NAALAIYA THIRAN PROJECT - 2022

19ECI01-PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

SMART SOLUTION FOR RAILWAYS

A PROJECT REPORT

Submitted by

ASWINI.R	**1904003**
HEMAVARDHINI.J	**1904013**
MOHANAPRIYA.S.S	**1904025**
NITHILAA LAKSHME.V	**1904029**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COIMBATORE INSTITUTE OF TECHNOLOGY, COIMBATORE – 641 014

(Government Aided Autonomous Institution affiliated to Anna University)

ANNA UNIVERSITY: CHENNAI 600025

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(Government aided Autonomous Institution Affiliated to Anna University)

COIMBATORE – 641014

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this report **"SMART SOLUTION FOR RAILWAYS"** is the Bonafide work of **R.ASWINI (1904003), J.HEMAVARDHINI (1904013), S.S.MOHANAPRIYA (1904025), V.NITHILAA LAKSHME (1904029)** who carried out **19ECI01 Professional Readiness for Innovation, Employability and Entrepreneurship** project offered by IBM and Anna University ,Chennai.

_____	_____	_____
SIGNATURE	**SIGNATURE**	**SIGNATURE**
Dr.M.POONGOTHAI	**Dr.I.S.AKILA**	**Dr. A. RAJESWARI, M.E. Ph.D.,**
FACULTY MENTOR	**FACULTY EVALUATOR**	**PRINCIPAL AND HEAD**
Professor	Associate Professor	Professor
Department of Electronics and Communication Engineering	Department of Electronics and Communication Engineering	Department of Electronics and Communication Engineering

PROJECT CALENDAR

Phase	Phase Description	Week	Dates	Activity Details
1	Preparation Phase (Pre-requisites, Registrations, Environment Set-up, etc.)	2	22 - 27 Aug 2022	Creation GitHub account & collaborate with Project repository in project workspace
2	Ideation Phase (Literature Survey, Empathize, Defining Problem Statement, Ideation)	2	29 Aug – 3rd Sept 2022	Literature survey (Aim, objective, problem statement and need for the project)
		3	5 - 10th Sept 2022	Preparing Empathy Map Canvas to capture the user Pains & Gains
		4	12 - 17 Sept 2022	Listing of the ideas using brainstorming session
3	Project Design Phase -I (Proposed Solution, Problem- Solution Fit, Solution Architecture)	5	19 - 24 Sept 2022	Preparing the proposed solution document
		6	26 Sept - 01 Oct 2022	Preparing problem - solution fit document & Solution Architecture
4	Project Design Phase -II (Requirement Analysis, Customer Journey, Data Flow Diagrams, Technology Architecture)	7	3 - 8 Oct 2022	Preparing the customer journey maps
		8	10 - 15 Oct 2022	Preparing the Functional Requirement Document & Data- Flow Diagrams and Technology Architecture
5	Project Planning Phase (Milestones & Tasks, Sprint Schedules)	9	17 - 22 Oct 2022	Preparing Milestone & Activity List, Sprint Delivery Plan
6	Project Development Phase (Coding & Solutioning, acceptance Testing, Performance Testing)	10	24 - 29 Oct 2022	Preparing Project Development - Delivery of Sprint-1
		11	31 Oct - 5 Nov 2022	Preparing Project Development - Delivery of Sprint-2
		12	7 - 12 Nov 2022	Preparing Project Development - Delivery of Sprint-3
		13	14 - 19 Nov 2022	Preparing Project Development - Delivery of Sprint-4

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

Indian Railways is one of the largest railway networks operated by the Government of India. A railway was first introduced in India in 1853. Today, its operations cover 29 states and 7 union territories, and also provide international services to its neighbors, Nepal, Bangladesh and Pakistan. It is also one of the busiest rail networks in the world, carrying about 18 million passengers daily. Moreover it is the world's largest employer, providing jobs to millions. In spite of being the largest and the busiest network, Indian Railways was never a sector to give good returns to the economy, (barring the time of Lalu Prasad Yadav). It faces a lot of problems, sometimes proving even a burden to the Indian Government. The age-old and crumbling infrastructure, low fares, lack of maintenance, mismanagement, lack of quality service deliverance etc are all the major issues with the railways. A sharp decline in the earnings and serious escalation in expenditure has posed even more problems for Indian Railways. A significant change in the Indian Railways came after the year 2004. The 156 years old Indian Railways was regarded as a hopeless, loss-making organization, with too little revenue, too many problems. Steps were taken to increase the demand rather than the price. A team of experts proposed and applied some simple techniques effectively on a per train basis. Indian Railways is the biggest Government institution of India which gives more than 17 Lakh people employment. Indian Railways is the biggest railway system of Asia and the second biggest railway system of the world. On the increase in popularity majority of people started preferring railways as their mode of transportation

since it is cheap. Over a period of time Indian railways started facing difficulties like standing in long queues for booking tickets etc. So, this project mainly focuses on providing a solution for all the existing problems.

1.2 PURPOSE

The main objective of this proposed system is to design and develop a webpage for public in order to book train tickets by looking at the available seats and confirming seat if available during immediate cancellation. After booking the train tickets the passengers will get the QR code for confirmation via SMS or Mail which can be verified with the ticket collector while boarding the train. People can book train tickets anywhere, anytime with ease.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEMS:

The Railway Reservation System makes it little difficult for customers to find out whether trains are available between two destinations, sharing the exact location of the train during the time of delay, booking and canceling of tickets etc. So in order to satisfy the basic needs of a customer an application is required.

From the literature survey it is inferred that there are existing solutions like booking tickets with GPS as the ticket collector or digitized Railway Ticket Verification Using Facial Recognition which had problems like cost effectiveness and these technologies were difficult for the rural people to book tickets.

2.2 PROBLEM STATEMENT DEFINITION:

One of the biggest challenges in the current ticketing facility is queue in buying railway tickets. It is more frustrating at times to stand in the queue for a very long time. So a Web page is designed for the public where they can book tickets by seeing the available seats. And a confirmation QR code is sent to the user.

SUMMARY

The smart phone application has been implemented which contain facial recognition and GPS features for tracking trains .Sometimes due to poor network people would not be able to book tickets online. And people may not able to carry tickets every time, so it becomes tough for ticket collector to verify the ticket. In order to solve the above problem, we design a web page for booking the tickets

simultaneously message and QR code will be notified to the user. Hence, ticket collector can identify information of user by scanning the QR code.

CHAPTER 3

IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users.

This helps to map what a design team knows about the potential audience. This tool helps to understand the reason behind some actions a user takes deeply. A good understanding of our customer base psychology will help build successful products. Many techniques help get a deep understanding of user needs and goals, and Empathy mapping is one of them. The benefits include are below:

1. More understanding of the Target Audience

2. More Organized Information in easy-to-understand format

3. Fast and Inexpensive

4. Easy Customization

5. Common Understanding and same mindset of whole team members

6. It describes what users think, say, feel, do

The Says quadrant contains what the user says out loud in an interview or some other usability study. Ideally, it contains verbatim and direct quotes from research.

The Thinks quadrant captures what the user is thinking throughout the experience. Ask yourself (from the qualitative research gathered): what occupies the user's

thoughts? What matters to the user? It is possible to have the same content in both Says and Thinks. However, pay special attention to what users think, but may not be willing to vocalize.

The Does quadrant encloses the actions the user takes. From the research, what does the user physically do? How does the user go about doing it?

The Feels quadrant is the user's emotional state, often represented as an adjective plus a short sentence for context. Ask yourself: what worries the user? What does the user get excited about? How does the user feel about the experience?

The empathy map for Smart Solution for Railway System is shown in Fig 3.1

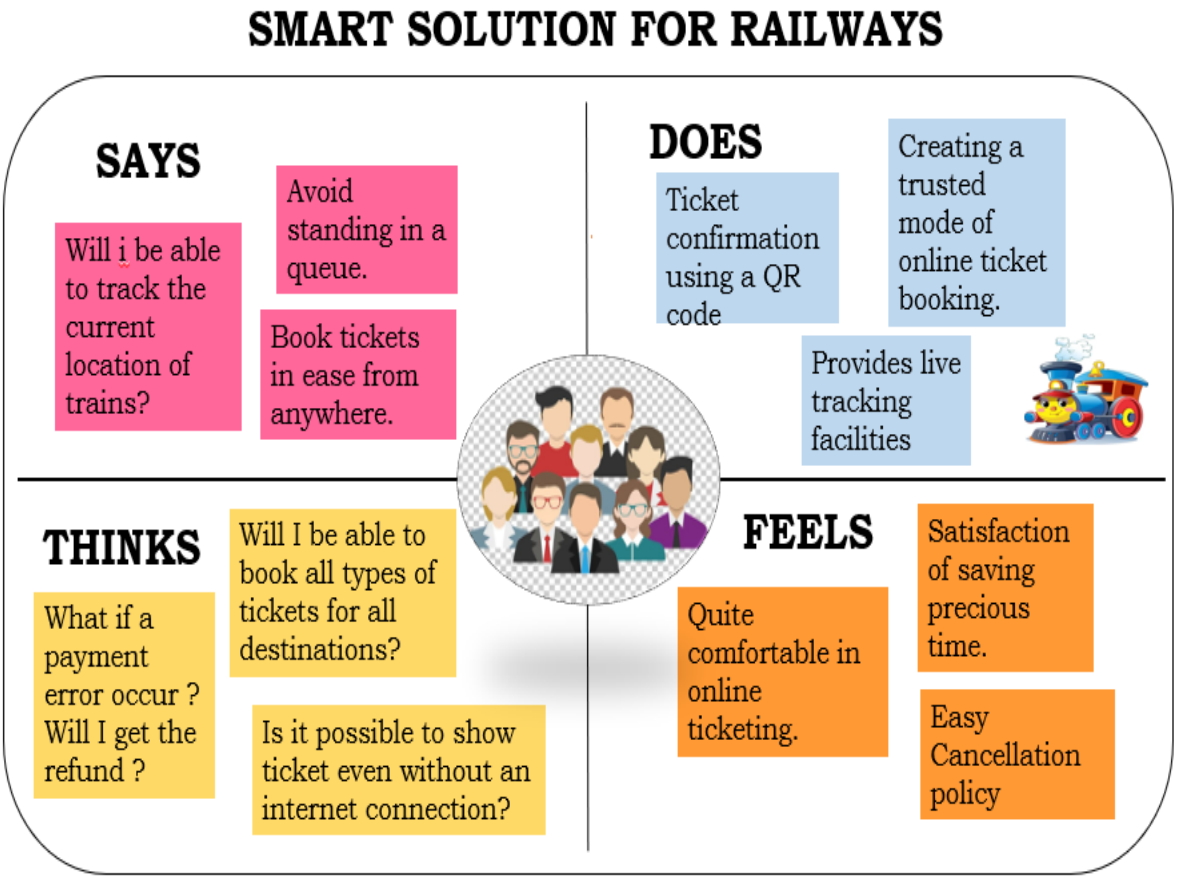

Figure 3.1 Empathy map

3.2 IDEATION AND BRAINSTORMING

Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming etc. Ideation is also the third stage in the Design Thinking process. Ideation is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of 'going wide' in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users. Ideation is often the most exciting stage in a Design Thinking project, because during Ideation, the aim is to generate a large quantity of ideas that the team can then filter and cut down into the best, most practical or most innovative ones in order to inspire new and better design solutions and products.

Brainstorming is a group activity where everyone comes together to discuss strategies for growth and improvement. Brainstorming is customarily a group activity, but individuals can also brainstorm ideas. If you are someone who gets their best ideas in a quiet place, individual brainstorming may be ideal for you. This way, you can do your research, prepare a solid plan and share it when the time comes. You will have more room to think and time to cover all your bases.

Group brainstorming sessions often inevitably focus on a few condensed ideas, overlooking contributions by individual members. This can lead your team to miss out on key ideas and solutions.

You can use your time efficiently to come up with great ideas and effective strategies that you can then convey to your team.

Brainstorming is useful in ways such as,

1. Brainstorming allows people to think more freely, without fear of judgment.

2. Brainstorming encourages open and ongoing collaboration to solve problems and generate innovative ideas.

3. Brainstorming helps teams generate a large number of ideas quickly, which can be refined and merged to create the ideal solution.

The Ideation chart for Industry Smart Solution for Railway System is shown in Table 3.2

Ideas	Description
Idea 1	The activity is started by a buyer, who, in this case, is the person who wants to buy a ticket. The online ticket booking and ticketing platform will request travel information from the buyer. Based on the information provided by the buyer, the online platform will calculate the total amount related to the travel ticket.
Idea 2	This study focuses on purchasing local train tickets online with just a smart phone application, allowing users to carry their tickets as a QR (Quick Response) code. The programmer leverages the "GPS" feature of smart phones to automatically validate and remove your ticket after a predetermined amount of time. For security reasons, user ticket information is kept in a

	CLOUD database. Additionally, a checker application is given to the ticket checker so that they can look up the user's ticket.
Idea 3	This study focuses on moving the ticket management process to a digital, paperless system. This is much more convenient for passengers and more efficient for ticket inspectors, thereby reducing paper consumption and improving passenger convenience. Also focuses on mitigating problems and modernizing traditional ticketing management systems by applying computer vision technology.
Idea 4	Smartphone having a profound influence on the daily routine of individuals, it will be utilized for paperless ticket travel. Verification of Identification proofs for 22 million people during their travel per day demands great human resource and every one these may be simplified digitally by linking application with the aadhar card database. Indian Railways harvests a revenue of ₹1.6345 trillion each year. With local trains contributing a significant share towards this revenue, considering the actual fact,

	that there are folks that travel without tickets.
Idea 5	This paper includes facilities for the Indian Railway Reservation System, such as dynamic seat allocation and real time charting. Using the proposed system, TTE can allocate seat dynamically if the seat is vacant while in transit. The entire process is network efficient, thus our proposed system has bare minimum requirement for internet connectivity.

3.3 PROPOSED SOLUTION

So, a Web page is designed for the public where they can book tickets by seeing the available seats. And a confirmation QR code is sent to the user.

The proposed solution for Smart solution for railway system is shown table,

S.No.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	One of the biggest challenges in the current ticketing facility is queue in buying railway tickets. It is more frustrating at times to stand in the queue for a very long time. So a Web page is designed for the public where they can book tickets by seeing the available seats. And a confirmation QR codes sent to the user.

2.	**Idea / Solution description**	To develop a railway reservation system, a web page is designed to book the train tickets between two destination. The user receives the QR code via mail or message and the ticket collector can identify the personal information by scanning the QR code. The client booking information will be stored in the database with unique ID and it is retrievable.
3.	**Novelty / Uniqueness**	The proposed model continuously monitors the number of available seats in the train in order to make the reservation. Also will track the live location of the network and update the data which provide safe and security travelling.
4.	**Social Impact / Customer Satisfaction**	Encourage people to travel in the train with more comfortable and saves time for reserving tickets in a comfortable way thereby ensures a happy Journey to travel.
5.	**Business Model (Revenue Model)**	The low cost requirement for designing this proposed model makes it more reliable and user friendly. This makes the model more practical for traveller who travels in railway.

6.	**Scalability of the Solution**	With efficient usage of IBM cloud, this proposed model will be able to handle a large number of user data. This makes a huge number of users to easily access and efficiently use it.

3.4 PROBLEM SOLUTION FIT

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. Problem-solution fit is a term used to describe the point validating that the base problem resulting in a business idea really exists and the proposed solution actually solves that problem.

The problem-solution fit is when you-

• Validate that the problem exists: When you validate your problem hypothesis using real-world data and feedback. That is, you gather information from real users to determine whether or not they care about the pain point you’re trying to solve.

• Validate that your solution solves the problem: When you validate that the target audience appreciates the value your solution delivers to them.

The problem-solution fit precedes the product development and forms the foundation upon which a company is built. It helps you answer the basics start-up-related questions before you even start your start-up.

Project Title: SMART SOLUTION FOR RAILWAYS | Project Design Phase-I - Solution Fit Template | Team ID : PNT2022TMID52749

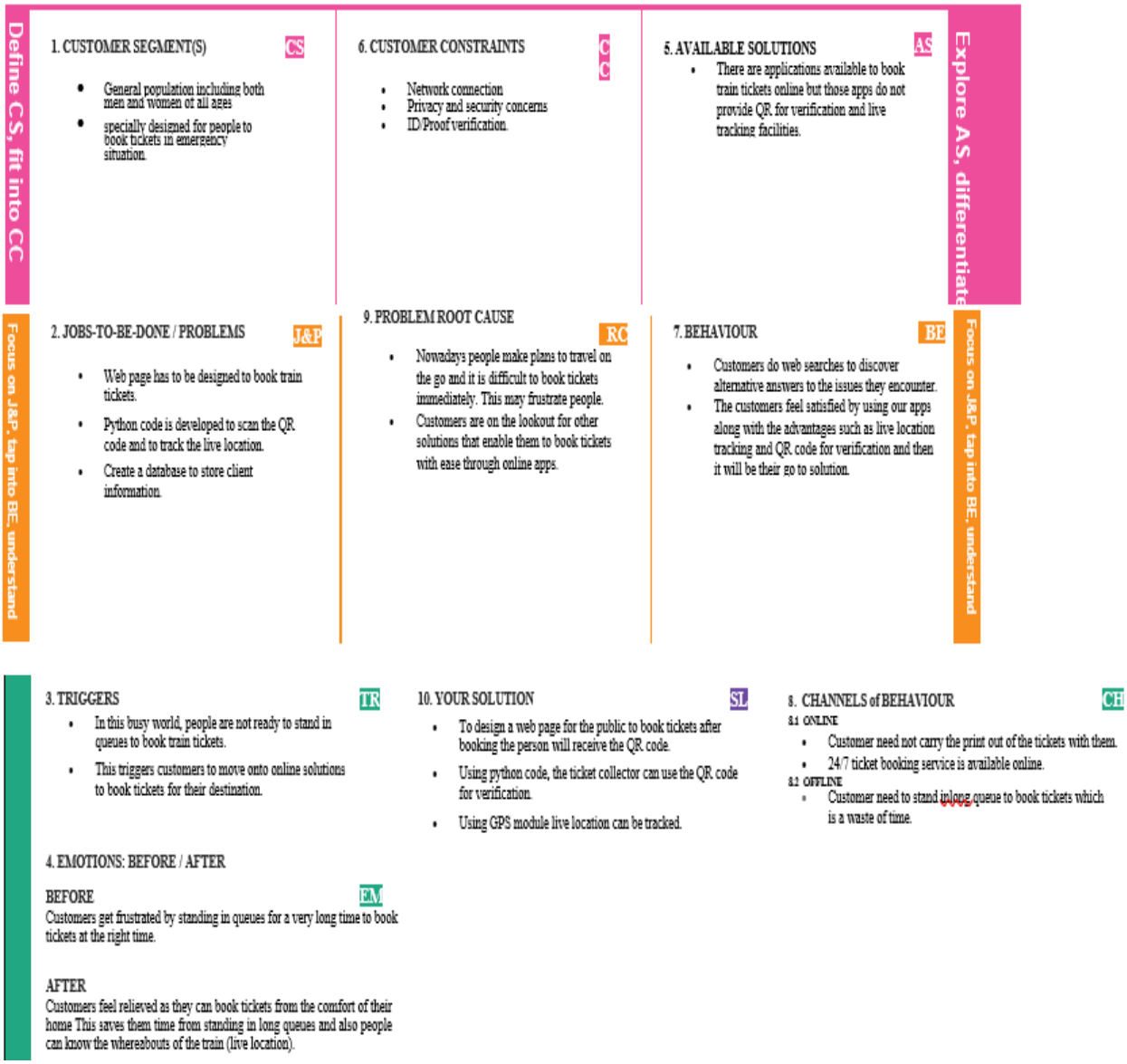

Figure 3.4 Proposed solutions fit

CHAPTER 4

REQUIREMENT ANALYSIS

Requirements analysis is very critical process that enables the success of a system or software project to be assessed. Requirements are generally split into two types: Functional and Non-functional requirements.

4.1 FUNCTIONAL REQUIREMENT

Functional requirements mainly define what a product must do, what its features and functions are. These are the specifications that the system must meet in order to satisfy the end user's basic needs. As a requirement of the contract, all of these functionalities must be built into the system. These are shown or described as the input to be provided to the system, the operation carried out, and the intended outcome. In contrast to non-functional needs, they are essentially the user-stated criteria that are visible in the finished product.

The following table 4.1 shows the functional requirements for the IOT based smart solutions for railways system using for agriculture.

FR No.	**Functional Requirement (Epic)**	**Sub Requirement (Story / Sub-Task)**
FR-1	User Registration	Download the application. Registration through Gmail ID / Verification process Link their Bank accounts.
FR-2	User Confirmation	A confirmation mail stating “Successfully Registered” is sent after the registration process.

FR-3	Global Positioning System	Using GPS module, the user can identify the current location of the train in case of delay/emergencies.
FR-4	QR Code	The QR code is sent through the mail to the user for ticket confirmation.

4.2 NON – FUNCTIONAL REQUIREMENTS

Non-functional requirements describe the general properties of a system. They are also known as quality attributes.

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	Usability	People need not have to stand in long tiring lines instead they can book tickets through our online application with ease.
NFR-2	Security	The application we are designing is secured for people to give their login credentials / ID's for verification purposes.
NFR-3	Reliability	We are creating this app which will serve as a time saver for millions of people who can book tickets to their destination on the go. The app also has advantages like GPS tracking module, QR code for verification.
NFR-4	Performance	The ticket booking confirmation is sent through a mail with the QR code along with the link for live location tracking of the train.

NFR-5	Availability	The application which we are designing is user friendly.
NFR-6	Scalability	Using IBM Watson IOT Platform the web application is connected to the IOT devices which ensures security of the application.

4.3 CUSTOMER JOURNEY MAPS

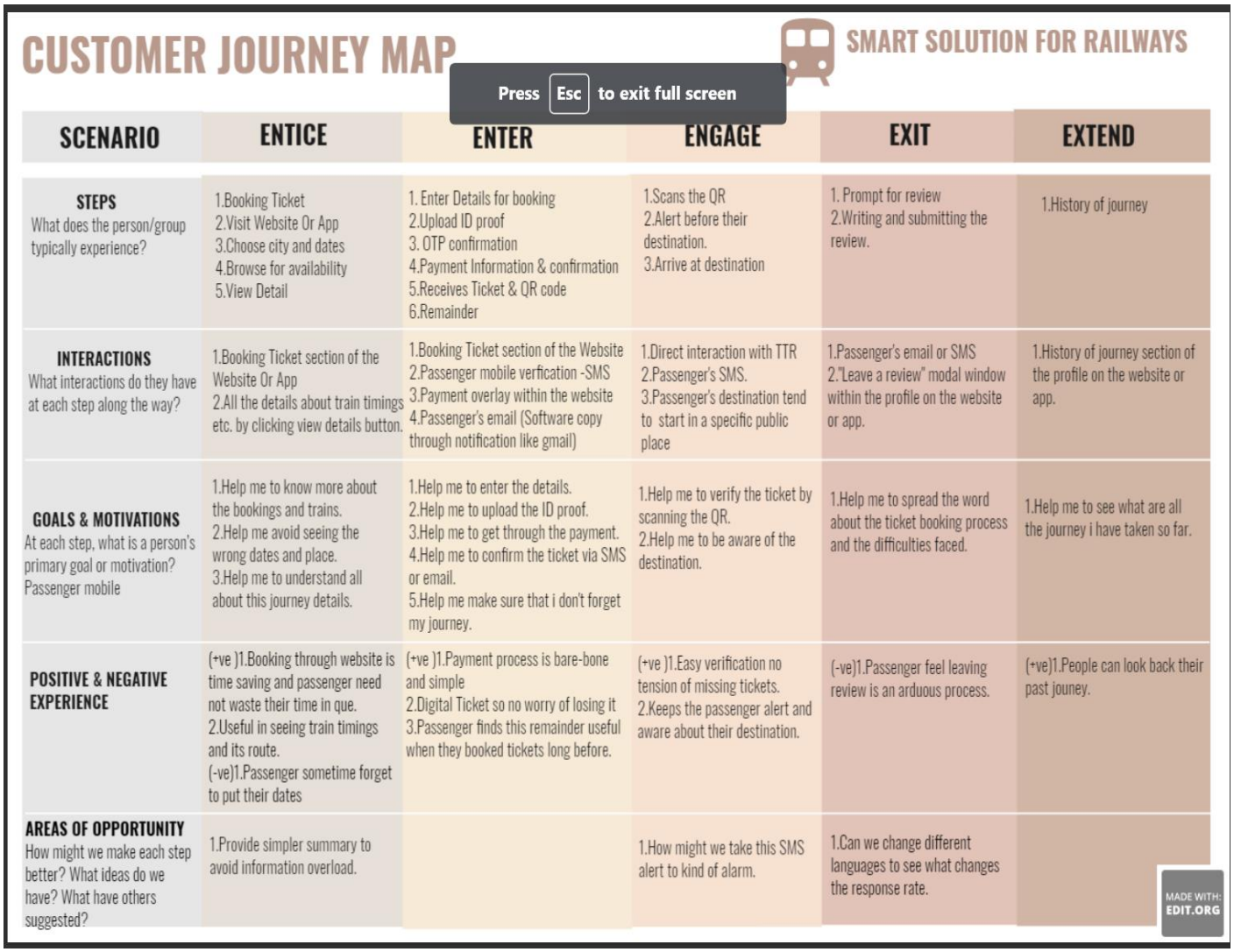

Figure 4.3 Customer journey map

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

DFD is the abbreviation for Data Flow Diagram. The flow of data of a system or a process is represented by DFD. It also gives insight into the inputs and outputs of each entity and the process itself. DFD does not have control flow and no loops or decision rules are present. Specific operations depending on the type of data can be explained by a flowchart. Data Flow Diagram can be represented in several ways. The DFD belongs to structured-analysis modeling tools. Data Flow diagrams are very popular because they help us to visualize the major steps and data involved in software-system processes.

The Data Flow Diagram has 4 components:

Process

Input to output transformation in a system takes place because of process function. The symbols of a process are rectangular with rounded corners, oval, rectangle or a circle. The process is named a short sentence, in one word or a phrase to express its essence

Data Flow

Data flow describes the information transferring between different parts of the systems. The arrow symbol is the symbol of data flow. A relatable name should be given to the flow to determine the information which is being moved. Data flow also represents material along with information that is being moved. Material shifts are modeled in systems that are not merely informative. A given

flow should only transfer a single type of information. The direction of flow is represented by the arrow which can also be bi-directional.

Warehouse

The data is stored in the warehouse for later use. Two horizontal lines represent the symbol of the store. The warehouse is simply not restricted to being a data file rather it can be anything like a folder with documents, an optical disc, a filing cabinet. The data warehouse can be viewed independent of its implementation. When the data flow from the warehouse it is considered as data reading and when data flows to the warehouse it is called data entry or data updation.

Terminator

The Terminator is an external entity that stands outside of the system and communicates with the system. It can be, for example, organizations like banks, groups of people like customers or different departments of the same organization, which is not a part of the model system and is an external entity. Modeled systems also communicate with terminator.

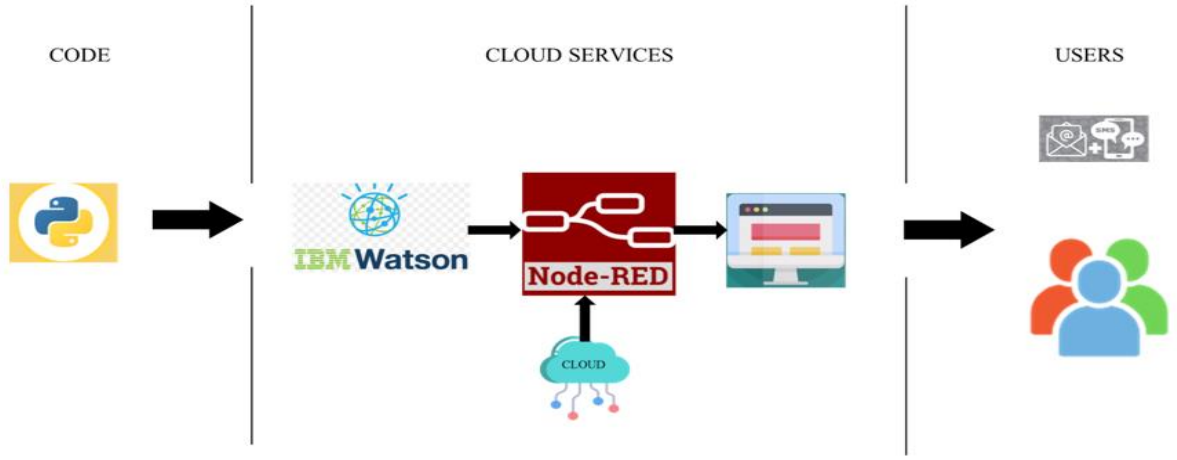

Figure 5.1 Data flow design

5.2 SOLUTION & TECHNICAL ARCHITECTURE

Technical architecture includes the major components of the system, their relationships, and the contracts that define the interactions between the components. The goal of technical architects is to achieve all the business needs with an application that is optimized for both performance and security.

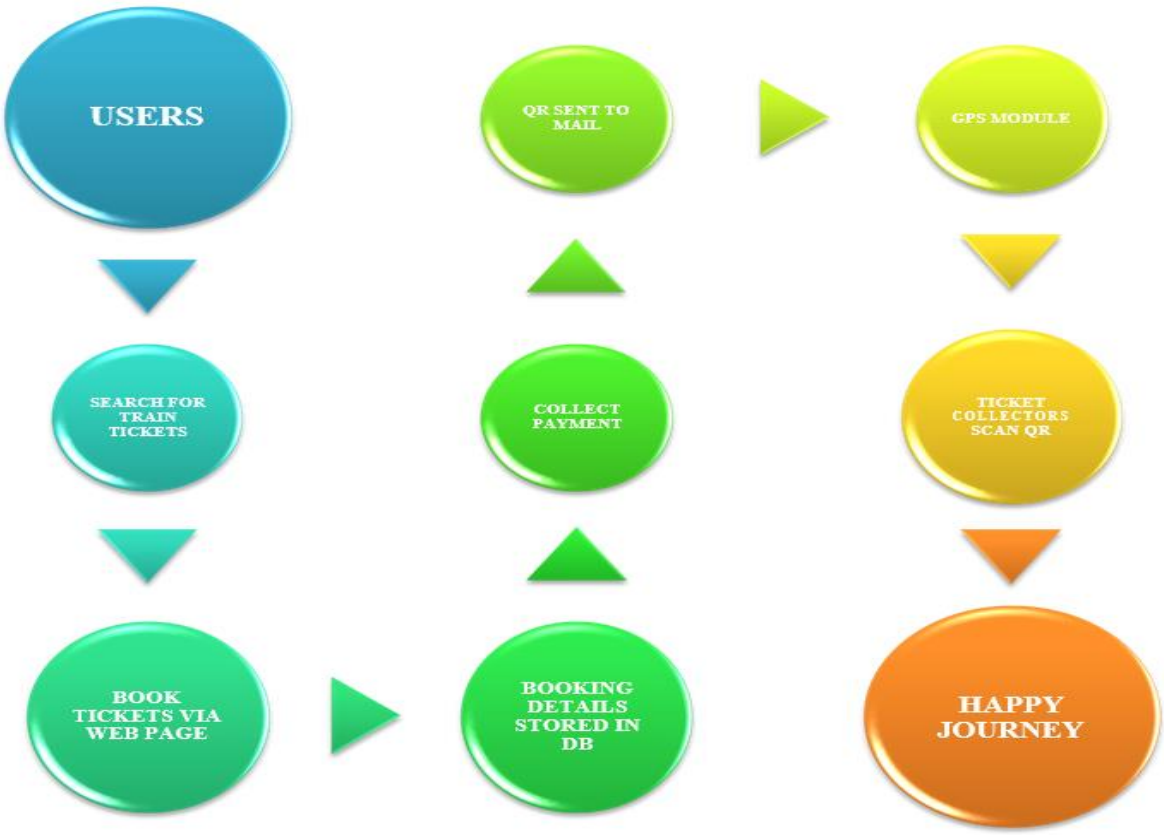

Figure 5.2 Architecture

5.3 USER STORIES

User stories help articulate what value a product feature can bring and have a better understanding of why users want a certain functionality. The main purpose of user stories is to simplify the essential core of the project and the fundamentals requirements needed to make it usable.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user/ Web user)	User Registration	USN-1	As a user, I can register for the application by entering my email, password.	I can access my account / dashboard	High	Sprint-1
	User Confirmation	USN-2	As a user, I will receive QR via email once I have booked the tickets.	I can receive confirmation email	High	Sprint-1
		USN-3	As a user, The TC can verify my ticket by scanning.	TC can Scan and verify the tickets	Medium	Sprint-2
	Global Positioning System		In the event of a delay or emergency, the user can locate the train's present location by using the GPS module.		Medium	Sprint-3
	QR Code		The user gets the QR code through the mail to confirm their ticket.		High	Sprint-4

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING &ESTIMATION

Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team.

The sprint planning session kicks off the sprint by setting the agenda and focus. If done correctly, it also creates an environment where the team is motivated, challenged, and can be successful. Bad sprint plans can derail the team by setting unrealistic expectations.

The Table 6.1 shows the sprint planning and estimation of IoT Based Smart Solution for railway System.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	User Registration	USN-1	As a user, I can register for the application by entering my email, password.	2	High
Sprint-1	User Confirmation	USN-2	As a user, I will receive QR via email once I have booked the tickets.	1	High
Sprint-2		USN-3	As a user, The TC can verify my ticket by scanning.	2	Medium
Sprint-3	Global Positioning System		In the event of a delay or emergency, the user can locate the train's present location by using the GPS module.	2	Medium

Sprint-4	QR Code		The user gets the QR code through the mail to confirm their ticket.	1	High

6.2 SPRINT DELIVERY SCHEDULE

- The What – The product owner describes the objective (or goal) of the sprint and what backlog items contribute to that goal. The scrum team decides what can be done in the coming sprint and what they will do during the sprint to make that happen.
- The How – The development team plans the work necessary to deliver the sprint goal. Ultimately, the resulting sprint plan is a negotiation between the development team and product owner based on value and effort.
- The Who – You cannot do sprint planning without the product owner or the development team. The product owner defines the goal based on the value that they seek. The development team needs to understand how they can or cannot deliver that goal. If either is missing from this event it makes planning the sprint almost impossible.
- The Inputs – A great starting point for the sprint plan is the product backlog as it provides a list of 'stuff' that could potentially be part of the current sprint. The team should also look at the existing work done in the increment and have a view to capacity.

- The Outputs – The most important outcome for the sprint planning meeting is that the team can describe the goal of the sprint and how it will start working toward that goal. This is made visible in the sprint backlog.

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint1	20	6 Days	24 Oct 2022	29 Oct 2022	20	28 Oct 2022
Sprint2	20	6 Days	31 Oct 2022	05 Nov 2022	20	04 Nov 2022
Sprint3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint4	20	6 Days	14 Nov 2022	19 Nov 2022	20	18 Nov 2022

Velocity:

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{6} = 3.33 = 3\ (approx.)$$

6.3 REPORTS FROM JIRA

A burndown chart shows the amount of work that has been completed in an epic or sprint, and the total work remaining. Burndown charts are used to predict your team's likelihood of completing their work in the time available. They're also great for keeping the team aware of any scope creep that occurs.

Burndown charts are useful because they provide insight into how the team works. For example:

• If you notice that the team consistently finishes work early, this might be a sign that they aren't committing to enough work during sprint planning.

• If they consistently miss their forecast, this might be a sign that they've committed to too much work.

• If the burndown chart shows a sharp drop during the sprint, this might be a sign that work has not been estimated accurately, or broken down properly.

Figure 6.3 Burn down Chart

CHAPTER 7

CODING & SOLUTIONING

7.1 FEATURE

Software required:

Figure 7.1 Pycharm

PyCharm is the most popular IDE used for Python scripting language. This chapter will give you an introduction to PyCharm and explains its features.PyCharm offers some of the best features to its users and developers in the following aspects

- Code completion and inspection
- Advanced debugging
- Support for web programming and frameworks such as Django and Flask

Features of PyCharm:

Besides, a developer will find PyCharm comfortable to work with because of the features mentioned below

- **Code Completion:**

  PyCharm enables smoother code completion whether it is for built in or for an external package.

- **SQLAlchemy as Debugger**

  You can set a breakpoint, pause in the debugger and can see the SQL representation of the user expression for SQL Language code.

- **Git Visualization in Editor:**

  When coding in Python, queries are normal for a developer. You can check the last commit easily in PyCharm as it has the blue sections that can define the difference between the last commit and the current one.

- **Code Coverage in Editor:**

  You can run **.py** files outside PyCharm Editor as well marking it as code coverage details elsewhere in the project tree, in the summary section etc.

- **Package Management:**

All the installed packages are displayed with proper visual representation. This includes list of installed packages and the ability to search and add new packages.

- **Local History:**

Local History is always keeping track of the changes in a way that complements like Git. Local history in PyCharm gives complete details of what is needed to rollback and what is to be added.

- **Refactoring:**

  Refactoring is the process of renaming one or more files at a time and PyCharm includes various shortcuts for a smooth refactoring process.

- **User Interface of PyCharm Editor:**

  The user interface of PyCharm editor is shown in the screenshot given below. Observe that the editor includes various features to create a new project or import from an existing project.

Libraries required:

```
import tkinter
```

Figure 7.2 Libraries required

Tkinter

Tkinter is an open source Python package This framework provides Python users with a simple way to create GUI elements using the widgets found in the Tk toolkit. Tk widgets can be used to construct buttons, menus, data fields, etc. in a Python application. Once created, these graphical elements can be associated with or interact with features, functionality, methods, data or even other widgets.

Python offers multiple options for developing GUI (Graphical User Interface). Out of all the GUI methods, tkinter is the most commonly used method. It is a standard Python interface to the Tk GUI toolkit shipped with Python. Python with tkinter is the fastest and easiest way to create the GUI applications. Creating a GUI using tkinter is an easy task.

To create a tkinter app:

Importing the module – tkinter

Create the main window (container)

Add any number of widgets to the main window

Apply the event Trigger on the widgets.

Importing tkinter is same as importing any other module in the Python code.

```
m=tkinter.Tk() where m is the name of the main window object
```

Figure 7.3 Libraries required

Tk(screenName=None, baseName=None, className='Tk', useTk=1): To create a main window, tkinter offers a method 'Tk(screenName=None, baseName=None, className='Tk', useTk=1)'. To change the name of the window, you can change the className to the desired one. The basic code used to create the main window of the application is:

```
import tkinter
m = tkinter.Tk()
'''
widgets are added here
'''
m.mainloop()
```

```
from tkinter import *
master = Tk()
w = Canvas(master, width=40, height=60)
w.pack()
canvas_height=20
canvas_width=200
y = int(canvas_height / 2)
w.create_line(0, y, canvas_width, y )
mainloop()
```

Figure 7.4 Libraries required

mainloop(): There is a method known by the name mainloop() is used when your application is ready to run. mainloop() is an infinite loop used to run the application, wait for an event to occur and process the event as long as the window is not closed.

pack() method:It organizes the widgets in blocks before placing in the parent widget.

grid() method:It organizes the widgets in grid (table-like structure) before placing in the parent widget.

place() method:It organizes the widgets by placing them on specific positions directed by the programmer.

There are a number of widgets which you can put in your tkinter application. Some of the major widgets are explained below:

To add a button in your application, this widget is used.

The general syntax is:

```
import tkinter as tk
r = tk.Tk()
r.title('Counting Seconds')
button = tk.Button(r, text='Stop', width=25, command=r.destroy)
button.pack()
r.mainloop()
```

Figure 7.5 Libraries required

There are number of options which are used to change the format of the Buttons. Number of options can be passed as parameters separated by commas. Some of them are listed below.

activebackground: to set the background color when button is under the cursor.

activeforeground: to set the foreground color when button is under the cursor.

bg: to set he normal background color.

command: to call a function.

font: to set the font on the button label.

image: to set the image on the button.

width: to set the width of the button.

height: to set the height of the button.

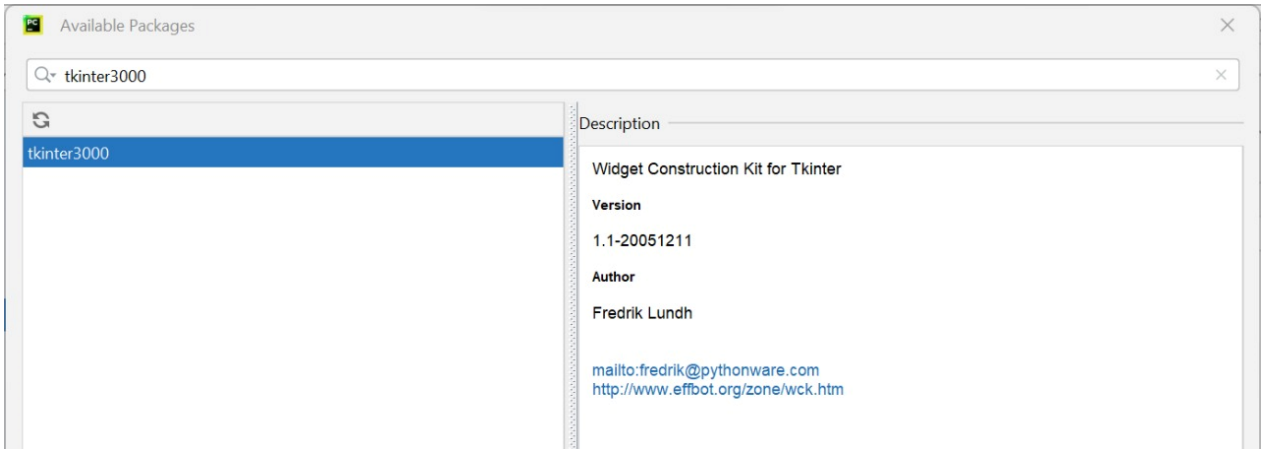

Figure 7.6 Installating the visions of Tkinter in Pycharm

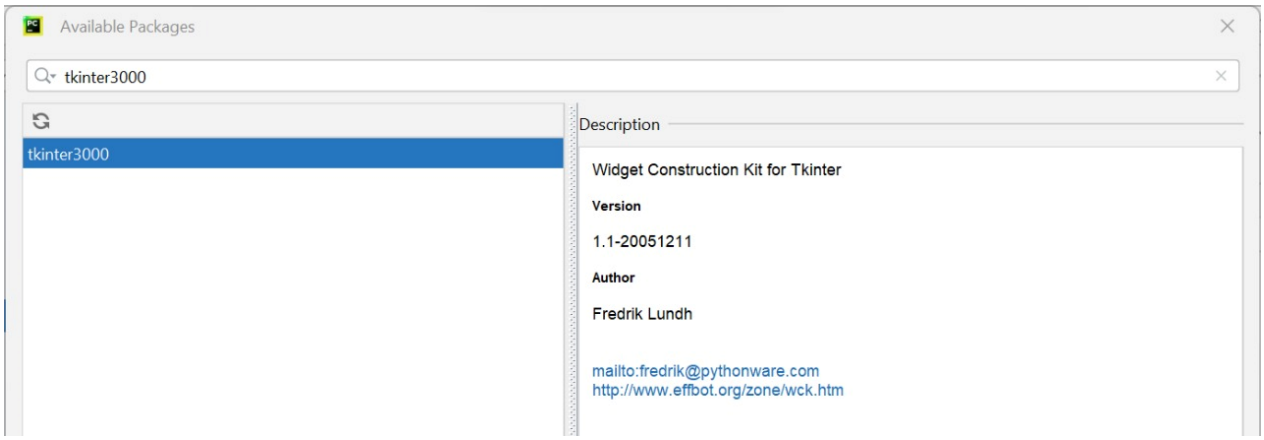

Figure 7.7 Installation the visions of Tkinter in Pycharm

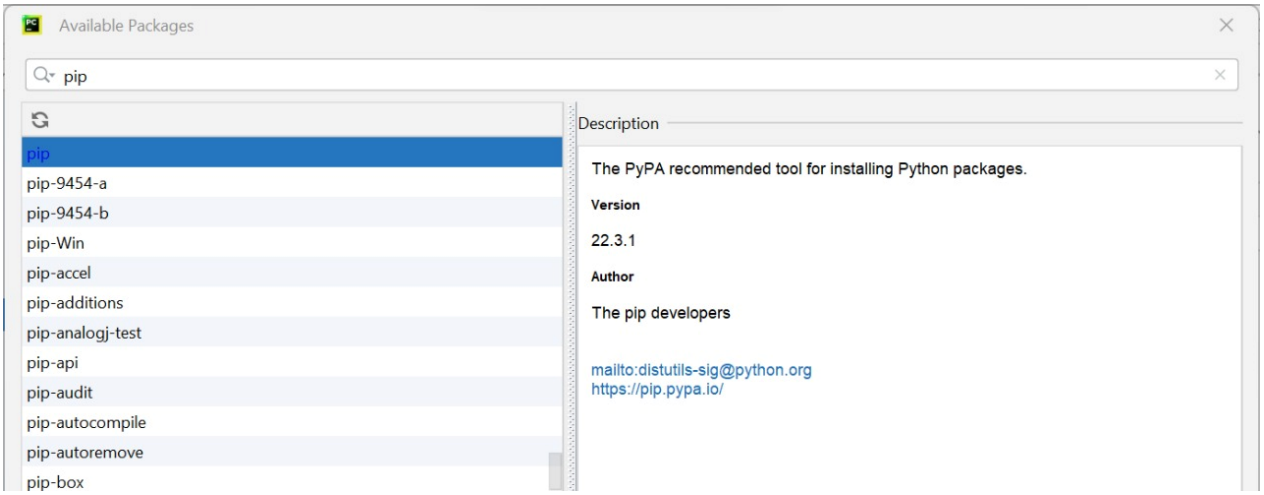

Figure 7.8 Installation of pip library in pycharm

Pipenv also generates the Pipfile.lock file, which is used to produce deterministic builds and create a snapshot of your working environment. This might be particularly helpful for security sensitive deployment, when project requirements and packages versions are critical.

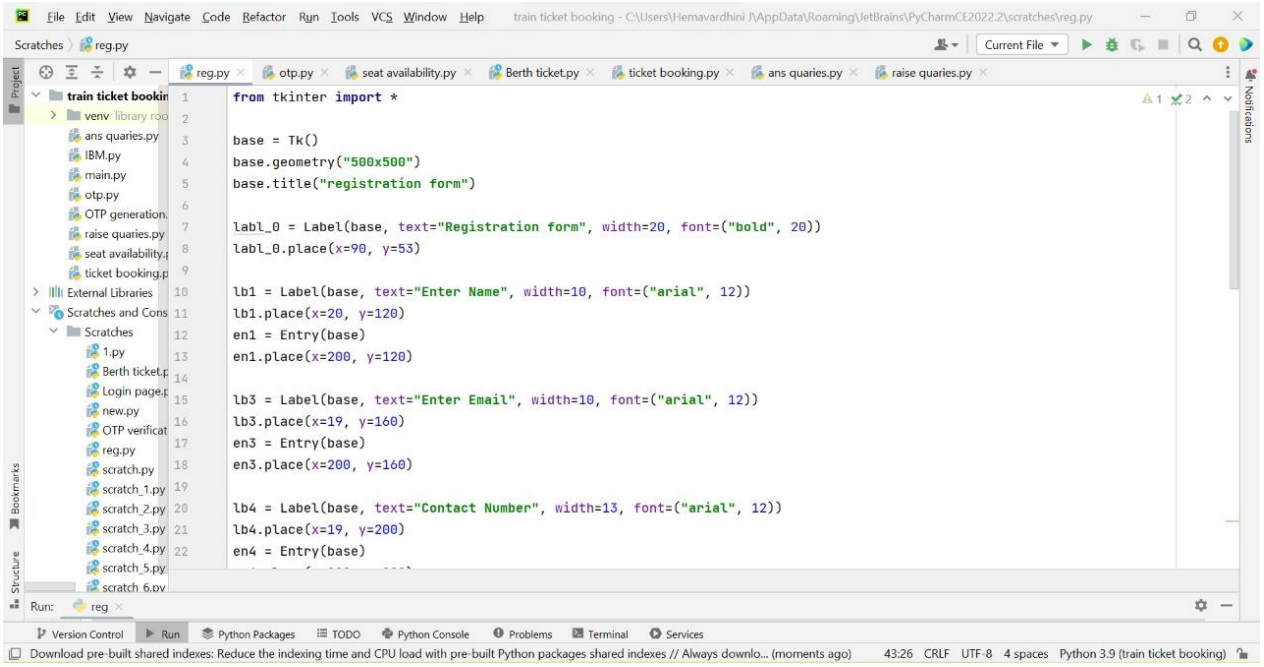

Figure 7.9 Program execution for Registration

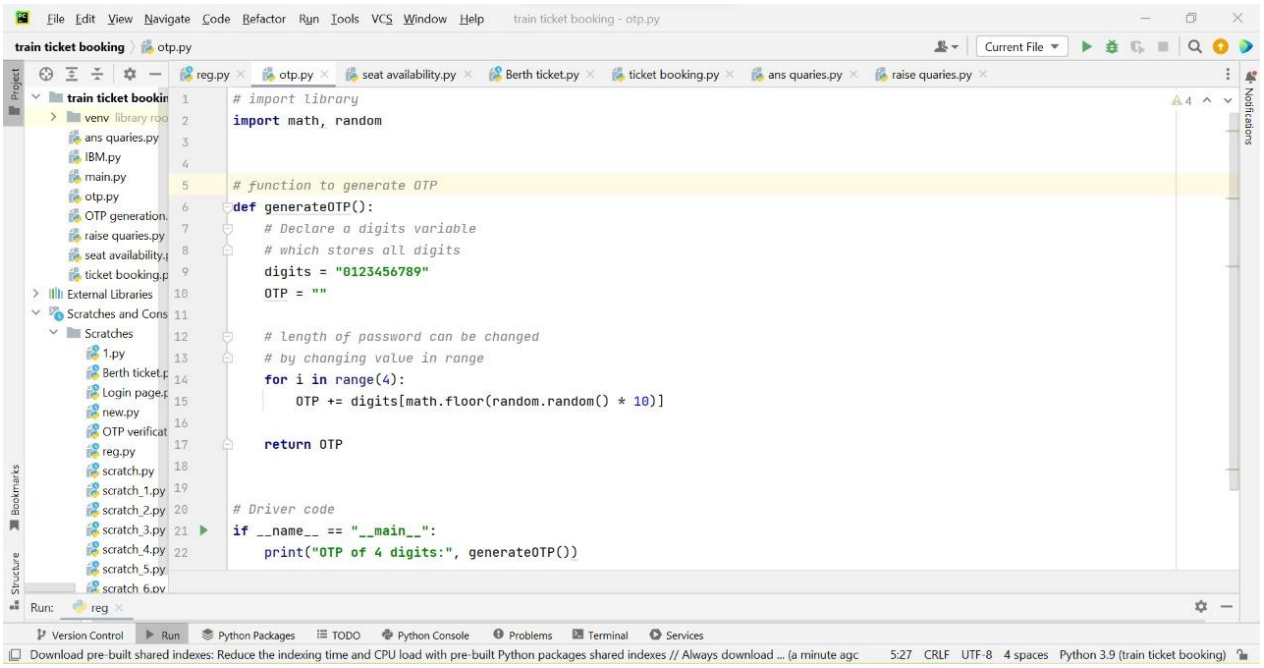

Figure 7.10 Program execution for OTP generation

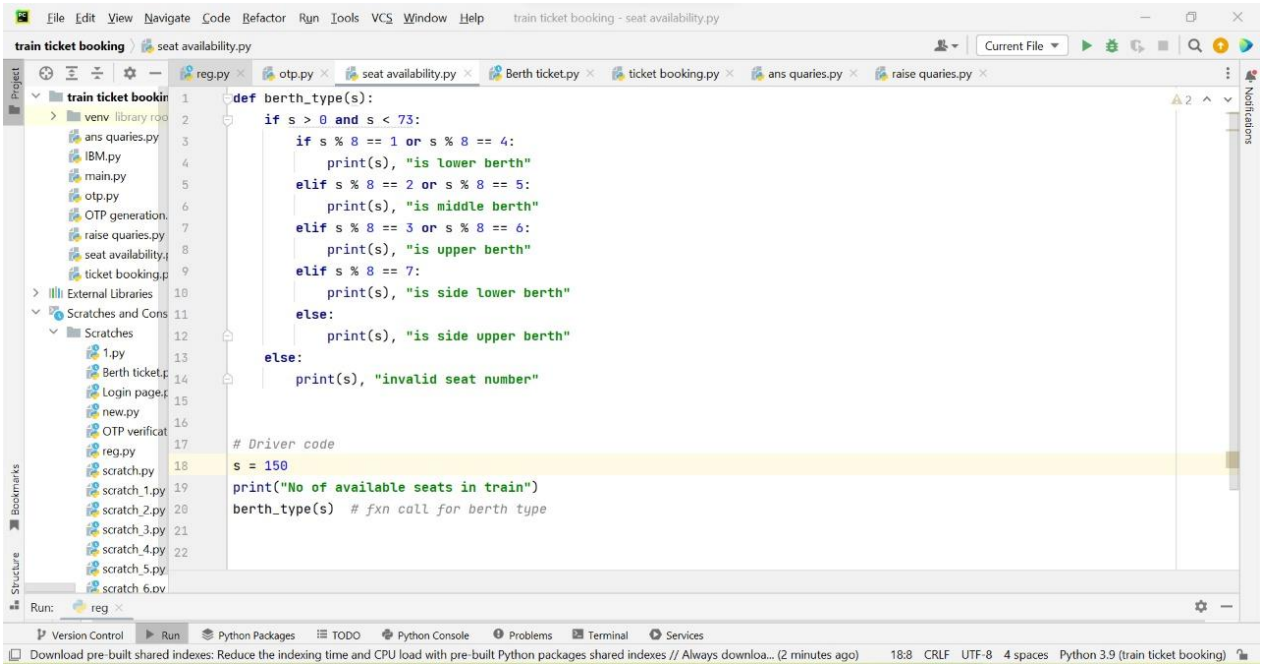

Figure 7.11 Program execution for seat availability

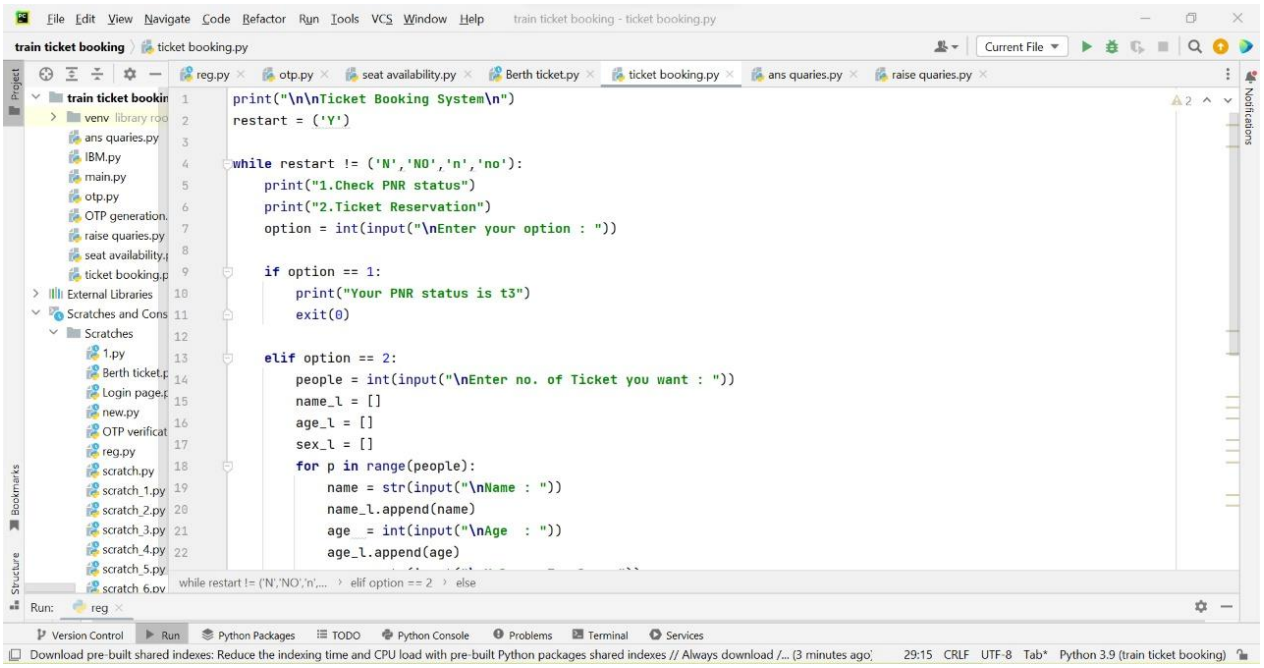

Figure 7.12 Program execution for ticket booking

Figure 7.13 QR code generation

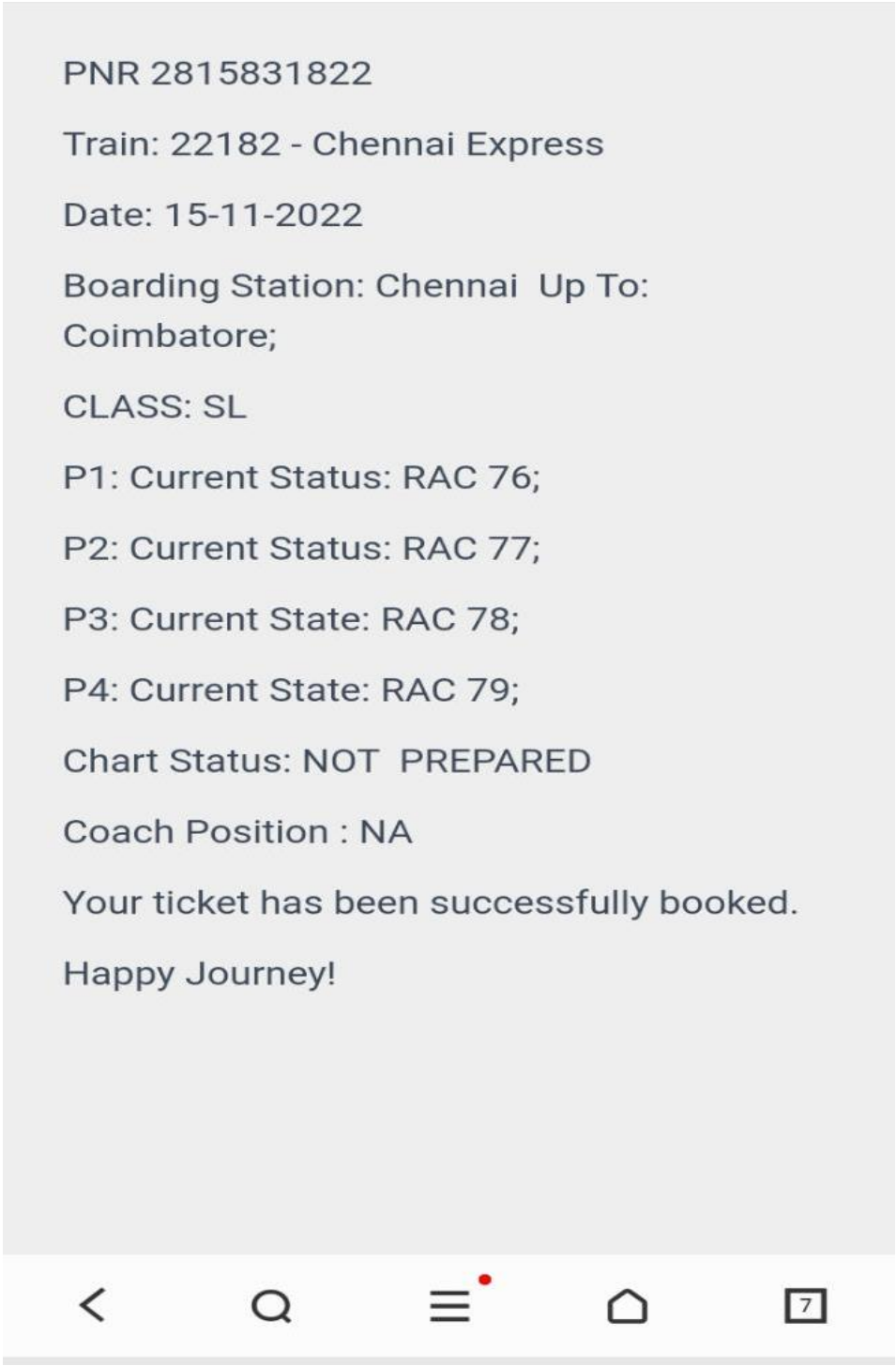

Figure 7.14 Message Output

CHAPTER 8
RESULTS

PERFORMANCE METRICS

This figure 8.1 specifies the login page where the user can give their credentials. Using this information, the user will be allowed inside the page to look into the availability of trains for various destinations. After successfully creating an account, customer can book a ticket by specifying the source and the destination and book a ticket.

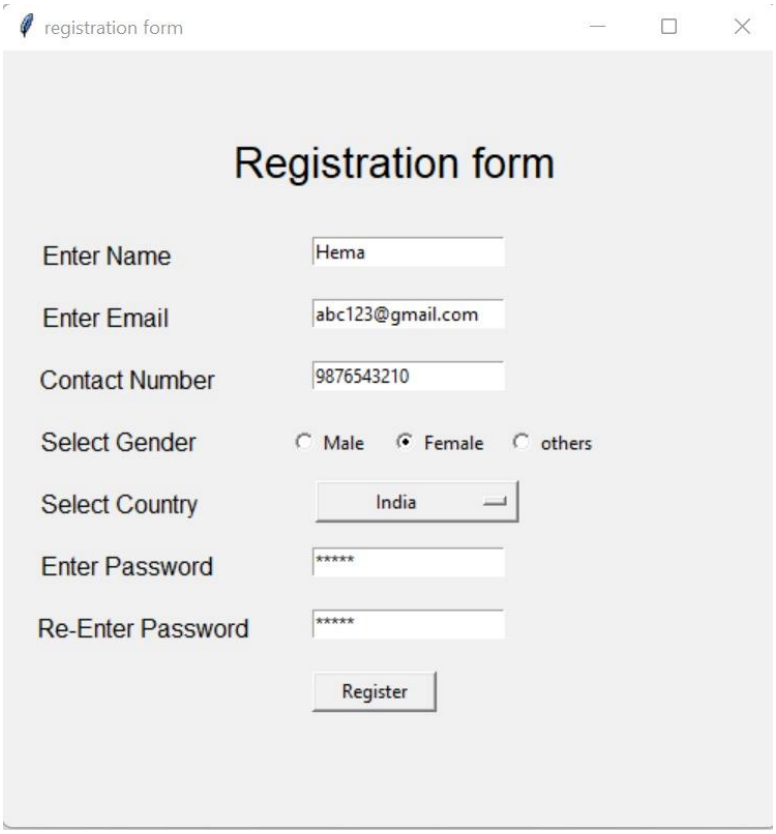

Figure 8.1 Login page of the website

By looking at the various availability of the trains for different destination the user can decide where to travel and book the train ticket by providing the details like name of the passenger, gender, their respective age and PNR status for

the tickets kept at waiting stage will be confirmed. Below that the appropriate details of the user entered will be visible for confirmation purposes as mentioned in the figure 8.2.

```
"D:\IBM PROJECT\train ticket booking\venv\Scripts\python.exe" "D:/IBM PROJECT/train ticket booking/ticket booking.py"


Ticket Booking System

1.Check PNR status
2.Ticket Reservation

Enter your option : 1
Your PNR status is t3

Process finished with exit code 0
```

```
"D:\IBM PROJECT\train ticket booking\venv\Scripts\python.exe" "D:/IBM PROJECT/train ticket booking/ticket booking.py"


Ticket Booking System

1.Check PNR status
2.Ticket Reservation

Enter your option : 2

Enter no. of Ticket you want : 1

Name : Hema

Age  : 21

Male or Female : Female

Did you forgot someone? y/n: y
1.Check PNR status
2.Ticket Reservation

Enter your option : 2


 Enter no. of Ticket you want : 1

 Name : nithis

 Age  : 14

 Male or Female : male

 Did you forgot someone? y/n: n

 Total Ticket :  1
 Ticket :  1
 Name :  nithis
 Age  :  14
 Sex :  male
 1.Check PNR status
 2.Ticket Reservation
```

Figure 8.2 Providing user information

After providing the user details and verifying them, OTP will be generated and sent to the user for the confirmation of the booked tickets. After booking the train, the person will get a OTP and QR code which has to be shown to the Ticket Collector while boarding the train.

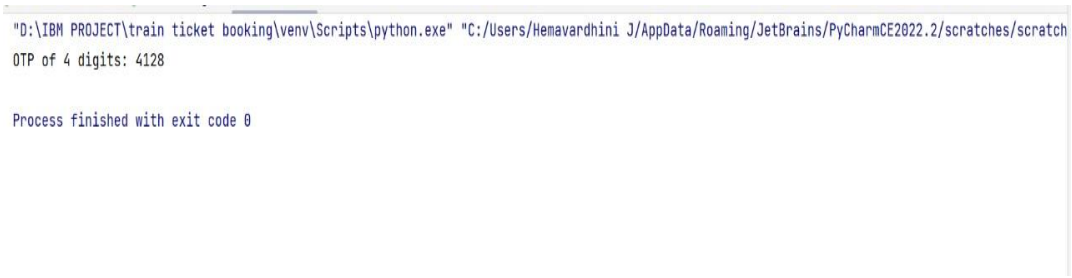

Figure 8.3 OTP code generation for confirmation

The application will generate a QR code of booked ticket which will be used at the railway station to scan the ticket (QR code). GPS facility is used for validation of the ticket at the source and deletion at the destination.

The information for each user is stored in a SQL database for security purpose which is unavailable in the current suburban railway system. Also, the ticket checker is provided with an application to search for the user's ticket with the ticket number in the cloud database for checking purposes. The ticket collectors can scan the QR code to identify the personal details.

Figure 8.4 QR code for ticket confirmation

After receiving the QR code via SMS or mail the user can confirm that he/ she has booked the train tickets successfully and then when they board the train, the passengers can show the QR received to the TC for the confirmation of the train tickets. And the passengers can travel hazel free instead of standing in long queues in order to book tickets for their destination.

CHAPTER 9

ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- Reduced the work load of the user and also the use of paper.
- There are many advantages in booking and purchasing a ticket online. One among them is necessity of travel, which promotes the use of public transportation and reduces pollution.
- Website saves a huge work for our ticket checkers by GPS validation of tickets and also moving from manual ticket checking process to digital ticket checking process.
- Convenient to the ticket examiner for easy carriage of tickets in mobile application.
- Faster and Secure
- More futuristic

DISADVANTAGES:

- It will be difficult for rural people to book ticket, as they do not have any prior knowledge regarding it.
- Cost effectiveness need to be considered along with accuracy.
- A disadvantage of railway transport is its inflexibility. It routes and timings cannot be adjusted to individual requirements.

CHAPTER 10

CONCLUSIONS & FUTURE SCOPE

10.1 CONCLUSION

The general public has access to a website where they may view the available seats and purchase tickets. The individual who reserved the train will receive a QR code, which must be presented to the ticket collector while boarding the train. The ticket collectors can identify the personal information by scanning the QR code. The train has a GPS module to be tracked. The Web app regularly updates the journey's live status. When the ticket collector scans the QR Code, all of the client booking information will be stored in the database with a special ID and be retrievable.

10.2 FUTURE SCOPE

The use of batteries as an electric power source is an effective and sustainable solution that the future scope will be to develop for diesel train locomotives. And the Railway Transportation industry is green and sustainable.

SOURCE CODE

REGISTRATION:

```
from tkinter import *

base = Tk()
base.geometry("500x500")
base.title("registration form")

labl_0 = Label(base, text="Registration form", width=20, font=("bold", 20))
labl_0.place(x=90, y=53)

lb1 = Label(base, text="Enter Name", width=10, font=("arial", 12))
lb1.place(x=20, y=120)
en1 = Entry(base)
en1.place(x=200, y=120)

lb3 = Label(base, text="Enter Email", width=10, font=("arial", 12))
lb3.place(x=19, y=160)
en3 = Entry(base)
en3.place(x=200, y=160)

lb4 = Label(base, text="Contact Number", width=13, font=("arial", 12))
lb4.place(x=19, y=200)
en4 = Entry(base)
en4.place(x=200, y=200)
```

```
lb5 = Label(base, text="Select Gender", width=15, font=("arial", 12))
lb5.place(x=5, y=240)
var = IntVar()
Radiobutton(base, text="Male", padx=5, variable=var, value=1).place(x=180, y=240)
Radiobutton(base, text="Female", padx=10, variable=var, value=2).place(x=240, y=240)
Radiobutton(base, text="others", padx=15, variable=var, value=3).place(x=310, y=240)

list_of_cntry = ("United States", "India", "Nepal", "Germany")
cv = StringVar()
drplist = OptionMenu(base, cv, *list_of_cntry)
drplist.config(width=15)
cv.set("United States")
lb2 = Label(base, text="Select Country", width=13, font=("arial", 12))
lb2.place(x=14, y=280)
drplist.place(x=200, y=275)

lb6 = Label(base, text="Enter Password", width=13, font=("arial", 12))
lb6.place(x=19, y=320)
en6 = Entry(base, show='*')
en6.place(x=200, y=320)

lb7 = Label(base, text="Re-Enter Password", width=15, font=("arial", 12))
lb7.place(x=21, y=360)
en7 = Entry(base, show='*')
```

```
en7.place(x=200, y=360)

Button(base, text="Register", width=10).place(x=200, y=400)
base.mainloop()
```

OTP:

```
# import library
import math, random



# function to generate OTP
def generateOTP():
    # Declare a digits variable
    # which stores all digits
    digits = "0123456789"
    OTP = ""

    # length of password can be changed
    # by changing value in range
    for i in range(4):
        OTP += digits[math.floor(random.random() * 10)]

    return OTP

# Driver code
if _name_ == "_main_":
    print("OTP of 4 digits:", generateOTP())
```

SEAT AVAILABILITY:

```
def berth_type(s):
    if s > 0 and s < 73:
        if s % 8 == 1 or s % 8 == 4:
            print(s), "is lower berth"
        elif s % 8 == 2 or s % 8 == 5:
            print(s), "is middle berth"
        elif s % 8 == 3 or s % 8 == 6:
            print(s), "is upper berth"
        elif s % 8 == 7:
            print(s), "is side lower berth"
        else:
            print(s), "is side upper berth"
    else:
        print(s), "invalid seat number"


# Driver code
s = 150
print("No of available seats in train")
berth_type(s)  # fxn call for berth type
```

TICKET BOOKING:

```
print("\n\nTicket Booking System\n")
restart = ('Y')

while restart != ('N','NO','n','no'):
```

```
print("1.Check PNR status")
print("2.Ticket Reservation")
option = int(input("\nEnter your option : "))

if option == 1:
        print("Your PNR status is t3")
        exit(0)

elif option == 2:
        people = int(input("\nEnter no. of Ticket you want : "))
        name_l = []
        age_l = []
        sex_l = []
        for p in range(people):
                name = str(input("\nName : "))
                name_l.append(name)
                age  = int(input("\nAge  : "))
                age_l.append(age)
                sex  = str(input("\nMale or Female : "))
                sex_l.append(sex)

        restart = str(input("\nDid you forgot someone? y/n: "))
        if restart in ('y','YES','yes','Yes'):
                restart = ('Y')
        else :
                x = 0
                print("\nTotal Ticket : ",people)
```

```
for p in range(1,people+1):
        print("Ticket : ",p)
        print("Name : ", name_l[x])
        print("Age  : ", age_l[x])
        print("Sex : ",sex_l[x])
        x += 1
```

GitHub Link: https://github.com/IBM-EPBL/IBM-Project-9698-1659068640

Project Demo Link:

https://drive.google.com/file/d/1IRn1o2Gk3UNXERQ2yuEG9cf1qiAnt7ua/view?usp=sharing

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[5] N. R. Borkar and S. Kuwelkar, "Real-time implementation of face recognition system," 2017 International Conference on Computing Methodologies and Communication (ICCMC), Erode, 2017, pp. 249-255, doi: 10.1109/ICCMC.2017.8282685