PERSONAL EXPENSE TRACKER APPLICATION

IBM-Project-23160-1659870485

NALAIYA THIRAN PROJECT BASED LEARNING ON PROFESSIONAL READLINESS FOR INNOVATION, EMPLOYNMENT AND ENTERPRENEURSHIP

A PROJECT REPORT

BY

LENIN S (2116191001039)
MANOJ R (2116191001045)
NITHYANANTHAM V (2116191001056)
JAYA SURIYA E (2116191001025)

BACHELOR OF TECHNOLOGY
IN
INFORMATION TECHNOLOGY

Rajalakshmi Engineering College, Rajalakshmi Nagar
Thandalam, Chennai - 602 105.

INDEX

1. INTRODUCTION

a. Project Overview

TEAM ID : PNT2022TMID02593

INDUSTRY MENTOR : Kusboo

FACULTY MENTOR : Nisha R S

Skills Required:

IBM Cloud, HTML, Java script, IBM Cloud Object Storage, Python- Flask, Kubernetes, Docker, IBM DB2, IBM Container Registry

1. **INTRODUCTION**
   a. Project Overview

This project is based on expense tracking .This project aims to create an easy, faster and smooth cloud application .For better expense tracking we developed our project that will help the users a lot. Most of the people cannot track their expenses and income leading to facing money crisis, so, this application can help people to track their expense day to day and make life stress free. Money is the most valuable portion of our daily life and without money we will not last one day on earth. So using the daily expense tracker application is important to lead a happy family. It helps the user to avoid unexpected expenses and bad financial situations. It will save time and provide a responsible lifestyle.

b. Purpose

Personal finance management is an important part of people's lives. However, everyone does not have the knowledge or time to manage their finances in a proper manner. And, even if a person has time and knowledge, they do not bother with tracking their expenses as they find it tedious and time-consuming. Now, you don't have to worry about managing your expenses, as you can get access to an expense tracker that will help in the active management of your finances. Also known as expense manager and money manager, an expense tracker is a software or application that helps to keep an accurate record of your money inflow and outflow. Many people in India live on a fixed income, and they find that towards the end of the month t hey don't have sufficient money to meet their needs. While this problem can arise due to low salary, invariably it is due to poor money management skills.

People tend to overspend without realizing, and this can prove to be disastrous. Using a daily
expense manager can help you keep track of how much you spend eve ry day and on what. At the
end of the month, you will have a clear picture where your money is going . This is one of the best ways to get your expenses under control and bring some semblance of order to your finances. Today, there are several expense manager applications in the market. Some are paid managers while others are free. Even banks like ICICI offer their customers expense tracker to
Help them out. Before you decide to go in for a money manager, it is important to decide the type you want.

2. LITERATURE SURVEY

a. Existing problem

In a study conducted by Forrester in 2016 surveying small and medium businesses (SMBs) across the world, 56% companies reported expense management as being the biggest challenge for their finance departments.

In another survey conducted by Level Research in 2018 in North America, respondents reported the following pain points in expense management before adopting automation:

i. Manual entry and routing of expense reports (62%)

ii. Lack of visibility into spend data (42%)

iii. Inability to enforce travel policies (29%)

iv. Lost expense reports (24%)

v. Lengthy expense approval system and reimbursement cycles(23%)

b. References

S.No	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
1.	**EXPENSE MANAGER APPLICATION. (2020)**	To Develop A Moblie Application That Keeps Record Of User Personal Expenses Contribution In Group Expenditure Top Investment Options View Of The Current Stock Market ,Read Authenticated Financial News	Android Studio	Cloud Application	Advantages: ➢ Keeps Track All Of Your Daily Transactions, Keeps Track Of Your Money Lent Or Borrowed. Disadvantages: ➢ Occupy Lot Of Space.
2.	**A NOVEL EXPENSE TRACKER USING STATISTICAL ANALYSIS. (2021)**	To Maintain And Manage Data Of Daily Expenditure In A More Precise Way.	SQL Lite	Cloud Application	Advantages: ➢ Its Suggest You With The Most Effective Investment Options. Disadvantages: ➢ The Work Done Being Is Not Accurate.
3.	**EXPENSE TRACKER. (2021)**	Facilitates The User To Keep Track And Manage Their Personal As Well As Business Expenses.	Android OS	Cloud Application	Advantages: ➢ Become Aware Of Poor Spending Habits And Take Care Of Your Finances Saving And Investment. Disadvantages: ➢ Searching And Referencing Is Difficult And Time-consuming.
4.	**EXPENSE TRACKER. (May 2021)**	The Application Keeps The Track Of The Income And Expenses Both Of User On A Day To Day Bases	Java	Cloud Application	Advantages: ➢ The Project Effectively Keeps Away From The Manual Figuring. Disadvantages: ➢ Report Generation Is A Tedious Process.

3.Problem Statement Definition

Who does the problem affect?	Working individuals, students and budget conscious consumers.
What are the boundaries of the problem?	Limited features to provide for expense tracking.
What is the issue?	To be vigilant about the expense spent increases financial stress. Being indecisive about the finances may result in less financial security and exceed the budget.
When does this issue occur?	When people are not able to track their expenses properly.
Where is the issue occurring?	In daily life of employees as well as students.
Why is it important that we fix the problem?	Fixing this issue will help users to better plan their budget and lead to financial well-being.

Customer Problem Statement :

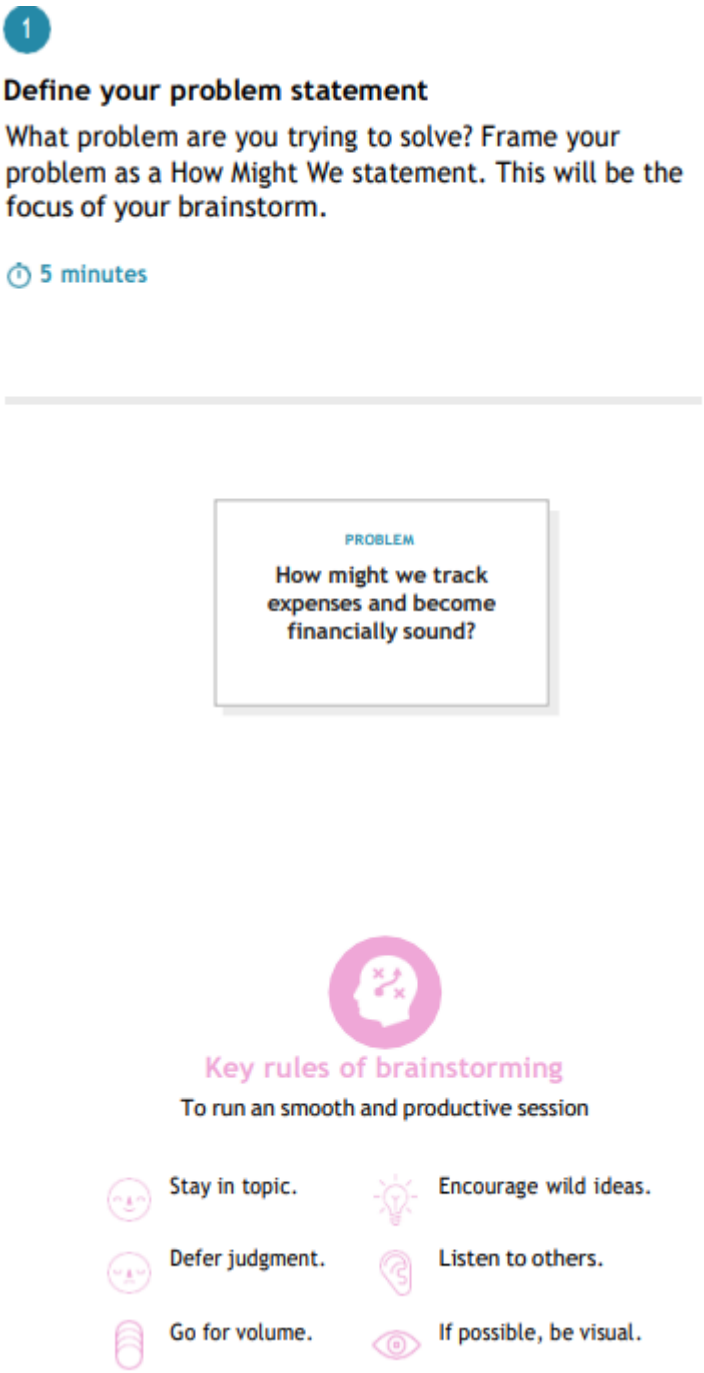
A well-articulated customer problem statement allows us to find the ideal solution for the challenges our customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Student	Manage my expenses	It is very difficult	There is no proper app to warn me regarding my expense	Frustrated
PS-2	IT employee	Reduce my expense	I am not able to keep track of my expens e	I cant see the app whoch satisfies my needs	Annoyed

1. IDEATION & PROPOSED SOLUTION

a. Empathy Map Canvas

B. Ideation & Brainstorming



2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

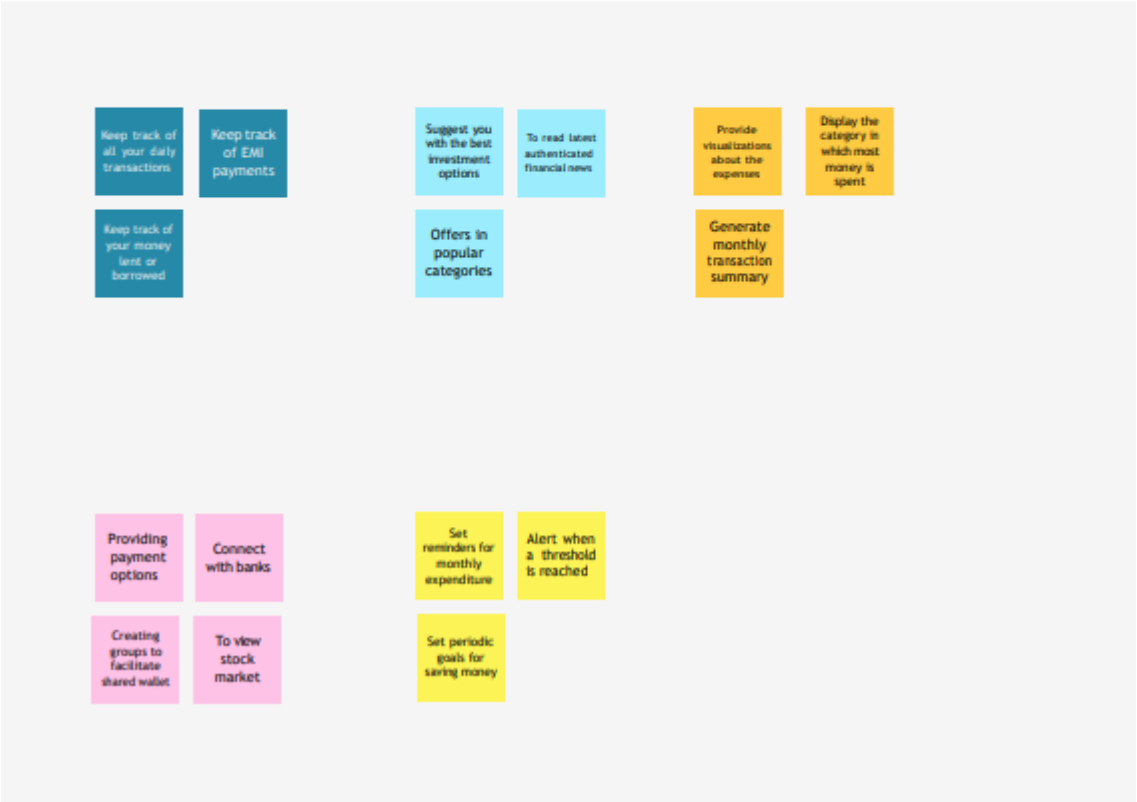
10 minutes

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

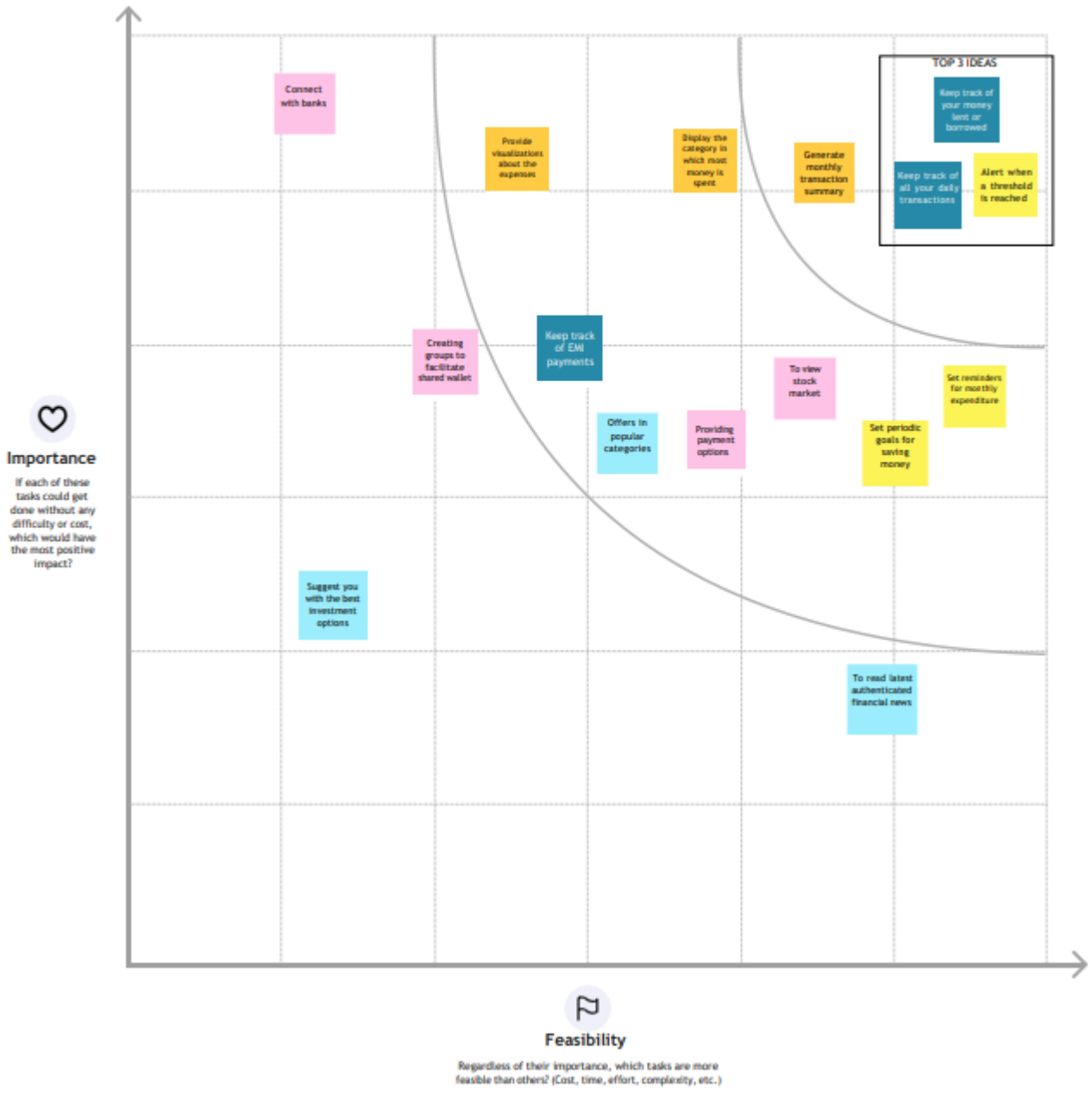


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



c.Proposed Solution

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Attempting to manage the expenses of an individual in an efficient and manageable manner, as compared to the traditional way of expense tracking.
2.	Idea / Solution description	The application will be helpful for the individuals in not just managing their expenses, but also in enabling them to improve their investments.
3.	Novelty / Uniqueness	The application gives the user a chance to plan his/her monthly expenses at the start of the month. Besides this, the user gets a notification when he/she exceeds the limit that is set.
4.	Social Impact / Customer Satisfaction	With such applications, the public will start to plan their expenses better leading to their own financial stability. With more users, this application will ensure that financial state of our society improves.
5.	Business Model (Revenue Model)	Free trial for 1 month can be given to the users, so that a significant userbase is created. Following the free trial, the users can be given subscription for 3 months, 6 months or 1 year.
6.	Scalability of the Solution	Since the application takes the same set of input from all the users and does not perform many complex computations, it will be easy for us to scale the application to a larger set of users.

PNT2022TMID02593

d.Problem Solution fit

PROBLEM-SOLUTION FIT

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)

- Working Individuals
- Students
- Budget conscious consumers

6. CUSTOMER CONSTRAINTS

- Internet Access
- Device (Smartphone) to access the application
- Data Privacy
- Cost of existing applications
- Trust

5. AVAILABLE SOLUTIONS

- Expense Diary or Excel sheet

PROS : Have to make a note daily which helps to be constantly aware

CONS : Inconvenient, takes a lot of time

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS

- To keep track of money lent or borrowed
- To keep track of daily transactions
- Alert when a threshold limit is reached

9. PROBLEM ROOT CAUSE

- Reckless spendings
- Indecisive about the finances
- Procrastination
- Difficult to maintain a note of daily spendings (Traditional methods like diary)

7. BEHAVIOUR

- Make a note of the expenses on a regular basis.
- Completely reduce spendings or spend all of the savings
- Make use of online tools to interpret monthly expense patterns

Identify strong TR & EM

3. TRIGGERS

- Excessive spending
- No money in case of emergency

4. EMOTIONS

BEFORE	AFTER
• Anxious	• Confident
• Confused	• Composed
• Fear	• Calm

10. YOUR SOLUTION

Creating an application to manage the expenses of an individual in an efficient and manageable manner, as compared to traditional methods

8. CHANNELS OF BEHAVIOUR

ONLINE

Maintain excel sheets and use visualizing tools

OFFLINE

Maintain an expense diary

4. REQUIREMENT ANALYSIS

a. **Functional requirements**

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Form for collecting details
FR-2	Login	Enter username and password
FR-3	Calendar	Personal expense tracker application must allow user to add the data to their expenses.
FR-4	Expense Tracker	This application should graphically represent the expense in the form of report.
FR-5	Report generation	Graphical representation of report must be generated.
FR-6	Category	This application shall allow users to add categories of their expenses.

b. Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Helps to keep an accurate record of your income and expenses.
NFR-2	**Security**	Budget tracking apps are considered very safe from those who commit cyber crimes.
NFR-3	**Reliability**	Each data record is stored on a well built efficient database schema. There is no risk of data loss.
NFR-4	**Performance**	The types of expense are categories along with an option. Throughput of the system is increased due to light weight database support.
NFR-5	**Availability**	The application must have a 100% up-time.
NFR-6	**Scalability**	The ability to appropriately handle increasing demands.

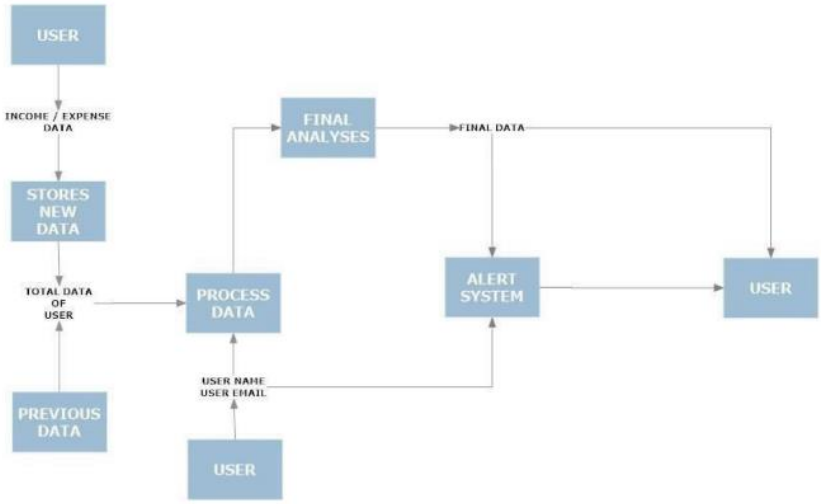
5. PROJECT DESIGN

a. **Data Flow Diagrams**

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



b .Solution & Technical Architecture

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

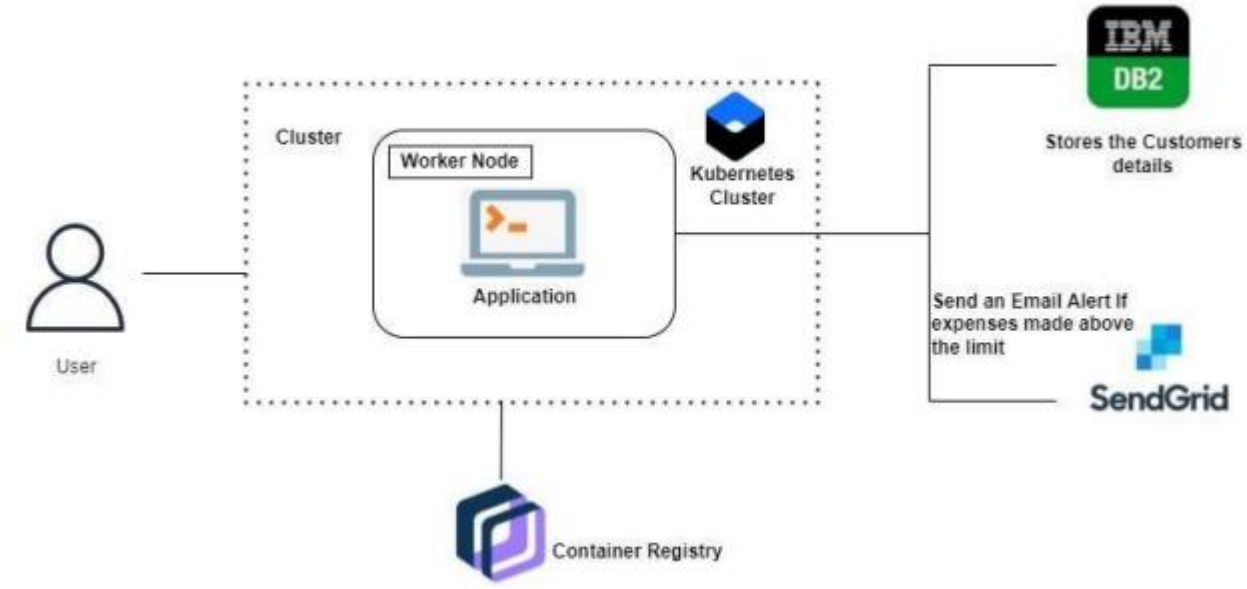


Table-1: Components & Technologies:

S.No.	Component	Description	Technology
1.	User Interface	The user can Interact with the application with use of Chatbot	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	The application contains the sign in/sign up where the user will login into the main dashboard	Java / Python
3.	Application Logic-2	Dashboard contains the fields like Add income, Add Expenses, Save Money	IBM Watson STT service
4.	Application Logic-3	The user will get the expense report in the graph form and also get alerts if the expense limit exceeds	IBM Watson Assistant,SendGrid
5.	Database	The Income and Expense data are stored in the MySQL database	MySQL, NoSQL, etc.
6.	Cloud Database	With use of Database Service on Cloud, the User data are stored in a well secured Manner	IBM DB2, IBM Cloudant etc.
7.	File Storage	IBM Block Storage used to store the Financial data of the user	IBM Block Storage or Other Storage Service or Local Filesystem

Table-2: Application Characteristics:

S.No.	Characteristics	Description	Technology
1.	Open-Source Frameworks	Flask Framework in Python is used to implement this Application	Python-Flask
2.	Security Implementations	This Application Provides high security to the user Financial data. It can be done by using the Container Registry in IBM cloud	Container Registry, Kubernetes Cluster
3.	Scalable Architecture	Expense Tracker is a life time access supplication. It's demand will increase when the user's income are high	Container Registry, Kubernetes Cluster
4.	Availability	This application will be available to the user at any part of time	Container Registry, Kubernetes Cluster

C.**User Stories**

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user & web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	
		USN- 3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	
	Login	USN - 4	As a user, I can log into the application by entering email & password	I can access the application	High	
	Dashboard	USN - 5	As a user I can enter my income and expenditure details.	I can view my daily expenses	High	
Customer Care Executive		USN – 6	As a customer care executive I can solve the log in issues and other issues of the application.	I can provide support or solution at any time 24*7	Medium	
Administrator	Application	USN - 7	As a administrator I can upgrade or update the application.	I can fix the bug which arises for the customers and users of the application	Medium	

6.PROJECT PLANNING & SCHEDULING

a. Sprint planning and estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint 1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Lenin
		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Manoj
	Login	USN-3	As a user, I can log into the application by entering email & password	1	High	Nithyanantham
	Dashboard	USN-4	Logging in takes to the dashboard for the logged user.	`2	High	Jaya Suriya
*Bug fixes, routine checks and improvisation by everyone in the team *Intended bugs only*						
	Workspace	USN-1	Workspace for personal expense tracking	2	High	Manoj

Sprint 2	Charts	USN-2	Creating various graphs and statistics of customer's data	1	Medium	Nithyanantham
	Connecting to IBM DB2	USN-3	Linking database with dashboard	2	High	Jaya Suriya
		USN-4	Making dashboard interactive with JS	2	High	Lenin
Sprint-3		USN-1	Wrapping up the server side works of frontend	1	Medium	Nithyanantham
	Watson Assistant	USN-2	Creating Chatbot for expense tracking and for clarifying user's query	1	Medium	Lenin
	SendGrid	USN-3	Using SendGrid to send mail to the user about their expenses	1	Low	Jaya Suriya
		USN-4	Integrating both frontend and backend	2		Manoj
*Bug fixes, routine checks and improvisation by everyone in the team *Intended bugs only*						
Sprint-4	Docker	USN-1	Creating image of website using docker/	2	High	Jaya suriya
	Cloud Registry	USN-2	Uploading docker image to IBM Cloud registry	2	High	Lenin
	Kubernetes	USN-3	Create container using the docker image and hosting the site	2	High	Manoj
	Exposing	USN-4	Exposing IP/Ports for the site	2	High	Nithyanantham

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint 1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Lenin
		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Manoj
	Login	USN-3	As a user, I can log into the application by entering email & password	1	High	Nithyanantham
	Dashboard	USN-4	Logging in takes to the dashboard for the logged user.	`2	High	Jaya Suriya
*Bug fixes, routine checks and improvisation by everyone in the team *Intended bugs only*						
	Workspace	USN-1	Workspace for personal expense tracking	2	High	Manoj

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)

Sprint - 1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint - 2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint - 3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint -4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

b. Sprint Delivery Schedule

S.NO	MILESTONES	ACTIVITIES	DATE
1.	**Preparation Phase**	Pre-requisites	24 Aug 2022
		Prior Knowledge	25 Aug 2022
		Project Structure	23 Aug 2022
		Project Flow	23 Aug 2022
		Project Objectives	22 Aug 2022
		Registrations	26 Aug 2022
		Environment Set-up	27 Aug 2022
2.	**Ideation Phase**	Literature Survey	29 Aug 2022 – 03 Sept 2022
		Empathy Map	5 Sept 2022 - 7 Sept 2022
		Problem Statement	8 Sept 2022 - 10 Sept 2022
		Ideation	12 Sept 2022 – 16 Sept 2022

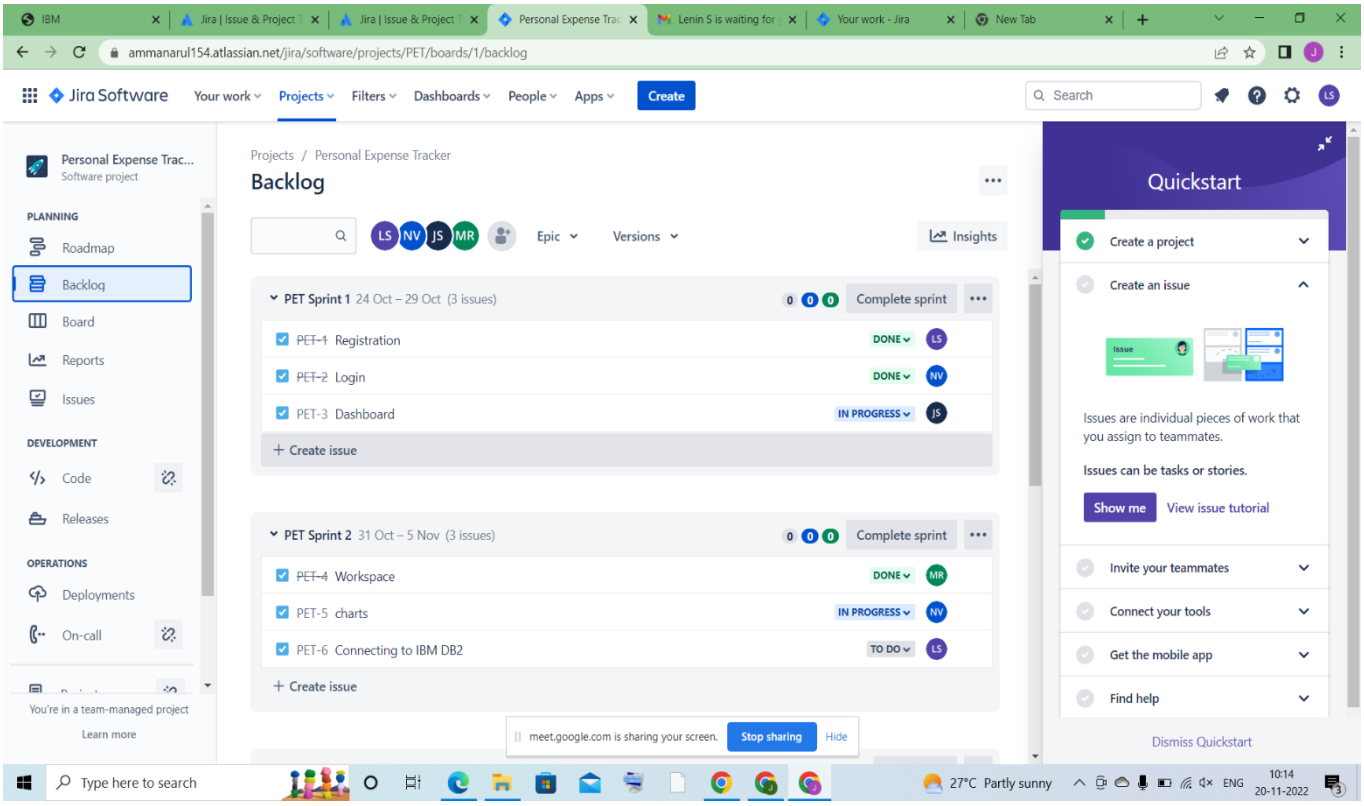
3.	**Project Design Phase - 1**	Proposed Solution	19 Sept 2022 – 23 Sept 2022
		Problem Solution Fit	24 Sept 2022 – 26 Sept 2022
		Solution Architecture	27 Sept 2022 – 30 Sept 2022

4.	**Project Design Phase - 2**	Customer Journey Map	03 Oct 2022 – 08 Oct 2022
		Requirement Analysis	09 Oct 2022 – 11 Oct 2022
		Data Flow Diagrams	11 Oct 2022 – 14 Oct 2022
		Technology Architecture	15 Oct 2022 - 16 Oct 2022
5.	**Project Planning Phase**	Milestones & Tasks	17 Oct 2022 – 18 Oct 2022
		Sprint Schedules	19 Oct 2022 – 22 Oct 2022
6.	**Project Development Phase**	Sprint - 1	24 Oct 2022 – 29 Oct 2022
		Sprint – 2	31 Oct 2022 – 05 Nov 2022

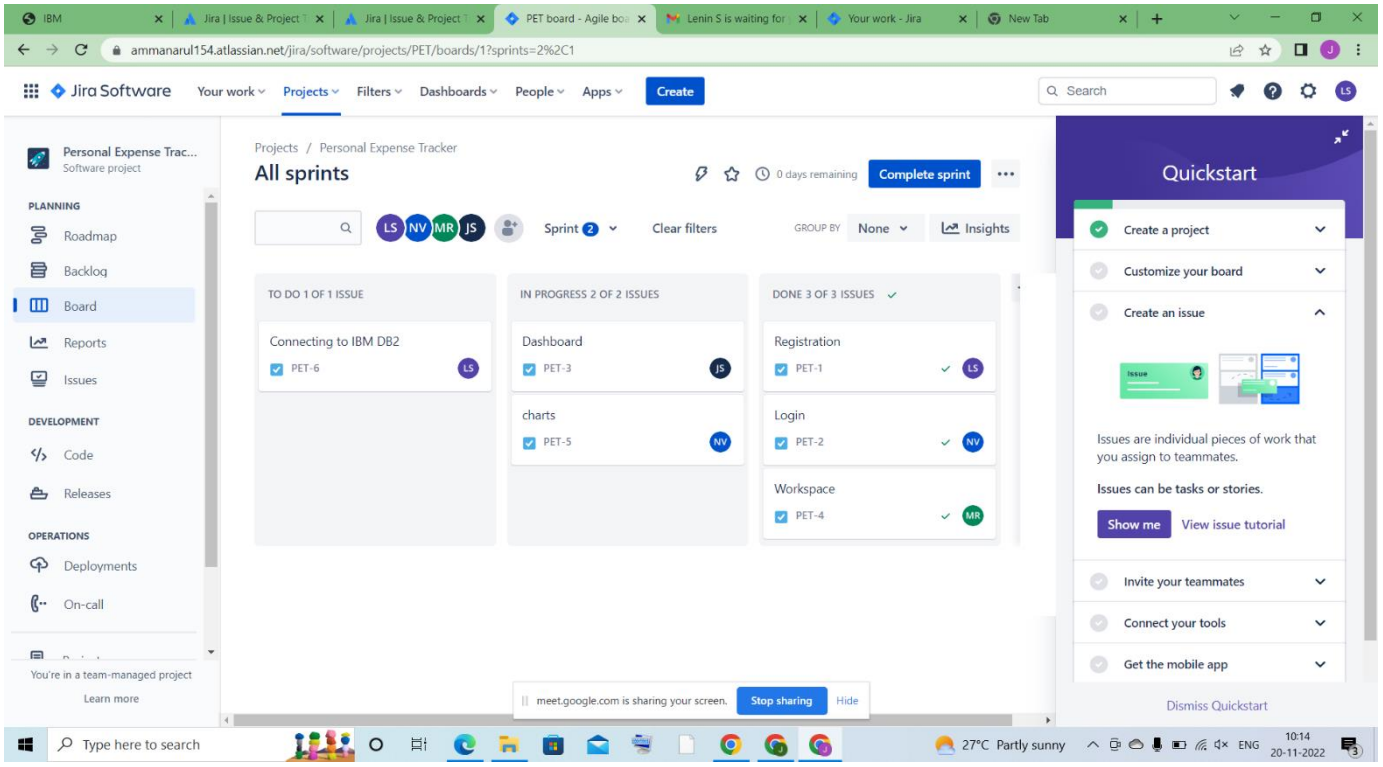
		Sprint – 3	07 Nov 2022 – 12 Nov 2022
		Sprint – 4	14 Nov 2022 – 19 Nov 2022

a. **Reports from JIRA**

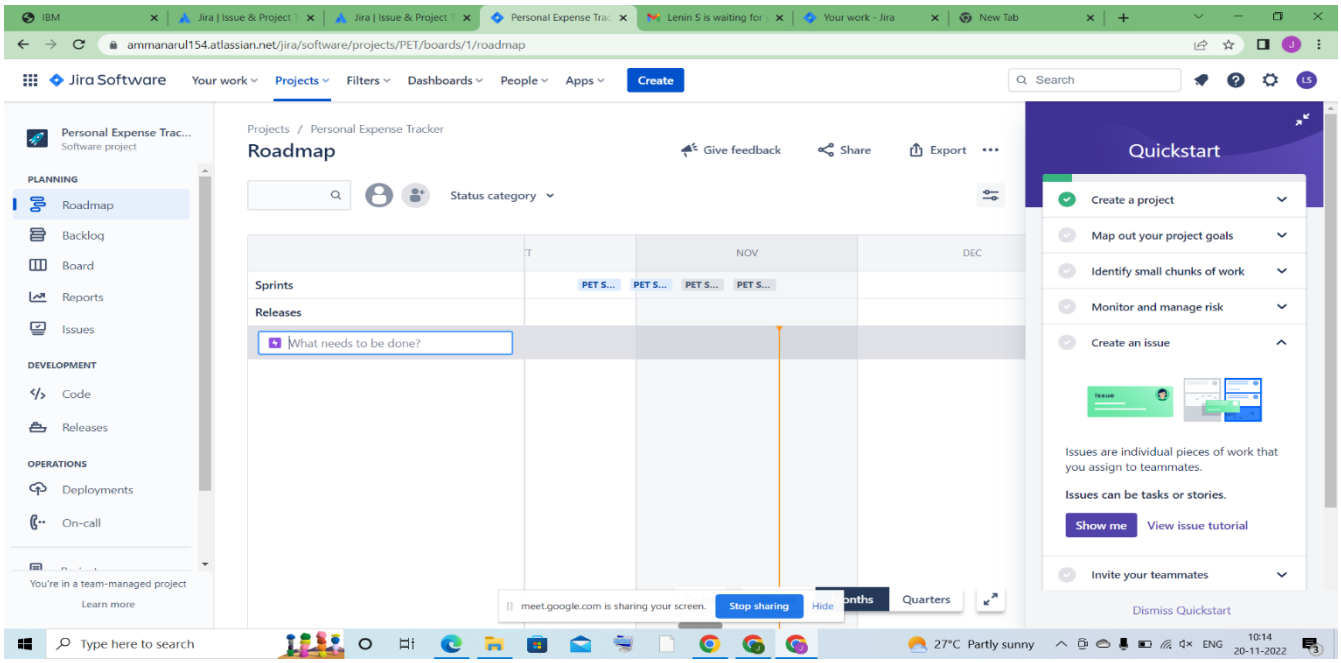
i. Backlog



ii. Board



iii. Road Map



7. CODING & SOLUTIONING

app.py:

```
# -*- coding: utf-8 -*-
"""
Spyder Editor

This is a temporary script file.
"""

from flask import Flask, render_template, request, redirect, session
# from flask_mysqldb import MySQL #
import MySQLdb.cursors
import re

from flask_db2 import DB2 import ibm_db
import ibm_db_dbi from sendemail import
sendgridmail,sendmail

# from gevent.pywsgi import WSGIServer import os



app = Flask(__name__)

app.secret_key = 'a'

# app.config['MYSQL_HOST'] = 'remotemysql.com'
# app.config['MYSQL_USER'] = 'D2DxDUPBii'
# app.config['MYSQL_PASSWORD'] = 'r8XBO4GsMz'
# app.config['MYSQL_DB'] = 'D2DxDUPBii'
"""
dsn_hostname = "3883e7e4-18f5-4afe-be8c-
fa31c41761d2.bs2io90l08kqb1od8lcg.databases.appdomain.cloud”
dsn_uid = "jhj79826"
dsn_pwd = "QGM66Sy9CTlMsFC1”
```

```
dsn_driver = "{IBM DB2 ODBC DRIVER}" dsn_database = "bludb"
dsn_port = "31498" dsn_protocol = "tcpip"

dsn = (
    "DRIVER={0};"
    "DATABASE={1};"
    "HOSTNAME={2};"
    "PORT={3};"
    "PROTOCOL={4};"
    "UID={5};"
    "PWD={6};"
).format(dsn_driver, dsn_database, dsn_hostname, dsn_port, dsn_protocol, dsn_uid, dsn_pwd)
"""
# app.config['DB2_DRIVER'] = '{IBM DB2 ODBC DRIVER}' app.config['database'] =
'bludb'
app.config['hostname'] = '3883e7e4-18f5-4afe-
be8cfa31c41761d2.bs2io90l08kqb1od8lcg.databases.appdomain.cloud'
app.config['port'] = '31498' app.config['protocol'] = 'tcpip'
app.config['uid'] = 'jhj79826' app.config['pwd'] ='QGM66Sy9CTlMsFC1'
app.config['security'] = 'SSL' try:
    mysql = DB2(app)

    conn_str='database=bludb;hostname=3883e7e4-18f5-4afe-be8c-
fa31c41761d2.bs2io90l08kqb1od8lcg.databases.appdomain.cloud;port=31498;protocol=tcpi p;\
            uid=jhj79826;pwd=QGM66Sy9CTlMsFC1e;security=SSL'
  ibm_db_conn = ibm_db.connect(conn_str,",")

    print("Database connected without any error !!") except:
    print("IBM DB Connection error   :     " + DB2.conn_errormsg())

# app.config['']

# mysql = MySQL(app)
```

```
#HOME--PAGE
@app.route("/home") def
home():
   return render_template("homepage.html")

@app.route("/") def
add():
   return render_template("home.html")



#SIGN--UP--OR--REGISTER


@app.route("/signup") def
signup():
   return render_template("signup.html")



@app.route('/register', methods =['GET', 'POST'])
def register():     msg = ''     print("Break
point1")     if request.method == 'POST' :
username = request.form['username']
email = request.form['email']         password =
request.form['password']

      print("Break point2" + "name: " + username + "------" + email + "------" + password)

try:
         print("Break point3")            connectionID =
ibm_db_dbi.connect(conn_str, '', '')            cursor =
connectionID.cursor()            print("Break point4")
except:
         print("No connection Established")
```

```
        # cursor = mysql.connection.cursor()
# with app.app_context():
        #     print("Break point3")
        #     cursor = ibm_db_conn.cursor()
        #     print("Break point4")

        print("Break point5")
        sql = "SELECT * FROM register WHERE username = ?"
stmt = ibm_db.prepare(ibm_db_conn, sql)
ibm_db.bind_param(stmt, 1, username)         ibm_db.execute(stmt)
result = ibm_db.execute(stmt)         print(result)
        account = ibm_db.fetch_row(stmt)
print(account)

        param = "SELECT * FROM register WHERE username = " + "\'" + username + "\'"
res = ibm_db.exec_immediate(ibm_db_conn, param)         print("---- ")
        dictionary = ibm_db.fetch_assoc(res)
while dictionary != False:
            print("The ID is : ", dictionary["USERNAME"])
dictionary = ibm_db.fetch_assoc(res)

        # dictionary = ibm_db.fetch_assoc(result)
        # cursor.execute(stmt)

        # account = cursor.fetchone()
        # print(account)

        # while ibm_db.fetch_row(result) != False:
        #     # account = ibm_db.result(stmt)
        #     print(ibm_db.result(result, "username"))

        #     print(dictionary["username"])
print("break point 6")         if account:
```

```
        msg = 'Username already exists !'        elif not
re.match(r'[^@]+@[^@]+\.[^@]+', email):
        msg = 'Invalid email address !'        elif not
re.match(r'[A-Za-z0-9]+', username):
        msg = 'name must contain only characters and numbers !'        else:
        sql2 = "INSERT INTO register (username, email,password) VALUES (?, ?, ?)"
stmt2 = ibm_db.prepare(ibm_db_conn, sql2)           ibm_db.bind_param(stmt2, 1, username)
ibm_db.bind_param(stmt2, 2, email)           ibm_db.bind_param(stmt2, 3, password)

        ibm_db.execute(stmt2)
        # cursor.execute('INSERT INTO register VALUES (NULL, % s, % s, % s)', (username,
email,password))
        # mysql.connection.commit()               msg = 'You
have   successfully   registered   !'                    return
render_template('signup.html', msg = msg)



#LOGIN--PAGE


@app.route("/signin") def
signin():
   return render_template("login.html")


@app.route('/login',methods =['GET', 'POST']) def
login():
 global userid
msg = ''
if request.method == 'POST' :
 username = request.form['username']
 password = request.form['password']
      # cursor = mysql.connection.cursor()
      # cursor.execute('SELECT * FROM register WHERE username = % s AND password = % s',
(username, password ),)
      # account = cursor.fetchone()
      # print (account)
```

```
        sql = "SELECT * FROM register WHERE username = ? and password = ?"
stmt = ibm_db.prepare(ibm_db_conn, sql)         ibm_db.bind_param(stmt, 1, username)

        ibm_db.bind_param(stmt, 2, password)
result = ibm_db.execute(stmt)         print(result)
account = ibm_db.fetch_row(stmt)
print(account)

        param = "SELECT * FROM register WHERE username = " + "\'" + username + "\'" + " and
password = " + "\'" + password + "\'"         res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)

        # sendmail("hello sakthi","sivasakthisairam@gmail.com")

        if account:
            session['loggedin'] = True              session['id'] =
dictionary["ID"]              userid = dictionary["ID"]
session['username'] = dictionary["USERNAME"]
session['email'] = dictionary["EMAIL"]

            return redirect('/home')
else:
            msg = 'Incorrect username / password !'

    return render_template('login.html', msg = msg)
```

#ADDING----DATA

```
@app.route("/add") def
adding():
    return render_template('add.html')



@app.route('/addexpense',methods=['GET', 'POST']) def
addexpense():

    date = request.form['date']
 expensename = request.form['expensename']
amount = request.form['amount']
paymode = request.form['paymode']
  category = request.form['category']

    print(date)     p1 = date[0:10]     p2 =
date[11:13]     p3 = date[14:]     p4 = p1
+ "-" + p2 + "." + p3 + ".00"     print(p4)
    # cursor = mysql.connection.cursor()
    # cursor.execute('INSERT INTO expenses VALUES (NULL,  % s, % s, % s, % s, % s, % s)',
(session['id'] ,date, expensename, amount, paymode, category))
    # mysql.connection.commit()
    # print(date + " " + expensename + " " + amount + " " + paymode + " " + category)


    sql = "INSERT INTO expenses (userid, date, expensename, amount, paymode, category) VALUES
(?, ?, ?, ?, ?, ?)"
    stmt = ibm_db.prepare(ibm_db_conn, sql)
  ibm_db.bind_param(stmt, 1, session['id'])
ibm_db.bind_param(stmt, 2, p4)
    ibm_db.bind_param(stmt, 3, expensename)
ibm_db.bind_param(stmt, 4, amount)
  ibm_db.bind_param(stmt, 5, paymode)
ibm_db.bind_param(stmt, 6, category)
 ibm_db.execute(stmt)
```

```
    print("Expenses added")


    # email part


    param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " AND
MONTH(date) = MONTH(current timestamp) AND YEAR(date) = YEAR(current timestamp)
ORDER BY date DESC"
    res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)      expense = []
while dictionary != False:
        temp = []temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
expense.append(temp)          print(temp)
        dictionary = ibm_db.fetch_assoc(res)


    total=0      for x in
expense:            total
+= x[4] param =
"SELECT id, limitss
FROM limits
WHERE userid = "
+ str(session['id']) +
" ORDER BY id
DESC LIMIT 1"
    res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)      row = []      s = 0
while dictionary != False:
        temp = []
temp.append(dictionary["LIMITSS"])
```

```
row.append(temp)        dictionary =
ibm_db.fetch_assoc(res)        s = temp[0]
     if total >
int(s):
       msg = "Hello " + session['username'] + " , " + "you have crossed the monthly limit of Rs.
" + s + "/- !!!" + "\n" + "Thank you, " + "\n" + "Team Personal Expense Tracker."
sendmail(msg,session['email'])


   return redirect("/display")




#DISPLAY---graph


@app.route("/display") def
display():
   print(session["username"],session['id'])


   # cursor = mysql.connection.cursor()
   # cursor.execute('SELECT * FROM expenses WHERE userid = % s AND date ORDER
BY `expenses`.`date` DESC',(str(session['id'])))
   # expense = cursor.fetchall()


   param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " ORDER BY date
DESC"
    res = ibm_db.exec_immediate(ibm_db_conn, param)
   dictionary = ibm_db.fetch_assoc(res)
expense = []     while dictionary != False:
       temp = []        temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
expense.append(temp)        print(temp)
```

```
        dictionary = ibm_db.fetch_assoc(res)

    return render_template('display.html' ,expense = expense)




#delete---the--data

@app.route('/delete/<string:id>', methods = ['POST', 'GET' ]) def
delete(id):
    #  cursor = mysql.connection.cursor()
    #  cursor.execute('DELETE FROM expenses WHERE  id = {0}'.format(id))
    #  mysql.connection.commit()

    param = "DELETE FROM expenses WHERE  id = " + id     res =
ibm_db.exec_immediate(ibm_db_conn, param)

    print('deleted successfully')
     return redirect("/display")



#UPDATE---DATA

@app.route('/edit/<id>', methods = ['POST', 'GET' ]) def
edit(id):
    # cursor = mysql.connection.cursor()
    # cursor.execute('SELECT * FROM expenses WHERE  id = %s', (id,))
    # row = cursor.fetchall()

    param = "SELECT * FROM expenses WHERE  id = " + id
res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)     row = []     while
dictionary != False:
```

```
        temp = []         temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
row.append(temp)         print(temp)
        dictionary = ibm_db.fetch_assoc(res)


    print(row[0])
    return render_template('edit.html', expenses = row[0]) @app.route('/update/<id>', methods =
['POST']) def update(id):
  if request.method == 'POST' :


      date = request.form['date']       expensename =
request.form['expensename']       amount =
request.form['amount']       paymode =
request.form['paymode']       category =
request.form['category']


    #   cursor = mysql.connection.cursor()
    #   cursor.execute("UPDATE `expenses` SET `date` = % s , `expensename` = % s , `amount` = % s,
`paymode` = % s, `category` = % s WHERE `expenses`.`id` = % s ",(date, expensename, amount,
str(paymode), str(category),id))
    #   mysql.connection.commit()


      p1 = date[0:10]
p2 = date[11:13]       p3
= date[14:]
      p4 = p1 + "-" + p2 + "." + p3 + ".00"


      sql = "UPDATE expenses SET date = ? , expensename = ? , amount = ?, paymode = ?, category =
? WHERE id = ?"
      stmt = ibm_db.prepare(ibm_db_conn, sql)
ibm_db.bind_param(stmt, 1, p4)       ibm_db.bind_param(stmt,
```

```
2, expensename)       ibm_db.bind_param(stmt, 3, amount)
ibm_db.bind_param(stmt, 4, paymode)
ibm_db.bind_param(stmt, 5, category)
ibm_db.bind_param(stmt, 6, id)       ibm_db.execute(stmt)


     print('successfully updated')       return
redirect("/display") #limit

@app.route("/limit" ) def
limit():
       return redirect('/limitn')


@app.route("/limitnum" , methods = ['POST' ]) def
limitnum():      if request.method == "POST":
        number= request.form['number']         #
cursor = mysql.connection.cursor()
       #  cursor.execute('INSERT INTO limits VALUES (NULL, % s, % s) ',(session['id'], number))
       #  mysql.connection.commit()


        sql = "INSERT INTO limits (userid, limitss) VALUES (?, ?)"
stmt = ibm_db.prepare(ibm_db_conn, sql)
ibm_db.bind_param(stmt, 1, session['id'])
ibm_db.bind_param(stmt, 2, number)          ibm_db.execute(stmt)


        return redirect('/limitn')



@app.route("/limitn")  def
limitn():

   # cursor = mysql.connection.cursor()
   # cursor.execute('SELECT limitss FROM `limits` ORDER BY `limits`.`id` DESC LIMIT 1')
   # x= cursor.fetchone()
   # s = x[0]
```

```
   param = "SELECT id, limitss FROM limits WHERE userid = " + str(session['id']) + " ORDER BY
id DESC LIMIT 1"
   res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)     row = []     s = " /-"
while dictionary != False:
       temp = []
temp.append(dictionary["LIMITSS"])
row.append(temp)         dictionary =
ibm_db.fetch_assoc(res)         s = temp[0]

   return render_template("limit.html" , y= s)

#REPORT

@app.route("/today") def
today():
   #   cursor = mysql.connection.cursor()
   #   cursor.execute('SELECT TIME(date)   , amount FROM expenses  WHERE userid =
%s AND DATE(date) = DATE(NOW()) ',(str(session['id'])))
   #   texpense = cursor.fetchall()
   #   print(texpense)

     param1 = "SELECT TIME(date) as tn, amount FROM expenses WHERE userid = " +
str(session['id']) + " AND DATE(date) = DATE(current timestamp) ORDER BY date DESC"
res1 = ibm_db.exec_immediate(ibm_db_conn, param1)       dictionary1 = ibm_db.fetch_assoc(res1)
texpense = []

     while dictionary1 != False:
        temp = []
temp.append(dictionary1["TN"])
temp.append(dictionary1["AMOUNT"])
texpense.append(temp)          print(temp)
        dictionary1 = ibm_db.fetch_assoc(res1)

   #   cursor = mysql.connection.cursor()
```

```
   #   cursor.execute('SELECT * FROM expenses WHERE userid = % s AND DATE(date) =
DATE(NOW()) AND date ORDER BY `expenses`.`date` DESC',(str(session['id'])))     #
expense = cursor.fetchall()


     param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " AND
DATE(date) = DATE(current timestamp) ORDER BY date DESC"
res = ibm_db.exec_immediate(ibm_db_conn, param)       dictionary =
ibm_db.fetch_assoc(res)       expense = []       while dictionary != False:
         temp = []          temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
expense.append(temp)          print(temp)
         dictionary = ibm_db.fetch_assoc(res)



     total=0
     t_food=0
t_entertainment=0
t_business=0
t_rent=0       t_EMI=0
t_other=0


     for x in expense:
total += x[4]          if
x[6] == "food":
t_food += x[4]


         elif x[6] == "entertainment":
t_entertainment  += x[4]


         elif  x[6]  ==  "business":
t_business  += x[4]            elif
```

```
x[6] == "rent":                t_rent
+= x[4]

        elif x[6] == "EMI":
t_EMI  += x[4]

        elif x[6] == "other":
t_other  += x[4]

print(total)

     print(t_food)
print(t_entertainment)
print(t_business)       print(t_rent)
print(t_EMI)       print(t_other)



     return render_template("today.html", texpense = texpense, expense = expense,  total = total ,
                        t_food   =   t_food,t_entertainment   =      t_entertainment,
t_business = t_business,  t_rent =  t_rent,                          t_EMI =  t_EMI,
t_other =  t_other )



@app.route("/month") def
month():
   #   cursor = mysql.connection.cursor()
   #   cursor.execute('SELECT DATE(date), SUM(amount) FROM expenses WHERE
userid= %s AND MONTH(DATE(date))= MONTH(now()) GROUP BY DATE(date) ORDER
BY DATE(date) ',(str(session['id'])))
   #   texpense = cursor.fetchall()
   #   print(texpense)

     param1 = "SELECT DATE(date) as dt, SUM(amount) as tot FROM expenses WHERE userid =
" + str(session['id']) + " AND MONTH(date) = MONTH(current timestamp) AND YEAR(date) =
YEAR(current timestamp) GROUP BY DATE(date) ORDER BY DATE(date)"       res1 =
```

```
ibm_db.exec_immediate(ibm_db_conn, param1)       dictionary1 = ibm_db.fetch_assoc(res1)
texpense = []


    while dictionary1 != False:
        temp = []
        temp.append(dictionary1["DT"])
temp.append(dictionary1["TOT"])
texpense.append(temp)          print(temp)
dictionary1 = ibm_db.fetch_assoc(res1)     #
cursor = mysql.connection.cursor()
   #   cursor.execute('SELECT * FROM expenses WHERE userid = % s AND
MONTH(DATE(date))= MONTH(now()) AND date ORDER BY `expenses`.`date`
DESC',(str(session['id'])))
   #   expense = cursor.fetchall()


  param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " AND MONTH(date) =
              MONTH(current timestamp) AND YEAR(date) = YEAR(current timestamp)
ORDER BY date DESC"
     res = ibm_db.exec_immediate(ibm_db_conn, param)
dictionary = ibm_db.fetch_assoc(res)       expense = []
while dictionary != False:
        temp = []          temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
expense.append(temp)          print(temp)
        dictionary = ibm_db.fetch_assoc(res)



    total=0       t_food=0
t_entertainment=0
t_business=0
```

```
t_rent=0       t_EMI=0
t_other=0


     for x in expense:
total += x[4]          if
x[6] == "food":
t_food += x[4]

        elif x[6] == "entertainment":
t_entertainment  += x[4]

        elif  x[6]  ==  "business":
t_business  += x[4]             elif
x[6] == "rent":                 t_rent
+= x[4]

        elif x[6] == "EMI":
t_EMI  += x[4]

        elif x[6] == "other":
t_other  += x[4]

print(total)

     print(t_food)
print(t_entertainment)
print(t_business)
print(t_rent)       print(t_EMI)
print(t_other)



     return render_template("today.html", texpense = texpense, expense = expense,  total = total ,
```

```
                    t_food  =  t_food,t_entertainment  =  t_entertainment,
t_business = t_business,  t_rent =  t_rent,                    t_EMI =  t_EMI,
t_other =  t_other )


@app.route("/year") def
year():
   #  cursor = mysql.connection.cursor()
   #  cursor.execute('SELECT MONTH(date), SUM(amount) FROM expenses WHERE
userid= %s AND YEAR(DATE(date))= YEAR(now()) GROUP BY MONTH(date) ORDER BY
MONTH(date) ',(str(session['id'])))
   #  texpense = cursor.fetchall()
   #  print(texpense)


    param1 = "SELECT MONTH(date) as mn, SUM(amount) as tot FROM expenses WHERE userid
= " + str(session['id']) + " AND YEAR(date) = YEAR(current timestamp)
GROUP BY MONTH(date) ORDER BY MONTH(date)"
res1 = ibm_db.exec_immediate(ibm_db_conn, param1)
dictionary1 = ibm_db.fetch_assoc(res1)      texpense = []


    while dictionary1 != False:
       temp = []
temp.append(dictionary1["MN"])
temp.append(dictionary1["TOT"])
texpense.append(temp)          print(temp)
       dictionary1 = ibm_db.fetch_assoc(res1)



   #  cursor = mysql.connection.cursor()
   #  cursor.execute('SELECT * FROM expenses WHERE userid = % s AND
YEAR(DATE(date))= YEAR(now()) AND date ORDER BY `expenses`.`date`
DESC',(str(session['id'])))
   #  expense = cursor.fetchall()


    param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " AND
YEAR(date) = YEAR(current timestamp) ORDER BY date DESC"
res = ibm_db.exec_immediate(ibm_db_conn, param)      dictionary =
ibm_db.fetch_assoc(res)      expense = []      while dictionary != False:
```

```
        temp = []          temp.append(dictionary["ID"])
temp.append(dictionary["USERID"])
temp.append(dictionary["DATE"])
temp.append(dictionary["EXPENSENAME"])
temp.append(dictionary["AMOUNT"])
temp.append(dictionary["PAYMODE"])
temp.append(dictionary["CATEGORY"])
expense.append(temp)          print(temp)
        dictionary = ibm_db.fetch_assoc(res)



    total=0       t_food=0
t_entertainment=0
t_business=0
t_rent=0       t_EMI=0
t_other=0

    for x in expense:
total += x[4]          if
x[6] == "food":
t_food += x[4]

        elif x[6] == "entertainment":
            t_entertainment  += x[4]

        elif  x[6]  ==  "business":
t_business  += x[4]             elif
x[6] == "rent":                t_rent
+= x[4]

        elif x[6] == "EMI":
t_EMI  += x[4]

        elif x[6] == "other":
t_other  += x[4]
```

```
print(total)
print(t_food)
print(t_entertainment)
print(t_business)
print(t_rent)
print(t_EMI)
 print(t_other)



     return render_template("today.html", texpense = texpense, expense = expense,  total = total ,
                        t_food   =   t_food,t_entertainment   =      t_entertainment,
t_business = t_business,  t_rent =  t_rent,                          t_EMI =  t_EMI,
t_other =  t_other )

#log-out

@app.route('/logout')

def logout():
   session.pop('loggedin', None)
session.pop('id', None)
session.pop('username', None)
session.pop('email', None)    return
render_template('home.html')



port = os.getenv('VCAP_APP_PORT', '8080') if
__name__ == "__main__":
    app.secret_key = os.urandom(12)     app.run(debug=True,
host='0.0.0.0', port=port)
```

deployment.yaml:

```
apiVersion: apps/v1 kind:
Deployment metadata:
  name: sakthi-flask-node-deployment
spec:    replicas: 1    selector:
   matchLabels:
app: flasknode
template:
metadata:       labels:
       app: flasknode      spec:
      containers:       -
name: flasknode
       image: icr.io/sakthi_expense_tracker2/flask-template2          imagePullPolicy:
Always
       ports:
- containerPort: 5000
```

flask-service.yaml:

```
apiVersion: v1 kind:
Service metadata:
 name: flask-app-service
spec:   selector:
   app: flask-app
ports:   - name: http
protocol: TCP     port:
80     targetPort: 5000
type: LoadBalancer
```

manifest.yml:

```
applications:
- name: Python Flask App IBCMR 2022-10-19    random-route: true
  memory: 512M    disk_quota: 1.5G
```

sendemail.py: import

```
smtplib import
```

```
sendgrid as sg import
os
from sendgrid.helpers.mail import Mail, Email, To, Content
SUBJECT = "expense tracker" s =
smtplib.SMTP('smtp.gmail.com', 587)

def sendmail(TEXT,email):
    print("sorry we cant process your candidature")
    s = smtplib.SMTP('smtp.gmail.com', 587)
    s.starttls()
    # s.login("il.tproduct8080@gmail.com", "oms@1Ram")
    s.login("tproduct8080@gmail.com", "lxixbmpnexbkiemh")
message  = 'Subject: {}\n\n{}'.format(SUBJECT, TEXT)     #
s.sendmail("il.tproduct8080@gmail.com", email, message)
s.sendmail("il.tproduct8080@gmail.com", email, message)
    s.quit() def
sendgridmail(user,TEXT):

    # from_email = Email("shridhartp24@gmail.com")
from_email = Email("tproduct8080@gmail.com")
to_email = To(user)      subject = "Sending with SendGrid
is Fun"     content = Content("text/plain",TEXT)     mail =
Mail(from_email, to_email, subject, content)

    # Get a JSON-ready representation of the Mail object      mail_json =
mail.get()
    # Send an HTTP POST request to /mail/send      response =
sg.client.mail.send.post(request_body=mail_json)
print(response.status_code)     print(response.headers)
```

Database Schema

Tables :

1.Admin:

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,username VARCHAR(32) NOT NULL, email VARCHAR(32) NOT NULL,password VARCHAR(32) NOT NULL

2.Expense:

id INT NOT NULL GENERATED ALWAYS AS IDENTITY, userid INT NOT NULL, date TIMESTAMP(12) NOT NULL,expensename VARCHAR(32) NOT NULL, amount VARCHAR(32) NOT NULL, paymode VARCHAR(32) NOT NULL, category VARCHAR(32) NOT NULL

3.LIMIT

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,userid VARCHAR(32) NOT NULL, limit VARCHAR(32) NOT NULL

8.TESTING:

a.TestCases:

PNT2022TMID02593

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	BUG ID
LoginPage_TC_OO 1	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	1. Go to website 2. Enter Valid username and password	Username: Kavi password: 123456	Login/Signup popup should display	Working as expected	Pass	-	
Loginpage_TC_002	Functional	Home Page	Verify that the error message is displayed when the user enters the wrong credentials	1.Go to website 2.Enter Invalid username and password	Username: XXXX Password: 12345	Error message should displayed	Working as expected	Pass	-	
LoginPage_TC_OO 2	UI	Home Page	Verify the UI elements in Login/Signup popup	1.Go to website 2.Enter valid credentials 3.Click Login	Username: Kavi password: 123456	Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Create account link e.Last password? Recovery password link	Working as expected	Pass	-	
LoginPage_TC_OO 3	Functional	Home page	Verify user is able to log into application with Valid credentials	1.Go to website 2.Enter details and click login	Username: Kavi password: 123456	User should navigate to user account homepage	Working as expected	Pass	-	
LoginPage_TC_OO 4	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Go to website 2.Enter details and click login	Username: Kavi password: 123456	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	-	
LoginPage_TC_OO 4	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Go to website 2.Enter details and click login	Username: Kavi password: 123456	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	-	
LoginPage_TC_OO 5	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Go to website 2.Enter details and click login	Username: Kavi password: 123456	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	-	
AddExpensePage_ TC _OO6	Functional	Add Expense page	Verify whether user is able to add expense or not	1. Add date, expense name and other details 2.Check if the expense gets added	add rent = 6000	Application adds expenses	Working as expected	Pass	-	

b.User Acceptance Testing

1. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	8	15
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	9	2	4	11	20
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	0	1	8
Totals	22	14	11	22	51

2. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Interface	7	0	0	7
Login	20	0	0	20
Logout	2	0	0	2
Limit	3	0	0	3
Signup	8	0	0	8
Final Report Output	4	0	0	4

9.RESULTS

a. Performance Metrics

i. Tracking income and expenses: Monitoring the income and tracking all expenditures (through bank accounts, mobile wallets, and credit & debit cards).

ii. Transaction Receipts: Capture and organize your payment receipts to keep track of your expenditure.

iii. Organizing Taxes: Import your documents to the expense tracking app, and it will streamline your income and expenses under the appropriate tax categories.

iv. Payments & Invoices: Accept and pay from credit cards, debit cards, net banking, mobile wallets, and bank transfers, and track the status of your invoices and bills in the mobile app itself. Also, the trackingapp sends remindersfor payments an d automatically matches the payments with invoices.

v. Reports: The expense tracking app generates and sends reports to give a detailed insight about profits, losses, budgets, income, balance sheets, etc.,

vi. Ecommerce integration: Integrateyour expense trackingapp wit h your eCommerce store and track your sales through payments received via multiple payment methods.

vii. Vendors and Contractors: Manage and track all the payments to the vendors and contractors added to the mobile app.

viii. Access control: Increase your team productivity by providing access control to particular users through custom permissions.

ix. Track Projects: Determine project profitability by tracking labor costs, payroll, expenses, etc., of your ongoing project.

x. Inventory tracking: An expense tracking app can do it all. Right from tracking products or the cost of goods, sending alert notifications when the product is running out of stock or the product is not selling, to purchase orders.

xi. In-depth insights and analytics: Provides in-built tools to generate reports with easy-to- understand visuals and graphics to gain insights about the performance of your business.

xii. Recurrent Expenses: Rely on your budgeting app to track, streamline, and automate all the recurrent expenses and remind you on a timely basis.

10. ADVANTAGES & DISADVANTAGES

1. **Achieve your business goals** with a tailored mobile app that perfectly fits your business.
2. **Scale-up** at the pace your business is growing.
3. Deliver an **outstanding** customer experience through additional control over the app.
4. Control the **security** of your business and customer data
5. Open **direct marketing channels** with no extra costs with methods such as push notifications.
6. **Boost the productivity** of all the processes within theorganization.

7. Increase **efficiency** and **customer satisfaction** with an app aligned to their needs.
8. **Seamlessly integrate** with existing infrastructure.
9. Ability to provide **valuable insights**.
10. Optimize sales processes to generate **more revenue** through enhanced data collection.

11. CONCLUSION

From this project, we are able to manage and keep tracking the daily expenses as well as income. While making this project, we gained a lot of experience of working as a team. We discovered various predicted and unpredicted problems and we enjoyed a lot solving them as a team. We adopted things like video tutorials, text tutorials, internet and learning materials to make our project complete.

12. FUTURE

The project assists well to record the income and expenses in general.
However, this project has some limitations:

1. The application is unable to maintain the backup of data once it is uninstalled.
2. This application does not provide higher decision capability.

To further enhance the capability of this application, we recommend the following features to be incorporated into the system:

3. Multiple language interface.
4. Provide backup and recovery of data.
5. Provide better user interface for user.
6. Mobile apps advantage.

13. APPENDIX

Source Code Github Link :https://github.com/IBM-EPBL/IBM-Project-23160-1659870485

Project Demo Link: https://drive.google.com/file/d/10XuuAKApCorERwnAoyuZnDHvUBjqbi-C/view?usp=share_links