

PERSONAL EXPENSE TRACKER APPLICATION

IBM-Project-33924-1660229003

NALAIYATHIRAN PROJECT BASED LEARNING ON PROFESSIONAL
READINESS FOR INNOVATION, EMPLOYING AND ENTREPRENEURSHIP

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INDEX

1. INTRODUCTION

- a. Project Overview
- b. Purpose

2. LITERATURE SURVEY

- a. Existing problem
- b. References
- c. Problem Statement Definition

3. IDEATION & PROPOSED SOLUTION

- a. Empathy Map Canvas
- b. Ideation & Brainstorming
- c. Proposed Solution
- d. Problem Solution fit

4. REQUIREMENT ANALYSIS

- a. Functional requirement
- b. Non-Functional requirements

5. PROJECT DESIGN

- a. Data Flow Diagrams
- b. Solution & Technical Architecture
- c. User Stories

6. PROJECT PLANNING & SCHEDULING

- a. Sprint Planning & Estimation
- b. Sprint Delivery Schedule
- c. Reports from JIRA

7. CODING & SOLUTIONING (Explain the features added in the project alongwith code)

- a. Feature 1
- b. Feature 2
- c. Database Schema (if Applicable)

8. TESTING

- a. User Acceptance Testing

9. RESULTS

- a. Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

Source Code

GitHub

1.INTRODUCTION:

a. Project Overview

TEAM ID	: PNT2022TMID23689
INDUSTRY MENTOR	: KUSHBOO
FACULTY MENTOR	: N.MOHANAPRIYA

Skills Required:

IBM cloud, Java Script , Html, 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 live. 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 they 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 every day and on what. This is one of the best ways to get your expenses under control and bring some semblance in 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 in 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 levvel research in 2018 in North America , respondents reported following main 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%)
- vi. Lost expense reports (24%)

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.

S.No	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOG Y	ADVANTAGES/ DISADVANTAG ES
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

I am	Describe customer with 3-4 key characteristics - who are they?	Describe the customer and their attributes here
I'm trying to	List their outcome or "job" the care about - what are they trying to achieve?	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way -- what bothers them most?	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists -- what needs to be solved?	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view -- how does it impact them emotionally?	Describe the emotions the result from experiencing the problems or barriers

Personal Expense Tracker Application:



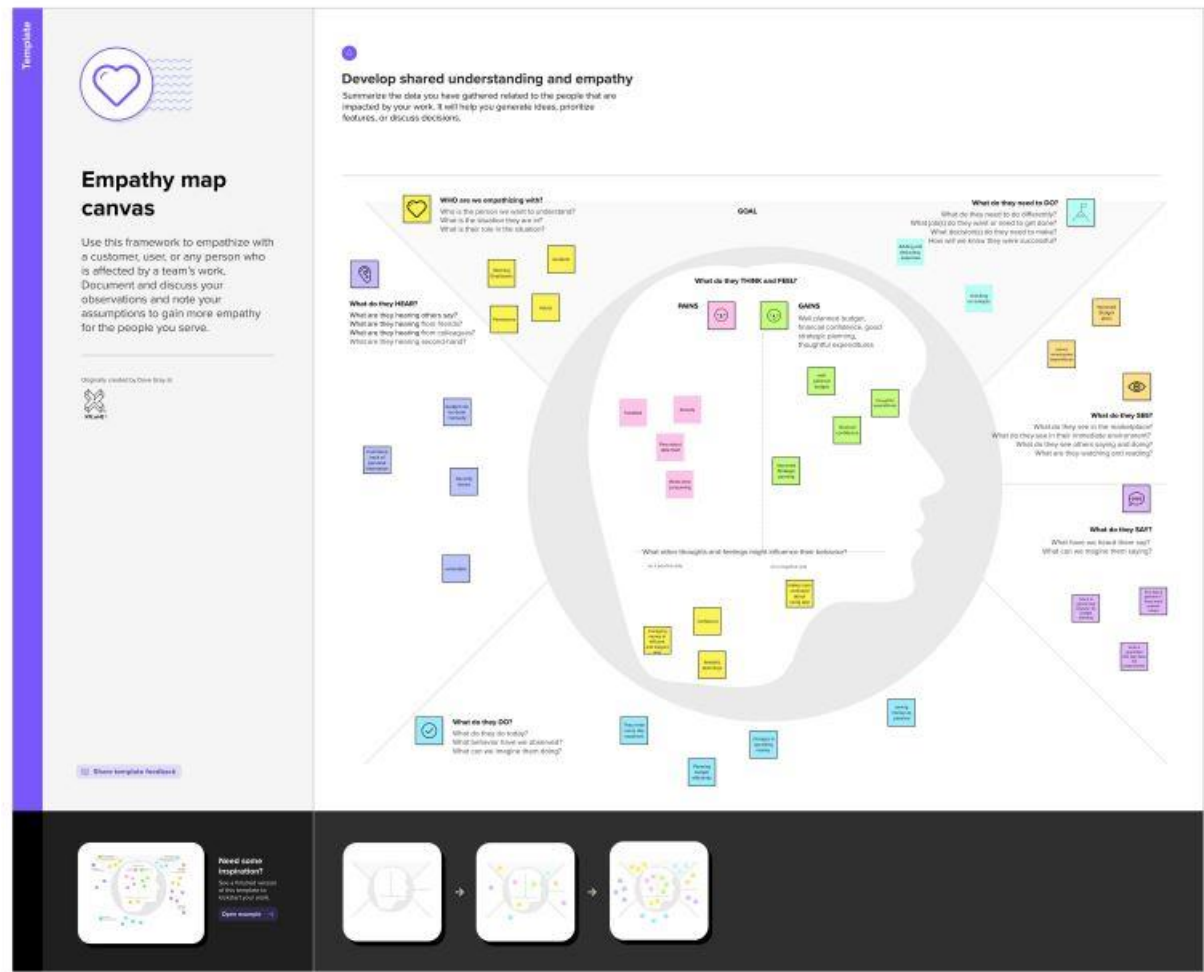
Customer Problem Statement :

A well-articulated customer problem statement allows us to find the ideal solution forthe 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.

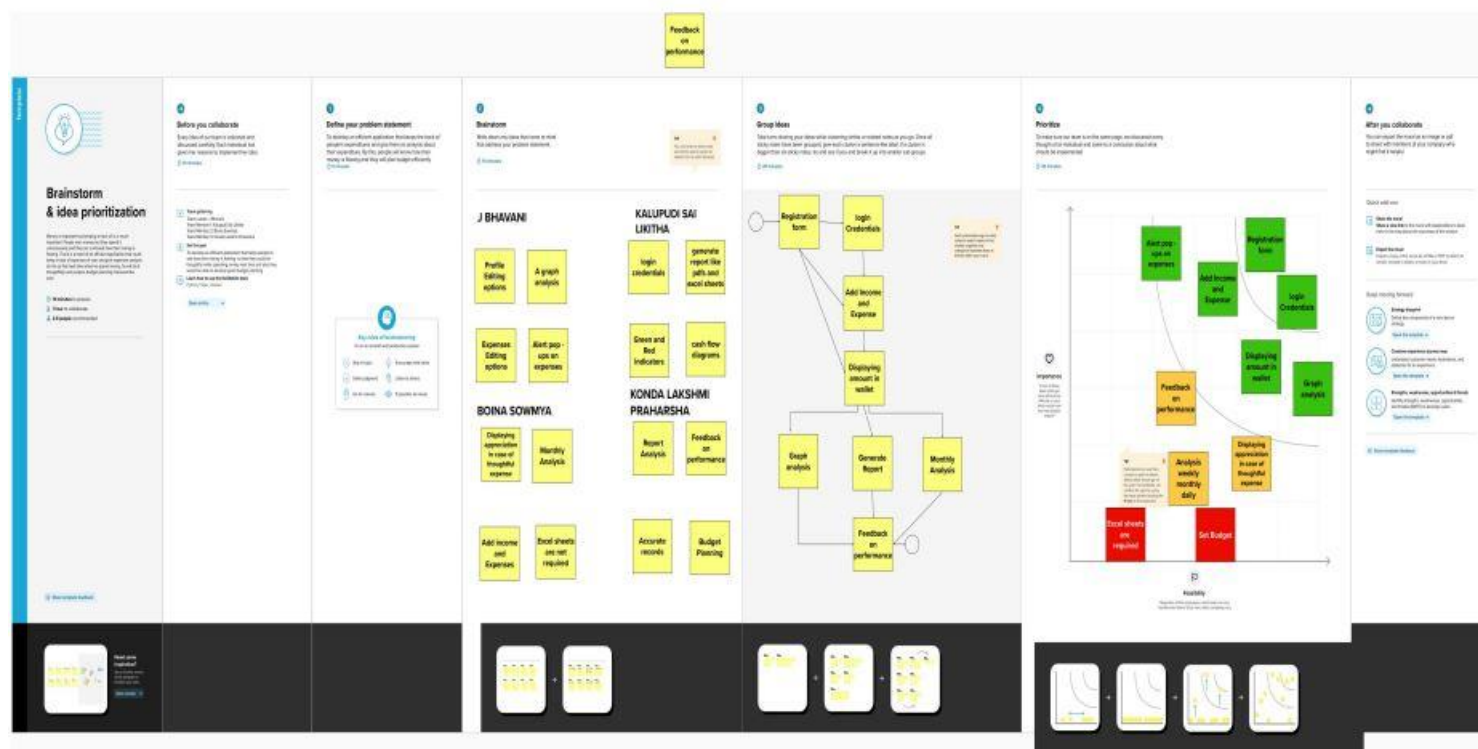
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Student	Manage my expenses	It is very difficult	There is no proper app to warn me regarding my expense	Frustrated
PS-2	IT employee	Reduce my expense	I am not able to keep track of my expense	I cant see the app which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

1. IDEATION & PROPOSED SOLUTION

a. Empathy Map Canvas



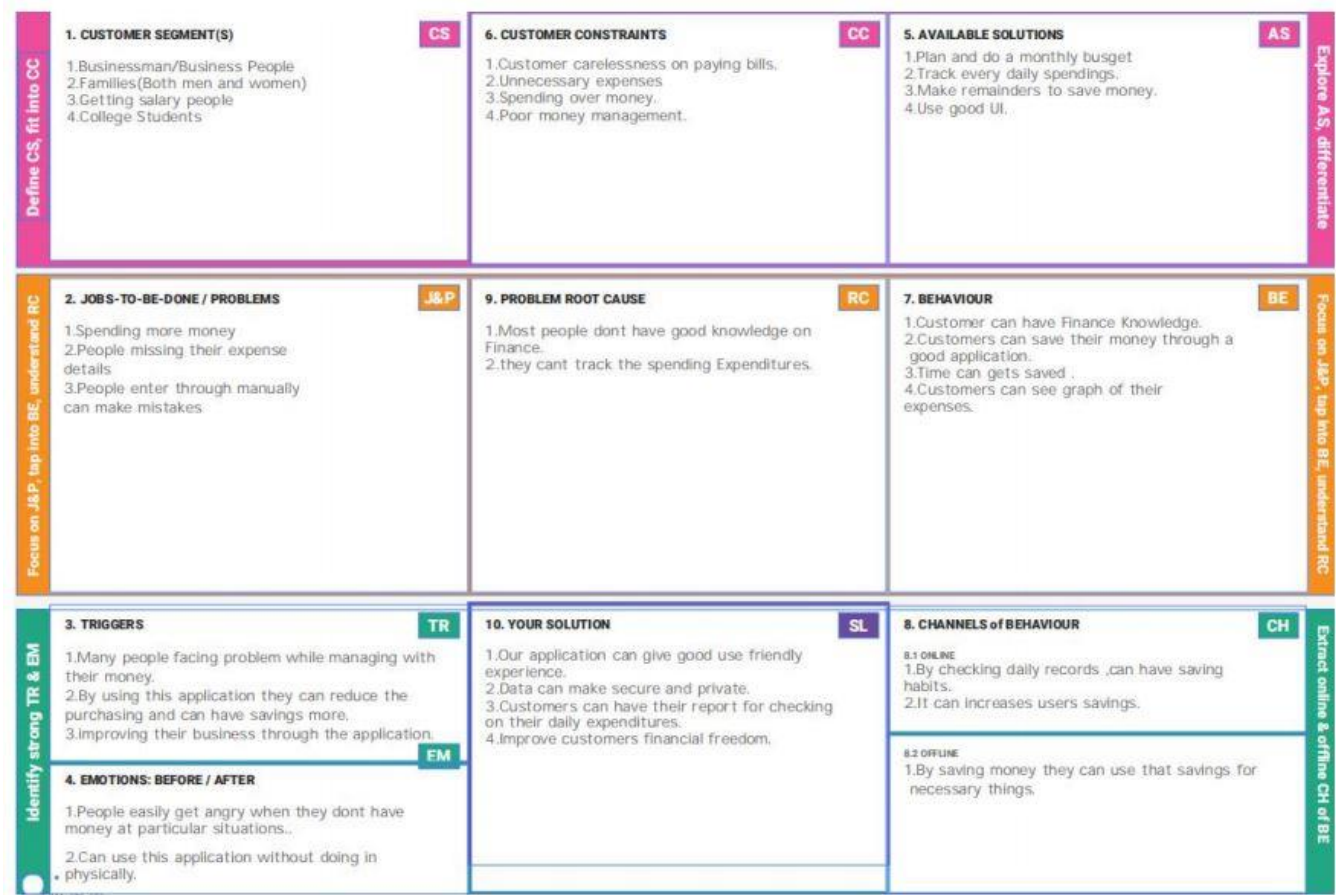
B. Ideation & Brainstorming



C. Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Lack of Planning on income can leads to crisis of money so inorder to avoid this kind of situation they can use an application where they can have daily calculations.
2.	Idea / Solution description	Using web Cloud Application the expenditure is logged into the cloud with automatic calculation and it gives an clear understanding where the money is using, can prioritize their expenditure and leads to savings.
3.	Novelty / Uniqueness	Adding the daily limitness on expenses and can stop them on spending less on unnecessary.
4.	Social Impact / Customer Satisfaction	Users can have stress free on money management through the application.
5.	Business Model (Revenue Model)	With the help of personlized ads and premium plans or features revenue is made and usage of applications by customers.
6.	Scalability of the Solution	As this web application uses cloud storage with microservices the scalability is made easily with affecting other feature.

D. Problem Solution fit



1. REQUIREMENT ANALYSIS

a. Functional requirements

F R N o .	Functional Requirement	Description
F R - 1	Register	Registration is the process of the user to complete the application's form.Certain details must be submitted such as e-mail address, password, and password confirmation. The user is identified using these details.

F R - 2	Login	The login screen is used to verify the identity of the user. The account can be accessed using the user's registered email address and password.
F R - 3	Categories	On the main page, we can see overall revenue and spending, as well as the balance remaining after expenditure, as well as the user's entire categories namely Entertainment, Cloth, Food and Drinks, Health and Fitness and so on.
F R - 4	Update Daily Expensive	The user can upload the daily expensive details what they are spending on each day. The details such as cloth, entertainment, food, health etc.,
F R - 5	View Expensive Chart	This module used to see a pictorial depiction of all details in the form of a pie chart, where each slice of the pie chart represents that the viewer to gain an approximate notion of which category has the highest expenses.
N F R - 6	Set Alert	When a user attempts to spend more than the pre-defined amount limit, the app will automatically send an alert if the threshold amount they selected for an alert is exceeded.

b. Non-Functional requirements

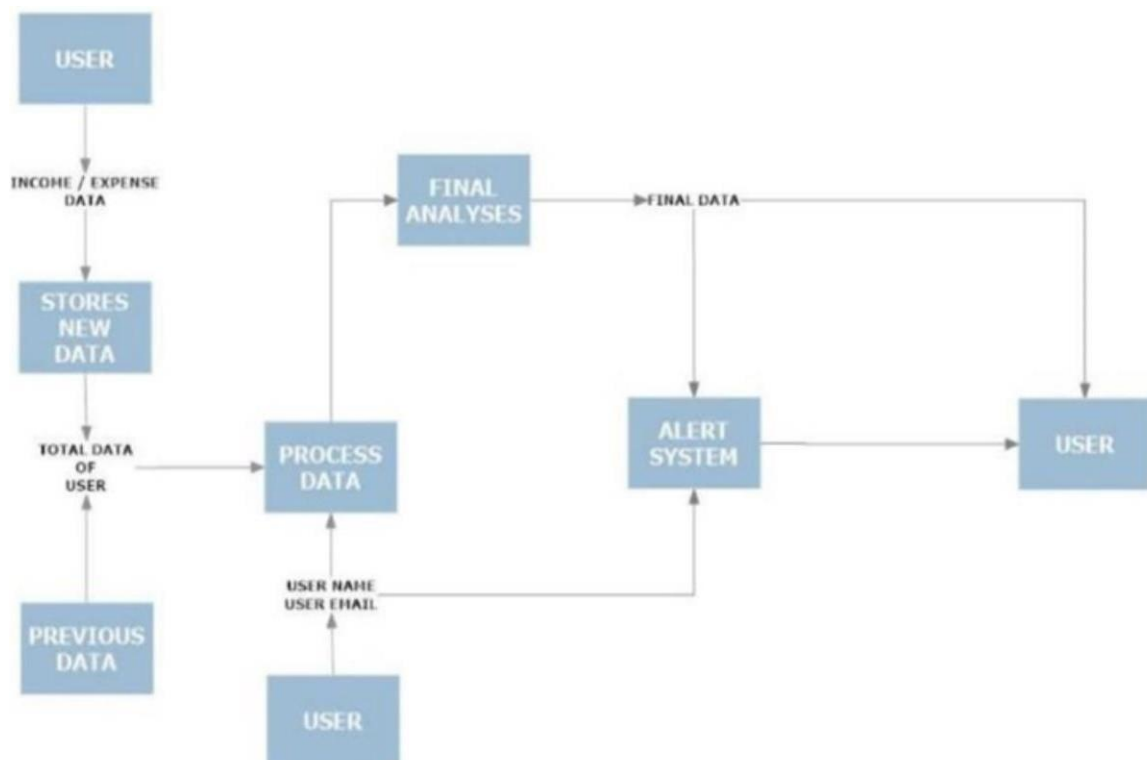
N F R N o .	Non-Functional Requirement	Description
N F R - 1	Usability	The system shall allow the users to access the system with pc using web application. The system uses a web application as an interface. The system is user friendly which makes the system easy.
N F R - 2	Security	A security requirement is a statement of needed security functionality that ensures one of many different security properties of software is being satisfied.
N F R - 3	Reliability	The system has to be 100% reliable due to the importance of data and the damages that can be caused by incorrect or incomplete data. The system will run 7 days a week. 24 hours a day.
N F R - 4	Performance	The information is refreshed depending upon whether some updates have occurred or not in the application. The system shall respond to the member in not less than two seconds from the time of the request submittal. The system shall be allowed to take more time when doing large processing jobs. Responses to view information shall take no longer than 5 seconds to appear on the screen.

N F R - 5	Availability	The system is available 100% for the user and is used 24 hrs a day and 365 days a year. The system shall be operational 24 hours a day and 7 days a week.
N F R - 6	Scalability	Scalability is the measure of a system's ability to increase or decrease in performance and cost in response to changes in application and system processing demands.

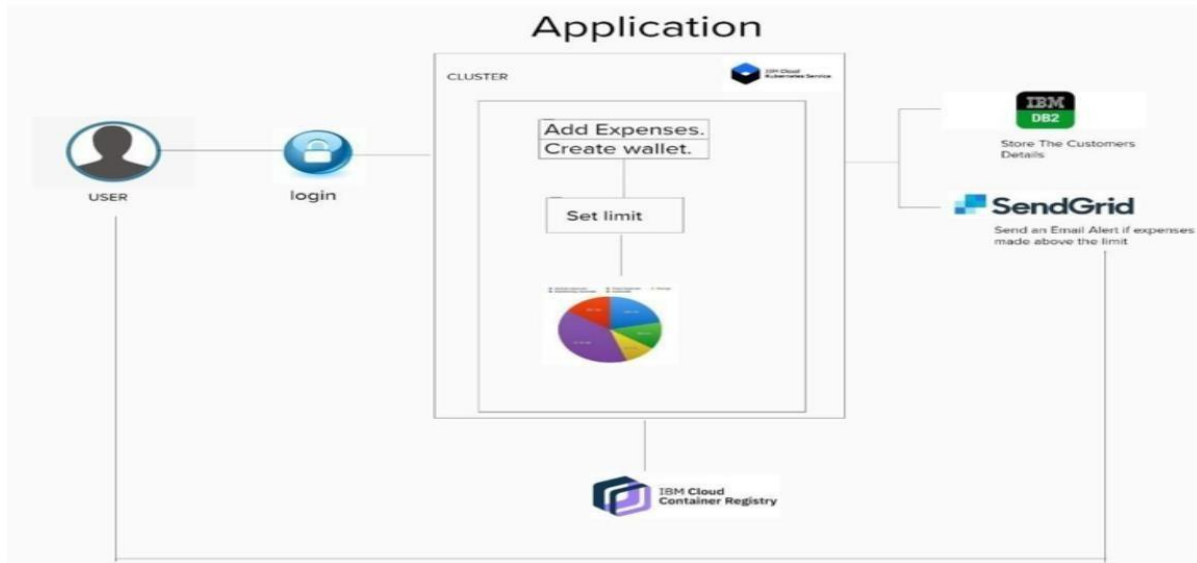
2. PROJECT DESIGN

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.



B.Solution & Technical Architecture



C. User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (web user)	Registration	USN-1	As a user, I can register for the application by entering mail id and password	I can access my account/ dashboard	High
		USN-2	As a user,I will receive a confirmation email once I have registered for the email and click application	I can receive a confirmation email	High
		USN-3	As a user, I can access using mail	I can register through mail	Low
	Login	USN-4	As a user, I can login application by entering application using email and password	I can access the application	High

	Dashboard	USN-5	As a user,I can view 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 login issue and other issues of the solution at any application	I can provide support	Medium
Administrator	Application	USN-7	As an administrator,I can upgrade or update the application	I can fix the bug	Medium

1. 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	Jayasri
		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Afra Thahseen
	Login	USN-3	As a user, I can log into the application by entering email & password	1	High	Abdul Waseem Nihaal
	Dashboard	USN-4	Logging in takes to the dashboard for the logged user.	2	High	Kavinaya
<i>Bug fixes, routine checks and improvisation by everyone in the team *Intended bugs only</i>						
Sprint 2	Workspace	USN-1	Workspace for personal expense tracking	2	High	Afra Thahseen
	Charts	USN-2	Creating various graphs and statistics of customer's data	1	Medium	Abdul Waseem Nihaal
	Connecting to IBM DB2	USN-3	Linking database with dashboard	2	High	Kavinaya
		USN-4	Making dashboard interactive with JS	2	High	Jayasri

Sprint-3		USN-1	Wrapping up the server side works of frontend	1	Medium	Abdul Waseem Nihaal
	Watson Assistant	USN-2	Creating Chatbot for expense tracking and for clarifying user's query	1	Medium	Kavinaya
	SendGrid	USN-3	Using SendGrid to send mail to the user about their expenses	1	Low	Jayasri
		USN-4	Integrating both frontend and backend	2		Afra Thahseen
<i>Bug fixes, routine checks and improvisation by everyone in the team *Intended bugs only</i>						
Sprint-4	Docker	USN-1	Creating image of website using docker/	2	High	Kavinaya
	Cloud Registry	USN-2	Uploading docker image to IBM Cloud registry	2	High	Jayasri
	Kubernetes	USN-3	Create container using the docker image and hosting the site	2	High	Afra Thahseen
	Exposing	USN-4	Exposing IP/Ports for the site	2	High	Abdul Waseem Nihaal

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
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3.	Project DesignPhase - 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
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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 PlanningPhase	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

The image displays two screenshots of the Jira Software interface, specifically the 'Backlog' view for the 'Personal Expense Tracker Application' project.

Top Screenshot: Shows the 'PETA Sprint 1' (24 Oct – 29 Oct) with 4 issues. The issues are:

- PETA-1: As a user, I can register for the application by entering my email, password, and confirming my pass... (REGISTRATION) (2) IN PROGRESS
- PETA-2: As a user, I will receive confirmation email once I have registered for the application (REGISTRATION) (1) TO DO
- PETA-4: As a user, I can log into the application by entering email & password (LOGIN) (1) TO DO

Bottom Screenshot: Shows the 'PETA Sprint 3' (7 Nov – 14 Nov) and 'PETA Sprint 4' (14 Nov – 21 Nov) with various issues.

PETA Sprint 3 (7 Nov – 14 Nov) Issues:

- PETA-15: To wrap up the server side works of frontend (FRONTEND) (1) TO DO
- PETA-29: Creating chatbot (WATSON ASSISTANT) (1) TO DO
- PETA-31: Integrating SendGrid services (SENDGRID) (1) TO DO
- PETA-32: Integrating both frontend and backend (2) TO DO

PETA Sprint 4 (14 Nov – 21 Nov) Issues:

- PETA-17: To create images of website using docker (DOCKER) (2) TO DO
- PETA-33: To upload docker image to IBM Cloud Registry (CLOUD REGISTRY) (2) TO DO
- PETA-34: To create a container using docker image and hosting the site (KUBERNETES) (2) TO DO
- PETA-35: Exposing IP Ports for the site (IP PORTS) (2) TO DO

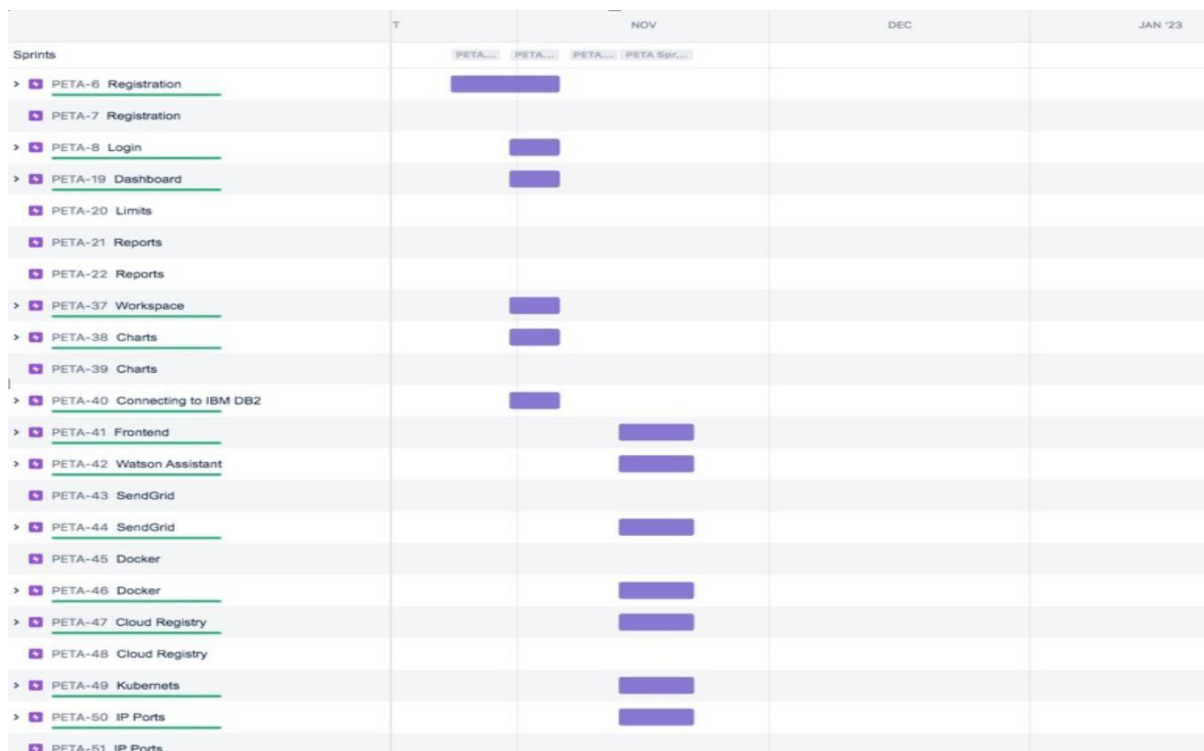
ii. Board

The screenshot shows the Jira Software interface for a project named "Personal Expense Tracker Application". The current view is the "Board" for "PETA Sprint 1". The board is organized into three columns: "TO DO 3 ISSUES", "IN PROGRESS 1 ISSUE", and "DONE".

- TO DO 3 ISSUES:**
 - Issue PETA-2: "As a user, I will receive confirmation email once I have registered for the application". Category: REGISTRATION. Priority: 1. Status: To Do.
 - Issue PETA-4: "As a user, I can log into the application by entering email & password". Category: LOGIN. Priority: 1. Status: To Do.
 - Issue PETA-5: "As a registered user, it takes the user to the dashboard". Category: DASHBOARD. Priority: 2. Status: To Do.
- IN PROGRESS 1 ISSUE:**
 - Issue PETA-1: "As a user, I can register for the application by entering my email, password, and confirming my password". Category: REGISTRATION. Priority: 2. Status: In Progress.
- DONE:** No issues are currently in the Done column.

The interface includes a sidebar with navigation options like "Roadmap", "Backlog", "Board", "Code", "Project pages", "Add shortcut", and "Project settings". The top navigation bar shows various project links and a search bar. A "Quickstart" button is visible in the bottom right corner.

iii. Road Map



1. 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_mysqlldb import MySQL
# import MySQLdb.cursorsimport re
```

```
from flask_db2 import DB2import ibm_db
import ibm_db_dbi
from sendemail import sendgridmail,sendmail
```

```
# from gevent.pywsgi import WSGIServerimport 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 = "sbb93800"

dsn_pwd = "wobsVLm6ccFxcNLe" 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-be8c-
fa31c41761d2.bs2io90l08kqb1od8lcg.databases.appdomain.cloud' app.config['port'] = '31498'
app.config['protocol'] = 'tcpip' app.config['uid'] = 'sbb93800' app.config['pwd'] = 'wobsVLm6ccFxcNLe'
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

```

```
uid=sbb93800;pwd=wobsVLm6ccFxcNLe;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'^[a-zA-Z0-9_]+@[a-zA-Z0-9_]+\.[a-zA-Z0-9_]+$', email):
    msg = 'Invalid email address !'
elif not re.match(r'^[A-Za-z0-9_]+$', 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 useridmsg = "

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","abcde@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 ORDERBY
`expenses`.`date` DESC',(str(session['id'])))

# expense = cursor.fetchall()


    param = "SELECT * FROM expenses WHERE userid = " + str(session['id']) + " ORDERBY 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 = " + idres = 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 = " + idres = 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'])))# texpanse = cursor.fetchall()

# print(texpanse)
    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)

texpanse = []

```

```

while dictionary1 != False:temp = []

    temp.append(dictionary1["TN"]) temp.append(dictionary1["AMOUNT"])temp.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']) + " ANDDATE(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", texpanse = texpanse, 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'])))# texpanse = cursor.fetchall()

# print(texpanse)


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)

texpanse = []

```

```

while dictionary1 != False:temp = []

    temp.append(dictionary1["DT"]) temp.append(dictionary1["TOT"])tempense.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=0t_business=0 t_rent=0

t_EMI=0

t_other

```

```
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", texpanse = texpanse, 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'])))# texpanse = cursor.fetchall() # print(texpanse)
```

```
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)
```

```
texpanse = []
```

```
while dictionary1 != False:temp = []
```

```
temp.append(dictionary1["MN"]) temp.append(dictionary1["TOT"])texpanse.append(temp) print(temp)
```

```
dictionary1 = ibm_db.fetch_assoc(res1)
```

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

```
# cursor.execute('SELECT * FROM expenses WHERE userid = % s ANDYEAR(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", texpanse = texpanse, 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-deploymentspec:
  replicas: 1 selector:
  matchLabels:
    app: flasknode template:
  metadata:
  labels:
    app: flasknodespec:
  containers:
  - name: flasknode
    image: icr.io/sakthi_expense_tracker2/flask-template2 imagePullPolicy: Always
```

ports:

- containerPort: 5000

flask-service.yaml:

apiVersion: v1kind: Service metadata:

name: flask-app-servicespec:

selector:

app: flask-appports:

- name: http protocol: TCPport: 80

targetPort: 5000 type: LoadBalancer **manifest.yml:**

applications:

- name: Python Flask App IBCMR 2022-10-19random-route: true

memory: 512M disk_quota: 1.5G

sendemail.py:

import smtplib

import sendgrid as sgimport os

from sendgrid.helpers.mail import Mail, Email, To, ContentSUBJECT = "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.login("il.tproduct8080@gmail.com", "oms@lRam") s.login("tproduct8080@gmail.com",
"lxi bmpn exbkiemh")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("hjlll24@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 objectmail_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:

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	BUG ID	Executed By
LoginPage_TC_OO1	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	-		Kavinaya
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	-		Afra
LoginPage_TC_OO2	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	-		Abdul Waseem
LoginPage_TC_OO3	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	-		Jayasri
LoginPage_TC_OO4	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	-		Afra
LoginPage_TC_OO4	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	-		Kavinaya
LoginPage_TC_OO5	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	-		Abdul Waseem
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	-		Jayasri

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 tracking app sends reminders for payments and 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:** Integrate your expense tracking app with 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 the organization.
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-33924-1660229003>

