1. **INTRODUCTION**

   1.1 Project Overview

Money is a great tool. Sometime though, we do not know where our money is going. The notion that people might not know where their money is going may seem strange, butmany don't know where is going, while many others might have wrong idea about where it might be going. That's why tracking expenses is very important, and it according to us, is the first step one need to take in the path for becoming financially sensible.

   1.2 Purpose

Now with this solution, we are able to enter their expenses regularly and users can get view graphical forms which allows them to grasp a quick knowledge on their spendings. This system attempts to free the user with as much as possible the burden of manual calculation and to keep the track of the expenditure. 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
   2.2 References

S.NO	AUTHOR	PAPER TITLE	YEAR	JOURNAL	FINDINGS (Technologies used)
1.	Velmurugan A, Albert Mayan, Niranjana P and Richard Francis	EXPENSE MANAGER APPLICATION	2020	Journal of Physics: Conference Series	1.Android Platform 2.Methodology used Android Studio, Kotlin and Java, SQLite, Android OS, Figma Designing Tool.

2.	Uday Pratap Singh,Aakas hKumar Gupta, Balamurugan	SPENDING TRACKER: A SMART APPROACH TOTRACK DAILY EXPENSE	2021	Turkish Journal of Computer and Mathematics Education	1.This Application isa Graphical User Interface(GUI) 2.Developed using Java(Apache NetBeans 11.3) and MySQlWorkbench.
3.	Dr.V.Geetha,G Nikhitha,H.Srilaya Dr.C.K.Gomathy	EXPENDITURE MANAGEMEN T	2022	Journal of Computing &Architectur e	1.It is based Web Application. 2. Android App which runs on all AndroidPlatforms .
4.	TamiaRuvimbo Masendu,Aanaje yManiTripath	DAILY EXPENSE TRACKE R	2022	International Journal of Research in Engineering, Science and Management .	1.Technology usedJava(Apache NetBeans IDE 13) and MySQL Workbench . 2.Application is Based Graphical User Interface(GUI)

5.	Hezerto,Malikberdi	BUDGET TRACKER HIGHLY CUSTOMIZABLE BUDGETING MOBILE APPLICATION	2021	Master of Information Technology	1. Technology can be used React Native, Expo, Redux, Recompose, Ramda and Async Storage (Global memory of the device) 2. Visual Studio Code, Android Studio
6.	Alhano of Althnian	DESIGN OF A RULE BASED PERSONAL FINANCE MANAGEMENT SYSTEM BASED ON FINANCIAL WELL BEING	2021	International Journal of Advanced Computer Science& Application	1. Android based Application. 2. Application Programming Interface(GUI) can Be used.
7.	Hrithik Gupta, Anant Prakash Singh,Navneet Kumar and J Angelin Blessy	EXPENSE TRACKER:A SMART APPROACH TO TRACK EVEY DAY EXPENSE	2020	Journal of Computer Science and Engineering	1. Technology can be Used Java (Apache NetBeans 11.3) and MySQL Workbench 8.0 CE. 2. Graphics User Interface (GUI) based Application.

8.	Shobit Sharma and Parth Verma	VOICE OPERATED REAL TIME EXPENSE TRACKER USING REACT JAVASCRIPT	2021	Journal of Computer Science and Engineering	1.Technology can be used JavaScript and JSX, React JS. 2.It Uses MongoDB (Active database)
9.	Manuel B,Garcia, Julius P Claour	MOBILE BOOKKEEPER: PERSONAL FINANCIAL MANAGEMENT	2021	Computer Studies(FEU Institute of Technology)	1.It is cross-Platform base Mobile Application (Apache Cordova) 2.HTML5, CSS3 and JavaScript .

2.3 Problem Statement Definition

    Currently, there is no direct method present to track our daily expenditures. People make use of simpler and less effective tools such as notes which cannot provide any alerts or maintain complexity.

    Now with this solution, we are able to enter their expenses regularly and users can get view graphical forms which allows them to grasp a quick knowledge on their spendings. This system attempts to free the user with as much as possible the burden of manual calculation and to keep the track of the expenditure. They havean 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.
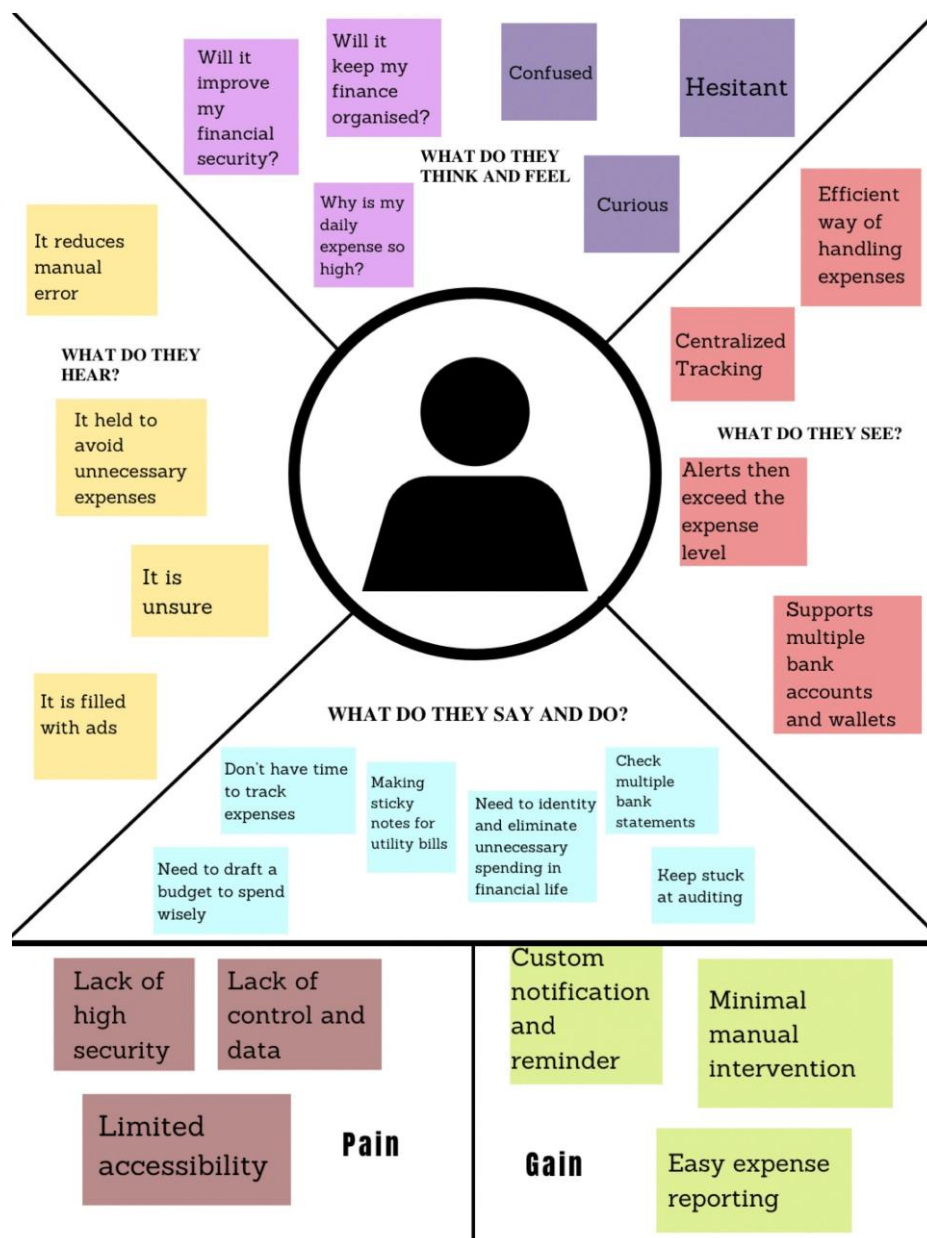

Problem Statement(PS)	I am (Customer)	I'm trying to	But	Because	Which makes mefeel
PS-1	commoner	Spend my money properly	It becomes complex	Often struck at calculation and interests	Frustratedand stressful

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a visual tool for gaining insight into a user's perspective. It's a commontechnique among user experience (UX) designers, salespeople, marketers and any other professionals who seek to understand consumer thoughts and behaviors.

By outlining various aspects of one or multiple user mindsets on a chart, you can share this information with others and collaborate easily. In addition, the process of empathizing with consumers and establishing their feelings and goals can be helpful in making essential designand business decisions.

Will it improve my financial security?

Will it keep my finance organised?

Confused

Hesitant

WHAT DO THEY THINK AND FEEL

Why is my daily expense so high?

Curious

Efficient way of handling expenses

It reduces manual error

Centralized Tracking

WHAT DO THEY HEAR?

It held to avoid unnecessary expenses

WHAT DO THEY SEE?

Alerts then exceed the expense level

It is unsure

Supports multiple bank accounts and wallets

It is filled with ads

WHAT DO THEY SAY AND DO?

Don't have time to track expenses

Making sticky notes for utility bills

Need to identity and eliminate unnecessary spending in financial life

Check multiple bank statements

Need to draft a budget to spend wisely

Keep stuck at auditing

Lack of high security

Lack of control and data

Custom notification and reminder

Minimal manual intervention

Limited accessibility

Pain

Gain

Easy expense reporting

3.2 Ideation & Brainstorming

2

Brainstorm

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

⏱ 10 minutes

GOKUL

Build Desktop Widgets for App	Colorful Visual Graphs	Gamifed reward system
Add monthly estimated income and expenditure limits	Fake Currency for children to learn with	Maintain Past History

JANANI

Light Weight Web App	Allow categories on expenditure	Multiple Login Methods
Provide multidevice support	Allow Dark Mode	

GOKUL KRISHNAN

Send Push Notifcation	Store personal information	Good UI/ UXGood UI/ UX
MongoDB (NoSQL) can be used	Implement ML algorithm to analyse the monthly spending	

DHIKSHA

Responsive Layout	Export the stats as CSV	Various types of notification and alerts
Send mail remainders when the limit exceeds	IBM Database	

③

Group ideas

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

🕐 20 minutes

4

Prioritize

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

🕐 20 minutes

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

Feasibility
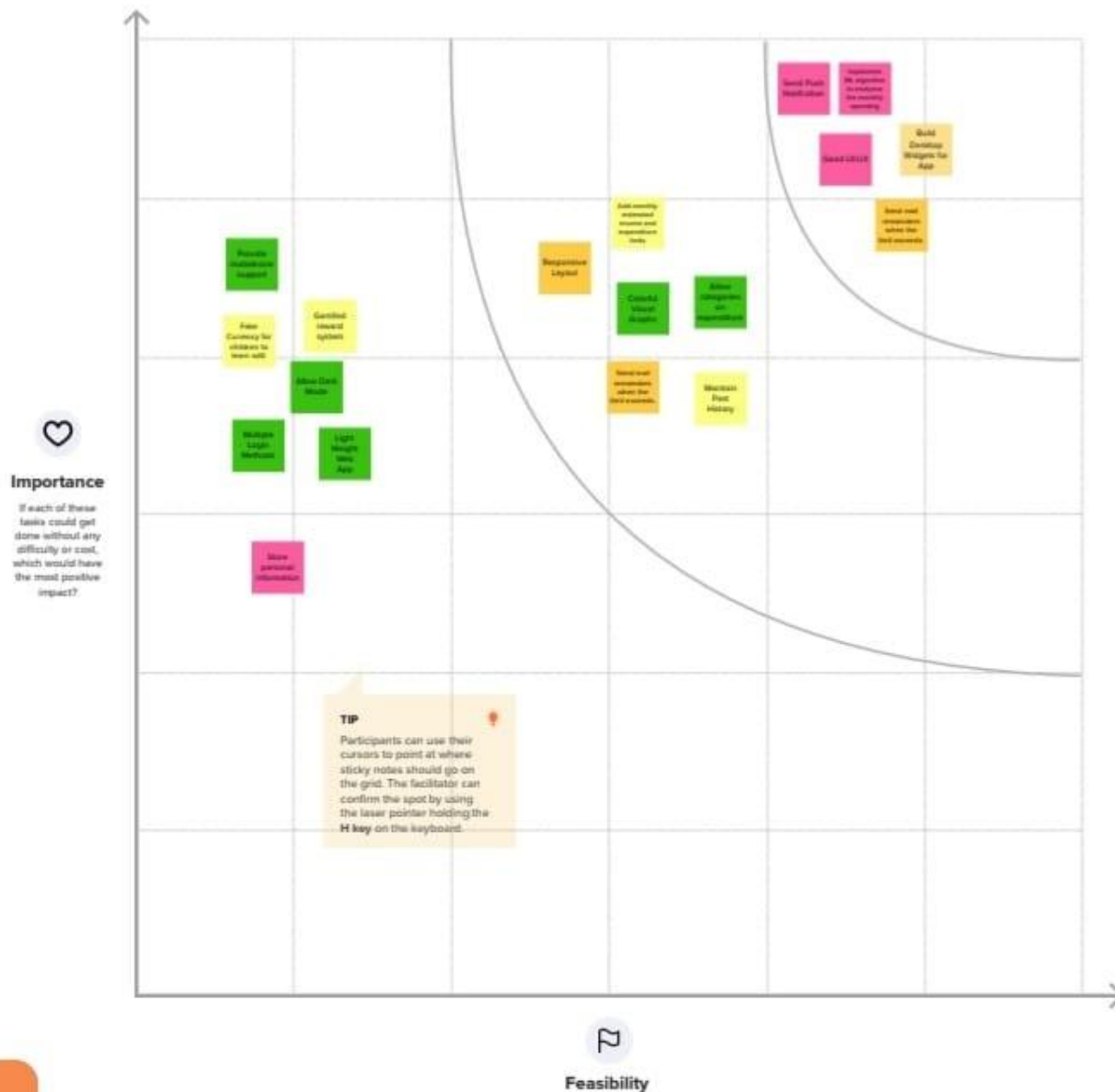
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	In a Traditional Paper based expense tracking system, it is difficult to track our monthly expenses manually. Some of the records may get lost in case of fire, floods, etc. We are trying to solve this problem in a more efficient way.
2.	Idea / Solution description	This expense tracker is a computerised application which keeps track of all your finances and helps in accounting and budgeting.
3.	Novelty / Uniqueness	The User gets notified once their expensetouches 50% 75% 90% & 100% of their limits. Display the costs on a monthly and weekly basis in a pie chart.
4.	Social Impact / Customer Satisfaction	The user will be able to Stick to their Spending Limits. They can able to scan theirbills any time thus data loss is avoided. Users can keep track of credit card bills andmake payments on time so as to not get any unwanted interests.
5.	Business Model (Revenue Model)	As this project is intended purely for educational purposes, we keep thisapplication free of cost.

6.	Scalability of the Solution	Based on an IBM cloud, the application is also scaled by Kubernetes and dockers so asto handle large scale usage. Our application can handle large numbers of users and data with high performance and security. It can adapt for both large-scale and small-scale purposes. Easily available in all kinds of devices.

1.1 Problem Solution fit

1. CUSTOMER SEGMENT(S)	6. CUSTOMER CONSTRAINTS	5. AVAILABLE SOLUTIONS
❖ Working peoples ❖ Organizations ❖ Students and families ❖ Common people with all ages canable to track their expenses.	❖ Network Issues ❖ Data Privacy ❖ Spending power ❖ Available devices	People makes use of sticky notes or diaryfor calculating their expenditure. **Pros**: 1. Didn't need any devices for calculations. **Cons**: 1. Time consuming. 2. Manual errors occur sometimes.
2. JOBS-TO-BE-DONE / PROBLEMS	**9. PROBLEM ROOT CAUSE**	**7. BEHAVIOUR**
❖ People have to track their expensesregularly. ❖ They need to keep their receipts andbills which shows their amount theyspent. ❖ Also they need to manually add orremove the desired categories.	❖ The root cause for this problem isthe delay in the budget. ❖ There may be a chance of gettingerrors in human calculations. ❖ No one alerts if their spending exceeds particular limit. They do not have enough time for calculating their expenditure.	❖ People should know their budget for each month regularly, . ❖ Collect receipts regularly without fail.

3. TRIGGERS

- ⬚ Realizing that excessive spending leadingto lack of money in case of emergencies.

- ⬚ Lack of Budgeting knowledge.

4. EMOTIONS: BEFORE /

AFTERBefore

- ❖ Excessive expenditure

- ❖ Afraid of spending

After

- ❖ Being aware of what they are spending.

- ❖ Satisfied and happy with their budgetexpenditure.

- ❖ There will not be any frustrations anymore since the process is quick and flexible.

10. YOUR SOLUTION

- ⬚ A cloud-based web application which keeps track of user's personal expenses. This system attempts to free the user withas much as possible the burden of manual calculation and to keep the track of the expenditure.

- ⬚ User just need to enter their day-to-day expenses. They also have an option to setthe limit. If their expenditure exceeds that limit, notification will be sentthrough mail.

- ⬚ This system also eliminates sticky notes,bills.

8. CHANNELS OF BEHAVIOUR

ONLINE

- ⬚ Provide the details of day-to-day expenses.

- ⬚ Select the area where customers use.

- ⬚ Maintain the expenses for budgeting.

OFFLINE

- ⬚ Maintain the required documents regularly.

- ⬚ Inspect the expenses for budgeting.

2. REQUIREMENT ANALYSIS

    2.1 Functional requirement

    2.2 Non-Functional requirements

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement(Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form by giving appropriatedetails.
FR-2	User Confirmation	Confirmation via EmailConfirmation via OTP
FR-3	User Login	login after registering properly.
FR-4	Track Expense	Tracking the expenses regularly.
FR-5	Dashboard panel	Managing the summary of expenses and income.
FR-6	Alert Notification	If the expenses exceed the limit that the user entered, notification will be sent through mail.

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This system will usable by anyone who are willing to manage their expenses and aims tosave for future investments.
NFR-2	**Security**	This system assures all data inside the system or its part will be protected against malware attacks or unauthorized access.
NFR-3	**Reliability**	Using this report expenses, store receipts, and track spending on an individual or departmentallevel is a painless process.
NFR-4	**Performance**	Calculates the overall expenses fastly and alsogenerate it in the form of pdf documents.
NFR-5	**Availability**	Users can also able to add and calculateexpenses in offline mode.
NFR-6	**Scalability**	This system has better storage capacity and alsoit provides flexibility to a product to appropriately react to growth.

3. PROJECT DESIGN

3.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the rightamount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.
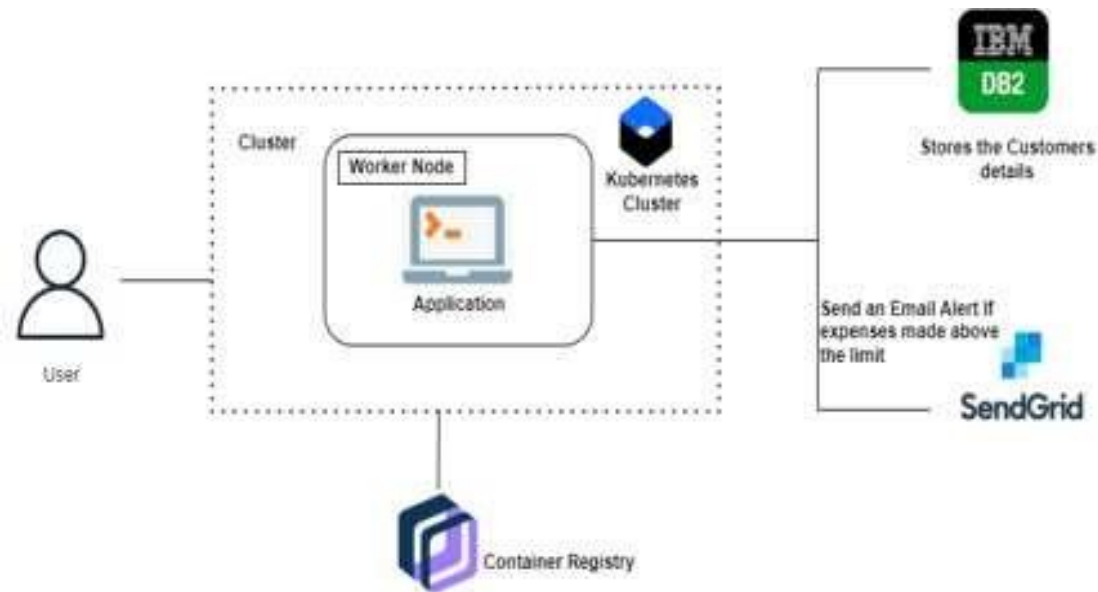
3.2 Solution & Technical Architecture   Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application via WebUI.	HTML, CSS, JavaScript, ReactJs etc.
2.	Application Logic-1	The application contains the sign in/sign up where the user will logininto the main dashboard	Python
3.	Application Logic-2	Dashboard contains the fields likeBudget, Expenses, Record	Python, ReactJs (ChartJs)
4.	Application Logic-3	The user will get the expense report in the graph form and alsoget alerts if the expense limit exceeds	IBM Watson Assistant,Send Grid
5.	Database	The Income and Expense data arestored in the MySQL database	IBM DB2
6.	Cloud Database	With use of Database Service on Cloud, the User data are stored ina well secured Manner	IBM DB2, IBM Cloudant etc.
7.	File Storage	IBM Block Storage used to store the Financial data of the user	IBM Block Storage or Other Storage Service or Local Filesystem
8.	Google OAuth	OAuth 2.0 allows users to share specific data withan application while keeping their username, passwords and other information private.	Enables login through Gmail account, thus making the application accessible

Table-2: Application Characteristics:

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

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile 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 Gmail, Google	I can register for the app through a Gmail login.	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering my email & password	I can register & access the dashboard with Gmail Login.	High	Sprint-1
	Dashboard	USN-5	As a user, I can add my day-to-day expenses regularl	I can track my expenses perfectly.	High	Sprint-2

			y.			
Custome r (Webuser)	Dashbo ard	USN-6	As a user, I can see the login page and registration page for which the user logins and inputs expenses.	I can log in through Gmail and register for expense tracking.	Medi um	Sprin t-2
Custo mer Care Execu tive	Dashbo ard	USN-7	As a customer care executive, I can solve the queries of users.	I can reply to their queries and solve their problems.	High	Sprin t-3
Administ rator	Registra tion	USN-8	As an Administrator, I can view the basic details of the user.	I can provide the login deta ils.	Medi um	Sprin t-4
	Dashbo ard	USN-9	As an administrator, I can able to view the overall progress of a user.	I can give rewards based on their progress.	Low	Sprin t-4

6.1 Sprint planning and estimation
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Homepage	USN-1	AS a user I can view the index page to see the about of the Expensetracker	20	High	Gokul Krishnan
Sprint-1	Registration	USN-2	As a User, I need to register user id and passcode for everyworkers over there in municipality	10	High	Dhiksha
Sprint-1	Login	USN-3	As a user, I need to login with user id and password to get in to thewebsite	10	High	Gokul
Sprint-2	Dashboard	USN-4	As a User, I will follow Co-Admin's instruction to reach the filling bin inshort roots and save time	20	Low	Gokul
Sprint-3	Add Expenses	USN-5	As a User I will add my expense throughout the month I spend on	10	Medium	Gokul Krishnan
Sprint-3	Total Expense Graph	USN-6	As a User I can view my expense in a graph of overview of the expenseI spend.	30	Medium	Janani

| Sprint -4 | Deployme nt incloud | USN-7 | As a User I can access the cloud to store my data of expense | 2 0 | High | Dhiks ha |

6.2 Sprint delivery Schedule

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

Sprint	Total Story Points	Durati on	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	40	6 Days	18 Oct 2022	23 Oct 2022	40	24 Oct 2022
Sprint-2	20	6 Days	25 Oct 2022	30 Oct 2022	20	31 Oct 2022
Sprint-3	40	6 Days	01 Nov 2022	06 Nov 2022	40	07 Nov 2022
Sprint-4	20	6 Days	08 Nov 2022	13 Nov 2022	20	14 Nov 2022

Velocity:

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

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

| TITLE	DESCRIPTION	DATE
Literature Survey & InformationGathering	Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc.	3 SEPTEMBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas tocapture the user Pains & Gains, Prepare list of problem statements	10 SEPTEMBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	17 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the scalability of solution ,idea, novelty business model, social impact, etc.	24 SEPTEMBER 2022
Problem Solution Fit	Prepare problem - solution fitdocument	01 SEPTEMBER 2022
Solution Architecture	Prepare solution architecture document.	01 SEPTEMBER 2022
Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	08 OCTOBER 2022

Functional Requirement	Prepare the functional requirement document.	15 OCTOBER 2022
Data Flow Diagrams	Prepare the functional requirement document.	15 OCTOBER 2022
Technology Architecture	Prepare the technology architecture diagram.	15 OCTOBER 2022
Prepare Milestone & ActivityList	Prepare the milestones & activitylist of the project.	18 OCTOBER 2022
Sprint Delivery Plan	Prepare sprint delivery plan	18 OCTOBER 2022
Project Development - Delivery ofSprint-1, 2, 3 & 4	Develop & submit the developedcode by testing it.	IN PROGRESS…

7.Coding and Solutions
Feature1
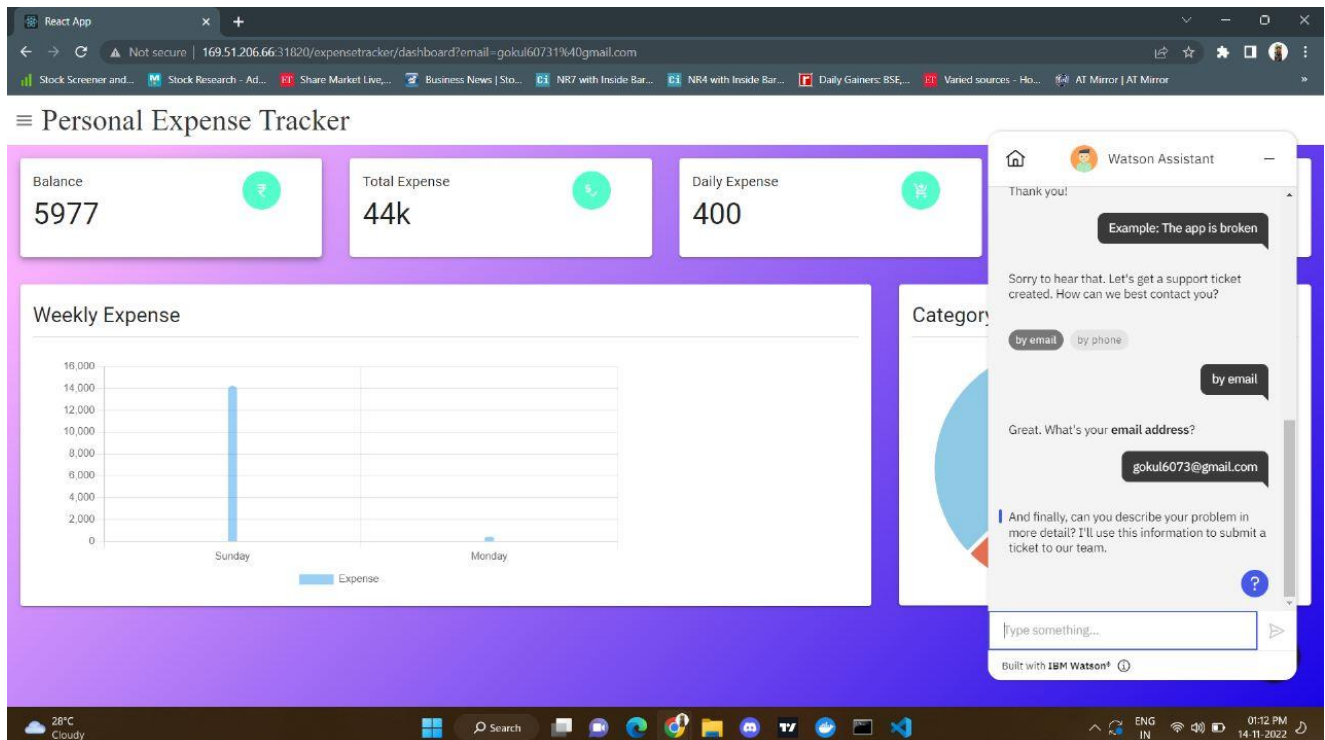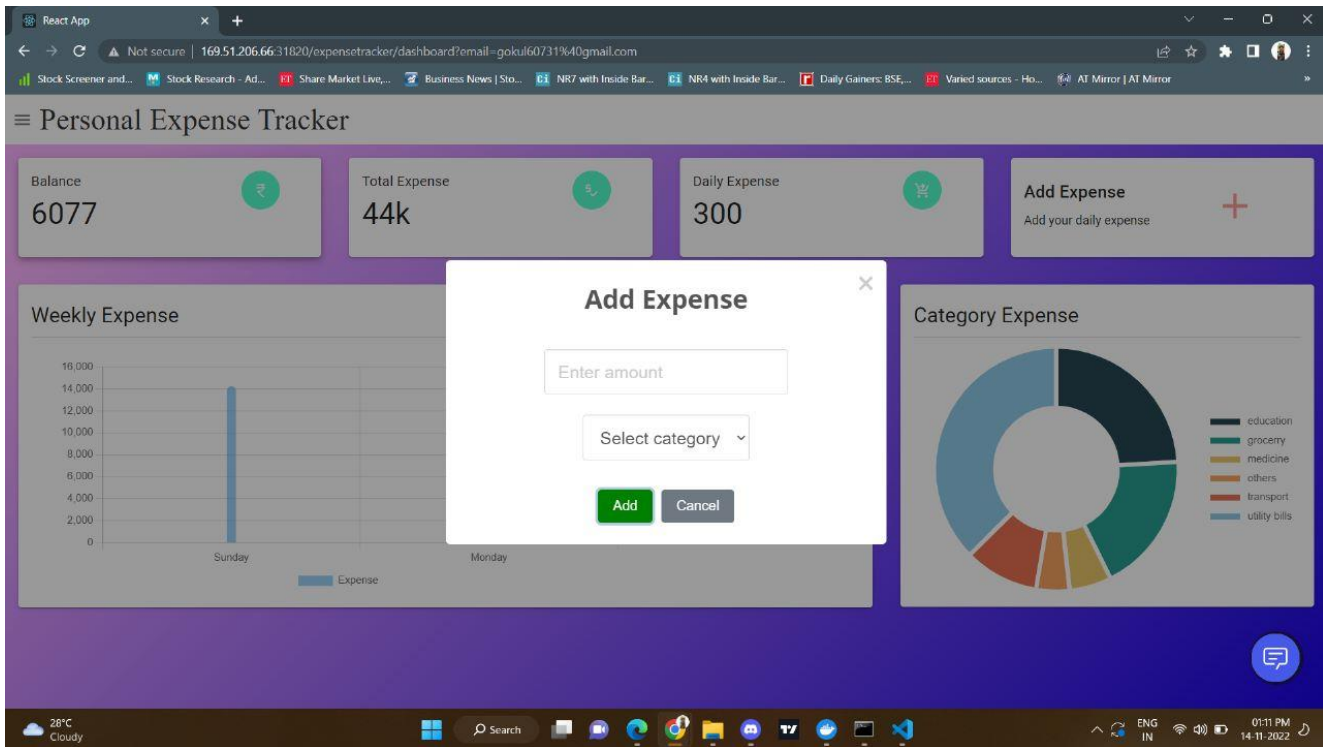
Feature 2:
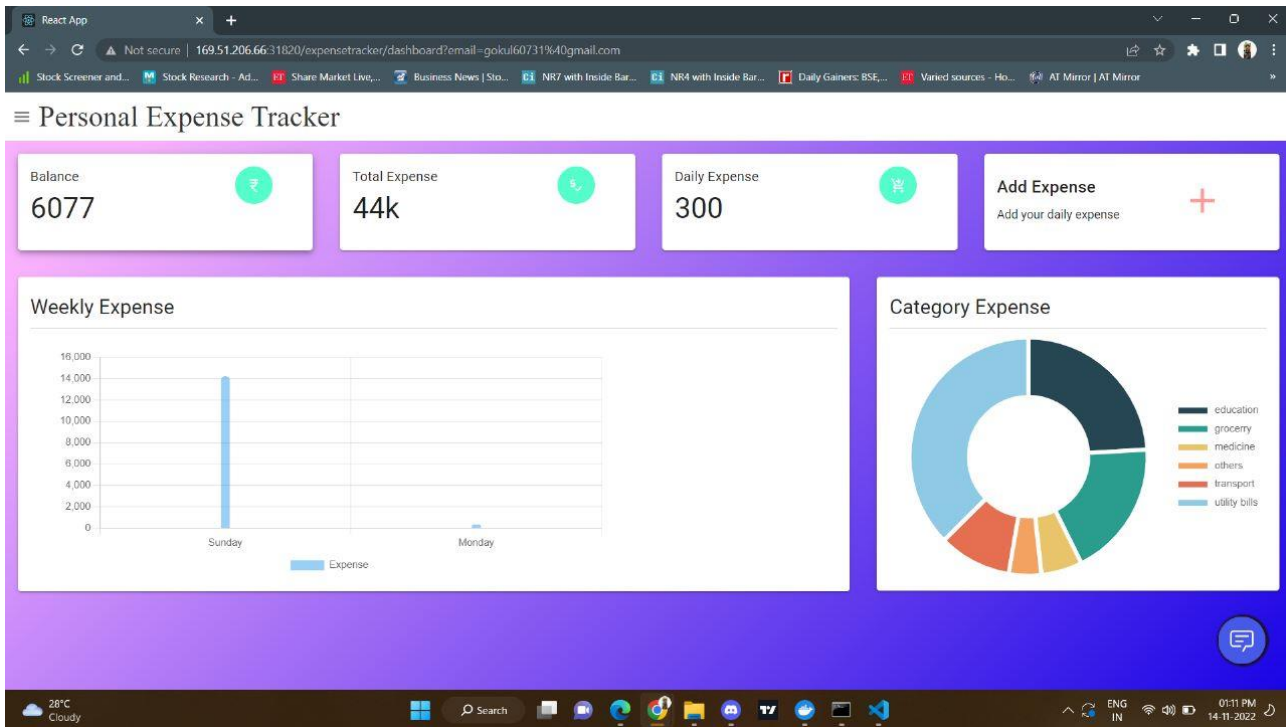
9. Advantages and Disadvantages

One of the major pros of tracking spending is always being aware of the state of one's personal finances.

Another pro is that many automatic spending **tracking software** programs are available for free.

By tracking business expenses daily, you can also control costs, and see what you're spending your money on and how much you're spending. T

These daily figures become your marker to see whether you're over or under your monthly budget. The entire process helps you become more financially aware.

A con with any system used to track spending is that one may start doing it then taper off until it's forgotten about all together.

Yet, this is a risk for any new goal such as trying to lose weight or quit smoking. If a person first makes a budget plan, then places money in savings before spending any each new pay period or month, the tracking goal can help.

In this way, tracking spending and making sure all receipts are accounted for only needs to be done once or twice a month.

Even with constant tracking of one's spending habits, there is no guarantee that financial goals will be met.

Although this can be considered to be a con of tracking spending, it could be changed into a pro if one makes up his or her mind to keep trying to properly manage all finances.

Another con that may occur when spending is being tracked is an error, but this may also be able to be changed into a pro if the person does regular tracking.

Frequent tracking of cash spending can allow one to catch and correct errors so that the budget plan is still able to be adhered to despite the mistake.

10. Conclusion:

The project that we have developed works efficiently to track income and expense tracker. The project successfully avoids the manual calculation for avoiding calculating the income and expenses per month. The modules are developed with efficiency and also in an attractive manner. The developed systems dispense the problem and meet the needs by providing reliable and comprehensive information. All the requirements projected by the user and IBM have been met by the system.

11. Future scope

Social Impact / Customer Satisfaction: The user will be able to Stick to their Spending Limits. They can able to scan their bills at any time thus data loss is avoided. Users can keep track of credit card bills and make payments on time so as to not get any unwanted interest.

Business Model (Revenue Model): As this project is intended purely for educational purposes, we keep this application free of cost.

Scalability of the Solution: Based on an IBM cloud, the application is also scaled by Kubernetes and dockers so as to handle large-scale usage. Our application can handle large numbers of users and data with high performance and security. It can adapt for both large-scale and small-scale purposes. Easily available on all kinds of devices.

12. Appendix

GIT hub link:

https://github.com/IBM-EPBL/IBM-Project-24979-1659951577

source code:

https://github.com/IBM-EPBL/IBM-Project-24979-1659951577