Project Report

Project Name: **SMART SOLUTIONS FOR RAILWAYS**

Team ID: **PNT2022TMID01176**

Team: **SUNDAR S - TEAM LEAD**

Team members: Sujish Kumar I

Sabarish Babu G

Santhanaprabhu J

1. INTRODUCTION

1.1 Project Overview

As trains are one of the most preferred modes of transportation among middle class and impoverished people as it attracts for its amenities. Simultaneously there is an increase at risk from thefts and accidents like chain snatching, derailment, fire accident. In order to avoid or in better words to stop all such brutality we came up with a solution by providing an application which can be accessed by the user after booking their tickets. With a single click this app addresses issues by sending a text message to TC and RPF as an alert. In our project we use Node-Red service, app-development, IBM cloud platform to store passenger data.

1.2 Purpose

The purpose of this project is to report and get relived from the issues related to trains.

2. LITERATURE SURVEY

2.1 Existing problem

- A Web page is designed for the public where they can book tickets by seeing the available seats.

- After booking the train, the person will get a QR code which has to be shown to the Ticket Collector while boarding the train.
- The ticket collectors can scan the QR code to identify the personal details.
- A GPS module is present in the train to track it. The live status of the journey is updated in the Web app continuously
- All the booking details of the customers will be stored in the database with a unique ID and they can be retrieved back when the Ticket Collector scans the QR Code.

2.2 References

S.NO	TITLE	AUTHOR	YEAR	KEY TECHNOLOGY
1	Main geotechnical problems of railways and roads in kriolitozone and their solutions.	Kondratiev, Valentin G	2017	Main problems in railways
2	Construction and Building Materials	Sañudo, Roberto, Marina Miranda, Carlos García, and David García-Sanchez	2019	Drainage in railways
3	Problems of Indian Railways	Benjamin	2021	Common problems in Indian railways
4	A comparative study of Indian and worldwide railways.	Sharma, Sunil Kumar, and Anil Kumar	2014	Study of Indian railways
5	Ticketing solutions for Indian railways using RFID technology	Prasanth,Venugopal, and K.P. Soman	2009	Solution for ticketing using RFID

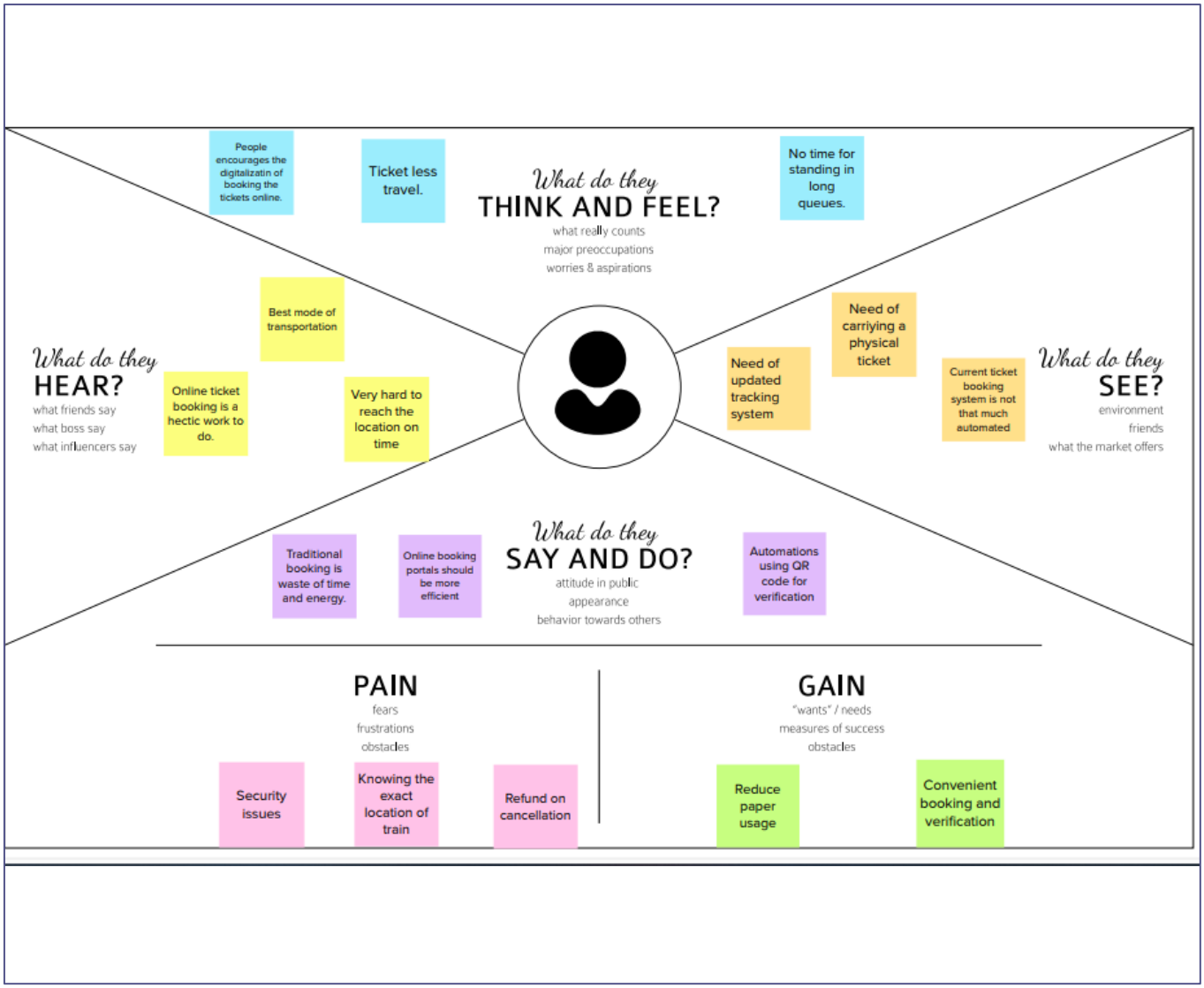
2.3 Problem Statement Definition

Smart Solutions for railways are designed to reduce the work load of the user and the use of paper.

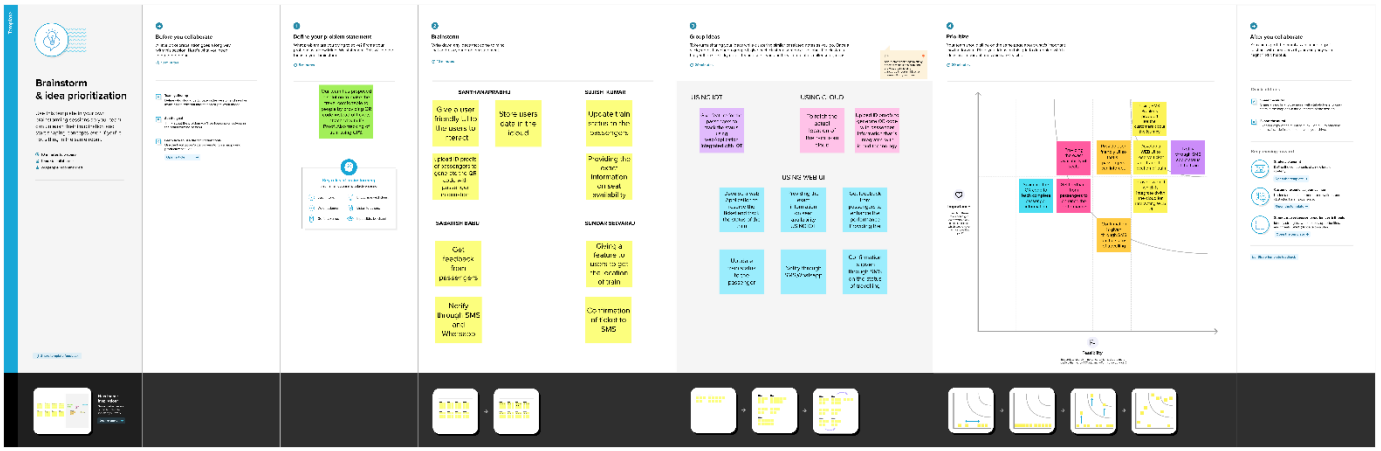
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS - 1	User	Book a ticket through application	Unable to book ticket properly	Lack of Guidance in those application	Cofused
PS – 2	Passenger	Book a train Seat Berth	Not Sure information about the berth	Evert seating showing as same	Irritated
PS – 3	Passenger	Give a feedback or complaint about my journey	I couldn't able to do that	There is no option like that in application	Hate
PS – 4	Government	Avoid Ticketless traveling in Railways	Some people are not following the rule	There is no checking while entering the platform	Worst

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

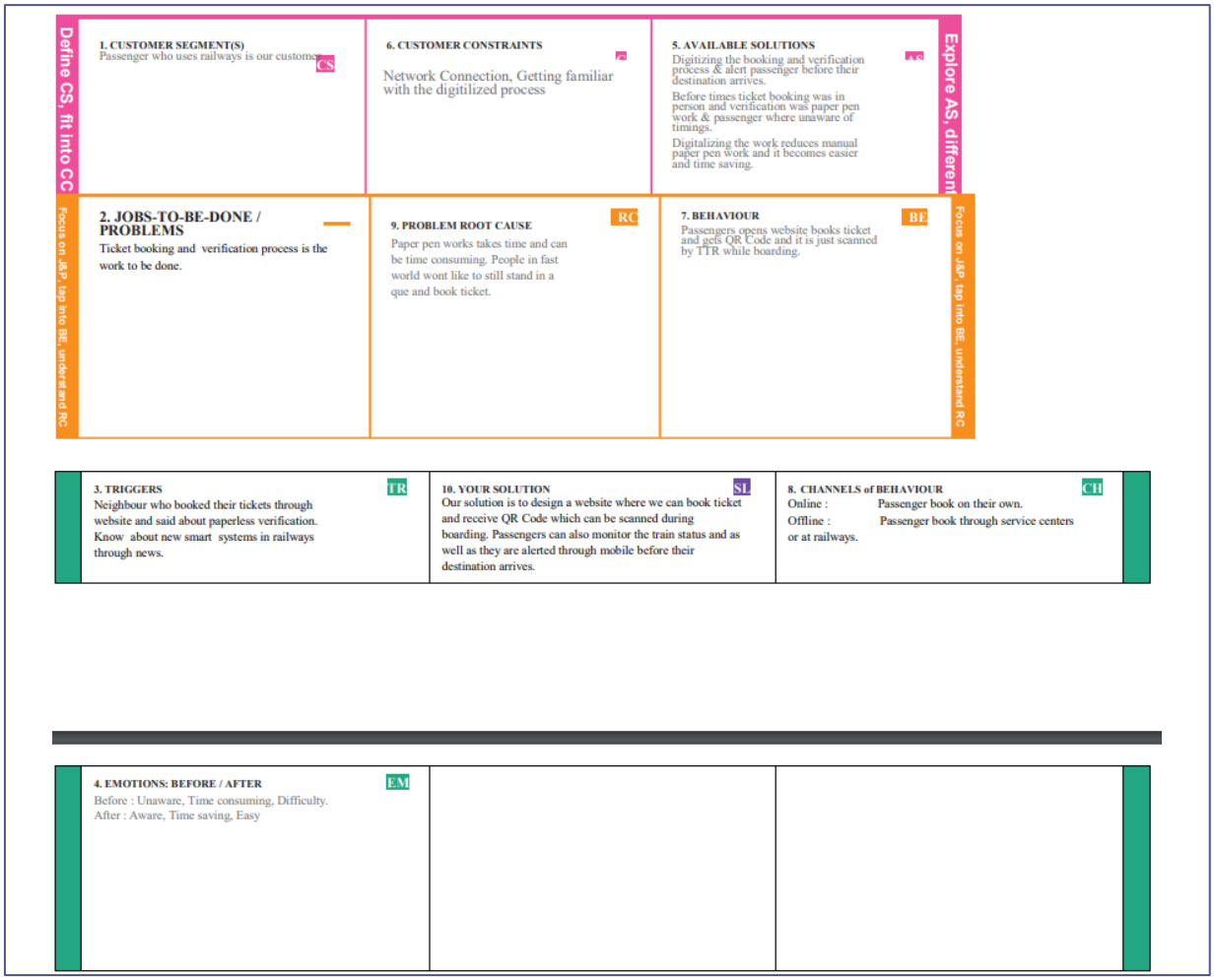


3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Problems in the railways like robbery, fire accidents etc..
2.	Idea / Solution description	Developing an app for the passengers.
3.	Novelty / Uniqueness	The passengers can send an alert to the respective officials during the travel time through the app when they are in trouble so that they can easily solve it.
4.	Social Impact / Customer Satisfaction	Usage of this app can be a great relief to the passengers, so that they can travel without any fear.
5.	Business Model (Revenue Model)	5000

6.	Scalability of the Solution	This solution will be useful for passengers while travelling. They can use the app between the time of their travel. The users will fell more secured, in-case of an emergency by simply clicking on a button the alert signal will be sent to the respective officials and the corresponding measures will be taken.

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

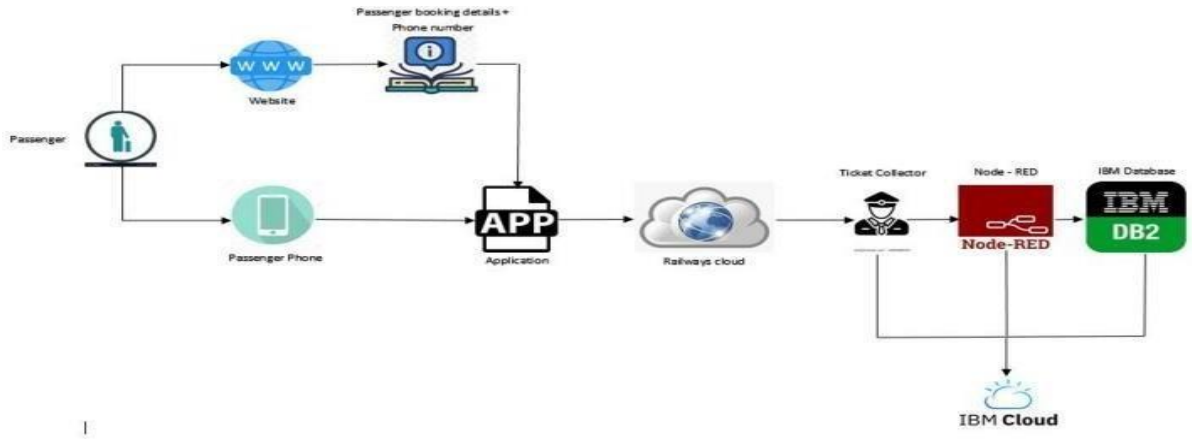
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Online Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Application installation	The application is installed through the given link
FR-4	User access	Access the app requirements

4.2 Non-Functional requirement

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• The app can be used during the travelling time • Easy and simple • Efficiency is high
NFR-2	**Security**	By clicking on the icon, the alert will be given to the respective officials
NFR-3	**Reliability**	Highly reliable to use
NFR-4	**Performance**	Low error rate
NFR-5	**Availability**	Free source
NFR-6	**Scalability**	It is scalable enough to support many users at the same time

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution Architecture

As trains are one of the most preferred modes of transportation among middle class and impoverished people as it attracts for its amenities. Simultaneously there is an increase at risk from thefts and accidents like chain-snatching, derailment, fire accident. In order to avoid or in better words to stop all such brutality we came up with a solution by providing an application which can be accessed by the user after booking their tickets. With a single click this app addresses issues by sending a text message to TC and RPF as an alert. In our project we use Node-Red service, app-development, IBM cloud platform to store passenger data.

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
PASSENGER (Mobile user)	Booking registration	USN-1	As a passenger, I book the ticket for the journey by entering my personal information.	I can access the web link to install the application.	High	Sprint-1
	Confirmation	USN-2	As a passenger, I will receive confirmation of the booking once I have registered for the application	I can receive confirmation email & click confirm.	High	Sprint-1

	Applicat ion registrat ion	USN-3	As a passenger, I can register for the application through the weblink.	I can register & access the application through google login.	Low	Sprint-2
	Application access	USN-4	As a passenger, I can access the application during my travel for resolving my issues.		Medium	Sprint-1

6. PROJECT PLANNING & SCHEDULING

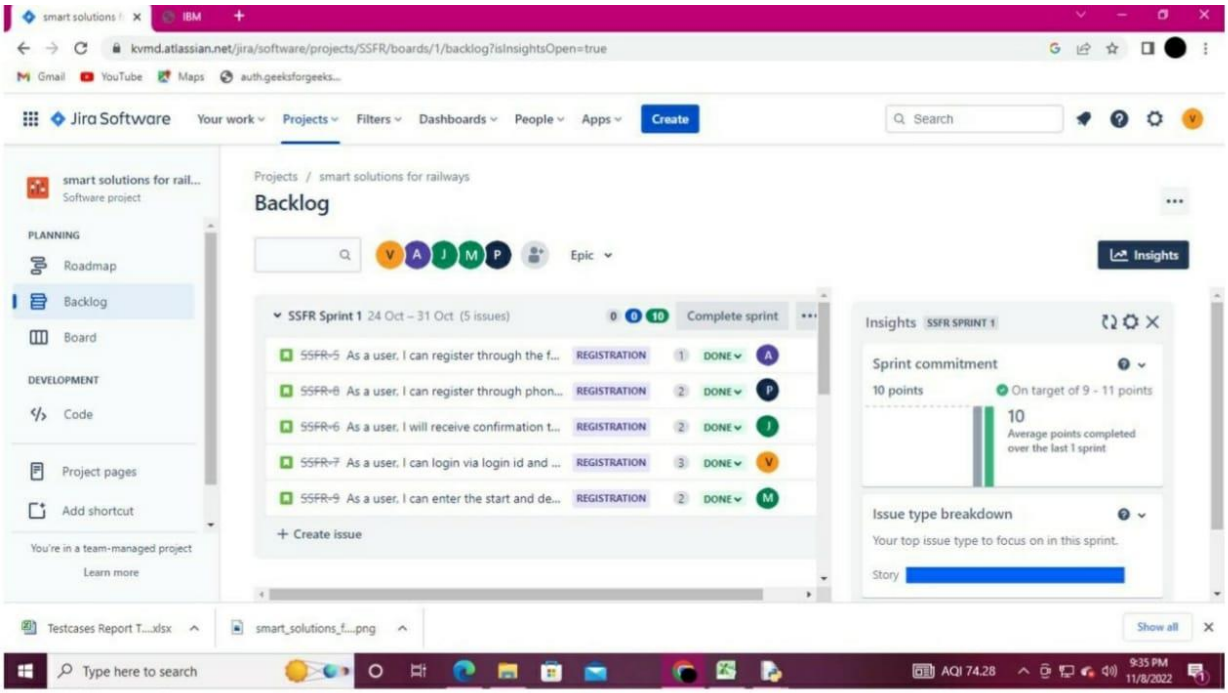
6.1 Sprint Planning & Estimation

STEP 1	Identify the problem
STEP 2	Prepare an abstract, problem statement
STEP 3	List required objects needed
STEP 4	Create a code and run it
STEP 5	Make a prototype

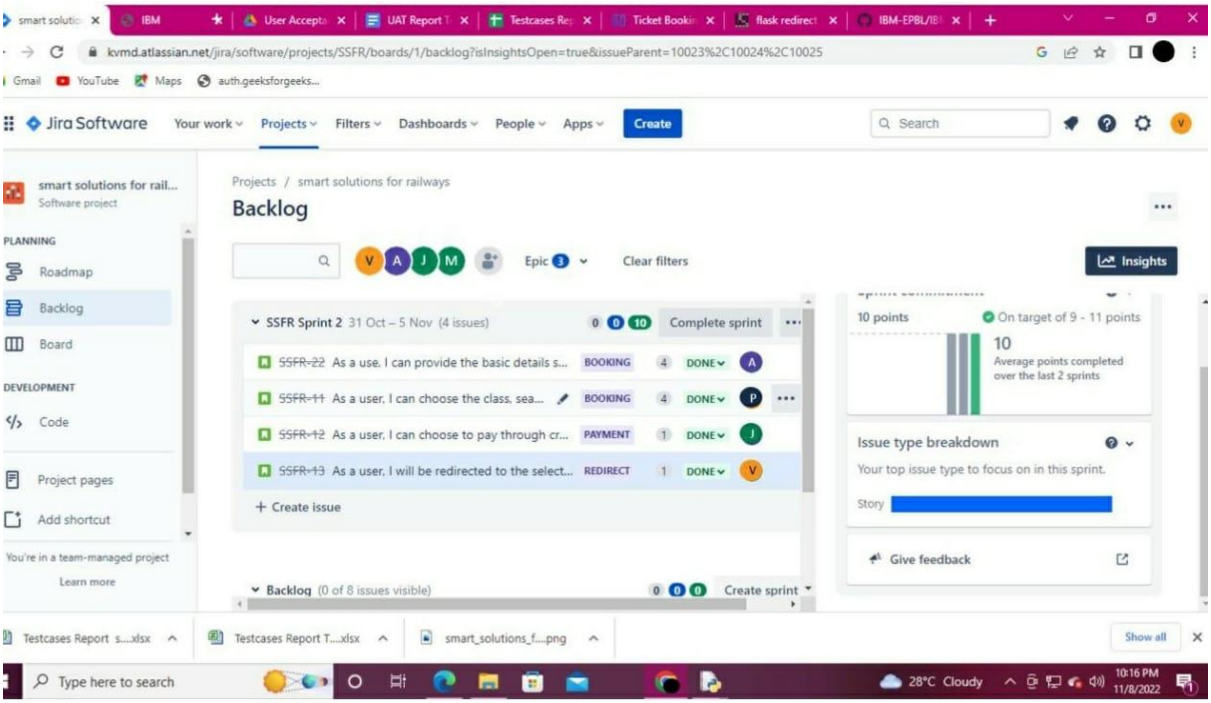
STEP 6	Test with the created code and check the designed prototype is working
STEP 7	Solution for the problem is found

6.2 Reports from JIRA

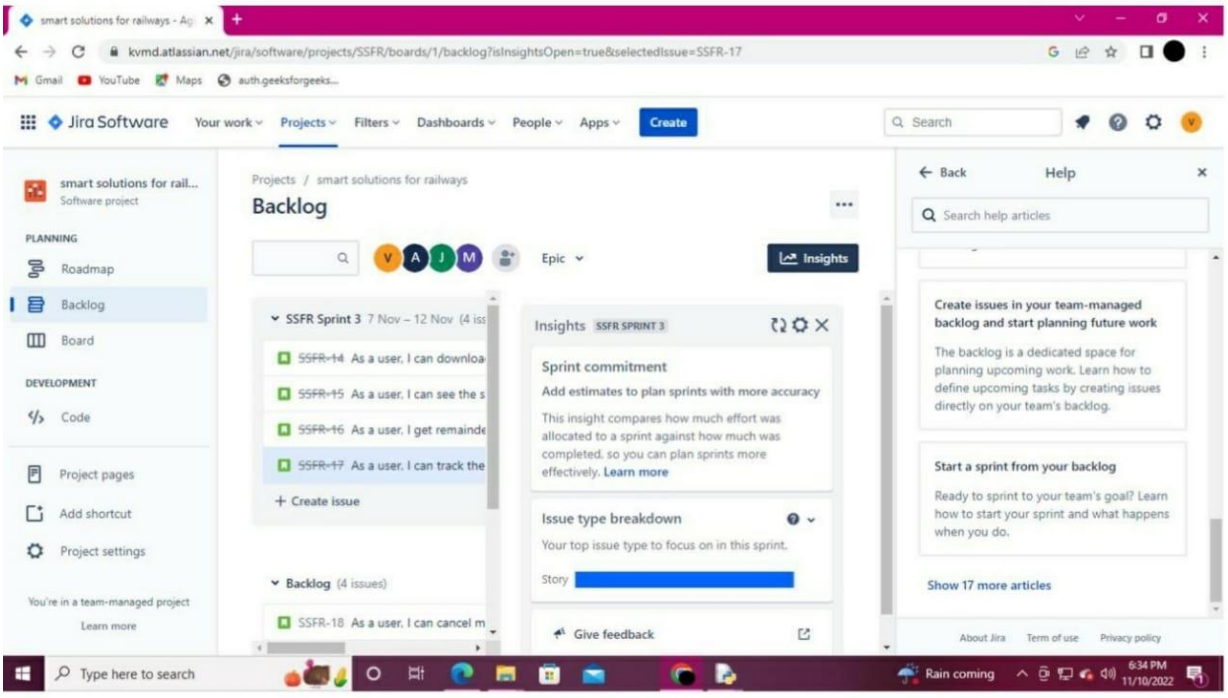
SPRINT 1



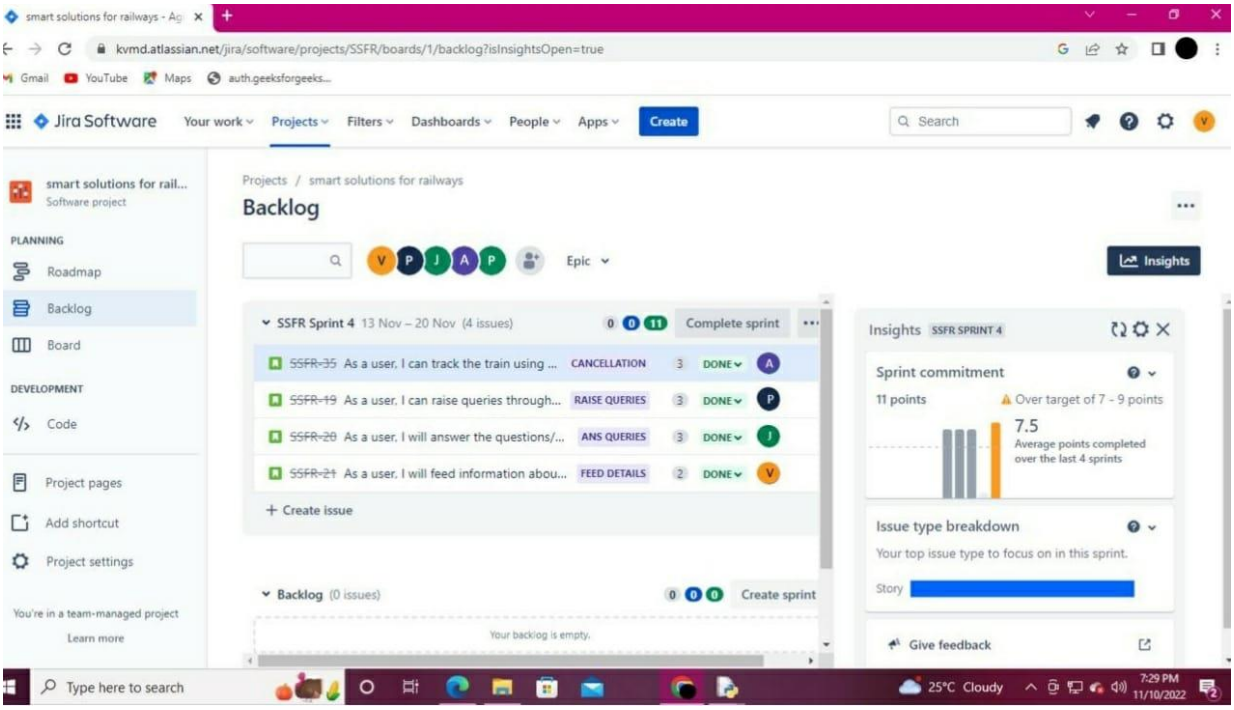
SPRINT 2



SPRINT 3



SPRINT 4



7. CODING & SOLUTIONING

7.1 Feature 1

- IoT device
- IBM Watson Platform
- Node red
- Cloudant DB
- Web UI
- MIT App Inventor
- Python code

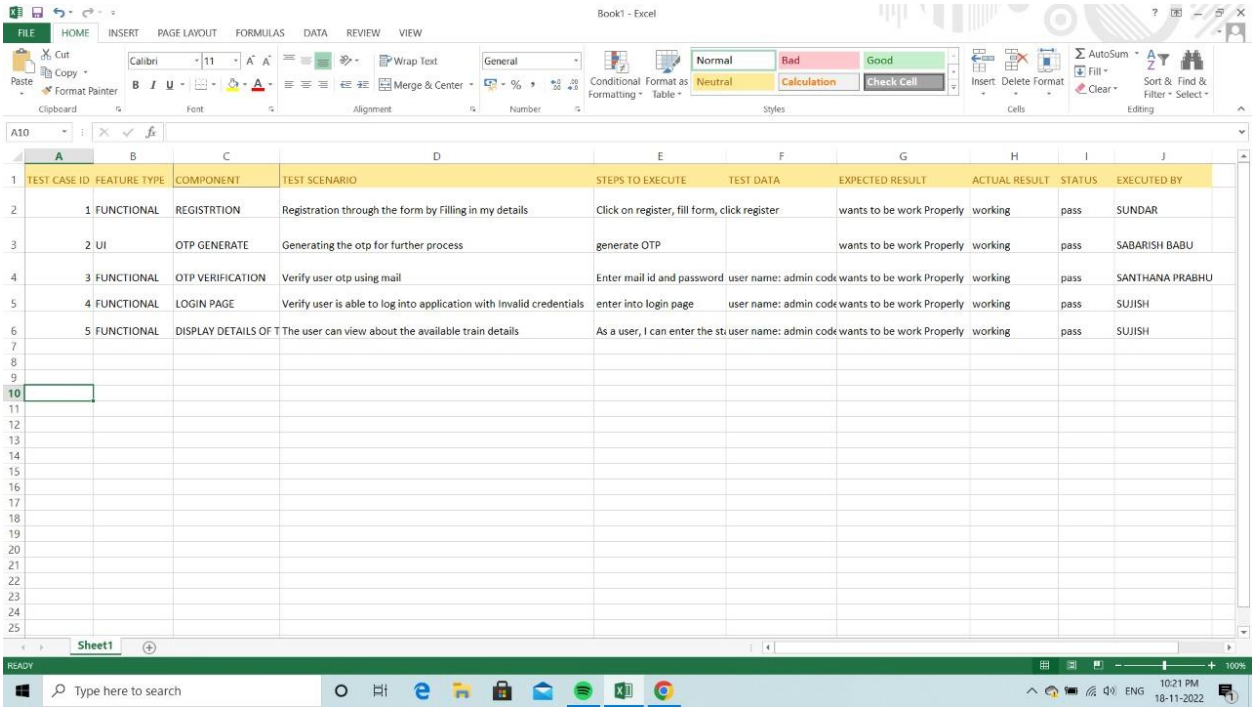
7.2 Feature 2

- Login
- Verification
- Ticket Booking
- Adding rating

8. TESTING AND RESULTS

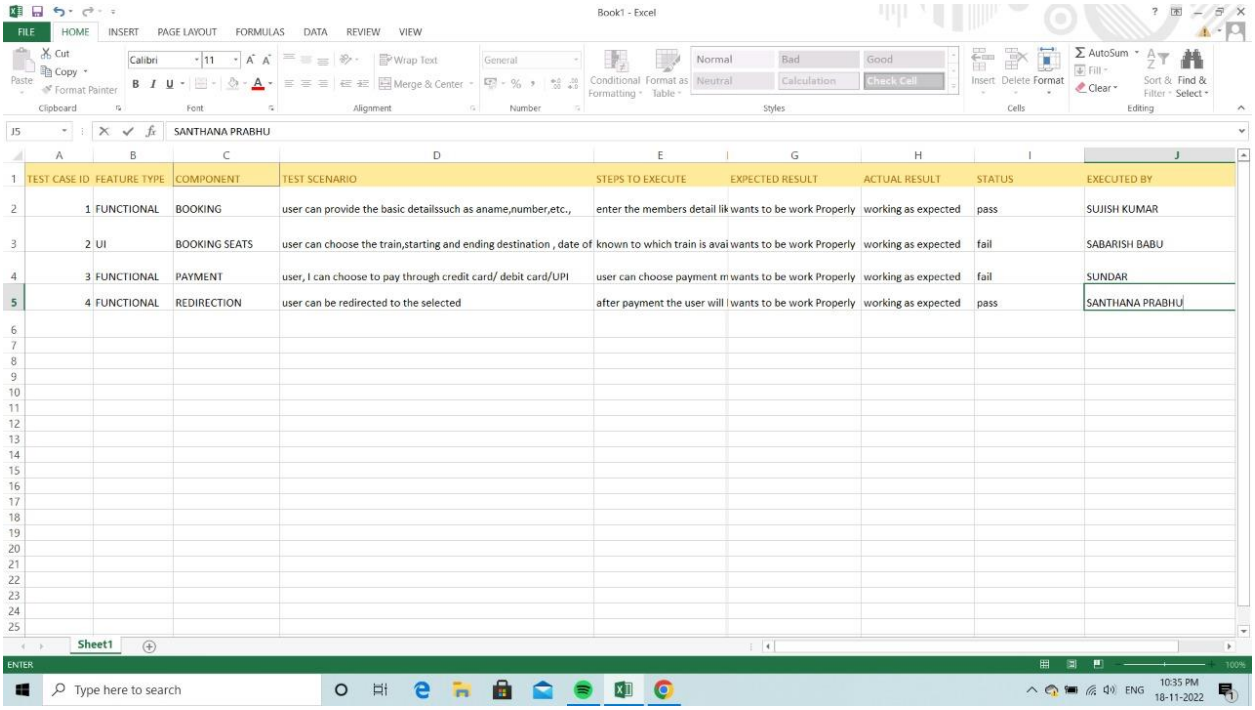
8.1 Test Cases

Test case 1



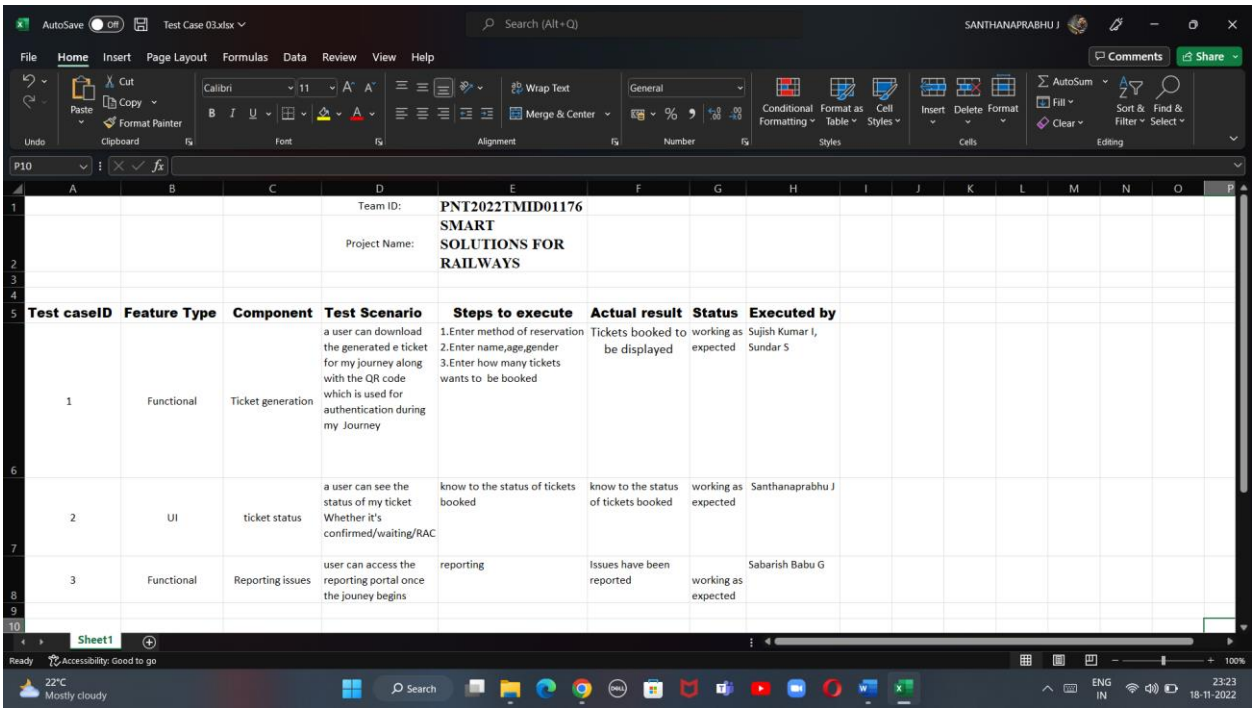
TEST CASE ID	FEATURE TYPE	COMPONENT	TEST SCENARIO	STEPS TO EXECUTE	TEST DATA	EXPECTED RESULT	ACTUAL RESULT	STATUS	EXECUTED BY
1	FUNCTIONAL	REGISTRTION	Registration through the form by Filling in my details	Click on register, fill form, click register		wants to be work Properly	working	pass	SUNDAR
2	UI	OTP GENERATE	Generating the otp for further process	generate OTP		wants to be work Properly	working	pass	SABARISH BABU
3	FUNCTIONAL	OTP VERIFICATION	Verify user otp using mail	Enter mail id and password	user name: admin cod	wants to be work Properly	working	pass	SANTHANA PRABHU
4	FUNCTIONAL	LOGIN PAGE	Verify user is able to log into application with Invalid credentials	enter into login page	user name: admin cod	wants to be work Properly	working	pass	SUJISH
5	FUNCTIONAL	DISPLAY DETAILS OF T	The user can view about the available train details	As a user, I can enter the st	user name: admin cod	wants to be work Properly	working	pass	SUJISH

Test case 2



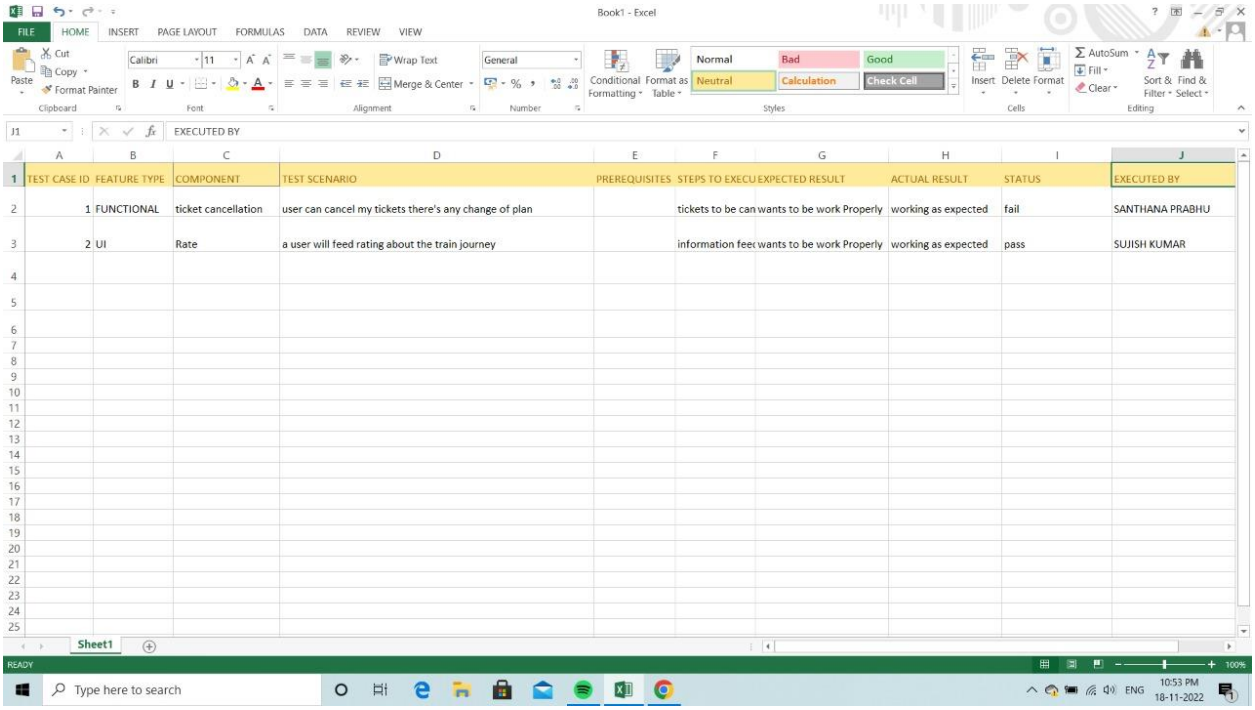
TEST CASE ID	FEATURE TYPE	COMPONENT	TEST SCENARIO	STEPS TO EXECUTE	EXPECTED RESULT	ACTUAL RESULT	STATUS	EXECUTED BY
1	FUNCTIONAL	BOOKING	user can provide the basic detailssuch as aname,number,etc.,	enter the members detail lik	wants to be work Properly	working as expected	pass	SUJISH KUMAR
2	UI	BOOKING SEATS	user can choose the train,starting and ending destination , date of	known to which train is avai	wants to be work Properly	working as expected	fail	SABARISH BABU
3	FUNCTIONAL	PAYMENT	user, I can choose to pay through credit card/ debit card/UPI	user can choose payment m	wants to be work Properly	working as expected	fail	SUNDAR
4	FUNCTIONAL	REDIRECTION	user can be redirected to the selected	after payment the user will	wants to be work Properly	working as expected	pass	SANTHANA PRABHU

Test case 3



			Team ID:	PNT2022TMID01176			
			Project Name:	SMART SOLUTIONS FOR RAILWAYS			
Test caseID	**Feature Type**	**Component**	**Test Scenario**	**Steps to execute**	**Actual result**	**Status**	**Executed by**
1	Functional	Ticket generation	a user can download the generated e ticket for my journey along with the QR code which is used for authentication during my Journey	1.Enter method of reservation 2.Enter name,age,gender 3.Enter how many tickets wants to be booked	Tickets booked to be displayed	working as expected	Sujish Kumar I, Sundar S
2	UI	ticket status	a user can see the status of my ticket Whether it's confirmed/waiting/RAC	know to the status of tickets booked	know to the status of tickets booked	working as expected	Santhanaprabhu J
3	Functional	Reporting issues	user can access the reporting portal once the jouney begins	reporting	Issues have been reported	working as expected	Sabarish Babu G

Test case 4



TEST CASE ID	FEATURE TYPE	COMPONENT	TEST SCENARIO	PREREQUISITES	STEPS TO EXECU	EXPECTED RESULT	ACTUAL RESULT	STATUS	EXECUTED BY
1	FUNCTIONAL	ticket cancellation	user can cancel my tickets there's any change of plan		tickets to be can	wants to be work Properly	working as expected	fail	SANTHANA PRABHU
2	UI	Rate	a user will feed rating about the train journey		information fee	wants to be work Properly	working as expected	pass	SUJISH KUMAR

9. ADVANTAGES

- The passengers can use this application, while they are travelling alone to ensure their safety.
- It is easy to use.
- It has minimized error rate.

10. DISADVANTAGES

 Network issues may arise.

11. CONCLUSION

Almost all the countries across the globe strive to meet the demand for safe, fast, and reliable rail services. Lack of operational efficiency and reliability, safety, and security issues, besides aging railway systems and practices are haunting various countries to bring about a change in their existing rail infrastructure. The global rail industry struggles to meet the increasing demand for freight and passenger transportation due to lack of optimized use of rail network and inefficient use of rail assets. Often, they suffer from the lack in smart technologies and latest technological updates to provide the most efficient passenger services. This is expected to induce rail executives to build rail systems that are smarter and more efficient. The passenger reservation system of

Indian Railways is one of the world's largest reservation models. Daily about one million passengers travel in reserved accommodation with Indian Railways. Another sixteen million travel with unreserved tickets in Indian Railways. In this vast system, it is a herculean task to efficiently handle the passenger data, which is a key point of consideration now-a-days. But the implementation of the latest technological updates in this system gradually turns inevitable due to increasing demand for providing the most efficient passenger services. Handling the passenger data efficiently backed by intelligent processing and timely retrieval would help backing up the security breaches. Here we've explored different issues of implementing smart computing in railway systems pertaining to reservation models besides pointing out some future scopes of advancement. Most significant improvements have been evidenced by more informative and user-friendly websites, mobile applications for real-time information about vehicles in motion, and e-ticket purchases and timetable information implemented at stations and stops. With the rise of Industry, railway companies can now ensure that they are prepared to avoid the surprise of equipment downtime. Like above mentioned, the developed application of our project can lead the passenger who travel can travel safely without any fear.

12. FUTURE SCOPE

This application is ensured for safety for the passengers while they are travelling alone as well as they travel with their family or friends.

In future, this application may also be used by passengers who travel through bus. By further enhancement of the application the passengers can explore more features regarding their safety.

13. APPENDIX

13.1 Source Code

LOGIN

```
from tkinter import *
import sqlite3

root = Tk()
root.title("Python: Simple Login Application")
width = 400 height = 280 screen_width =
root.winfo_screenwidth() screen_height =
root.winfo_screenheight() x =
(screen_width/2) - (width/2) y =
(screen_height/2) - (height/2)
root.geometry("%dx%d+%d+%d" % (width, height, x, y)) root.resizable(0,
0)

#==============================VARIABLES=======================
```

```
============
USERNAME = StringVar()
PASSWORD = StringVar()

#==============================FRAMES==========================
============
Top = Frame(root, bd=2,  relief=RIDGE)
Top.pack(side=TOP, fill=X)
Form = Frame(root, height=200)
Form.pack(side=TOP, pady=20)

#==============================LABELS==========================
============
lbl_title = Label(Top, text = "Python: Simple Login Application", font=('arial', 15))
lbl_title.pack(fill=X)
lbl_username = Label(Form, text = "Username:", font=('arial', 14), bd=15)
lbl_username.grid(row=0, sticky="e")
lbl_password = Label(Form, text = "Password:", font=('arial', 14), bd=15) lbl_password.grid(row=1,
sticky="e") lbl_text = Label(Form)
lbl_text.grid(row=2, columnspan=2)

#==============================ENTRY
WIDGETS=================================
username = Entry(Form, textvariable=USERNAME, font=(14)) username.grid(row=0,
column=1)
password = Entry(Form, textvariable=PASSWORD, show="*", font=(14))
password.grid(row=1, column=1)




#==============================METHODS==========================
============ def
Database():
   global conn, cursor
   conn = sqlite3.connect("pythontut.db")
cursor = conn.cursor()
   cursor.execute("CREATE TABLE IF NOT EXISTS `member` (mem_id INTEGER NOT
NULL PRIMARY KEY  AUTOINCREMENT, username TEXT, password TEXT)")
cursor.execute("SELECT * FROM `member` WHERE `username` = 'admin' AND
```

```
`password` = 'admin'")        if
cursor.fetchone() is None:
      cursor.execute("INSERT INTO `member` (username, password) VALUES('admin',
'admin')")            conn.commit() def Login(event=None):
Database()              if USERNAME.get() == "" or
PASSWORD.get() == "":
      lbl_text.config(text="Please complete the required field!", fg="red")
else:
      cursor.execute("SELECT * FROM `member` WHERE `username` = ? AND `password`
= ?", (USERNAME.get(), PASSWORD.get()))
if cursor.fetchone() is not None:
         HomeWindow()
         USERNAME.set("")
PASSWORD.set("")
lbl_text.config(text="")        else:
         lbl_text.config(text="Invalid username or password", fg="red")
         USERNAME.set("")
PASSWORD.set("")
   cursor.close()
   conn.close()


#============================BUTTON
WIDGETS=================================
btn_login = Button(Form, text="Login", width=45, command=Login)
btn_login.grid(pady=25, row=3, columnspan=2)
btn_login.bind('<Return>', Login)


def HomeWindow():
global Home
root.withdraw()
Home = Toplevel()
   Home.title("Python: Simple Login Application")
width = 600    height = 500    screen_width =
root.winfo_screenwidth()    screen_height =
root.winfo_screenheight()    x = (screen_width/2)
- (width/2)    y = (screen_height/2) - (height/2)
   root.resizable(0, 0)
   Home.geometry("%dx%d+%d+%d" % (width, height, x, y))
   lbl_home = Label(Home, text="Successfully Login!", font=('times new roman',
```

```
20)).pack()
   btn_back = Button(Home, text='Back', command=Back).pack(pady=20, fill=X)

def Back():
Home.destroy()
root.deiconify()
```

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()
```

START AND DESTINATION

```
# import module import
requests
from bs4 import BeautifulSoup

# user define function
# Scrape the data def
getdata(url): r =
requests.get(url)
return r.text


# input by geek from_Station_code
= "GAYA"
from_Station_name = "GAYA"

To_station_code = "PNBE"
To_station_name = "PATNA"
# url
url = "https://www.railyatri.in/booking/trains-between-
stations?from_code="+from_Station_code+"&from_name="+from_Station_name+"+JN+&j
ourney_date=+Wed&src=tbs&to_code=" + \
   To_station_code+"&to_name="+To_station_name + \
   "+JN+&user_id=-
1603228437&user_token=355740&utm_source=dwebsearch_tbs_search_trains"

# pass the url # into
getdata function
htmldata = getdata(url)
```

```
soup = BeautifulSoup(htmldata, 'html.parser')

# find the Html tag
# with find() # and convert into string data_str = "" for item in
soup.find_all("div", class_="col-xs-12 TrainSearchSection"):     data_str
= data_str + item.get_text() result = data_str.split("\n")

print("Train between "+from_Station_name+" and "+To_station_name) print("")

# Display the result
for item in result:
if item != "":
print(item)
```

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
```

SEATS BOOKING 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
= 10
berth_type(s) # fxn call for berth type

s = 7
berth_type(s) # fxn call for berth type

s = 0
berth_type(s) # fxn call for berth type **CONFIRMATION**
import module import
requests from bs4 import
BeautifulSoup import pandas
as pd

user define function
Scrape the data def
getdata(url): r =
requests.get(url)
return r.text

# input by geek
train_name = "03391-rajgir-new-delhi-clone-special-rgd-to-ndls"

# url
url = "https://www.railyatri.in/live-train-status/"+train_name

```
# pass the url # into
getdata function
htmldata = getdata(url)
soup = BeautifulSoup(htmldata, 'html.parser')

# traverse the live status from # this Html code data = [] for
item in soup.find_all('script', type="application/ld+json"):
data.append(item.get_text())

# convert into dataframe
df = pd.read_json(data[2])

# display this column of #
dataframe
print(df["mainEntity"][0]['name'])
print(df["mainEntity"][0]['acceptedAnswer']['text'])
```

TICKET GENERATION

```
class Ticket:     counter=0
   def                                          __init__(self,passenger_name,source,destination):
self.__passenger_name=passenger_name
       self.__source=source
self.__destination=destination
self.Counter=Ticket.counter
Ticket.counter+=1     def
validate_source_destination(self):
       if          (self.__source=="Delhi"          and          (self.__destination=="Pune"          or
self.__destination=="Mumbai"              or              self.__destination=="Chennai"              or
self.__destination=="Kolkata")):          return True        else:
           return False

   def   generate_ticket(self   ):
if True:
           __ticket_id=self.__source[0]+self.__destination[0]+"0"+str(self.Counter)
print( "Ticket id will be:",__ticket_id)        else:
           return False     def
get_ticket_id(self):        return
self.ticket_id     def
get_passenger_name(self):
return self.__passenger_name
```

```
def get_source(self):         if
self.__source=="Delhi":
          return         self.__source
else:
          print("you have written invalid soure option")
return None     def get_destination(self):         if
self.__destination=="Pune":             return
self.__destination         elif
self.__destination=="Mumbai":
          return self.__destination         elif
self.__destination=="Chennai":
          return self.__destination         elif
self.__destination=="Kolkata":
          return self.__destination


       else:
          return None
```

OTP GENERATION

```
import          os
import      math
import random
import smtplib

digits = "0123456789"
OTP = ""

for i in range (6):
   OTP += digits[math.floor(random.random()*10)]

otp = OTP + " is your OTP" message
= otp
s = smtplib.SMTP('smtp.gmail.com', 587)
s.starttls()

emailid = input("Enter your email: ")
s.login("YOUR Gmail ID", "YOUR APP PASSWORD")
s.sendmail('&&&&&&',emailid,message)

a = input("Enter your OTP >>: ") if
a == OTP:
   print("Verified") else:
```

```
    print("Please Check your OTP again")
```

OTP VERIFICATION

```
import os
import math
import random
import smtplib

digits = "0123456789"
OTP = ""

for i in range (6):
    OTP += digits[math.floor(random.random()*10)]

otp = OTP + " is your OTP" message
= otp
s = smtplib.SMTP('smtp.gmail.com', 587)
s.starttls()

emailid = input("Enter your email: ")
s.login("YOUR Gmail ID", "YOUR APP PASSWORD")
s.sendmail('&&&&&&',emailid,message)

a = input("Enter your OTP >>: ") if
a == OTP:
    print("Verified") else:
    print("Please Check your OTP again")
```

13.2 GitHub

GitHub link:

https://github.com/IBM-EPBL/IBM-Project-2987-1658491579