A

PROJECT REPORT

ON

“INDIAN RAILWAY ANDROID APPLICATION”

Submitted by

DEV SONI.

In the Fulfillment of

“DIPLOMA IN APP DEV”

Guided By

Dhruvika Madam

Janki Madam

Submitted To : -

INFORMATION TECHNOLOGY CENTRE(ITC)

ACKNOWLEDGEMENT

With immense Pleasure I Would like to presence the Project Assignment. I am thankful to all who have helped me a lot for successful completion of the project. and So, I take this Opportunity. My sincere thanks to Dhruvika Madam and Janki Madam who have provided valuable guidance to my Android Railway Information Application.

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I Sincerely Thankful to Information Technology Centre(I.T.C) and their all Teaching and Non-Teaching Staff Members for giving me courage and moral support.

I sincerely Thankful to my Parents and Friends who have motivated and encouraged and helped me to complete my project.

This Project has given me immense knowledge and which is more practical. It will help me in making Commercial Application in Future and help my in my Career.

Thanks to All

Dev Soni

TABLE OF CONTENTS

ABSTRACT

In today's world we need an application, which provides information about railway and updates the user about the status of trains on their smartphones. In India , approximately 85-90 % smartphone users are of Android users. So, our target is to make android application instead of ios or other application to reach maximum users.

Railway Information Application is very user-friendly, easy to use mobile application. with internet connection any user can operate the app very easily.

This Railway Information Application provides variety of features to the users like, Trains Between Stations , Find Train by Train Number or Train Name, Rescheduled Trains, Cancelled Trains , Train Arrivals at particular Station, Train Route Details , PNR Status etc. These features are very helpful to the users and easy to use.

By using this Application , User can know Train Number, Route Details, They can know Station Status, so their time can be saved and they can update themselves.

This Railway Application is Free for Users. So, Users have not to pay anything to use this Application. So, It's Scope is good.

CHAPTER – 1

INTRODUCTION

Contents : -

1.1 Project Overview

Project Title	Railway Information Android Application	
Aim	Railway Information Application is a solution for Routine Passengers as well as New Passengers. The Aim of Making This Application is - People can see online the Train Timings and How many Trains Between two particular Stations, they can find Train Number by Train Name or Vice Versa. They can see whether the train is cancelled or rescheduled or not. They can see Particular Train's Time Table and its Stoppages. They can also see whether their reservation is confirmed or not and seat position by entering their PNR Number. They can also see Live Station Status so that they can know how many trains will come in 2 hours and 4 hours and which train is on time and which train is late and if late then how many minutes late. And These all functions they can see on their mobile sitting at their home. So they will not have to go to station or looking for an online website to inquire this.	
Developed At	Information Technology Centre (ITC) , Mogri , Anand.	
Organization	Information Technology Centre (ITC), Mogri	
Project Guide	Miss. Dhruvika Doshi and Miss. Janki Patel.	
Project Category	Android Application	
Platform Used	Operating System :	Windows 8.1
Tools Used : -	IDE:	Android Studio 3.0
	Framework:	Android
	Language:	Java,Android
	Library Used : -	Volley for JSON Parsing
Back-End	Railway API (Response in JSON Format)	
Duration	2 Months(1st October 2018 - 30th November 2018)	
Team Size	1	

1.2 Purpose : -

The Purpose of my project is to make Android Based Mobile Application rather than Online Websites. So, that People can use or see the functionalities and services by simply downloading (one Time) and then opening the Application. They have not to search the websites and remembering the URL's all the time.

- With Online Android Application, we can accelerate business cycles, improve productivity and reliability, and provide higher levels of service to passengers.
- It can be accessed Online.
- It reduces IT Cost and Maintenance.
- Android Application can be updated and maintained easily. By updating and maintaining Application on Playstore by developer, all the installed Application can be updated. Mobile user just have to download update from Playstore. So, All user's Installed Application Updated Very Easily.
- When the Developer Updates the Application on Playstore, All the Installed User of the Application gets Notification to Update the Application.

1.3 Scope : -

- **What is the Scope of Railway Information Android Application?**

✓ As said the necessities of This Application was there before also, but today in this Technology-friendly world its necessities has increased. Because it helps to get information about Trains to the people. As with the all basic information and functionalities categorized, the Railway Application gives a very simple and user friendly interface to the end user, so its scope is very good.

✓ As the People can check The Station Live Status , Arriving Trains in 2 to 4 Hours , PNR Details, Train Details, Cancelled and Rescheduled Trains, and Train Between Stations easily by using this application on their mobile with internet connection, they have not go to the station to inquire about trains and even they have not to sit in front of computer to search about it, it becomes very easy for the people to update about their train and journey. It is free of cost for end user to use it. Only they require smart phone and good internet Connection with this application installed. So, its Scope is Wide.

1.4 Objectives:-

Railway Inquiry is a Tedious Process. If People want to get information about Railway, they have to go to the Railway Station and stand in a queue in front of Inquiry Window.

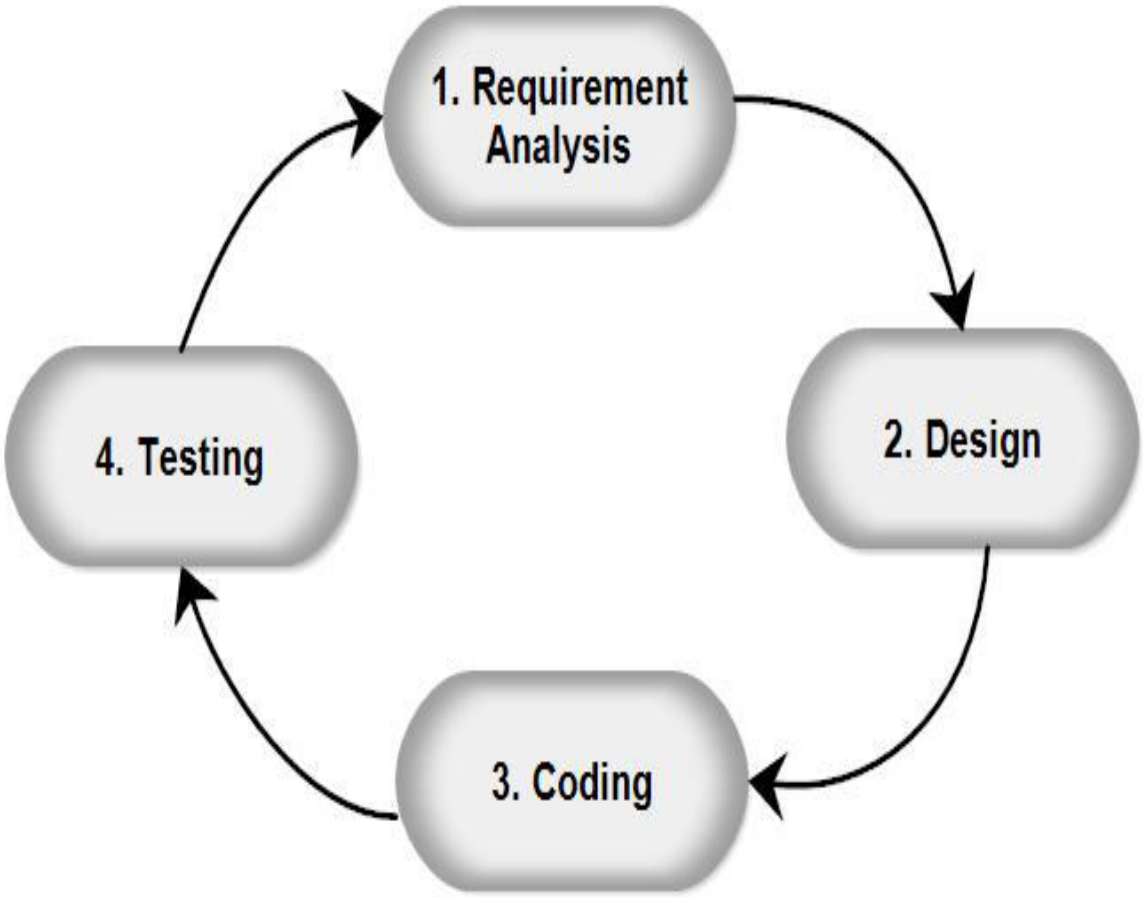
Then ,They have to ask about Train. Sometimes they have to call Railway Inquiry Number to get information. Sometimes, They want to visit IRCTC or other Railway Websites. But By this Application they can get Information on their Mobile Phones. So, This becomes Easy.

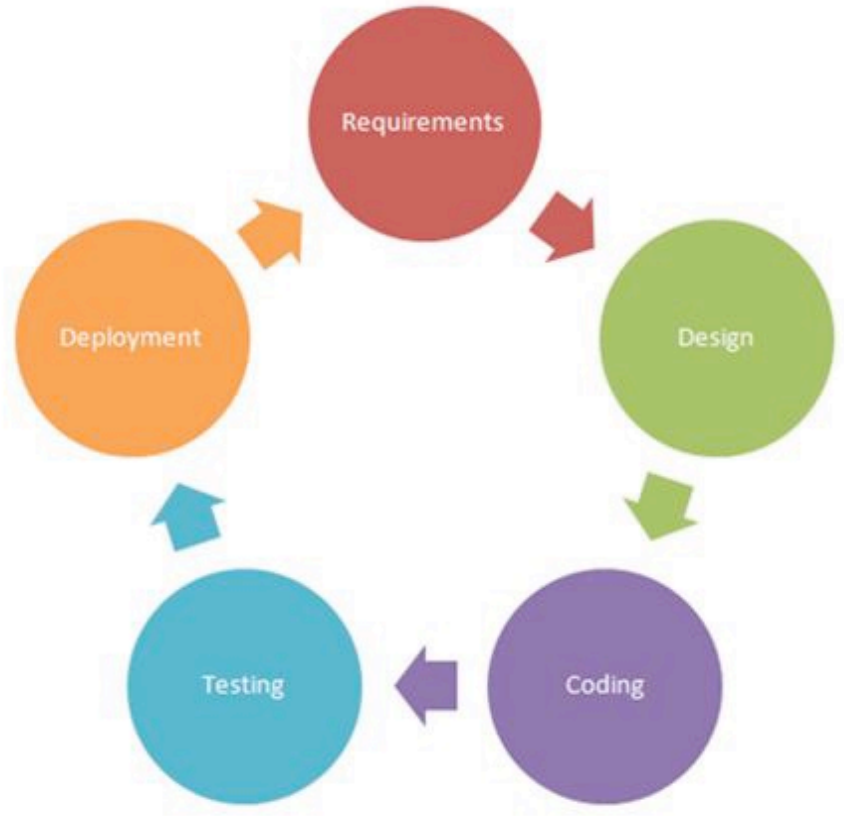
The objective of This Application is to aware the People about Railway and its Services. By Using this Application People's life become easy. In this Application , People can Search between Stations , They can find Trains by Name or Number. They can Search about Rescheduled and Cancelled Trains. They Can Check their PNR Status, Train Route. They also see about a particular Train's total Stoppages.

People can aware about Train Timings and Changes in them by using this Application.

1.5 Project Life Cycle : -

Here in this project, We have implemented a Waterfall model. The purpose of this model is that it works parallel with modules. This model follows the following steps:





- **Requirement Analysis :**

Requirement Analysis is done very first to understand what client want in new system. All requirements were clearly discussed, understood and requests were approved.

➢ Designing

Designing is the major part of any software development process. Proper design is the base of any project. I have designed module wise forms and reports to make coding easy.

➢ Coding

The coding for any phase is as needed as the design phase of the project. Coding was the second major task. Coding was done parallel with design of the modules.

➢ Testing

Testing was done on the regular base during the coding phase itself. Some errors that remained uncovered were corrected at the time of modules testing and integration testing. And we get the required output that we want.

➢ Deployment

Once the product is tested and ready to be deployed it is released formally in the appropriate market. Sometimes product deployment happens in stages as per the business strategy of that organization. The product may first be released in a limited segment and tested in the real business environment (UAT- User acceptance testing).

Then based on the feedback, the product may be released as it is or with suggested enhancements in the targeting market segment. After the product is released in the market, its maintenance is done for the existing customer base.

Here, our software is partially developed, as clients requirements are increased during the development process so after satisfying clients requirements, those modules which are developed later, will be tested then the entire software will be deployed to the client.

CHAPTER - 2

TOOLS & TECHNOLOGY

CONTENTS : -

2.1 Tools Used : -

- Android Studio 3.0
- Microsoft Word as a Document Tools
- Microsoft Visio for Diagram
- JSON to POJO Tool (Back End)

2.2 Technologies Used : -

Front End : -

- Android with Java as a Language

Back End : -

- Railway API (Response in JSON Format)

2.3 Introduction : -

❖ Introduction to Android Studio (IDE For Android Development)

Android Studio is the Official Integrated Development Environment (IDE) for Google's Android Operating System, built on JetBrains' IntelliJ IDEA software and designed specifically for android development. It's develpers are Google and JetBrains. It is available for download on Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application development. It is Written in Java, Kotlin and C++.

Android Studio was announced on May 16, 2013 at the Google I/O conference. It was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014. The first stable build was released in December 2014, starting from version 1.0. The current stable version is 3.2.1, which was released in October 2018.

❖ Features of Android Studio

The Following features are provided in the current stable version.

- Gradle based build support.
- Android-specific refactoring and quick fixes.
- Lint tools to catch performance, usability, version, compatibility and other problems.
- ProGuard integration and app-signing capabilities.
- Template-based wizards to create common Android designs and components.
- A rich layout editor that allows users to drag- and - drop UI components, option to preview layouts on multiple screen configurations.
- Support for building Android Wear Apps.
- Built-in support for Google Cloud Platform, enabling integration with Firebase Cloud Messaging (Earlier 'Google Cloud Messaging') and Google App Engine
- Android Virtual Device (Emulator) to run and debug apps in the Android studio.

Android Studio supports all the same programming languages of IntelliJ, and CLion e.g. Java (programming language), and C++ and Android Studio 3.0 or later supports Kotlin and Java 7 language features and a subset of Java 8 language features that vary by platform version. External projects backport some Java 9 features.

❖ System Requirements for Android Studio

For Latest Version From 3.0 and above

Criterion	Description
OS version	Microsoft Windows 7/8/10 (32-bit or 64-bit), 64-bit required for native debugging, Mac OS X 10.10 (Yosemite) or higher, up to 10.13 (macOS High Sierra), GNOME or KDE desktop Linux (64 bit capable of running 32-bit applications) (GNU C Library (glibc) 2.19+)
RAM	3 GB RAM minimum, 8 GB RAM recommended; plus 1 GB for the Android Emulator
Disk space	2 GB of available disk space minimum,4 GB recommended (500 MB for IDE + 1.5 GB for Android SDK and emulator system image)
Java version	Java Development Kit (JDK) 8, use of bundled OpenJDK is recommended
Screen resolution	1280×800 minimum screen resolution

❖ Version Histroy of Android Studio

Version	Release Date
0.1.x	May 2013
0.2.x	July 2013
0.3.2	Oct 2013
0.4.2	Jan 2014
0.4.6	March 2014
0.5.2	May 2014
0.8.0	June 2014

0.8.6	August 2014
0.8.14	October 2014
1.0	December 2014
1.0.1	December 2014
1.1.0	February 2015
1.2.0	April 2015
1.2.1	May 2015
1.2.2	June 2015
1.3.0	July 2015
1.3.1	August 2015
1.3.2	August 2015
1.4.0	September 2015
1.4.1	October 2015
1.5.0	November 2015
1.5.1	December 2015
2.0.0	April 2016
2.1.0	April 2016
2.1.1	May 2016
2.1.2	June 2016
2.1.3	August 2016
2.2.0	September 2016
2.2.1	October 2016
2.2.2	October 2016
2.2.3	December 2016
2.3.0	March 2017
2.3.1	April 2017
2.3.2	April 2017
2.3.3	June 2017
3.0	October 2017
3.0.1	November 2017
3.1	March 2018
3.1.1	April 2018
3.1.2	April 2018
3.1.3	June 2018
3.1.4	August 2018
3.2	September 2018

CHAPTER - 3

SYSTEM ANALYSIS

CONTENTS : -

3.1 Study of Current System : -

The Current Application is working with various features like Train Between Stations, Find Trains, Live Station Status, PNR Status etc. but some of these features have minor bugs. So,This requires Correction and updation. As the current Application is old and some of the other Apps have not proper features, they requires updation. Some features requires new layout and functionality as well.

3.2 Proposed System(Application) :-

The Railway Application(Proposed System) is the best solution for the Users as per the requirement. The Android based application provides many benefits to the user. It will provide Train Timings and other features more accurately and in less time on the mobile of the user.

The proposed Application have following modules and features : -

1) Train Between Stations
2) Live Station Status
3) Find Trains By Train Name or Train Number(Partial Number or Name is also helps in finding Results)
4) PNR Details of the Passengers
5) Train Schedules – From where Train gets Departured to Where its Destination and in between all stations are showed with timings and distance covered in kilometers.
6) Rescheduled Trains
7) Cancelled Trains

The proposed Application is developed to the users to find Railway Related Information on their smartphones and Tablets.

The proposed system consists of the following goals as follows :-

➢ Goals : -

- To Ease the Process of Railway Inquiry.
- To improve the existing application.
- To be highly available and to reach more users. As, android platform is used highest in smartphones in the world and as well as india.

3.3 Requirements of the New Application(System)

❖ Functional Requirements

- ✓ Search Train Between to stations
- ✓ Find Trains by Name or Number
- ✓ Rescheduled Trains
- ✓ New Timings of Trains
- ✓ Cancelled Trains
- ✓ Arrival of Trains
- ✓ Live Station Status
- ✓ Train Arrival in Next 0 to 4 Hours
- ✓ PNR Inquiry and seat status
- ✓ Station Name or Station Code
- ✓ Type of Train, Train Details

❖ Non - Functional Requirements

- **Performance** : Application should be able to handle multiple users at a time. Many requests are coming to search at the same time. The Application should be capable to handle such requests.

- **Reliability :** Database should be continuously updated. Or we have to use search API or web services which provide accurate data. This API Database should follow Transaction Processing to avoid data inconsistency. Here Railway App is a general Application and its clients are people of country who will download it, so if reliability violates it affects the general people of the country not only specific company or organization. So, here Reliability is a major issue, so Application should be Reliable.

- **Availability :** The Application is published to the Playstore after developed. So , its users can be all android users who want to download and use this app. So,it will be available for free for all android users in Google Playstore.

- **Maintainability :** As the Application is android based, so anyone who has knowledge of smartphone can use it , but they can not make changes in it . If any Updation requires, They need an android developer who modifies in the source code and update it . so, for normal use users doesn't require a programming knowledge but if app requires modification then, it should be modified by the developer or android expertee.

- **Portability :** The Application is highly Portable , if The user changes his smartphone or tablet or user want to use it in smartphone and tablet too, simply he or she have to download this app from paystore on both the devices.

3.4 Feasibility Study : -

The importance of the preliminary investigation is the determination of the system requested is feasible or not. There are three aspects of feasibility study which should be checked in preliminary investigation.

Feasibility study is a short, focused study, which aims to answer a number of questions : -

- Does the Application contribute to the overall objectives of the railway and its users ?
- Can the Application be implemented using current technology and within given cost and schedule constraints?
- Can the Application be integrated with the current application or system which is already in place ?

There are various types of Feasibility Study : -

1) Operational Feasibility
2) Technical Feasibility
3) Time Schedule Feasibility
4) Economical Feasibility
5) Implementation Feasibility
6) Legal Feasibility

1) Operational Feasibility :-

Operational Feasibility measure how well the solution or output will work for the railway users and how well end-user and management and railway staff feels about the Application ?

Proposed Application is helpful for the government ,Railway Staff, Normal users , Citizens. It will allow them to raise query to get appropriate and accurate and adequate information.

On Studying the Operational Feasibility of the Project, the following conclusions could be derived:

- Developed Application for Railway will provide and manage adequate and accurate throughput and all necessary information to all end-users.
- It will provide beneficial and reliable services.
- If it can be installed with suitable environment , System will do operation under environment of limited resources.

2) Technical Feasibility : -

This assessment focuses on the technical resources available to the organization. It helps organization to determine whether technical resources meet capacity and whether technical team is capable of converting ideas into working systems. Technical feasibility also involves evaluation of hardware, software and other technology requirements of the proposed system.

Technical Feasibility tries to answer the following questions to make the software feasible to develop.

- The software or tools for building or running the application are easily available or not?
- The compatibility among software exists or not?
- Is developer aware of theses chosen technologies? What about the alternative of these chosen technologies?

The answer of the above question is given below:

- ✓ All are familiar with these Android technologies.
- ✓ The selected technologies have greater advantage over their challenging technologies.
- ✓ All the products are available with developer.

So, we can say that project is technical feasible.

3) Time Schedule Feasibility :-

Project is initiated with specific deadline. We need to evaluate whether the deadline is mandatory or desirable. Time is one of the critical factors in the development of the system but this kind of feasibility is hardly perfect in any system. We have been complete the project within the working days of the organization having period of 2 months approximately. So we have managed to complete the project before the deadline.

4) Economical Feasibility : -

This assessment typically involves a cost/ benefits analysis of the project, helping organizations determine the viability, cost, and benefits associated with a project before financial resources are allocated. It also serves as an independent project assessment and enhances project credibility—helping decision makers to determine the positive economic benefits to the organization that the proposed project will provide. As the development tools are free of cost, there is not any burden of buying softwares and tools.

5) Implementation Feasibility : -

Under the study of Implementation Feasibility we have to take care of implementation related issues. Like, can we install application or software within given environment? And will organization management and users will support for installation ? Will proposed application or software cause harm to the operation of organization? Answer to such questions are management and users will be supportive and it won't cause any harm to organizations and user's day to day activities.

6) Legal Feasibility : -

This assessment investigates whether any aspect of the proposed project conflicts with legal requirements like data protection acts, or social media laws.

3.5 FACT FINDING TECHNIQUES

We used four fact finding methods technique in our system analysis.

- Interview
- Questionnaire
- Record review
- Observation

- **Interview:-**

We used this technique frequently in the system analysis after questionnaires. The interview were unstructured. We choose some people in the organization who were either decision maker or operator or uses Some activity related with the project. As we interviewed them many helped us to understand all stages involved.

- **Questionnaire:-**

We used this technique in the initial and Final phases of our project. In the initial phase we Prepared some questionnaire to get some basic information about the current system. Then we used the questionnaire to get some numerical data that was required or missing after all the observation.

- **Record review:-**

This was the most beneficial technique for us while making our database we studied the existing file structure, documents used and generated

in the organization. For every files registers we tried to identify its significance need relation with other data item.

- **Observation:-**

While finding the facts we keenly observed all the activities and transaction usage of files and document. Observation

helped us in finding out the actual way functioning apart from the ideal or desired.

3.6 Requirement Validation

Requirements validation is an iterative process which takes place throughout the lifecycle of the project. During elicitation, analysis and specification one should constantly be questioning and clarifying the data in order to check its validity. This will ensure that the SRS that is produced is complete, consistent and ready for the formal validation process.

The formal requirements validation process is aimed to ensure that the SRS is complete, consistent, modifiable and traceable. Also testing to makes sure that the requirements statements themselves are complete, correct, feasible, necessary, prioritized, unambiguous and verifiable. This may seem like a lofty task but it is essential to pick up any gaps or errors at this stage in order to minimize defects later.

The costs associated with rectifying defects later in the process are exorbitant. Ironing out as much possible at this stage should be your priority.

3.7 Project Planning : -

To develop the project as a single unit project is divided in to modules. First the project is divided into modules. Then further divided into submodules. The submodules are implemented on the coding basis. Then the submodules are integrated into modules & layouts are

designed for the modules. Then the modules are integrated into the single entity of project.

3.8 System Requirements : -

➢ Hardware Requirements

The **Minimum** Requirements at the **Developer** side are : -

- 4 GB RAM
- 100 GB of Hard-disk space
- Intel i3 processor

The **Recommended** Requirements at the **Developer** side are : -

- 8 GB RAM
- 500 GB Hard disk or 1 TB Hard-disk
- Intel i3 processor is minimum required, Intel i5 recommended, Intel i7 is best.

Requirement at Client Side :-

- Android Smart phone
- Good Internet Connection

- Minimum OS Android 7.0 Nougat or higher for best Performance of Application.

➢ Software Requirement : -

Developer side : -

- System having Windows 7 or higher OS installed
- Android Studio 2.3.3 or higher, Android studio 3.0 is recommended.

Client side : -

- Android Smartphone with Android 7.0.0 or higher is required for best performance of the application.

CHAPTER - 4

Implementation Environment and Coding Standard

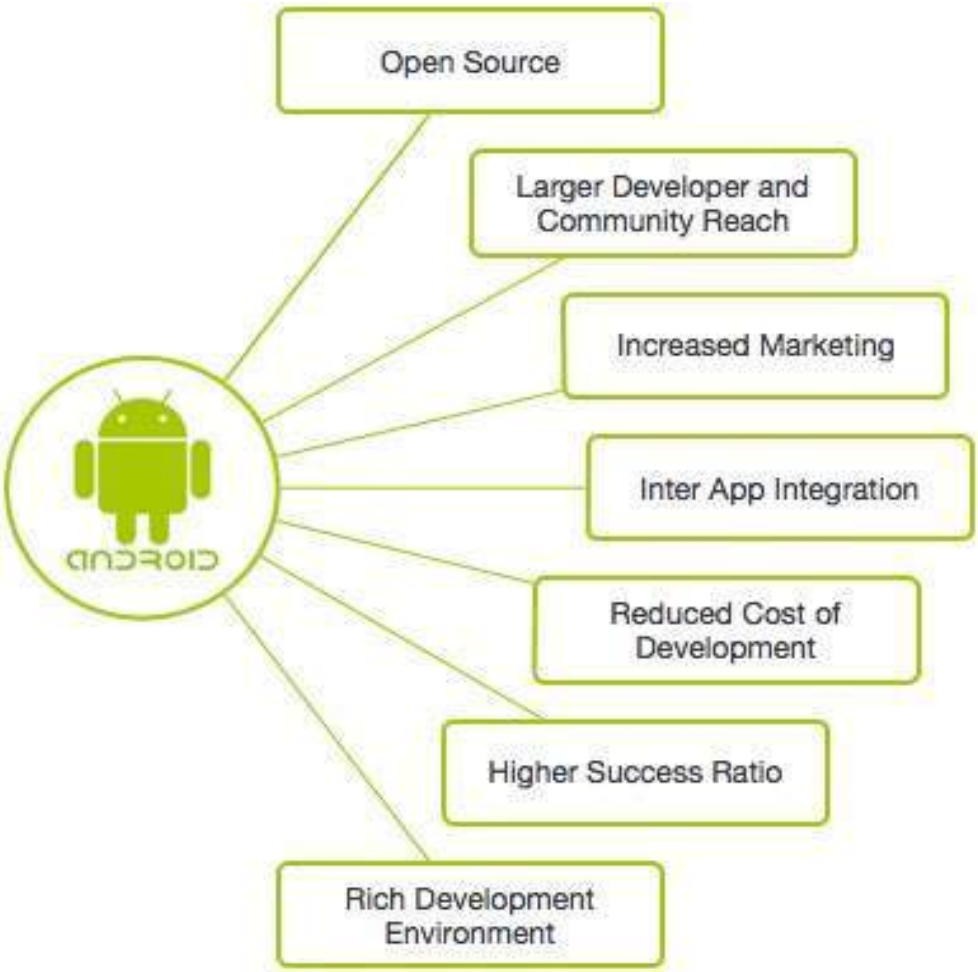
Contents : -

4.1 Android Environment : -

Android is an open source and Linux-based operating system for mobile devices such as smartphones and tablet computers. Android was developed by the Open Handset Alliance, led by Google, and other companies.

Android offers a unified approach to application development for mobile devices which means developers need only develop for Android, and their applications should be able to run on different devices powered by Android.

➢ Why Android ?



❖ Features of Android : -

1. Beautiful UI

Android OS basic screen provides a beautiful and intuitive user interface.

2. Connectivity

GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX.

3. Storage

SQLite, a lightweight relational database, is used for data storage purposes.

4. Media support

H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP.

5. Messaging

SMS and MMS

6. Web browser

Based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript engine supporting HTML5 and CSS3.

7. **Multi-touch**

Android has native support for multi-touch which was initially made available in handsets such as the HTC Hero.

8. **Multi-tasking**

User can jump from one task to another and same time various application can run simultaneously.

9. **Resizable widgets**

Widgets are resizable, so users can expand them to show more content or shrink them to save space.

10. **Multi-Language**

Supports single direction and bi-directional text.

11. **GCM**

Google Cloud Messaging (GCM) is a service that lets developers send short message data to their users on Android devices, without needing a proprietary sync solution.

12. **Wi-Fi Direct**

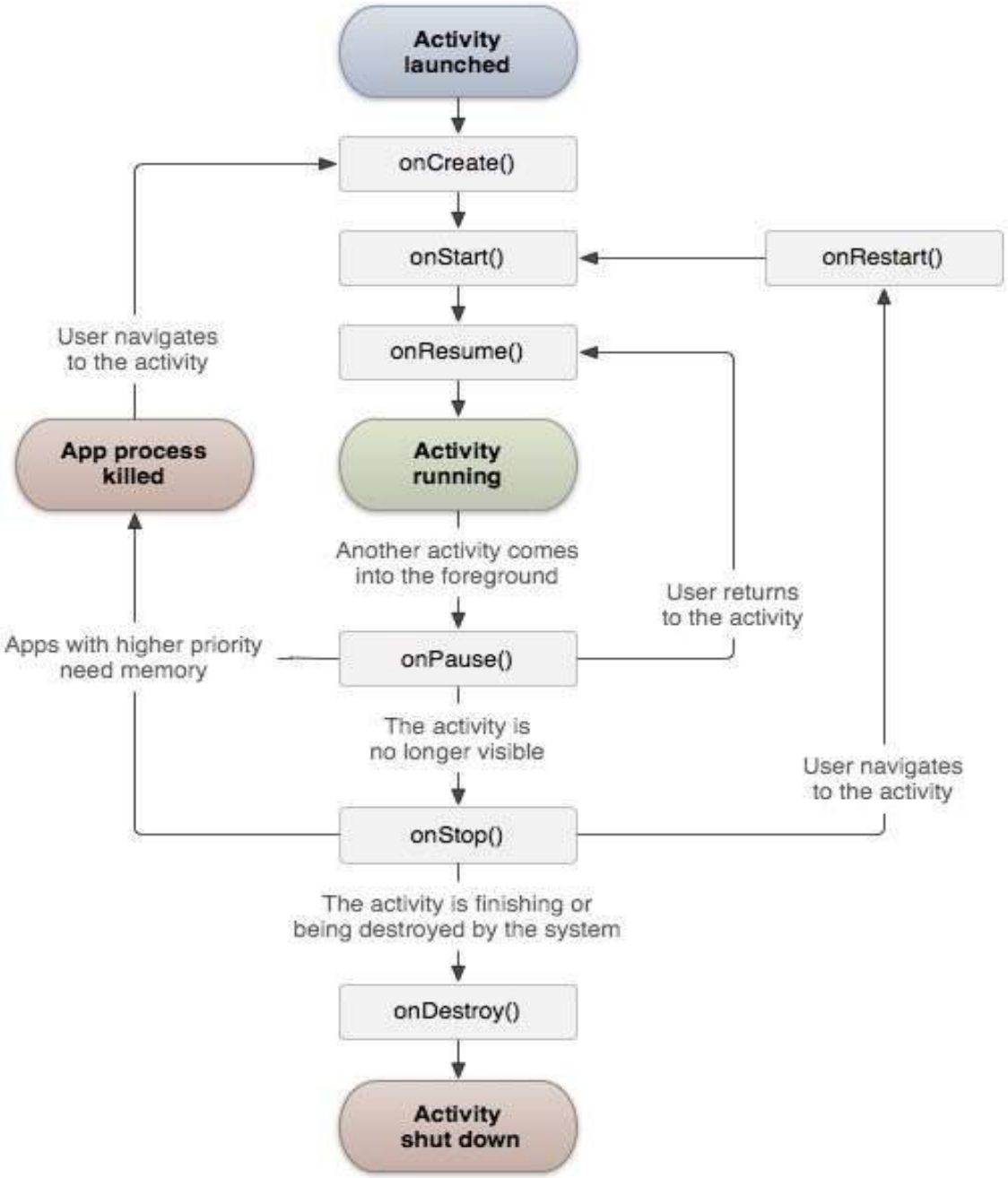
A technology that lets apps discover and pair directly, over a high-bandwidth peer-to-peer connection.

13. **Android Beam**

A popular NFC-based technology that lets users instantly share, just by touching two NFC-enabled phones together.

4.2 Android Activity Lifecycle : -

Android system initiates its program with in an **Activity** starting with a call on *onCreate()* callback method. There is a sequence of callback methods that start up an activity and a sequence of callback methods that tear down an activity as shown in the below Activity life cycle diagram :-



The Activity class defines the following call backs i.e. events. You don't need to implement all the callbacks methods. However, it's important that you understand each one and implement those that ensure your app behaves the way users expect.

Sr.No	Callback & Description
1	**onCreate()** This is the first callback and called when the activity is first created.
2	**onStart()** This callback is called when the activity becomes visible to the user.
3	**onResume()** This is called when the user starts interacting with the application.
4	**onPause()** The paused activity does not receive user input and cannot execute any code and called when the current activity is being paused and the previous activity is being resumed.
5	**onStop()** This callback is called when the activity is no longer visible.
6	**onDestroy()** This callback is called before the activity is destroyed by the system.

7	**onRestart()** This callback is called when the activity restarts after stopping it.

4.3 CODING STANDARDS

❖ **Why have coding conventions**

Code conventions are important to programmers for a number of reasons:

- 85% of the lifetime cost of a piece of software goes to maintenance.
- Hardly any software is maintained for its whole life by the original author.
- Code conventions improve the readability of the software, allowing engineers to understand new code more quickly and thoroughly.

If you ship your source code as a product, you need to make sure it is a well packaged and clean any as other product you create.

❖ **Coding Technique : -**

Coding techniques incorporate facets of software development and, although they usually have no impact on the functionally of the application, they contribute to an improvement comprehension of source code. For the purpose of this document, all forms of source code are considered, including programming and query languages.

The coding techniques are divided into three sections:

- **Naming Conventions:** Naming conventions make programs more understandable by making them easier to read. They can also give information about the function of the identifier-for example, whether it's a constant, package, or class-which can be helpful in understanding the code.

- **Comments:** Software documentation exists in two forms, external and internal. External documentation is maintained outside of the source code, such as specification, help files, and design documents. Internal documentation is composed of comments that developers write within the source code at development time.

- **Code Formatting:** Formatting makes the logical organization of the code stand out. Taking the time to ensure that the source code is formatted in a consistent, logical manner is helpful in reading and understanding to you and to other developers who must decipher the source code.

    - It is acceptable to break up long statements (such as a long "if" condition) onto multiple lines or leave it in one long line.
    - The start block bracket ("{") should always be by itself on the next line. Do not place it at the end of the statement that starts the block.
    - Always use block brackets, even if the block is one line long.
    - Do not put multiple statements on one line.
    - Every coding block should be indented.
    - The standard indentation is 3 spaces.

CHAPTER – 5

TESTING

Contents : -

5.1 Testing Plan : -

- **The Testing Process**

  We have tested the software process activates like design, implementation and requirement engineering. As design errors are costlier to repair, once the system has started to operate it is therefore quite obvious to repair them all at the initial stage of the system.

- **Requirement Traceability**

  As most interested portion in the system meeting its requirements, therefore testing should be planned so that all requirements are individually tested, we have checked the output of certain combinations of inputs which gives desirable output or not. Strictly going alone, our requirements specifications gave us the path to get desirable result for system users.

- **Tested Items**

  Our test items were like, validation of each and every field when user enters the data. The user is not allowed to enter incorrect data and also he is not allowed to leave the text views empty. The mandatory fields which were the necessary fields were tested to contain data and not empty. Places where numeric or alphanumeric characters were required, testing was done to see that no data other than required was entered.

- **Testing Schedule**

  We have tested each module Back to Back so that errors and omissions can be found as early as possible. Once the system has been developed fully we tested it on other machines by deploying it on various machines.

- **General Plan for Testing**

  The Application is tested using Bottom up testing strategy.

  - ✓ Testing of each rest service with standard inputs.
  - ✓ Testing of each individual class files.
  - ✓ Testing of each individual user interface layout file.
  - ✓ Module wise testing (all sub modules) while code developed.
  - ✓ Integration testing of system after integration of individual modules.
  - ✓ Security testing.
  - ✓ User level testing.

5.2 TESTING STRATEGY

Testing strategy is a general approach to the testing process rather than method of devising particular system or components test. Different testing strategies may be adopted depending on the type of system to be tested and the develop process used. So considering functional oriented nature of this software we adopted mixture of following strategies:

1. A detect found helps in the process of making the software reliable.

2. Even if the defects found are not corrected, testing gives an idea as to how reliable the software is.
3. Over time, the record of defects found reveals the most common kinds of defects is, which can be used for developing appropriate preventive measures such as training, proper design and reviewing.

The testing sub process includes the following activities in a phase dependent manner.

- Create test plans.
- Create test specifications.
- Review test plans and test specifications.
- Conduct test according to the test specifications and log the defects.
- Fix defects, if any.
- When defects are fixed, continue from activity.

5.3 Testing Methods : -

The development process repeats the testing of sub-process a number of times for the following phases:

- **Unit Testing**

  Unit testing focuses verification effort on the smallest unit of software design the software component or module. In this type of testing module are tested individually and verified whether accurate output was made available or not.

- **Integrated Testing**

  When unit testing was over, all the modules were integrated one by one and tested as a whole. It might be possible that all modules may work individually, but they may not work when put together. Data can be lost across the interface, one module can have an advertise effect on other sub function of another. Global data structure can present problem. So any system has to be tested this way so that the final output is the desired one. Also common functions throughout the system were taken and formed into a class so that they could be accessed from the same place without creating any ambiguity.

- **Validation Testing**

  After the integration testing software is completely assembled as a package, interfacing errors have been uncovered and corrected, validation testing begins. Validation testing can be defined as Validation succeeds when the software function in a manner that can be reasonably accepted by the client.

- **Storage Testing**

  The database of the system comes from the API in the form of JSON Format. So, The response is coming properly or not and it is parsed in a proper manner or not it is tested and arranged in a proper layout format.

- **System Testing**

  Users interact with your app on a variety of levels, from pressing a **Submit** button to downloading information onto their device. Accordingly, you should test a variety of use cases and interactions as you iteratively develop your app.

5.4 Use an iterative development workflow : -

As your app expands, you might find it necessary to fetch data from a server, interact with the device's sensors, access local storage, or render complex user interfaces. The versatility of your app demands a comprehensive testing strategy.

When developing a feature iteratively, you start by either writing a new test or by adding cases and assertions to an existing unit test. The test fails at first because the feature isn't implemented yet.

It's important to consider the units of responsibility that emerge as you design the new feature. For each unit, you write a corresponding unit test. Your unit tests should nearly exhaust all possible interactions with the unit, including standard interactions, invalid inputs, and cases where resources aren't available.

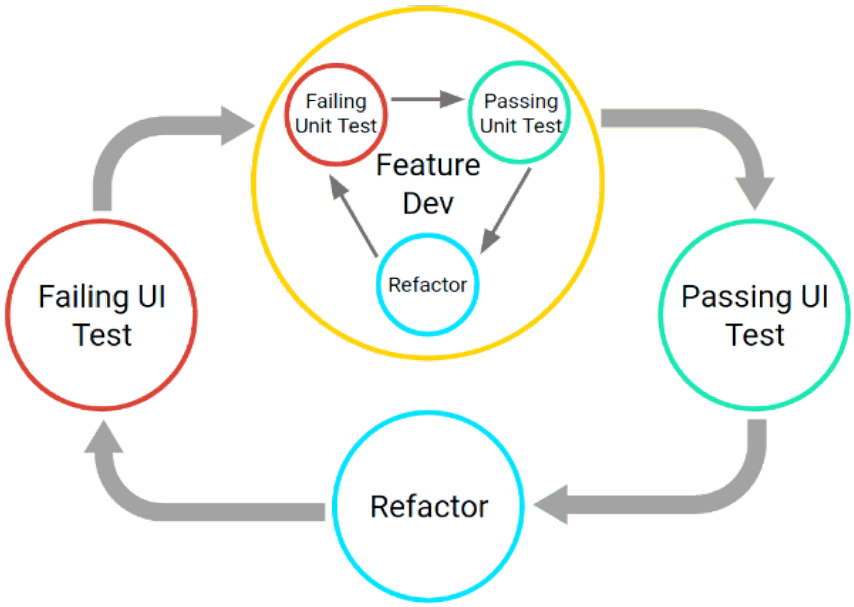


Figure 1. The two cycles associated with iterative, test-driven development

The full workflow, as shown in Figure 1, contains a series of nested, iterative cycles where a long, slow, UI-driven cycle tests the integration of code units. You test the units themselves using shorter, faster development cycles. This set of cycles continues until your app satisfies every use case.

❖ Understand the Testing Pyramid :-

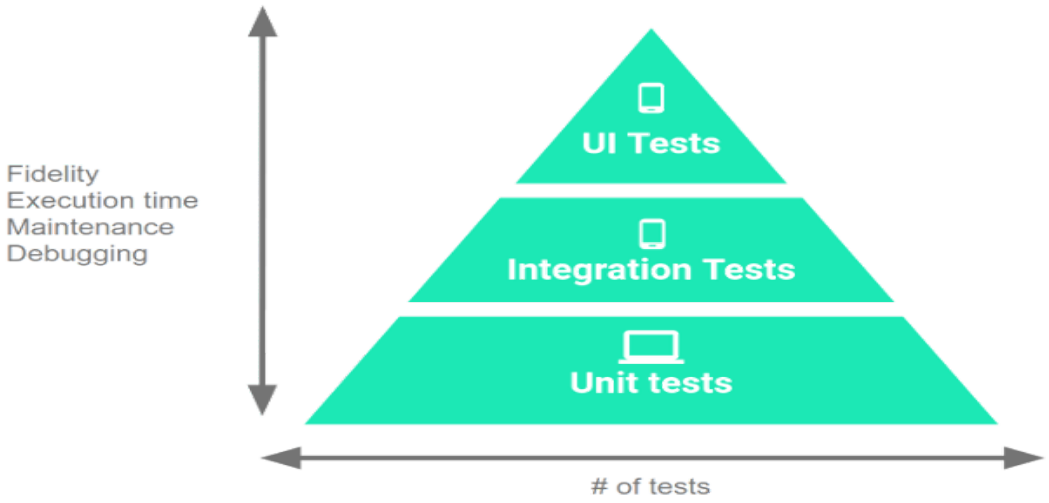


Figure 2. The Testing Pyramid, showing the three categories of tests that you should include in your app's test suite

The Testing Pyramid, shown in Figure 2, illustrates how your app should include the three categories of tests: small, medium, and large:

- Small tests are unit tests that you can run in isolation from production systems. They typically mock every major component and should run quickly on your machine.
- Medium tests are integration tests that sit in between small tests and large tests. They integrate several components, and they run on emulators or real devices.
- Large tests are integration and UI tests that run by completing a UI workflow. They ensure that key end-user tasks work as expected on emulators or real devices.

Although small tests are fast and focused, allowing you to address failures quickly, they're also low-fidelity and self-contained, making it difficult to have confidence that a passing test allows your app to work. You encounter the opposite set of trade-offs when writing large tests.

Because of the different characteristics of each test category, you should include tests from each layer of the test pyramid. Although the proportion of tests for each category can vary based on your app's use cases, we generally recommend the following split among the categories: **70 percent small, 20 percent medium, and 10 percent large**.

CHAPTER – 6

User Manual

Contents : -

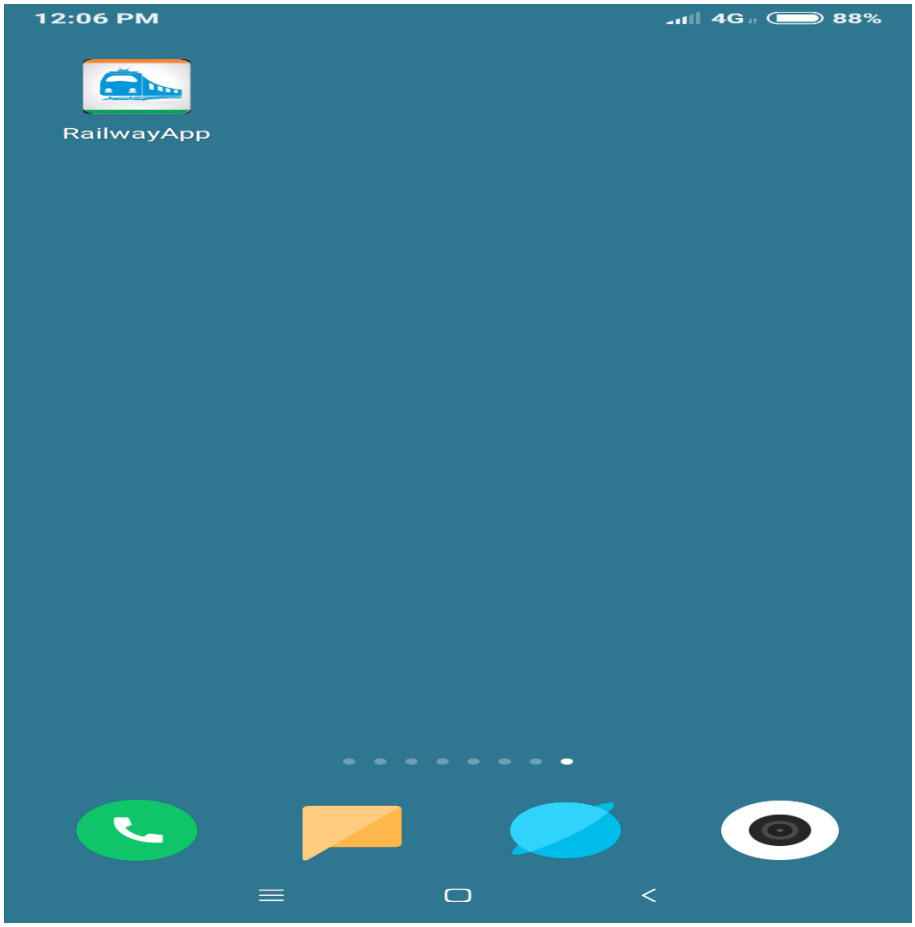
6.1 Introduction : -

User Manual is a document for novice users that explains how to use or operate something, such as software program, some other component or application.

User Manual tells the novice user by written description or by picture to use that particular application. It also describes the steps to follow for particular functionality to work. In my application I am providing the different functionality to user for that following is the stepwise description to use that functionality.

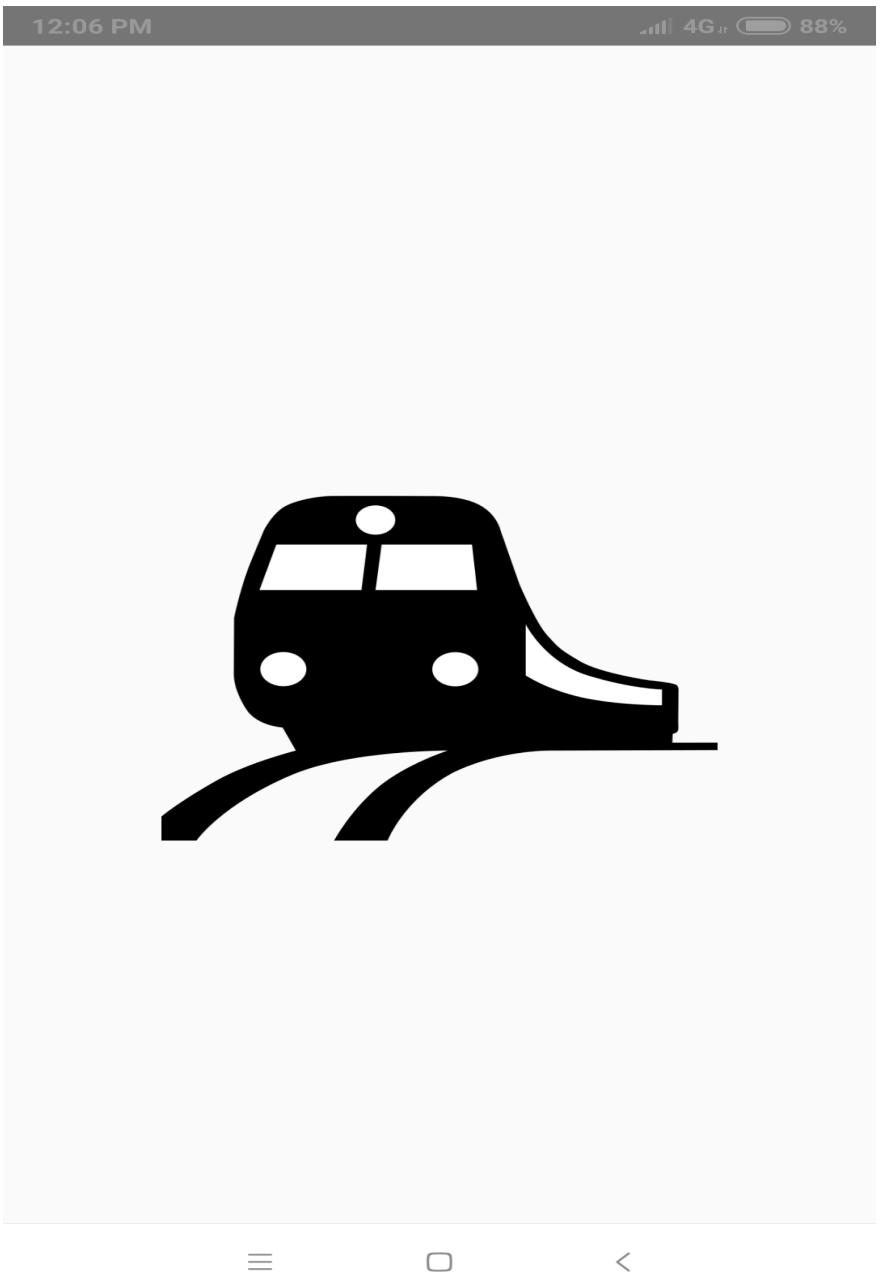
6.2 Screen-Shots : -

- **App Icon : -**



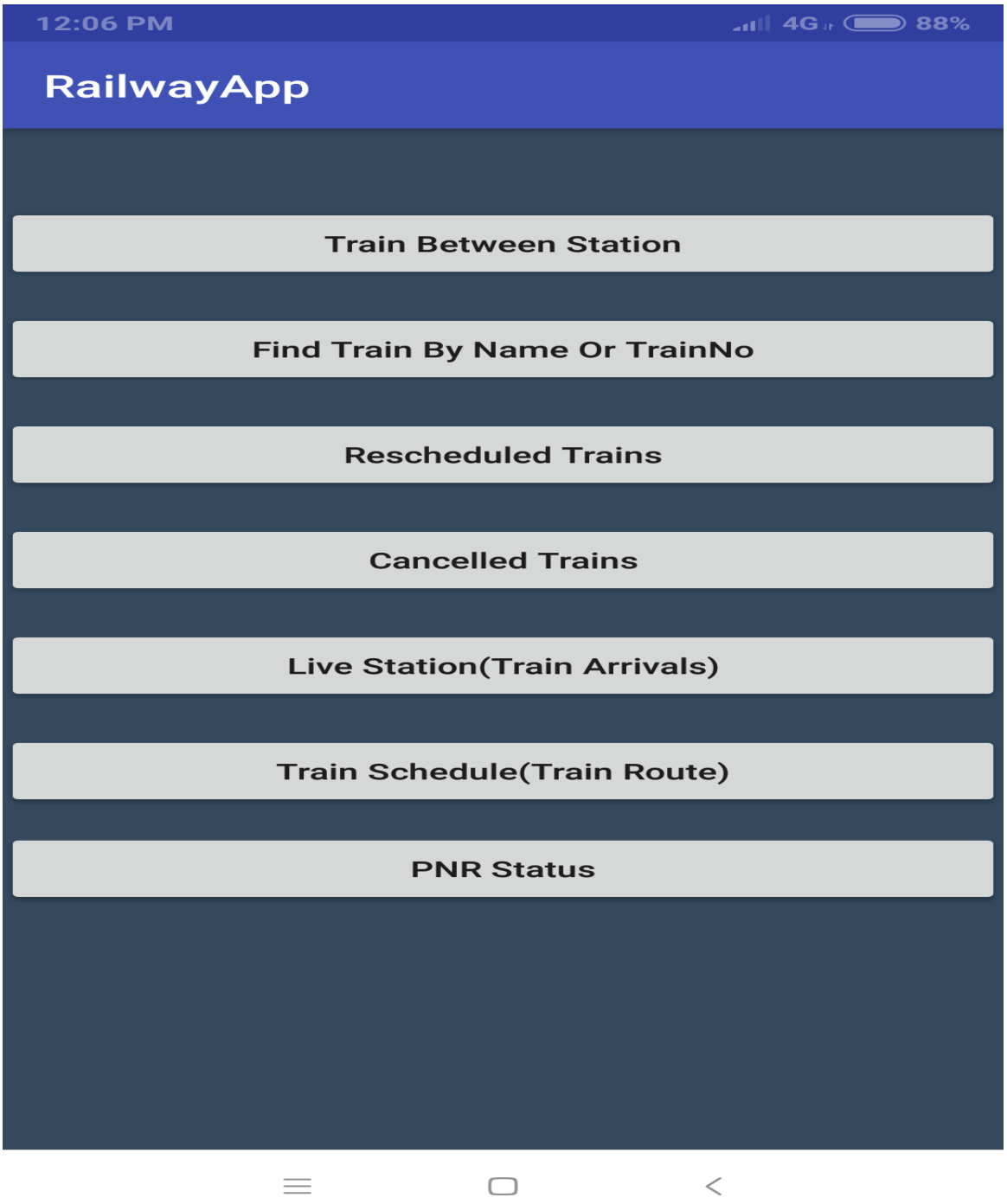
This is the Main Icon or Logo of this Railway Application. By this Icon our application is identified.

- **Splash Screen**



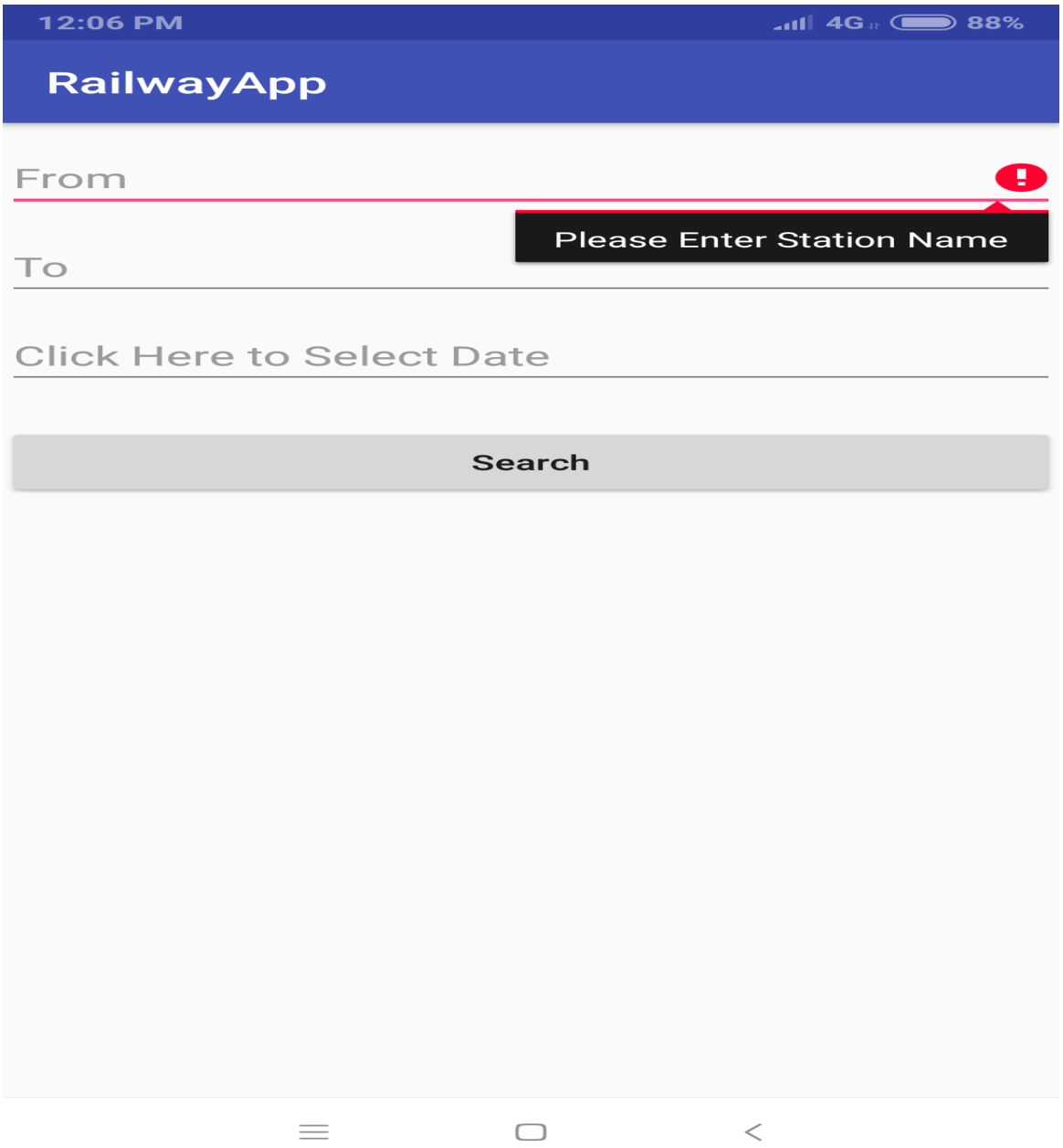
This is the Splash Screen of the Application. When we start the Application , then first the user sees the splashscreen for 5 seconds then he/she will be redirected to the home screen of the application.

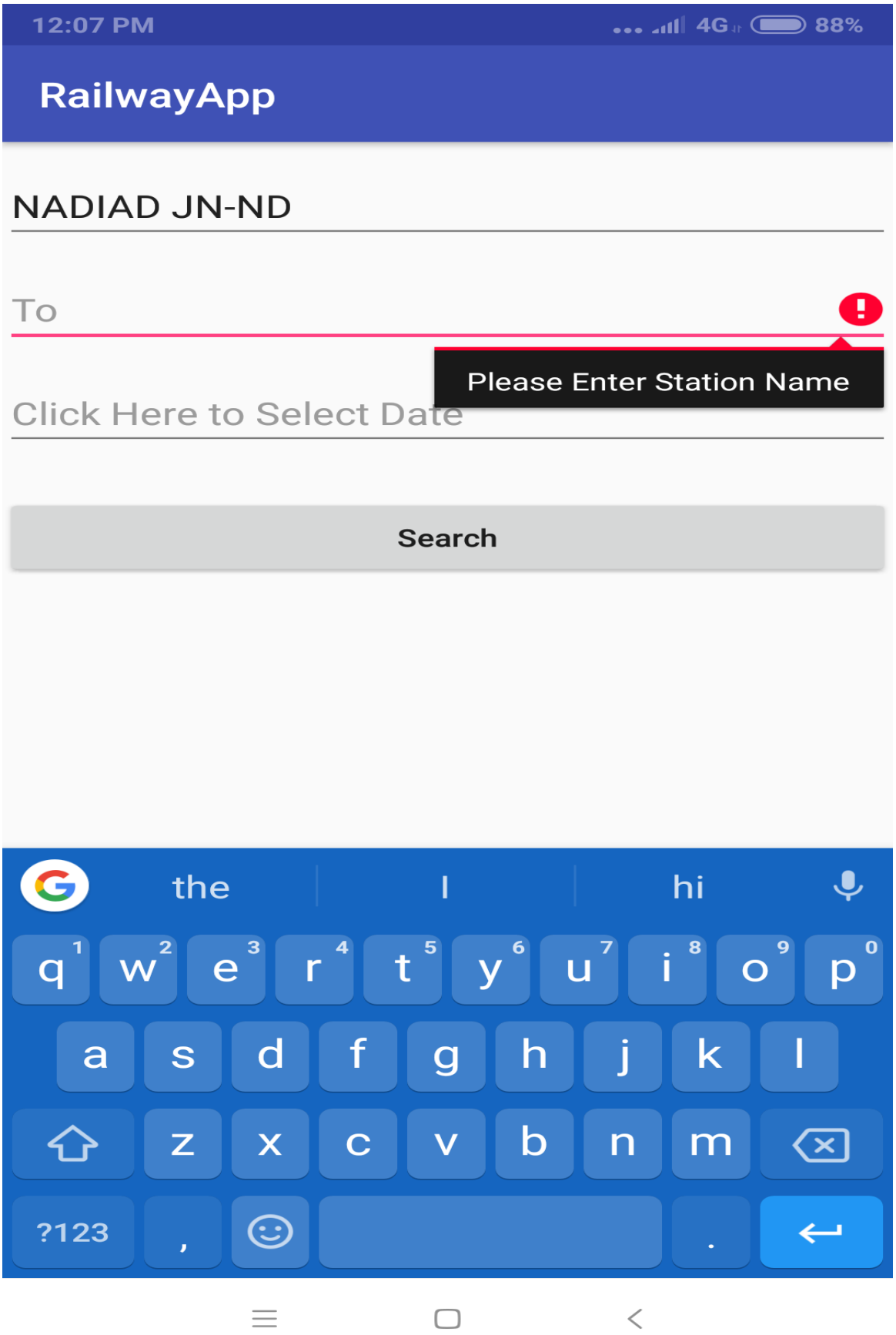
- **Home Screen : -**

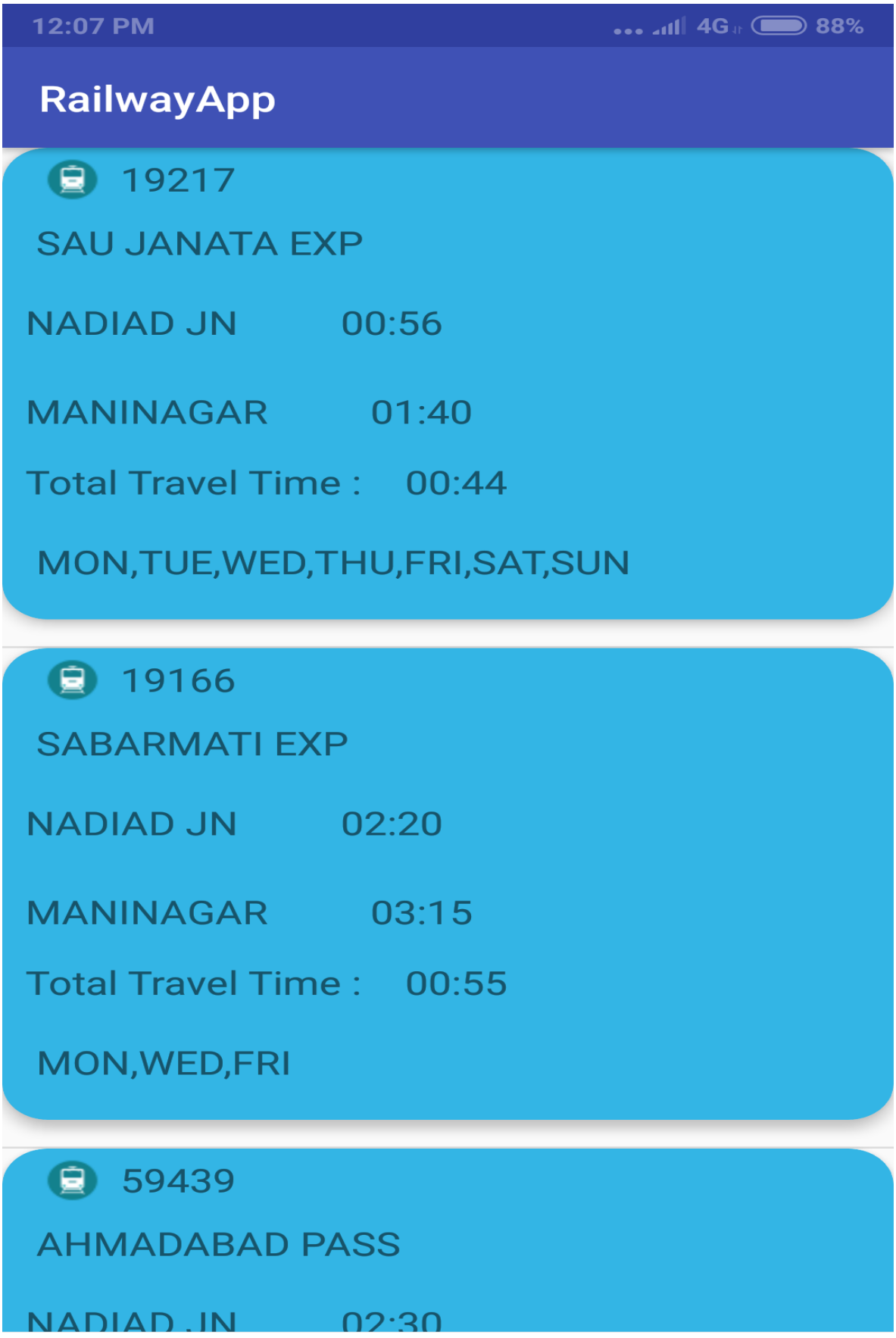


This is a Home Screen of the Application. When user opens the application, first he visits the splash screen then he/she will be redirected to the home screen of the application. From this Home Screen, user can access various features of the application. If the user want to access different features of the app , first he/she has to come to the Home Screen of the app.

- **Train Between Station: -**



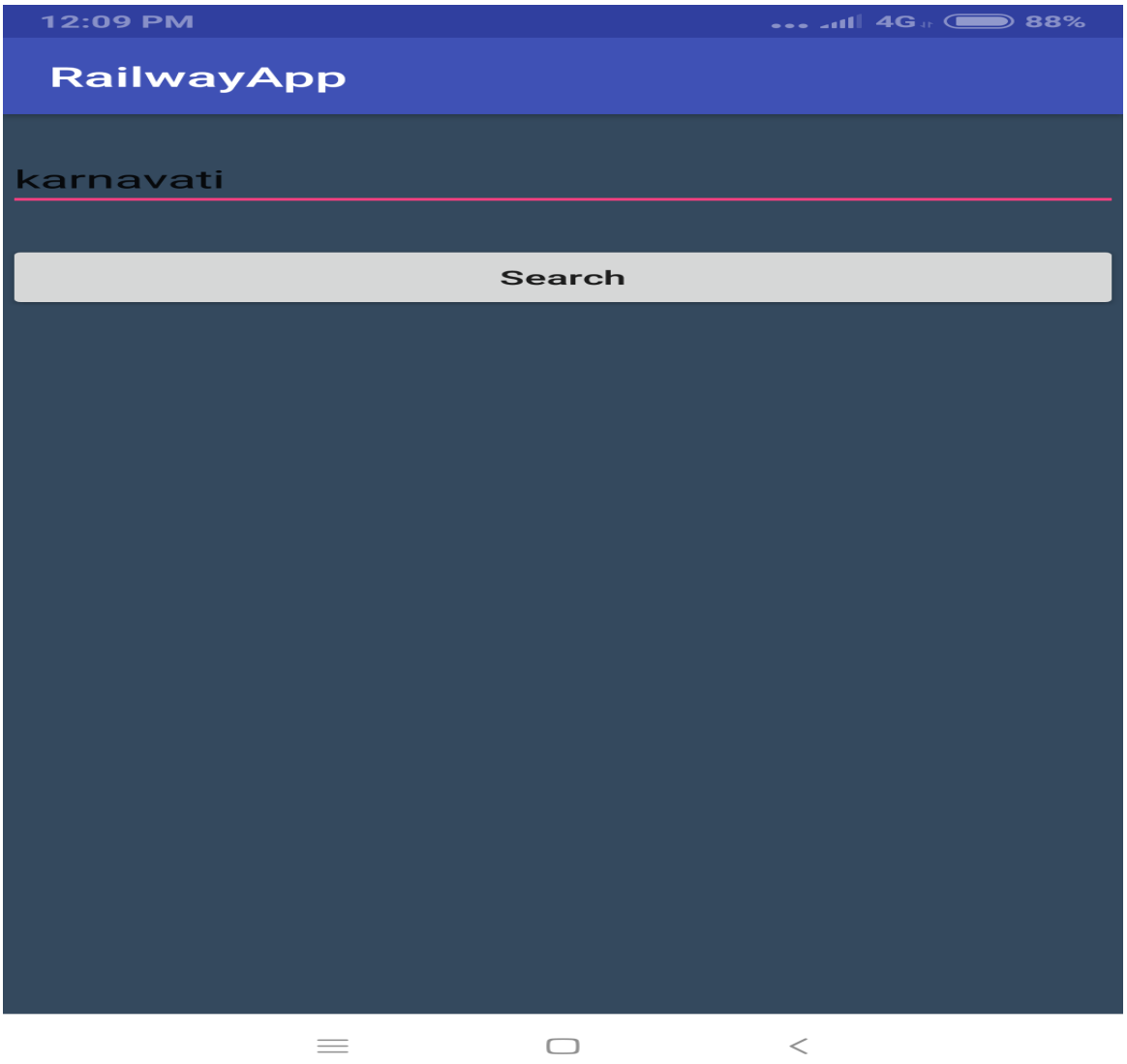

12:07 PM
4G
88%
RailwayApp
NADIAD JN-ND
To
Please Enter Station Name
Click Here to Select Date
Search
the
I
hi

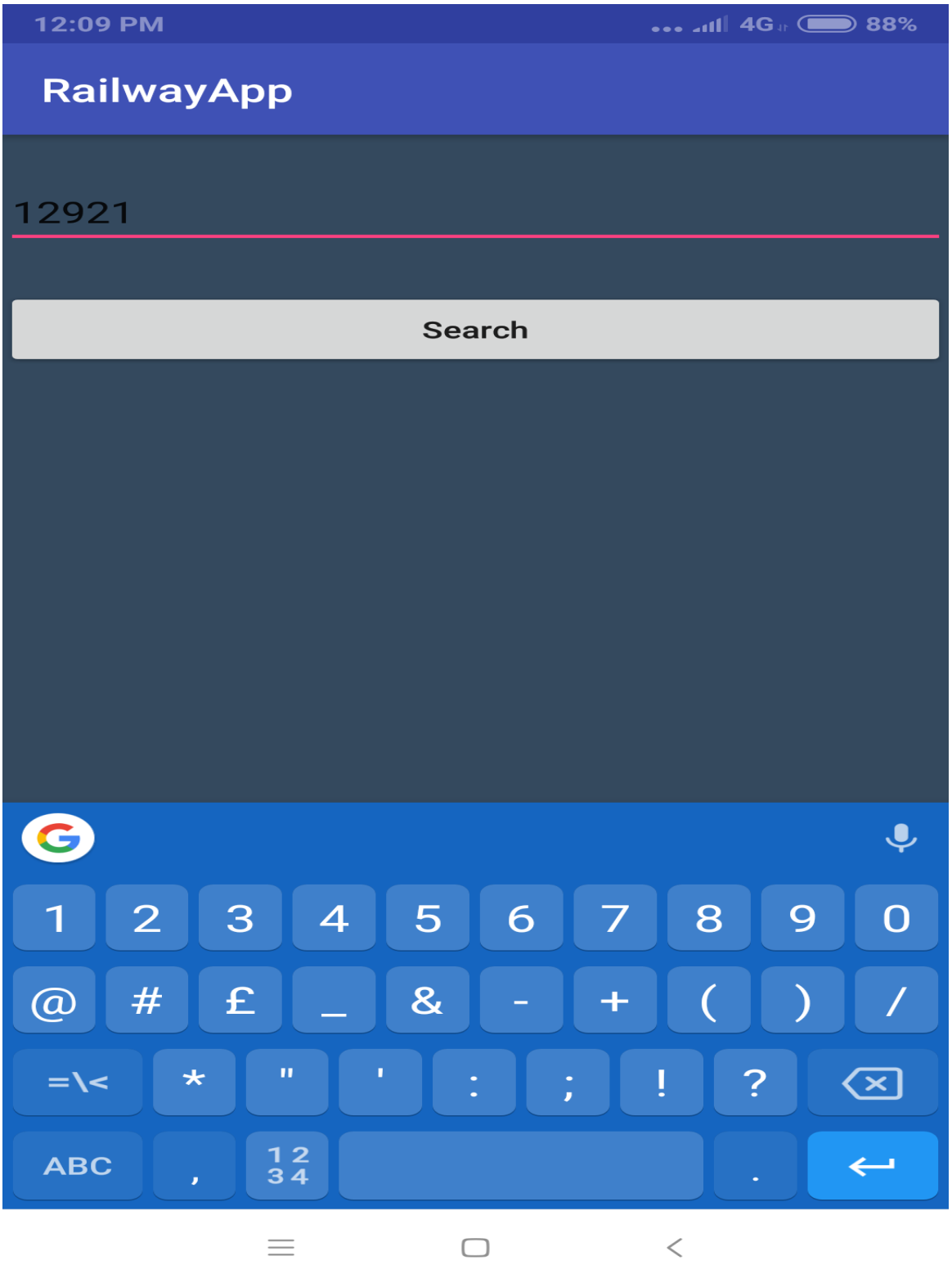

12:07 PM
4G
88%
RailwayApp
19217
SAU JANATA EXP
NADIAD JN 00:56
MANINAGAR 01:40
Total Travel Time : 00:44
MON,TUE,WED,THU,FRI,SAT,SUN
19166
SABARMATI EXP
NADIAD JN 02:20
MANINAGAR 03:15
Total Travel Time : 00:55
MON,WED,FRI
59439
AHMADABAD PASS
NADIAD JN 02:30

This is the First Functionality of the Application. Where user can find Train between two stations. When user writes station name in “from” field it shows suggestions. Then select the appropriate suggestions in “From” and “To” Field. Then user have to select the date then user can search trains between stations. Here in this example, result is shown between two stations. i.e. Nadiad to Maninagar.

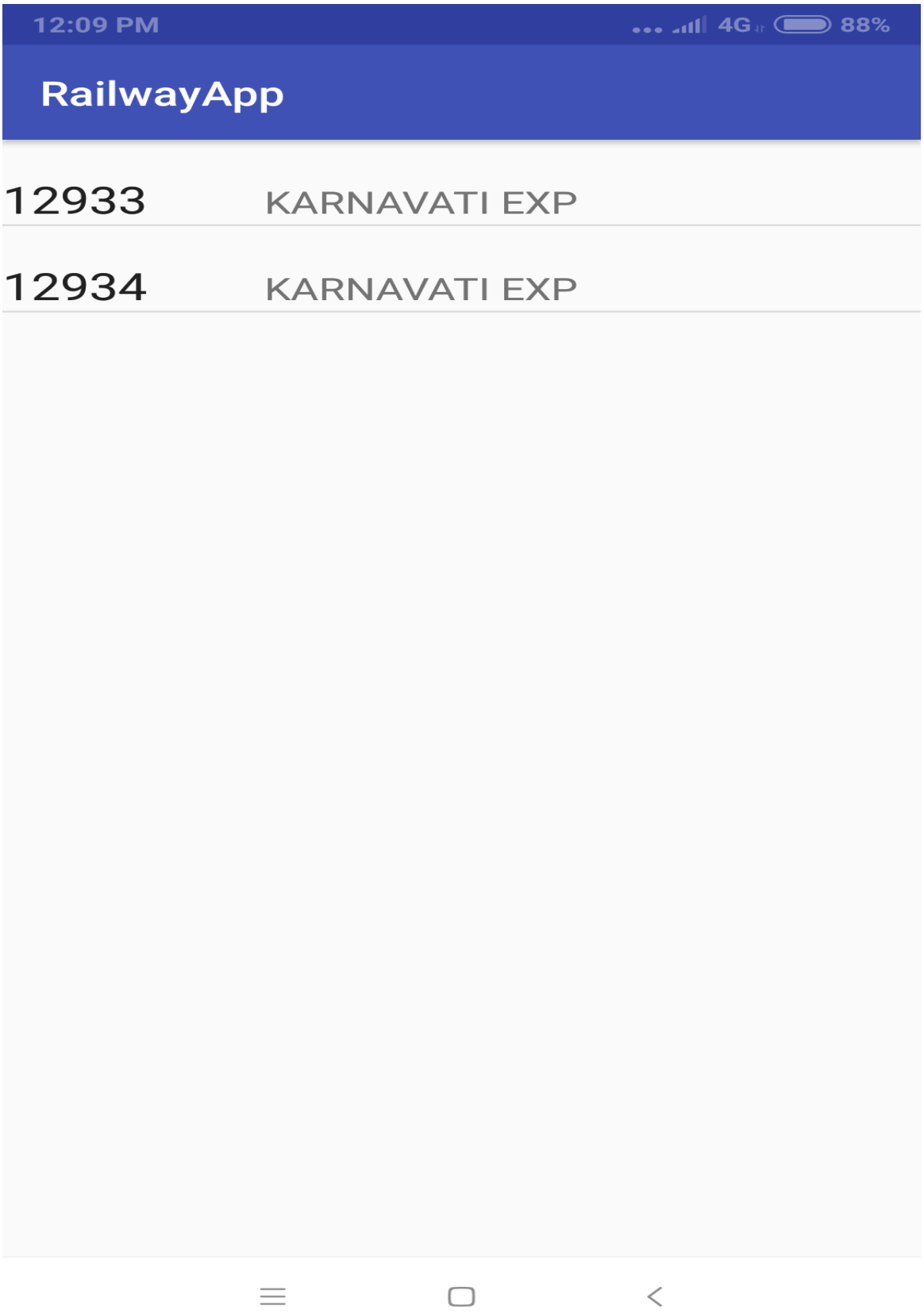
Here in Result, Train Number, Train Name ,Source station name and from their departure time to user’s destination station name and arrival time at that station, total travel time of the journey and which days of the week particular train is available is displayed.

- **Find Train By Train Name or Train Number : -**





Here , User can find Train Name and Number by either entering Train Name (fully or partially) or Train Number(fully or partially). If Train Name or Number will be entered partially, the corresponding all Train's Name and Number will be shown in the result.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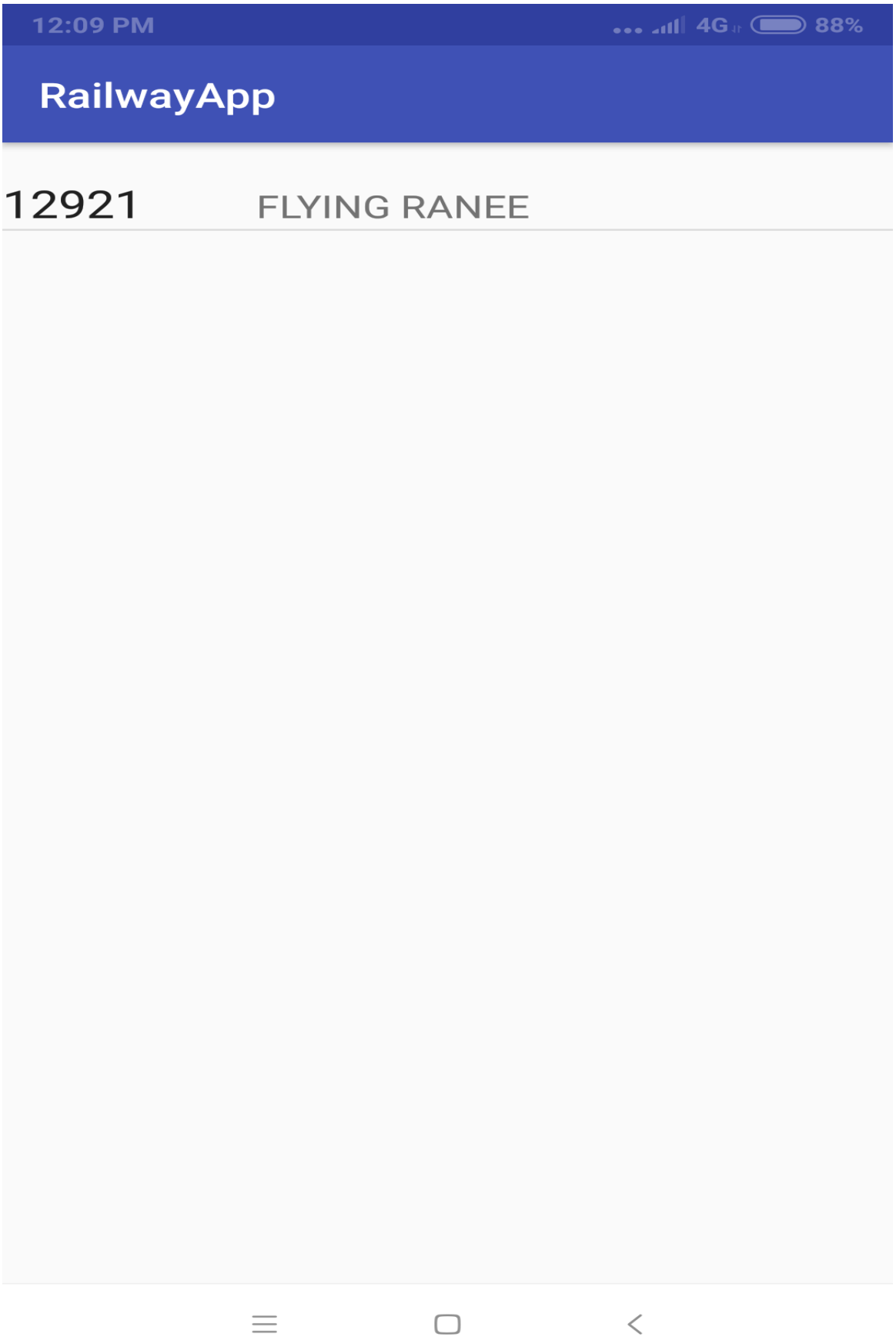
RailwayApp
12933
KARNAVATI EXP
12934
KARNAVATI EXP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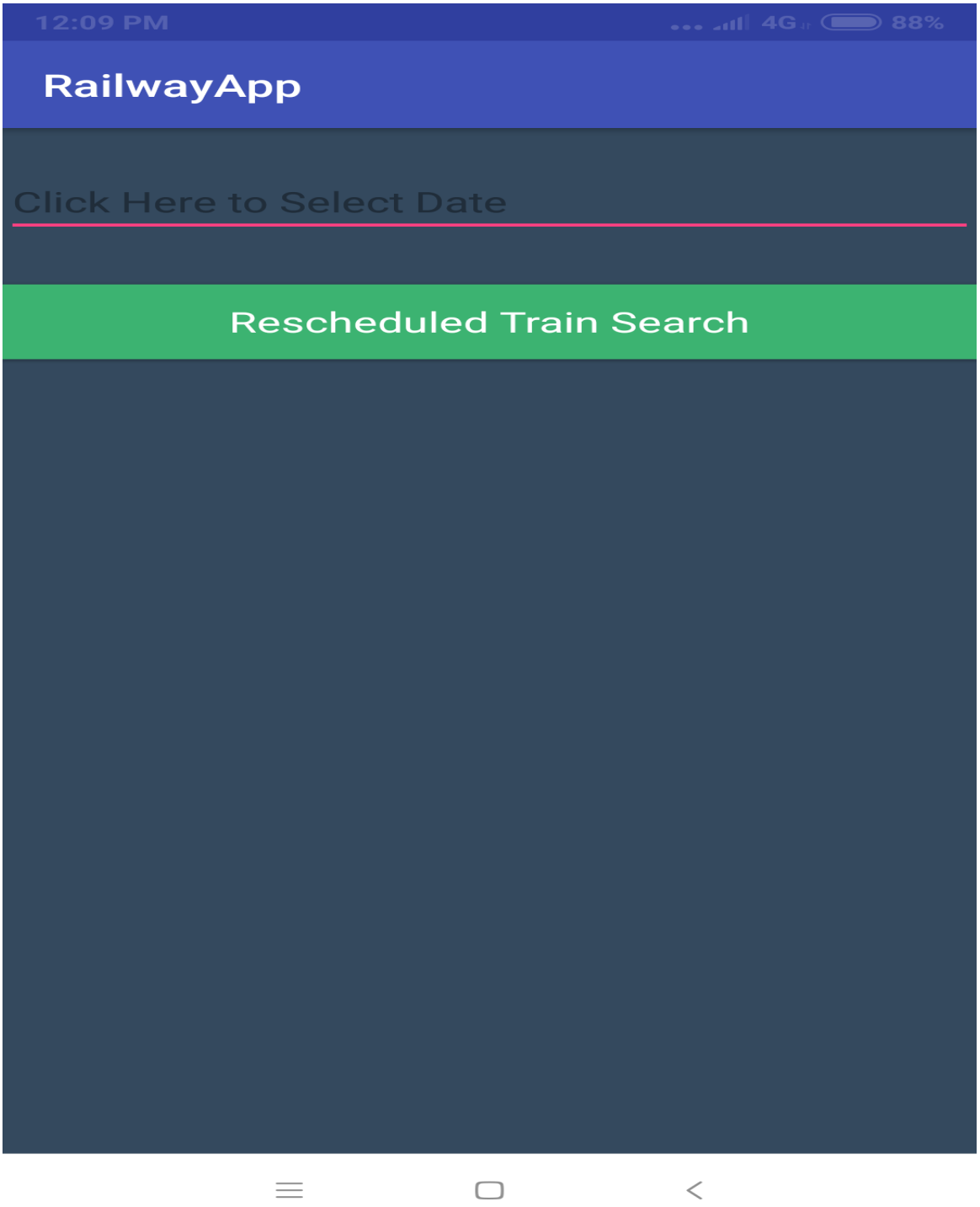
RailwayApp
12921
FLYING RANEE

- **Rescheduled Trains : -**

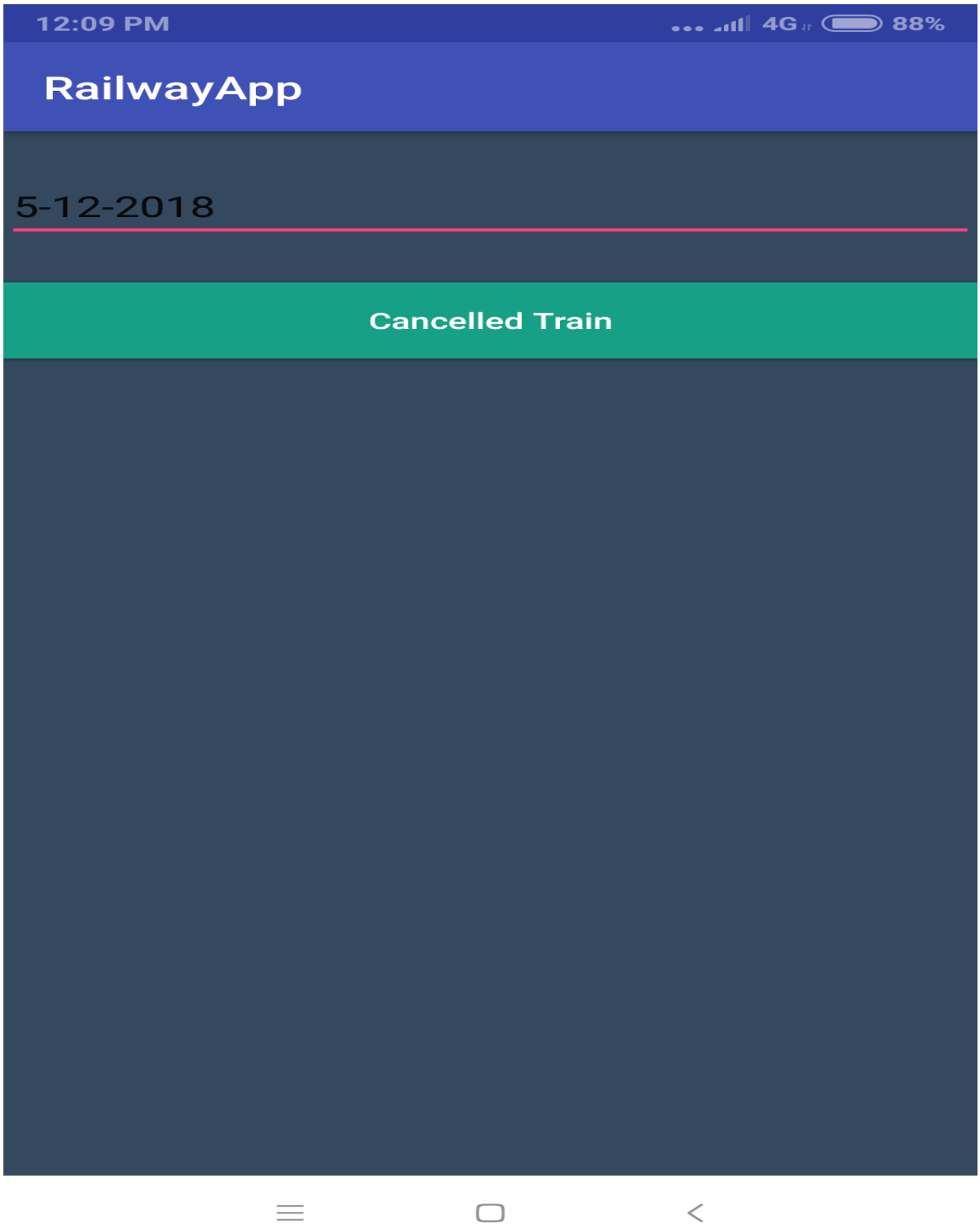


First of all, From the Homescreen user has to select Rescheduled Trains. Then , user has to Select the date by clicking the field “Click

Here to Select Date ” for which date he/she has to see rescheduled trains. Then click on the button “Reschedule Train Search” to see the rescheduled trains for a selected date.

Here in Result , Train No, Train Name, Reschedule Date, Reschedule Time, Time Difference, Source station, Destination station of each rescheduled train of a selected date are displayed.

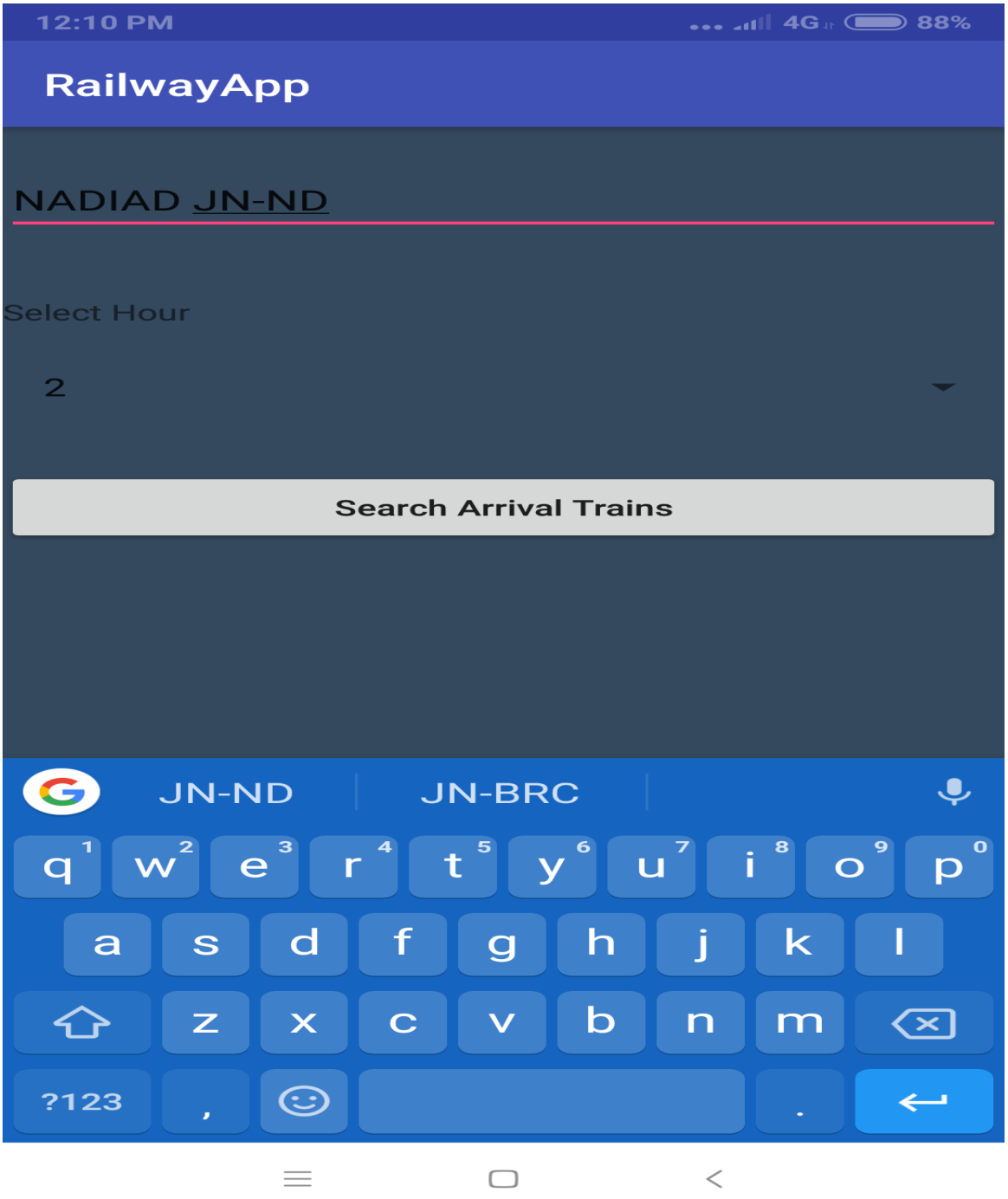
- **Cancelled Trains**

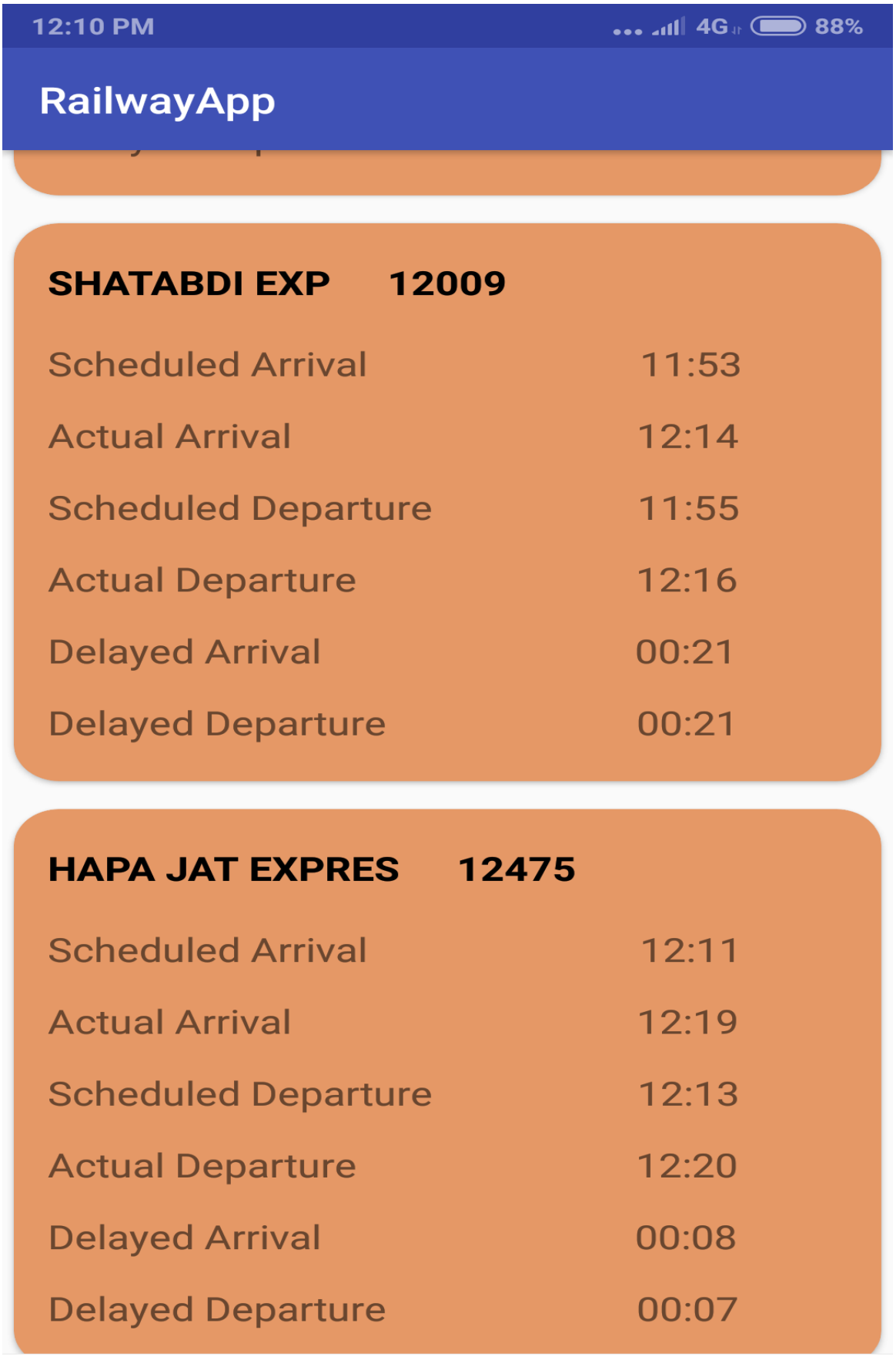



12:10 PM
4G
88%
RailwayApp
GKP-BST SPL 05105
Source : GORAKHPUR- GKP
Destination : BASTI- BST
Start Time : 5 Dec 2018
Train Type : SPECIAL
BST-GKP SPL 05106
Source : BASTI- BST
Destination : GORAKHPUR- GKP
Start Time : 5 Dec 2018
Train Type : SPECIAL
KRR-SA DMU 06833
Source : KARUR- KRR
Destination : SALEM JN- SA
Start Time : 5 Dec 2018
Train Type : SPECIAL
SA-KRR DMU 06834

Here, in Result Train Name, Train Number, Source station name, destination station name, Train's start time and train type are displayed of all cancelled trains of the particular date.

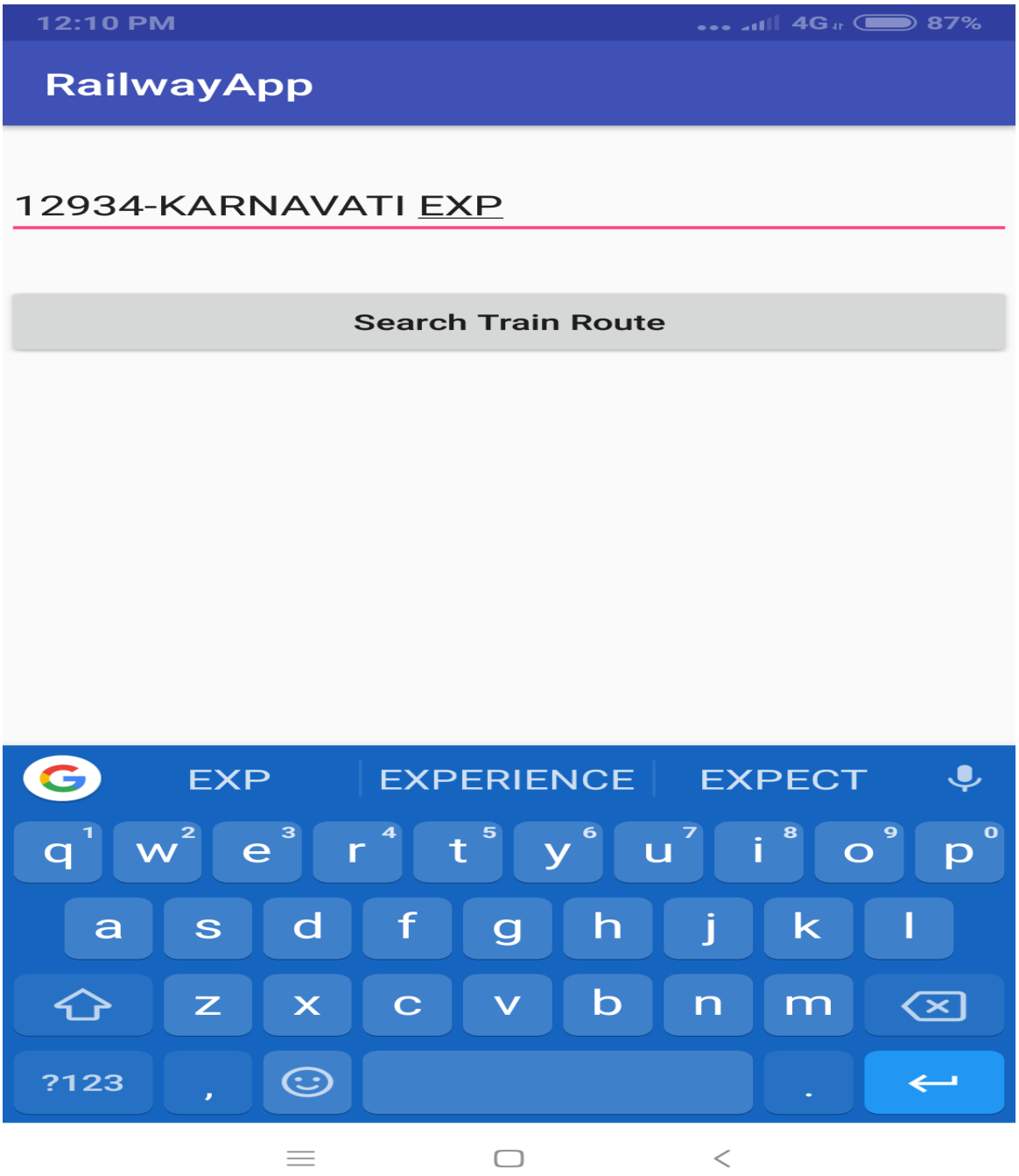
- **Live Station Status : -**




12:10 PM
4G
88%
RailwayApp
SHATABDI EXP 12009
Scheduled Arrival 11:53
Actual Arrival 12:14
Scheduled Departure 11:55
Actual Departure 12:16
Delayed Arrival 00:21
Delayed Departure 00:21
HAPA JAT EXPRES 12475
Scheduled Arrival 12:11
Actual Arrival 12:19
Scheduled Departure 12:13
Actual Departure 12:20
Delayed Arrival 00:08
Delayed Departure 00:07

In, Live Station Status Feature, user has to write and select station of which he/she want to see status either of 2 hours or 4 hours. Then user can see following details. Schedule Arrival Time, Actual Arrival Time, Scheduled Departure Time, Actual Departure Time, Delayed Arrival Time and Delayed Departure Time and Train Name and Number.

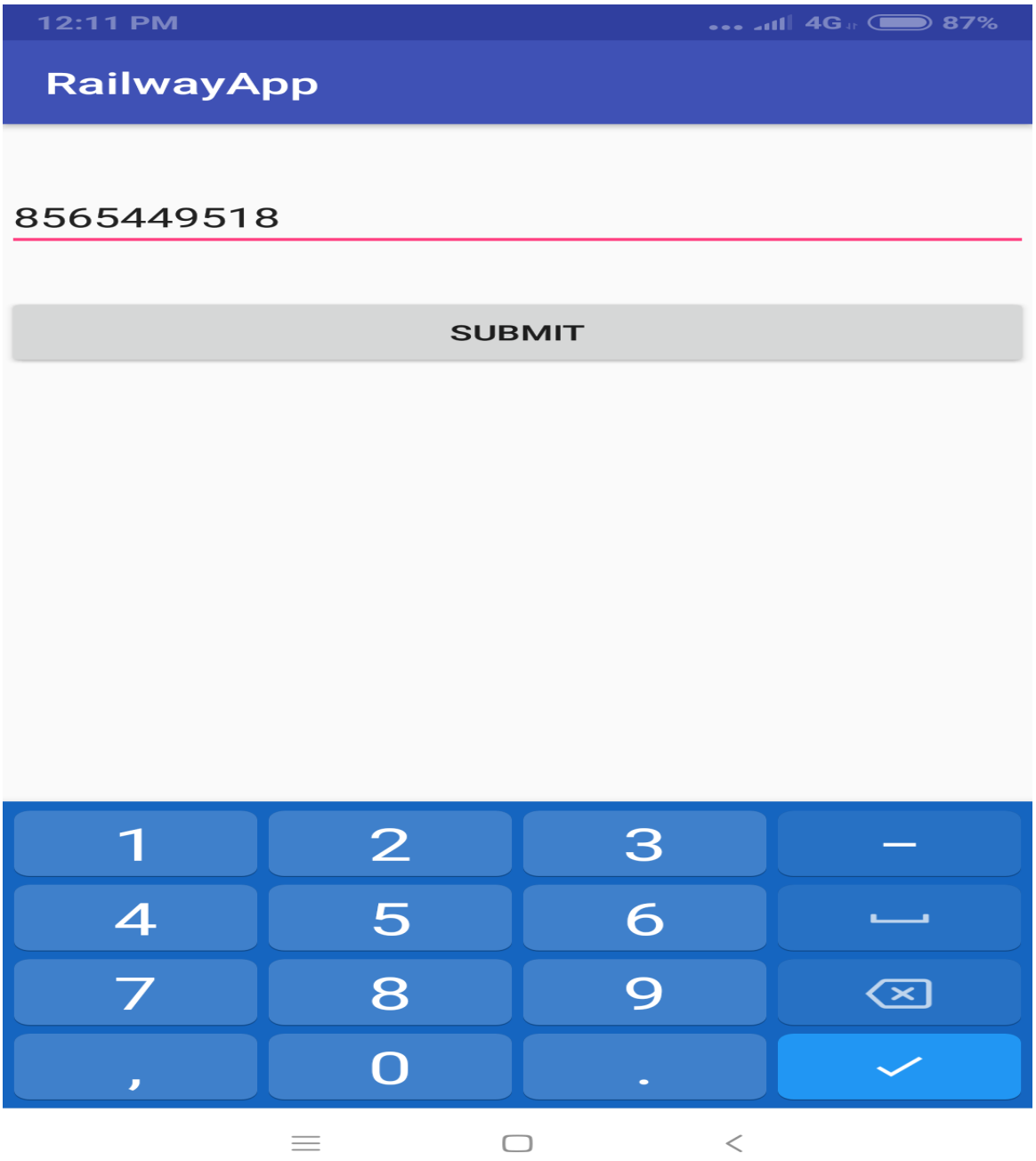
- **Train Schedule (Train Route)**

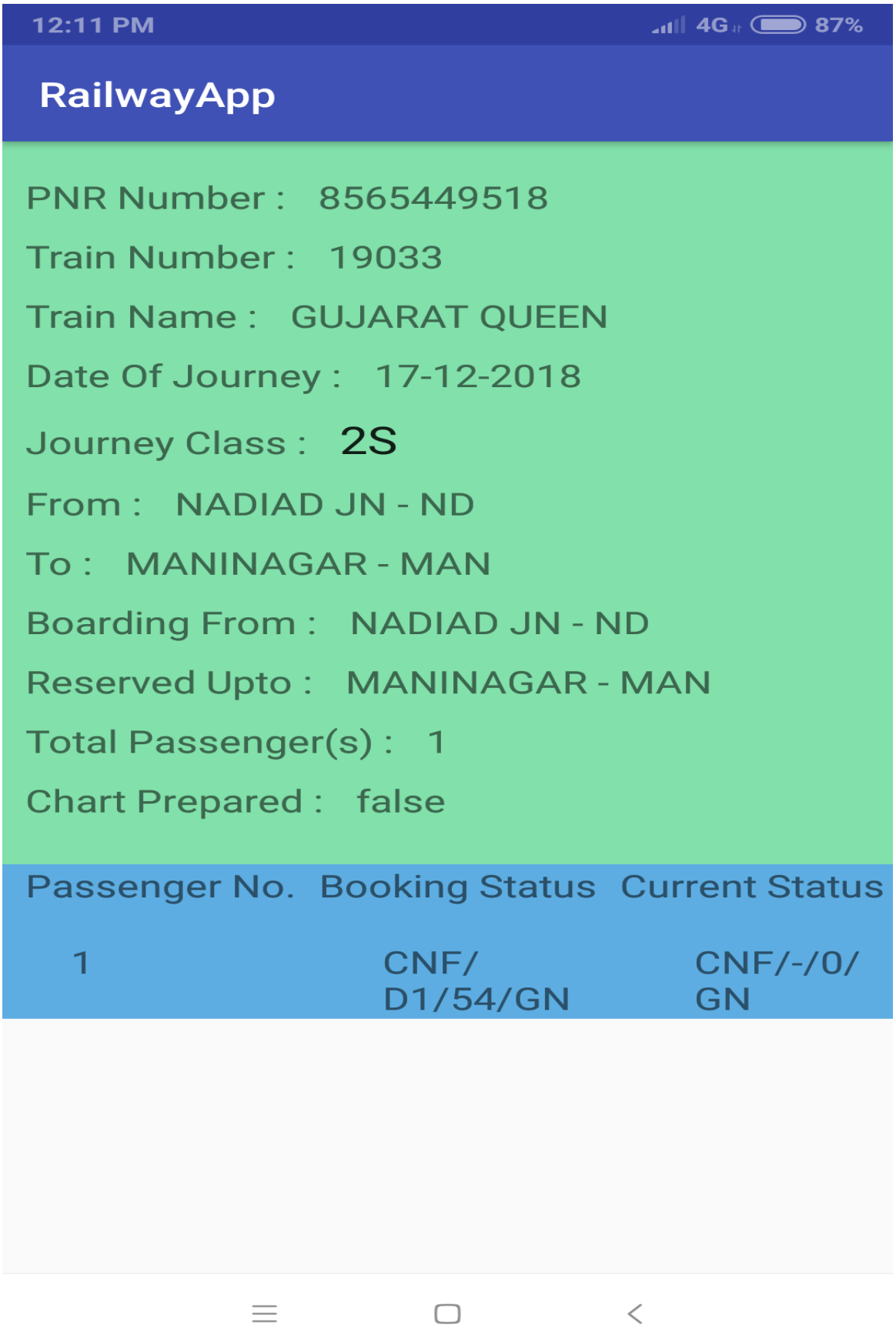



12:11 PM
4G
87%
RailwayApp
12934-KARNAVATI EXP
AHMEDABAD JN-ADI SOURCE 04:55 0.0 KM
NADIAD JN-ND 05:39 05:41 46.0 KM
ANAND JN-ANND 05:59 06:01 64.0 KM
VADODARA JN-BRC 06:42 06:47 100.0 KM
BHARUCH JN-BH 07:35 07:37 170.0 KM
SURAT-ST 08:35 08:40 229.0 KM
VALSAD-BL 09:30 09:32 297.0 KM
VAPI-VAPI 09:51 09:53 321.0 KM
BORIVALI-BVI 11:48 11:50 461.0 KM
MUMBAI CENTRAL-MMCT 12:35 DEST 491.0 KM

In this feature, Train Schedule (Train Route) user has to enter Train Name or Train Number and accept the appropriate suggestion. In result, Train Number, Train Name, Train's Source station and departure time from source station to all stations of the train with their arrival and departure timings and total distance covered are displayed.

- **PNR Status : -**




12:11 PM
4G
87%
RailwayApp
PNR Number : 8565449518
Train Number : 19033
Train Name : GUJARAT QUEEN
Date Of Journey : 17-12-2018
Journey Class : 2S
From : NADIAD JN - ND
To : MANINAGAR - MAN
Boarding From : NADIAD JN - ND
Reserved Upto : MANINAGAR - MAN
Total Passenger(s) : 1
Chart Prepared : false
Passenger No.
Booking Status
Current Status
1
CNF/ D1/54/GN
CNF/-/0/ GN

In This Feature, user has to write 10 digit PNR Number to show status of his journey and seat confirmation. When user writes his 10 digit PNR Number then he/she can see various details about his/her journey shown in above screen shot.

- **What is PNR Number ?**

  PNR: Passenger Name Record

  PNR simply means an entry in the database of your airline/railway/travel agency to store travel information of a passenger or group of passengers. PNR is used to keep track of travel itinerary in computer records.

CHAPTER - 7

Limitations and Future Enhancements

Contents : -

7.1 Limitations : -

On a review of the Android Application, Following Points were noticed and pointed as a limitation.

- The Current Android Railway Application has not Fare Enquiry Feature, So, User can not see the fare details of the journey by entering PNR Details.

- In This Application, user can not see Reservation Fare Details as well as they can not see Seat Availability and Class Details of the trains.

- In this application user can not see Live Train Status of the particular trains by entering Train Name or Train Number.

- In this application user can not book tickets and make payments to railway. So, Reservation can not be done by this application. As, present the focus is on only information of railway and not booking, user can not reserve their tickets.

- As this application is connected through API and fetch data through API, this application can not have its own local database or connected through some other database. So, user can not save its recent searches and can not make his/her account and maintain it.

- As, it shows relevant data through API and web services, User must have internet connection, as above said, this application does not have its own local database, without Internet user can do nothing.

- As, API is provided by other company, developer has to pay maintenance charges to that company. So, maintenance charges are very high. So, it becomes difficult to maintain by developer.

7.2 Future Enhancements : -

At Present, This Application misses many modules. These modules are enhanced in future.

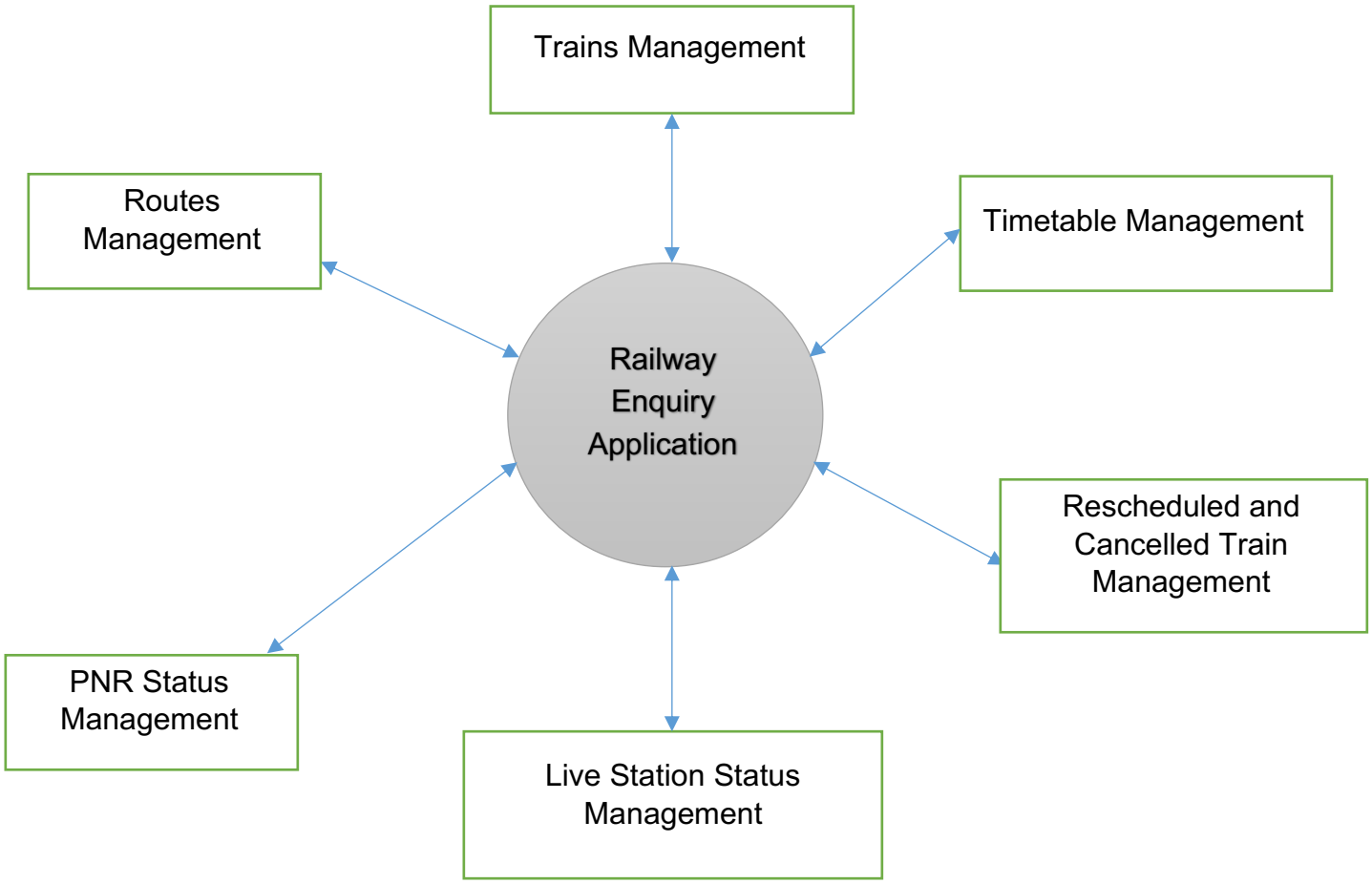
- Reservation and Ticket Booking can not be done currently in this Application. So, This Feature will be added in future.
- Train Live Status Feature is not there in this Application. This Feature will be added in future to improve accuracy and usability of the application.
- Seat Availability Feature is not there at present, this can be added in future. So, Classes available in a particular train can be shown. For Ex. 2S, CC, 3A, 2A, 1A.
- Fare details and Fare of the Journey in PNR Feature will be added in future. So, Person can know if he want to travel in 2S or CC or 3A,2A,1A then how much total fare will be charged.
- Seat Map- Seat Location, Coach Position in a train can be added in future.
- Train Arrived on Which Platform Number is not displayed currently, this can be enhanced in future.
- In future, Local Train General Ticket and Platform ticket can be added in this application.
- Railway Helpline Number and Other Numbers related to railway services will be added soon in this application.

CHAPTER - 8

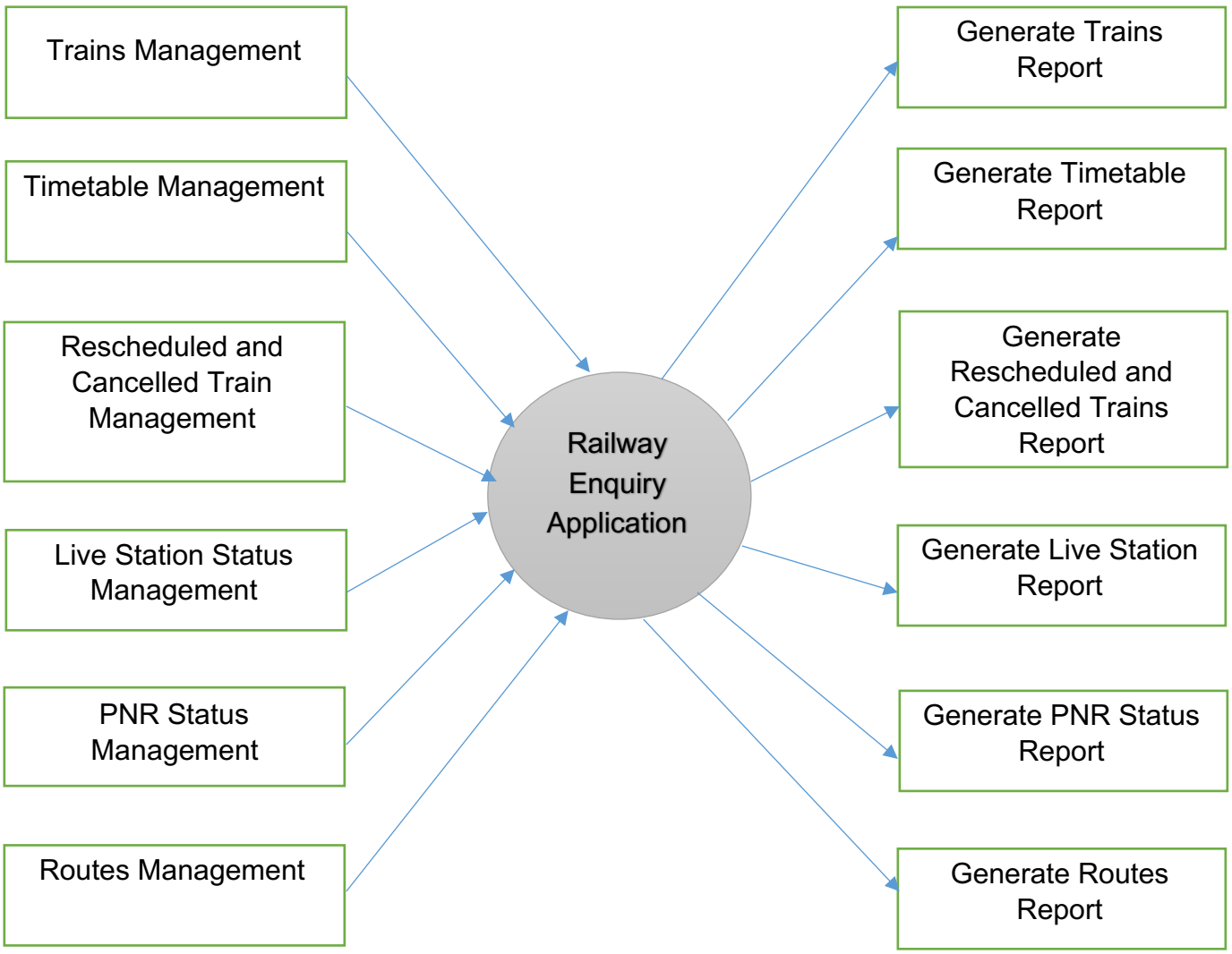
Diagrams

Contents : -

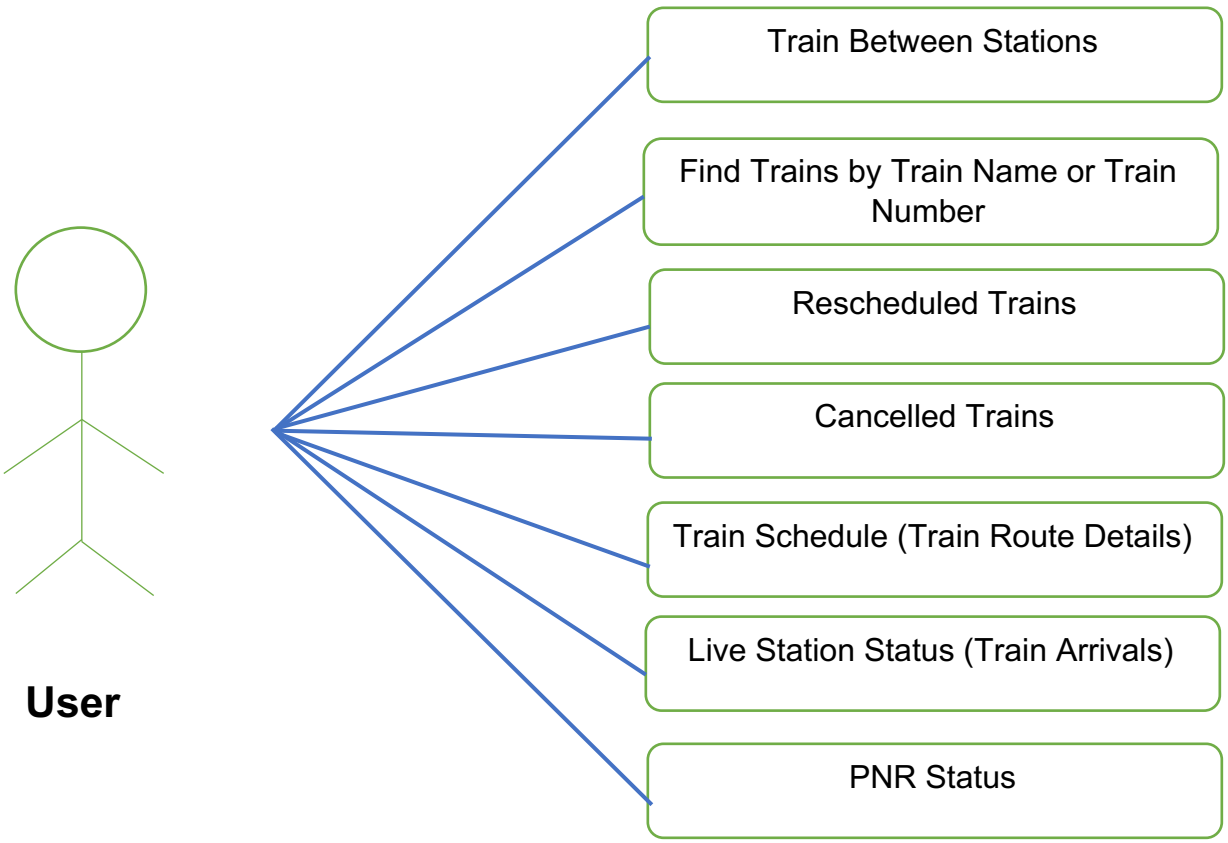
8.1 Zero Level Data Flow Diagram(DFD)



8.2 First Level Data Flow Diagram(DFD) : -



8.3 Use – Case Diagram : -



CHAPTER - 9

Experience and References

Contents : -

9.1 Experience : -

- After making Android Application, I am now able to know that how to develop real time Application in industry.

- From, this Institution, I got much knowledge of coding and developing apps, and how to work and how to solve errors when coding.

- I have faced many real time problems and errors and when I got the solutions of those, there is an additional experience to my life.

- My Project is based on Railway Information Application, so I have gathered most of the information about Railways.

- I have observed many Applications from playstore of Railway Information and IRCTC Application too, so, I can learn how to develop application, what kind of functionalities a railway application should have.

- I have also learned what type of User Interface is needed, which kind of design is required for the Application.

- I have also learned in this Project, how to develop Whole Android Application, how to deal with JSON Format Data and how to deal with APIs and how to parse JSON Data.

- I have also learned how to use POJO Tool, how to convert JSON response into Java Objects and make Model Class, usage of “@Serialized Name” annotation, how to use Libraries in android like, GSON converter and Volley Library.

9.2 References : -

- Some Android Blogs Article from Google.
- https://www.javatpoint.com/android-tutorial
- https://www.google.com/
- https://abhiandroid.com/
- https://www.simplifiedcoding.net/
- https://www.youtube.com/
- https://www.tutorialspoint.com/android/
- https://developer.android.com/