

PERSONAL EXPENSE TRACKER APPLICATION

IBM-Project-39452-1660449612

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

A PROJECT REPORT BY

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TEAM DETAILS:

TEAM ID : PNT2022TMID33307
INDUSTRY MENTOR : Kusboo
FACULT MENTOR : K.Senthilkumar

Skills Required:

IBM Cloud, HTML, Javascript, 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 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. 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.REFERENCE:

1. Expense Tracker Mobile Application by Angad Manchanda Master of Science in Computer Science, San Diego State University, San Diego, California, United States, 2012

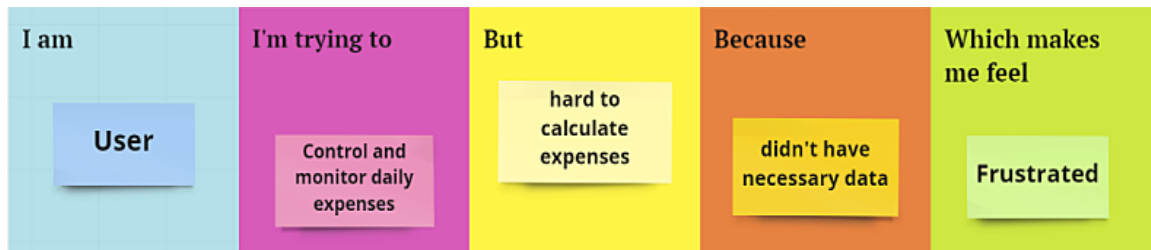
2. Cloud based Expense Tracker by Muskan Aggarwal and AsthhaWahal under the Supervision of Dr. T Poongodi Professor in Bachelors of Technology, Galgotias University, Greater Noida, India.

3. Income and Expense Tracker by P. Thanapal, Mohammed Yaseen Patel, T.P. Lokesh Raj and J. Satheesh Kumar, SITE, VIT University, Vellore, Tamil Nadu, India, 2015

3.Problem Statement Definition

I am	User, need to reduce unwanted expenses and save money.
I'm trying to	Needs to monitor and control expenses in day-to-day life.
But,	It takes long time to load and I couldn't get time to analyse every expense I made. And reading or viewing each expenses every time was not comfortable for me in eachtime.
Because	I am not comfortable with listing each day expenses and can't find an appropriate way to handle it.
Which makes me feel	I consider listing a expense manually are frustrated to use the application.

Personal Expense Tracker Application:



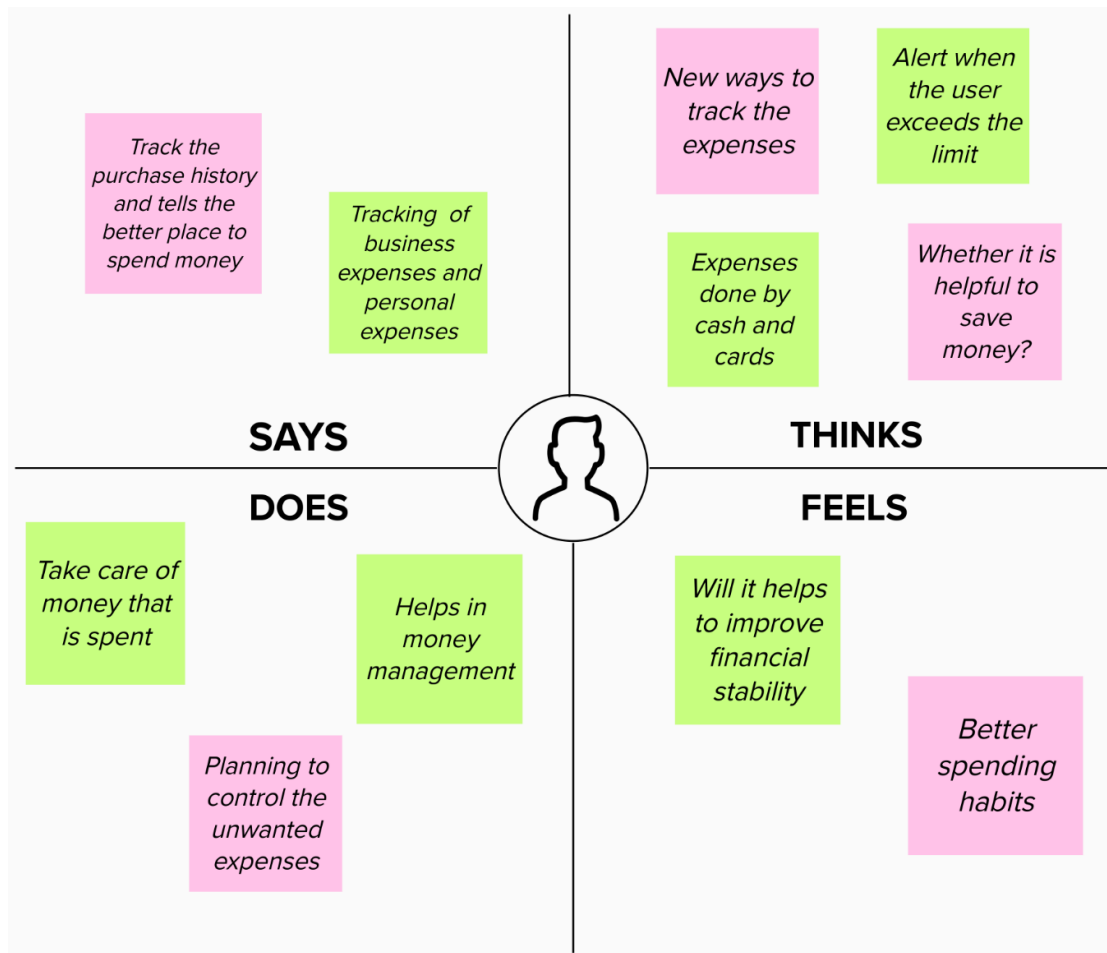
Customer Problem Statement Template:

This study is aimed at developing a cloud-based application capable of monitoring and controlling personal expenses, as well as cautioning the user against reckless and unbudgeted spending. The application allows users to track their expenses daily, weekly, monthly, and yearly in terms of summary, bar graphs, and pie-charts.

Problem Statement (PS)	I am	I'm trying to	But	Because	Which makes me feel
PS-1	User	Control daily expenses	Hard to calculate expenses	Didn't have necessary data	Frustrated
PS-2	User	Monitor expenses	All expenses are not recorded	Lack of required data	Irritated

1. IDEATION & PROPOSED SOLUTION

a. Empathy Map Canvas



B. Ideation & Brainstorming

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
 1 hour to collaborate
 2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

- Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.
- Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.
- Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#)

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

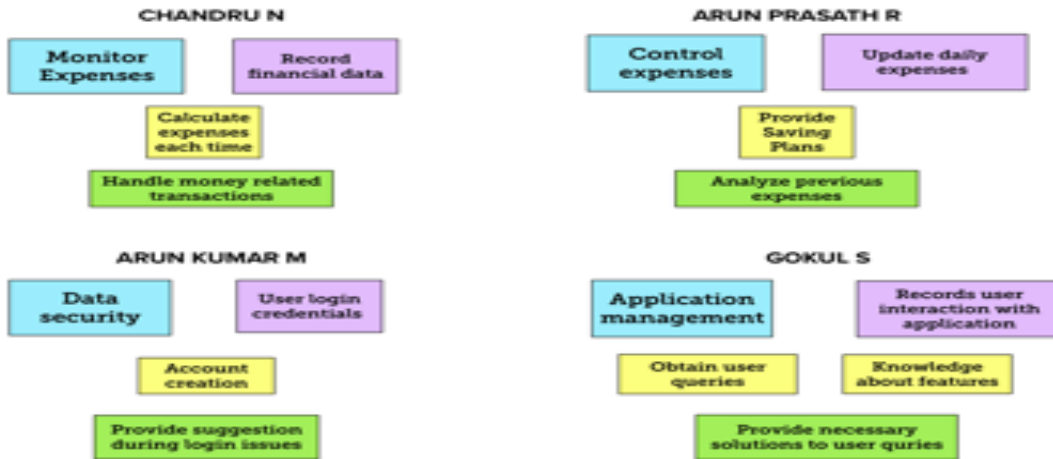
To develop a cloud-based application capable of monitoring and controlling personal expenses, as well as cautioning the user against reckless and unbudgeted spending. The application allows users to track their expenses daily, weekly, monthly, and yearly in terms of summary, bar graphs, and pie-charts.

2

Brainstorm

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

🕒 10 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

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	This study is aimed at developing a cloud-based application capable of monitoring and controlling personal expenses, as well as cautioning the user against reckless and unbudgeted spending. The application allows users to track their expenses daily, weekly, monthly, and yearly in terms of summary, bar graphs, and pie-charts.
2.	Idea / Solution description	More accurate techniques to track the expenses.
3.	Novelty / Uniqueness	Approval of expenditures in real-time.
4.	Social Impact / Customer Satisfaction	Helps in money management.
5.	Business Model (Revenue Model)	Planning to control and monitor the unwanted expenses.
6.	Scalability of the Solution	Tracking of daily personal expenses.

d. Problem Solution fit

Problem-Solution fit canvas 2.0

Purpose / Vision

1. CUSTOMER SEGMENT(S) Who is your customer? i.e. working parents of 0-5 y.o. kids CS Define CS, fit into CC	6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. CC Explore AS, differentiate	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What price & come do these solutions have? i.e. pen and paper is an alternative to digital monitoring. AS Explore AS, differentiate
2. JOBS-TO-BE-DONE / PROBLEMS Which jobs to be done (or problems) do you address for your customer? There could be more than one; explore different sides. J&P Focus on J&P, up into BE, understand RC	9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. RC Focus on J&P, up into BE, understand RC	7. BEHAVIOUR What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace). BE Focus on J&P, up into BE, understand RC
3. TRIGGERS What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. TR Identify strong TR & EM	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits customer limitations, solves a problem and matches customer behaviour. SL Safety, Payment of expenses, savings, accessibility.	8. CHANNELS OF BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. CH Extract online & offline CH of BE
4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure → confident, in control → use it to your communication strategy & design. Our customers are illiterates, trustees, joint account holders, executors and administrators, Power of attorney holders. EM Identify strong TR & EM	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits customer limitations, solves a problem and matches customer behaviour. SL Safety, Payment of expenses, savings, accessibility.	8. CHANNELS OF BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. CH Extract online & offline CH of BE

4.REQUIREMENT ANALYSIS

a.Functional requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Application Registration through Gmail to <i>prove their identity</i>
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User monthly expense tentative data	Data to be registered in the app
FR-4	User monthly income data	Data to be registered in the app
FR-5	Alert/ Notification	Alert through E-mail Alert through SMS
FR-6	User Budget Plan	Planning and Tracking of user expense vs budget limit

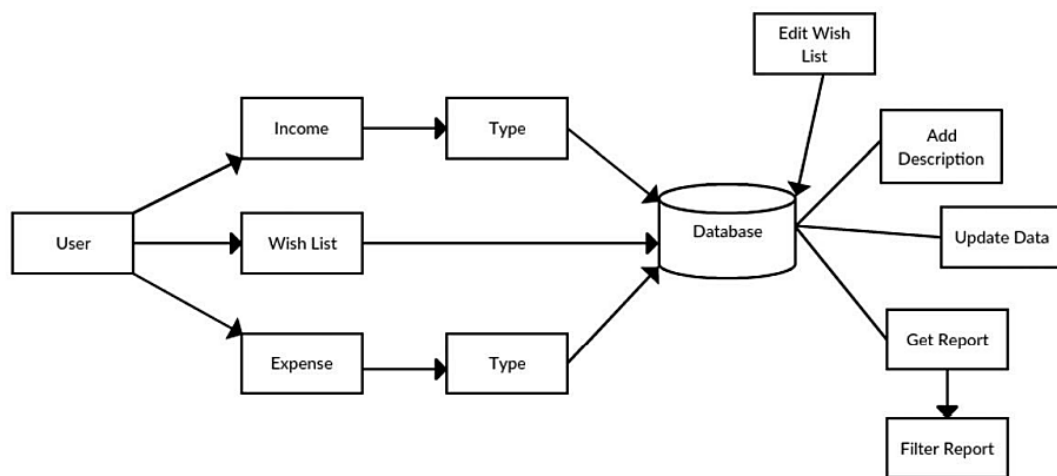
b. Non - Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Effectiveness, efficiency and overall satisfaction of the user while interacting with our application.
NFR-2	Security	Authentication, authorization, encryption of the application.
NFR-3	Reliability	Probability of failure-free operations in a specified environment for a specified time.
NFR-4	Performance	How the application is functioning and how responsive the application is to the end-users.
NFR-5	Availability	Without near 100% availability, application reliability and the user satisfaction will affect the solution.
NFR-6	Scalability	Capacity of the application to handle growth, especially in handling more users.

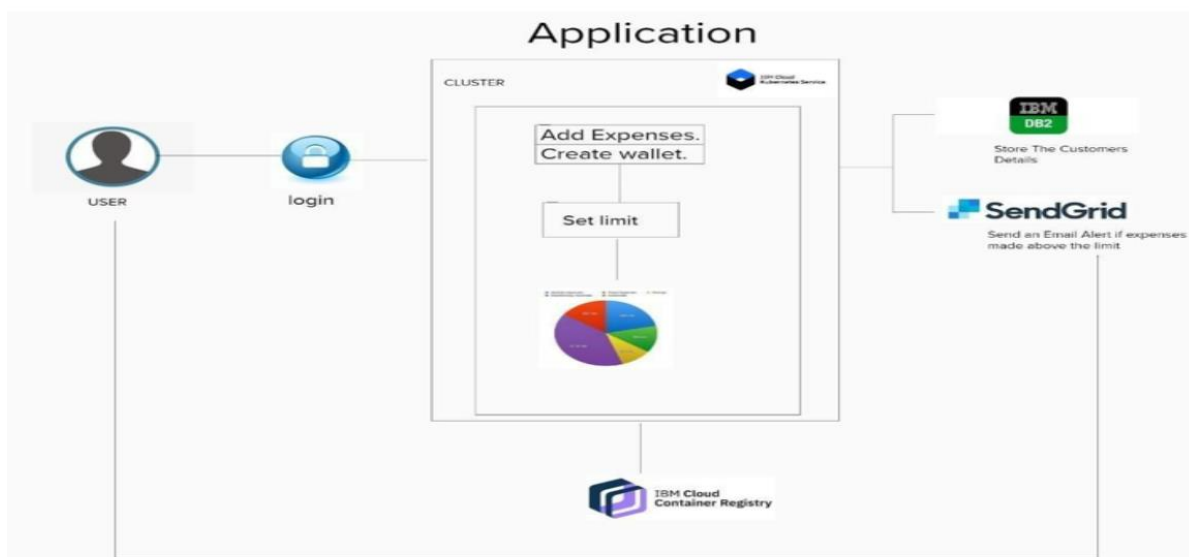
5. PROJECT DESIGN

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.



B.Solution & Technical Architecture



6.PROJECT PLANNING & SCHEDULING

a. Sprint planning and estimation

Sprint	Function al Requirem ent (Epic)	User Story Numb er	User Story / Task	Acceptance criteria	Prio rity	Team Members
Sprint-1	Registrati on	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	Hi gh	CHANDRU N GOKUL S
Sprint-1		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	ARUNPRAS ATH R
Sprint-1		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboa rd with Facebook Login	Low	ARUNKUM AR M

Sprint-1		USN-4	As a user, I can register for the application through Gmail	I can receive confirmation email & click confirm	Medi um	ARUNKUM AR M
Sprint-2	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account / dashboard	Hi gh	CHANDRU N
Sprint-2	Dashboard	USN-6	Create a model set that contains those models, then assign	Assign that group to the appropriate	Hi gh	GOKUL S

			it to a role.	roles on the Roles page		
Sprint-3	Identity-Aware _	USN-7	Open, public access, User- authenticated access, Employee- restricted access.	Company public website. App running on the company intranet. App with access to customer private information.	High	ARUNPRA SATH R
Sprint-4	Communication	USN-8	A customer care executive is a professional responsible for communicating the how's and why's regarding service expectations within a company.	For how to tackle customer queries.	Medium	ARUNKUM AR M
Sprint-4	Device management	USN-9	You can Delete/Disable/Enable devices in Azure Active Directory but you cannot Add/Remove Users in the directory.	Ease of use.	Medium	GOKUL S

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	30 Oct 2022	04 Nov 2022	20	4 Nov 2022
Sprint-3	20	6 Days	05 Nov 2022	10 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	11 Nov 2022	16 Nov 2022	20	16 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

2.		Project Objectives	22 Aug 2022
		Registrations	26 Aug 2022
		Environment Set-up	27 Aug 2022
	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
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		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	1. Oct 2022 - 2. Oct 2022
5.	Project Planning Phase	Milestones & Tasks	1. Oct 2022 – 2. 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 screenshot displays the Jira Software interface for a project named 'Personal Expense Tracker Application'. The main view is the 'Backlog' section, which shows two sprints:

- PETA Sprint 1** (18 Nov - 2 Dec, 4 issues):
 - PETA-4: As a user, I can register for the application through Gmail. Status: DONE. Assignee: [Avatar].
 - PETA-3: As a user, I can register for the application through Facebook. Status: DONE. Assignee: [Avatar].
 - PETA-2: As a user, I will receive confirmation email once I have registered for the application. Status: DONE. Assignee: [Avatar].
 - PETA-1: As a user, I can register for the application by entering my email, password. Status: DONE. Assignee: [Avatar].
- PETA Sprint 2** (18 Nov - 16 Dec, 2 issues):
 - PETA-5: As a user, I can log into the application by entering email & password. Status: DONE. Assignee: [Avatar].
 - PETA-6: Create a model set that contains those models, then assign it to a role. Status: DONE. Assignee: [Avatar].

The left sidebar contains navigation options: PLANNING (Roadmap, Backlog, Board), DEVELOPMENT (Code), Project pages, Add shortcut, and Project settings. At the bottom, it states 'You're in a team-managed project' with a 'Learn more' link.

ii.Board

The screenshot shows the Jira Software interface for a project named 'Personal Expense Tracker Application'. The main view is the 'Backlog', which lists issues assigned to team members. The interface includes a top navigation bar with the Jira logo, project name, and various filters. A left sidebar contains navigation options like 'Roadmap', 'Backlog', 'Board', and 'Code'. The main content area displays two sprints: 'PETA Sprint 3' (18 Nov - 30 Dec) and 'PETA Sprint 4' (18 Nov - 13 Jan). Each sprint contains a list of issues with their status (e.g., 'DONE') and assigned team members. A 'Backlog' section at the bottom shows 0 issues and a 'Start' button.

Browser address bar: pnt2022tmd33307.atlassian.net/jira/software/projects/PETA/boards/1/backlog

Jira Software navigation: Your work ▾ Projects ▾ Filters ▾ Dashboards ▾ People ▾ Apps ▾ Create

Search: Q Search

Left sidebar: Personal Expense Trac... Software project

Left sidebar: PLANNING

Left sidebar: Roadmap

Left sidebar: Backlog

Left sidebar: Board

Left sidebar: DEVELOPMENT

Left sidebar: Code

Left sidebar: Project pages

Left sidebar: Add shortcut

Left sidebar: Project settings

Left sidebar: You're in a team-managed project

Left sidebar: Learn more

Projects / Personal Expense Tracker Application

Backlog

Q [Team icons] Epic ▾ Insights

▼ PETA Sprint 3 18 Nov - 30 Dec (1 issue) 0 0 0 Complete sprint ...

PETA-10 Open, public access, User- authenticated access, Employee- restricted access. DONE [Avatar]

+ Create issue

▼ PETA Sprint 4 18 Nov - 13 Jan (2 issues) 0 0 0 Complete sprint ...

PETA-13 You can Delete/Disable/Enable devices in Azure Active Directory but you cannot. Add/Remove Users in the directory. DONE [Avatar]

PETA-14 A customer care executive is a professional responsible for communicating the how's and why's regarding service expectations within a company. DONE [Avatar]

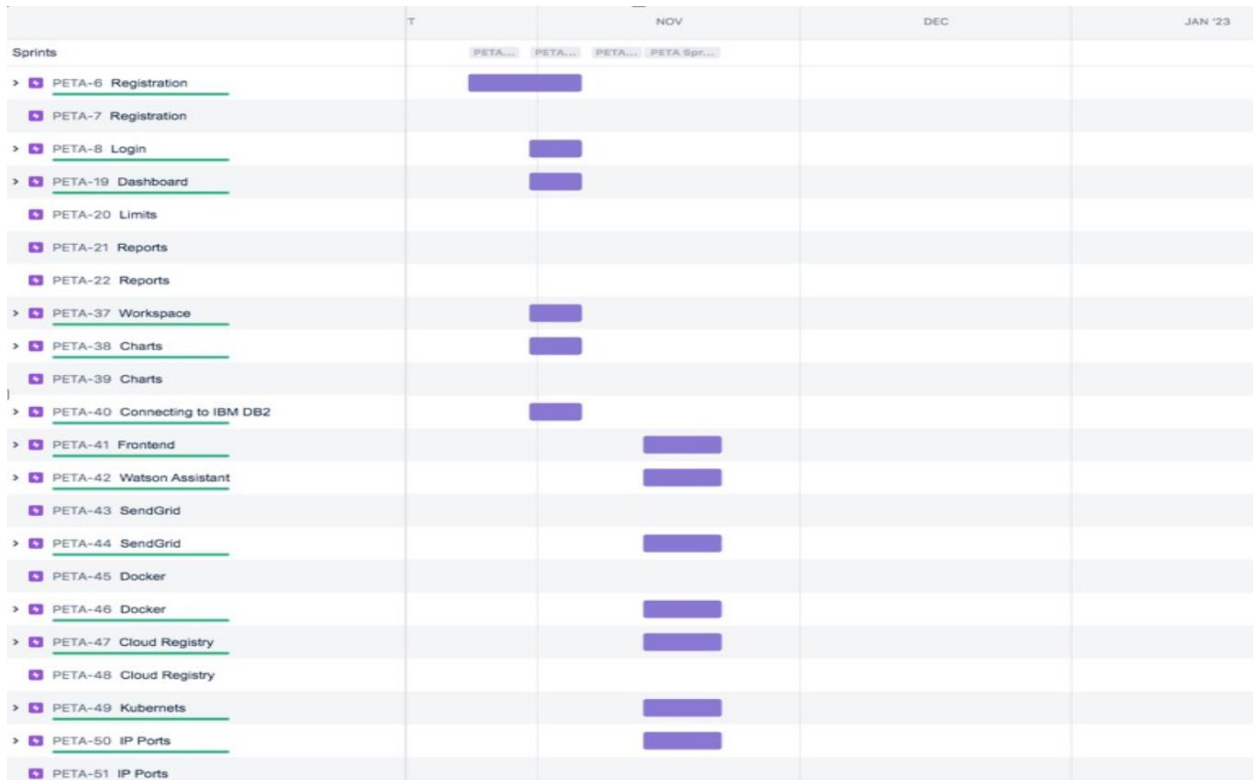
+ Create issue

▼ Backlog (0 issues) 0 0 0 Create sprint

Start

Your backlog is empty.

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 sendmail 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 = "sbb93800"
dsn_pwd = "wobsVLm6ccFxcNLe"
dsn_driver = "{IBM DB2 ODBC DRIVER}"
dsn_database = "bludb"
dsn_port = "31498"
dsn_protocol = "tcip"

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'] = 'tcip'
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 p;\
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'^@]+@^[^@]+\.[^@]+', 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)PNT2022TMID09631
    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 chandru","nchandru360@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'])PNT2022TMID09631
    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"PNT2022TMID09631
    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])PNT2022TMID09631
@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():PNT2022TMID09631
    # 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 = []PNT2022TMID09631
    while dictionary1 != False:
        temp = []
        temp.append(dictionary1["TN"])
        temp.append(dictionary1["AMOUNT"])
        texpanse.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=0PNT2022TMID09631
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)PNT2022TMID09631
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"])
    texpanse.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=0PNT2022TMID09631
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 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')PNT2022TMID09631
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:

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	BUG ID
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	-	
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_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	-	
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	-	
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	-	
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	-	
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	-	
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

- Tracking income and expenses: Monitoring the income and tracking all expenditures (through bank accounts, mobile wallets, and credit & debit cards).
- 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 sendsremindersfor 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: Integrateyour expense trackingapp 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 yourbusiness.
- 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 aspush 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-39452-1660449612>

Project Demo Link:

https://drive.google.com/file/d/1heJ9eOYWImFPLNt779RSgPJusmDnencb/view?usp=share_link