UTM

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SEMESTER II - SESI

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System Analysis and Design

Project Phase 1

Lecturer: Dr. Layla Rasheed Hasan

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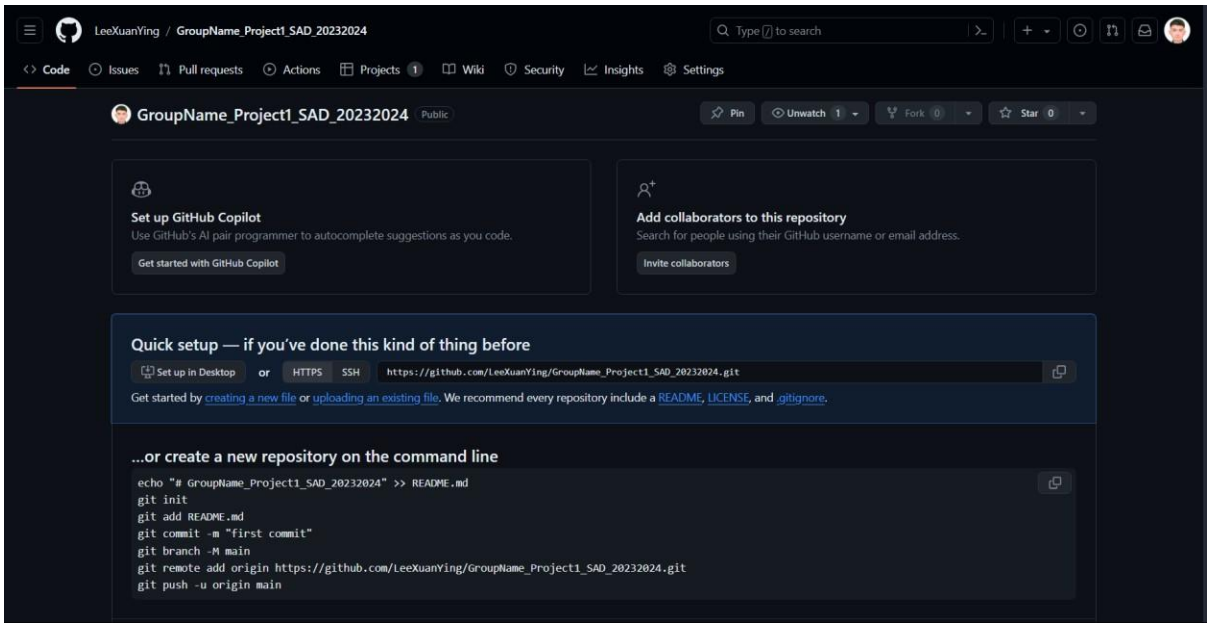
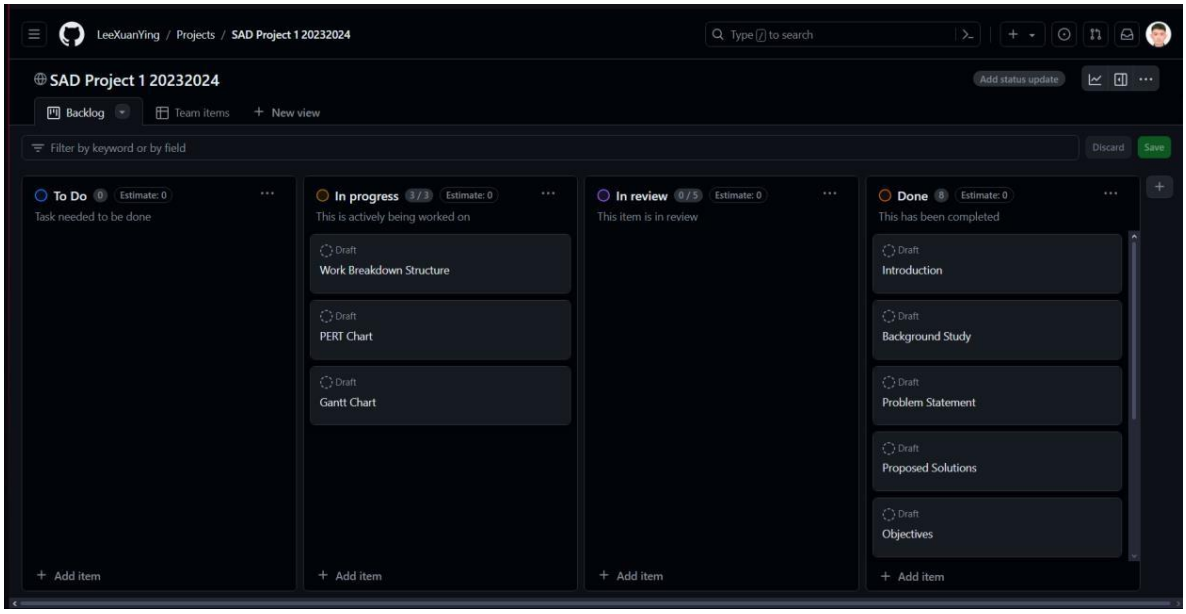
URL of the Github Repository

https://github.com/LeeXuanYing/GroupName_Project1_SAD_20232024



Kanban board



Importance of using version control

- Streamlined release management
- Confliction prevention
- Tracking changes to digital artifacts

1.0 Introduction

With the prevalence of trade based on currency and not of goods or bartering, expenses and incomes are now much more visualizable and to be kept track of. With how life in society is majorly around money, keeping track of one's income and expenses is vital in one having an easier time in life and making sure that one is always sure of its own spending capability and don't overspend and suffer the consequences. Our Expense Tracker is designed to help to keep track of Income-Expense of an individual or an organization on a day-to-day basis.The system will record the income and divide it to record the daily expenses. It will change its daily expenses to fit the allowed expended amount if the daily expenses exceed the day's expense. It will generate a report at the end of the month to show the total Income and Expense accumulated this month. This is able to be used by the customer to let the system produce a final report that helps to predict the next month's expenses, helping to manage overall expense and income. If using this system in a business enviroment, it will allow the employee to utilize the software to automate a business expense entry and cut down on recipes tracking and administrative work. Expense Tracker allows the administrators to have visibility of the expenses and track employee use of business financial resources. It allow the user to analyze overall expenses, identify cost-saving opportunities, and control excessive spending. Expense Tracker is developed to manage the daily expenses in a more efficient and manageable way. We can reduce the manual calculation required for daily expenses and keep track of the expenditure. The user can provide his income to calculate his total expenses each day and these results will be stored for each user. Expense tracking plays a crucial role in managing the expenses of a business organization and can bring in several advantages for an organization. The expense tracker will help any organization to deal with all their expenses more efficiently. Using Expense Tracker will help to control unnecessary expenses and makes any organization run faster and smoother. It also allow financial health of budget to be improved by keeping a daily record of your expenses by tracking receipts, invoices, and other outgoing expenses.

2.0 Background study

The idea that led to our group choosing to create and plan out an expenses tracker is that we realize that we don’t have our expenses in our daily expenditure during college study detailed out and thus causes trouble in us having difficulty when calculating our expenditure to plan for our budget for daily activities and entertainment. Tracking back our expenditure to various e-wallet or bank application transaction history uses up a high amount of time and is fairly tedious and annoying to do. Thus, it resonated with us to come up with an expense tracker of our own to aid in our problem. It will be able to help us save money along the way through better management of our budget and tracking of our expenses. We will be able to track where we are spending our money so that we are able to control our spending. It will also be able to generate our expenses and saving reports as time duration we selected so there will be a reminder that will help to save money for our pre-defined expenses.

Expense Tracker

3.0 Problem Statement

• Difficult to navigate interface
- Most Expense Trackers tend to have a complicated interface or not detailed explanation on how to navigate the system.
- Lead to consumers' confusion and can be the cause of consumer disinterest and dropping off the product or led to using the wrong function within the system for their needs
- Consumers forced to dedicated some amount of time to learn how the product is navigated instead of using them from the get-go

• All calculation have to be done manually by the users
- Consumers before being introduced to an expense tracker system, have to perform all the calculation by themselves
- Have to account for all the tax deduction and tax rebate in the case of taking tax payment as a form of expense in the tracker
- Prone to user error in calculation and causes incorrect results

• Repeated logging into the system in order to manually add data to be keep track of or record
manually in a diary
- Consumers have to manually log into their respective expense tracker to add their expenses or income for the system to register and record
- Prone to consumers losing track of the receipt after some time if not recorded immediately or consumers having a short-term memory, forgetting the exact expense or income.
- Non-expense tracking system consumers have to constantly bring their diary around to record their expenses to not risk losing track of them

• Lack of proper planning for income and categorization of expense
- Consumers have to plan out their income and categorize their expense manually
- Consumers are prone to overspend without noticing in some part of their planning of income due to lack of tracking of category of expenses
- Non-expense tracking system consumers have to manually record their income planning in accordance to their expenses

4.0 Proposed Solutions

• Make the user interface easy to understand and navigate
- Upon system first initialization, the consumer is prompted to give a step-by-step guide on the system functions and how the various functions are accessed and used within the system. The guide is always available to view within the system in the case of the consumer forgetting or the system is used by another consumer.
- Design the system user interface to show the basics needs of consumer on the front page is shown first, with more complex or niche function being further into the interface, to make sure the commonly used function is easily accessible without confusion by other function that is tailored for specific consumers
- Allow shortcut to be set for the function that the consumer wish to access easily so that the consumer don't have to use up much time navigating the system

• Calculation function for various needs
- Design the system with calculation system that help to subtract all the expense from

consumer income to show the balance of the consumer
- Have specific calculation like for taxes or interest to be used to help in recording expenses for a more robust calculation system

• Service is synced with various payment and shopping application and services
- The system is designed with sync function with other payment application or services like Touch'n Go e-wallet, shoppe, lazada and others, so that when payment is made, a record is made in the system, allowing the record to be updated in real time without needing consumer input
- The system also make a backup record of each expenses locally within the user device for offline reference in the case of system failure or no internet services is available

• Built in income planner and sync the expense recorded in the system into different category
- The user can input their income and allocate the amount of budget they want to a specific spending group and when expenses are made, said expenses record will be tracked down and identified the type of expense is and make deduction in the specific allocated budget from the income.
- The system will give a notification whenever the budget only have specific percentages left and the range can be customized to the consumer liking

• Technical Feasibility:
- Implementing calculation features are feasible, as our expense tracker uses simple calculation to achieve its goal. No overly complex calculation that is technically challenging is required
- Designing a user-friendly interface and help review of the system will also be feasible as it can simplified to more simple menu that isn't technically demanding
- Income planner will be feasible as it is a simple data insert feature
- Expense categorizing will be feasible albeit more technically demanding, the expense can be tracked down to the merchant and do an online comparison on what type of service the merchant provide in order to determine the expense category, if unable to find a appropriated result, it will be placed in "other" category
- Syncing with payment and shopping applications and services will be potentially unfeasible due to the complexity and communication required with the various payment and shopping applications and services, progress and services included may be updated slowly as our system developed to include more services.

• Operational Feasibility:
- For implementing calculation features and income planner are feasible by our member to be implemented
- Expense categorizing and designing a user-friendly interface will be feasible albeit more challenging, requiring some training in order to learn an algorithm and online search incorporation to determine the type of expense made by the user. User-friendly interface will require some study and training in order to be implemented for the system to be easily accessible by the consumers
- Syncing with payment and shopping applications and services will be extremely challenging as systems need to be implemented with syncing features with other

services, requiring talented programmers and thus a heavy amount of training. Our team also requires a communicator between our system and the services in order to plan out deals with said services.

• Economic Feasibility:
- Implementing calculation features and income planner will be economically feasible as not much resource is needed for these features
- Implementing expense categorizing and user-friendly interface design will be economically feasible but will cost more as both require training and study cost before both features can be implemented
- Syncing with payment and shopping applications and services will be potentially economically unfeasible as deals need to be striked between those services in order to minimize cost, the system needs to pay for long term incorporation with those services and using their API, leading to long-term cost beside the initial contract cost.
- Aim to have built in advertisement display for consumer from time to time in order to be a source of revenue for consumer using the system on a free version
- Consumers can pay a monthly subscription to have a premium version that is more customizable and is advertisement free
- Deal can be made with starting or small business to sell them the system for corporate use at a cheaper cost to make the deal more appealing

• Cost Benefit Analysis:

Estimated Cost	
System Feature	RM 15000
Training / Study	RM 5000
Contract with payment and shopping services	RM 5000
Maintenance	RM 2500 per year
Network Servers	RM 5000 per year
Payment and shopping services API	RM 2500 per year

Assumption	
Discount Rate	15%
Sensitivity factor (Cost)	1.1
Sensitivity factor (Benefits)	0.95
Annual change in production costs	10%
Annual change in benefits	5%

Estimated Benefits	
Subscription	RM 4500 per month

Cost	Year 0	Year 1	Year 2	Year 3
Development Cost				
- System Feature	20000			
- Training / Study	5000			
- Contract with payment and shopping services	15000			
Total	40000			
Production Cost				
- Maintenance		2750	3025	3327.50
- Network Servers		5500	6050	6655
- Payment and shopping services API		2750	3025	3327.50
Annual prod.cost (Present Value)		11000 9565.22	12100 9149.34	13310 8751.54
Accumulated Cost		49565.22	58714.56	67466.10

Benefits	Year 0	Year 1	Year 2	Year 3
Subscription (Present Value)		51300 44608.70	53865 40729.68	56558.25 37187.97
Accumulated Beneifts (Present Value)		44608.70	85338.38	122526.35
Gain or Loss		(4956.52)	26623.82	55060.25
Profitability Index	1.38			

5.0 Objective

The objective of our system is to develop and implement an expense tracker system that is simple to use and navigate for the users, allowing users of all age ranges and of all technological backgrounds to use our system with ease. Secondly, our system also aims to help our users carry out the calculation required to manage their incomes and expenses, help to meddle out the tedious work of calculating each expense and the details of more complicated expenses like taxes where multiple factors have to be accounted for and reduce the possible human error on calculation. Thirdly, removing the repeated need of having to log into the system in order to record the expenses is also one of our objectives to be solved. We aim to sync our system with various payment and shopping applications or services so that our system can record the purchases made with said payment application and services and record the expenses in our system without having to be inputted manually. Lastly, our system aims to help users to plan out their income and spend accordingly by tracking the type of expense, this is to help the user in knowing whether they have overspend or not in a specific category and can plan accordingly.

6.0 Scope of the Project

The scope of the project encompasses the development of the Expense Tracker application, which will provide users with a good platform for managing their personal finances. Here are the important scopes for this project.

1. ***User Interface Design and Development:***
    - Designing an intuitive and visually appealing user interface (UI) that facilitates easy navigation and interaction.
    - Developing responsive UI components to ensure seamless access across various devices and screen sizes.

2. ***Database Architecture and Management:***
    - Designing and implementing an effective database architecture to store user data securely.
    - Creating tables and defining relationships to efficiently store and retrieve expense-related information.
    - Implementing data validation and integrity constraints to maintain the accuracy and consistency of stored data.

3. ***Expense Recording and Categorization Features:***
    - Developing features for users to record their expenses by entering relevant details such as date, amount, category, and description.
    - Implementing categorization functionalities to allow users to classify expenses into predefined categories (e.g., food, transportation, entertainment).
    - Supporting the addition, modification, and deletion of expense entries to enable users to manage their financial records effectively.

4. ***Testing and Quality Assurance:***
    - Conducting the testing procedures, including unit testing, integration testing, and system testing, to ensure the reliability, functionality, and performance of the application.
    - Identifying and addressing any defects or issues through thorough debugging and troubleshooting processes.
    - Performing usability testing to gather feedback from potential users and incorporate improvements to enhance user experience.

5. ***Documentation and User Support:***
    - Creating comprehensive documentation, including user manuals, installation guides, and technical documentation, to assist users in understanding and utilizing the application.

- Providing user support through various channels, such as online help resources, FAQs, and customer support services, to address user
  inquiries, issues, and feedback effectively.

7.0 Project Planning

7.1 Human Resource

A successful Expense Tracker project requires a good team with diverse skills and expertise. Each member in the team act as an important role to achieve success.

Project Manager

Ling Lee Hom is the project manager of this group. He will lead the team, plans the project, and communicates with everyone involved. The responsible of a project manager are make sure the project is following the schedule as planned, assign tasks to team members, and solve any problems that come up.

UI/UX Designer

Nicholas Yek Ei Zhe is UI/UX Designer in this group. He will design how the app looks and feels. Make sure the product can be used comfortably and looks good by creating prototypes and testing for further enhancements.

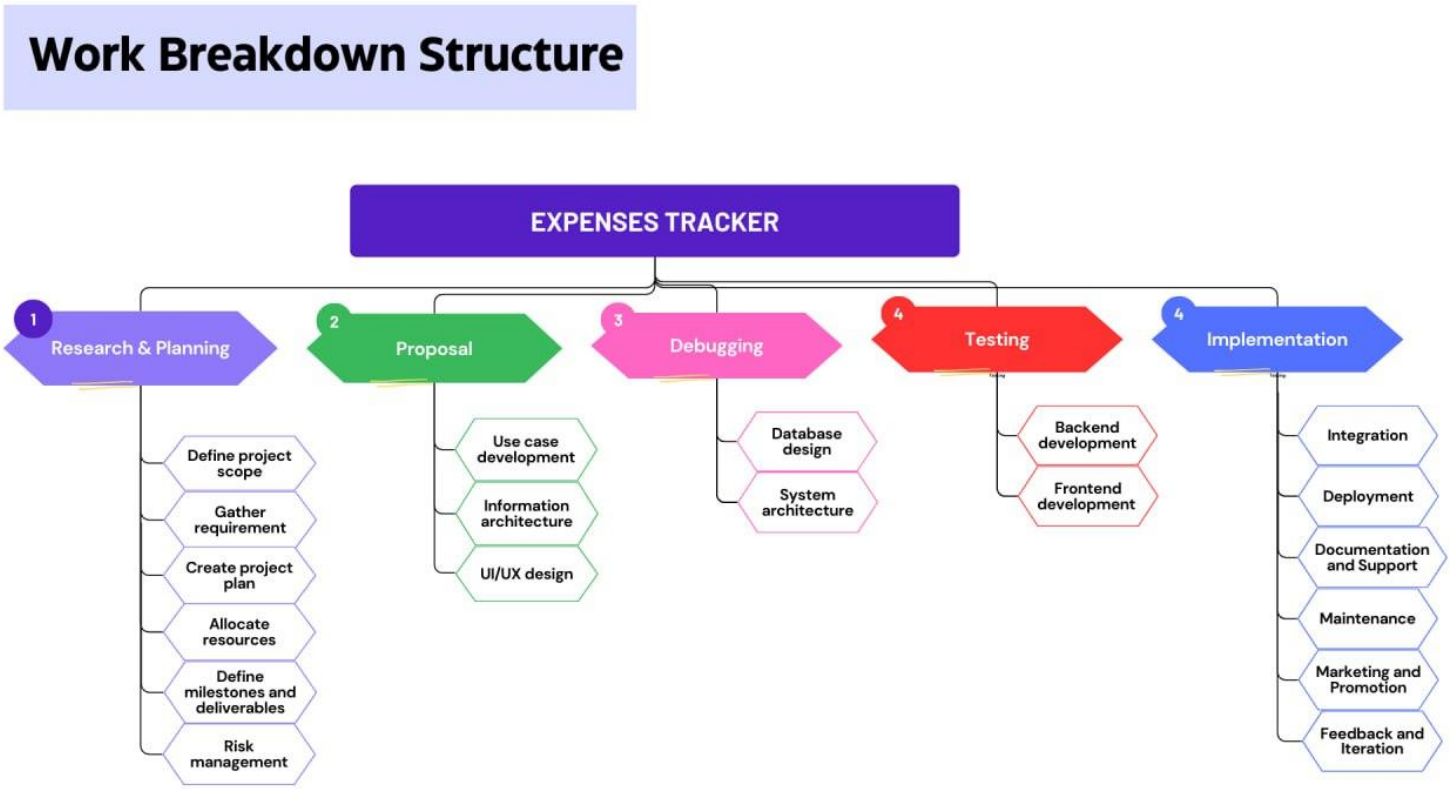
Software developers

Lee Xuan Ying is the software developer in this group. He will in charge with designing, developing, and testing the Expense Tracker. Besides that, he will also collaborate with UI/UX designer to make the best user interface for the users. They will always test the app to make sure it works perfectly and fix any bugs found by others.

System Analyst

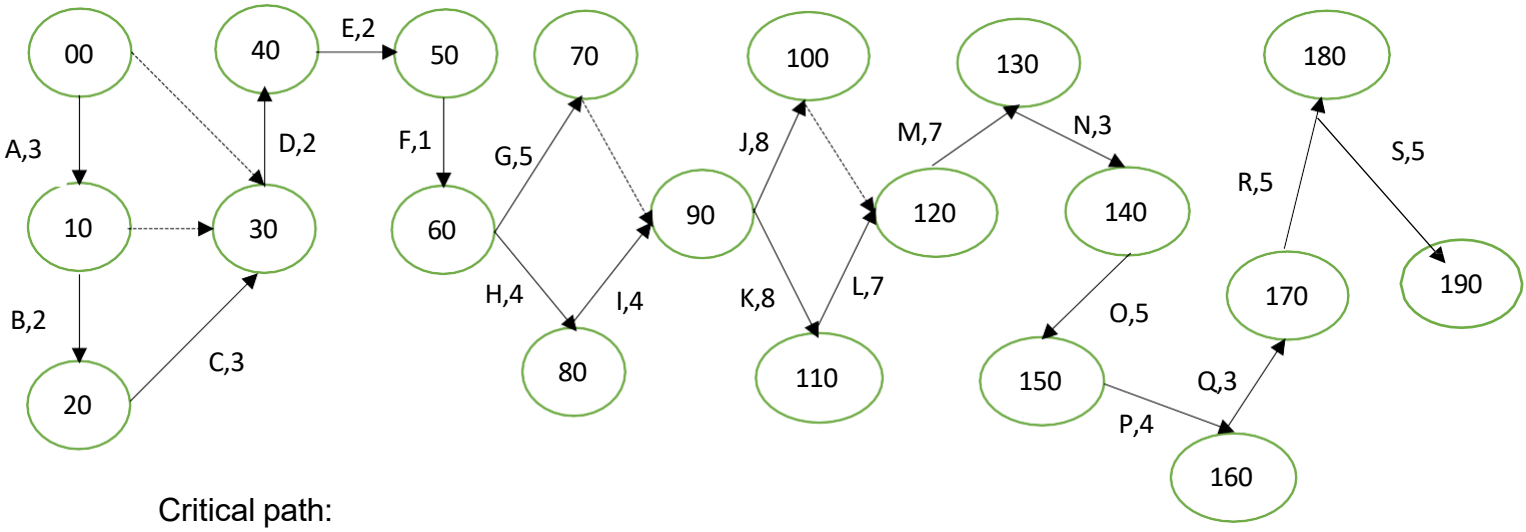
Sou Cheng Jie is the system analyst in this group. He will work closely with stakeholders to understand the needs and objectives of the Expense Tracker. He will identify and state out any requirement of the system.

7.2 Work Breakdown Structure (WBS)



7.3 PERT CHART

NO	Task	Duration (day)	Predecessor
	Research & Planning		
A	Define project scope	3	None
B	Gather requirement	2	A
C	Create project plan	3	B
D	Allocate resources	2	A,B,C
E	Define milestones and deliverables	2	D
F	Risk management	1	E
	Proposal		
G	Use case development	5	F
H	Information architecture	4	F
I	UI/UX design	4	G,H
	Debugging		
J	Database design	8	I
K	System architecture	8	I
	Testing		
L	Backend development	7	J,K
M	Frontend development	7	L
	Implementation		
N	Integration	3	M
O	Deployment	5	N
P	Documentation and Support	4	O
Q	Maintenance	3	P
R	Marketing and Promotion	5	Q
S	Feedback and iteration	5	R



Critical path:

A > B > C > D > E > F > H > I > K > L > M > N > O > P > Q > R > S

Duration (day):

3 + 2 + 3 + 2 + 2 + 1 + 4 + 4 + 8 + 7 + 7 + 3 + 5 + 4 + 3 + 5 + 5 = 68 days

7.4 Gantt Chart

ID	Task	Start	Finish	Duration
A	Define project scope	2024-04-23	2024-04-25	3.0 d.
B	Gather requirements	2024-04-26	2024-04-27	2.0 d.
C	Create project plan	2024-04-28	2024-04-30	3.0 d.
D	Allocate resources	2024-05-01	2024-05-02	2.0 d.
E	Define milestones and deliverables	2024-05-03	2024-05-04	2.0 d.
F	Risk management	2024-05-05	2024-05-05	1.0 d.
G	Use case development	2024-05-06	2024-05-10	5.0 d.
H	Information architecture	2024-05-11	2024-05-14	4.0 d.
I	UI/UX design	2024-05-14	2024-05-17	4.0 d.
J	Database design	2024-05-18	2024-05-25	8.0 d.
K	System architecture	2024-05-21	2024-05-28	8.0 d.
L	Backend development	2024-05-28	2024-06-03	7.0 d.
M	Frontend development	2024-05-28	2024-06-03	7.0 d.
N	Integration	2024-06-04	2024-06-06	3.0 d.
O	Deployment	2024-06-07	2024-06-11	5.0 d.
P	Documentation and Support	2024-06-12	2024-06-15	4.0 d.
Q	Maintenance	2024-06-16	2024-06-18	3.0 d.
R	Marketing and Promotion	2024-06-19	2024-06-23	5.0 d.
S	Feedback and Iteration	2024-06-24	2024-06-28	5.0 d.

8.0 Benefit and Overall Summary of Proposed System

The Expense Tracker system offers several advantages to users. The first benefit is enhanced financial awareness. By using the Expense Tracker, users can categorize and visualize their expenses more easily, enabling them to make better financial decisions with insightful analytics provided by the system.

Besides that, Expense Tracker enhances time efficiency for users by consolidating all records in one place, as opposed to manual record-keeping and spreadsheet management. With its user-friendly interface and automated features, users can quickly and consistently record every expense they make.

The Expense Tracker also assists users in goal setting and monitoring. This system facilitates goal setting and monitoring by allowing users to set personalized financial objectives, such as saving to purchase desired items or building emergency funds. Users can track their progress, which can motivate them to achieve their goals.

Overall, the Expense Tracker system offers a practical solution to the challenges of personal financial management, providing users with the tools and insights they need to control their finances and improve their financial status. With the usability and efficiency provided by the Expense Tracker system, users can effectively take control of their expenses.

Phase 2- Information System Gathering and Requirement

1.0 Overview of the Project

This project aims to create an expense tracker that can be used no matter the scale of the user, be it individual or organization wide as modern society revolves around income and expenses, the negligence of keeping track could easily cause one to be in financial trouble due to mismanagement of their own fortune. The project have placed focus on all types of user, as it is made with the intention to have easy to use and understand nature that allow it to thrive in usage of all scales, including individual usage or organization wide usage. On the side of business need, it is to help with budget management, financial analysis, managing cash flow, enforce accountability and transparency and lastly help with tax deduction to reduce tax liabilities

Objective of this project is to develop and implement an innovative expense tracker system that addresses the challenges of insufficient financial awareness, time inefficiency, and ineffective goal setting and monitoring by delivering a user-friendly, intuitive, and technologically advanced expense tracker solution that empower individuals and businesses to streamline expense tracking process, enhance financial literacy, optimize time efficiency in financial management and achieve long-term financial goals, thereby fostering greater financial stability and success.

Project timeline for this project consists of research and planning, proposal, debugging, testing and implementation. Human resources required is a project manager to lead the team, plan the project and communicate with everyone involved. UI/UX designers design how the app looks and feels to make sure the product can be used comfortably and looks good. Software developers play a crucial role in designing, developing, and testing the expense tracker. Database Administrator manages the database where all the information of the expense tracker is stored. Quality assurance engineers act as the role of testing the expense tracker to make sure it is running with the best condition. Documentation specialist for creating and maintaining the documentation for the expense trackers.

Risk and problem that may challenge our project is that consumers may have privacy concerns with their data and thus are not willing to use our product. The product may also have the potential for inaccurate tracking due to potential bugs that got past the testing phase and will hamper the user experience and fail to make a good first impression. There may also be the problem of unexpected difficulty during the development phase that causes some phases to require longer time than usual, causing the progress of the project to be delayed and need to be coordinated again.

In the end, we wish to be able to deliver an expense tracker system that is simple and intuitive to use for all the users.

2.0 Problem Statement

• Difficult to navigate interface

- Most Expense Trackers tend to have a complicated interface or not detailed explanation on how to navigate the system.
- Lead to consumers' confusion and can be the cause of consumer disinterest and dropping off the product or led to using the wrong function within the system for their needs
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Cost Benefit Analysis:

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(Present Value)				
Gain or Loss		(4956.52)	26623.82	55060.25
Profitability Index	1.38			

4.0 Information Gathering Process
4.1 Method used
To gather all the essential information for the system, we utilized interactive methods, including structured interviews.
Interactive methods were pivotal in directly engaging with stakeholders to understand their experiences and gather detailed feedback. A key part of this process was an interview session with the manager- Sou Cheng Jie , as well as the users of the system, which is Benedict Lim, Thomas Wong and Albert Tan. This interview was structured with closed-question for the manager and open-ended question for the users. The interviews focused on issues such as gathering the information about the system and the expectation from the users in the next version of the system.

Interview Questions and Responses:

Interviewee: Ling Lee Hom (Manager)
Q: What is the primary motivation behind implementing the Expense Tracker System?
The main motivation behind implementing the system is because we want to address the problem that face by the current society, which is the financial problem. We want to let the society aware of how exactly is their money spend on their daily life, so they can have a better picture on their spending habit, which can further help them to relieve their financial crisis. Besides, we also want to educate the society to have a healthy spending habit

Q: Who are the primary users of the system?
Our system is suitable for all age of user no matter their background or jobs. However, according to the data we have, the primary users of the systems Is the university student.

Q: What are the core features of the system?
The main feature of our system is tracking the expense of the user. User can record the amount of money they used, also they can classify their expense on different category . Not only that, user also can record their income on our system. Our system also generate a financial report to our user every end of month.

Q: What new features do user want in the next version?
Albert Tan (User1) :
I think the current version is great, but I would like to expected some improvement for the next version. First of all, the system can equip with more interesting graphic and image. This would make the whole system look more captivating and professional. User can also be hooked at the same time. Beside, I also think the user interface can be more organize. The current user interface are quite complex and messy, the new version can do more on the user interface by simplify it.

Thomas Wong (User 2):
For the next version of the system, I actually got some great ideas. I think the system can give us some recommendation on budgeting suggestion, spending trend analysis and alert for potential overspending based on our spending habit. Also, it would be great if the system have some automation features. The system automatically categorize our expense based on the data and AI algorithm.

Benedict Lim (User3):
Based on my experience in using similar expense tracking app, I have some suggestion for the

improvement in the version update. I think the system can add the collaborative features. The collaborative features can allow user to invite other to manage the expense together, such as with family members, roommates or colleagues. This could include shared expense tracking, bill splitting and group budgeting capabilities.

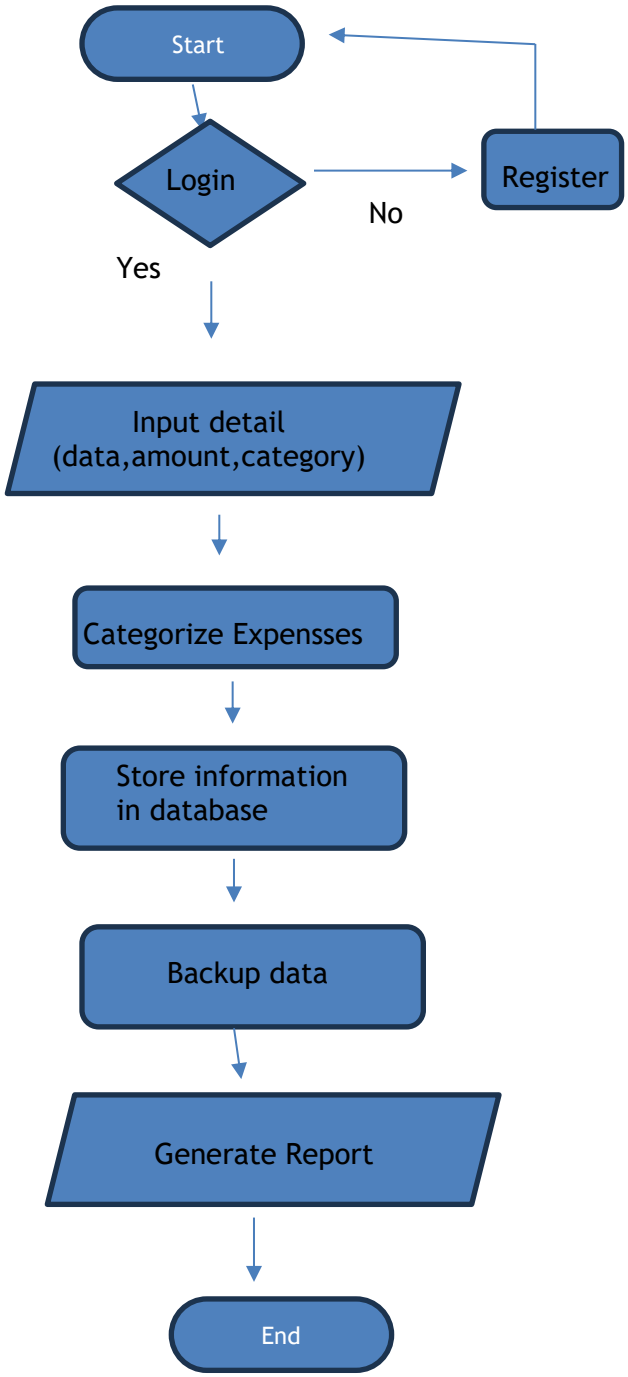
4.2 Summary from methods used

The interview provide a lot of essential and useful information for us. From the interview, we knew the mission of the system, the majority of the users as well as the main features of the system. Not only that, we also gather the suggestions and ideas about the next version of the system, which would be very helpful for the development of the system. We found that our system still got a lot of improvement. Interactive and simple user interface, automation, personalized recommendation and collaborative features would be the focus on the upcoming version of the system.

5.0 Requirement Analysis

5.1 Current Business Process (scenarios, workflow)

There are several steps involved for a user when using our expense tracker system. First, users start by accessing the expense tracker system by providing their credentials to log in. After logging in, users can record their expenses by giving details like date, amount of expenses, category of expenses and description. The system will periodically update expense records based on these integrations. As expense analysis and reporting, the system will show expenses by category, month or custom time frames. Report will include charts, graphs and tables for the users to gain insights into their spending habits.


Start
Login
Register
No
Yes
Input detail
(data,amount,category)
Categorize Expensses
Store information
in database
Backup data
Generate Report
End

5.2 Functional Requirement (Input, Process, Output)

Input

1. User login
   - users provide their credentials like username and password to log in.

2. Expense recording
   -users manually record their expenses by input details like date, amount and category of the expenses.
   -system integrates with various payment method like credit card and bank account so that the expense record is automatically record in the system.

3. Data backup and security
   -user have the authority to manage the permission for data security measure like two factor authentication and encryption.

Process

1. User login
   -system collect user information and undergo authentication

2. Expense recording
   -system store the information in a database or data repository.

3. Data backup and security
   -system will do regular backups to prevent data loss.

4. Expense Analysis
   -system calculate the total expenses according to the category set by the user and store it in a database.

Output

1. User login
   -if authentication is successful, the system will grant success to the user to have access to the system.

2. Expense Analysis
   -The system aggregates expenses by category, month or custom time frames.
   -Report include charts, graphs or tables showing for the users to gain insights into their spending habits easily.

5.3 Non-functional Requirements

In this subtopic, we will show about the non-functional requirements which are performance and controls of our system.

5.3.1 Performance & Reliability

1. The system should be able to support the daily usage of over more than 1000 users without noticeable delay in response time about 10 seconds.
2. The system should ready the handle every users' data without any decrease in performance.

5.3.2 Data Resources Secure

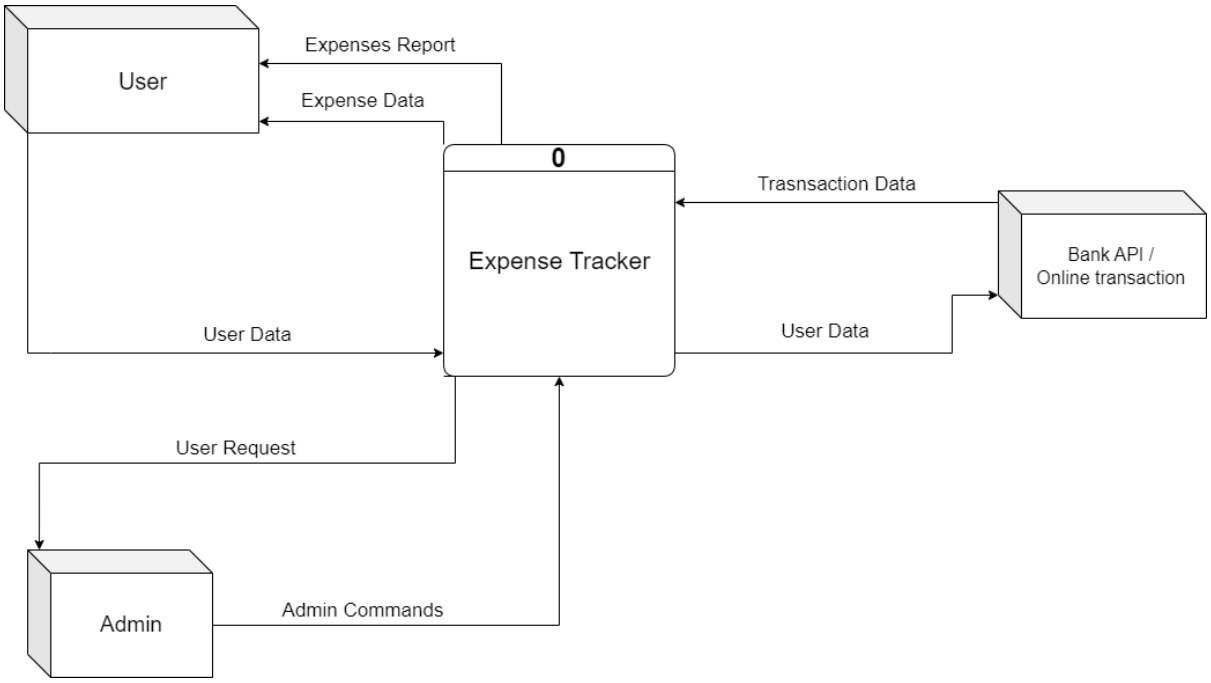
1. The system should carry out data backups for all the data stored.
2. The system should be ready with at least one disaster recovery plan to ready to face any upcoming issues.

5.3.3 Security

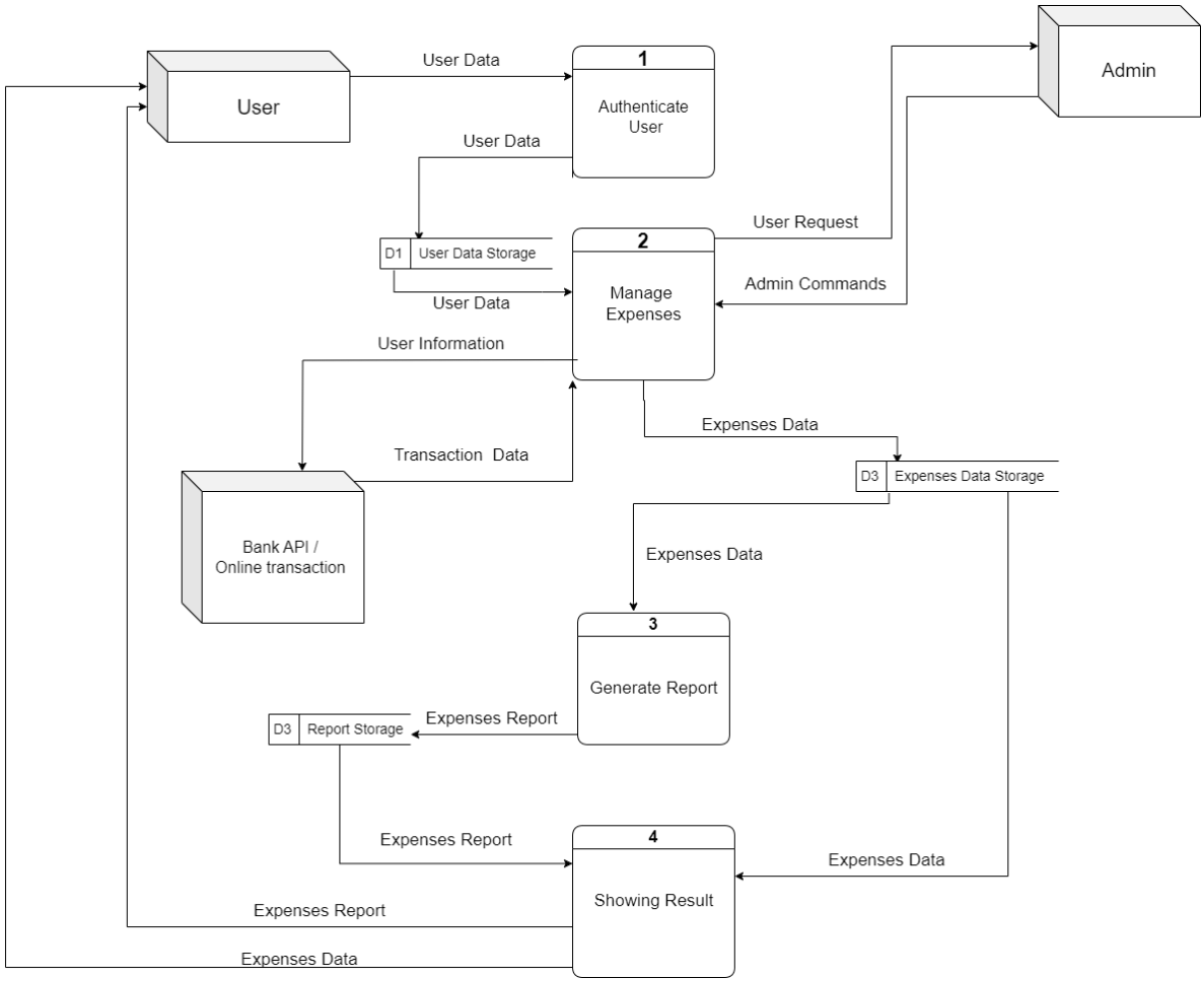
1. The system needs to ensure all users' data are encrypted and protected.
2. The system needs to have regular security checks to make sure security works fine and enhance any possible weaknesses.

5.4 Logical DFD AS-IS Diagram

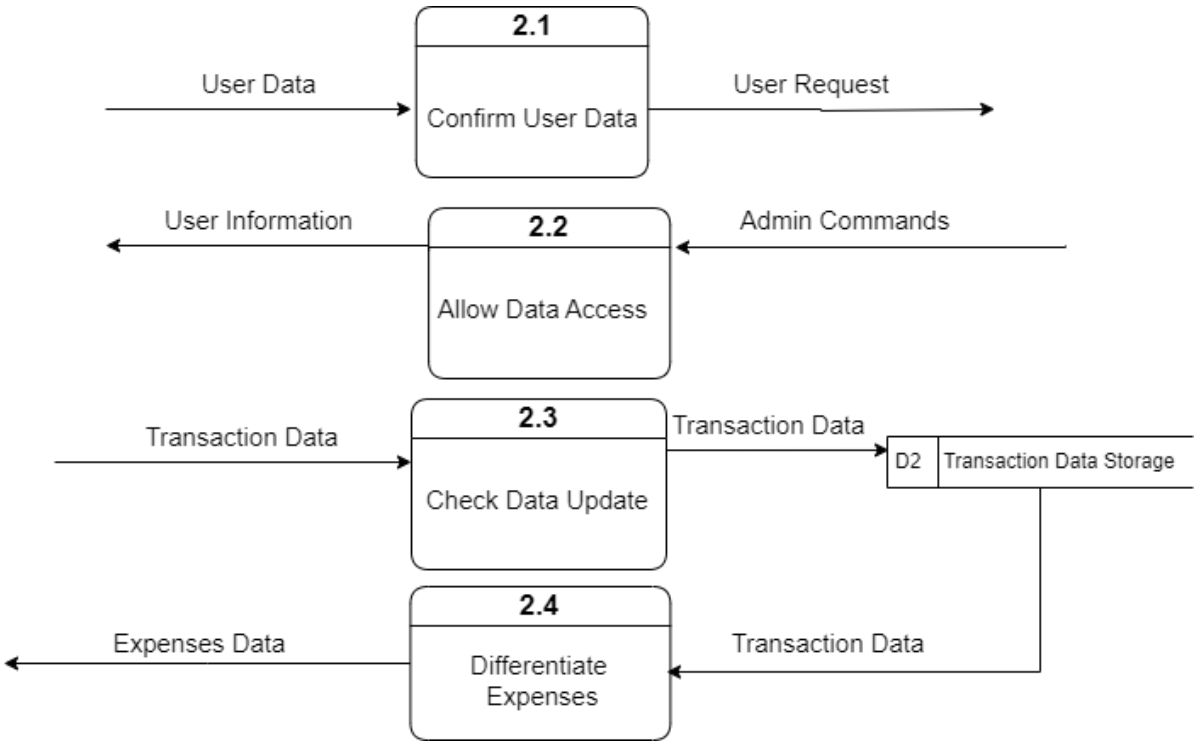
Context Diagram



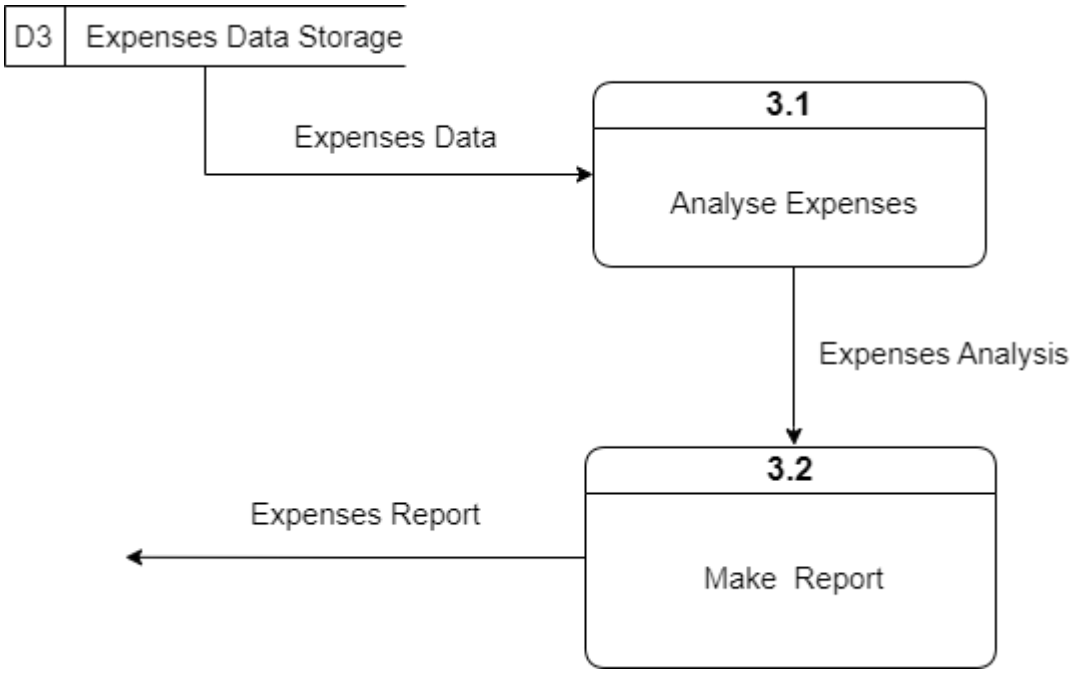
Level 0 diagram



Child Diagram for 2(Manage Expenses)



Child Diagram for 3(Generate Report)



6.0 Summary of Requirement Analysis Process

The expense tracker system help our users to manage their daily expenses. First of all, our users need to key in their information such as password and email to login to the system. Then , the users can record their expenses as well as categorize their expenses into different type of expense. All of the record will be store in a database. The data will be analyze by our system at the end of the month and then a report will be generate for the users . Users can use the report to get a better picture about their financial condition as well as their expenditure in the previous month.