVICE);
```

```
    return
```

```
    locationManager.isProviderEnabled(LocationManager.GPS_PROVIDER) &&
```

```
locationManager.isProviderEnabled(LocationManager.NETWORK_PROVIDE  
R);
```

```
    } public void confirmClicked(View view) {
```

```
        /*
```

```
        take this location and set it as home address
```

```
        */
```

```
        Log.d(LogTags.Map_TAG, "confirmClicked: location taken =  
"+pickedLocation.toString());
```

```
        Toast.makeText(this, "Your home location was saved!",  
        Toast.LENGTH_SHORT)
```

```
            .show();
```

```
// send data to parent activity
```

```
        Intent resultIntent = new Intent();
```

```
        resultIntent.putExtra("latitude-longitude",
```

```
            pickedLocation.getLatitude()+" "+pickedLocation.getLongitude());
```

```
        setResult(RESULT_OK, resultIntent);
```

```
        finish();
```

```
    } }
```

## DEBUGGING:

```
@if "%DEBUG%" == "" @echo off
```

```
@rem
```

```
#####  
#####
```

```
@rem
```

@rem Gradle startup script for Windows

@rem

@rem

#####  
#####

@rem Set local scope for the variables with windows NT shell

if "%OS%"=="Windows\_NT" setlocal

set DIRNAME=%~dp0

if "%DIRNAME%" == "" set DIRNAME=.

set APP\_BASE\_NAME=%~n0

set APP\_HOME=%DIRNAME%

@rem Add default JVM options here. You can also use JAVA\_OPTS and GRADLE\_OPTS to pass JVM options to this script.

set DEFAULT\_JVM\_OPTS=

@rem Find java.exe

if defined JAVA\_HOME goto findJavaFromJavaHome

set JAVA\_EXE=java.exe

%JAVA\_EXE% -version >NUL 2>&1

if "%ERRORLEVEL%" == "0" goto initecho.

echo ERROR: JAVA\_HOME is not set and no 'java' command could be found  
in your PATH.

echo.

echo Please set the JAVA\_HOME variable in your environment to match the



echo location of your Java installation.

goto fail:findJavaFromJavaHome

set JAVA\_HOME=%JAVA\_HOME:"=%

set JAVA\_EXE=%JAVA\_HOME%/bin/java.exe

if exist "%JAVA\_EXE%" goto init

echo.

echo ERROR: JAVA\_HOME is set to an invalid directory: %JAVA\_HOME%

echo.

echo Please set the JAVA\_HOME variable in your environment to match the

echo location of your Java installation.

goto fail:init

@rem Get command-line arguments, handling Windows variants

if not "%OS%" == "Windows\_NT" goto win9xME\_args:win9xME\_args

@rem Slurp the command line arguments.

set CMD\_LINE\_ARGS=

set \_SKIP=2:win9xME\_args\_slurp

if "x%~1" == "x" goto execute

set CMD\_LINE\_ARGS=%\*:execute

@rem Setup the command line

set CLASSPATH=%APP\_HOME%\gradle\wrapper\gradle-wrapper.jar

@rem Execute Gradle

```
"%JAVA_EXE%"      %DEFAULT_JVM_OPTS%      %JAVA_OPTS%  
%GRADLE_OPTS%    "-Dorg.gradle.appname=%APP_BASE_NAME%" -  
classpath        "%CLASSPATH%"          org.gradle.wrapper.GradleWrapperMain  
%CMD_LINE_ARGS%:end
```

```
@rem End local scope for the variables with windows NT shell
```

```
if "%ERRORLEVEL%"=="0" goto mainEnd
```

```
:fail
```

```
rem Set variable GRADLE_EXIT_CONSOLE if you need the _script_ return  
code instead of
```

```
rem the _cmd.exe /c_ return code!
```

```
if not "" == "%GRADLE_EXIT_CONSOLE%" exit 1
```

```
exit /b 1:mainEnd
```

```
if "%OS%"=="Windows_NT" endlocal:omega
```

GitHubLink: [\*\*IBM-Project-30949-1660193224\*\*](#)