

PROJECT REPORT

Sri Sai Ram Institute of Technology (Autonomous)

DEPARTMENT

COMPUTER SCIENCE AND ENGINEERING

PROJECT NAME

PERSONAL EXPENSE TRACKER APPLICATION

TEAM ID: PNT2022TMID20802

INDUSTRY MENTOR: KUSBOO

FACULTY MENTOR: MATHUPRIYA S

TEAM MEMBERS

ROLE	NAME	REGISTER NO
TEAM LEADER	LAKSHMI NARAYANAN R	412419104058
TEAM MEMBER 1	NITHISH R	412419104077
TEAM MEMBER 2	SANTHOSH B	412419104102
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IdeationPhase

DefinetheProblemStatements

Team ID	PNT2022TMID20802
Project Name	PersonalExpenseTrackerApplicati on

CustomerProblemStatementTemplate:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	I'm trying to	But	Because	Which makes me feel
shopkeeper	manage my family budget	it is tedious process	there is no proper calculation	disappointed

I am	I'm trying to	But	Because	Which makes me feel
driver	control my monthly expenses	it is hard to calculate	there is no proper application	frustruated

LITERATURE SURVEY

S.NO	Title, Publication and Authors	Techniques & Mechanisms	Parameter Analysis	Tools	Findings
1	Spending Tracker: A Smart Approach to	YNAB and Penny AI	YNAB is an amount tracker	Java (Apache Net beans 11.3) and	Have multi- languagefeatures.
	Track Daily Expense, Vol.12 No.6 (2021),		that automatically tracks our	My SQL Workbench.	The main feature of this app is that you can trackyour
	UDAY PRATAP SINGH, AAKASH KUMAR GUPTA,		expenses through our bank account or credit card		expense by the mentioning date, month and year.
	DR B.BALAMURUG AN				
2	A Novel Expense Tracker using Statistical Analysis, June 2021 IJIRT Volume 8 Issue 1 ISSN: 2349-6002, MUSKAAN SHARMA , AYUSH BANSAL, DR. RAJU RANJAN , SHIVAM SETHI4	Statistical Analysis	In which using excel accounting team designed a Cost Allocation tool 1 in which a spreadsheet is used toallocate the product category both by site and the cooperationand a Cost allocation tool 2 which is a developed to furtherintegrate and allocate cost to identify which manufactureris profitable to use.	Excel,CAT tool, CSS and xml technologies.	Keep tracking daily expenses and budgeting; B) Save money for necessary expenses which in return will help to plan the future investments.

3	Expense Tracker, MAY 2021 IRE Journals Volume 4 Issue 11 ISSN: 2456-8880, ATIYA KAZI , PRAPHULLA S. KHERADE , RAJ S. VILANKAR3, PARAG M. SAWANT,	Digital record System	Generates a monthly report of the expenses in PDF format.	Angular 8 for front end and SQL Lite forback end.	Users are provided with three options for data entry namely Income, Expense and Wish List. The remainder is set if the type future expense.
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4	A Review on Budget Estimator Android Application International Research Journal of Engineering and Technology (IRJET) NAMITA JAGTAP, PRIYANKA JOSHI, ADITYA KAMBLE	Google places AP, Haversine Algorithm	Do notrequired any GPU support to run thisapplication,t he major advantage is when we develop any application using angular ionic frameworkthen it has capability to run on all platforms like android, Ios, windows.	Angular ionic framework.	Firestore Authentication to sign in a user by sending an SMS message to the user's phone. Send a verification code to the user'sphone and verify it.
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5	Expense Tracker International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) Volume 9, Issue 4, September 2020. PROF MIRIAM THOMAS, LEKSHMI P, AND DR. MAHALEKSHMI T	Least Square Algorithm	The least squares method is a statistical procedure to find the best fit for a set of data points by minimizing the sum of the offsets or residuals of points from the plotted curve. Least squares regression is used to predict the behaviour of dependent variables	Net Beans for Java, PHP, HTML5 and JavaScript, Dreamweaver, MySQL (XAMPP)	In this application, there are 3 logins such as admin, manager and staff. Admin has the privilege to add, edit, delete manager, add, edit, delete staff, and to get all custom reports. For Manager, the privileges are to add type of expense, verify expense, add type of income, verify income and generate reports. For staff, the privileges are to add and edit expense, income and calculations, and send for verifications.
6	Student expense tracking application IJARIIE-ISSN(O)-2395-4396, Vol-8 Issue-2 2022.	Digital record System and Statistical Analysis	This android application can be used on all android devices above android version 5.0.	Android studio for the front end and Firebase for the backend	The application size is less than 20 MB. It doesn't need any high-end hardware specifications.
	SAUMYA DUBEY, PRAGYA DUBEY, RIGVED RISHABH KUMAR				

7	Expense Tracker Application March 2021 IJIRT Volume 7 Issue 10 ISSN: 2349-6002 VELMURUGAN.R1, MRS.P.USHA	View Analytics	It also has a special feature which will distribute your expenses in different categories suitable for the user. An expense history will also be provided in application.	Java, Xml, My SQL	The proposed system should provide different categories for the user to select from and they can enter the amount and mode of payment. This system should be able to analyze the information, provide analytics on which category did the user spend most of their money
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8	Expense Tracker : A Smart Approach to Track Everyday Expense Easy Chair Preprint December 25, 2020 HRITHIK GUPTA, ANANT PRAKASH SINGH, NAVNEET KUMAR AND J. ANGELIN BLESSY	YNAB and Penny AI, The waterfall model	Have developed the necessary system to work without internet. We need a database, desktop, application and user to use this system.	Java (Apache Net beans 11.3) and My SQL Workbench 8.0 CE	Expense Tracker application have five entities: expense, user, backup, notification, transaction.
9	D2D Expense Tracker Application	YNAB and Penny Techniques	D2D applications provide day by day updates to the user regarding their expenses.	Android Studio, SQLite, Java JDK, Eclipse	Provide billing to the user regarding their transactions and Expenses.

Ideation Phase Empathize & Discover

Team ID	PNT2022TMID20802
Project Name	Personal Expense Tracker Application

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from

the user's perspective along with his or her goals and challenges.

Our Empathy Map Link :

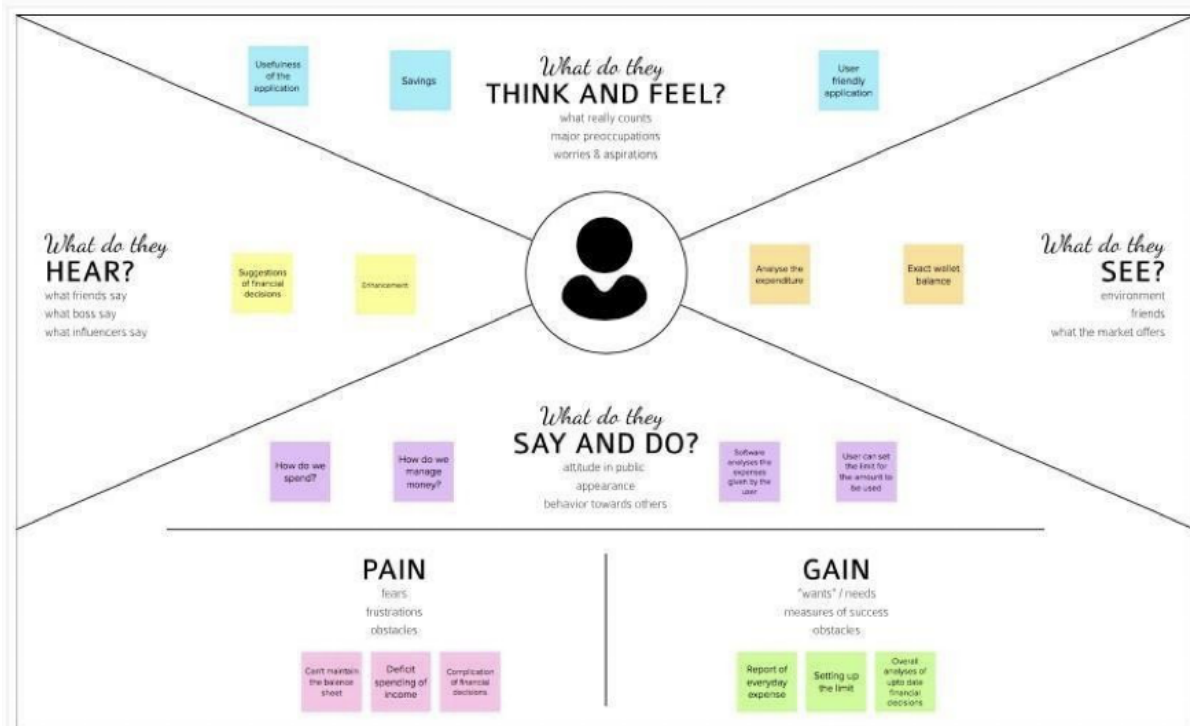
<https://app.mural.co/invitation/mural/ibm26623/1663688982628?sender=ub6701e84813676987e917800&key=8fd7f970-6268-48d6-9a55-a76e350442ce>

Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.



Brainstorm & Idea Prioritization Template

Brainstorm & Idea Prioritization Template:

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. 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.

Our Mural Link :

<https://app.mural.co/invitation/mural/ibm26623/1663692010561?sender=ub6701e848136>

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

1

Define your problem statement

In simple words, personal finance entails all the financial decisions and activities that a Finance app makes your life easier by helping you to manage your finances efficiently. A personal finance app will not only help you with budgeting and accounting but also give you helpful insights about money management. Personal finance applications will ask users to add their expenses and based on their expenses wallet balance will be updated which will be visible to the user. Also, users can get an analysis of their expenditure in graphical forms. They have an option to set a limit for the amount to be used for that particular month if the limit is exceeded the user will be notified with an email alert.



Key rules of brainstorming

To run a smooth and productive session



Stay in topic.



Encourage wild ideas.



Defer judgment.



Listen to others.



Go for volume.



If possible, be visual.

Step-2:Brainstorm,Idea Listing andGrouping

2

Brainstorm

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

🕒 10 minutes

Rahul S

Auto categorization of transactions, manually review items	Easy transaction download	Automatic logging of recurring transactions
A forecast of your ending balances at some point in time	one real luxury on the wish list: the ability to scan receipts	

Tarun V

Personal Budgeting	Track Your Spending and Expenses	Know Your Spending Habits
Budget Planner	Capturing and organizing receipts	Particular area of spending
Graphical representation of report		

Sai Kumar

Offering analytics	Automated workflows	Safe storage of data
Incorporating IBM Cloud	Accurate observation of transactions	

Rokesh

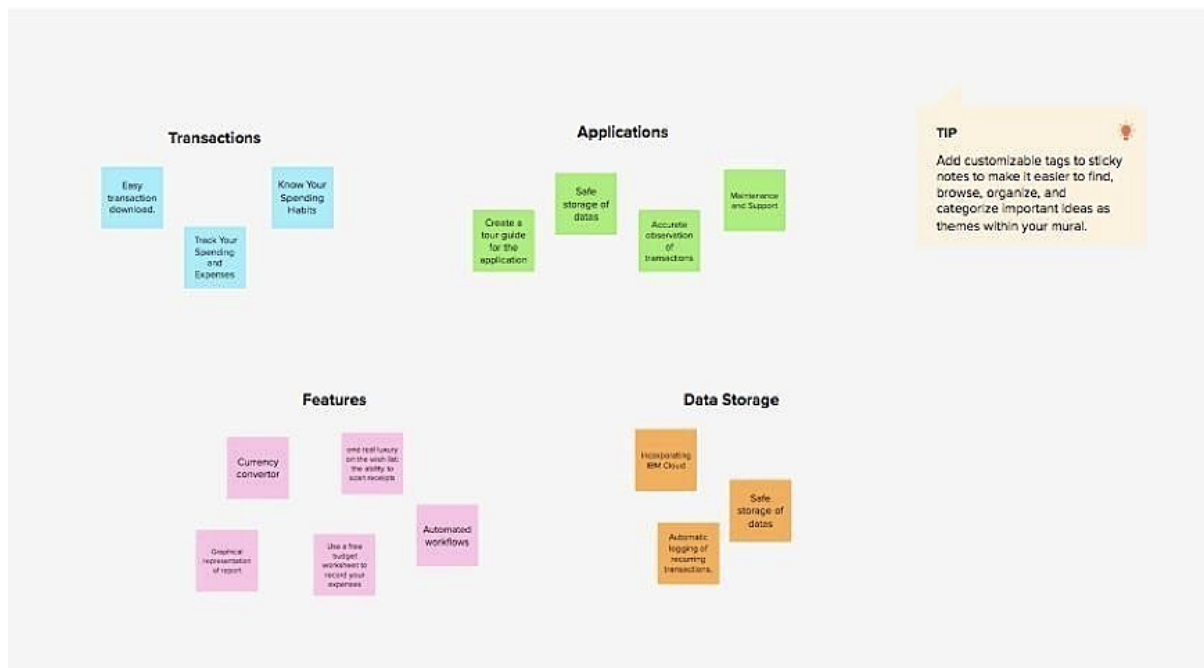
Maintenance and Support	Create a tour guide for the application	Currency converter
Use a free budget worksheet to record your expenses		

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



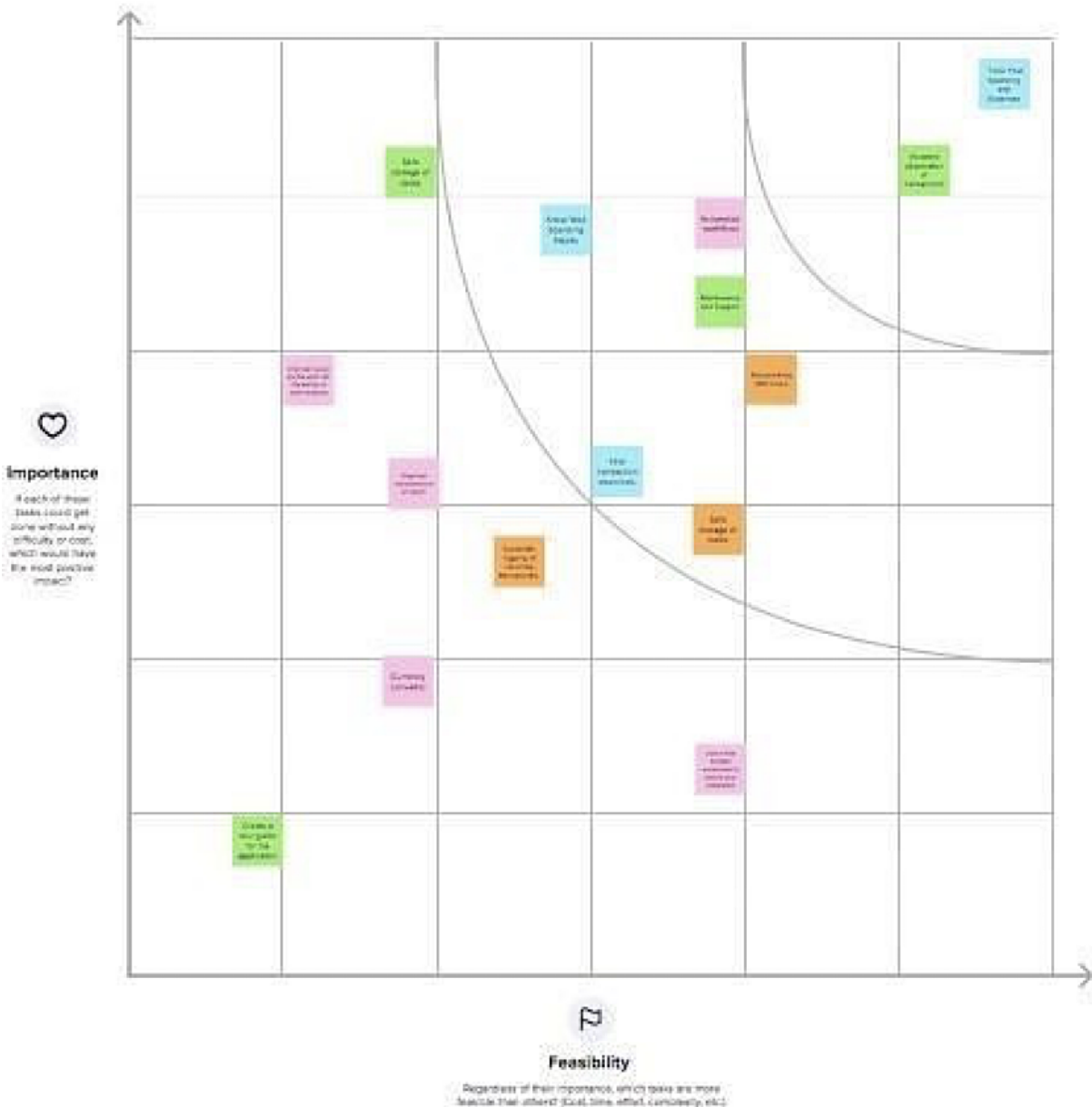
Step-3:Idea Prioritization



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



1. CUSTOMER SEGMENT(S) <ul style="list-style-type: none"> • Working People • Housewife 	6. CUSTOMER CONSTRAINTS <p>Anxiety-It's a fear of not having the resources available to meet your needs or face challenges that lie ahead.</p>	5. AVAILABLE SOLUTIONS <ul style="list-style-type: none"> • The solution to financial problems is often to reduce expenses, increase income. • Think about all the things you usually tend to spend money on.
2. JOBS-TO-BE-DONE / PROBLEMS <ul style="list-style-type: none"> • Solve unexpected expenses and financial anxiety. • solved by set an limit for the amount to be used for that particular month if the limit is exceeded the user will be notify with email 	9. PROBLEM ROOT CAUSE <ul style="list-style-type: none"> • A missed opportunity • A loss of savings • Investment gone wrong 	7. BEHAVIOUR <ul style="list-style-type: none"> • When the user Don't have the knowledge about particular thing this kind of situation

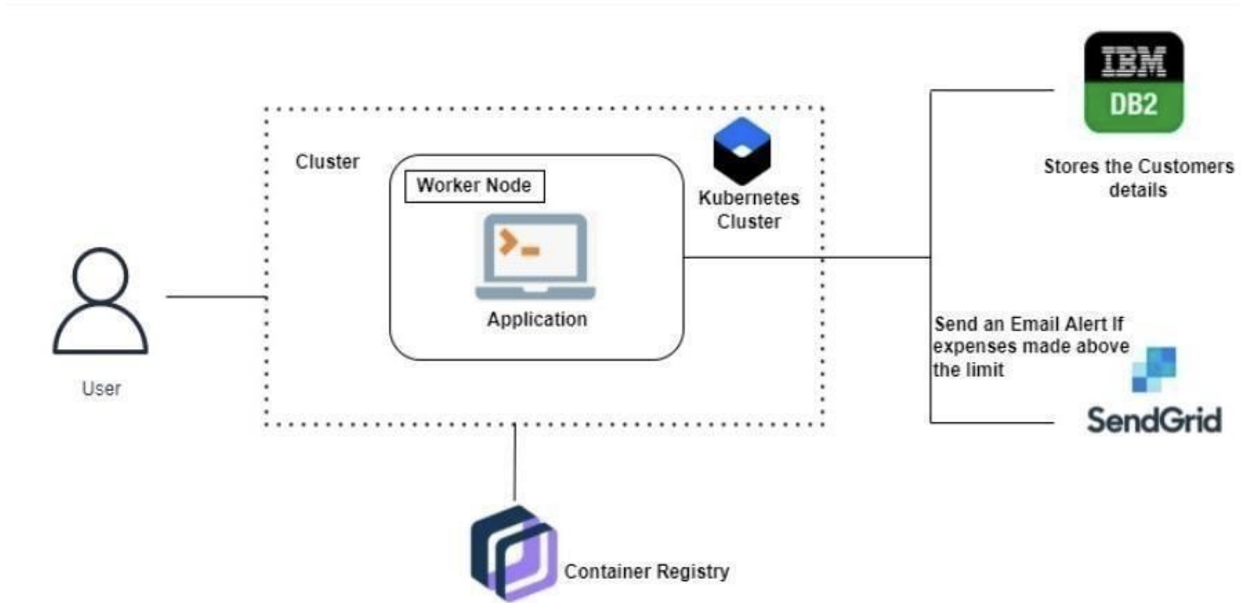
3. TRIGGERS <ul style="list-style-type: none"> • Seeking for self-gratification byearning the thing 	10. YOUR SOLUTION <ul style="list-style-type: none"> • This applications will ask users to add their expenses .users can get an analysis of their expenditure in graphical forms. • They have option to set a limit for the amount to be used for that particular month if the limit is exceeded the user will benotified with an email alert. 	8. CHANNELS of BEHAVIOUR <ol style="list-style-type: none"> ONLINE <ul style="list-style-type: none"> • Online websites • Social mediaplatforms OFFLINE <ul style="list-style-type: none"> • Customer throwwords
4. EMOTIONS: BEFORE / AFTER <ul style="list-style-type: none"> • Before:users are depressedstate. • After: users confident to facethe expense. 		

Proposed Solution Template:

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

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Can't receive notifications properly. The transaction have not been updated properly
2.	Idea / Solution description	Personal finance applications will ask users to add their expenses and based on their expenses 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
3.	Novelty / Uniqueness	Notification can bereceivethrough email.
4.	Social Impact / Customer Satisfaction	Personal Expense Tracker apps and design to be more user friendly and to enhance customer experience so that more people can transact and fulfill their essential banking needs through mobile app. This will make a impact on Mobile Banking for Customers' Satisfaction.
5.	Business Model (RevenueModel)	The Personal Expense Tracker app is a business model .but, Each people need to use the finance app to gain the benefit.
6.	Scalability of the Solution	Yes, it is scalable solution. we will develop project to get a better user experience.

Technology Architecture



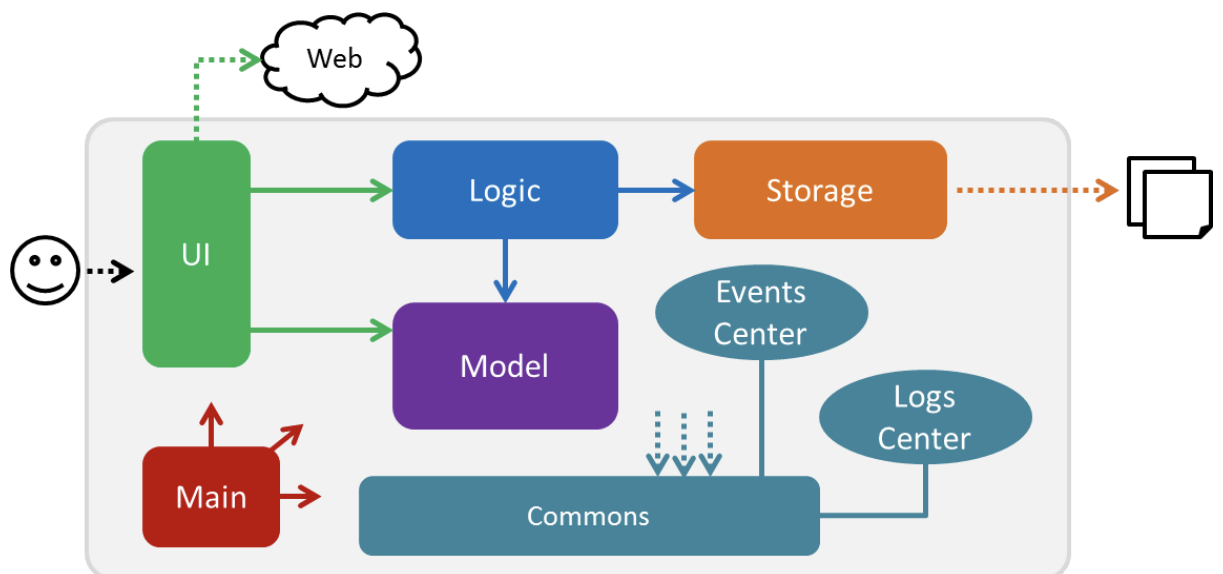
Project Design Phase-I Solution Architecture

SolutionArchitecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Initialising the components in the correct sequence and connecting them up with each other when the app is launched.
- Shutting down the components and invoking cleanup methods where necessary when the app is shut down.
- Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:

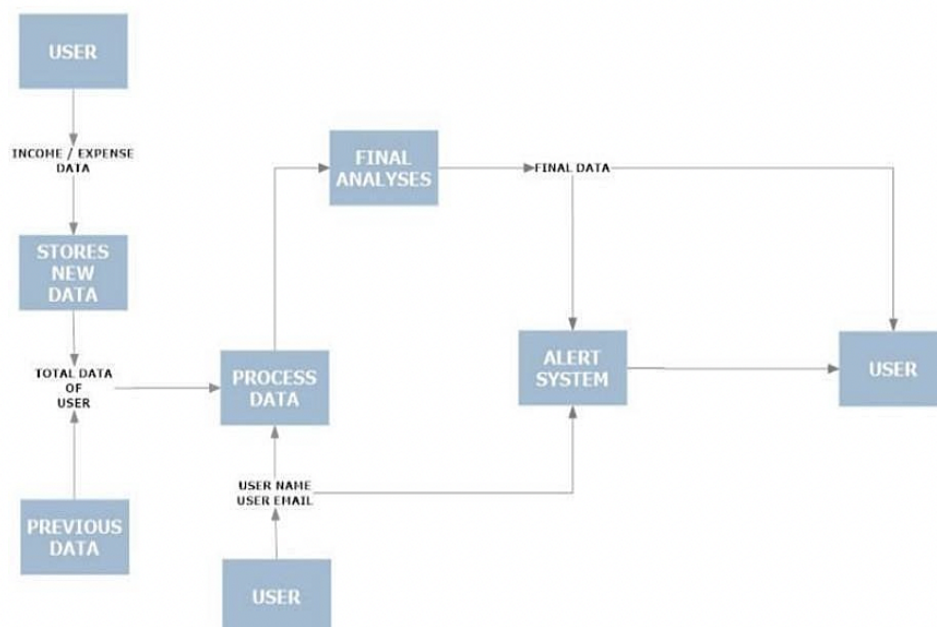


Project Design Phase-II

Data Flow Diagram & User Stories

Data Flow Diagrams:

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



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 (Mobile user and web user)	Registration	USN-1	As a user, I can register for the application by entering my email and confirming my password.	I can access my account/dashboard	High	
		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	
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	
	Login	USN-4	As a user, I can log in to the application by entering my email and password.	I can access the application	Medium	
	Dashboard	USN-5	As a user, I can enter my income and expenditure details	I can view my daily expenses	High	

CustomerCare		USN-6	As a customer executive, I	I can provide	Medium	
Executive			can solve the login issue and other issues of the application	support or solution at any time 24*7		
Administrator	Application	USN-7	As an administrator, I can upgrade or update the application	I can fix the bug which arises for the customers and users of the application	Medium	

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Functional Requirements:

Following are the functional requirements of the proposed solution.

FRNo.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Register	Registration is the process of the user to complete the application's form. Certain details must be submitted such as e-mail address, password, and password confirmation. The user is identified using these details.
FR-2	Login	The login screen is used to verify the identity of the user. The account can be accessed using the user's registered email address and password.
FR-3	Categories	On the main page, we can see overall revenue and spending, as well as the balance remaining after expenditure, as well as the user's entire categories namely Entertainment, Cloth, Food and Drinks, Health and Fitness and so on.
FR-4	Update Daily Expensive	The user can upload the daily expensive details what they are spending on each day. The details such as cloth, entertainment, food, health etc.,
FR-5	View Expensive Chart	This module used to see a pictorial depiction of all details in the form of a pie chart, where each slice of the pie chart represents that the viewer to gain an approximate notion of which category has the highest expenses.
FR-6	Set Alert	When a user attempts to spend more than the pre-defined amount limit, the app will automatically send an alert if the threshold amount they selected for an alert is exceeded.
FR-7	Notification	A feature of the application called push notifications lets the administrator or developer send a personalized tip of money management to all of the app's users.

Non-functional Requirements:

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

FRNo.	Non-Functional Requirement	Description
NFR-1	Usability	The system shall allow the users to access the system with pc using web application. The system uses a web application as an interface. The system is user friendly which makes the system easy.
NFR-2	Security	A security requirement is a statement of needed security functionality that ensures one of many different security properties of software is being satisfied.
NFR-3	Reliability	The system has to be 100% reliable due to the importance of data and the damages that can be caused by incorrect or incomplete data. The system will run 7 days a week. 24 hours a day.
NFR-4	Performance	The information is refreshed depending upon whether some updates have occurred or not in the application. The system shall respond to the member in not less than two seconds from the time of the request submittal. The system shall be allowed to take more time when doing large processing jobs. Responses to view information shall take no longer than 5 seconds to appear on the screen.
NFR-5	Availability	The system is available 100% for the user and is used 24 hrs a day and 365 days a year. The system shall be operational 24 hours a day and 7 days a week.
NFR-6	Scalability	Scalability is the measure of a system's ability to increase or decrease in performance and cost in response to changes in application and system processing demands.

Project Planning Phase
ProjectPlanningTemplate(ProductBacklog,SprintPlanning,Stories, Story points)

Milestone and Activity List

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	Lakshmi NarayananR
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	SharanRaj G
Sprint-1	Login	USN-3	As a user, I can log into the application by entering email & password	1	High	SaravananV
Sprint-1	Dashboard	USN-4	As a registered user, it takes the user to the dashboard	2	High	Santhosh B
Sprint-2	Workspace	USN-1	Showing the workspace for personal expense tracker	2	Medium	Nithish R
Sprint-2	Charts	USN-2	Creating various graphs and statistics of customers data	1	High	SaravananV
Sprint-2	Connecting to IBM DB2	USN-3	To link the database with dashboard	2	High	Nithish R
Sprint-2	Dashboard	USN-4	To make a dashboard with javascript	2	High	Santhosh B

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Frontend	USN-1	To wrap up the server side works of frontend	1	Medium	Lakshmi NarayananR
Sprint-3	Watson Assistant	USN-2	Creating chatbot	1	Medium	SaravananV
Sprint-3	SendGrid	USN-3	Integrating SendGrid services	1	Low	Nithish R
Sprint-3		USN-4	Integrating both frontend and backend	2	Medium	Santhosh B
Sprint-4	Docker	USN-1	To create images of website using docker	2	High	Lakshmi NarayananR
Sprint-4	Cloud Registry	USN-2	To upload docker image to IBM Cloud Registry	2	High	Sharan RajG
Sprint-4	Kubernetes	USN-3	To create a container using docker image and hosting the site	2	High	SaravananV
Sprint-4	IP ports	USN-4	Exposing IP Ports for the site	2	High	Sharan RajG

Sprint	Total StoryPoints	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as onPlanned EndDate)	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

User Acceptance Testing

S.No	Test Cases	Yes/ No
1.	Keyword driven	Yes
2.	Responds in manually drafted rules	Yes
3.	Manages multiple users	Yes
4.	Conversational Paradigm	Yes
3.	Learns from real interactions	No
4.	Training via historical data	No
5.	Has decision-making skills	No

IBM DB2 CONNECTION:

IBM Db2 on Cloud

Load DataLoad History**Tables**ViewsIndexesAliasesMQTsSequencesApplication objects

Find schemas or tables

Refresh

Schemas

<input type="checkbox"/>	Name	Type	Tables
<input type="checkbox"/>	JRQ38167	User	3

Total: 1, selected: 0

IBM Db2 on Cloud

Load DataLoad History**Tables**ViewsIndexesAliasesMQTsSequencesApplication objects

Find schemas or tables

Refresh

Schemas

<input checked="" type="checkbox"/>	Name	Type	Tables
<input checked="" type="checkbox"/>	JRQ38167	User	3

Total: 1, selected: 1

Tables

New table +

<input type="checkbox"/>	Name	Schema	Properties
<input type="checkbox"/>	EXPENSES	JRQ38167	...
<input type="checkbox"/>	LIMITS	JRQ38167	...
<input type="checkbox"/>	REGISTER	JRQ38167	...

Total: 3, selected: 0

IBM Db2 on Cloud

Load DataLoad HistoryTablesViewsIndexesAliasesMQTsSequencesApplication objects

Find schemas or tables

Refresh

Schemas

Tables

New table +

NameSchemaProperties

EXPENSES

JRQ38167

...

LIMITS

JRQ38167

...

REGISTER

JRQ38167

...

Total: 3, selected: 0

Table definition

EXPENSES

No statistics available.

Name	Data type	Nullable	Length	Scale
ID	INTEGER	N		0
USERID	VARCHAR	N	30	0
DATE	VARCHAR	Y	30	0
EXPENSENAME	VARCHAR	Y	30	0
AMOUNT	INTEGER	Y		0
PAYMENTMODE	VARCHAR	Y	30	0
CATEGORY	VARCHAR	Y	30	0
TIME	VARCHAR	Y	30	0

View data

IBM Db2 on Cloud

Load DataLoad HistoryTablesViewsIndexesAliasesMQTsSequencesApplication objects

Find schemas or tables

Refresh

Schemas

Tables

New table +

NameSchemaProperties

EXPENSES

JRQ38167

...

LIMITS

JRQ38167

...

REGISTER

JRQ38167

...

Total: 3, selected: 0

Table definition

LIMITS

No statistics available.

Name	Data type	Nullable	Length	Scale
ID	INTEGER	N		0
USERID	VARCHAR	N	30	0
EXPLIMIT	INTEGER	Y		0

View data

IBM Db2 on Cloud

Load DataLoad HistoryTablesViewsIndexesAliasesMQTsSequencesApplication objects

Find schemas or tables

Refresh

Tables

New table

Name

Schema

Properties

EXPENSES

JRQ38167

...

LIMITS

JRQ38167

...

REGISTER

JRQ38167

...

Total: 3, selected: 0

Table definition

REGISTER

Approximate 1 rows (32.0 KB)
Updated on 2022-11-20 07:03:16

Name	Data type	Nullable	Length	Scale
ID	INTEGER	N		0
USERNAME	VARCHAR	Y	30	0
PASSWORD	VARCHAR	Y	30	0
EMAIL	VARCHAR	Y	30	0

View data

IBM Db2 on Cloud

Load DataLoad HistoryTablesViewsIndexesAliasesMQTsSequencesApplication objects

JRQ38167.LIMITS

Back

Export to CSV

ID	USERID	EXPLIMIT
1	1	8000
2	2	400
3	1	4000
4	1	4444
5	1	777

ID	USERID	DATE	EXPENSENAME	AMOUNT	PAYMENTMODE	CATEGORY	TIME
2	1	2022-11-19	Bill	8000	epayment	EMI	12:55
3	1	2022-11-11	Dinner	999	debitcard	entertainment	12:56
4	2	2022-11-12	movie ticket	500	creditcard	entertainment	13:13

ADVANTAGES

- Available 24/7 across the globe
- Direct connection with the bank agents
- No queueing in responses
- Latest queries are answered with ease Updated to the latest details
- Easy to setup and communicate

DIS-ADVANTAGES

- Limited Response Scaling
- Frequent Maintenance
- Misreading of Queries
- Connectivity Issues

CONCLUSION

The solution to almost all the querying applications has become chatbot for assistance and resolving. We believe that the same technology can be in banking queries as it was meant for that purpose. Though the bot would not be able to solve or satisfy all the queries for customer, it can certainly resolve issues that the user might be facing often and help the banking sectors maintain great relationships with their customers.

FUTURE SCOPE

The future of project lies entirely on how the customers get benefitted from the interaction and the interface. We would have to make improvements in the bot to make it as user-friendly as possible.

The following areas could have a serious impact on our scope:

- i. Support for multiple languages
- ii. Low latency in fetching responses
- iii. Voice and video instructions

Git-Hub: <https://github.com/IBM-EPBL/IBM-Project-19042-1659692347>

Project Demo Link: <https://youtu.be/1HQwEwcmQIo>