

**NALAIYA THIRAN PROJECT BASED LEARNING ON
PROFESSIONAL READLINESS FOR INNOVATION,
EMPLOYNMENT AND ENTREPRENEURSHIP**

Personal Expense Tracker Application

IBM-Project-7312-1658852375

A PROJECT REPORT

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1.INTRODUCTION

1.1 Project Overview

Category: Cloud App Development

Team ID: PNT2022TMID35388

Skills Required:

IBM Cloud, HTML, CSS, JavaScript, IBM Cloud Object Storage, Python-Flask,

Kubernetes, Docker, IBM DB2, IBM Container Registry

Project Description:

Income and Expense Tracker is used to maintain data of daily, weekly, monthly, yearly expenses, Manages your expenses and earnings in a simple and intuitive way. The web application “Personal Expense Tracker” is developed to manage the daily expenses in a more efficient and manageable way. By using this application, we can reduce the manual calculations of the daily expenses and keep track of the expenditure. This application will ask users to add their expenses and based on that their expenses wallet balance will be updated which will be visible to the user. Also, users can get an analysis of their expenditure in graphical forms. They have an option to set a limit for the amount to be used for that particular month if the limit is exceeded the user will be notified with an email alert.

1.2 Purpose

In this project we propose a web application known as “Personal Expense Tracker” which is helpful to manage out income and expense. It also acts as an indicator or reminder in the fastest world which we can't be able to remember what are the things we have to do for the end of month and what are the payments we have to pay for the particular month. This application will help us to make a note for what or the things we have to do for the end of month. For example, like how much it expenses for monthly and what are the expenses for a month. In this fast-moving world this web application will be very useful for a people who was a family and especially for a business people. Budgeting is an integral part of the society. Budget Tracking involves recording and analyzing the incomes and expenses of a person or an organization over a particular period of time. Today, since we are living in a hurry up and get it done society, many people are looking forward to efficient ways to budget their time and money. During the recent years, some research has been carried out on household budget. It has been noted that in most cases, budget management is being done mentally and never being put on paper which makes Budget Tracking difficult.

2.LITERATURE SURVEY

2.1 Existing problem

In a study conducted by Forrester in 2016 surveying small and medium businesses (SMBs) across the world, 56% companies reported expense management as being the biggest challenge for their finance departments. In another survey conducted by Level Research in 2018 in North America, respondents reported the following pain points in expense management before adopting automation:

- Manual entry and routing of expense reports (62%)
- Lack of visibility into spend data (42%)
- Inability to enforce travel policies (29%)
- Lost expense reports (24%)
- Lengthy expense approval system and reimbursement cycles (23%)

2.2 References

S.NO	TITLE	AUTHOR	ABOUT	ADVANTAGES/ DISADVANTAGES
1	D2D Expense tracker application	Anjali Kumara, Utkarsh Raj	It aims to assist everybody to understand their expenses and save from it. User will outline their own classes for expense sort like food, clothing, rent and bills wherever they need to enter the cash that has been spent and can also add some info in further info to specify the expense.	The main advantages are it keeps track of all our daily Transaction, keeps track of our Money lent or borrowed. It has a disadvantage of occupying lots of space.
2	Expense tracker	Atiya Kazi, Praphulla.S	This project is an android app which is used to track the daily expenses of the user. It is like digital record keeping which keeps the records of expenses done by a user. The application keeps the track of the Income and Expenses both of user on a day-to-day basis.	It has an advantage of suggesting us with the most effective investment Options. The main disadvantage is that, the work being done is not accurate.

3	Expenditure management system	Dr.V. Geetha, G. Nikhitha	In this project a weekly, monthly, and yearly basis, details of expenses will be displayed in the form of a pie chart. It aids us in remembering and adding information about what money we receive from others and what costs or payments we must make on a given date or month.	The main advantage is that it takes care of our Finance saving and investment but has the difficulty in Searching and Referencing.
4	Expense Tracker	Miriam Thomas	By using this application, we can reduce the manual calculations of the daily expenses and keep track of the expenditure. In this application, user can provide his income to calculate his total expenses per day and these results will be stored for each user.	The Project Effectively Keeps Away from The Manual Figuring, but has the difficulty in Generation of the Report.
5	Tracking Expenses by Commodity at Widget Farmers' Cooperative	Ramasamy	Widget Farmers Coop (WFC) is a large retail agricultural supply cooperative with 12 locations in two states. It has over 40 million dollars in annual sales each year since its creation in 2004. WFC management would like to track expenses and identify areas of the business that are profitable and capitalize on them, as well as identify areas that are not profitable and realign or eliminate them.	It has the advantage of helping in the awareness of Poor Spending Habits but has the disadvantages in Time Consumption.

2.3 Problem Statement Definition

PROBLEM STATEMENT:

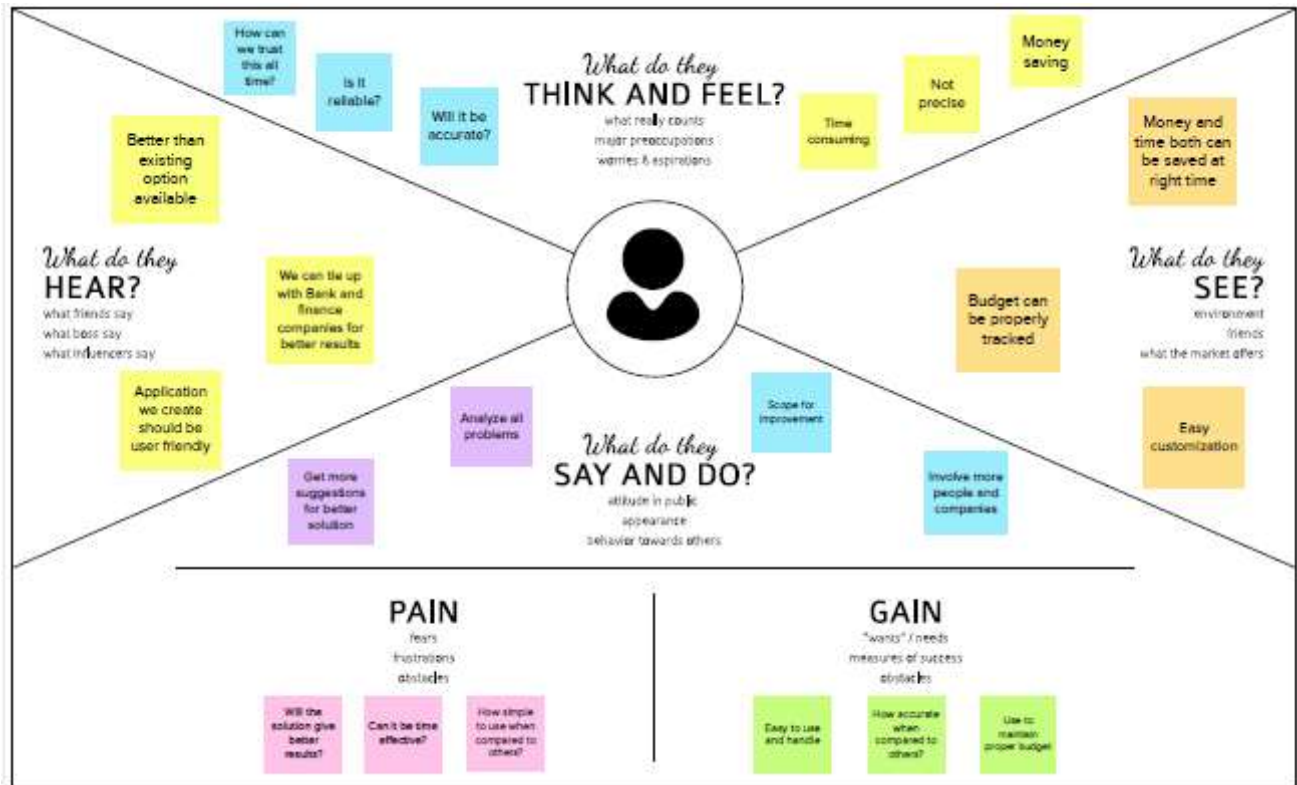
Many organizations have their own system to record their income and expenses, which they feel is the main key point of their business progress. It is good habit for a person to record daily expenses and earning but due to unawareness and lack of proper applications to suit their privacy, lacking decision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

Who does the problem affect?	People getting regular wages.
What is the issue?	The paper-based expense tracker system does not provide the user portability, existing system only used on paper-based records so unable to update anywhere expenses done and unable to update the location of the expense details disruptive that the proposed system.

When does the issue occurs?	When the digits could not be recognized correctly. When the transactions are not successful. When the elder people unable to understand the smaller handwritten digits. When the paper-based expense tracker records are subjected to fire accident, flood, etc.
Where is the issue occurring?	The issue occurs when the person is unable to track his income and expenditure.
Why is it important that we fix the problem?	By solving this issue those people getting regular wages can track their expenses and avoid unwanted expenses.

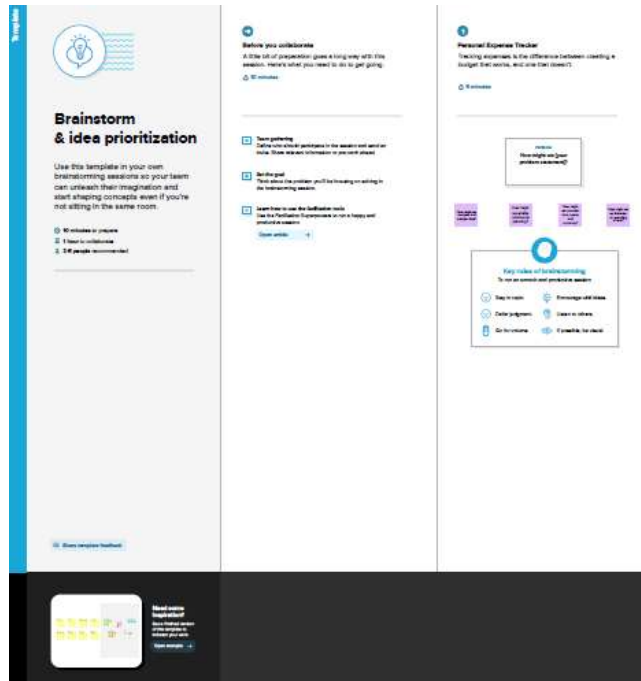
3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map

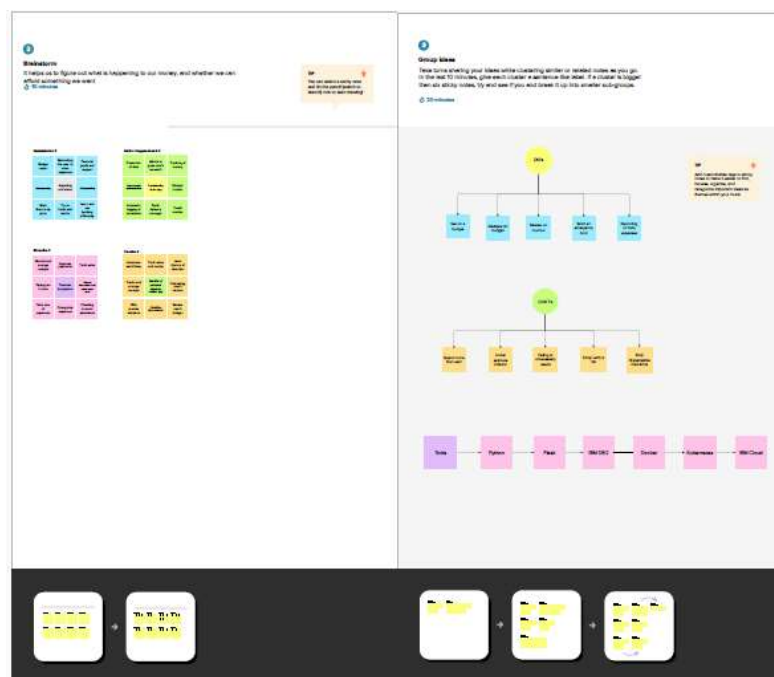


3.2 Idea on & Brainstorming

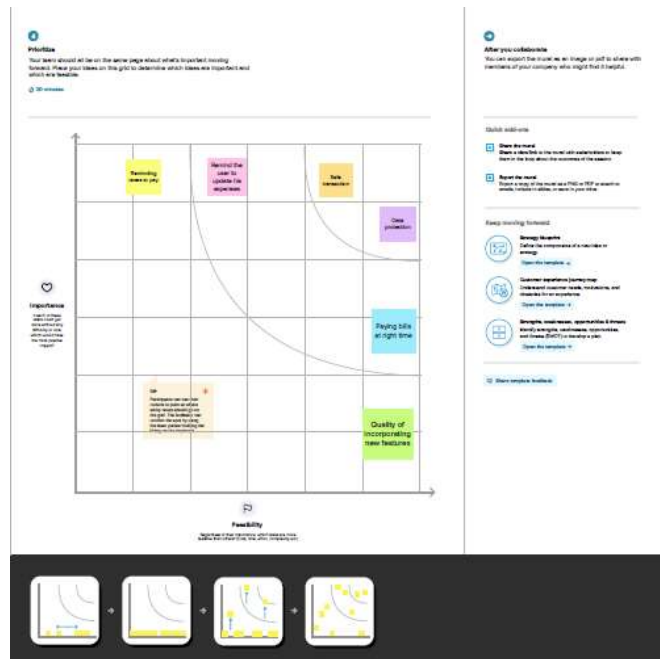
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea listening and Grouping



Step-3: Idea Prioritization



3.3 Proposed Solution

S.NO.	Parameter	Description
1.	Problem Statement	The sole reason behind the need for this application is that when we start finding out where we are spending your money, it becomes easy to figure out how we can save money by cutting back or even eliminating spending in some areas.
2.	Idea / Solution description	Daily expense management system which is specially designed for non- salaried and salaried personnel for keeping track of their daily expenditure with easy and effective way through computerized system which tends to eliminate manual paper works.
3.	Novelty / Uniqueness	It will be an approach for people to control their spending better in more efficient ways. The Expenses Tracker System is developed to keep track of users' spending and make a prediction for their budget monthly.
4.	Social Impact / Customer Satisfaction	The application should be able to generate reports of their spending and notify users if they have exceeded their budget. It is designed to be dynamic to produce the prediction. It also provides users' personal information, their income as well as their expenses.
5.	Business Model (Revenue Model)	This application shall act as a simple tool for smaller businesses and freelancers to track where money is going. It also lets them create budgets and goals within the app, and track your credit score.
6.	Scalability of the Solution	Scalability refers an application that can be adapted to a bigger scale than just the local context. This application can adapt for both large-scale and small-scale purposes.

3.4 Problem Solution fit

<p>1. CUSTOMER SEGMENT(S) Who is your customer? i.e. working parents of 0-5 y.o. kids</p> <p>CS</p> <ol style="list-style-type: none"> 1) Small scale companies to make the process of budget in an easier way. 2) Used by lenders to keep their account in precised manner 3) Aged between 20-65 are the most common age group of customers for this application. 	<p>6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices</p> <p>CC</p> <ol style="list-style-type: none"> 1) There are chances of discrepancy between the actual budget and the practical budget. 2) Due to many scam websites among the network customer may have the question on the reliability. 	<p>5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem? or need to get the job done? What have they tried in the past? What price & how do those solutions have? i.e. pen and paper</p> <p>AS</p> <ol style="list-style-type: none"> 1) Evaluation of the budget 2) Faster calculation of budget to the customers. 3) Email is alert is sent to the necessary times.
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<p>2. JOBS-TO-BE-DONE / PROBLEMS Which jobs to be done (or problems) do you address for</p> <p>JD</p> <ol style="list-style-type: none"> 1) Data collection 2) Sending the email at right time 3) Sufficient documentation 4) Lack of awareness among consumers 	<p>9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the task</p> <p>RC</p> <ol style="list-style-type: none"> 1) The root cause for this problem is the delay in the budget. 2) Another cause is the lack of proper input. 3) Improper input leads to lack of trust among consumer 	<p>7. BEHAVIOUR i.e. identify relevant fact the right action point needed, behaviour</p> <p>BE</p> <ol style="list-style-type: none"> 1) The consumer should capture the correct budget. 2) Upload correct inputs in the application
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<p>3. TRIGGERS What trigger events is will be setting that trigger something like push, notify, share, connect, share in the app</p> <p>TD</p> <ol style="list-style-type: none"> 1) Lack of budgeting knowledge. 2) Inadequate input. <p>4. EMOTIONS BEFORE / AFTER How do customers feel about their task/budgeting to work and afterwards? i.e. how, because it is difficult, it is easy, need to stop, immediate response to them</p> <p>EM</p> <ol style="list-style-type: none"> 1) The user will have more trust because we provide good user friendly environment 2) There will not be any frustration any more since the process is quick and flexible. 3) As time is very much saved, people will find this application as boon for budgeting. 	<p>10. YOUR SOLUTION What are existing or emerging business, service, product or system solutions that all or the users, and that they need in the market? How are existing or a new business proposition, idea being a fresh and you will be the same with some up with a different idea for solving customer problems, which is problem and another customer behaviour</p> <p>Personal Expense Tracker Application falls in the Finance Category and serves the important purpose of managing finances which is a very important part of one's life. The main purpose of this application is</p> <ul style="list-style-type: none"> ◆ Maintain computerized diary ◆ Track of expenses of a user on a day-to-day basis. ◆ Categorize distribution of the expenses 	<p>8. CHANNELS OF BEHAVIOUR i.e. JOURNAL What kind of platform do customers use to interact? Through online resources, how do?</p> <ul style="list-style-type: none"> ◆ Provide the details of day-to-day expenses ◆ Select the area where consumer use ◆ Upload the expenses for budgeting <p>6.1 OFFLINE What kind of platform do customers use to interact? Through offline resources, how do?</p> <ul style="list-style-type: none"> ◆ Expense form has to be filled ◆ Required documents have to be submitted ◆ Inspect the expenses for budgeting
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4. REQUIREMENT ANALYSIS

4.1 Functional requirement

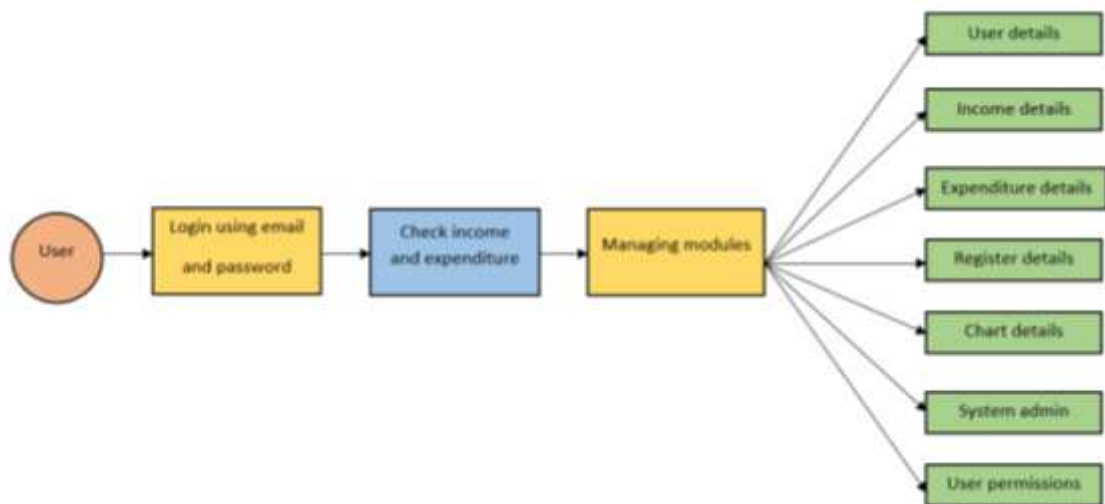
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Email through Application Registration.
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Expense Data Month wise	Data to be registered in the app
FR-4	User Monthly Income	Data to be registered in the app
FR-5	Notifications	Notified through email and SMS
FR-6	User Budget Plan	Comparing income and expenditure

4.2 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Efficient and gain, overall satisfaction of the user while interacting with our application
NFR-2	Security	Authenticated and encrypted application
NFR-3	Reliability	Probability of failure is very low in specified environment and in specified time
NFR-4	Performance	Function and response of the application is of end-to-end
NFR-5	Availability	Without cent percent availability and user satisfaction solution affect badly
NFR-6	Scalability	Capacity of the application should be enough to handle more users

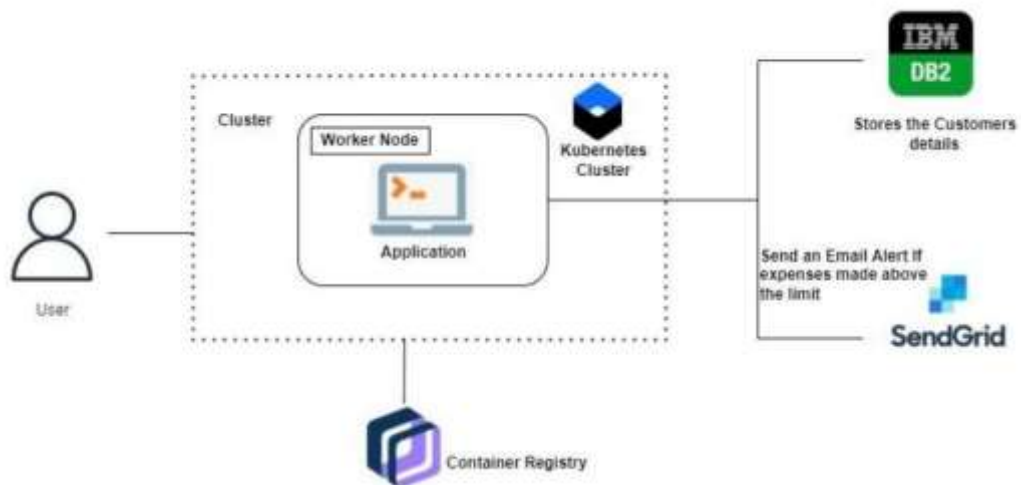
5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

Technical Architecture:



Solution Architecture

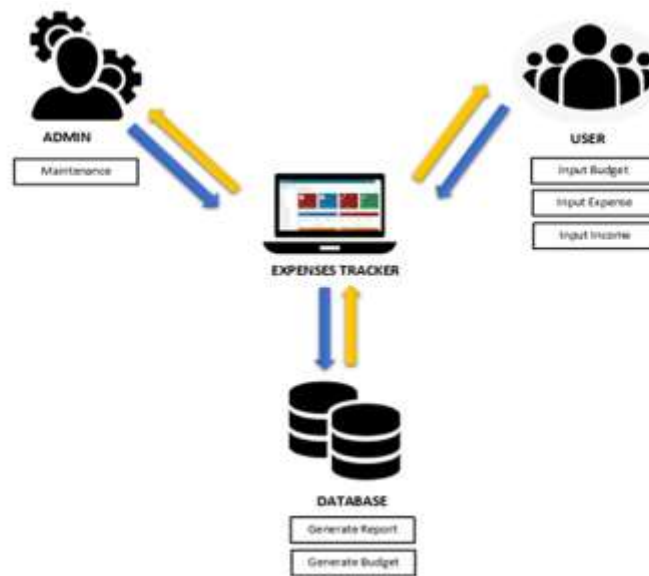


Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	Usage of chatbot helps user to interact with application	HTML, CSS, JavaScript etc.
2.	Application Logic-1	This application enables the user to login into the main dashboard	Python
3.	Application Logic-2	Helps to collect input from the user	IBM Watson STT service
4.	Application Logic-3	User will get expense report in the form of graph and an email will be sent if expense limit exceeds	IBM Watson Assistant SendGrid
5.	Database	The inputs are stored in MySQL database	MySQL, NoSQL, etc.
6.	Cloud Database	The user data is stored in well secured manner with the help of Database Service on cloud	IBM DB2, IBM Cloudant, etc.
7.	File Storage	Financial data of the user is stored in IBM Block Storage	IBM Block Storage or Other Storage Service or Local Filesystem

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	Container Registry in IBM cloud provides high security to the user financial data	Container Registry, Kubernetes Cluster
3.	Scalable Architecture	Expense Tracker is a life time access supplication. Its demand will increase when the user's incomes are high.	Container Registry, Kubernetes Cluster
4.	Availability	Availability of the application to the user at any time.	Container Registry, Kubernetes Cluster
5.	Performance	The Performance rate will be high, due to no network traffics in the application.	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, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-3
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access through Gmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can enter by entering email & password	High	Sprint-1
		USN-6	As a user, I can login to user dashboard and see the info about my income and expenses	I can login to user dashboard and information	High	Sprint-1
	Dashboard	USN-7	As a user, I can enter my income and expenditure details	I can view my daily expense	High	Sprint-2
Customer Care Executive		USN-8	As a customer care executive, I can solve the login issues and other application issues	I can provide solution at any time	Medium	Sprint-4
Administrator	Application	USN-9	As an administrator, I can upgrade or update the application	I can fix the bug that arise for the users	Medium	Sprint-4

6.PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & 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	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-3		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	1	High	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-1		USN-5	As a user, I can login to user dashboard and see the info about my income and expenses	1	High	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-2	Dashboard	USN-6	As a user, I can enter my income and expenditure details	2	High	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K
Sprint-4		USN-7	As a customer care executive, I can solve the login issues and other application issues	2	Medium	Muthu Vengateshwari G, Mahalakshmi S, Preetha S, Birundha K

6.2 Sprint Delivery 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

Velocity

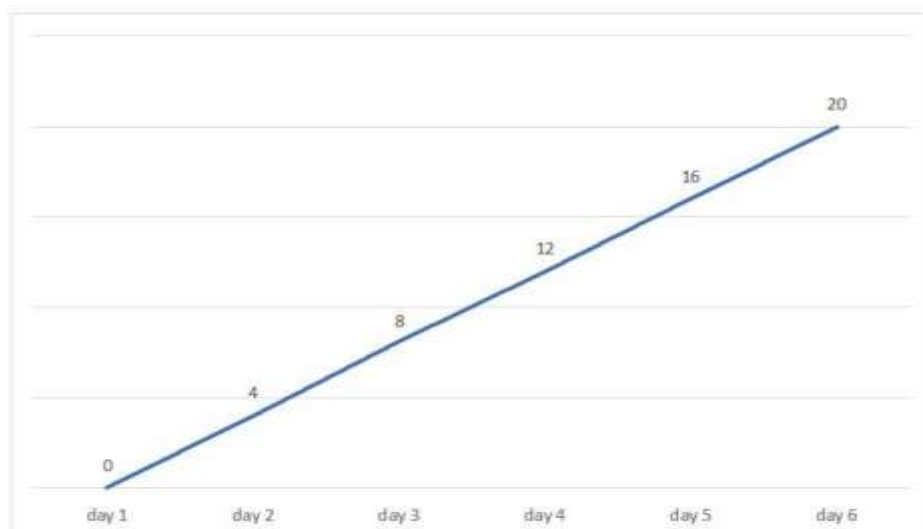
We have a 6-day sprint duration, and the velocity of the team is 20 (points per sprint).

Calculating the team's average velocity (AV) per iteration unit (story points per day)

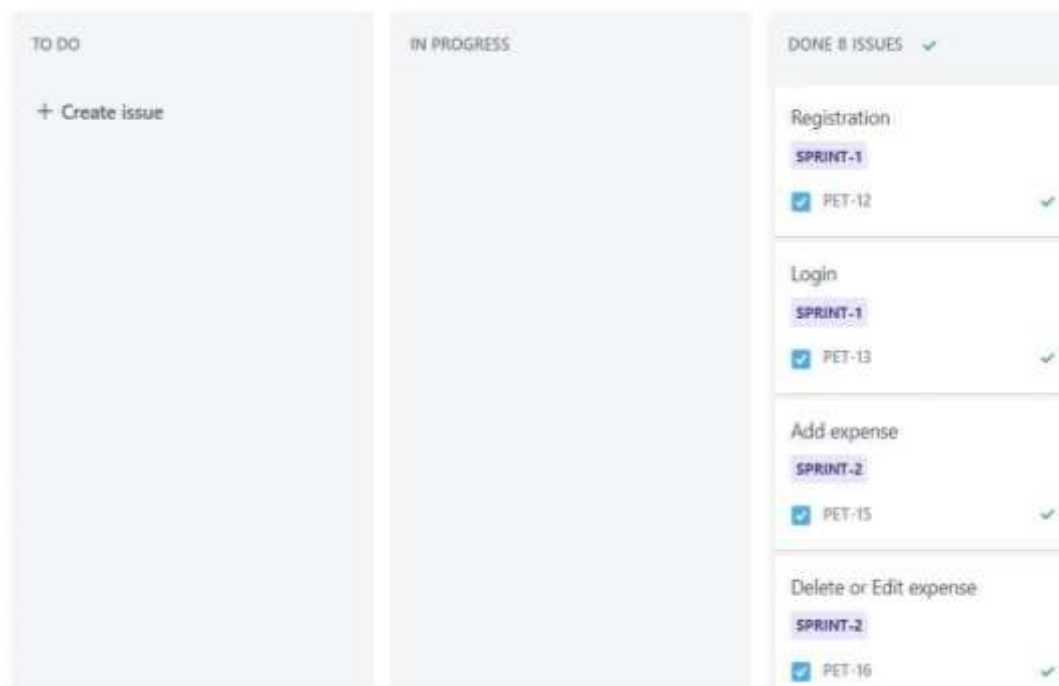
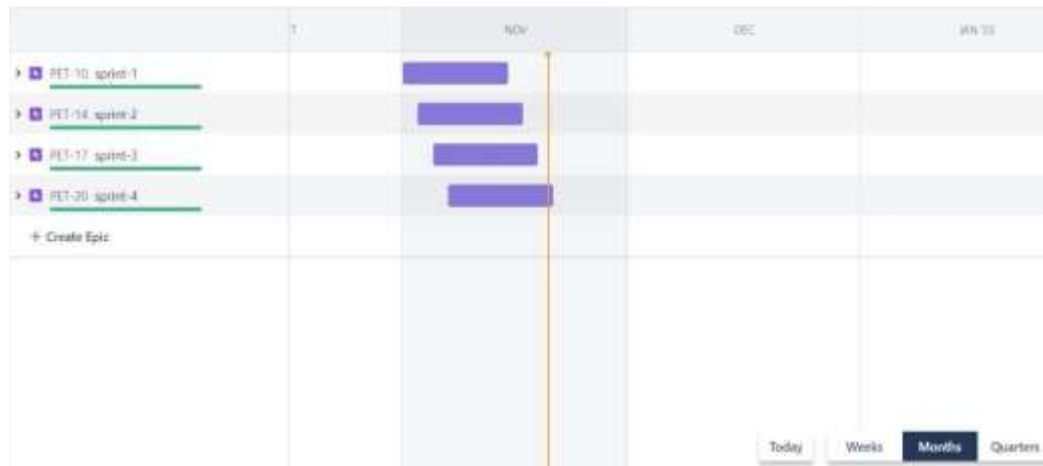
$$AV = \text{sprint duration} / \text{velocity} = 20/6 = 3.33$$

Burn down Chart:

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



6.3 Reports From JIRA:



7. CODING & SOLUTIONING

7.1. FEATURE 1

We have added the data visualization methods for expenditure. The pie chart has been used to represent the monthly expenses. The pie chart is a pictorial representation of data that makes it possible to visualize the relationships between the parts and the whole of a variable. For example, it is possible to understand the industry count or percentage of a variable level from the division by areas or sectors. The recommended use for pie charts is two-dimensional, as three-dimensional use can be confusing.

The dimensions form sectors of the measurement values; they can have one or two sizes and up to two measures. The first dimension is used to define the angle of each sector that makes up the chart and the second dimension optionally determines the radius of each sector. Additionally, these plots are useful for comparing data over a fixed period since they do not show changes over time. Therefore, their use should be considered if:

- You are looking to categorize and compare a set of data.
- You only have positive values.
- You have less than seven categories since a larger number can make it difficult to perceive each segment.

CODE:

```
#DISPLAY---graph
@app.route("/display")
def display ():
    print(session["username"], session['id'])
    param = "SELECT * FROM Expense WHERE userid = " + str(session['id']) + " ORDER BY date DESC"
    res = ibm_db. exec_immediate (ibm_db_conn, param)
    dictionary = ibm_db.fetch_assoc(res)
    expense = []
    while dictionary != False:
        temp = []
        # temp. append(dictionary["ID"])
        temp. append(dictionary["USERID"])
        temp. append(dictionary["DATE"])
        temp. append(dictionary["EXPENSENAME"])
        temp. append(dictionary["AMOUNT"])
        temp. append(dictionary["PAYMODE"])
```

```

temp. append(dictionary["CATEGORY"])
expense. append(temp)
print(temp)
dictionary = ibm_db. fetch_assoc(res)
return render_template ('display.html', expense = expense)
#Delete---the--data
@app. route('/delete/<string:id>', methods = ['POST', 'GET'])
def delete(id):
param = "DELETE FROM Expense WHERE userid = " + id
res = ibm_db. exec_immediate (ibm_db_conn, param)
print ('deleted successfully')
return redirect("/display")
#UPDATE---DATA
@app. route('/edit/<id>', methods = ['POST', 'GET'])
def edit(id):
param = "SELECT * FROM Expense WHERE userid = " + id
res = ibm_db. exec_immediate (ibm_db_conn, param)
dictionary = ibm_db. fetch_assoc(res)
row = []
while dictionary != False:
temp = []
# temp. append(dictionary["ID"])
temp. append(dictionary["USERID"])
temp. append(dictionary["DATE"])
temp. append(dictionary["EXPENSENAME"])
temp. append(dictionary["AMOUNT"])
temp. append(dictionary["PAYMODE"])
temp. append(dictionary["CATEGORY"])
row. Append(temp)
print(temp)
dictionary = ibm_db. fetch_assoc(res)
print (row [0])
return render_template ('edit.html', expenses = row [0])

```

7.2. FEATURE 2

Email notifications will be sent to the users once they cross the expenditure limit through send grid mail system. Most notifications are transactional, meaning a recipient's action or account activity triggers them. But some notifications are marketing related, encouraging the recipient to take a specific action. Ecommerce product notifications inform recipients about new products or discounts. Plus, unlike general marketing emails, these are highly personalized and focus on a single product. For example, if a customer views an item on your website and that item goes on sale, you can send the customer a notification to let them know this is the best time to buy. Users can also opt into receiving notifications when an out-of-stock item is back in stock. Notification emails tend to perform well because the content is highly relevant to the recipient. But the only way for the recipient to know this is if you state the content clearly in the subject line. For example, the subject line "New Sign-in to Your Account" gets straight to the point, letting the user know why you sent this notification.

CODE:

```
# Email part
param = "SELECT * FROM Expense WHERE MONTH (date) = MONTH (current timestamp) AND YEAR
(date)
= YEAR (current timestamp) ORDER BY date DESC"
res = ibm_db. exec_immediate (ibm_db_conn, param)
dictionary = ibm_db. fetch_assoc(res)
expense = []
while dictionary != False:
    temp = []
    # temp. append(dictionary["ID"])
    temp. append(dictionary["USERID"])
    temp. append(dictionary["DATE"])
    temp. append(dictionary["EXPENSENAME"])
    temp. append(dictionary["AMOUNT"])
    temp. append(dictionary["PAYMODE"])
    temp. append(dictionary["CATEGORY"])
    expense. append(temp)
print(temp)
dictionary = ibm_db. fetch_assoc(res)
total=0
for x in expense:
    total += int (x [3])
param = "SELECT userid, limit FROM limit WHERE userid = " + str(session['id'])
```

```

res = ibm_db. exec_immediate (ibm_db_conn, param)
dictionary = ibm_db. fetch_assoc(res)
row = []
s = 0
while dictionary != False:
temp = []
temp. append(dictionary["LIMIT"])
row. append(temp)
dictionary = ibm_db. fetch_assoc(res)
s = temp[len(temp)-1]
if total > int(s):
msg = "Hello " + session['username'] + “, ” + "you have crossed the monthly limit of Rs. " + str(s) + "/- !!!"
+ "\n" + "Thank you, " + "\n" + "Team Personal Expense Tracker."
sendmail (msg, session['email'])

```

7.3 Database Schema Tables

REGISTER

```

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,username
VARCHAR (255) NOT NULL,
email VARCHAR (255) NOT NULL, password
VARCHAR (255) NOT NULL

```

EXPENSES

```

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,
userid INT NOT NULL,
date TIMESTAMP NOT NULL,
expensename VARCHAR (255) NOT NULL,amount
INT NOT NULL,
paymode VARCHAR (255) NOT NULL,category
VARCHAR (255) NOT NULL

```

LIMITS

```

id INT NOT NULL GENERATED ALWAYS AS IDENTITY,userid
VARCHAR (255) NOT NULL,
limits VARCHAR (255) NOT NULL

```

8. TESTING

8.1 Test Cases

TEST CASE ID	PURPOSE	TEST CASES	RESULT
TC1	Authentication	Password with length less than 4 characters	Password cannot be less than 4 characters
TC2	Authentication	User name with length less than 2 characters	User name cannot be less than 2 characters
TC3	Authentication	Valid user name with minimum 2 characters	User name accepted
TC4	Authentication	User name left blank	User name cannot be less than 2 characters
TC5	Authentication	Password field left blank	Password cannot be empty
TC6	Authentication	Minimum 4 characters valid password	Password accepted
TC7	Authentication	Password and Confirm Password did not match	Please enter same password
TC8	Authentication	Confirm Password field left blank	Please enter same password

8.2 User Acceptance Testing

Test Case ID	Test Case Description
TC_001	Verify if user is able to order single product.
TC_002	Verify if user is able to order multiple products.
TC_003	Verify if user can apply single or multiple filters
TC_004	Verify if user can apply different sort by
TC_005	Verify if user is able to pay by Master Card
TC_006	Verify if user is able to pay by Debit Card
TC_007	Verify if user is able to pay fully by reward points
TC_008	Verify if user is able to pay partially by reward points

9. RESULTS

9.1 Performance Metrics

- **Tracking income and expenses:**

Monitoring the income and tracking all expenditures.

- **Transaction Receipts:**

Capture and organize your payment receipts to keep track of your expenditure.

- **Organizing Taxes:**

Import your documents to the expense tracking app, and it will streamline your income and expenses under the appropriate tax categories.

- **Payments & Invoices:**

Accept and pay from credit cards, debit cards, net banking, mobile wallets, and bank transfers, and track the status of your invoices and bills in the mobile app itself. Also, the tracking app sends reminders for payments and automatically matches the payments with invoices.

- **Reports:**

The expense tracking app generates and sends reports to give a detailed insight about profits, losses, budgets, income, balance sheets, etc.,

- **E-commerce integration:**

Integrate your expense tracking app with your e-Commerce store and track your sales through payments received via multiple payment methods.

- **Vendors and Contractors:**

Manage and track all the payments to the vendors and contractors added to the mobile app.

- **Access control:**

Increase your team productivity by providing access control to particular users through custom permissions.

- **Track Projects:**

Determine project profitability by tracking labor costs, payroll, expenses, etc., of your ongoing project.

- **Inventory tracking:**

An expense tracking app can do it all. Right from tracking products or the cost of goods, sending alert notifications when the product is running out of stock or the product is not selling, to purchase orders.

- **In-depth insights and analytics:**

Provides in-built tools to generate reports with easy-to-understand visuals and graphics to gain insights about the performance of your business.

10. ADVANTAGES AND DISADVANTAGES

Advantages:

- **Improved visibility:**

Most expense management software includes a dashboard that compiles employee expense data and presents it in an easy-to-understand visual format using charts and other graphics.

- **Security:**

All the Data are stored in IBM cloud and db2 so all the data are maintained safely.

- **Month wise Comparison:**

Using the Expense Manager, you can easily make month on month comparisons of earning, expenses and spending in a more organized manner.

- **Alert Mail:**

User Receives the alert mail when they exceed the expense limit.

- **Automation:**

All the calculations are automated. Graph are generated based on the expense made.

- **User Friendly:**

Expenses can be added easily.

Disadvantage:

- **Requires Internet Connection:**

This web application requires an active internet connection to access.

- **Cost:**

Using cloud service need some investments. Every time we can't access the cloud freely.

11. CONCLUSION

From this project, we are able to manage and keep tracking the daily expenses as well as income. While making this project, we gained a lot of experience of working as a team. We discovered various predicted and unpredicted problems and we enjoyed a lot solving them as a team. We adopted things like video tutorials, text tutorials, internet and learning materials to make our project complete.

12. FUTURE SCOPE

- User can able to upload the receipt of their expenses made.
- Application will make suggestion to reduce unnecessary expense.
- User get remainder in email to add their daily expense.
- User can able to link bank accounts with our application.

13. APPENDIX

GitHub Source code link:

<https://github.com/IBM-EPBL/IBM-Project-7312-1658852375>