

**DR SIVANTHI ADITANAR COLLEGE OF  
ENGINEERING  
PERSONAL EXPENSE TRACKER APPLICATION**

**A PROJECT REPORT**

Submitted by

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OF  
**BACHELOR OF ENGINEERING**  
IN  
**COMPUTER SCIENCE ANDENGINEERING**

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## **1.INTRODUCTION:**

### **1.1 Project Overview:**

This report entails the Personal Expense Tracker Application built with HTML, Flask and Docker. This project was developed by Balaji.K, Manoj Kumar.T, Iyappan.K, Mubarak.J, students of Anjalai Ammal Mahalingam engineering college under the guidance of kalaiselvi, guide and Khusboo, our industrial mentor from IBM for the Naalaiyathiran scheme of 2022.

### **1.2 Purpose:**

A personal finance app makes 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

## **2. LITERATURE SURVEY:**

### **2.1 Existing Problem**

The current problem is that users are not motivated to monitor their expenses and not willing to alter their spending trends. Our system introduces a goal and reward system to beat the problem. Secondly, the feature of sending reminders for recurring bills is a key feature in this app. Most often, users do not have the right guidance with spending and it is hard for them to analyze their mistakes. To make this process simpler, our app displays the spending trends as a graph to help users analyse and find the real reason behind his inability to meet their goals.

## **2.2 References:**

### **MINT-INDIVIDUAL/PERSONAL EXPENSES:**

- a) Mint is a free budgeting app that allows you to connect all of your financial accounts in one digital space
- b) After connecting your financial accounts, Mint tracks your transactions and categorises them into budget categories to simplify tracking. Users can keep the default categories provided by Mint or create custom categories to fit their needs
- c) Track all of your monthly bills through Mint and receive reminders so you can easily pay your bills on time
- d) Mint is meant for individual users and there's no option for joint Mint accounts. Users with joint financial accounts can each create their own Mint account and sync the same accounts to view the same information
- e) Mint is free for everyone to use.

### **GOOD BUDGET -INDIVIDUAL/PERSONAL EXPENSES:**

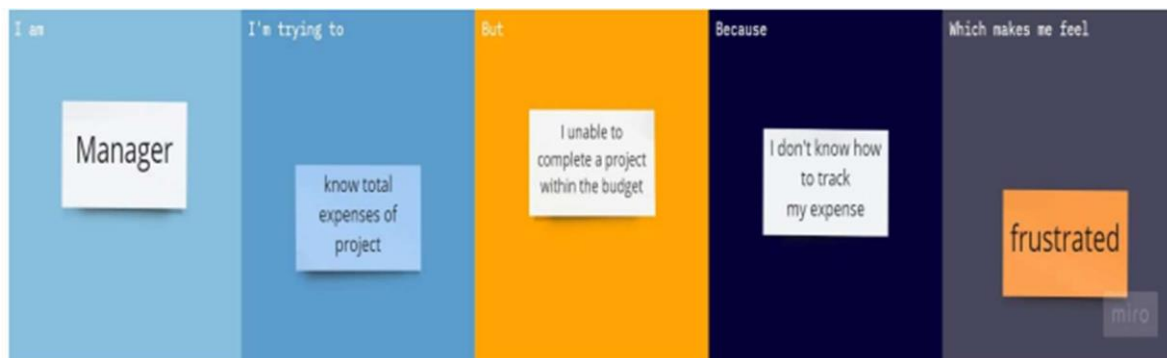
- a) "Envelope method" - Users allocate a certain amount of their income into categories of expenses(groceries,clothing).
  - 1. Users can visualise their spending better and define new goals
- b) Not linked to bank accounts/credit cards->manual entry of expenses make users aware of spending
- c) 256-bit bank grade encryption in a secure data centre
- d) Custom/predefined categories of expenses
- e) One year of transaction history

### **QUICKBOOKS - BUSINESS EXPENSES:**

- a. Tracks business expenses on the fly, as well as income
- b. Syncs to bank accounts, credit cards and third-party apps like PayPal and Square
- c. Offers real-time dashboards to keep user updated on all financial transactions related to their business
- d. Different plans according to size of business and requirements(analytics, fast transactions)
- e. Full-service payroll is a feature of some plans

## 2.3 Problem statement definition:

Users spend money on various transactions that may be a part of their daily routine or could be a one-time transaction. Every user has different priorities and thus different expenses. Our team aims to develop a customizable Personal Expense Tracker that allows users to tailor-make the application to suit their needs. We aim to do so through the provision of user-defined expense categories, rewards, goals, and limits to name a few. The application will also provide users with the feature to view a graphical analysis of their expenditure to understand their spending patterns and reach conclusions accordingly.



| Problem Statement (PS) | I am (Customer) | I'm trying to              | But   | Because  | Which makes me feel |
|------------------------|-----------------|----------------------------|---|--|---------------------|
| PS-1                   | An employee.    | Make a monthly budget.     | There is no facilities to set a budget.         | I need to save money for my future plans.            | Frustrated.         |
| PS-2                   | A manager.      | Keep track of my expenses. | can't categorize the various types of expenses. | There is no option to organize the various expenses. | Uncomfortable.      |

### 3. IDEATION AND PROPOSED SOLUTION:

#### 3.1 Empathy Map Canvas:

An empathy map is a simple,easy to digest visual that captures knowledge about a users behaviours and attitude.It is a useful tool to helps 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 users perspective along with his or her goals and challenges.




#### 3.2 Ideation and brainstorming :

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving.Prioritizing volume over value,out of the box ideas are welcome and built upon,and all participants are encouraged to collaborate,helping each other develop a rich amount of creative solutions.

## Step-1: Team Gathering, Collaboration and Select the Problem Statement

Template



### 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

A

**Team gathering**

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

**Set the goal**

Think about the problem you'll be focusing on solving in the brainstorming session.

C

**Learn how to use the facilitation tools**

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1

**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

📝

How might we (your problem statement)?

🔑

**Key rules of brainstorming**

To run an smooth and productive session

- 🕒 Stay in topic.
- 💡 Encourage wild ideas.
- 🕒 Defer judgment.
- 👂 Listen to others.
- 🗣️ Go for volume.
- 👁️ If possible, be visual.

[👉 Share template feedback](#)

## Step-2: Brainstorm, Idea Listing and Grouping

### 2 Brainstorm

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

⌚ 10 minutes

**TIP**

You can select a sticky note and tell the participants to stick 10 more to that cluster!

### 3 Group ideas

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

⌚ 20 minutes

#### MANOJ KUMAR

Make use of budgeting apps


Spend money under plan or budget

Avoid spending money on things that are not essential or cheap

Track money spent and saved etc.

Track our money and plan expenses based on our income



Make a budget (monthly)



Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

#### MUBARAK

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

#### SALAJI

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

#### IYAPPAN

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

Track money on mobile apps etc.

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Track money on mobile apps etc.



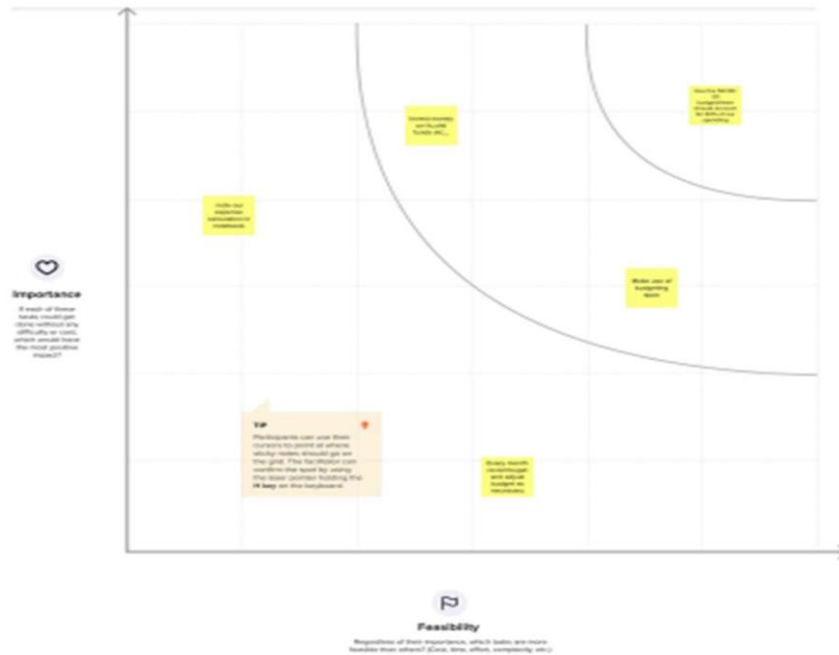
## Step-3:Ideaprioritization



### 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.

⌚ 30 minutes





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

| S.No. | Parameter                                | Description   |
|-------|--|---|
| 1.    | Problem Statement (Problem to be solved) | All the financial decisions and activities that you make are unable to keep a track of it. This app makes your life easier and helps you to track where your money is going, so that we know where you are starting from. A personal finance app will not only help you with tracking, budgeting and accounting. it give full insights about your financial management. |
| 2.    | Idea / Solution description              | All the financial activities and decisions that a financial 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.   |
| 3.    | Novelty / Uniqueness                     | This will show our complete expenses in the Pie chart basis. so we can easily see our expenses.   |
| 4.    | Social Impact/Customer Satisfaction      | It will help you to track the expenses and it alerts when you reaches your budget limit.  |
| 5.    | Business Model (Revenue Model)           | we can provide subscription based application, So we can earn the revenue via this kind of the subscription.  |
| 6.    | Scalability of the Solution              | IBM Cloud automatically allocate the storage for the users.   |

### 3.4 PROBLEM SOLUTION FIT

| Problem-Solution fit canvas 2.0 |   | Project Design phase-I - Solution Fit Template  |  | Team ID: PNT2022TMD32893          |  |
|---------------------------------|---|---|--|-----------------------------------|--|
| Define CS, fit into CC          | <b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span><br>Who is your customer?<br>i.e. working parents of 0-5 y.o. kids<br><br>Students, Common people, Travellers, Business persons, Financier.  | <b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span><br>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.<br><br>1. Users can use this application via their smart phones.<br><br>2. Users no need to spend the too much amount of money, they will spent the money within their income and budget.  | <b>5. AVAILABLE SOLUTIONS</b> <span>AS</span><br>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 & cons do these solutions have? i.e. pen and paper is an alternative to digital notebaking<br><br>This application is used to save lot of money, when we make the correct monthly budget limits.<br><br>This application helps to track the expenses very easily and organize and categorize the various types of expenses.  | Explore AS, differentiate         |  |
|                                 | <b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span><br>Which jobs to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.<br><br>People may face lot of problems while they track their expenses<br><br>1. if we use this application there is no need for record the expenses manually like records daily expenses in notes etc.<br><br>2. it is difficult to make the budget manually, this application helps to make good budgets and avoid unnecessary expenses. | <b>9. PROBLEM ROOT CAUSE</b> <span>RC</span><br>What is the real reason that this problem exists?<br>What is the back story behind the need to do this job?<br>i.e. customers have to do it because of the change in regulations.<br><br>Track the daily expenses is the challenging one for the peoples.<br><br>They can make the budget limits to avoid the over expenses.  | <b>7. BEHAVIOUR</b> <span>BE</span><br>What does your customer do to address the problem and get the job done?<br>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)<br><br>Track our expenses and make the monthly budget. Avoid unnecessary expenses make saving goals for future purposes.  | Focus on J&P, tap into C          |  |
| Identify strong TR & EM         | <b>3. TRIGGERS</b> <span>TR</span><br>What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.<br><br>Unnecessary expenses should be avoid. Make the correct budget and save money is the problem among lot of peoples. If we use this application it makes the process very easy.   | <b>10. YOUR SOLUTION</b> <span>SL</span><br>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.<br>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 within customer limitations, solves a problem and matches customer behaviour.<br><br>Users can able to set their income amount in this application. they can set the budget limit to avoid the unwanted expenses. It alerts the people when they cross their limits. It can be alerts the people via sms or email. | <b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span><br><b>8.1 ONLINE</b><br>What kind of actions do customers take online? Extract online channels from #7<br><br>This application get the total income amount from the users, users can set the budget limits. if the user reach their budget limit it alerts. This app provide the graph for identify the unwanted expenses.<br><br><b>8.2 OFFLINE</b><br>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.<br><br>Record our expenses by pen in notebook and make budget limits manually. this can be useful to track the expenses. | Extract online & offline CH of BE |  |
|                                 | <b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span><br>How do customers feel when they face a problem or a job and afterwards?<br>i.e. lost, insecure → confident, in control - use it in your communication strategy & design.<br><br>Before:<br>Depression, Tension, Stress, Confusion.<br>After:<br>Confident on spending money, clear.   |   |  |                                   |  |


 Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license  
 Created by Daria Napierkhu / Amaltama.com



## 4. REQUIREMENT ANALYSIS:

### 4.1 Functional Requirement:

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task)   |
|--------|-------------------------------|--|
| FR-1   | User Registration             | Registration through Form<br>Registration through Gmail<br>Registration through LinkedIn                       |
| FR-2   | User Confirmation             | Confirmation via Email<br>Confirmation via OTP   |
| FR-3   | Login                         | Enter the valid username and password  |
| FR-4   | Calendar                      | Personal expense tracker application shall allow user to store the daily expenses.                             |
| FR-5   | Expense Tracker               | This application should represent the expenses details in the graphical method like piechart, bar chart etc.,, |
| FR-6   | Report generation             | Report generation through Message using gmail.   |
| FR-7   | Category                      | This application shall allow users to add categories of their expenses.  |

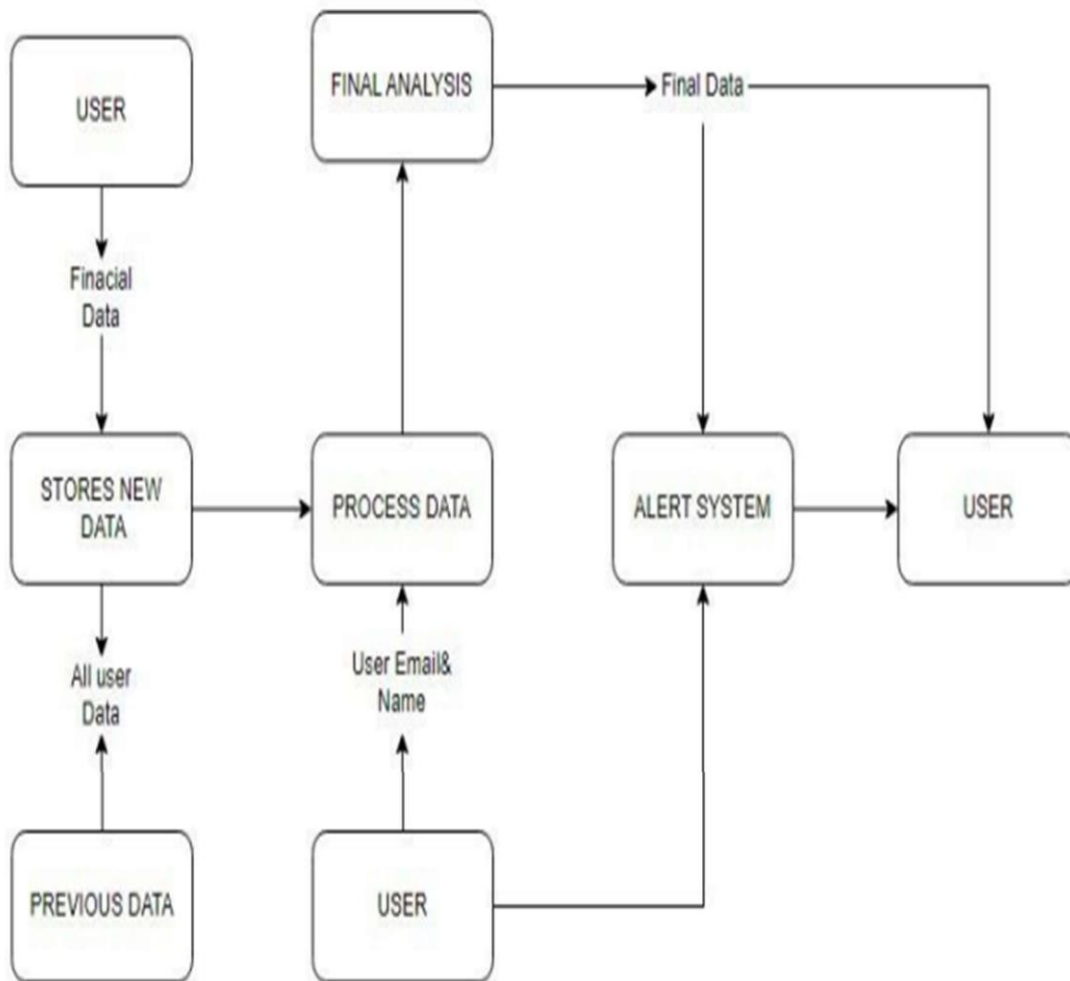
### 4.2 Non Functional Requirement:

| FR No. | Non-Functional Requirement | Description  |
|--------|----------------------------|--|
| NFR-1  | <b>Usability</b>           | Helps to keep an accurate record of your money inflow and outflow.   |
| NFR-2  | <b>Security</b>            | Expense tracking apps are considered very safe from cyber criminal activities.   |
| NFR-3  | <b>Reliability</b>         | Each data record is stored on a well built efficient database schema. There is no risk of data loss.                             |
| NFR-4  | <b>Performance</b>         | The types of expense are categories along with an option. Performance is very good because of the light weight database support. |
| NFR-5  | <b>Availability</b>        | It is available all the time.No time limit for the application.  |
| NFR-6  | <b>Scalability</b>         | The ability to appropriately handle increasing demands.  |

## 5. PROJECT DESIGN:

### 5.1 Data flow diagram

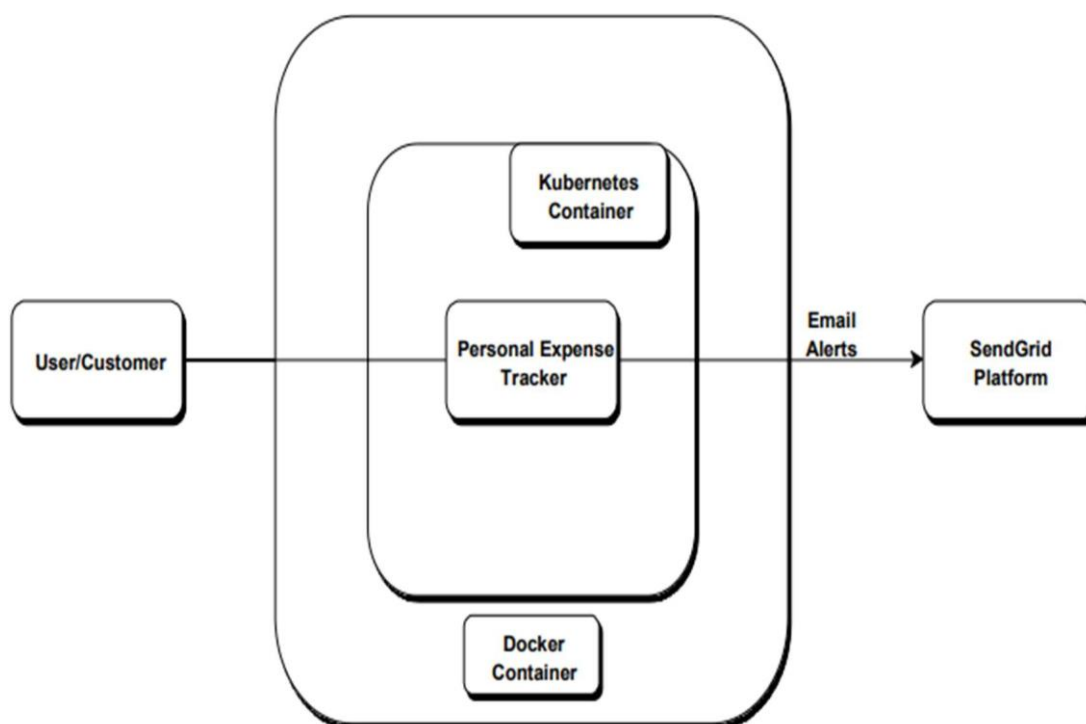
A Data flow diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



## 5.2 Solution and Technical Architecture

### SOLUTION DESCRIPTION:

The solution to this problem is the people who gets regular payments can able to track their payments and they can easily track how much amount of money they can spent on daily basis. It alerts when they reach their limit.if they spending too much amount of money, it alerts. This application gives proper information about our expenses ,income and how much money they spent. By using this application we can avoid the unnecessary expenses.If we use this application human error can be eradicated.It reduces the man power for accounting and financing the money.



### 5.3 User Stories :

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

| User Type                             | Functional Requirement (Epic) | User Story Number | User Story / Task   | Acceptance criteria   | Priority | Release  |
|---------------------------------------|-------------------------------|-------------------|---|---|----------|----------|
| Customer<br>(Mobile user & web user ) | Registration                  | USN-1             | As a user, I can register for the application by entering my email, and password, and confirming my password. | I can access my account/dashboard                                   | High     | Sprint-1 |
|                                       |                               | USN-2             | As a user, I will receive a confirmation email once I have registered for the application                     | I can receive a confirmation email & click confirm                  | High     | Sprint-1 |
|                                       |                               | USN-3             | As a user, I can register for the application through Facebook3   | I can register & access the dashboard with Facebook Login           | Low      | Sprint-2 |
|                                       |                               | USN-4             | As a user, I can register for the application through a Google account.                                       | I can register & access the dashboard with a Google Account login.  | Medium   | Sprint-1 |
|                                       | Login                         | USN-5             | As a user, I can log into the application by entering my email & password                                     | I can access the application.                                       | High     | Sprint-1 |
|                                       | Dashboard                     | USN-6             | As a user, I can see the daily expenses and expenditure details.  | I can view the daily expenses and add the expense details.          | High     | Sprint-1 |
| Customer Care Executive               |                               | USN-7             | As a customer care executive ,it is easy to solve the problem that faced by the customers.                    | I can provide support to customers at any time 24*7.                | Medium   | Sprint-1 |
| Administrator                         | Application                   | USN-8             | As an administrator, I can update the application and provide necessary upgrades.                             | I can fix any bugs raised by customers and upgrade the application. | Medium   | Sprint-1 |



## 6. PROJECT PLANNING AND SCHEDULING:

### 6.1 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     | Balaji K      |
| Sprint-1 |                               | USN-2             | As a user, I will receive confirmation email once I have registered for the application                   | 1            | High     | Mubarak J     |
| Sprint-2 |                               | USN-3             | As a user, I can register for the application through Facebook  | 2            | Low      | Iyappan K     |
| Sprint-1 |                               | USN-4             | As a user, I can register for the application through Gmail   | 2            | Medium   | Manoj Kumar T |
| Sprint-1 | Login                         | USN-5             | As a user, I can log into the application by entering email & password                                    | 1            | High     | Balaji K      |
| Sprint-3 | Dashboard                     | USN-6             | As a user I can see the expenditure details on the application  | 3            | High     | Mubarak J     |
| Sprint-3 | Limits                        | USN-6             | As a user I can set my monthly expense limit so that I receive a mail on exceeding that                   | 4            | High     | Iyappan K     |
| Sprint-4 | Reports                       | USN-6             | As a user I can view the graphical form of my expenses category wise                                      | 5            | Medium   | Manoj Kumar T |

### 6.2 Sprint Delivery and Schedule

| 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 |

### 6.3 Reports from JIRA

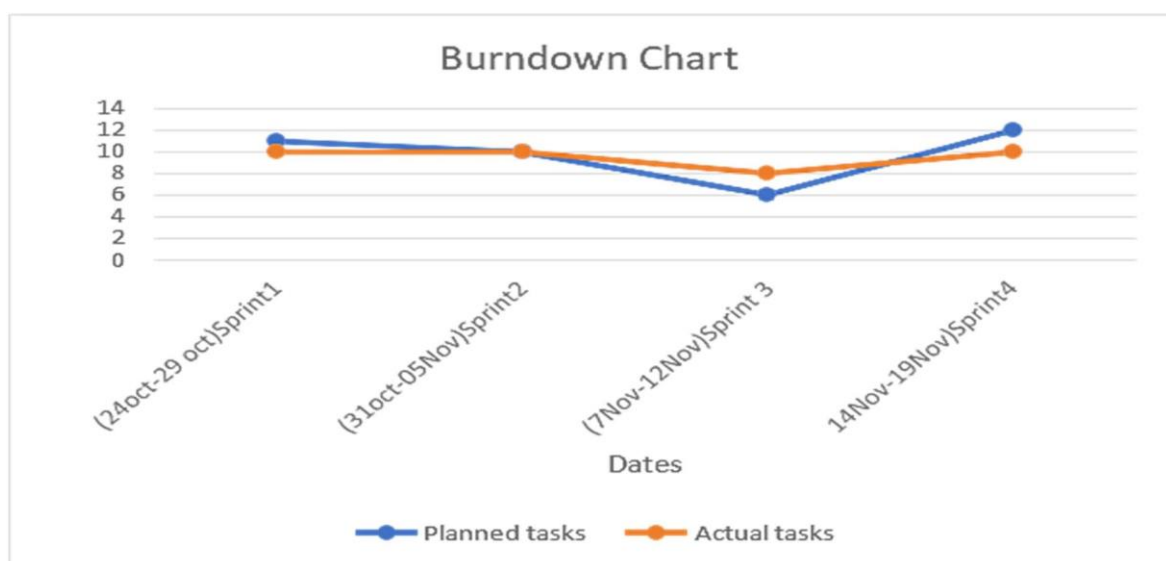
#### Velocity:

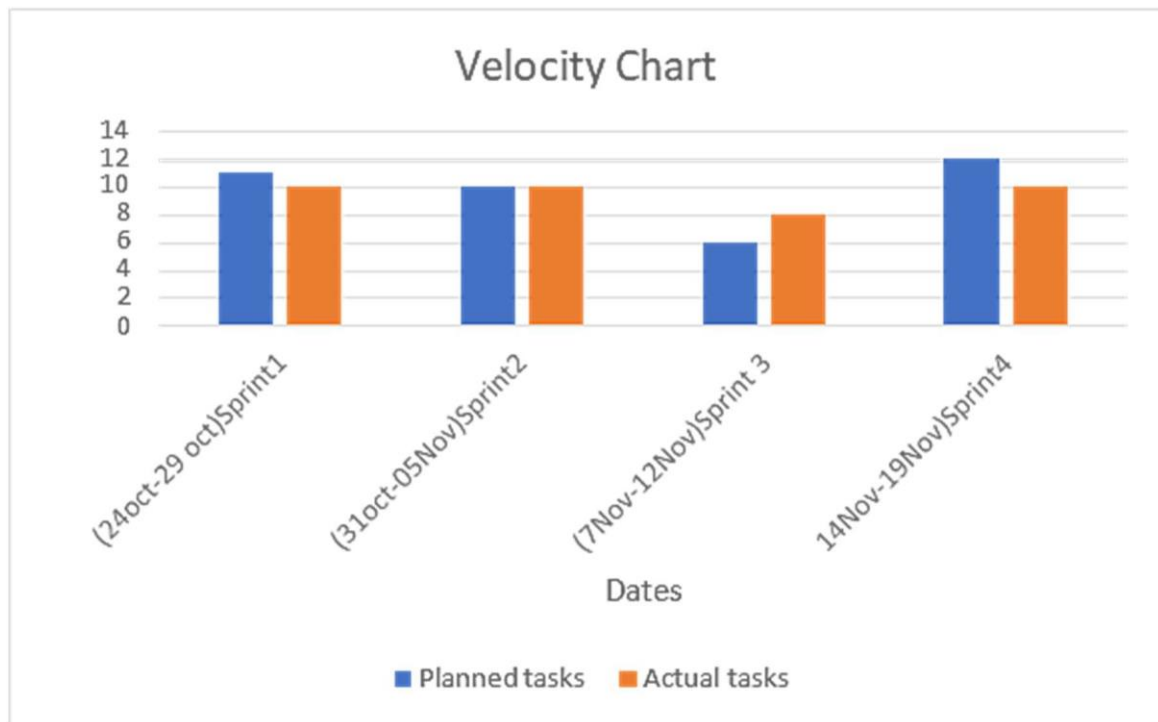
Imagine we have a 10-day sprint duration , and the velocity of the team is 20 (point per sprint). Lets calculate the teams average velocity(AV) per iteration unit(story points per day).

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

#### Burndown Chart:

A burndown chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burndown chart can be applied to any project containing measurable progress over time.





## 7. CODING AND SOLUTIONING:

### 7.1 Feature - Add Expense

This feature allows the user to add an expense, it takes in the amount spent, the date of the expense, the category under which the expense falls and the group to which the expense belongs. It also takes an optional description for the expense.

### 7.2 Feature - Update Wallet

This feature allows the user to update the wallet amount. This is useful, for example to reflect the receiving of salary.

### 7.3 Feature - Dashboard

This allows the user to view the most recent expenses made. It displays each expense along with its details. It is also the home page which the user sees on logging in.

### 7.4 Feature - Rewards and Goals

This allows the user to specify certain goals regarding expenses, for example, to spend less than a certain amount over a certain period of time. The user can also specify a reward on completion of the goal.

## 7.5 Feature - Set Monthly Limit

This allows the user to set a limit on how much is spent in a given month. This can be changed. If the user's expenses exceeds the monthly limit, then a warning email is sent to the user.

## 7.6 Feature - Add Category

This feature allows the user to add his/her own categories. This allows for high customizability.

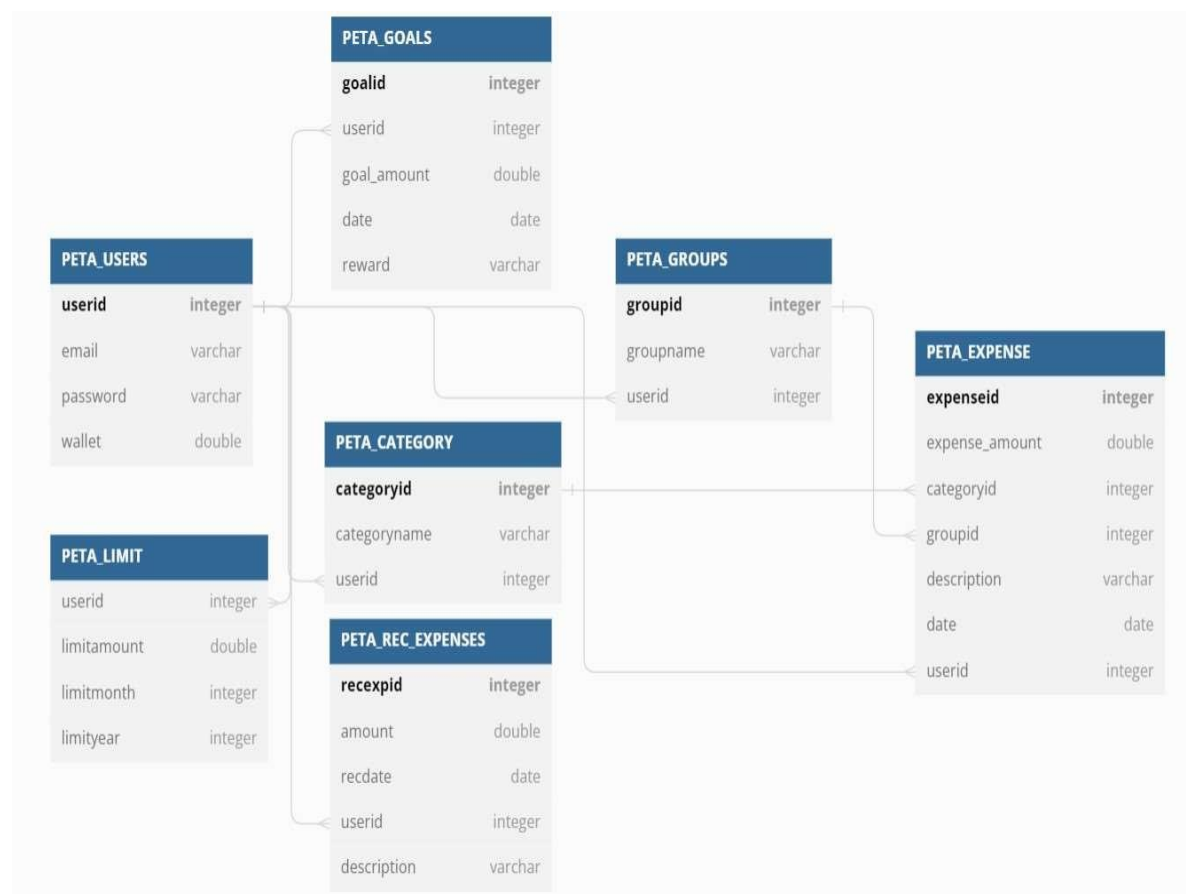
## 7.7 Feature - Analyse Expenses

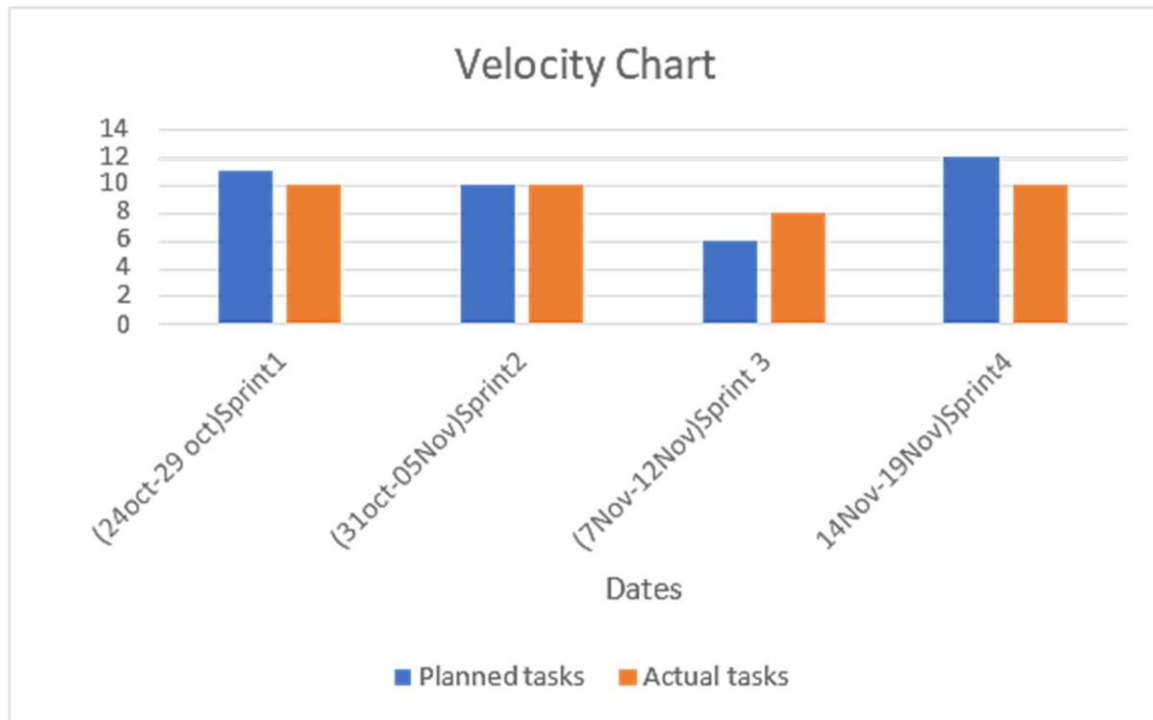
This feature allows the user to view how much is spent in a given period of time, and other analyses based on the user's expenses.

## 7.8 Feature - Add Recurring/Periodic Expenses

This feature allows the user to add an expense that is recurring for every month. This is useful, for example, to model bills that need to be paid.

## 7.9 Database Schema





## 8. TESTING:

### 8.1 Test Cases

- Verify that the user is able to login successfully on entering appropriate credentials.
- The UI elements, such as the card for the login, the button to submit etc are functional and are rendered properly in all devices.
- Users who enter invalid credentials will not be redirected to the dashboard
- Verify that users are able to register themselves to the application.
- The UI elements, such as the card for the registration, the button to submit etc are functional and are rendered properly in all devices.
- The user should not be able to register successfully if any of the fields are left empty.
- The user should receive the email from nunnaarthi@gmail.com, stating a successfully registration.
- "The UI part of the dashboard,
- the side navbar, the logout option, the cards showing various expenses, and the wallet edit icon must be functioning and rendered properly"
- The UI part of the add expense page must be rendered and functioning.
- "The user must be able to
- add an expense. "
- The user should not be able to add the same expense again.
- The user should be able to update the balance and it must be reflected in the dashboard where the wallet balance is displayed.
- The user views all the UI components rendered properly and functioning accordingly.
- The user should be able to set a monthly limit for his expenditures.
- The page must render properly and function appropriately.
- The user must be able to view the analysis of their expenses.

- The UI which contains 2 graphs must be rendered properly.
- The user must be able to view the analysis of their expenses.
- The UI is rendered properly and the various components are functioning properly.
- The UI is rendered properly and the various components are functioning properly.
- This page allows the user to view the recurring expenses that he or she has created using the add recurring expense page.
- The user must be able to view their existing rewards and goals . They can also use the add reward and goal icon to add the reward and goal.
- The user must be able to add a reward and goal.
- The user must be able to view their existing rewards and goals in a properly rendered manner.
- The user must be able view the UI components to add a goal in the appropriate manner.
- The user must be able to create a new category for themselves.
- The UI components of the add category page is rendered properly and functions appropriately.
- The user views the expense cards, and clicks on a particular card's edit icon to modify the expense
- The user views the expense cards displaying the expenses available to edit.

## 9. RESULTS:

### 9.1 Performance Metrics:

NFT-Risk assessment:

| Software Changes | Impact of Downtime                        | Load/Volume Changes |
|------------------|---|---------------------|
| Moderate         | Considerable time taken to insert into DB | No Changes          |
| Moderate         | Faster DB operations                      | No Changes          |

| Risk Score | Justification   |
|------------|---|
| ORANGE     | - Adding this feature makes is coherent with features like adding group and hence, functional changes is high |
| ORANGE     | Updated SQL statements for faster DB operations   |

NFT - Detailed Test Plan:

| S.No | Project Overview            | NFT Test approach   | Assumptions/Dependencies/Risks             |
|------|-----------------------------|---------------------|--|
| 1    | Personal Expense Tracker v1 | Load testing        | Locust installed, app deployed with docker |
| 2    | Personal Expense Tracker v2 | Stress testing      | Locust installed, app deployed with docker |
| 3    | Personal Expense Tracker v2 | Spike testing       | Locust installed, app deployed with docker |
| 4    | Personal Expense Tracker v2 | Reliability testing | Locust installed, app deployed with docker |

## End Of Test Report:

| S.No | Project Overview            | NFT Test approach   | NFR - Met          |
|------|-----------------------------|---------------------|--------------------|
| 1    | Personal Expense Tracker v1 | Load testing        | Failures           |
| 2    | Personal Expense Tracker v2 | Stress testing      | Response time      |
| 3    | Personal Expense Tracker v2 | Spike testing       | Response time      |
| 4    | Personal Expense Tracker v2 | Reliability testing | Number of failures |

| Test Outcome   | GO/NO-GO decision |
|--|-------------------|
| Number of failures spikes from 0.3 to 0.9 with increase in number of users from 70 to 100  | GO                |
| Increases from 3100ms for one user to 19000ms for 20 users   | GO                |
| Varies from minimum of 1367ms and maximum of 25609ms for a specific feature of adding expenses                                       | GO                |
| 41% failures with adding expense with spike in user data and incorrect input values, but maintained average of 13000ms response time | GO                |

| Recommendations  | Identified Defects (Detected/Closed/Open)                              |
|--|--|
| Provide checks from input value before inserting into database | Bad request error on adding expense without primary, required rows     |
|  |  |
| Provide checks from input value before inserting into database | internal server error on adding expense without primary, required rows |

## 10. ADVANTAGES AND DISADVANTAGES:

### Advantages:

1. An added expense can also be modified. Hence an error that is made while adding an expense is easily rectified.
2. Rewards and goals may be used to motivate the user to spend less.
3. The expenses can be analysed to understand the patterns of expenditure.
4. Recurring expenses can be added to model bills and such.
5. Categories can be added for higher customizability.

### Disadvantages:

1. Complex analysis based on categories is not supported.
2. Limits cannot be imposed on arbitrary periods of time, but only on a single month.
3. Recurring expenses have a period of exactly one month, which is not customizable.
4. It requires the user to manually enter expense information accurately.
5. The user is the one who is responsible for rewarding himself on the completion of a goal.

## 11. CONCLUSION:

A Personal Expense Tracker supporting myriad features has been designed and implemented using IBM's cloud based tools such as DB2, IBM Object Storage, etc. SendGrid is used to send mails to users. Docker and Kubernetes are used for deployment of the application.

## 12. FUTURE SCOPE:

Future avenues of work in this application would include:

1. Design and implementation of complex analyses based on various parameters such as categories, groups, etc.
2. Prediction of expenses based on machine learning.
3. Adding support for limits imposed on arbitrary periods of time.
4. Adding support for recurring expenses that have a user-specified period.
5. Having the application itself reward the user for accomplishment of various goals, such as coupons, vouchers, etc.

## 13. APPENDIX:

### 13.1 Source Code

```
from flask import Flask, render_template, request, redirect
from flask_mail import Mail, Message
from datetime import datetime
from flask_cors import CORS, cross_origin
import ibm_db
import json
import plotly
import plotly.graph_objs as go
import pandas as pd
from flask import send_file
from io import BytesIO
import matplotlib.pyplot as plt
import numpy as np
import base64
from PIL import Image
import time
import atexit
from datetime import datetime
from apscheduler.schedulers.background import BackgroundScheduler
```

```
app = Flask(__name__, template_folder='templates')
app.config['SECRET_KEY'] = 'top-secret!'
app.config['MAIL_SERVER'] = 'smtp.sendgrid.net'
app.config['MAIL_PORT'] = 587
app.config['MAIL_USE_TLS'] = True
app.config['MAIL_USERNAME'] = 'apikey'
app.config['MAIL_PASSWORD'] =
```

```
'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'  
app.config['MAIL_DEFAULT_SENDER'] = 'balaji1649417@gmail.com'
```

```
mail = Mail(app) cors = CORS(app)
```

```
app.config['CORS_HEADERS'] = 'Content-Type'
```

```
# Global variables EMAIL = "
```

```
USERID = "
```

```
conn=ibm_db.connect("DATABASE=bludb;HOSTNAME=1bbf73c5-d84a-4bb0-85b9-  
ab1a4348f4a4.c3n41cmd0nqnrk39u98g.databases.appdomain.cloud;PORT=32286;Security  
=SSL;SSLServerCertificate=DigiCertGlobalRootCA.crt;UID=gkf87001;PWD=CXtQLAGZ06fD0f  
hC;","","")
```

```
# FUNCTIONS INTERACTING WITH DB #
```

```
def fetch_walletamount():
```

```
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, EMAIL) ibm_db.execute(stmt)
```

```
user = ibm_db.fetch_assoc(stmt) # print(user['WALLET'])
```

```
return user['WALLET'] # returns int
```

```
def fetch_categories():
```

```
sql = 'SELECT * FROM PETA_CATEGORY WHERE USERID = ?'
```

```
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, USERID)  
ibm_db.execute(stmt)
```

```
categories = []
```

```
while ibm_db.fetch_row(stmt) != False: categories.append([ibm_db.result(stmt,  
"CATEGORYID"),
```

```
ibm_db.result(stmt, "CATEGORY_NAME")])
```



```
sql = 'SELECT * FROM PETA_CATEGORY WHERE USERID IS NULL'
stmt = ibm_db.prepare(conn, sql) ibm_db.execute(stmt)
```

```
while ibm_db.fetch_row(stmt) != False: categories.append([ibm_db.result(stmt,
"CATEGORYID"),
ibm_db.result(stmt, "CATEGORY_NAME")])
```

```
# print(categories)
return categories # returns list
```

```
def fetch_userID():
sql = 'SELECT USERID FROM PETA_USER WHERE EMAIL=?'
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, EMAIL) ibm_db.execute(stmt)
user = ibm_db.fetch_assoc(stmt) # print(user['USERID'])
return user['USERID'] # returns int
```

```
def fetch_groups():
sql = 'SELECT * FROM PETA_GROUPS'
stmt = ibm_db.exec_immediate(conn, sql) groups = []
while ibm_db.fetch_row(stmt) != False:
```

```
groups.append([ibm_db.result(stmt, "GROUPLD"),
ibm_db.result(stmt, "GROUPNAME")])
# print(groups)
return groups # returns list
```

```
def fetch_expenses():
sql = 'SELECT * FROM PETA_EXPENSE where USERID = ' + str(USERID)
# print(sql)
```

```

stmt = ibm_db.exec_immediate(conn, sql) expenses = []
while ibm_db.fetch_row(stmt):
    category_id = ibm_db.result(stmt, "CATEGORYID") category_id = str(category_id)
    sql2 = "SELECT * FROM PETA_CATEGORY WHERE CATEGORYID = " +
    category_id
    stmt2 = ibm_db.exec_immediate(conn, sql2) category_name = ""
    while ibm_db.fetch_row(stmt2) != False:
        category_name = ibm_db.result(stmt2, "CATEGORY_NAME")
        expenses.append([ibm_db.result(stmt, "EXPENSE_AMOUNT"),
        ibm_db.result(
        stmt, "DATE"), ibm_db.result(stmt, "DESCRIPTION"), category_name])
    # print(expenses) return expenses

```

```

def fetch_rec_expenses_cron():
    sql = 'SELECT * FROM PETA_REC_EXPENSES;'
    stmt = ibm_db.exec_immediate(conn, sql) rec_expenses = []
    while ibm_db.fetch_row(stmt) != False: amt = ibm_db.result(stmt, "AMOUNT") amt = str(amt)
    description = ibm_db.result(stmt, "DESCRIPTION") userid = ibm_db.result(stmt, "USERID")
    date = ibm_db.result(stmt, "RECDATE") rec_expenses.append([amt, description, date,
    userid])
    # print(rec_expenses) return rec_expenses

```

```

def fetch_rec_expenses():
    sql = 'SELECT * FROM PETA_REC_EXPENSES WHERE USERID = ' + str(USERID)
    stmt = ibm_db.exec_immediate(conn, sql)

    rec_expenses = []
    while ibm_db.fetch_row(stmt) != False: amt = ibm_db.result(stmt, "AMOUNT") amt = str(amt)
    description = ibm_db.result(stmt, "DESCRIPTION") userid = ibm_db.result(stmt, "USERID")

```

```
date = ibm_db.result(stmt, "RECDATE") rec_expenses.append([amt, description, date,
userid])
```

```
# print(rec_expenses) return rec_expenses
```

```
def fetch_limits():
```

```
now = datetime.now() year = now.year
```

```
limits = [0 for i in range(12)]
```

```
sql = 'SELECT LIMITAMOUNT, LIMITMONTH FROM PETA_LIMIT WHERE USERID = ?
AND LIMITYEAR = ?'
```

```
statement = execute_sql(sql, USERID, year)
```

```
while ibm_db.fetch_row(statement):
```

```
limit_amount = int(ibm_db.result(statement, 'LIMITAMOUNT')) limit_month =
int(ibm_db.result(statement, 'LIMITMONTH')) limits[limit_month] = limit_amount
```

```
return limits
```

```
# HELPER FUNCTIONS #
```

```
def fetch_latest_expenses(expenses):
```

```
# must return expenses of last month latest_month = datetime.today().month
latest_expenses = []
```

```
for exp in expenses:
```

```
if exp[1].month == latest_month: latest_expenses.append(exp)
```

```
return latest_expenses
```

```
def fetch_monthly_expenses(expenses): latest_year = datetime.today().year
monthly_expenses = {}
```

```
for month in range(1, 13):
```

```
    monthly_expenses[month] = 0
```

```
for exp in expenses:
```

```
    if exp[1].year == latest_year: monthly_expenses[exp[1].month] += exp[0]
```

```
return monthly_expenses.values()
```

```
def draw_graph1(expenses):
```

```
    # TOTAL EXPENSE / DAY OF MONTH
```

```
    # x-axis: day , y-axis: expense/day
```

```
    latest_expenses = fetch_latest_expenses(expenses) mp = {}
```

```
    for day in range(1, 31): mp[day] = 0
```

```
    for exp in latest_expenses: mp[exp[1].day] += exp[0]
```

```
    x = mp.keys() y = mp.values()
```

```
    # print(mp) plt.figure()
```

```
    plt.title('Expense recorded over the past month')
```

```
    plt.plot(x, y) plt.xlabel('Day of the month') plt.ylabel('Recorded expense') plt.xlim(1, 32)
```

```
    buffer = BytesIO() plt.savefig(buffer, format='png')
```

```
    encoded_img_data = base64.b64encode(buffer.getvalue()) return encoded_img_data
```

```
def draw_graph2(expenses, limits):
```

```
    # limit/month vs expense/month -> 2 line graphs
```

```
monthly_expenses = fetch_monthly_expenses(expenses) x = range(1, 13)
```

```
y1 = limits
```

```
y2 = monthly_expenses
```

```
plt.figure()
```

```
plt.title('Month-wise comparison of limit and expense') plt.plot(x, y1, label="Limit/month")
```

```
plt.plot(x, y2, label="Expenses/month") plt.xlabel('Month')
```

```
plt.legend()
```

```
buffer = BytesIO() plt.savefig(buffer, format='png')
```

```
encoded_img_data = base64.b64encode(buffer.getvalue()) return encoded_img_data
```

```
# finds the category id that matches that of the recurring expense category
```

```
def fetch_recurring_category_id(): categories = fetch_categories() for category in categories:
```

```
    p = "
```

```
    for i in category[1]: if (i == ' '):
```

```
        break p += i
```

```
    category[1] = p print(categories) categoryid = -1
```

```
    for category in categories:
```

```
        if category[1] == 'recurring': categoryid = category[0]
```

```
    print(categoryid) return categoryid
```

```
# cron to autodeduct the expenses each day def auto_renew():
```

```
    global USERID
```

```
    # print(time.strftime("%A, %d. %B %Y %l:%M:%S %p")) rec_expenses =  
    fetch_rec_expenses_cron() print(rec_expenses)
```

```
    current_day = time.strftime("%d") print(current_day)
```

for expense in rec\_expenses:

here = str(expense[2]) here = here.split('-') here = here[2] print(here)

if (here == current\_day):

sql = "INSERT INTO PETA\_EXPENSE(USERID, EXPENSE\_AMOUNT, CATEGORYID, DESCRIPTION, DATE) VALUES(?,?,?,?,?);"

USERID = str(expense[3])

categoryid = fetch\_recurring\_category\_id() print(categoryid)

stmt = ibm\_db.prepare(conn, sql) ibm\_db.bind\_param(stmt, 1, expense[3])

ibm\_db.bind\_param(stmt, 2, expense[0])

ibm\_db.bind\_param(stmt, 3, categoryid)

ibm\_db.bind\_param(stmt, 4, expense[1]) d3 = time.strftime("%Y-%m-%d")

ibm\_db.bind\_param(stmt, 5, d3) print(d3, categoryid, expense[0],

expense[1], expense[2], expense[3]) ibm\_db.execute(stmt)

check\_monthly\_limit(datetime.now().month, datetime.now().year) # print(here, d3, expense[0], expense[1], expense[2])

sql = "UPDATE PETA\_USER SET WALLET = WALLET - ? WHERE USERID = ?"

statement = ibm\_db.prepare(conn, sql) print(USERID)

ibm\_db.bind\_param(statement, 1, expense[0])

ibm\_db.bind\_param(statement, 2, expense[3]) print("deducted") ibm\_db.execute(statement)

# caller code for the cron scheduler = BackgroundScheduler()

scheduler.add\_job(func=auto\_renew, trigger="interval", seconds=3600 \* 24)

# END POINTS #

scheduler.start()

atexit.register(lambda: scheduler.shutdown())

```

@app.route('/', methods=['GET', 'POST']) @cross_origin()
def registration(): global EMAIL print("hello")

if request.method == 'GET':
    return render_template('registration.html') if request.method == 'POST':
    email = request.form['email']
    EMAIL = email
    password = request.form['password'] wallet = request.form['wallet']
    sql = "INSERT INTO PETA_USER(EMAIL,PASSWORD,WALLET) VALUES(?,?,?)"
    stmt = ibm_db.prepare(conn, sql)

    ibm_db.bind_param(stmt, 1, email)
    ibm_db.bind_param(stmt, 2, password)
    ibm_db.bind_param(stmt, 3, wallet)
    print(stmt)
    ibm_db.execute(stmt)

    # msg = Message('Registration Verification',recipients=[EMAIL]) # msg.body =
    ('Congratulations! Welcome user!')

    # msg.html = ('<h1>Registration Verification</h1>' #'<p>Congratulations! Welcome user!'
    # '<b>PETA</b>!'</p>')
    # mail.send(msg)
    EMAIL = email
    return redirect(url_for('dashboard'))

```

```

@app.route('/login', methods=['GET', 'POST']) def login():
    global EMAIL print("login")
    if request.method == 'POST': email = request.form['email']
    EMAIL = email print(EMAIL)
    password = request.form['password']
    sql = "SELECT * FROM PETA_USER WHERE email=? AND password=?" stmt =
    ibm_db.prepare(conn, sql)

```

```
ibm_db.bind_param(stmt, 1, email)
ibm_db.bind_param(stmt, 2, password) ibm_db.execute(stmt)
account = ibm_db.fetch_assoc(stmt) if account:
return redirect(url_for('dashboard')) else:
return redirect(url_for('login')) elif request.method == 'GET':
return render_template('login.html')
```

```
@app.route('/logout', methods=['GET']) def logout():
if request.method == 'GET': global USERID
global EMAIL USERID = "" EMAIL = ""
return redirect(url_for('login'))
```

```
@app.route('/dashboard', methods=['GET']) def dashboard():
global USERID global EMAIL print("dashboard")
if USERID == "" and EMAIL == "":
print("null email")
return render_template('login.html') elif USERID == "":
USERID = fetch_userID() print(USERID)
```

```
sql = "SELECT EXPENSEID, EXPENSE_AMOUNT, DESCRIPTION, CATEGORY_NAME, DATE
FROM PETA_EXPENSE, PETA_CATEGORY WHERE PETA_EXPENSE.USERID = ? AND
PETA_EXPENSE.CATEGORYID = PETA_CATEGORY.CATEGORYID"
statement = execute_sql(sql, USERID)
```

```
expenses = [] while True:
expense = ibm_db.fetch_assoc(statement) if expense:
expenses.append(expense) else:
break
```

```
wallet = fetch_walletamount()
return render_template('dashboard.html', expenses=expenses, wallet=wallet, email=EMAIL)
```



```
@app.route('/updatebalance', methods=['GET', 'POST']) def update_balance():
if request.method == 'GET': wallet = fetch_walletamount()
return render_template('updatebalance.html', wallet=wallet) elif request.method == 'POST':
global EMAIL
```

```
global USERID if EMAIL == "":
return render_template('login.html', msg='Login before proceeding')
if (USERID == ""):
# get user using email USERID = fetch_userID()
```

```
new_balance = request.form['balanceupdated']
sql = 'UPDATE PETA_USER SET WALLET = ? WHERE USERID = ?'
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, new_balance)
ibm_db.bind_param(stmt, 2, USERID) ibm_db.execute(stmt)
```

```
return redirect(url_for('dashboard'))
```

```
@app.route('/addcategory', methods=['GET', 'POST']) def add_category():
if request.method == 'GET':
# categories = fetch_categories()
return render_template('addcategory.html')
```

```
elif request.method == 'POST': categoryname = request.form['category']
sql = 'INSERT INTO PETA_CATEGORY(CATEGORY_NAME, USERID) VALUES(?,?)'
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, categoryname)
ibm_db.bind_param(stmt, 2, USERID) ibm_db.execute(stmt)
```

```
return redirect(url_for('dashboard'))
```

```

@app.route('/addgroup', methods=['POST']) def add_group():
if request.method == 'POST': if USERID == "":
return render_template('login.html', msg='Login before proceeding')
sql = "INSERT INTO PETA_GROUPS(GROUPNAME, USERID) VALUES(?,?)"
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, request.form['groupname'])
ibm_db.bind_param(stmt, 2, USERID) ibm_db.execute(stmt)

```

```

group_info = {}

```

```

sql = "SELECT * FROM PETA_GROUPS WHERE GROUPNAME=?"
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, request.form['groupname'])
ibm_db.execute(stmt)
group_info = ibm_db.fetch_assoc(stmt)
return {"groupID": group_info['GROUPID'], 'groupname': group_info['GROUPNAME']}

```

```

@app.route('/addexpense', methods=['GET', 'POST']) def add_expense():
if request.method == 'GET': groups = fetch_groups()
categories = fetch_categories() if len(categories) == 0:
return redirect(url_for('add_category'))
return render_template('addexpense.html', categories=categories, groups=groups)

```

```

elif request.method == 'POST': global EMAIL
global USERID if EMAIL == "":
return render_template('login.html', msg='Login before proceeding')
if (USERID == ""):
# get user using email USERID = fetch_userID()

```

```

amount_spent = request.form['amountspent'] category_id = request.form.get('category')
description = request.form.get('description') date = request.form['date']

```

```
groupid = request.form.get('group')
```

```
groupid = None if groupid == "" else groupid
```

```
print(amount_spent, category_id, description, date, groupid,  
USERID)
```

```
sql = "INSERT INTO PETA_EXPENSE(USERID, EXPENSE_AMOUNT, CATEGORYID, GROUPID,  
DESCRIPTION, DATE) VALUES(?,?,?,?,?,?)"
```

```
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, USERID)
```

```
ibm_db.bind_param(stmt, 2, amount_spent)
```

```
ibm_db.bind_param(stmt, 3, category_id)
```

```
ibm_db.bind_param(stmt, 4, groupid)
```

```
ibm_db.bind_param(stmt, 5, description)
```

```
ibm_db.bind_param(stmt, 6, date) ibm_db.execute(stmt)
```

```
print(date, amount_spent, category_id)
```

```
sql = "UPDATE PETA_USER SET WALLET = WALLET - ? WHERE USERID = ?"
```

```
statement = ibm_db.prepare(conn, sql) ibm_db.bind_param(statement, 1, amount_spent)
```

```
ibm_db.bind_param(statement, 2, USERID) ibm_db.execute(statement)
```

```
return redirect(url_for('dashboard'))
```

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

```
global USERID global EMAIL
```

```
print("viewrecurring")
```

```
if USERID == "" and EMAIL == "":
```

```
print("null email")
```

```
return render_template('login.html') elif USERID == "":
```

```
USERID = fetch_userID() # print(USERID)
```

```
print(USERID)
```

```

expenses = fetch_rec_expenses() wallet = fetch_walletamount()
return render_template('viewrecurring.html', expenses=expenses, wallet=wallet,
email=EMAIL)

```

```

@app.route('/recurringexpense', methods=['GET', 'POST']) def recurring_expense():
global USERID, EMAIL
if request.method == 'GET': groups = fetch_groups()
categories = fetch_categories() if len(categories) == 0:
return redirect(url_for('add_category')) USERID = fetch_userID()
# check if user has added a category for recurring category, if not redirect and ask her to
recur_id = fetch_recurring_category_id() if (recur_id == -1):

return (redirect(url_for('add_category'))) return render_template('recurringexpense.html',
categories=categories, groups=groups)

```

```

elif request.method == 'POST': if EMAIL == "":
return render_template('login.html', msg='Login before proceeding')
if (USERID == ""):
# get user using email USERID = fetch_userID()
# check if user has added a category for recurring category, if not redirect and ask her to
recur_id = fetch_recurring_category_id() if (recur_id == -1):
return (redirect(url_for('add_category'))) amount_spent = request.form['amountspent']
category_id = request.form.get('category') description = request.form['description']
date = request.form['date']
# months = request.form['autorenewals'] # groupid = request.form.get('group')
print("recurring : ")
print(amount_spent, description, date, USERID)

```

```

sql = "INSERT INTO PETA_REC_EXPENSES(AMOUNT, RECDATE, USERID, DESCRIPTION)
VALUES (?,?,?,?)"
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, amount_spent)
ibm_db.bind_param(stmt, 2, date)

```

```
ibm_db.bind_param(stmt, 3, USERID)
ibm_db.bind_param(stmt, 4, description) ibm_db.execute(stmt)
```

```
sql = "INSERT INTO PETA_EXPENSE(USERID, EXPENSE_AMOUNT, CATEGORYID,
DESCRIPTION, DATE) VALUES(?,?,?,?)"
```

```
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, USERID)
ibm_db.bind_param(stmt, 2, amount_spent)
ibm_db.bind_param(stmt, 3, category_id)
ibm_db.bind_param(stmt, 4, description)
ibm_db.bind_param(stmt, 5, date) ibm_db.execute(stmt)
```

```
sql = "UPDATE PETA_USER SET WALLET = WALLET - ? WHERE USERID = ?;"
statement = ibm_db.prepare(conn, sql) ibm_db.bind_param(statement, 1, amount_spent)
```

```
ibm_db.bind_param(statement, 2, USERID) ibm_db.execute(statement)
```

```
return redirect(url_for('dashboard'))
```

```
@app.route('/removerecurring', methods=['POST']) def remove_recurring():
print("remove recurring") if request.method == 'POST':
global EMAIL global USERID if EMAIL == "":
return render_template('login.html', msg='Login before proceeding')
if (USERID == ""):
# get user using email USERID = fetch_userID()
description = request.form['description'] print(description, USERID)
sql = 'DELETE FROM PETA_REC_EXPENSES WHERE USERID = ? AND DESCRIPTION = ?;'
stmt = ibm_db.prepare(conn, sql) ibm_db.bind_param(stmt, 1, USERID)
ibm_db.bind_param(stmt, 2, description) ibm_db.execute(stmt)

return redirect(url_for('dashboard'))
```

```

@app.route('/analysis', methods=['GET', 'POST']) def analyse():
    if request.method == 'GET': expenses = fetch_expenses() limits = fetch_limits()

    graph1 = draw_graph1(expenses=expenses)
    graph2 = draw_graph2(expenses=expenses, limits=limits)

    return render_template("analysis.html", img_data1=graph1.decode('utf-8'),
                           img_data2=graph2.decode('utf-8'))

    elif request.method == 'POST':
        return render_template('analysis.html')

def execute_sql(sql, *args):

    stmt = ibm_db.prepare(conn, sql) for i, arg in enumerate(args):
        ibm_db.bind_param(stmt, i + 1, arg) ibm_db.execute(stmt)
    return stmt

def check_monthly_limit(month, year):
    sql = 'SELECT SUM(EXPENSE_AMOUNT) FROM PETA_EXPENSE WHERE USERID = ?
    AND MONTH(DATE) = ? AND YEAR(DATE) = ?'
    statement = execute_sql(sql, USERID, month, year) amt_spent =
    ibm_db.fetch_tuple(statement)

    sql = 'SELECT LIMITAMOUNT FROM PETA_LIMIT WHERE USERID = ? AND LIMITMONTH = ?
    AND LIMITYEAR = ?'
    statement = execute_sql(sql, USERID, month, year) monthly_limit =
    ibm_db.fetch_tuple(statement)

    if amt_spent and monthly_limit and int(amt_spent[0]) > int(monthly_limit[0]):

```

```
diff = int(amt_spent[0]) - int(monthly_limit[0])
msg = Message('Monthly limit exceeded', recipients=[EMAIL]) msg.body = (
f'Monthly limit exceeded by {diff} for the month of {month},
{year}')
mail.send(msg)
```

```
def update_monthly_limit(monthly_limit, month, year):
sql = 'SELECT LIMITAMOUNT FROM PETA_LIMIT WHERE USERID = ? AND LIMITMONTH = ?
AND LIMITYEAR = ?'
statement = execute_sql(sql, USERID, month, year)
```

```
if ibm_db.fetch_row(statement):
sql = 'UPDATE PETA_LIMIT SET LIMITAMOUNT = ? WHERE USERID = ? AND LIMITMONTH =
? AND LIMITYEAR = ?'
execute_sql(sql, monthly_limit, USERID, month, year) else:
sql = 'INSERT INTO PETA_LIMIT VALUES(?, ?, ?, ?)'
execute_sql(sql, USERID, monthly_limit, month, year) check_monthly_limit(month, year)
```

```
@app.route('/setmonthlylimit', methods=['GET', 'POST']) def set_monthly_limit():
if request.method == 'GET':
```

```
return render_template('setmonthlylimit.html') elif request.method == 'POST':
new_monthly_limit = request.form['monthlylimit'] now = datetime.now()
update_monthly_limit(new_monthly_limit, now.month, now.year) return
redirect(url_for('dashboard'))
```

```
@app.route('/modifyexpense', methods=['GET', 'POST']) def modify_expense():
if request.method == 'GET':
expenseid = request.args.get('expenseid')
sql = "SELECT * FROM PETA_EXPENSE WHERE EXPENSEID = ?"
```

```

statement = execute_sql(sql, expenseid) expense = ibm_db.fetch_assoc(statement)
categories = fetch_categories()

groups = fetch_groups()

return render_template('modifyexpense.html', expense=expense, categories=categories,
groups=groups)

elif request.method == 'POST':

amount_spent = request.form['amountspent'] category_id = request.form.get('category')
description = request.form['description'] date = request.form['date']

groupid = request.form.get('group')


expenseid = request.form['expenseid'] old_amount_spent = request.form['oldamountspent']


sql = "UPDATE PETA_EXPENSE SET EXPENSE_AMOUNT = ?, CATEGORYID = ?, GROUPID = ?,
DESCRIPTION = ?, DATE = ? WHERE EXPENSEID = ?"

execute_sql(sql, amount_spent, category_id, groupid, description, date, expenseid)


sql = "UPDATE PETA_USER SET WALLET = WALLET + ?"

execute_sql(sql, float(old_amount_spent) - float(amount_spent)) return
redirect(url_for('dashboard'))


def fetch_goals():

sql = 'SELECT * FROM PETA_GOALS WHERE USERID = ?'

statement = execute_sql(sql, USERID)


goals = [] while True:

goal = ibm_db.fetch_tuple(statement)


if goal:

goals.append(goal[2:]) else:

break


print(goals) return goals

```



```
@app.route('/rewards', methods=['GET']) def rewards_and_goals():
goals = fetch_goals()
return render_template('rewards.html', goals=goals)
```

```
@app.route('/addgoal', methods=['GET', 'POST']) def add_goal():
if request.method == 'GET':
return render_template('addgoal.html') elif request.method == 'POST':
goal_amount = request.form['goal_amount'] date = request.form['date']
reward = request.form['reward']
sql = "INSERT INTO PETA_GOALS(USERID, GOAL_AMOUNT, DATE, REWARD) VALUES(?, ?, ?,
?)"
execute_sql(sql, USERID, goal_amount, date, reward) return redirect(url_for('dashboard'))
```

```
def check_goals():
sql = "SELECT A.GOALID, A.USERID, A.GOAL_AMOUNT, A.DATE, A.REWARD, B.WALLET
FROM PETA_GOALS AS A, PETA_USER AS B WHERE A.USERID = B.USERID"
statement = execute_sql(sql)
```

```
now = datetime.now() while True:
row = ibm_db.fetch_assoc(statement) if not row:
break
if row['DATE'] == now:
if row['GOAL_AMOUNT'] <= row['WALLET']:
msg = Message('Goal achieved!', recipients=[EMAIL]) msg.body = (
f'You are eligible for your reward:\n{row["REWARD"]}') mail.send(msg)
else:
msg = Message('Goal limit exceeded', recipients=[EMAIL])

msg.body = (
```

```
f'You are not eligible for the reward:\n{row["REWARD"]}\nBetter luck next time!')
mail.send(msg)
sql = "DELETE FROM PETA_GOALS WHERE GOALID = ?"
execute_sql(sql, row['GOALID'])
```

```
scheduler.add_job(func=check_goals, trigger="interval", seconds=3600 * 24)
```

```
if name == 'main': app.run(host='0.0.0.0', debug=True)
```

base\_template.html

```
<!DOCTYPE html>
<html lang="en">
<head>
<!-- Required meta tags -->
<meta charset="utf-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1">

<!-- Bootstrap CSS -->
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min. css"
rel="stylesheet"
integrity="sha384-EVSTQN3/azprG1Anm3QDgPJLIm9Nao0Yz1ztcQTWfSpd3yD65Vohhpuu
C0mLASjC" crossorigin="anonymous">

<!-- bootstrap for the cards -->
<link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min. css"
integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJISAwGgFAW/
dAiS6JXm" crossorigin="anonymous">

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle
```

.min.js"

integrity="sha384-MrcW6ZMFYlzcLA8Nl+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/tWtIaxVXM" crossorigin="anonymous"></script>

{% block title %}

<title>Base Template</title>

{% endblock title %}

</head>

<body>

<div class="container-fluid">

<div class="row flex-nowrap">

<div class="col-auto col-md-3 col-xl-2 px-sm-2 px-0" style="background-color: #B2D3C2">

<div class="d-flex flex-column align-items-center align-items-sm-start px-3 pt-2 min-vh-100" style="color:black">

<p class="d-flex align-items-center pb-3 mb-md-0 me-md-auto text-white text-decoration-none">

<span class="fs-5 d-none d-sm-inline" style="color:black; font-weight: bold;">Personal Expense Tracker</span>



</p>

<ul class="nav nav-pills flex-column mb-sm-auto mb-0 align-items-center align-items-sm-start" id="menu">

<li class="nav-item mt-2" style="background-color:

{{'#00AD83' if highlight == 'dashboard'}}; height: 50px; width: 150px; border-radius: 5px;">

<a href="dashboard" class="nav-link align-middle px-0" style="color:black;">



d-sm-inline">Home</span>

```
<span class="ms-1 d-none
```

```
</a>
```

```
</li>
```

```
<li class="nav-item mt-2" style="background-color:
```

```
{{'#00AD83' if highlight == 'addexpense'}};">
```

```
<a href="addexpense" class="nav-link px-0 align-middle" style="color:black;">
```

```

```

```
<span class="ms-1 d-none d-sm-inline">Add
```

```
Expense</span>
```

```
</a>
```

```
</li>
```

```
<li class="nav-item mt-2" style="background-color:
```

```
{{'#00AD83' if highlight == 'recurringexpense'}};">
```

```
<a href="recurringexpense" class="nav-link px-0 align-middle" style="color:black;">
```

```

```

```
<span class="ms-1 d-none d-sm-inline">Initiate a recurring expense</span>
```

```
</a>
```

```
</li>
```

```
<!-- <li class="nav-item mt-2"
style="background-color: {{'#00AD83' if highlight == 'modifyexpense'}};">
<a href="modifyexpense" class="nav-link px-0 align-middle" style="color:black;">

<span class="ms-1 d-none d-sm-inline">Modify Expense</span>
</a>
</li> -->
```

```
<li class="nav-item mt-2" style="background-color:
{{'#00AD83' if highlight == 'viewrecurring'}};">
<a href="viewrecurring" class="nav-link px-0 align-middle" style="color:black;">

<span class="ms-1 d-none d-sm-inline">View
recurring expenses</span>
</a>
</li>
```

```
<li class="nav-item mt-2" style="background-color:
{{'#00AD83' if highlight == 'analysis'}};">
<a href="analysis" class="nav-link px-0 align-middle" style="color:black;">

<span class="ms-1 d-none d-sm-inline">View
Analysis</span>
```

</a>

</li>

<li class="nav-item mt-2" style="background-color:

{{'#00AD83' if highlight == 'rewards'}};">

<a href="rewards" class="nav-link px-0 align-middle" style="color:black;">



<span class="ms-1 d-none d-sm-inline">Rewards & Goals</span>

</a>

</li>

<li class="nav-item mt-2" style="background-color:

{{'#00AD83' if highlight == 'addcategory'}};">

<a href="addcategory" class="nav-link px-0 align-middle" style="color:black;">



<span class="ms-1 d-none d-sm-inline">Create category</span>

</a>

</li>

<li class="nav-item mt-2" style="background-color:

{{'#00AD83' if highlight == 'setmonthlylimit'}};">

<a href="setmonthlylimit" class="nav-link px-0 align-middle" style="color:black;">



Monthly Limit</span>

<span class="ms-1 d-none d-sm-inline">Set

</a>

</li>

</ul>

<ul class="nav nav-pills flex-column mb-sm-auto mb-0 align-items-center align-items-sm-end" id="menu">

<li class="nav-item mt-2">

<a href="logout" class="nav-link px-0 align-middle" style="color:black;">



Out</span>

<span class="ms-1 d-none d-sm-inline">Log

</a>

</li>

</ul>

</div>

</div>

{% block content %}

```
<h1>This needs to be overridden</h1>
{% endblock content %}
</div>
</div>
```

```
{% block script %}
<script></script>
{% endblock script %}
</body>
</html>
```

addcategory.html

```
{% extends 'base_template.html' %}
```

```
{% block title %}
<title>Add Category</title>
{% endblock title %}
```

```
{% set highlight = 'addcategory' %}
```

```
{% block content %}
<div class="col py-3" style="background-color:#00AD83">
<h3 style="color:white; text-align: center;">Add category</h3>
<div class="container mt-3" style="width: 600px;">
<div class="card shadow-lg bg-white rounded">
<form action="/addcategory" method="POST">
<div class="card-header" style="text-align: center;">
<span style="display:inline-flex"><h4>New
Category</h4><img
```



```
src="https://s3.jp-tok.cloud-object-storage.appdomain.cloud/personalexpendracker/capd/category_add.webp" style="margin-left:10px; width:30px; height:30px"></span>
```

```
<span style="display:inline-flex"><h5>Include a category called 'recurring' if you want to use recurring expenses</h5></span>
```

```
</div>
```

```
Name: </label>
```

```
<div class="card-body">
```

```
<div class="mb-3">
```

```
<label for="category" class="form-label">Category
```

```
<input type="text" class="form-control"
```

```
name="category" id="category"></input>
```

```
</div>
```

```
<div class="mb-3">
```

```
<label for="description" class="form-label">Description of Category: </label>
```

```
<input type="text" class="form-control" name="description" id="description"></input>
```

```
</div>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align:center">
```

```
<button type="submit" style="background-color:#00AD83; border-color:#00AD83; border-radius:5px;">Add category</button>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```

```
addexpense.html
```

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Add Expense</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'addexpense' %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h3 style="color:white; text-align: center;">Add expense</h3>
```

```
<div class="container mt-3" style="width: 600px;">
```

```
<div class="card shadow-lg bg-white rounded">
```

```
<form action="/addexpense" method="POST">
```

```
<div class="card-header" style="text-align: center;">
```

```
<span style="display:inline-flex"><h4>Expense
```

```
Made</h4></span>
```

```
</div>
```

```
<div class="card-body">
```

```
<div class="mb-3">
```

```
<label for="amountspent" class="form-label">Amount
```

```
Spent: (Rs) </label>
```

```
<input type="number" class="form-control"
```

```
name="amountspent" id="amountspent" placeholder="100.00" required>
```

</div>

<div class="mb-3">

<label for="expensecategory" class="form-label">Expense Category: </label>

<select name="category" id="category" class="form-control" placeholder="Select a category" required>

<option value="">Select a category</option>

{% for cat in categories %}

<option value="{{ cat[0] }}">{{ cat[1]

}}</option>

Expense: </label>

{% endfor %}

</select>

</div>

<div class="mb-3">

<label for="date" class="form-label">Date of

<input type="date" class="form-control"

name="date" id="date" required></input>

</div>

<div class="mb-3">

<label for="description" class="form-label">Description of Expense: </label>

<input type="text" class="form-control" name="description" id="description"></input>

```
</div>
<div class="mb-3">
<label for="group" class="form-label">Group(if
needed): </label>
<div title="New group" style="float:right"
value="Create group" onclick="addGroup()">ADD GROUP</div>
<br/>
```

```
class="form-control"> group</option>
```

```
}}</option>
```

```
<select name="group" id="group"
```

```
<option value="">Select existing
```

```
{% for group in groups %}
```

```
<option value="{{ group[0] }}">{{ group[1]
```

```
{% endfor %}
```

```
</select>
```

```
</div>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align:center">
```

```
<button type="submit" value="submit" style="background-color:#00AD83; border-
color:#00AD83; border-radius:5px;">Submit Expense</button>
```

```
</div>
```

```
</form>
```

```
</div>
```

```

</div>
</div>
{% endblock content %}

{% block script %}
<script>
function addGroup(e) {
// e.preventDefault();

group = window.prompt('Enter group name: ') console.log('PROMPT WINDOW
SHOWN'+group);

const formData = new FormData(); formData.append("groupname", group);

const xhttp = new XMLHttpRequest(); xhttp.onload = function() {
if (this.readyState == 4 && this.status == 200) { var groupid= JSON.parse(this.responseText);
console.log(groupid);
// create option using DOM
const newOption = document.createElement('option'); const optionText =
document.createTextNode(groupid['groupname']);
newOption.appendChild(optionText); newOption.setAttribute('value',groupid['groupID']);
const selectDropdown = document.getElementById('group');
selectDropdown.appendChild(newOption); console.log('GROUPLD :'+ groupid['groupID']);
}
}
xhttp.open("POST", "http://localhost:5000/addgroup"); xhttp.send(formData);
}

document.querySelector('#date').valueAsDate = new Date();
</script>
{% endblock script %}

```

addgoal.html

```
{% extends 'base_template.html' %}
```

{% block title %}

<title>Add Goal and Reward</title>

{% endblock title %}

{% block content %}

<div class="col py-3" style="background-color:#00AD83">

<h3 style="color:white; text-align: center;">Add Goal and Reward</h3>

<div class="container mt-3" style="width: 600px;">

<div class="card shadow-lg bg-white rounded">

<form action="/addgoal" method="POST">

<div class="card-header" style="text-align: center;">

<span style="display:inline-flex"><h4>Goal &

Reward</h4></span>

</div>

<div class="card-body">

<div class="mb-3">

<label for="amountspent" class="form-label">Goal Wallet Balance: (Rs) </label>

<input type="number" class="form-control" name="goal\_amount" id="goal\_amount" placeholder="100.00" required>

</div>

Validity: </label>

<div class="mb-3">

<label for="date" class="form-label">Date of

```
<input type="date" class="form-control"
```

```
name="date" id="date" required></input>
```

```
</div>
```

```
<div class="mb-3">
```

```
<label for="description" class="form-label">Reward: </label>
```

```
<input type="text" class="form-control" name="reward" id="reward"></input>
```

```
</div>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align:center">
```

```
<button type="submit" value="submit" style="background-color:#00AD83; border-  
color:#00AD83; border-radius:5px;">Create Goal & Reward</button>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```

```
analysis.html
```

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Analysis</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'analysis' %}
```

```
{% block content %}
```

```

<div class="col-auto px-0 col-lg-10 col-md-6 col-sm-4">
<div class="card min-vh-100" style="background-color: #00ad83">
<h4 class="card-header">Analysis of my expenses</h4>
<div class="card-body">
<div class="row flex-nowrap">
<div class="col col-lg-5 col-md-3 px-4" style="background-color: #00ad83">

</div>
<div class="col col-lg-5 col-md-3 px-4" style="background-color: #00ad83">

</div>
</div>
</div>
</div>
</div>
</div>
{% endblock content %}

```

```
{% block script %}
```

```

<script type="text/javascript"> function generate_graph1() {}
</script>
{% endblock script %}

```

dashboard.html



```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Dashboard</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'dashboard' %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h4 style="color:red;">{{ msg }}</h4>
```

```
<h3 style="color:black; text-align: center;">Welcome Back! {{ email  
}}</h3>
```

```
<div class="d-flex justify-content-end">
```

```

```

```
<h4 style="margin-left:10px;">Wallet Balance: <span><h5  
style="display:inline"><i>{{wallet}}</i></h5></span></h4>
```

```
<a href="updatebalance"></a>
```

```
</div>
```

```
<h3>Here are your expenses:</h3>
```

```
<div class="card-deck">
```

```
{% for expense in expenses %}
```

```
<div class="card shadow-lg bg-white rounded" style="margin: 20px;width:20rem;  
height:20rem;">
```

```
<div class="card-header" style="text-align: center;">
```

```
<h4>Expense {{loop.index}}</h4>
```

```
</div>
```

```

<div class="card-body">
<h6 class="card-text"> Amount Spent:
<span style="color:#00AD83"> Rs
{{expense['EXPENSE_AMOUNT']}}</span>
<br><br> Description:

<span style="color:#00AD83">{{expense['DESCRIPTION']}}</span>
<br><br> Category:
<span style="color:#00AD83">{{expense['CATEGORY_NAME']}}</span>
</h6>
<a href="/modifyexpense?expenseid={{expense['EXPENSEID']}}">Modify</a>
</div>

<div class="card-footer text-muted" style="text-align:center">
<h6>Date on which Expense was made: <span
style="color:#00AD83">{{expense['DATE']}}</span></h6>
</div>
</div>
{% endfor %}
</div>

</div>
{% endblock content %}

```

login.html

```

<!doctype html>
<html lang="en">
<head>
<!-- Required meta tags -->
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">

```

```
<!-- Bootstrap CSS -->
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min.css"
rel="stylesheet"
integrity="sha384-EVSTQN3/azprG1Anm3QDgpJLIm9Nao0Yz1ztcQTwFspd3yD65Vohhpuu
COmLASjC" crossorigin="anonymous">

<title>Login</title>
</head>
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle
.min.js"
integrity="sha384-MrcW6ZMFYlzcLA8NI+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/t
WtlaxVXM" crossorigin="anonymous"></script>

<body style="background-color:#B2D3C2">
<div class="container mt-3">

<h1 style="color: black; text-align: center;">
Personal Expense Tracker 
</h1>
<div class="container mt-5" style="width: 600px;">
<h4>{{ msg }}</h4>
<div class="card shadow-lg bg-white rounded">
<div class="card-header" style="text-align:
center;">

<h4>Login</h4>
</div>
<div class="card-body">
<form action="/login" method="POST">
```

```
<div class="mb-3">
<label for="email"

class="form-label">Email: </label>

<input type="email" class="form-control" name="email" id="email"
placeholder="abc@gmail.com">

</div>

<div class="mb-3">
<label for="passowrd" class="form-label">Password: </label>

<input type="password" class="form-control" name="password" id="password"></input>

</div>

<button type="submit" style="background-color:#00AD83; border-color:#00AD83; border-
radius:5px;">Login</button>

</form>

</div>

<div class="card-footer text-muted" style="text-align:center">
New user? <span><a href="/">Register

Here</a></span>
```

```
</div>
</div>
</body>
</html>
modifyexpense.html
```

```
</div>
</div>
```

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Modify Expense</title>
```

```
{% endblock title %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h3 style="color:white; text-align: center;">Modify expense</h3>
```

```
<div class="container mt-3" style="width: 600px;">
```

```
<div class="card shadow-lg bg-white rounded">
```

```
<form action="/modifyexpense" method="POST">
```

```
<div class="card-header" style="text-align: center;">
```

```
<span style="display:inline-flex">
```

```
<h4>Expense Made</h4>
```

```

```

```
</span>
```

```
</div>
```

```
<div class="card-body">
```

```
<div class="mb-3">
```

```
<label for="amountspent" class="form-label">Amount
```

```
Spent: (Rs) </label>
```

```
<input type="number" class="form-control"
```

```
name="amountspent" id="amountspent" placeholder="100.00" value="{{expense['EXPENSE_AMOUNT']}}" required>
```

```
</div>
```

```
<div class="mb-3">
```

```
<label for="expensecategory" class="form-label">Expense Category: </label>
```

```
<select name="category" id="category" class="form-control" placeholder="Select a category">
<option value="">Select a category</option>
{% for category in categories %}
<option value="{{ category[0] }}"
{{ 'selected' if expense['CATEGORYID'] == category[0] }}>{{ category[1]
}}</option>
{% endfor %}
</select>
</div>
```

Expense: </label>

```
<div class="mb-3">
<label for="date" class="form-label">Date of

<input type="date" class="form-control"

name="date" id="date" value="{{ expense['DATE'] }}" required></input>
</div>
```

```
<div class="mb-3">
<label for="description" class="form-label">Description of Expense: </label>
<input type="text" class="form-control" name="description" id="description"
value="{{ expense['DESCRIPTION'] }}"></input>
</div>
```

needed): </label>

<div class="mb-3">

<label for="group" class="form-label">Group(if

<div title="New group" style="float:right"

value="Create group" onclick="addGroup()">ADD GROUP</div><br/>

class="form-control"> group</option>

<select name="group" id="group"

<option value="">Select existing

{% for group in groups %}

<option value="{{ group[0] }}"

{{ 'selected' if expense.get('GROUPID') and expense.get('GROUPID') == group[0] }}>{{ group[1] }}</option>

{% endfor %}

</select>

</div>

<input type="hidden" name="expenseid" value="{{ expense['EXPENSEID'] }}" />

<input type="hidden" name="oldamountspent" value="{{ expense['EXPENSE\_AMOUNT'] }}" />

</div>

<div class="card-footer text-muted" style="text-align:center">

```
<button type="submit" value="submit" style="background-color:#00AD83; border-color:#00AD83; border-radius:5px;">Submit Expense</button>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```

```
{% block script %}
```

```
<script>
```

```
function addGroup(e) {
```

```
// e.preventDefault();
```

```
group = window.prompt('Enter group name: ') console.log('PROMPT WINDOW SHOWN'+group);
```

```
const formData = new FormData(); formData.append("groupname", group);
```

```
const xhttp = new XMLHttpRequest(); xhttp.onload = function() {
```

```
if (this.readyState == 4 && this.status == 200) { var groupid= JSON.parse(this.responseText); console.log(groupid);
```

```
// create option using DOM
```

```
const newOption = document.createElement('option'); const optionText =
```

```
document.createTextNode(groupid['groupname']);
```

```
newOption.appendChild(optionText); newOption.setAttribute('value',groupid['groupID']);
```

```
const selectDropdown = document.getElementById('group');
```

```
selectDropdown.appendChild(newOption); console.log('GROUPID :'+ groupid['groupID']);
```

```
}
```

```
}
```

```
xhttp.open("POST", "http://localhost:5000/addgroup"); xhttp.send(formData);
```

```
}
```

```
</script>
```



```
{% endblock script %}
```

recurringexpense.html

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Recurring Expense</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'recurringexpense' %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h3 style="color:white; text-align: center;">Add Recurring Expense</h3>
```

```
<div class="container mt-3" style="width: 600px;">
```

```
<div class="card shadow-lg bg-white rounded">
```

```
<form action="/recurringexpense" method="POST">
```

```
<div class="card-header" style="text-align: center;">
```

```
<span style="display:inline-flex"><h4>Expense
```

```
Made</h4></span>
```

```
</div>
```

```
<div class="card-body">
```

```
<div class="mb-3">
```

```
<label for="amountspent" class="form-label">Amount
```

```
Spent: (Rs) </label>
```

```
<input type="number" class="form-control"
```

```
name="amountspent" id="amountspent" placeholder="100.00" required>
```

```
</div>
```

```
<div class="mb-3">
<label for="expensecategory" class="form-label">Expense Category: </label>
<select name="category" id="category" class="form-control" placeholder="Select a
category">
<option value="">Select a category</option>
{% for cat in categories %}
<option value="{{ cat[0] }}">{{ cat[1]
}}</option>
```

Expense: </label>

```
{% endfor %}
</select>
</div>
<div class="mb-3">
<label for="date" class="form-label">Date of
<input type="date" class="form-control"
name="date" id="date" required></input>
</div>
<div class="mb-3">
<label for="description" class="form-label">Description of Expense: </label>
<input type="text" class="form-control" name="description" id="description"></input>
</div>
```

```

<!-- <div class="mb-3">
<label for="duration" class="form-label">Number of autorenewals (in months) </label>
<input type="text" class="form-control" name="autorenewals" id="autorenewals"></input>
</div> -->

<!-- <div class="mb-3"> -->
<!-- <label for="group" class="form-label">Group(if needed): </label> -->

<!-- <div title="New group" style="float:right" value="Create group" onclick="addGroup()">ADD
GROUP</div><br/>

class="form-control"> group</option>

}}</option>

<select name="group" id="group"

<option value="">Select existing

{% for group in groups %}
<option value="{{ group[0] }}">{{ group[1]

{% endfor %}
</select>
</div> -->

<!-- </div> -->

<div class="card-footer text-muted" style="text-align:center">
<button type="submit" value="submit" style="background-color:#00AD83; border-
color:#00AD83; border-radius:5px;">Submit Expense</button>
</div>

```

```

</form>
</div>
</div>
</div>
{% endblock content %}

{% block script %}
<script>
function addGroup(e) {
// e.preventDefault();

group = window.prompt('Enter group name: ') console.log('PROMPT WINDOW
SHOWN'+group);

const formData = new FormData(); formData.append("groupname", group);

const xhttp = new XMLHttpRequest(); xhttp.onload = function() {
if (this.readyState == 4 && this.status == 200) { var groupid= JSON.parse(this.responseText);
console.log(groupid);

// create option using DOM
const newOption = document.createElement('option'); const optionText =
document.createTextNode(groupid['groupname']);
newOption.appendChild(optionText); newOption.setAttribute('value',groupid['groupID']);

const selectDropdown = document.getElementById('group');
selectDropdown.appendChild(newOption); console.log('GROUPIX :'+ groupid['groupID']);
}
}

xhttp.open("POST", "http://localhost:5000/addgroup"); xhttp.send(formData);
}

document.querySelector('#date').valueAsDate = new Date();
</script>
{% endblock script %}

```

registration.html

```
<!doctype html>
<html lang="en">
<head>
<!-- Required meta tags -->
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">

<!-- Bootstrap CSS -->
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min. css"
rel="stylesheet"
integrity="sha384-EVSTQN3/azprG1Anm3QDgplJLm9Nao0Yz1ztcQTwFspd3yD65Vohhpuu
COmLASjC" crossorigin="anonymous">

<title>Registration</title>
</head>
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle
.min.js"
integrity="sha384-MrcW6ZMFYlzcLA8Nl+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/t
WtlaxVXM" crossorigin="anonymous"></script>

<body style="background-color:#B2D3C2">
<div class="container mt-3">
<h1 style="color: black; text-align: center;">
Personal Expense Tracker 
</h1>
<div class="container mt-2" style="width: 600px;">
<div class="card shadow-lg bg-white rounded">
```

center;">

<div class="card-header" style="text-align:

<h4>Registration Form</h4>

</div>

<div class="card-body">

<form action="/" method="POST">

<div class="mb-3">

<label for="email"

class="form-label">Email: </label>

<input type="email" class="form-control" name="email" id="email"  
placeholder="abc@gmail.com">

</div>

<div class="mb-3">

<label for="password" class="form-label">Password: </label>

<input type="password" class="form-control" name="password" id="password"></input>

<p style="color: gray;"

class="mt-3">Please make sure that the password meets the following requirements:</p>

<ol style="color: gray;"><li>Minimum of 8 characters</li><li>Contains an upper case and a  
special character</li></ol>

</div>

<div class="mb-3">

<label for="confirmpassword" class="form-label">Confrim Password: </label>

<input type="password" class="form-control" name="confirmpassword"  
id="confirmpassword" placeholder="\*\*\*\*\*">

</div>

<div class="mb-3">

<label for="wallet" class="form-label">Initial Wallet Amount (Rs): </label>

<input type="number" class="form-control" name="wallet" id="wallet"  
placeholder="10000.00">

```

</div>

<button type="submit" style="background-color:#00AD83; border-color:#00AD83; border-
radius:5px;">Register</button>

</form>

</div>

<div class="card-footer text-muted" style="text-align:center">
Already an existing user? <span><a href="login">Login Here</a></span>
</div>

</div>

</div>

</div>

</div>

</body>

</html>

```

rewards.html

```

{% extends 'base_template.html' %}

{% block title %}
<title>Goals and Rewards</title>
{% endblock title %}

{% set highlight = 'rewards' %}

{% block content %}

<div class="col py-3" style="background-color:#00AD83">

<h3>Here are your current rewards and goals:</h3>
<div class="card-deck">
<!-- {% set count = 1 %} -->

```

```
{% for goal in goals %}
```

```
<div class="card shadow-lg bg-white rounded" style="margin: 20px; width: 20rem; height: 20rem;">
```

```
<div class="card-header" style="text-align: center;">
```

```
<h4>Goal and Reward {{loop.index}}</h4>
```

```
</div>
```

```
<div class="card-body">
```

```
<h6 class="card-text">Amount Set: <span style="color: #00AD83"> Rs {{goal[0]}}</span>
```

```
<br><br>Reward: <span style="color: #00AD83">{{goal[2]}}</span></h6>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align: center;">
```

```
<h6><br><br>Date of Validity: <span style="color: #00AD83">{{goal[1]}}</span></h6>
```

```
</div>
```

```
</div>
```

```
{% endfor %}
```

```
</div>
```

```
<div style="text-align: center; margin-top: 5px">
```

```

```

```
<a href="addgoal" style="color: black; text-decoration: none;"><h4 style="display: inline">Add Goal and Reward</h4></a>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```



setmonthlylimit.html

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Set Monthly Limit</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'setmonthlylimit' %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h3 style="color:white; text-align: center;">Set Monthly Limit</h3>
```

```
<div class="container mt-3" style="width: 600px;">
```

```
<div class="card shadow-lg bg-white rounded">
```

```
<form action="/setmonthlylimit" method="POST">
```

```
<div class="card-header" style="text-align: center;">
```

```
<span style="display:inline-flex">
```

```
<h4>Monthly Limit</h4>
```

```

```

```
</span>
```

```
<div class="card-body">
```

```
<div class="mb-3">
```

```
<label for="monthlylimit"
```

```
class="form-label">Maximum amount allowed this month: (Rs) </label>
```

```
<input type="number" class="form-control" name="monthlylimit" id="monthlylimit"
placeholder="5000.00" required>
```

```
</div>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align:center">
```

```
<button type="submit" value="submit" style="background-color:#00AD83; border-color:#00AD83; border-radius:5px;">Set Monthly Limit</button>
```

```
</div>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```

updatebalance.html

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>Update Balance</title>
```

```
{% endblock title %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h3 style="color:white; text-align: center;">Update Balance</h3>
```

```
<div class="container mt-3" style="width: 600px;">
```

```
<div class="card shadow-lg bg-white rounded">
```

```
<form action="/updatebalance" method="POST">
```

```
<div class="card-header" style="text-align: center;">
```

```
<span style="display:inline-flex"><h4>Wallet
```

```
Balance</h4></span>
```

```
</div>
```

```
<div class="card-body">
<div class="mb-3">
<label for="category" class="form-label">Current

Balance: </label>
```

```
Balance: </label>
```

```
<input type="text" value="{{wallet}}" readonly>
</div>
<div class="mb-3">
<label for="description" class="form-label">New
```

```
<input type="text" class="form-control"
```

```
name="balanceupdated" id="balanceupdated"></input>
```

```
</div>
```

```
</div>
```

```
<div class="card-footer text-muted" style="text-align:center">
```

```
<button type="submit" style="background-color:#00AD83; border-color:#00AD83; border-
radius:5px;">Update Balance</button>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
{% endblock content %}
```

viewrecurring.html

```
{% extends 'base_template.html' %}
```

```
{% block title %}
```

```
<title>View Recurring Expenses</title>
```

```
{% endblock title %}
```

```
{% set highlight = 'viewrecurring' %}
```

```
{% block content %}
```

```
<div class="col py-3" style="background-color:#00AD83">
```

```
<h4 style="color:red;">{{ msg }}</h4>
```

```
<h3 style="color:black; text-align: center;">Welcome Back! {{ email  
}}</h3>
```

```
<div class="d-flex justify-content-end">
```

```

```

```
<h4 style="margin-left:10px;">Wallet Balance: <span><h5  
style="display:inline"><i>{{wallet}}</i></h5></span></h4>
```

```
<a href="updatebalance"></a>
```

```
</div>
```

```
<h3>Here are your expenses:</h3>
```

```
<div class="card-deck">
```

```
<!-- {% set count = 1 %} -->
```

```
{% for expense in expenses %}
```

```

<div class="card shadow-lg bg-white rounded" style="margin: 20px;width:20rem;
height:20rem;">

<div class="card-header" style="text-align: center;">

<h4>Expense {{loop.index}}</h4>

</div>

<div class="card-body">

<h6 class="card-text">Amount Spent: <span style="color:#00AD83"> Rs
{{expense[0]}}</span>

<br><br>Reason: <span style="color:#00AD83">{{expense[1]}}</span>

<!-- <br><br>Category: <span style="color:#00AD83">{{expense[3]}}</span></h6> -->

<br><br> <button type = "button" name = "{{expense[1]}}" onclick="removeExpense(name)">
Remove Expense </button>

</div>

<div class="card-footer text-muted" style="text-align:center">

<h6>Date on which Expense was initiated: <span
style="color:#00AD83">{{expense[2]}}</span></h6>

</div>

</div>

{% endfor %}

</div>

{% endblock content %}

{% block script %}

<script>

function removeExpense(e) { console.log("hello");
// e.preventDefault();
// group = window.prompt('Enter group name: ')
// console.log('PROMPT WINDOW SHOWN'+group);

```

```

window.alert("cancelling " + e + " autorenewal"); const formData = new FormData();
formData.append("description", e);

const xhttp = new XMLHttpRequest(); xhttp.onload = function() {
if (this.readyState == 4 && this.status == 200) { window.location.reload
}
}
xhttp.open("POST", "http://localhost:5000/removerecurring"); xhttp.send(formData);
}
</script>
{% endblock script %}

```

Dockerfile

```

FROM debian:stable COPY ./server WORKDIR /server RUN apt-get update
RUN apt-get install -y apt-utils
RUN apt install -y build-essential libxml2 RUN apt install -y python3
RUN apt install -y python3-pip RUN rm -rf /var/lib/apt/lists/* RUN apt-get update
RUN pip3 install -r requirements.txt EXPOSE 5000
CMD [ "python3", "-m", "flask", "run", "--host=0.0.0.0"]

```

## requirements.txt

```

APScheduler==3.9.1.post1
blinker==1.5
click==8.1.3
contourpy==1.0.6
cycler==0.11.0
Flask==2.2.2
Flask-Cors==3.0.10
Flask-Mail==0.9.1
fonttools==4.38.0
ibm-db==3.1.3
itsdangerous==2.1.2

```

Jinja2==3.1.2  
kiwisolver==1.4.4  
MarkupSafe==2.1.1  
matplotlib==3.6.2  
numpy==1.23.4  
packaging==21.3  
pandas==1.5.1  
Pillow==9.3.0  
plotly==5.11.0  
pyparsing==3.0.9  
python-dateutil==2.8.2  
pytz==2022.6  
pytz-deprecation-shim==0.1.0.post0  
six==1.16.0  
tenacity==8.1.0  
tzdata==2022.6  
tzlocal==4.2  
Werkzeug==2.2.2

## 13.2 Github Link

GITHUB - <https://github.com/IBM-EPBL/IBM-Project-32603-1660210942>