वन Rakhwali

Project report submitted in partial fulfillment of the requirement for the degree of Bachelor of Technology

in

Computer Science and Engineering

By

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(151476)

Under the supervision of

Dr. Pradeep Kumar Singh

to

Department of Computer Science & Engineering and Information Technology

Jaypee University of Information Technology Waknaghat, Solan-173234, Himachal Pradesh

Certificate

Candidate's Declaration

I hereby declare that the work presented in this report entitled "वन Rakhwali" in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from August 2018 to May 2019 under the supervisio**n of Dr. Pradeep Kumar Singh (Assistant Professor (Senior Grade), Department of Computer Science & Engineering and Information Technology).**

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

Yogesh Kumar, 151476

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

This report is not meant to be submitted anywhere else in any other form without the prior permission of the supervisor.

Dr. Pradeep Kumar Singh

Assistant Professor (Senior Grade)

Department of Computer Science & Engineering and Information Technology

Dated:

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ACKNOWLEDGMENT

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Yogesh Kumar (151476)

ABSTRACT

Forest department being custodian of forest land keeps checks of any illicit tree felling and also on other forbidden activities like mining etc. Forest department currently keeps strict vigil. They act upon complaints received. But the problem is that Forest department has limited man power which can't be omnipresent.

Complaints received are either outdated or lacks vital information and therefore no action is taken on the complaints. By launching वन Rakhwali mobile app, we can facilitate citizens to be part of the drive against illicit activities as whenever they see any illegal activity happening around them they can file the complaint then and there only. By this time gap between occurrence and report is minimized. Information received is accurate including the GPS, set of images.

The user has got the facility of clicking images of the illicit activity and uploads the image then and there only. This app mainly focuses on betterment of the environment as the complaint will be handled immediately and there will be no delay in handling of complaints. This makes it easier for the forest department also as the manpower is very less and with the help of the app there work load becomes less. The state is divided into several districts and each district has 4 rangers which take care of the complaints of that particular area.

This application right now is only targeting districts of Himachal Pradesh only, so user shall not be able to report from any other state of India. App right only focuses on picture sent on the spot of the location which need to be reported.

CHAPTER: 1

INTRODUCTION

1.1. *Introduction*

"वन Rakhwali Android Application"- is a project which shall help reporting of illicit and illegal activities going around in Himachal Pradesh forest area easily. Also the receiving of those complaints shall be made hassle free for authorities who shall look into these complaints.

1.2. *Problem Statement*

In the present era, where the development has taken a rapid pace, deforestation, mining and other such activities have come into force. The forest department is under immense pressure to take care of their property. The forest officials also cannot be omnipresent to take down every complaint so we need a more efficient way of recording complaints so that a necessary and proper action can be taken.

1.3. *Objective*

The project is all about providing a better and interactive portal to file complaints regarding all the irregular and felonious activities going on in Himachal Pradesh's forest area every now & then. It is also aimed at helping out the authorities in sorting out the complaints and taking the required action in non- chaotic manner, providing them a better control over forest regarding complaints.

1.4. *Methodology*

The idea of connecting the android application with a mobile camera provides the users with a facility of clicking pictures, with ability of application to locate the applicant with the help of GPS making it a robust method to file a complaint regarding serious issues of hampering forest areas. For this project implementation, the testing will be done mainly on a single user who shall fill the complaint form and send out pictures. After successful and multiple testing of application it may be tested on multiple users as well.

CHAPTER : 2

LITERATURE SURVEY

Some of the research works done in past regarding forest related problems and other related issues are summarized here:

2.1.   Identifying Smart Solutions for Fighting Illegal Logging and Timber Trade

Ioannis Athanasiadis, Despina Anastasiadou, Kostas Koulinas, Fotis Kiourtsis[1].

The author talks about how smart Information and Communication Technologies (ICT) solutions can be used for fighting against illicit logging and timber trade. In this paper various methods are put together from requirements engineering to propose a solution for identifying user description and connected possible problems and priorities and via a workshop, named Inception Workshop. Various methodologies were suggested in the workshop like Central systems for issuing permits, DNA fingerprinting, Market control mechanisms, Forest certification, GIS systems and databases, marking logs with RFID tags, Satellite imagery, and Machine vision. These mentioned methodologies were presented by various technology-experts, illustrating examples from like market retail taxation and fiscal systems, parking stations and fire protection, electronic tickets. Stories like Truck load detection, Satellite imaging are also discussed in detail in this paper which were discussed at the workshop.

2.2.   FLEGT – Combating Illegal Logging through Forest Law Enforcement, Governance and Trade

FLEGT.org, EU FLEGT Facility, European Union[2].

This is a website hosted by EU FLEGT facility and funded by European Union. It is a portal where people can view and share news, knowledge, learning materials and many other resources. It is a website where you can connect to civil sector, private sector and government bodies and other people who all are working to achieve the Action Plan's goals of combating illegal logging and fostering good forest governance.

2.3. Global Forest Watch- Forest Monitoring Designed for Action

globalforestwatch.org, Global Forest Watch (Washington, US) [3].

Global Forest Watch website is an online portal which makes available the data and tools for watching out forests areas. Using the latest technology, Global Forest Watch makes anyone able to watch out precise real-time data about what are the trends in changing of forest around the world. According to the website its data is used on regular basis by government departments, several relevant industries, civil sector companies, journalists, and normal people who are aware enough about their local forests. Lot of satellite pictures are posted on this online portal showing patterns changing forest covers several locations all over globe like Amazon Forest Cover etc. As per website GFW has made ever growing collaborations of over 100 organizations, researchers, and companies that altogether have an insight for protecting the forests.

2.4. Saving Forest: The Composition and Structure of Deciduous Forest under Community Management in North East THAILAND

Md. Enamul Kabir1, Edward L. Webb.[4].

In this piece of work author talks about decreasing vegetation in northeast forest area of Thailand due to conversion large forest areas for commercial purposes and also because of large heavy commercial logging of trees. Dependency of several local livelihoods and how are they getting affected is also described in the research paper. First the survey design is taken in to picture and history of the site is understood then the patterns are observed of the decreasing forest cover over the area and its possible reasons. Solutions are also proposed like facilitation of forest regeneration and restoration of biodiversity and replantation of native species.

2.5.   Illegal Logging and Illegal Activities in the Forestry Sector

Carl-Éric Guertin, R.p.f., M. Sc. [5].

This paper presents the idea that today no is talking about issues like logging and illegal forest activities. Also the potential impact on world trade is also demonstrated if no soon the required actions are taken. Negative impacts like lowering of prices, competition in global market and impact on honest industries is also told about. UNICEF Timber Committee also shows what role they to play in all this stuff. It is concluded by saying it is the high time to start proposing the solutions or else it will too late to take any action.

2.6   ANDROID

2.6.1 Introduction to Android

Android in an open source operating system majorly used as OS for mobile devices, especially touch screen mobile devices. It is a Google developed OS and regular updates pushed by Google actively. Google now have expanded its market in world of Televisions, Netbooks, wearable smart wristwatches etc. Android is the Operating System installed largest no of mobile devices which is followed by Apple's operating system known as iOS. Android being open source leads developer to have plenty of options to customize their respective OS for a given device.

2.6.2 SPECIFICATIONS

Android has a Linux kernel based architecture and is mostly run on ARM processor based devices like smartphones these days from companies like Xiaomi etc.

• **Architecture of Android:**
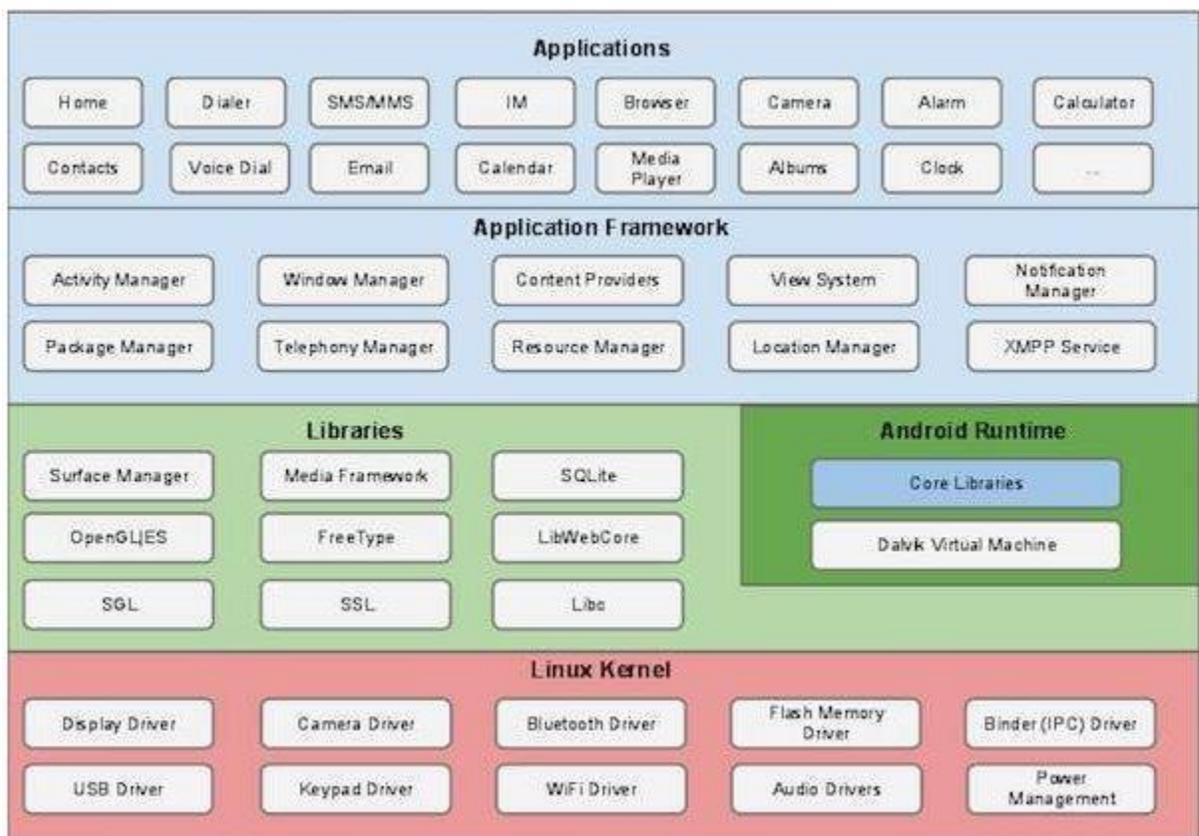
Figure 1: Different layers of Android [6]

Above diagram describes the architecture of android platform.

• **Current Android Version in Market**

 Latest version of Android in market is of API 9 and is named as PIE.

Figure 2: Android Versions [7]

Above shown are all versions of Android released ever. First ever version released was called to be Cupcake followed by Donut and so on, latest version in the market is PIE right now in 2019.

Following is the table with name of each android version name with its release year.

Name	Year
Cupcake	2009
Donut	2009
Eclair	2009
Froyo	2010
Gingerbread	2011
Honeycomb	2011
Ice Cream Sandwich	2012
Jelly Bean	2013
KitKat	2014
Lollipop	2015
Nougat	2016
Oreo	2017
Pie	2018

Version	Codename	API	Distribution
2.3.3 - 2.3.7	Gingerbread	10	0.3%
4.0.3 - 4.0.4	Ice Cream Sandwich	15	0.3%
4.1.x	Jelly Bean	16	1.2%
4.2.x		17	1.5%
4.3		18	0.5%
4.4	KitKat	19	6.9%
5.0	Lollipop	21	3.0%
5.1		22	11.5%
6.0	Marshmallow	23	16.9%
7.0	Nougat	24	11.4%
7.1		25	7.8%
8.0	Oreo	26	12.9%
8.1		27	15.4%
9	Pie	28	10.4%

Figure 3: Version Distribution [8]

Above is the table of all the android versions with their names and respective API and also tells what percent of particular version is currently is being used in all the devices throughout the world. According to the table latest version of Android i.e. Pie is currently is being used by 10.4% of the total android users all over the world.

2.6.3 Market Characteristics

• Competitors

- iPhone OS. It is the major competitor of Android in market.

- PDA's Palm OS devices

- Blackberry: it has unique kind of OS for its devices.

- Windows Mobile: Inspired from windows for PC windows for phone is developed today

• Market share

Android Phones hold a major part in today's mobile phone market. A large number of mobile manufacturing giants like Xiaomi, Vivo, Samsung, Motorola, OnePlus etc. have Android as an operating system in their respective mobile phones, while Apple uses IOS for the mobile phones manufactured by itself as an OS which hold second spot in market share of mobile market.
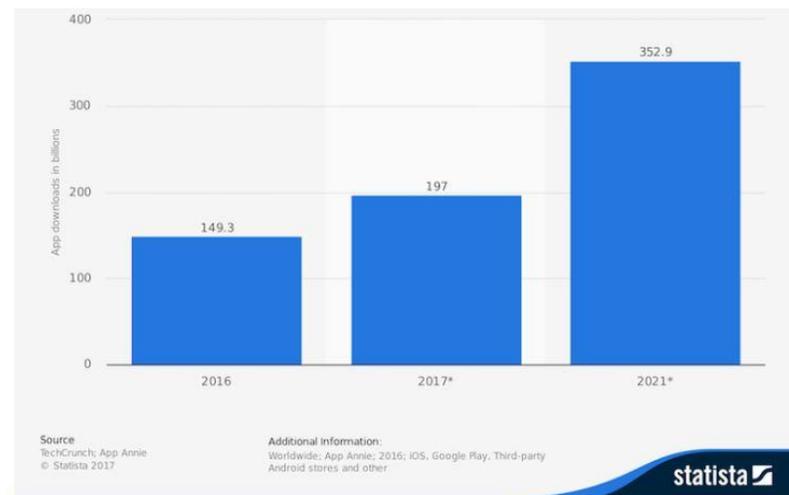
Figure 3: Market Characteristics [9]

X axis: Respective Year

Y axis: App downloaded in billions

This plot is no. of android app downloaded in billions in year 2016, 2017 and a prediction till 2021.

2.6.4 Why Android?

• Applications

- Google applications
  Being a Google developed Operating system usually it is provided with all of the
  Applications provided by Google such as YouTube, Hangouts, Duo etc. which is used
  on daily basis by users. Users can also install third party applications by downloading it
  from Google play store or directly using its APK file.

-Widgets
With Android, one download widgets like clock, weather forecast, news windows which
keep on updating on real time directly on the home screen.

- Android Application Stores
Applications for Android are mainly downloaded from Google playstore where each kind
of application is available for an android user. Applications are either free or paid, it
depends on the developer of the application who uploads the application this playstore.
This store holds to have millions of applications and the number is increasing with a high
rate on daily basis due to shift of businesses from websites to mobile applications.

• Multitasking
Android like windows allows multitasking as more than one apps can run altogether. And
we can observe switching among task thread using task-manager.

• Standard Development Kit (SDK)

Standard Development Kit (SDK) is provided by Google for developers to freely develop Android applications according to ones requirements. This package contains a collection of libraries, tools, troubleshooting and improvement platforms, an emulator, well defined documentation; updates are being pushed on regular basis.

• Open Source:

Android being an open source operating system, its source code is available for anyone to use it make changes according to the requirements of the developer. A larger number of android versions are available in market both updated by Google itself and also by unknown developers.

2.6.5 Creating an Android App

Activity:

Just like a website is made of several web pages linked to each other, similarly android application are developed with collection of activities. These activities are made with help of two languages XML and java.

XML is used to handle the UI part of activity while JAVA are brains behind the scenes which act as backend support in an Activity.

XML:

Xml stands for Extensible Markup Language. While developing applications in android studio most of the User Interface is designed in XML. XML holds views with its attributes define in particular layouts. Later this XML files' views are connected with backend with line of codes in Java.

View:

A user interface in android studio is made with the collection of views in a XML file. There are several number of views available for creating a user interface in an app like button, seekbar, textview , edit text view etc. all these views have one thing common which is that all of them helps to interact with users on the app inside with UI.

Intent:

This component of Android Development helps to switch between activities and services of android app also one can communicate between service within or outside app using Intent. You can start communication, by sending a broadcastIntent to any required BroadcastReceiver and achieve the required communication. Another aim is to interact between the codes in various parts of applications. It can be measured as the connection among the activities. You can also send some additional data using an Intent, on account of a class called objectpackage, using below given method:

Intent.putExtras(int objetbunble);

Android Manifest:

Android Manifest file for an android app is a source file which holds all the specifics needed by the android system around the app. It is a main file that works as a bond between the android developer and platform of android development. It supports the developer to pass on features and requirements of ones app to Android. This is an xml file which must always be called as AndroidManifest.xml and placed at app root directory. Each and every Android application must have AndroidManifest.xml file. AndroidManifest.xml lets us to describe,

The parcels, libraries, APIs needed for the app.

Simple building blocks of app are like activities, services and etc.
Particulars about required permissions.

2.1.6 Database Connectivity

Android app appears to be able to connect two kind of databases one is local like SQLite and other one is online or external like Firebase, AWS etc. Local database is simpler but can only be used in case when the database to be managed is of large size and when application being developed is static whereas online databases like Firebase and AWS are needed in order to create real-time dynamic applications. It also helps to sync data together in all the devices simultaneously.
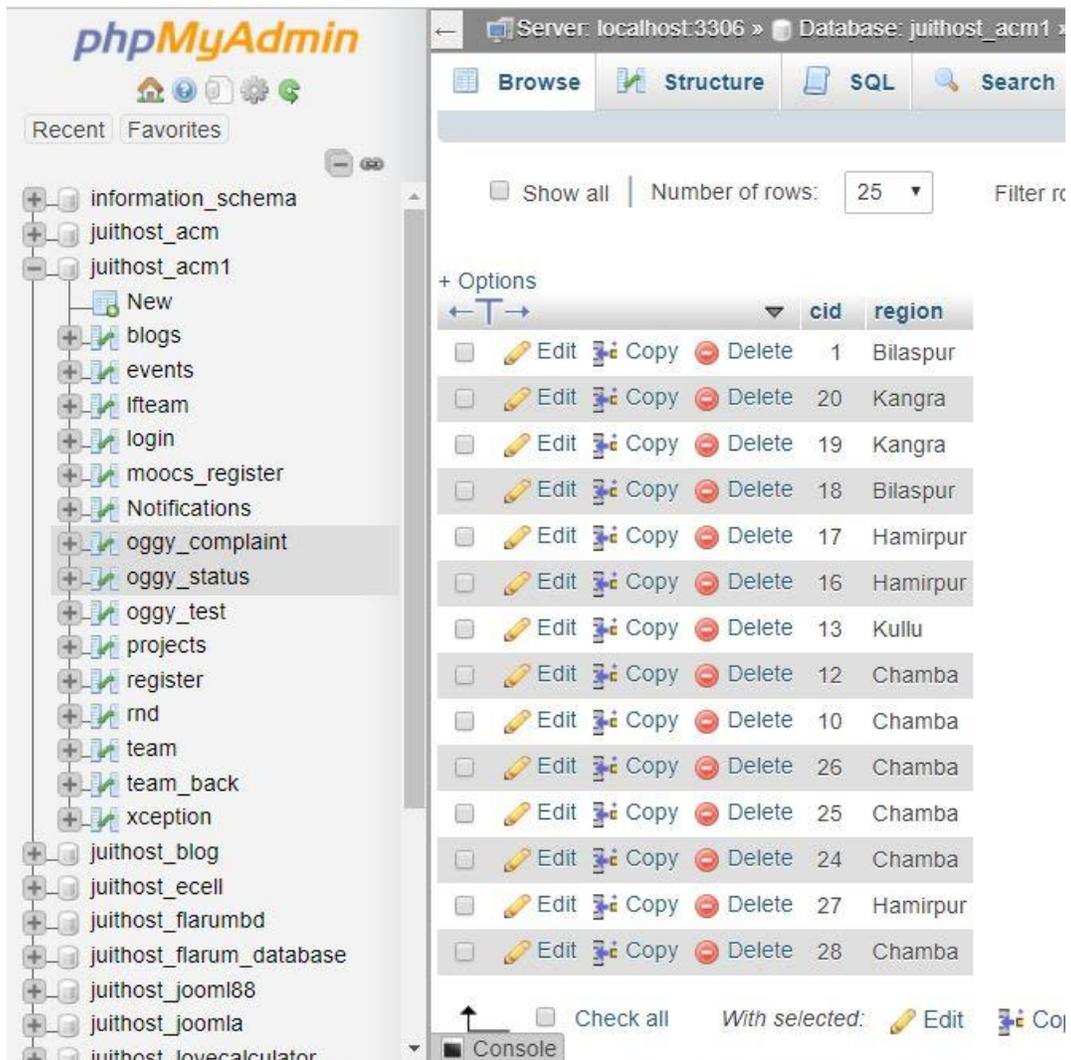
Table1. Complaint Table

- **CID**

  It holds the complaint ID of the respective complaint

- **Region**

  It holds the information regarding district of complaint filed.

CHAPTER : 3

SYSTEM DEVELOPMENT

3.1. Analysis

This project development is supposed to completely be Android based as of now. Users of this application will be either the one who shall file the complaint or the one who needs check after all the complaints and start series of actions required in order to take care of what is mentioned in the complained.

All the development work shall be done on *Android Studio 3.2.1 for Windows 64-bit*. *SQLite* and *Google Firebase* will be used for database purposes which shall be used store all the complaint filed, digital images of sites, users' information and pushing notifications and storing them.

The Application developed shall be compatible with all the Android Devices with camera and having *Android OS version of 4.4 (KitKat)* and above.

3.2. Design

The Design of application is kept clean, simple and interactive. The User Interface and switching between the activities is smooth. User Interface designed in such a way there shall be no confusions or hassles while using or operating the app. Application is provided with functionalities like filing complaints with pictures, tracking the complaints filed, see the info of current logged in user, feedback window, and real time notifications. Each of these options are presented on the single *Activity* the main one to avoid any kind problem for even user with a non-tech background or are not much into mobile and other tech stuff. All the input forms are applied with basic checkpoints on input fields. All basic stuff like *SharedPrefrences, Session Manager* are used to make user experience better. Live notifications shall help users stay updated with current status of their applications. Camera Application used in this application is especially designed for this project as per its requirements and integrated with the same.

3.2.1 Following is the use case diagram of our application
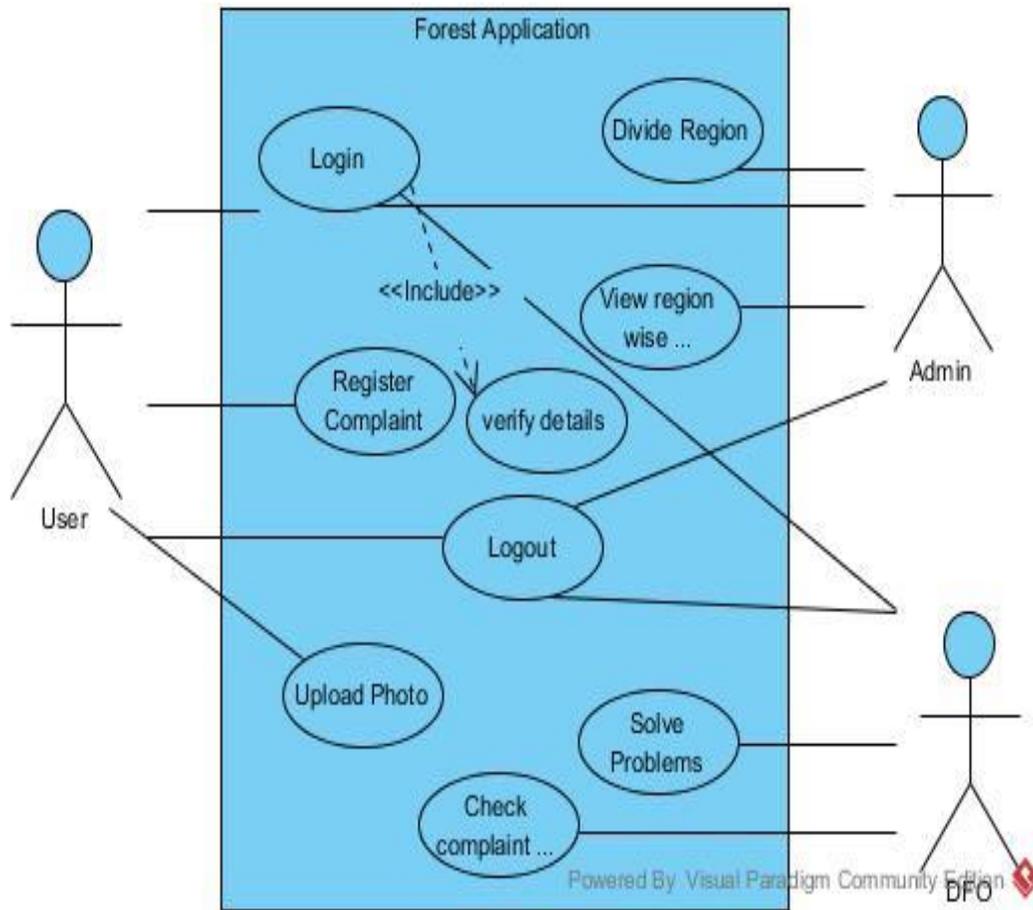
Figure 4. Use Case Diagram

3.2.2 Following is the activity flow diagram of our application
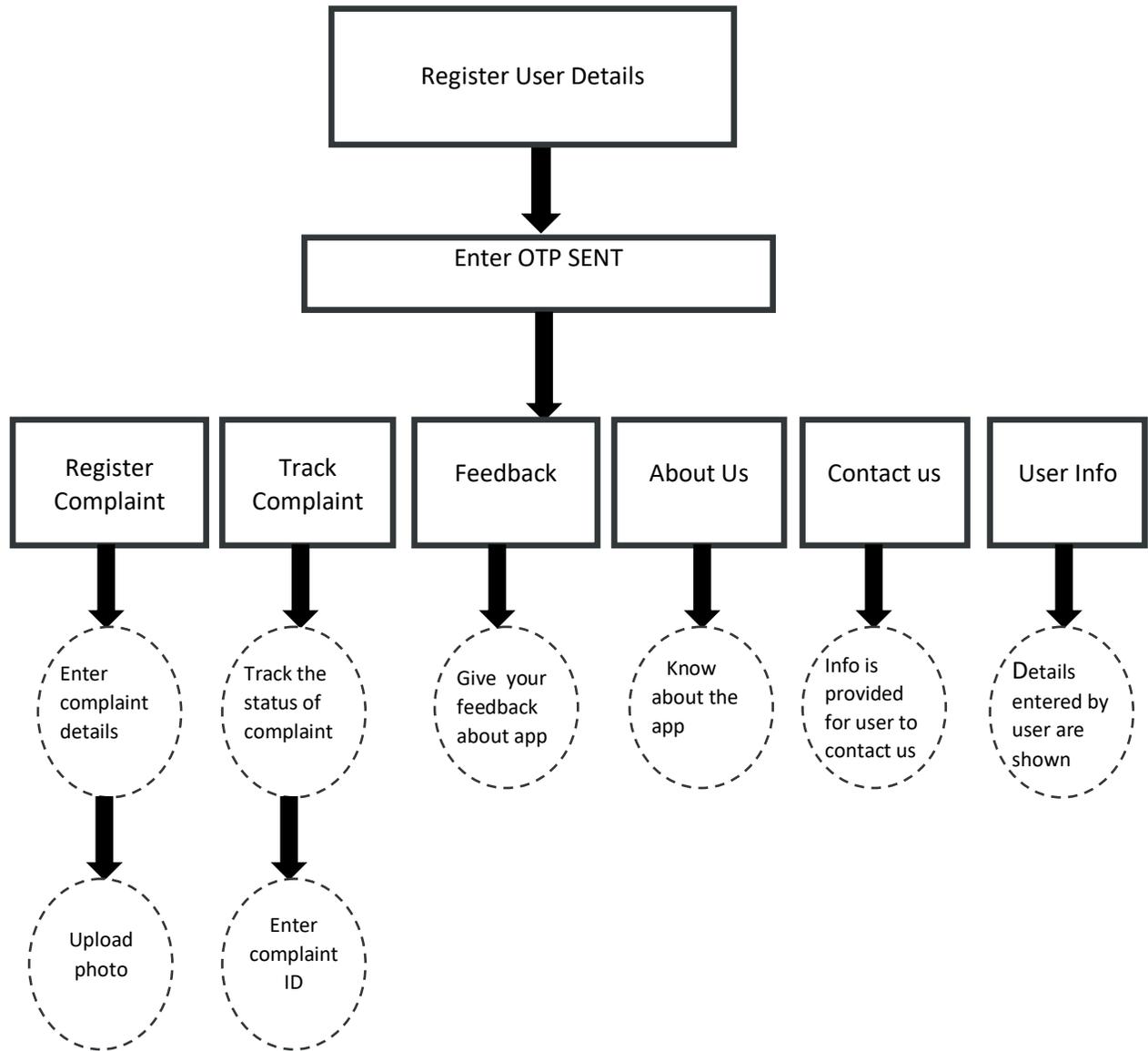
Figure 5. Activity flow diagram

3.3. Development

The development of project was done in four phases:

3.3.1. UI Designing.

3.3.2. Developing Custom Camera App and Integration

3.3.3. Integrating UI with Backend Code.

3.3.4. Connecting SQLite database.

3.3.5. Making Adjustments for App look same on each phone.

3.3.6   Admin Panel

3.3.7   DFO Panel

3.3.8   Connecting Online Database

3.3.9   Connect Google Firebase

3.3.10 Use Shared Preferences

3.3.1   UI Designing.

For our project we are using mainly Android studio. The UI is designed in such a way that it is interactive and easy for a common man to use. There are error check points on every form so that the user has no headache of checking his or her details. First the user needs to login into the app either as admin or as user. Then on the next user will get various options such as register complaint, track complaint, give feedback etc. This is made with the help of cardview. User can then click on any option as per his requirement and can perform further action. We have provided feature of custom camera to click the picture of any illicit activity happening around him immediately and upload its picture. By clicking on track application cardview the user can also track his applications and see whether his complaint is handled correctly or not. If not then he can also give feedback by clicking on feedback Cardview.

3.3.2   Developing Custom Camera App and Integration.

The android framework supports various applications which allow the user to click pictures and add them in android apps. This can take place in two ways, either by using the camera application on the device or by building our own custom camera which has UI as per our requirement. In this application we have built a custom camera using camera2 API by Google which allows the user to click multiple pictures of illicit activities happening around and uploading them so that the complaint can be handled instantly. In android framework we can capture images or videos through the android.hardware.camera2 API or camera Intent.

3.3.3   Integrating UI with Backend Code.

Till now we have developed only the UI of the app with the help of which user interacts easily with the app. But only the UI is not enough, there are brains running behind with which we integrate UI with backend Java Code. We make login form which is UI of the app but to make it functional with all the error checkpoints is done by the help of Java code. To make the app functioning properly there should be proper interaction between UI and backend code.

3.3.4.   Connecting SQLite database.

Till now we have fetched data from user. We also need to store that data somewhere so that we have a record for future use. To solve this problem we have used SQLite database. When the user enters his details such as name, place, Id etc. then it is stored in tables in database. Also we store the pictures that the user clicks and uploads. Now whenever we again need user data for tracking application or sending feedback etc. the user does not need to enter it again n again but it will be automatically fetched from database and entered into the form. In database there is a centre table where data will be stored logically.

3.3.5. Making Adjustments for App look same on each phone.

Now after making the complete app we need to make sure that the app looks same on all the devices. It will be a big problem and failure of app if it looks and works differently on all phones. We need to use relative layout so that the layout adjust itself according to the device screen and looks same on all devices.

3.3.6. Admin Panel

Users have option to login as an Admin with required credentials. After logging in as admin the user is able to see complaints from each and every district, also user is able to see details of applications like status of the action taken upon the application, id, location, images and information of the person who lodged the complaint.

3.3.7. DFO Panel

DFO stands for district forest officer, there is another option on home page for DFO to login with proper credentials and choosing the correct district of which the user is DFO of. After the successful login user can only see the complaints of that respective district and user in this case is provided with exclusive feature to update the application like if it is accepted, in process etc.

3.3.8. Connecting Online Database

This application is connected with an online database provided by a company called BigRock. Database is used fetch and information regarding users, applications lodged by them, pictured uploaded, action taken, status etc. Online database help to sync the update of data throughout all devices with app i.e. if user files a complaint from one mobile device, the user can see this complaint from another device as admin or dfo without reinstalling the app.

3.3.9 Connecting Google Firebase

Google Firebase provides us with many real-time services one of them is real-time group messaging or pushing real-time notifications. Here in this application admin or dfo can push the notification to the applicants of this app regarding information related to its application.

3.3.10 Use Shared Preferences

It is a tool in android development for storing data temporally in key-value format in phone itself. Here it is used manage login sessions.

3.4. Development

First the UI flow designed is using XML, in which all the activities of UI are designed are linked with each other using Intent then the backend code is written in java to achieve required objective, which is explained in Chapter-4 in detail.

CHAPTER : 4

ALGORITHMS

4.1. Algorithm

The application is developed with algorithms such that flow of data and activities is simple.

The application comprises of 3 kinds of users, normal user, admin login and DFO. On using the app for the first time user has choose between three options register complaint and admin login with DFO login.

4.1.1. User who shall file the complaint.

4.1.2. User as Admin.

4.1.3. User as DFO.
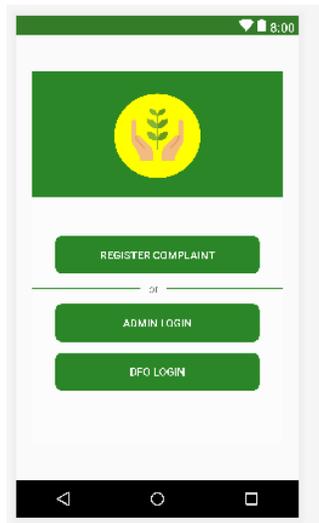
4.1.1. User who shall file the complaint.

- User shall ask to register with personal details on choosing *Register Complaint* option. Following dialog shall appear on the screen.
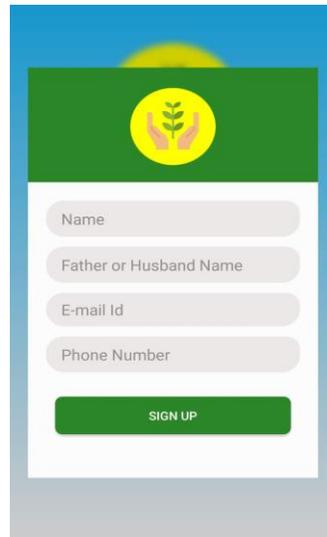
- On filling the correct details user needs to enter OTP.
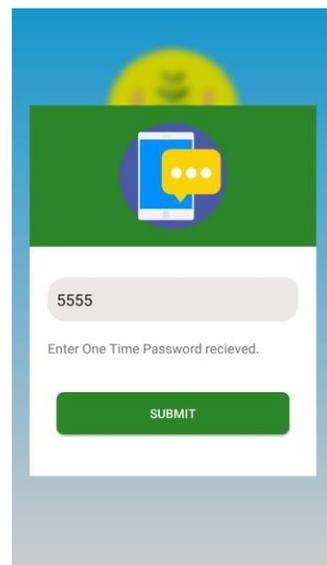
- If the OTP entered is correct the following screen appears with 6 options to choose from:

4.1.1.1 Register Complaint

4.1.1.2 Track Already Register Complaint

4.1.1.3 Check Details of logged in User

4.1.1.4 Portal to giveback feedback

4.1.1.5 Screen to know about the organization

4.1.1.6 Contact Details option

Following is the screenshot for the same.
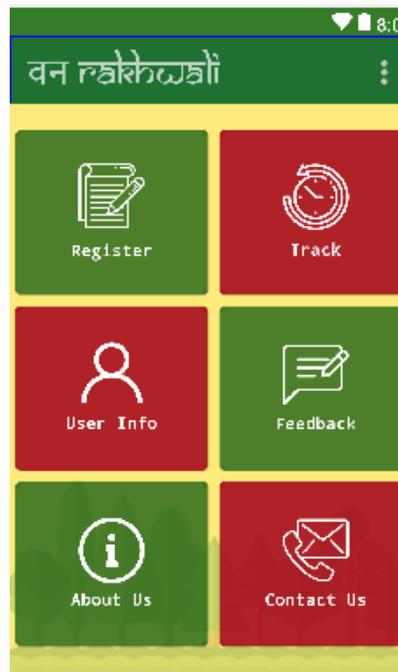
4.1.1.1 Register Complaint

- When user chooses to register complaint option following screen appears where user need to give details about the complaint like region, exact address.
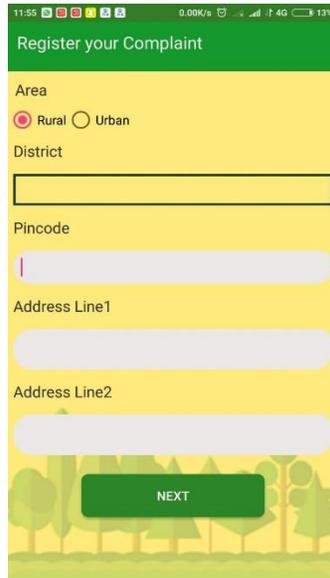
- On entering correct details and clicking on next button, user get option to write down about the complaint and click and upload pictures related to complaint.
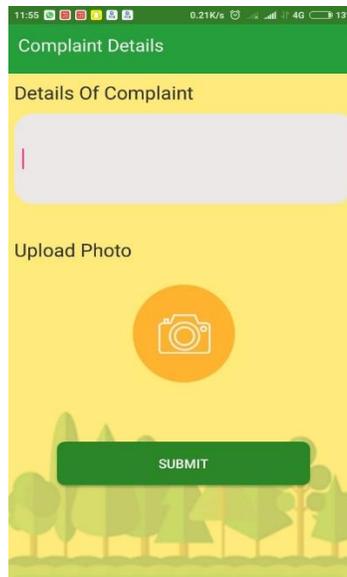
4.1.1.2 Track Already Register Complaint

- When user chooses to track complaint option following screen appears where user need to enter complaint id.
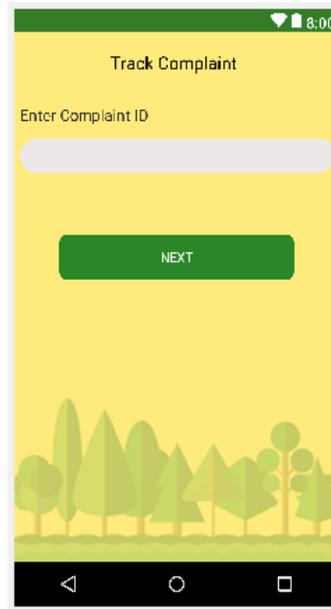
- On entering correct complaint id user shall be able to see details about complaint like status etc. as shown.
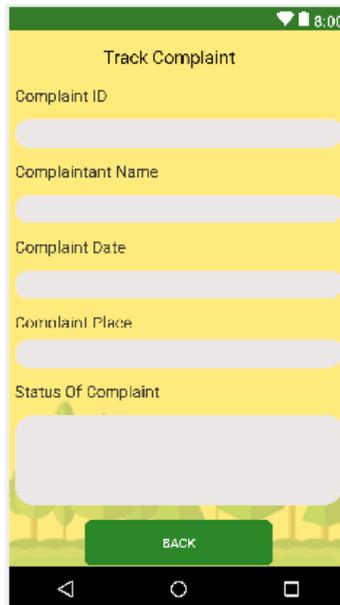
4.1.1.3 View Details of logged in User

- When user chooses *User Info* option following screen appears where user can view the details of logged in account and is provided with logout button to logout from current account.
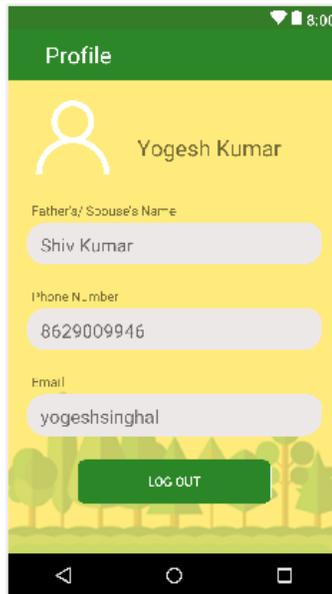
4.1.1.4 Portal to giveback feedback

User can provide feedback to developers and administrators of the application.
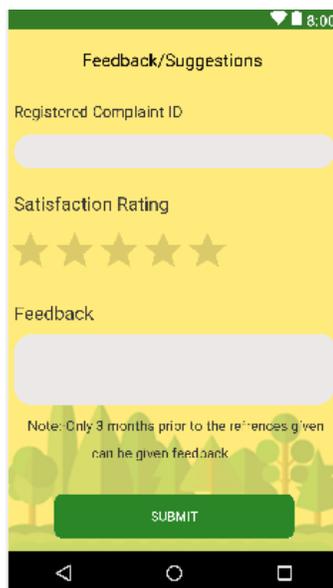
4.1.1.5 Screen to know about the organization

- User shall be able to read about the organization handling the application.

4.1.1.6 Contact Details option

- User can view contact details here
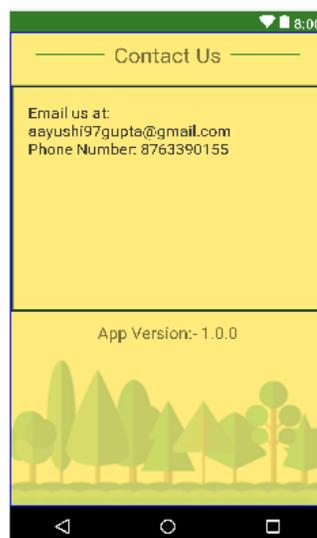
4.1.2. User as Admin.

- User shall be asked to correct username and password to login as a Admin
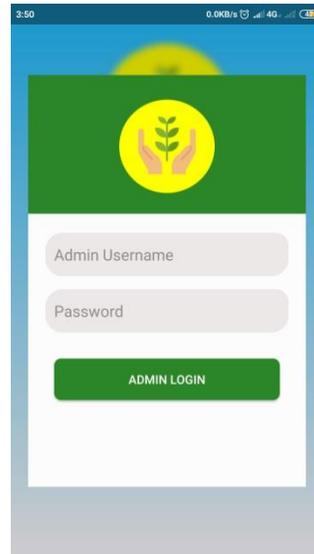
- On filling the correct details user is able to see all the complaints lodged till date from all the districts.
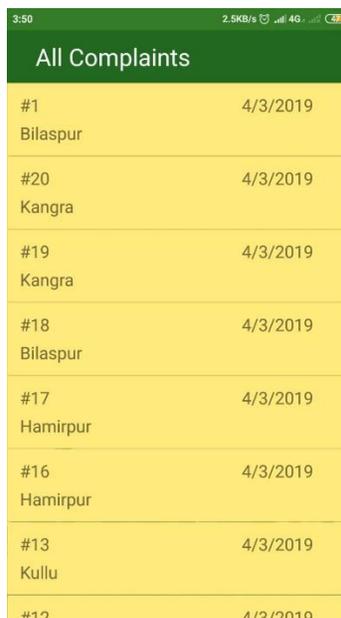
- On taping any complaint following screen appears, it is basically for details regarding that particular complaint.
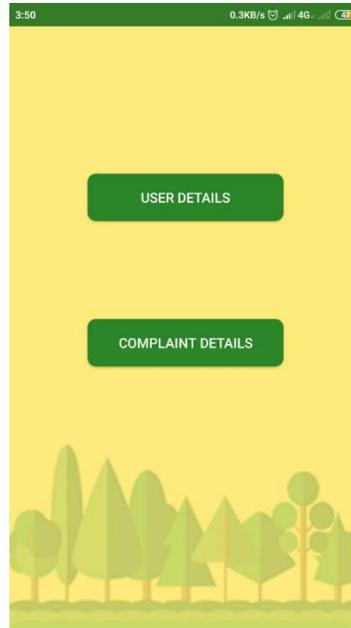
4.1.2.1 User Details

4.1.2.2 Check Status of that particular complaint

4.1.2.1 User Details

- When user chooses this option screen is displayed with details of the user who lodged this particular complaint.

4.1.2.2 Check Status of that particular complaint

- When user chooses to check status following screen appears with status of complaint with id and district.
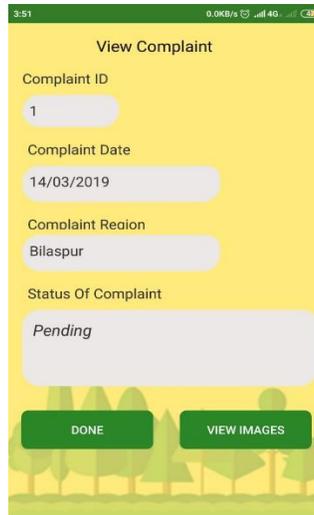
4.1.2.2.1 Done

4.1.2.2.2 View Images

4.1.2.2.1Done Button

- This bring user back to all complaint list.

4.1.2.2.2 View Images

- When user chooses to view images of that particular complaint following screen appears
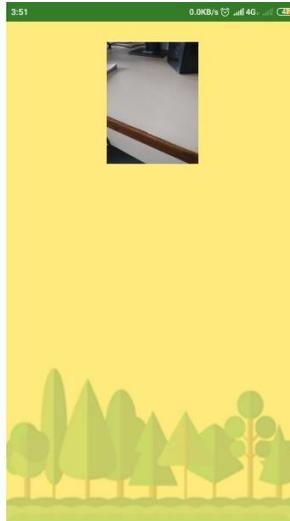
4.1.3. User as DFO.

- User shall be asked to correct username and password with its district to login as a DFO.
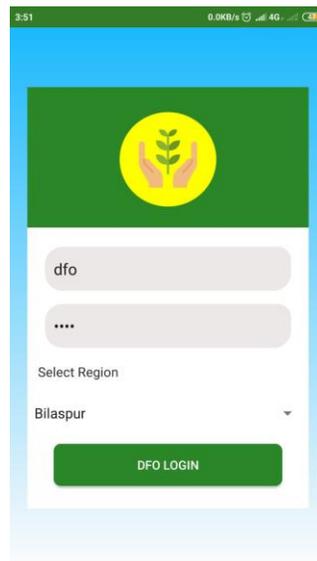
- On filling the correct details user is able to see all the complaints lodged till date from that respective the district from which DFO is assigned to.

- On taping any complaint following screen appears, it is for setting the status for complaint which will be visible to user and admin.
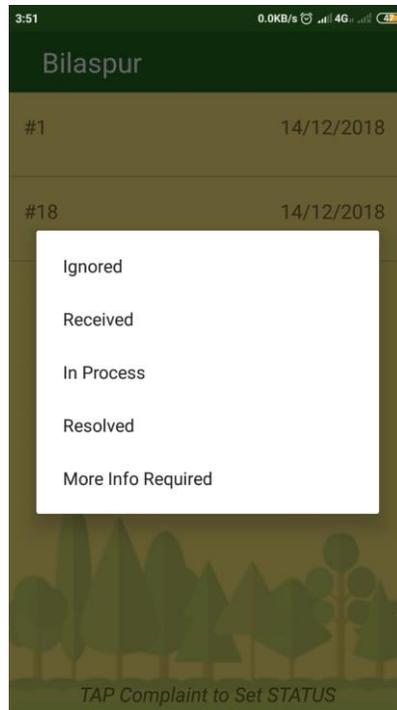
- On taping any choice from the listed the status is updated on the online database and is reflected to all the users.

4.2.   Online Database

This application is well connected with an online database provided by a company called BigRock. Database is used fetch and information regarding users, applications lodged by them, pictured uploaded, action taken, status etc. Online database help to sync the update of data throughout all devices with app i.e. if user files a complaint from one mobile device, the user can see this complaint from another device as admin or DFO without reinstalling the app. Following four tables are made during developing this database:

4.2.1 User Table

It holds the data of all the applicants.

Table 2. User Details Table

- **Name**

  It holds the name of the applicant of the respective complaint.

- **Fname**

  It holds the information regarding the father's name of applicant.

- **Email**

  It holds email of the applicant.

- **Phone**

  It holds the phone no of the applicant

4.2.2 Application Table

It holds the id and the district of all the applications.
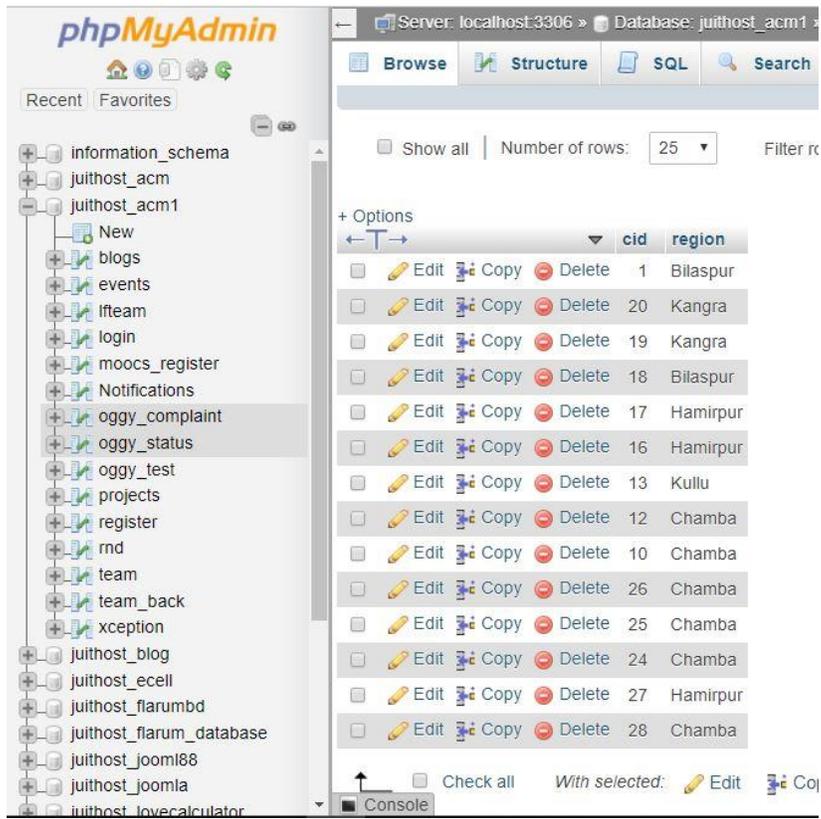
Table 3. User Complaint Table

- **CID**

  It holds the complaint ID of the respective complaint

- **Region**

  It holds the information regarding district of complaint filed.

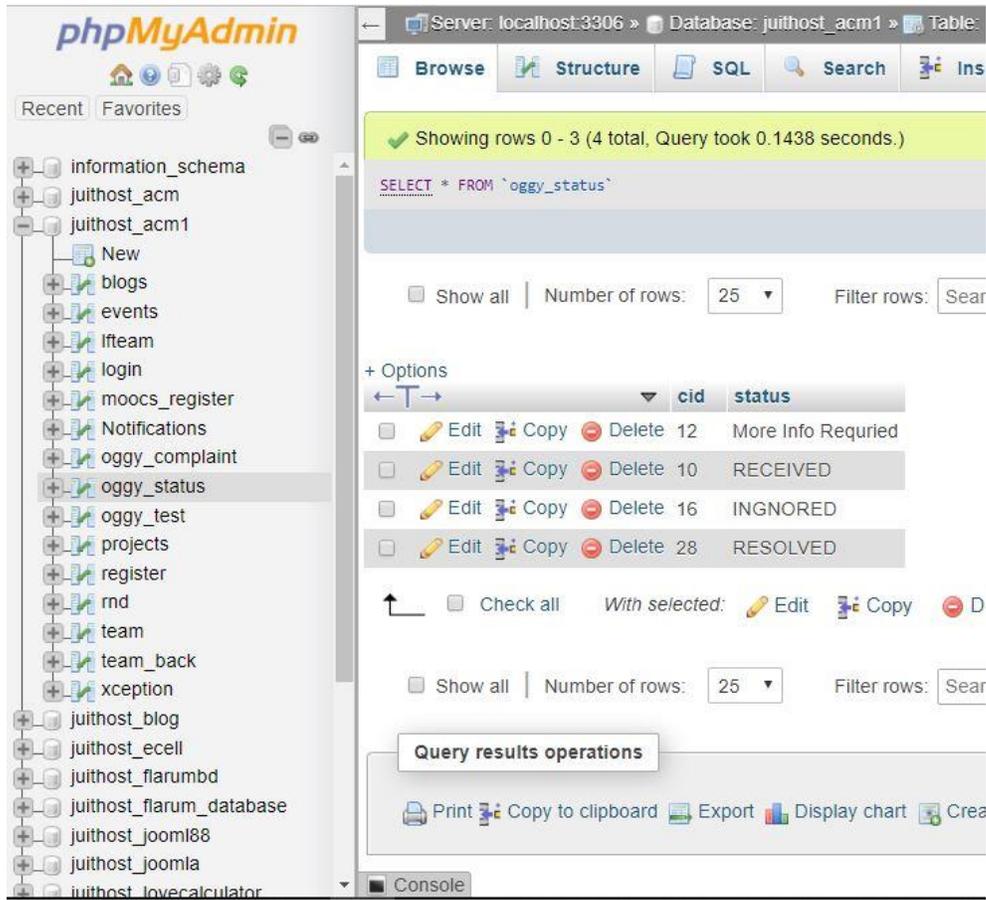## 4.2.3 Status Table

It holds the status of all the applications.

Table 4. User Status Table

- **CID**

  It holds the complaint ID of the respective complaint

- **Status**

  It holds the information status of a particular complaint filed.

4.2.3 Notification Table

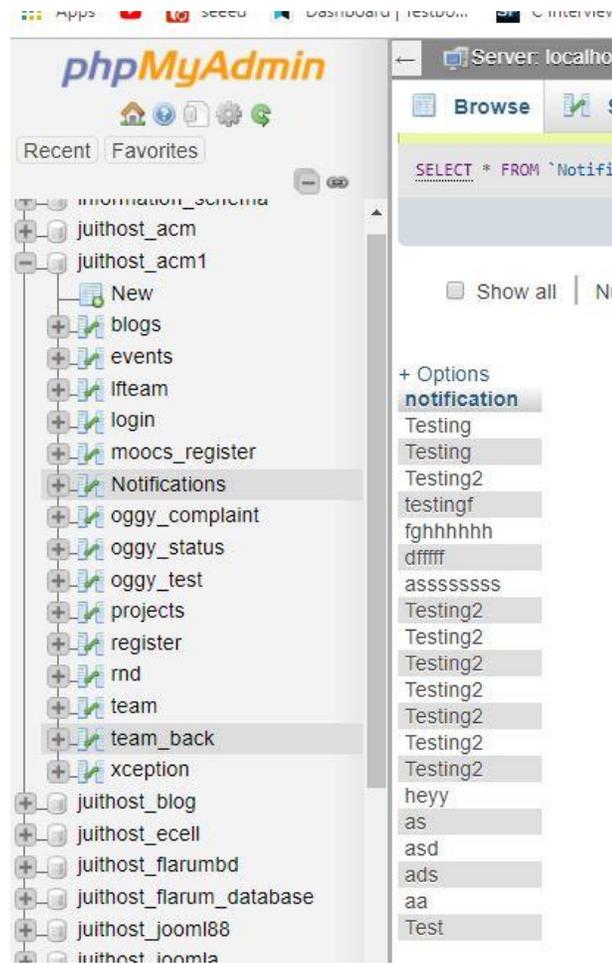It holds the status of all the notifications pushed to user.


Table 5. Notifications Table

- **Notification**

    It holds each and every universal notification pushed to all the users.

4.3.   Form Validation

Proper form validation was implemented while developing this application. Regex was used to achieve the same. Whenever a wrong pattern is entered the text box pops out a message. Various patterns like email, phone number etc. are implemented.
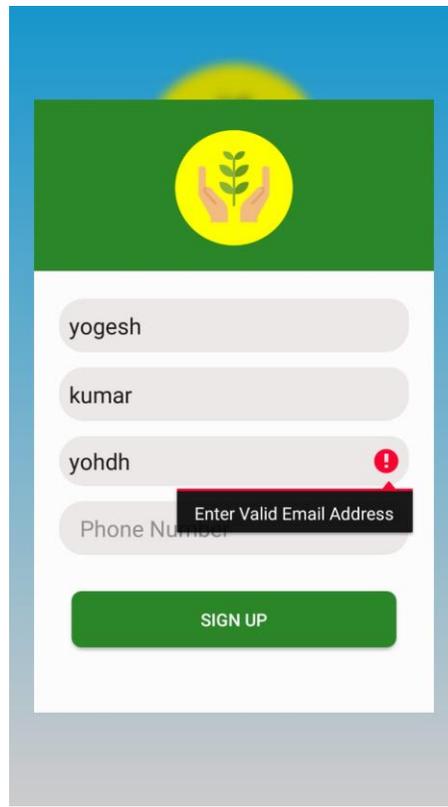
4.4 Post Application Submission

- Application shall be automatically deleted from database after 15 days of proper action taken.
- Vague applications shall be deleted within 5 days after being reported by DFO or admin.

4.5 Feedback Reversal

User is got with an option to push feedback regarding both application and a particular complaint. In case of giving feedback of a particular complaint user needs to mention the complaint id in the text box.
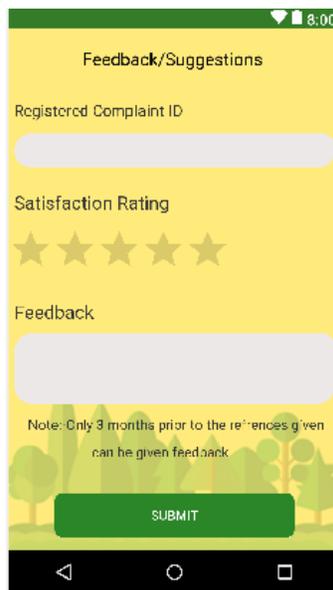
CHAPTER : 5

TEST ANALYSIS

5.1 System Testing

To check the proper functioning of application we need to test it first by making several test cases and by checking whether the expected output and calculated output are same or not. If they are same then test case passes else fails.

In our first test case input was complaint id 10045 which had to be assigned to operator. By our application also it was assigned to the operator, therefore the test case passed.

In second test case according to the region the complaint had to be assigned to DFO1 but the application assigned it to DFO2, therefore the test case failed. Similarly third test case failed because it was meant to be assigned to operator but got assigned to DFO directly.

Input	Expected Output	Calculated Output	Test Case
Complaint ID 10045	Assigned to operator	Assigned to operator	Pass
Complaint ID 10047	Assigned to DFO1 region wise	Assigned to DFO2 region wise	Fail
Complaint ID 10048	Assigned to operator	Assigned to DFO directly	Fail
Complaint Id 10049	3 pictures uploaded successfully	3 pictures uploaded successfully	Pass
Complaint Id 10050	Complaint submitted successfully	Application crashes	Fail

Test Table 1.

5.2Functional Testing

To check the proper functioning of each functionality of application we need to test it first by making several test cases and by checking whether the expected output and calculated output are same or not. If they are same then test case passes else fails.

Input	Expected Output	Calculated Output	Test Case
Validation of Form	Pop up on wrong input pattern	Pop up visible	Pass
Store Complaint	Complaint get saved properly	No complaint saved	Fail
Custom Camera Check	Camera clicking pictures smoothly	Delayed click pics	Fail
Database Retrieve check	Data being fetched properly	Data received correctly	Pass
Push notifications	Notifications received on time	Received notifications time	Pass

Test Table 2.
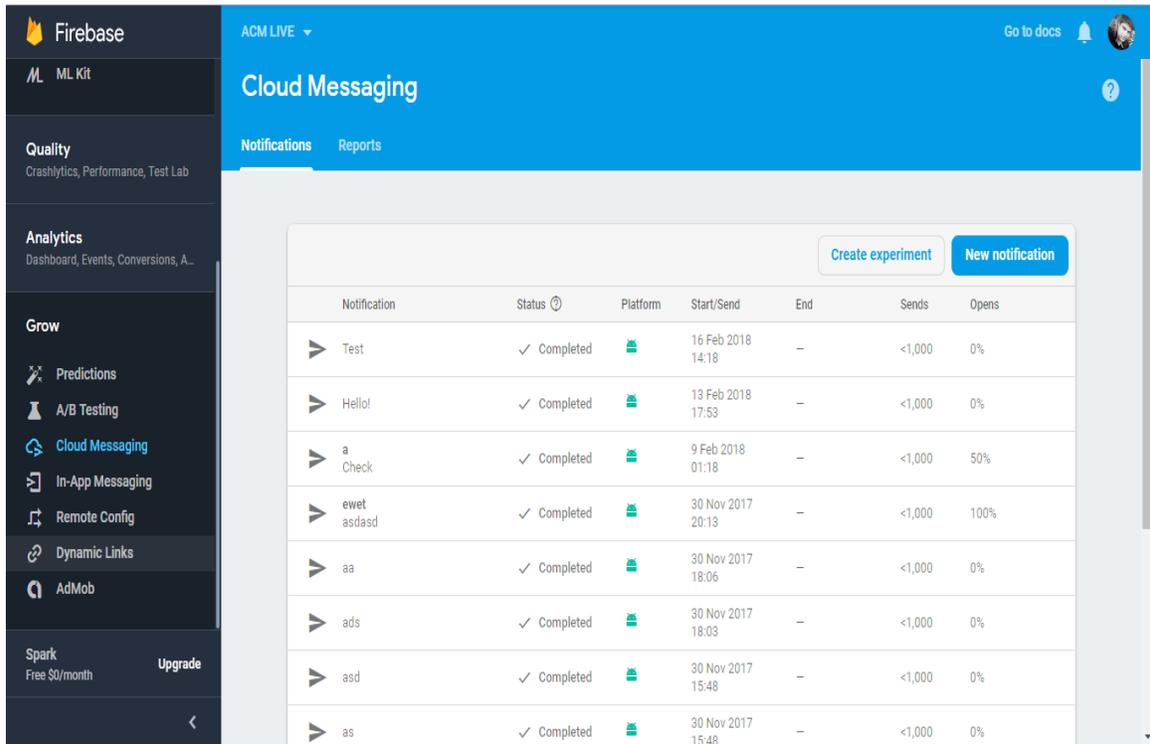
5.3 Performance Testing

To check the overall performance of application on the basis of data transfer rate, load management, speed etc.

Parameter	Expected Output	Calculated Output	Test Case
Data Transfer Rate	Database Table get updated instantly	Data updated on time	Pass
Response Time	Response of activities are quick	Response time is a bit slow	Fail
Load Management	Simultaneous use of app by many users works fine	Overloading makes data transfer slow	Fail
Network Test	Data being fetched properly on low network conditions	Data received correctly even in less network	Pass
Push notifications	Notifications received on time	Received notifications time	Pass

Test Table 3.

5.4 Notification Testing (Firebase)

Notifications were rigorously pushed to make sure notifications reach on real time basis to the user.

CHAPTER : 6

CONCLUSION

During developing this project we have had an experience filled with learning new aspects of technology. This project gave us a solution to the amount of illicit activities happening around us which are not handled properly due to lack of man force.

The thought of successful completion of the project and visualizing it making things easier for endless number of users, especially the forest department, has been a constant source of motivation for both of us.

The thrill of learning and exploring new spheres of technologies which were, before sometime, completely untouched by us helps us keep undeterred and to keep pushing further in terms of implementation and optimization.

Some challenges which we are currently facing and will possibly face in our future endeavors comprise end to end fault free integration of hardware with the device to be tested, lossless transmission of data to Google Firebase, accessing data in the Android application in real-time, achieving accuracy in computation of results.

We are contended with the accomplishments so far and feel proud to present this partial report before you as a representation of our efforts. We are working diligently and passionately towards achieving the goal we have set for this project and expect best results to appear.

We will conclude by thanking the reader (whomsoever it may concern) for sparing some of their invaluably precious time in reading, assessing or evaluating this project report. Any criticisms will be positively accepted and will be considered as touchstones for the betterment of our performance.

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