

# **PERSONAL EXPENSE TRACKER APPLICATION**

## **HX8001& Professional Readiness for Innovation, Employability & Entrepreneurship**

**A PROJECT REPORT  
BY**

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# 1. INTRODUCTION

## 1.1 Project Overview

### Skills Required:

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

### Project Description:

In simple words, personal finance entails all the financial decisions and activities that a Finance app makes your life easier by helping you to manage your finances efficiently. A personal finance app will not only help you with budgeting and accounting but also give you helpful insights about money management.

Personal finance applications will ask users to add their expenses and based on their expenses wallet balance will be updated which will be visible to the user. Also, users can get an analysis of their expenditure in graphical forms. They have an option to set a limit for the amount to be used for that particular month if the limit is exceeded the user will be notified with an email alert.

## 1.2 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 realising, 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**

### **2.1 Existing problem**

#### **A) Expense Tracker (2019)**

This Expense Tracker is a web application that facilitates the users to keep track and manage their personal as well as business expenses. This application helps the users to keep a digital diary. It will keep track of a user's income and expenses on a daily basis. The user will be able to add his/her expenditures instantly and can review them anywhere and anytime with the help of the internet. He/she can easily import transactions from his/her mobile wallets without risking his/her information and efficiently protecting his/her privacy. He can see the accurate duration for how long a particular product is being used by him. The monthly, and year-wise comparison of expenditures will be done by the app which will let the user know the area where he is spending the most. The user will be able to see the detailed analyses with the help of graphical visualisations. This project will provide a lot of benefits to the users with the help of which they will be surely able to keep track of each penny. It is time to stop using paper and excel sheets to keep track of your digital as well as cash payments. Using paper is not easy to manage. It is common to delete files accidentally or misplace files. This expense tracker provides a complete digital solution to this problem. Excel sheets do very little to help in tracking expenses. Furthermore, they don't have the advanced functionality of preparing graphical visuals automatically. Not only will it save the time of the people but also it will assure error-free calculations. The user just has to enter the income and expenditures and everything else will be performed by the system.

#### **B) Intelligent Online Budget Tracker (2020)**

The development of this application has been conducted in a stepwise manner using the well-defined methodology, RUP, customised according to the requirements of the system. Most of the goals set at the start of the development phase have been met. Security problems like web security or network security have also been treated in the design and development of the system, thus increasing the reliability of the system. Quality management issues have also been handled satisfactorily.

#### **C) Expense Tracker Mobile Application (2018)**

Modern life offers a plethora of options of services and goods for consumers. As a result, people's expenses have gone up dramatically, e.g., compared to a decade ago, and the cost of living has been increasing day by day. Thus it becomes essential to keep a check on expenses in order to live a good life with a proper budget set up. The iPhone device, designed and marketed by Apple Inc., is one of the top-selling smartphones in the USA, and with the launch of the new iPhone5 on September 21, 2012, whose sales have already surpassed the previous iPhone handsets (iPhone 4S, iPhone4) sales, it is apparent that people have been using smartphones as an organisational tool. XpensTrak, the Expense Tracker Mobile Application was developed for iPhone users to keep track of their expenses and determine whether they are spending as per their set budget. Potential users need to input the required data such as the expense amount, merchant, category, and date when the expense was made. Optional data such as sub-category and extra notes about the expense can be entered as well. The application

allows users to track their expenses daily, weekly, monthly, and yearly in terms of summary, bar graphs, and pie-charts. This mobile application is a fully detailed expense tracker tool that will not only help users keep a check on their expenses, but also cut down the un-required expenses, and thus will help provide a responsible lifestyle. An analysis comparing existing expense tracking software with the one being introduced is provided.

#### **D) Expense Tracker : A Smart Approach to Track Everyday Expense (2020)**

Expense Tracker is a day-to-day expense management system designed to easily and efficiently track the daily expenses of unpaid and unpaid staff through a computerised system that eliminates the need for manual paper tasks that systematically maintains records and easily accesses data stored by the user. We have tried to design the window application in such a way that the user does not have to bother using this application without much effort. End users with window running devices can use this software. The language databases we use to develop this system are Java (Apache Net bins 11.3) and MySQL Workbench 8.0 CE. This application is a GUI (Graphics User Interface) based application. If you are a window user, you can download the application and work accordingly. This system is used by any person to control his income expenditure from daily to annual basics. And to keep an eye on their spending. This app is very easy to use and multi-language. The main feature of this app is that you can track by day and category. You can use it according to your category.

#### **E) Daily Expense Tracker: An Android Based Mobile Application (2019)**

This project is based on expense and income tracking system. This project aims to create an easy, faster and smooth tracking system between the expense and the income. This project also offers some opportunities that will help the user to sustain all financial activities like digital automated diary. So, for the better expense tracking system, we developed our project that will help the users a lot. Most of the people cannot track their expense and income one way they face in money crisis, in this case daily expense tracker can help the people to track income-expense day to day and making life tension free. Money is the most valuable portion of our daily life and without money we will not last one day in the earth. So uses the daily expense tracker application is important to load happy family. Daily expense tracker helps the user to avoid unexpected expenses and bad financial situations. This Project will save time and provide a responsible lifestyle. This system is made and supervised by the experts and satisfying by the user. XML, JAVA, SQLite database, Android Studio are used to develop the system. The system is tested by over 5 users, and 80% of them found the system useful.

## **2.2 Problem Statement**

Many organisations have their own system to record their income and expenses, which they feel is the main key point of their business progress. It is a good habit for a person to record daily expenses and earning but due to unawareness and lack of proper applications to suit their privacy, lacking decision making capacity people are using traditional note keeping methods to do so. Due to lack of a complete tracking system, there is a 2 constant overload to rely on the daily entry of the expenditure and total estimation till the end of the month

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

## Personal Expense Tracker Application:

I am	I'm trying to	But	Because	Which makes me feel
a Traveller.	track my expenses during every trip.	unable to sort out my expenses with my records.	there is no root for me to do so.	worried.

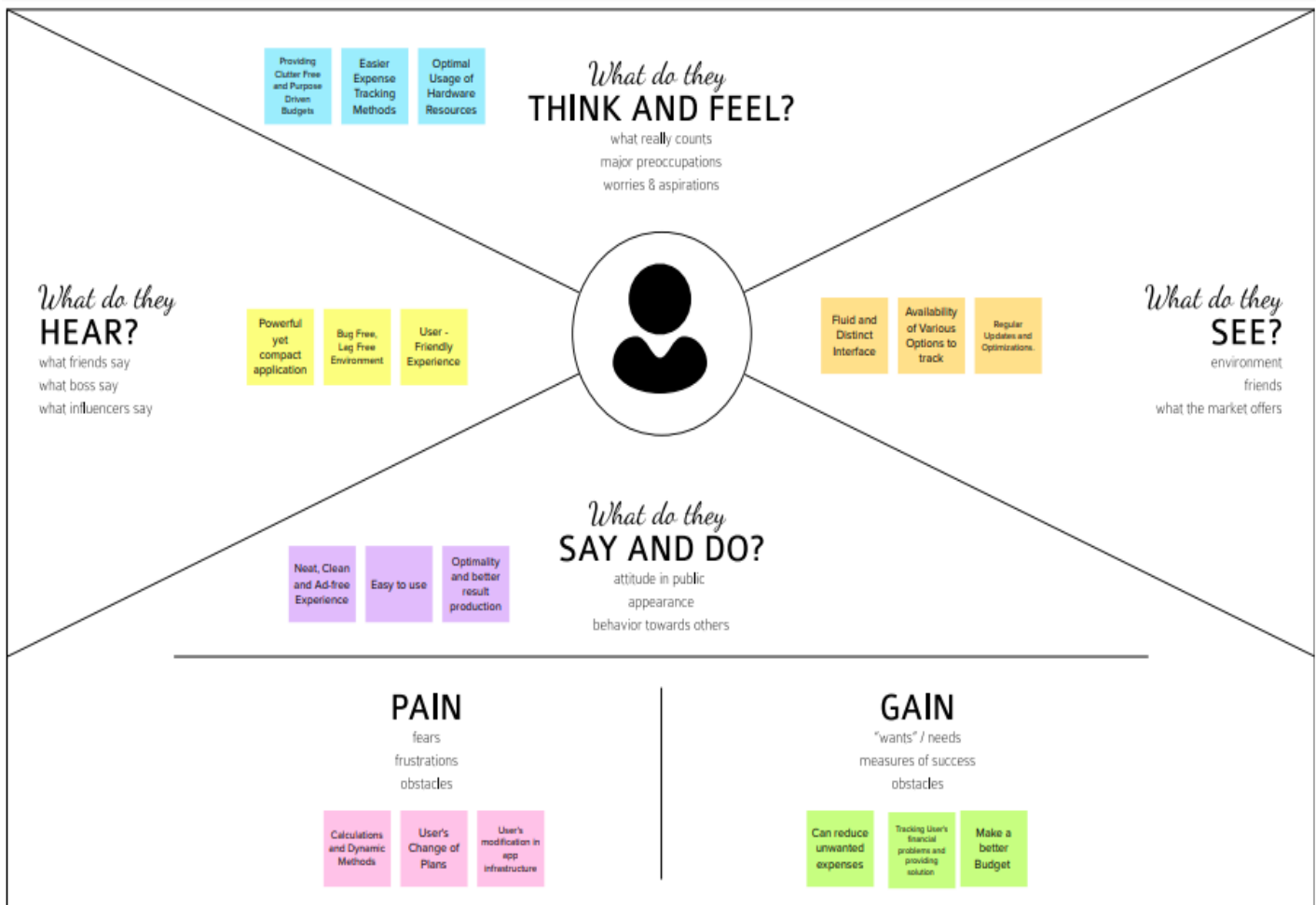
### 3. IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to help teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



## 3.2 Ideation & Brainstorming

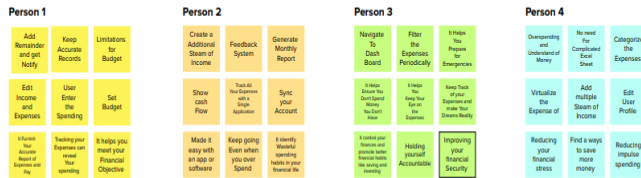
### Step-1: Team Gathering, Collaboration and Select the Problem Statement Step-2: Brainstorm, Idea Listing and Grouping

2

#### Brainstorm solo

Have each participant begin in the "solo brainstorm space" by silently brainstorming ideas and placing them into the template. This "silent-storming" avoids group-think and creates an inclusive environment for introverts and extroverts alike. Set a time limit. Encourage people to go for quantity.

🕒 10 minutes

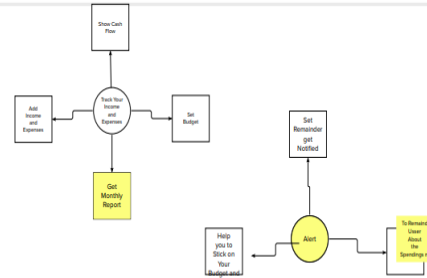


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#### Brainstorm as a group

Have everyone move their ideas into the "group sharing space" within the template and have the team silently read through them. As a team, sort and group them by thematic topics or similarities. Discuss and answer any questions that arise. Encourage "Yes, and..." and build on the ideas of other people along the way.

🕒 15 minutes





### 3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem of today people's is finding hard to keep track of the Monthly and Yearly expenses that do and to prevent unwanted spending.
2.	Idea / Solution description	Create a web application that will allow users to input their daily expenses and have useful visualizations and reports sent to user.
3.	Novelty / Uniqueness	The personal expense tracker application helps the user not only in budgeting and accounting; it also provides the insights about money management through the analysis. The user also gets notified if the monthly limit is exceeded
4.	Social Impact / Customer Satisfaction	The customer might be pleased to have his spending in check and have an app to remind him when he is over budget and if he misses daily entry.
5.	Business Model (Revenue Model)	The application can have free and premium version where the user can upgrade to premium version to access additional features. Also, the premium version may be advertisement free.
6.	Scalability of the Solution	This project is highly feasible and can later on be further updated with other additional features as <u>well</u> .

## 3.4 Problem Solution fit

Problem-Solution fit		Personal Expense Tracker Application-Team ID - PNT2022TMID25395		
Define CS, fit into CC	<div><b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span></div> <div>Who is your customer?</div> <div>The main customers for our project are:</div> <div><div>Businessman</div><div>Home makers</div><div>Professionals</div></div>	<div><b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span></div> <div>What constraints prevent your customers from taking action or limit their choices of solutions?</div> <div><div>Most of them don't have a reminder to warn them of their expenses and help to overcome the high expenses.</div><div>Managing money is tedious in their day-to-day activities.</div><div>Network connections</div></div>	<div><b>5. AVAILABLE SOLUTIONS</b> <span>AS</span></div> <div>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 pros &amp; cons do these solutions have?</div> <div><div>Pen &amp; Paper tracking.</div><div>Notion expense tracking.</div><div>Tracking using Google sheet.</div></div>	Explore AS, differentiate
Identify strong TR & EM	<div><b>3. TRIGGERS</b> <span>TR</span></div> <div>What triggers customers to act? i.e., seeing their neighbors installing solar panels, leading about a more efficient solution in the news.</div> <div><div>People interested in managing the money and who likes to keep a track on it.</div></div>	<div><b>10. YOUR SOLUTION</b> <span>SL</span></div> <div>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.</div> <div><div>Helps in periodical budgeting for different categories.</div><div>Alerts when expenses go beyond budget limit.</div><div>This help users to save money and avoid unnecessary activities.</div></div>	<div><b>8. CHANNELS OF BEHAVIOUR</b> <span>CH</span></div> <div><b>8.1 ONLINE</b> What kind of actions do customers take online? Extract online channels from 7</div> <div><div>Immediate accessibility irrespective of place and time.</div><div>Google advertisements.</div></div> <div><b>8.2 OFFLINE</b> What kind of actions do customers take offline? Extract offline channels from 7 and use them for customer development. #</div> <div><div>Access of previously downloaded information</div><div>Recommendation from the customers.</div></div>	Extract online & offline CH of BE
	<div><b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span></div> <div>How do customers feel when they face a problem or a job and afterwards?</div> <div><div>Before: Fear, Hopeless, Depressed</div><div>After: Confident, Aware</div></div>			

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional Requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Email/SignUp Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Add expenses	Enter the everyday expenses Split it into categories(example : food, petrol,movies)
FR-4	Reminder mail	Sending reminder mail on target (for ex : if user wants a reminder when his/her balance reaches some amount(5000)) Sending reminder mail to the user if he/she has not filled that day's expenses.
FR-5	Creating Graphs	Graphs showing everyday and weekly expenses. Categorical graphs on expenditure.
FR-6	Add salary	Users must enter the salary at the start of the month.
FR-7	Export CSV	User can export the raw data of their expenditure as CSV

Non-functional Requirements:

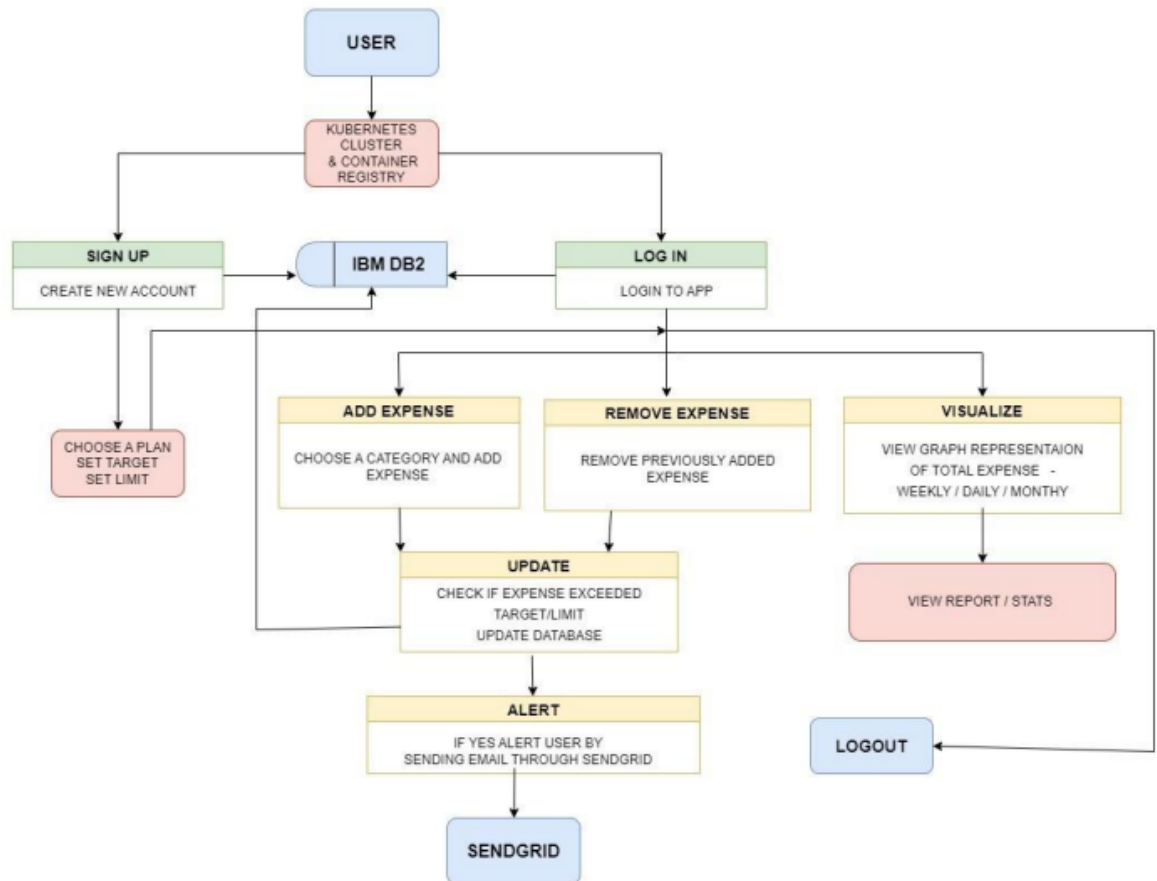
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	A simple web application which is accessible across devices
NFR-2	Security	The OAuth Google sign in and email login are secure with hashed and salted secure storage of credentials.
NFR-3	Reliability	Containerized service ensures that new instance can kick up when there is a failure
NFR-4	Performance	The load is managed through the load balancer used with docker. Thus ensuring good performance
NFR-5	Availability	With load balancing and multiple container instances, the service is always available.
NFR-6	Scalability	Docker and Kubernetes are designed to accommodate scaling based on need

# PROJECT DESIGN

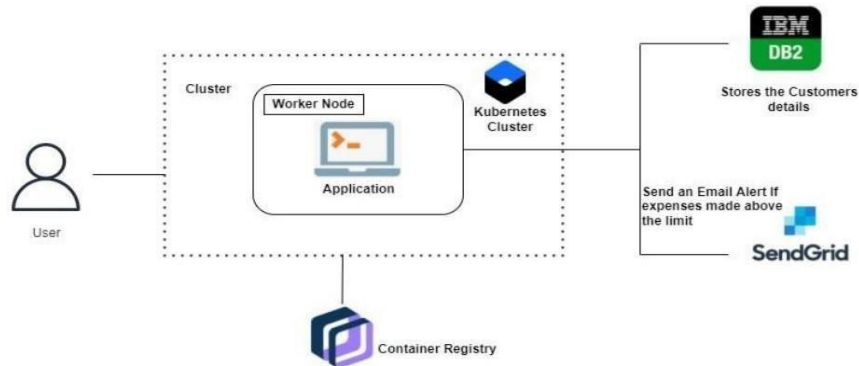
## 4.2 Data Flow Diagrams

**Data Flow Diagram of Personal Expense Tracker: DFD Level 2**

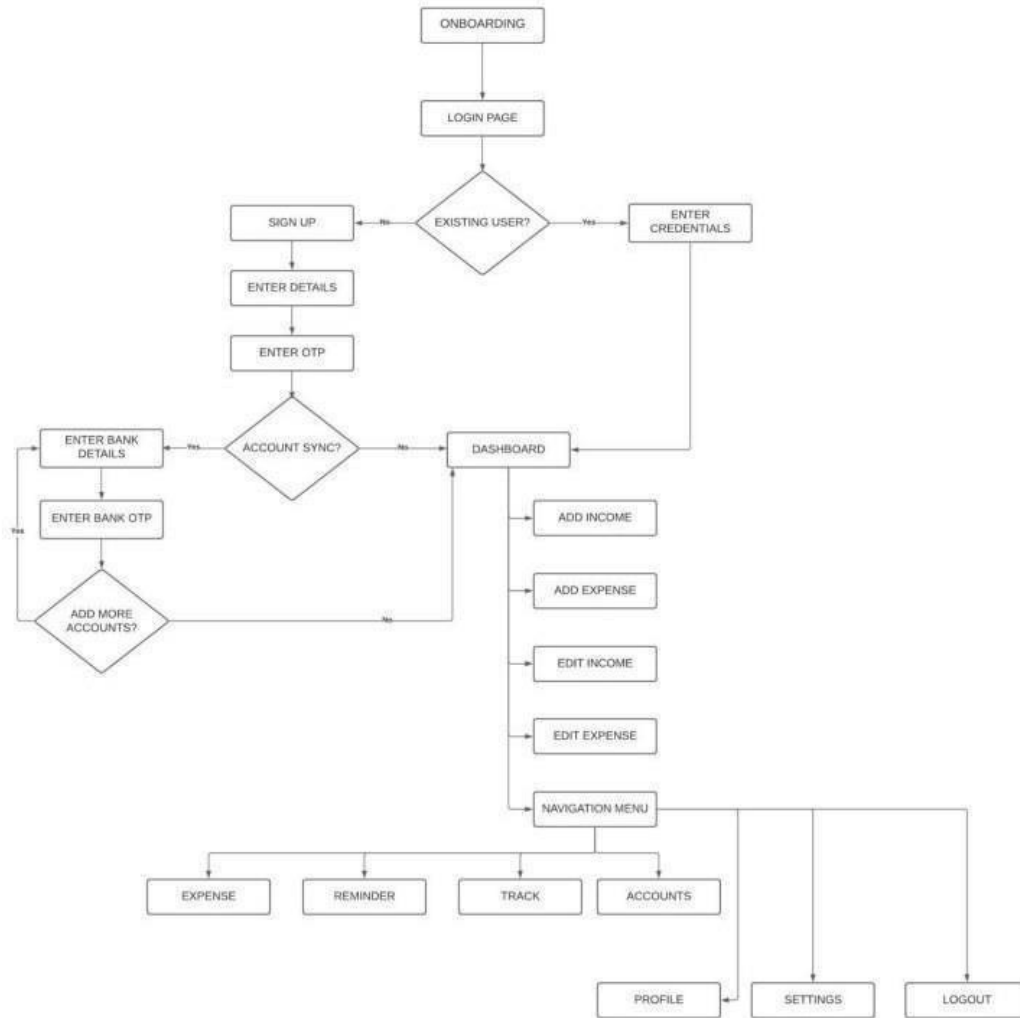


## 4.3 Solution & Technical Architecture

### Technical Architecture:



## Solution architecture:



## 4.4 User Stories

### User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email,password, and confirming my password.
	Login	USN-2	As a user, I can log into the application by entering email & password
	Add	USN -3	As a user , I can add in new expenses.
	Remove	USN – 4	As a user , I can remove previously added expenses.
	View	USN - 5	As a user , I can view my expenses in the form of graphs and get insights.
	Get alert message	USN - 6	As a user , I will get alert messages if I exceed my target amount.
Administrator	Add / remove user	USN – 7	As admin , I can add or remove user details on db2 manually.
		USN - 8	As admin , I can add or remove user details on sendgrid.

## 5. PROJECT PLANNING & SCHEDULING

### 5.1 Sprint Planning & Estimation

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

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	16	6 Days	24 Oct 2022	29 Oct 2022	16	29 Oct 2022
Sprint-2	12	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	14	6 Days	07 Nov 2022	12 Nov 2022	13	12 Nov 2022
Sprint-4	14	6 Days	14 Nov 2022	19 Nov 2022	13	19 Nov 2022

#### Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

## 5.2 Sprint Delivery Schedule

### Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	20 November 2022
Team ID	PNT2022TMID25395
Project Name	Personal Expense Tracker Application
Maximum Marks	8 Marks

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

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	1 November 2022	19 November 2022	20	20 November 2022
Sprint-2	20	6 Days	3 November 2022	19 November 2022	20	20 November 2022
Sprint-3	20	6 Days	7 November 2022	19 November 2022	20	20 November 2022
Sprint-4	20	6 Days	14 November 2022	19 November 2022	20	20 November 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \text{Sprint Duration} / \text{Velocity} = 20/6 = 3.33$$



## 5.3 Database Schema

Tables:

### 1) USER

id INT NOT NULL GENERATED ALWAYS AS IDENTITY, username VARCHAR (100) NOT NULL,  
email VARCHAR (100) NOT NULL, password VARCHAR (100) NOT NULL

### 2) EXPENSES

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,  
user\_id INT NOT NULL, date DATE NOT NULL,  
expense\_name VARCHAR (100) NOT NULL, amount DECIMAL(10) NOT NULL, pay\_mode  
VARCHAR (100) NOT NULL, category VARCHAR (100) NOT NULL

### 3) LIMITS

id INT NOT NULL GENERATED ALWAYS AS IDENTITY, user\_id VARCHAR (100) NOTNULL,  
limit DECIMAL(10) NOT NULL

## **6. RESULTS**

### **6.1 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 organise your payment receipts to keep track of your expenditure.
- Organising Taxes: Import your documents to the expense tracking app, and it will streamline your income and expenses under the appropriate tax categories.
- 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.
- Reports: The expense tracking app generates and sends reports to give a detailed insight about profits, losses, budgets, income, balance sheets, etc.,
- E-commerce integration: Integrate your expense tracking app with your eCommerce store and track your sales through payments received via multiple payment methods.
- Vendors and Contractors: Manage and track all the payments to the vendors and contractors added to the mobile app.
- Access control: Increase your team productivity by providing access control to particular users through custom permissions.

- Track Projects: Determine project profitability by tracking labour costs, payroll, expenses, etc., of your ongoing project.
- 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.
- 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.
- Recurrent Expenses: Rely on your budgeting app to track, streamline, and automate all the recurrent expenses and remind you on a timely basis.

## 7. **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 organisation.
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. Optimise sales processes to generate **more revenue** through enhanced data collection.

## **8. 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 solving them a lot as a team. We adopted things like video tutorials, text tutorials, internet and learning materials to make our project complete.

## 9. FUTURE

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

- The application is unable to maintain the backup of data once it is uninstalled.
- 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:

- Multiple language interfaces.
- Provide backup and recovery of data.
- Provide a better user interface for users.
- Mobile apps advantage.

## **10. APPENDIX**

**Source Code Github Link :**

<https://github.com/IBM-EPBL/IBM-Project-39137-1660397499>

**Demo Video Link :**

[https://drive.google.com/file/d/1A4\\_KVspEffGYOJjZZf7TmnJJkhFQHdGj/view?usp=sharing](https://drive.google.com/file/d/1A4_KVspEffGYOJjZZf7TmnJJkhFQHdGj/view?usp=sharing)