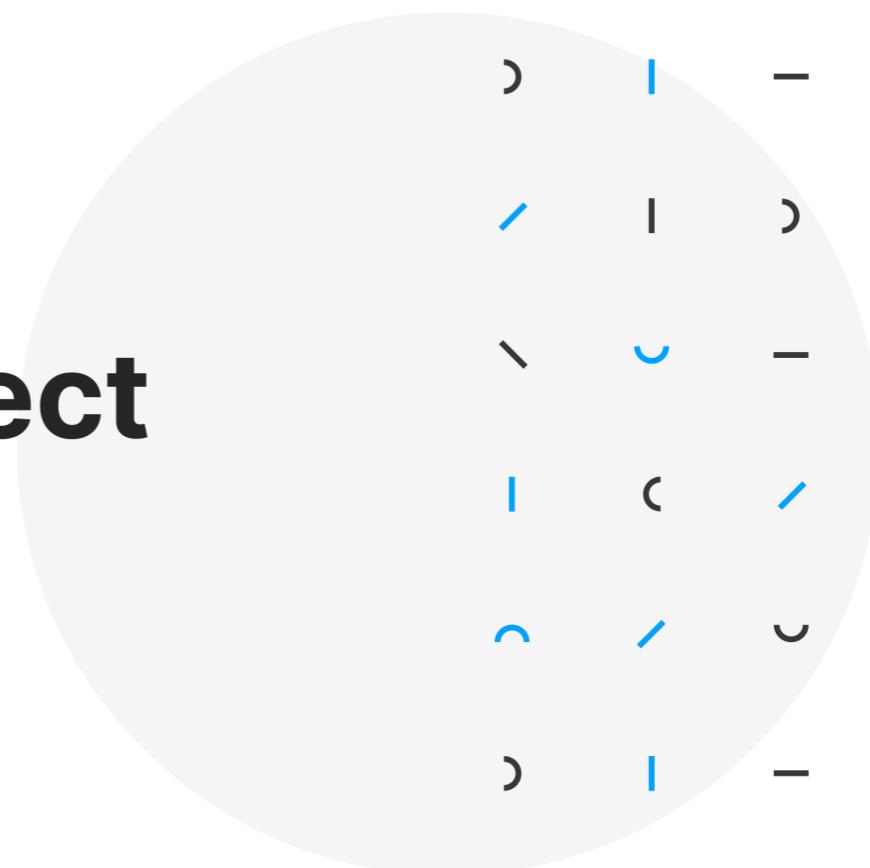


CE301 Capstone Project

Individual Project Challenge



Project Selection Criteria

Meaningful with positive impact - The mark of a life well lived is measured by the positive impact one has on the world

Has real-world application - Something people will actually use

Resume worthy - A project that I will be proud to put on my resume

Project Selection Approach

Exploring projects that have already been funded by reputable organizations

Areas of Interest: Health, Social Media, Employment, Finance*



[3]



**UK Research
and Innovation**

[4]



[5]

IGMS
Integrated Grant
Management System

[6]

NATIONAL RESEARCH FOUNDATION
PRIME MINISTER'S OFFICE
SINGAPORE

[7]

Discovery

Singapore is one of “**the world’s most highly cited**” for distributed ledger technologies/fintech. [8]

It has also “**engaged over 300 companies and started more than 60 projects focusing on sectors such as healthcare, finance**” [8]

There is a tech fund called Startup SG Tech, a FinTech Association, and a fintech event called Fintech Festival which is partly organized by the Monetary Authority of Singapore (MAS) [9]

Some of the sponsors & speakers



TEMASEK

Grab

UOB

Google Cloud

PayPal

Microsoft

OCBC Bank

VISA

standard chartered

amazon

J.P.Morgan



ANTHONY TAN
Co-founder & Group CEO
Grab



MICHELLE NEAL
Executive Vice President & Markets
Group Head
Federal Reserve Bank of New York



LAWRENCE WONG
Deputy Prime Minister and Minister
for Finance
Republic of Singapore



PARUL MUNSHI
Partner
PwC South East Asia Consulting



STEPHANIE DAVIS
Vice President, Google Southeast
Asia
Google



VITALIK BUTERIN
Co-founder of Ethereum &
Researcher at the Ethereum
Foundation
Ethereum Foundation



PATSIAN LOW
Vice President, Inclusive Impact &
Sustainability Asia Pacific
Visa

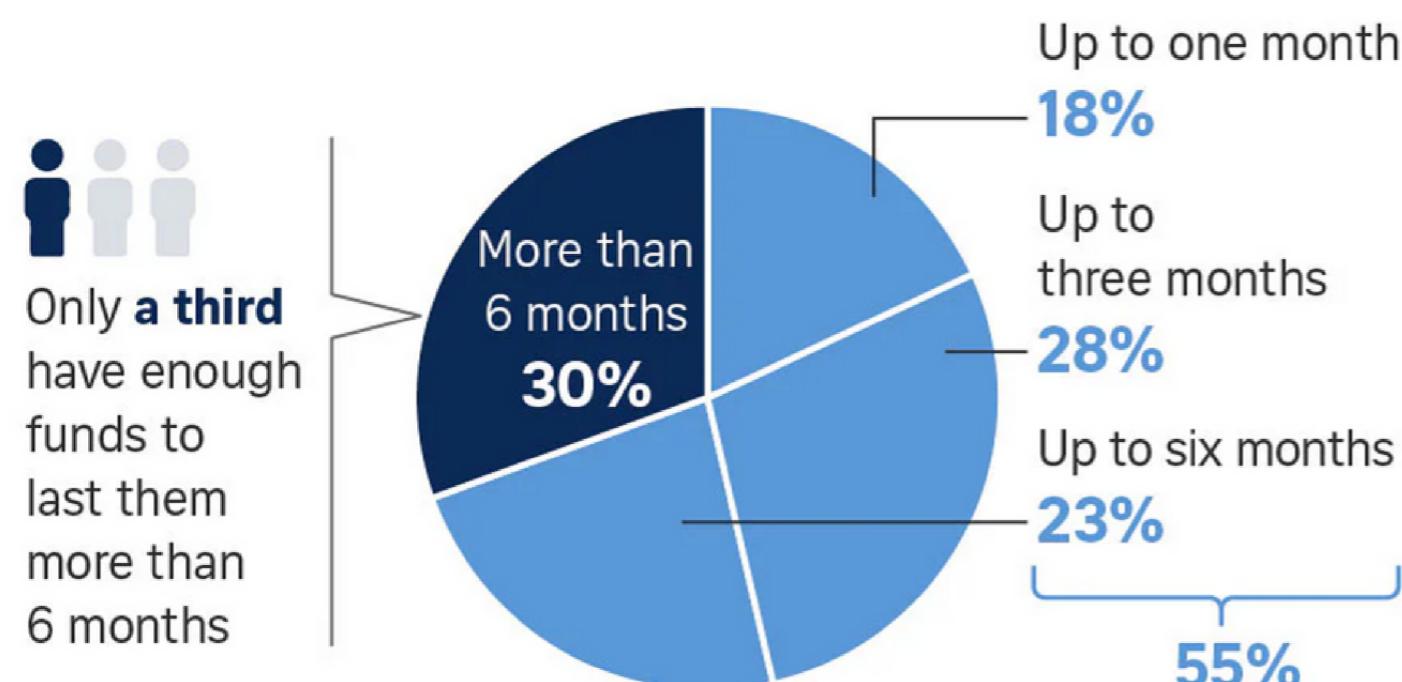


PIYUSH GUPTA
CEO
DBS Bank

Are there problems to be solved in the financial industry? Yes! Now more than ever

Covid-19 has affected the job stability of many Singaporeans

"I have enough savings to sustain myself for _____ if I were to lose my job now."



[10]

2 in 3 working Singaporeans do not have savings to last them beyond 6 months: OCBC survey [10]

Covid-19 has also had damaging effects on Singapore's economy such as a **reduction in GDP** and a **slowing down of economic growth** according to the Macroeconomic Review published by the MAS. [11]

What other problems are there?

Covid-19 and the war between Russia and Ukraine have affected supply chain [12]

When supply decreases but demand remains the same prices of goods increase and we experience this as inflation



[12]

GST is also set to increase from Jan 2024

The rise of Buy Now Pay Later companies. A debt pandemic

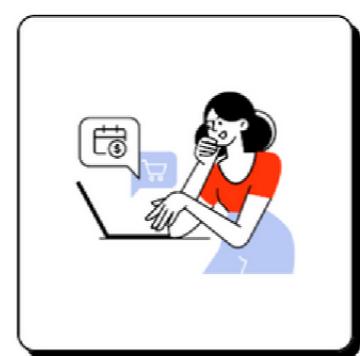
38% of Singaporeans around 1.1 million people have used a buy now pay later service [13]



01

Sign in and set up PayLater

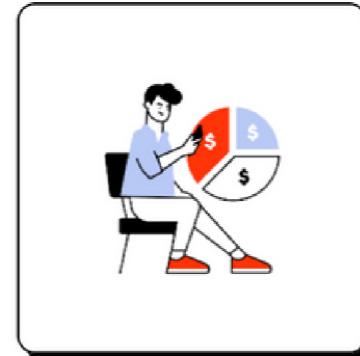
Link your cards or payment methods to ShopBack and complete a quick identity check.



02

Select PayLater at checkout

Look for the ShopBack PayLater logo when shopping online or in-store. Scan the QR code to pay.



03

Pay in 3 monthly instalments

Pay a third of the bill first, and the rest over the next 2 months. Check status and manage payments in the ShopBack app.

[14]

Proof of income is not required

Proof of income is important as it shows that one is able to service their debt

Anyone above 18 can sign up

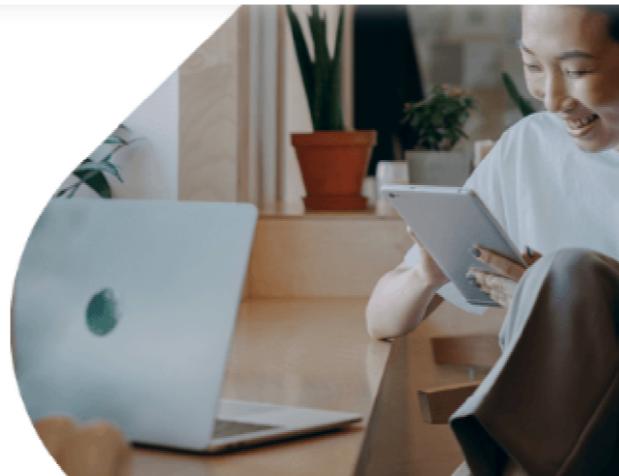
The youths of Singapore, who have the least experience in financial literacy and disposable income make up 40% of BNPL users. [13]

Message to encourage poor financial decisions 😞



Save more when you pay smarter

Supercharge your rewards with ShopBack Pay at checkout. And when waiting is not an option, PayLater lets you buy it now and pay over 3 monthly instalments.



[14]

Get the app

Reward yourself with the finer things in life.

[15]

I'm shopping for All stores

Show me



[15]

Get it today.
Split your purchase into 3 payments.

We live in the moment just like you, and we get that some things in life shouldn't have to wait.

[15]

Does Buy Now Pay Later actually help?

"27% of Singaporeans admit to **being worse off financially due to a buy now pay later mistake.**" A contrast to Shopback's statement of "Save more when you pay smarter"

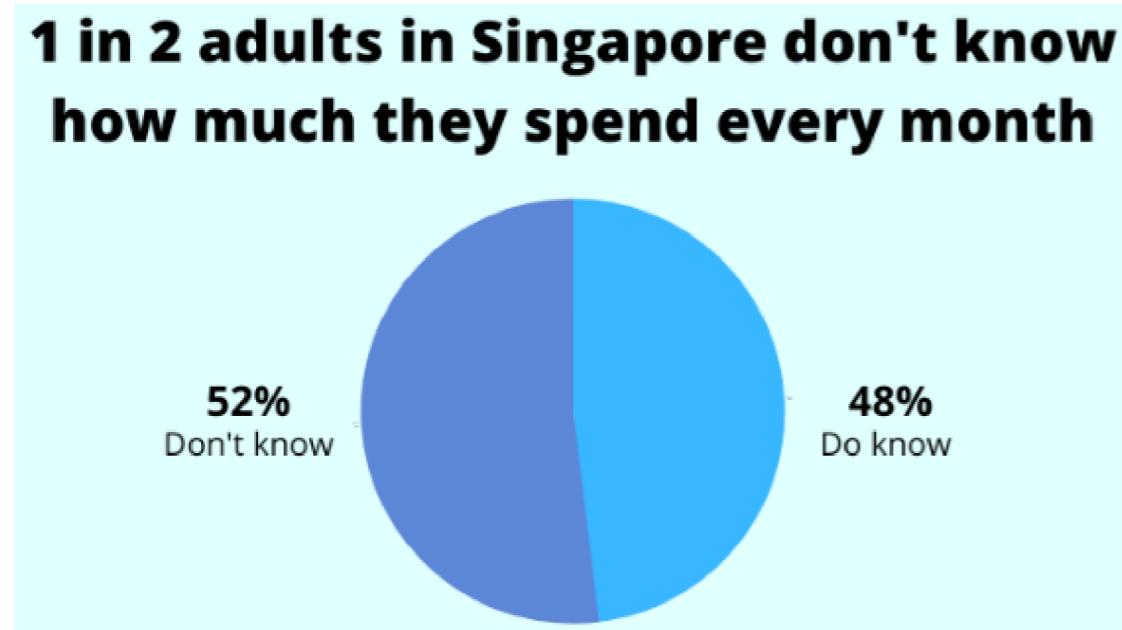
"one in five Singaporeans" makes an impulse purchase

The most common buy now pay later mistakes

◆ Buy now pay later mistakes	◆ Percentage ◆
1 Made an impulse purchase	17%
2 Bought a more expensive item than you otherwise would have	15%
3 Overstretched your budget and struggled to pay for other expenses	11%
4 Paid a late fee	9%
5 Had your bank account go into overdraft	7%

Maybe the people who make these mistakes are the minority?

52% of adults don't know how much they spend every month



Those aged 18 to 24 are the least likely to know how much they spend

The same age group makes up 40% of BNPL users.

1 in 4 who track their spending still have the habit of overspending. The reason? **Impulse purchases**.

Why don't people track their spending?

It is troublesome
to do so

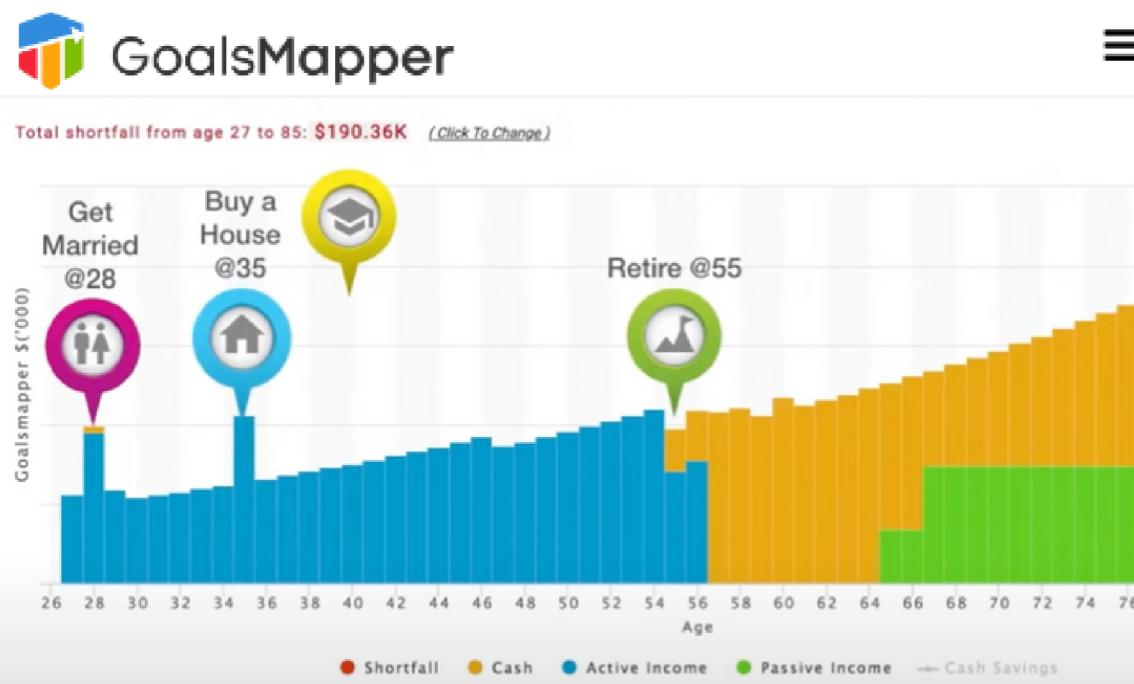
Fear of finding out their
financial outcome

Some view it as an
unnecessary task

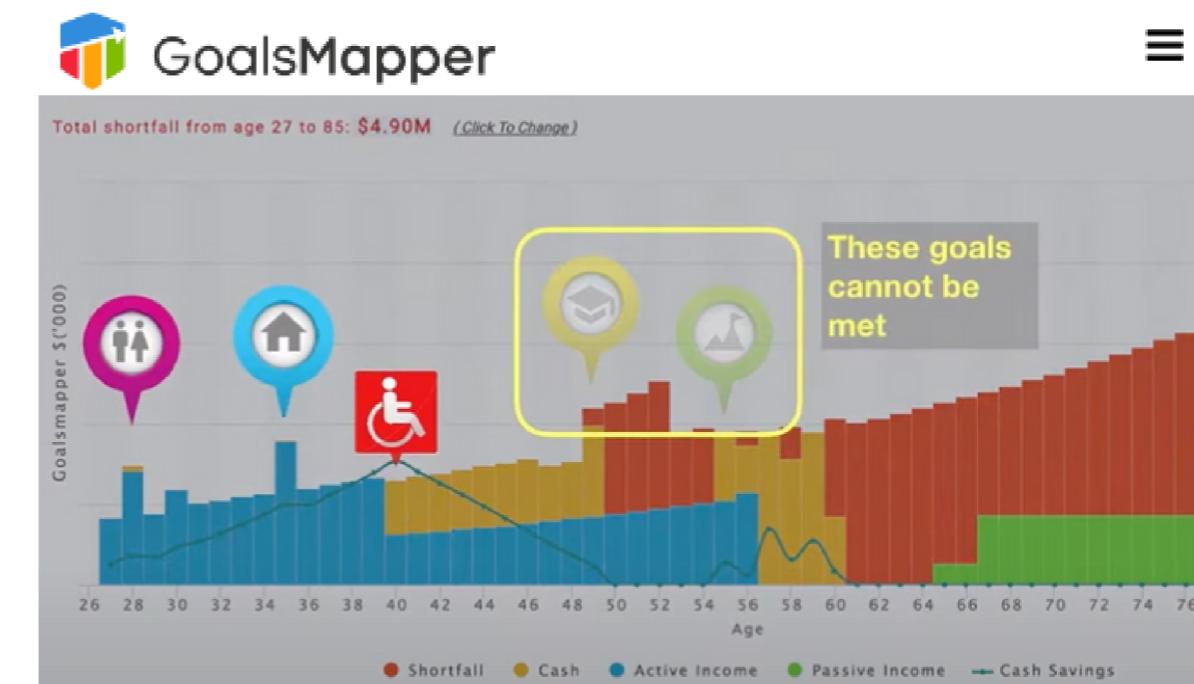
The act of tracking creates
more stress

However not tracking leads to more serious issues in the long run including **living from paycheck to paycheck and not having enough savings**

Are there existing solutions?



[17]



[17]

What about iBanking apps?



[9]

Banking apps will not be able to track expenses made outside the app or with other banks. Is it an incomplete solution.

How about apps?



Money Manager Expense & Budget

Realbyte Inc.

Contains ads · In-app purchases

4.7★

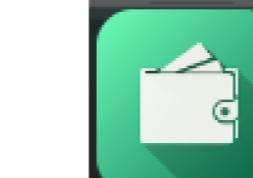
338K reviews

10M+

Downloads

3+

Rated for 3+ ⓘ



Monefy - Budget & Expenses app

Reflectly

Contains ads · In-app purchases

4.3★

180K reviews

5M+

Downloads

3+

Rated for 3+ ⓘ



Monny

Greamer

Contains ads · In-app purchases

4.6★

9.19K reviews

100K+

Downloads

3+

Rated for 3+ ⓘ



Money+ Cute Expense Tracker

zotiger studios

In-app purchases

4.8★

34.3K reviews

1M+

Downloads

3+

Rated for 3+ ⓘ

[18]

[19]

[20]

[21]

Let's compare

Features	Money Mgr.	Monefy	Monny	Money+
Different account types (e.g: debit, credit)	Free limited to 15	✓	✓	Free limited to 1
Recurring expenses	✓	Paid Version	✓	Paid Version
Export data	✓	✓	✓	Paid Version
Import data	Formatting Need	✗	✗	✗
Methods available to add expenses	Manual Input	Manual Input	Manual Input	Manual Input
Expense Categories	✓	✓	✓	✓
Customise or add categories	✓	Paid Version	✓	Paid Version
Methods to add categories to expenses	Manual Input	Manual Input	Manual Input	Manual Input
Allow users to set budgets	✓	✓	✓	✓
Allow users to forecast financials	✗	✗	✗	✗
Available on desktop	Paid Version	✗	✗	✗
Visualise financial reports	✓	✗	✓	✓

So what's the verdict?

There is no appropriate solution to truly help people gain control of their financials

Almost all apps require users to manually input.

If someone were to have 3 expenses in a day namely, breakfast, lunch, and dinner in a month they will have to **manually input 90 times** and this is the bare minimum

Money Mgr's import feature requires users to download a file and then input their expenses into the file in a specific format which is **as good as inputting directly into the app.** [22]

None of the apps allows users to project and forecast their finances like GoalsMapper.

Projecting finances is important. It provides a better picture of not just your current financial position but also that in the coming months and years.

“more than half of the respondents had not developed a plan for retirement savings.” - MAS

This survey was done in 2021, involving 2000 Singaporean aged 18 - 79 showing

[23]

How do I think I can help?

Remove the resistance to financial tracking and planning



BASE

Create a web software that offers all the existing features available on the apps we just explored

Ensures that features that users are used to are available hence not creating additional resistance

- Different account types
- Recurring expenses
- Export data
- Expense categories
- Customize or add categories
- Allow users to set budgets
- Visualise financial reports



ENHANCEMENTS

Introduce essential new features such as:

- **Importing of data**
- **Methods available to add expenses**
- **Methods to add categories to expenses**
- **Allow users to forecast financials**
- **Available on desktop and mobile optimized**

Essential details on enhancements

Project context, aims, objectives and what will be achieved



Importing of data & methods to add expense

Allow users to import data is important as having to make at least 90 manual inputs a month added to the resistance

Users can upload PDF bank statements, photos, CSV, or even videos, and the software will **use Machine Learning to extract the relevant information for the uploaded document**

Manual input function is still available but this greatly reduces the amount of manual input required



Methods available to add expenses

Once the relevant transaction has been extracted from the document the software will proceed to execute Natural Language Processing

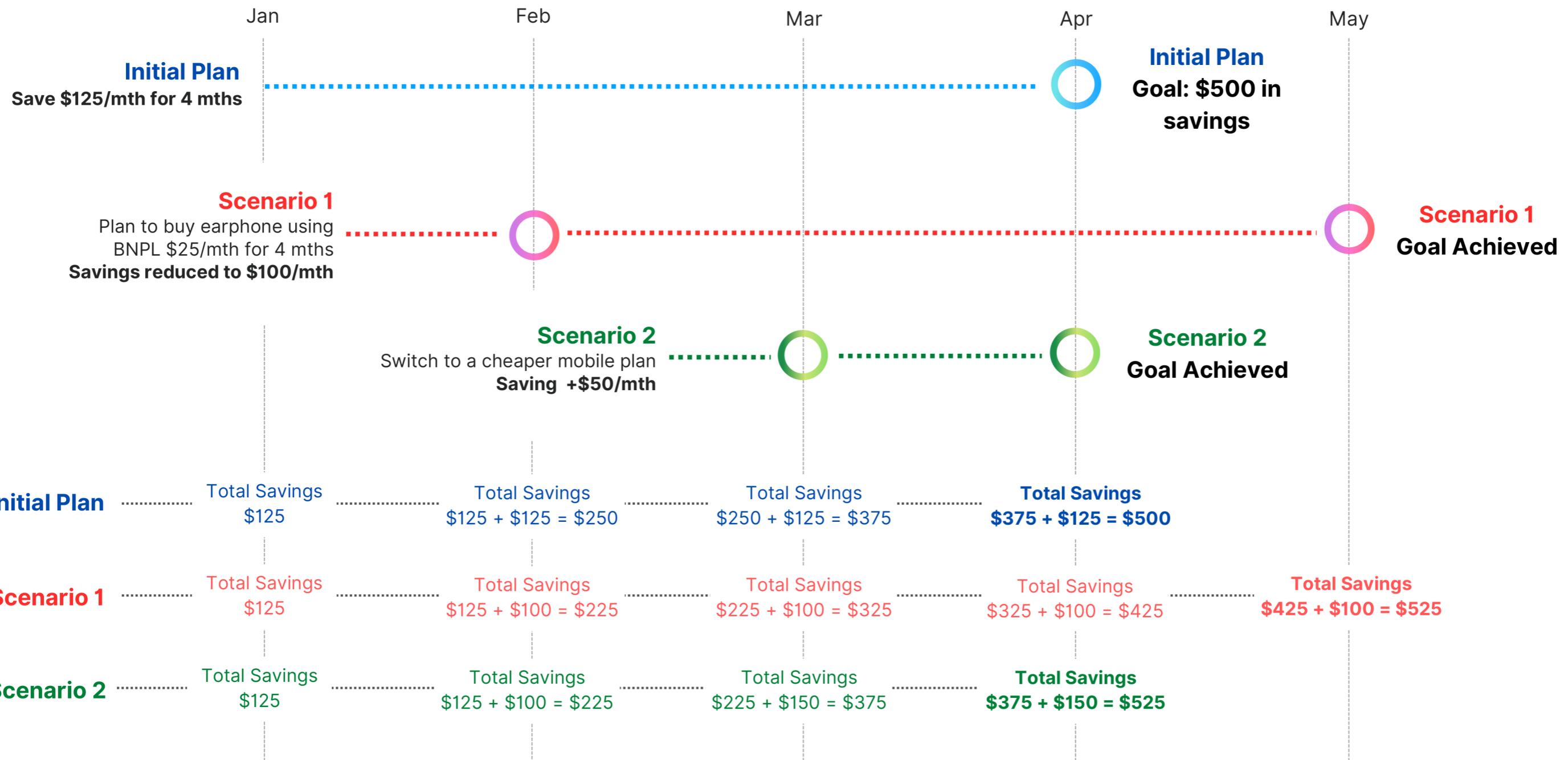
Doing so will **categorize expenses from the users automatically**

Users can still change the categories but the software will reduce the occurrence needed.



Allow users to forecast financials

Enable users to set goals, *project their finances into the future, add scenarios* that they think would occur, and *see how it will affect their goals*



Technologies and tools that I will be exploring for this project

A full stack web software

Frontend & Styling

React, JavaScript, HTML, CSS, Tailwind, Bootstrap     

Backend & Logic

Python, Django, JavaScript, Node JS    

Content Management System

Wordpress, Sanity iO  

Database

MongoDB, SQL, Firebase   

Server & Hosting

Firebase, Netlify  

Version Control

Github 

Project Management

Jira (KanBan) 

Misc

Google Workspace, Canva  

What have I done thus far (part 1)

Technical achievements

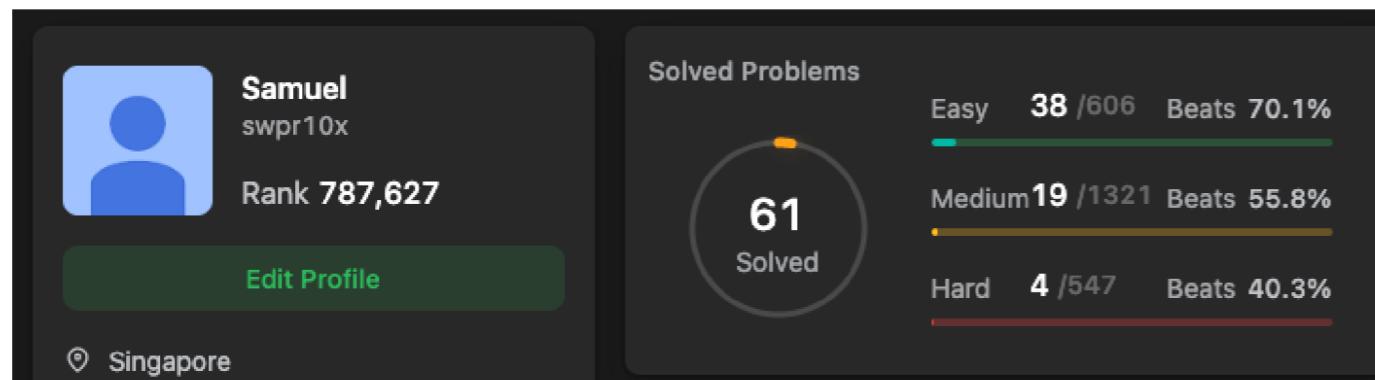
Coding personal projects and using version control frequently



Screenshots of my Github commits

Github link: <https://github.com/samwpr>

Coding challenges on Leetcode



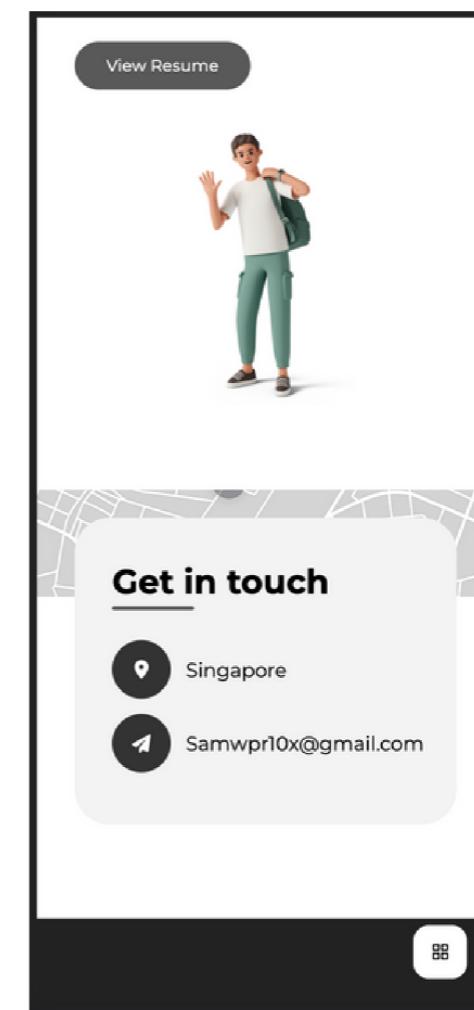
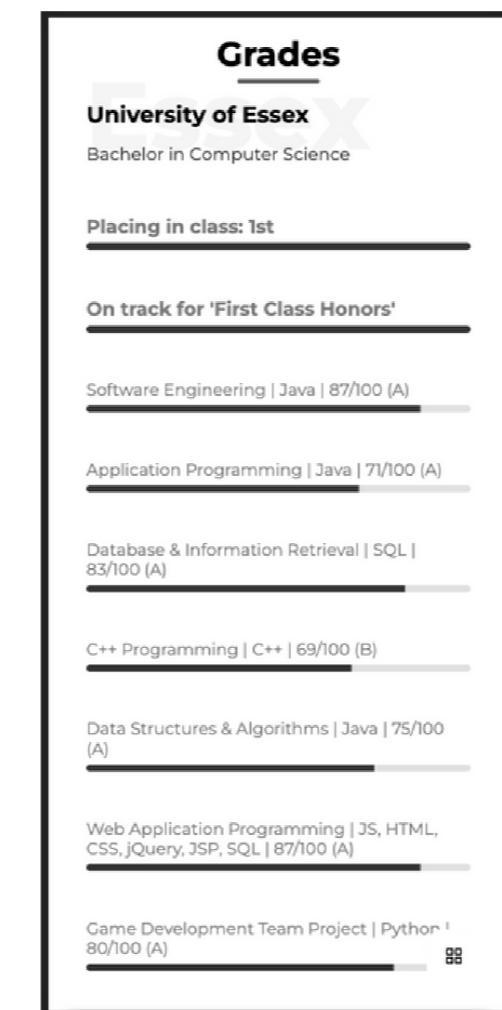
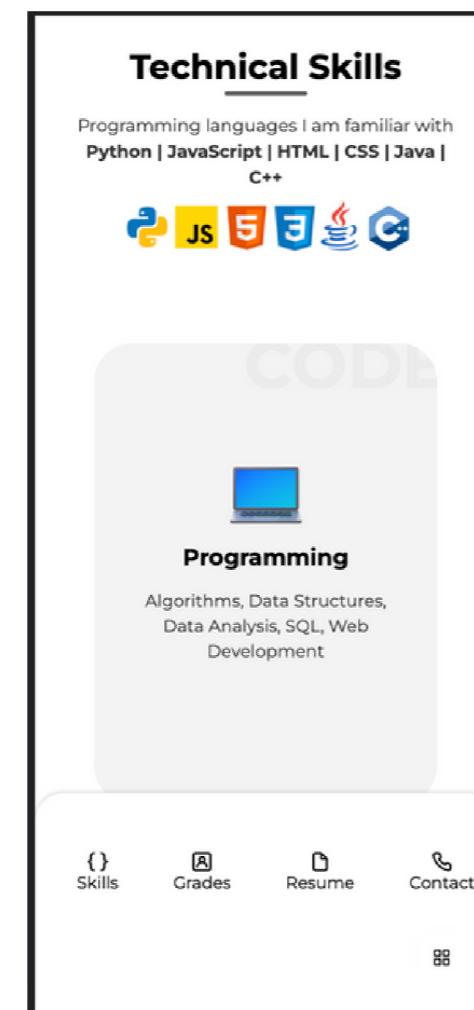
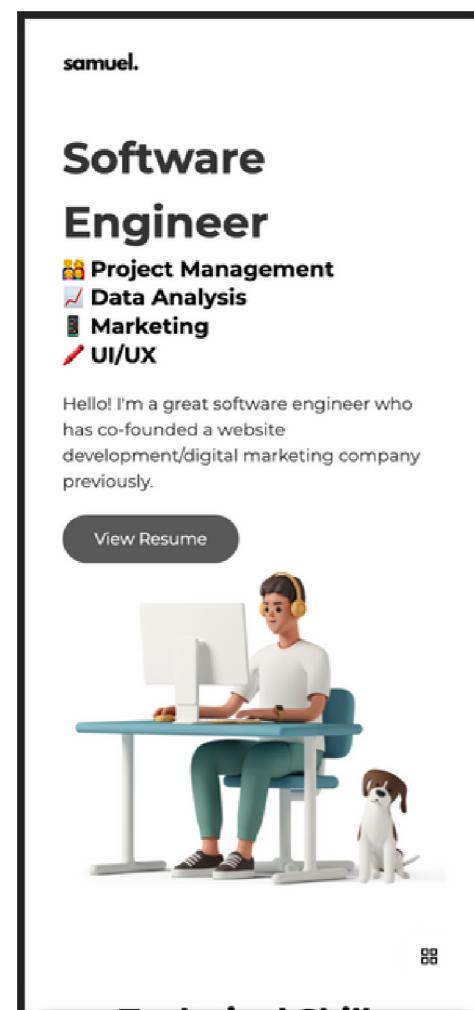
Coding challenges are done in Python, Java, and JavaScript

What have I done thus far (part 2)

Technical achievements

Developing my personal website

Framework: JavaScript, HTML, CSS | Server: Netlify | Link: <https://samwong.netlify.app/>

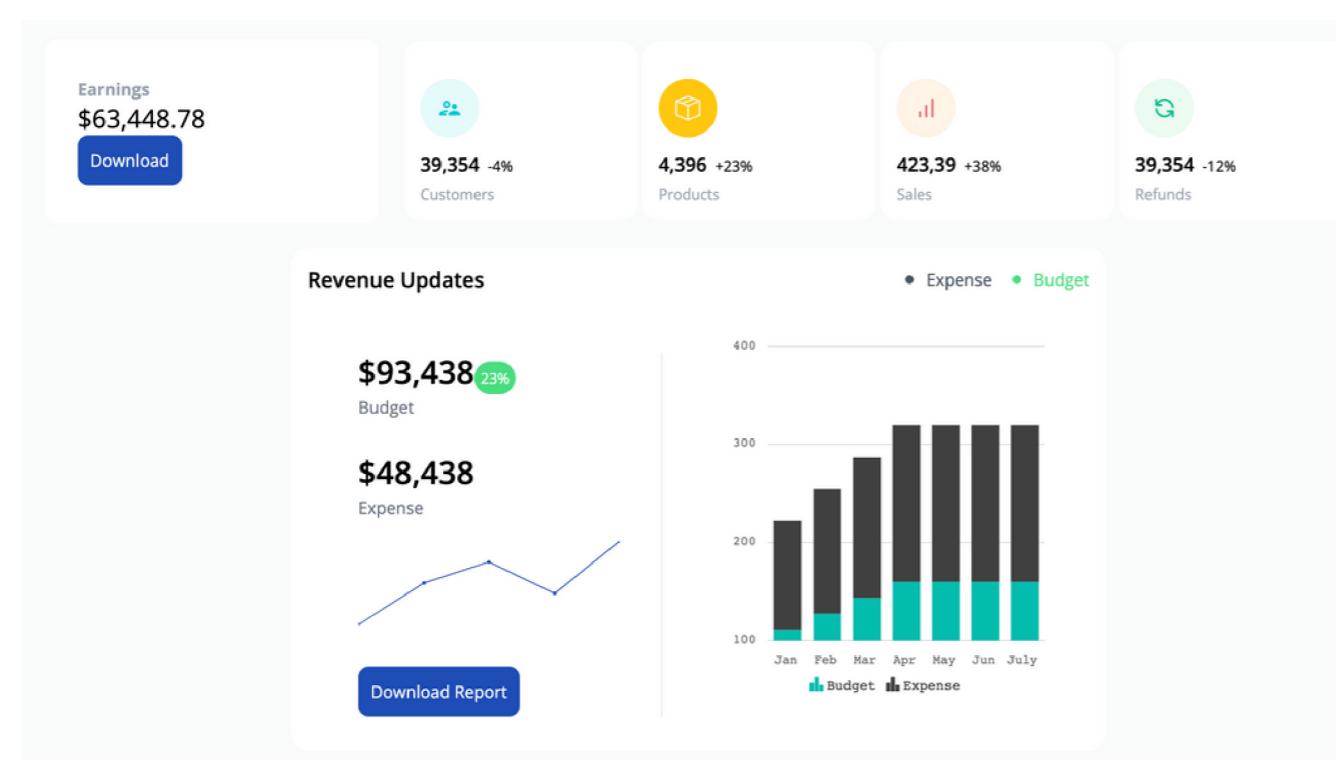


What have I done thus far (part 3)

Technical achievements

Developing a dashboard

Framework: React

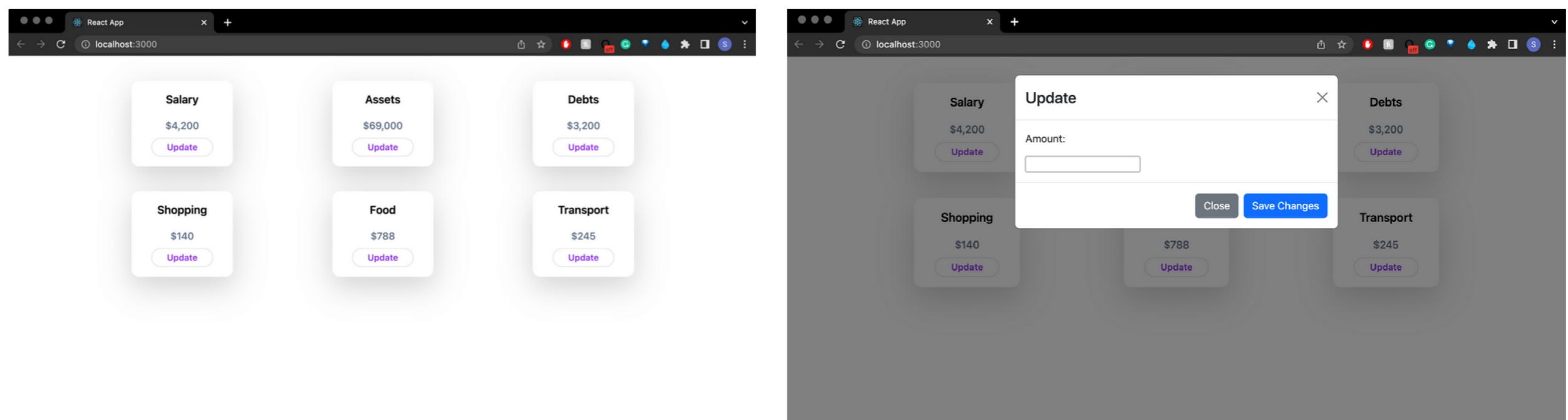


What have I done thus far (part 4)

Technical achievements

Accounts / expenses dashboard

Framework: React

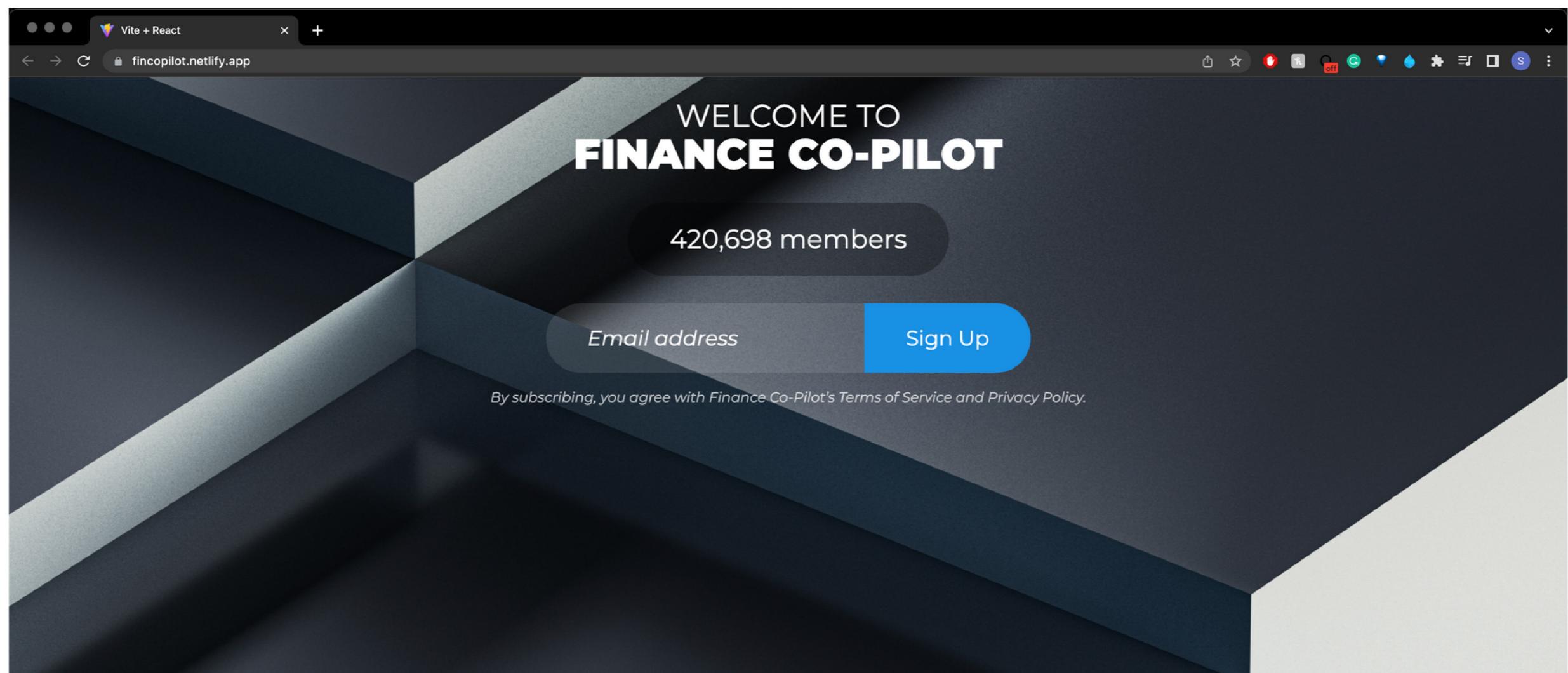


What have I done thus far (part 5)

Technical achievements

Sign Up Landing Page

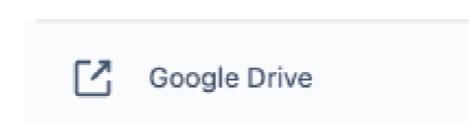
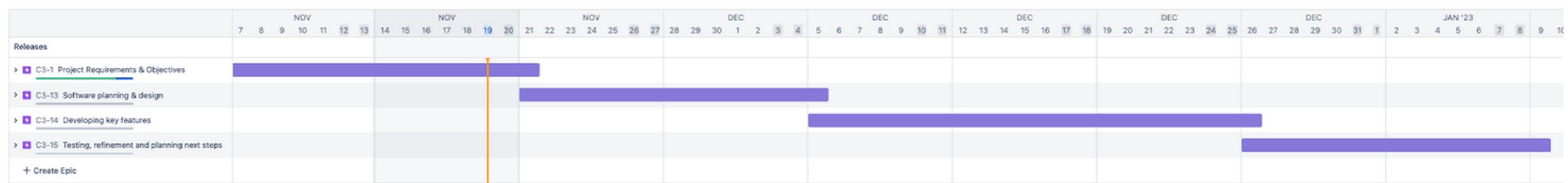
Framework: React, Tailwind | Link: <https://fincopilot.netlify.app/>



What have I done thus far (part 6)

Technical achievements

Jira Planning (Epics & Set Up)



Link to Drive where key documents can be found

- #### Releases
- › **C3-1 Project Requirements & Objectives**
 - › **C3-13 Software planning & design**
 - › **C3-14 Developing key features**
 - › **C3-15 Testing, refinement and planning next steps**

Folders

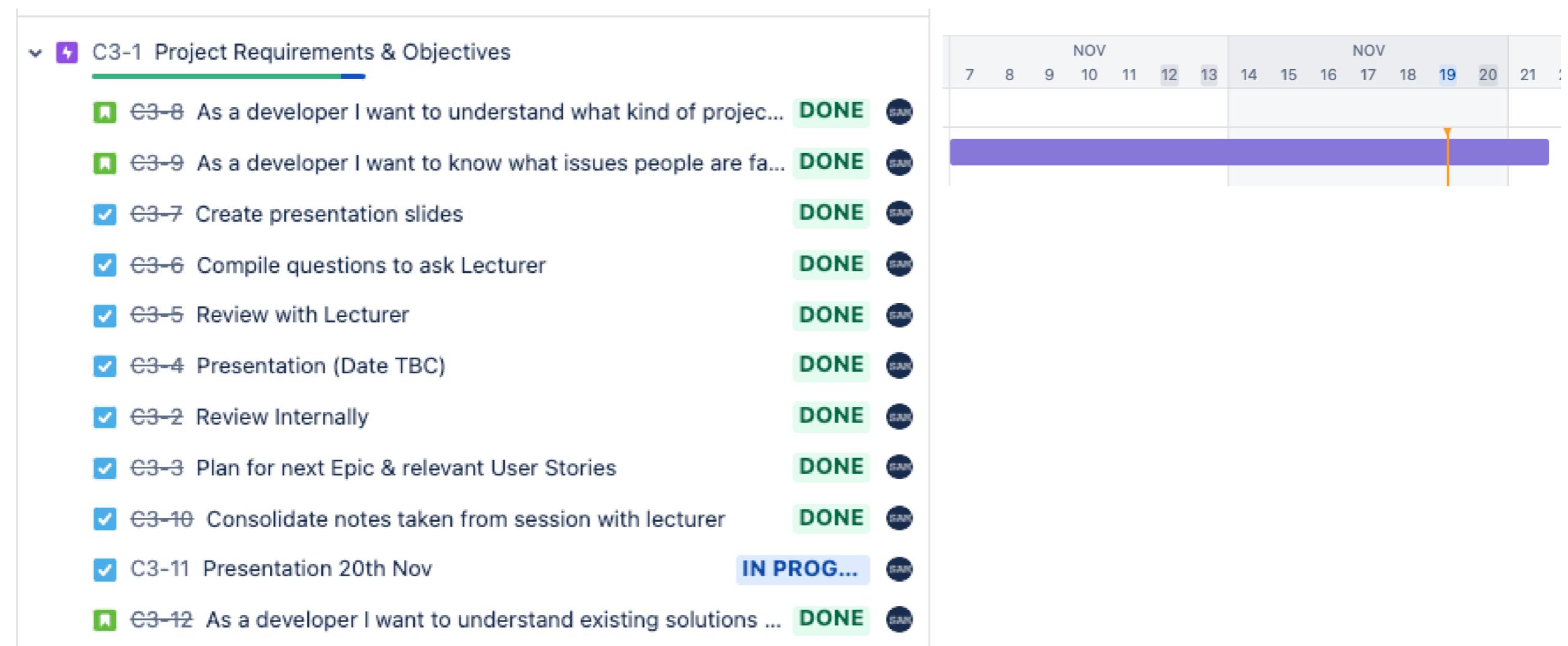
- Assignment Brief
- Background Reading
- Minutes
- Presentation 20th N...**

Component	Description	Component lead	Default assignee	Issues
Testing			Project default	1 issue
Research			Project default	11 issues
Project Management			Project default	26 issues
Development			Project default	14 issues
Design			Project default	6 issues

What have I done thus far (part 7)

Technical achievements

Jira Epic 1 - Project Requirements & Objectives



What have I done thus far (part 8)

Technical achievements

Jira Epic 2 - Software planning & design

C3-13 Software planning & design		
<input checked="" type="checkbox"/> C3-60 Ask how to give access to Jira	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-28 Check requirements for Oral Interview	SELECT...	SAM
<input checked="" type="checkbox"/> C3-16 As a developer I want to create UML diagram as it ...	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-17 Use case diagrams	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-18 Class diagrams	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-19 Communication diagrams	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-20 As a developer I want to see wireframes and this ...	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-21 Check in with lecturer once between (21 - 27)	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-23 Review Internally 1	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-25 Plan for next week	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-27 As a developer I want to identify the key challenge...	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-22 Check in with lecturer once between (28 Nov - 04...	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-24 Review Internally 2	BACKLOG	SAM
<input checked="" type="checkbox"/> C3-26 Plan for next Epic	BACKLOG	SAM

What have I done thus far (part 9)

Technical achievements

Jira Epic 3 - Developing key features

<p>⚡ C3-14 Developing key features</p> <ul style="list-style-type: none">💡 C3-35 As a developer I want to start learning how to inte... BACKLOG SAM✓ C3-36 Identify programming language that is best for fro... BACKLOG SAM✓ C3-38 Python/JS and React Integration BACKLOG SAM✓ C3-39 Python and Django Integration BACKLOG SAM✓ C3-40 Trying out databases(Mongo, SQL, Firebase) BACKLOG SAM✓ C3-47 Check in with lecturer once between (05 - 11) BACKLOG SAM✓ C3-41 Review Internally 1 BACKLOG SAM✓ C3-44 Plan for next week BACKLOG SAM💡 C3-29 As a developer I want to identify the key features ... BACKLOG SAM	<ul style="list-style-type: none">✓ C3-30 Extraction of data using machine learning BACKLOG SAM✓ C3-31 Cleaning up of extracted text BACKLOG SAM✓ C3-32 Automation of categorising expenses BACKLOG SAM✓ C3-33 Exporting of extracted data BACKLOG SAM✓ C3-34 Creating a simple user interface to present data BACKLOG SAM✓ C3-48 Check in with lecturer once between (12 - 18) BACKLOG SAM✓ C3-42 Review Internally 2 BACKLOG SAM✓ C3-45 Plan for next week BACKLOG SAM✓ C3-49 Check in with lecturer once between (19- 26) BACKLOG SAM✓ C3-43 Review Internally 3 BACKLOG SAM✓ C3-46 Plan for next Epic BACKLOG SAM
---	--

What have I done thus far (part 10)

Technical achievements

➡ Jira Epic 4 - Testing, refinement and planning next steps

The screenshot shows a Jira backlog interface. At the top, there is a header for 'C3-15 Testing, refinement and planning next steps'. Below this, a list of tasks is displayed, each with a status indicator (green for in progress, blue for completed), a task ID, a brief description, a 'BACKLOG' button, and a small circular icon labeled 'SAM'.

- C3-50 As a developer I want to identify test methods tha... BACKLOG SAM
- C3-51 Identify what testing is required BACKLOG SAM
- C3-52 Document bugs and refinement need BACKLOG SAM
- C3-53 Prepare for oral interview BACKLOG SAM
- C3-54 Check in with lecturer once between (26 Dec - 01... BACKLOG SAM
- C3-56 Review Internally 1 BACKLOG SAM
- C3-58 Plan for next week BACKLOG SAM
- C3-55 Check in with lecturer once between (02 - 09 Jan) BACKLOG SAM
- C3-57 Review Internally 2 BACKLOG SAM
- C3-59 Plan for next Epic BACKLOG SAM

Additional skills needed

More exposure and experience to certain technologies

Frontend & Styling

Still a beginner at React, Tailwind, Bootstrap

Backend & Logic

Close to zero experience in Django and Machine Learning

Database

No experience in MongoDB and Firebase

Content Management System

Only have one prior experience with Sanity iO

Server & Hosting

No experience in Firebase

Risk and mitigation (part 1)

An uncertain event/events that if occurred would have either a positive or negative impact

Late delivery

Risk Probability: 3/5

I have not been late on assignments to date. Having said so I have not had to attempt such a large project

Risk Impact: 5/5

The university will give me no marks for late submission

Mitigation:

Plan well and include buffers in my project. Employ planning tools taught in the previous term. Cover as much ground as possible and when that is done then proceed to make refinements

Integration incompatibility

Risk Probability: 4/5

As I have not used a lot of the technologies stated I am uncertain if they can Integration with each other

Risk Impact: 4/5

The software may not work if it can't be integrated

Mitigation:

In my technology list, I have included different options to choose from. Should one not work with another I have something else to explore

Risk and mitigation (part 2)

An uncertain event/events that if occurred would have either a positive or negative impact

Additional testing needed as code base increase to meet requirements

Risk Probability: 5/5

Seeing that it is my first time working on such a large project it is most likely that I have not captured all the requirements needed and hence additional testing will be needed

Risk Impact: 5/5

This may result in late delivery

Mitigation:

Have a better understanding of the requirements of my software and scale down where possible

Attending to the most challenging requirements first

Software doesn't end up helping people track and plan their finances

Risk Probability: 2/5

Based on my background reading it is unlikely that my software doesn't have product market fit, however, you never know

Risk Impact: 4/5

No one uses the software

Mitigation:

Understand the needs of the user better by organizing Interviews and surveys

Risk and mitigation (part 3)

An uncertain event/events that if occurred would have either a positive or negative impact

► **Development strategies are not approved by lecturers**

Risk Probability: 2/5

The lecturers thus far seem very supportive of our ideas and it is unlikely they will request major changes that will affect the project

Risk Impact: 5/5

This may result in late delivery

Mitigation:

Communicate frequently with the lecturer

► **Hardware and/or software failure**

Risk Probability: 1/5

My laptop crashes or there are errors with the software I am using

Risk Impact: 5/5

This may result in late delivery or loss of progress

Mitigation:

Have frequent backups and additional hardware to work on

How will this help with my career?

A more experience and holistic developer

- ▶ Gain experience as a full stack developer
- ▶ Exposure in frontend and backend
- ▶ An additional project I can add to my resume
- ▶ Provide me with job opportunity in web and data science
- ▶ Show employers that I can manage and develop a large scale project
- ▶ Opportunities to make my software into an actual company

Deliverable and what the assessor should be looking for

Specific achievables

- A well managed, planned and documented project (wk 12)
- Extraction of data using machine learning (wk 12)
- Automation of expense categorisation (wk 12)
- Different finance account types (e.g: credit, debit)
- Ability to create recurring expenses
- Various expense categories
- Setting of budgets
- Visualise finance reports
- Forecasting and planning of finances
- Access controls, user account, content management account, admin account
- Good UI/UX and mobile optimisation

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