

UNDERGRADUATE PROJECT PROGRESS REPORT

Project Title:	Comprehensive Personal Expenses Tracking System
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1 Introduction

1.1 Background

As people's lives continue to enrich, effective management of personal finances is a common concern. Many people struggle with the complexity of tracking their expenses and income. This challenge stems from the diversity of income sources, expenditure diversity, and the necessity of maintaining financial stability (Gupta et al., 2020). In order to address these common financial difficulties and enable individuals to view their income and expenditure status promptly and control their financial situation, I hope to develop a web-based Comprehensive Personal Expenses Tracking System to simplify personal expenditure and income tracking.

1.2 Aim

The aim of this project is to develop a web-based Comprehensive Personal Expenses Tracking System that enables users to efficiently track and manage their personal finances. The system is designed to be intuitive, user-friendly, and adaptable to various user requirements, ensuring that it can serve a wide range of personal financial management needs.

1.3 Objectives

The objectives are as follows:

- (1) Complete a background check on personal expenditure and income tracking websites.
- (2) Understand the technology required for the website and determine project requirements.
- (3) Design an intuitive interface for users to access and use easily.
- (4) Implement login and registration functions.
- (5) Implement cost recording function.
- (6) Implement expense classification function and customize expense categories.
- (7) Implement a user fee suggestion function to help users spend within a reasonable range.
- (8) Carry out test.
- (9) Present the work to the audience.

1.4 Project Overview

1.4.1 Scope

The software is designed as a web-based Comprehensive Personal Expenses Tracking System primarily for personal use. Its main function is to assist individuals, especially young people, in managing their finances by tracking daily expenses and incomes. The system allows users to add, delete, modify, and view their financial transactions, categorize them, and manage default expense categories. The software will provide a clear understanding of each expenditure, aiding in rational spending and saving.

The software operates on a B/S architecture using popular Java programming language with the Springboot framework and a MySQL database. It follows MVC design principles, separating the business logic from the client interface. Users will interact with the software through a browser, accessing data stored and processed on a remote server. The system incorporates various modules for user management, expense category management, and accounting functionalities, ensuring secure and efficient data handling.

1.4.2 Audience

This product is suitable for those seeking convenient and efficient solutions to track and manage personal finances, including company, students, working professionals, entrepreneurs, and anyone who hope to understand their own expenses and have a clear plan for their consumption.

2 Background Review

The Comprehensive Personal Expenses Tracking System helps to manage our income and expenses daily or regularly, or to remind us at any time (Gomathy, 2022). The fee tracker can help users track their consumption habits and effectively manage their finances, which can help users determine the priority of spending and make wise decisions on resource allocation(Patil et al., 2023).

The comparison in Table 1 shows that various accounting websites have developed relatively complete functions in adding bills, viewing bills, modification of bill information, and bill reports, indicating that these functions are basic functions at the same level as login and registration. However, the import bill data and account information management functions do not cover all platforms, indicating that these functions are secondary. Most platforms do not implement the bill data analysis and synchronize bank card information function, which means that this function is a subsidiary function with low importance.

Website name Website Features	Zoho Expense	Sui shouji	Wa cai	Ai jizhang
Add bill	√	√	√	√
View bill	√	√	√	√
Modification of bill information	√	√	√	√
Bill data analysis	√	N/A	N/A	N/A
Import bill data	√	N/A	N/A	√
Bill Report	√	N/A	√	√
Account information management	N/A	√	N/A	√
Synchronize bank card information	√	N/A	N/A	N/A

Figure 1. Features Comparison of Different Websites.

3 Technical Progress

3.1 Approach

With the Waterfall Model, the logical implementation is separated from the physical implementation with structured analysis and design methods. In this project, the software life cycle is divided into seven basic activities: requirements gathering, design, implementation, testing, deployment, evaluation, and operation maintenance. As shown in Figure 1.

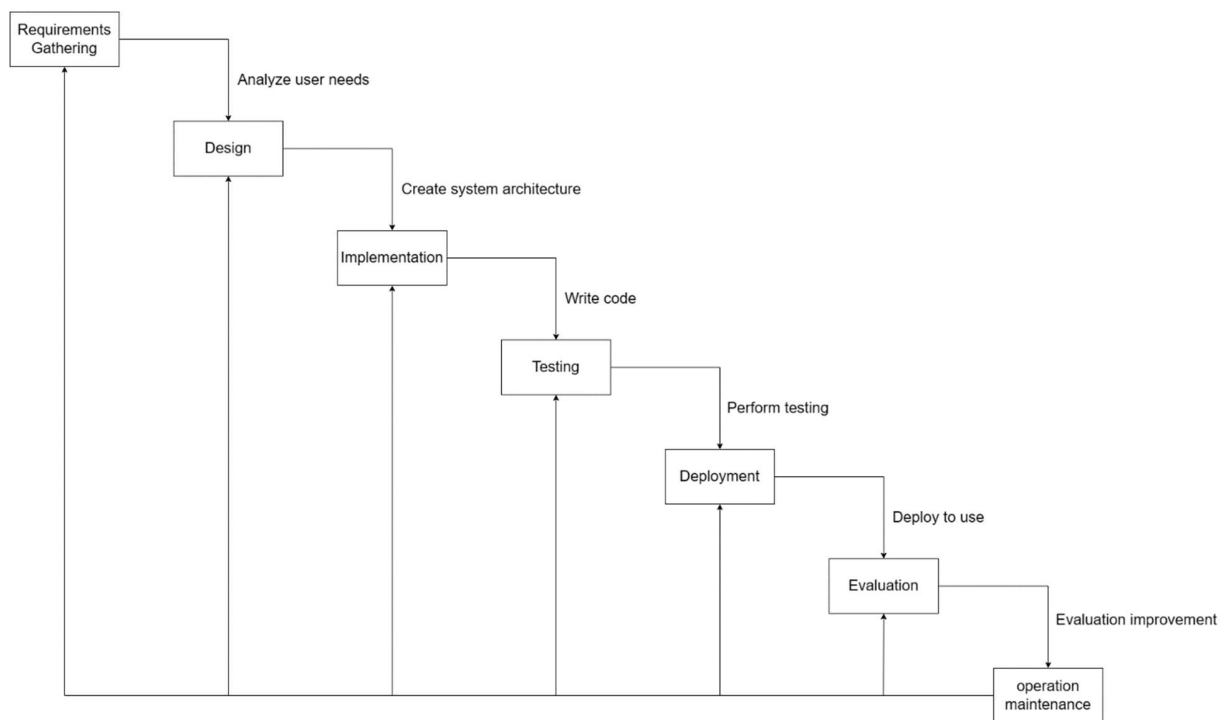


Figure 2. Software Development - Waterfall Model.

Our approach will involve the following key steps:

- 1) Requirement Gathering: We will conduct interviews and surveys with potential users to collect their input and preferences.
- 2) Design: Create wireframes and mockups to visualize the user interface and overall system architecture.
- 3) Development: Implement features according to user stories and iterative sprints.
- 4) Testing: Conduct regular testing, including unit testing, integration testing, and user acceptance testing.
- 5) Deployment: Regularly deploy updates to a test environment for user feedback and then to a production environment.
- 6) Evaluation: Collect user feedback and measure system performance.
- 7) Operation maintenance: Make system changes and maintenance based on user feedback.

Requirement Gathering Method:

- 1) User survey: Conduct a survey to gather valuable insights from potential users. These surveys aim to understand their specific needs, preferences, and difficulties in tracking personal expenses and income.
- 2) User Interviews: Engage in one-on-one or group interviews with representative users to better understand their requirements.

3.2 Technology

The technology stack used for this web-based Comprehensive Personal Expenses Tracking System includes:

Programming Language: Java, using Springboot framework.

Database: MySQL 8.0

Front-end: Vue.js and ElementUI

Development Tools: IntelliJ IDEA

Server: Apache Tomcat 9.0

3.3 Testing and Evaluation Plan

3.3.1 Introduction to Testing Approach

Testing is a critical phase in software development that ensures the quality and functionality of the application. For this web-based Comprehensive Personal Expenses Tracking System, I adopt a Test-driven development (TDD) approach. This methodology involves writing tests before developing the actual functionality, ensuring that each code segment is tested as it's developed.

3.3.2 Unit Testing

Unit testing involves testing individual components of the software to validate that each unit operates as designed. For my system, I will use JUnit, a popular framework for testing Java applications. Key components to be tested include:

User Authentication: Verifying the correct operation of login and registration functions.

Expense Recording: Testing the accurate recording and retrieval of expense data.

Category Management: Ensuring that expense categories are correctly added, modified, and deleted.

3.3.3 Integration Testing

Integration testing checks the interaction between different parts of the system. We will focus on the interaction between the front-end (Vue.js) and the back-end (Java with Springboot). Test scenarios will include:

Data Flow: Validating the seamless flow of data from the user interface to the server and back.

API Responses: Ensuring that RESTful API responses are accurate and timely.

3.3.4 User Acceptance Testing

User Acceptance Testing (UAT) will involve real users testing the system in a production-like environment. We will invite a group of potential users, including students and Student family members, to use the system and provide feedback. This feedback will help refine the system's usability and functionality.

3.3.5 Performance Testing

Performance testing is crucial for our web application's responsiveness and stability. We will conduct load testing to simulate multiple users accessing the system simultaneously and assess the system's performance under varying loads.

3.3.6 Evaluation Metrics

Evaluation will be based on:

Bug Frequency: The number and severity of bugs identified.

Response Time: The time taken for the system to respond to user requests.

User Satisfaction: Feedback from users regarding their experience with the system.

3.4 Design and Implementation

Details of progress completed so far

3.4.1 Background Check on Personal Expenditure and Income Tracking Websites

Comprehensive research was conducted on existing personal finance tracking websites. This involved analyzing several platforms to understand their features, user interface, and functionality.

I documented the key features these websites offer, such as bill tracking and reporting, and the differences in their functions were analyzed, such as a small number of websites having functions for importing bank card information and analyzing billing data, while all websites have functions such as Add bill, View bill, and Modification of bill information.

3.4.2 System Analysis and Feasibility

Technical Feasibility: The accounting system is developed on a B/S architecture using the MVC design concept. It employs Vue for front-end development, Java as the programming language, Springboot for backend operations, and MySQL for database management. The separation of business logic from the client interface in the B/S architecture and the independence of components in the MVC model contribute to a well-structured system.

3.4.3 User Interface Design

I created detailed wireframes and mockups for the user interface, focusing on simplicity and ease of use. The design process involved iterative revisions to ensure the interface is intuitive.

3.4.4 Login and Registration Functions

The login and registration module were successfully developed. This included implementing authentication mechanisms to ensure user data security and privacy.

The registration function allows new users to easily create accounts, while the login system ensures secure access to user profiles.

3.4.5 Cost Recording Function

I developed a comprehensive cost recording function. This allows users to input and track their daily expenses and income, supporting various expense types and income sources.

The function is designed for ease of use, with quick entry fields and a straightforward interface.

3.4.6 Expense Classification Function

A dynamic expense classification system was implemented. Users can categorize their expenses into pre-defined or custom categories, enhancing their ability to manage and analyze their spending.

This feature includes the ability to modify and delete categories, offering users flexibility in managing their expense data.

4 Project Management

4.1 Activities

Objective	Task	Completion Status
Complete a background check on personal expenditure and income tracking websites.	1) Research and review existing personal finance tracking websites. 2) Document key features and shortcomings.	All done
Understand the technology required for the website and determine project requirements.	1) Identify the technology stack for front-end and back-end development. 2) Gather and document project requirements based on user feedback and research.	All done
Design an intuitive interface for users to access and use easily.	Create wireframes and mockups for the user interface.	All done
Implement login and registration functions.	1) Develop user registration functionality. 2) Create a secure login system.	All done

Implement cost recording function.	Develop the functionality for users to record their expenses and income.	All done
Implement expense classification function and customize expense categories	Create a system for categorizing expenses and allow users to customize categories.	All done
Implement a user fee suggestion function to help users spend within a reasonable range.	Develop a feature that provides spending suggestions to users based on their financial situation.	None of them have been completed
Implement monthly/annual budget planning and reporting on user consumption	<ol style="list-style-type: none"> 1) Implement monthly budget planning for users 2) Implement monthly consumption reports for users 3) Implement annual budget planning for users 4) Implement annual consumption reports for users 	<p>Complete tasks:</p> <p>Implement monthly consumption reports for users</p> <p>Uncompleted tasks:</p> <ol style="list-style-type: none"> 1) Implement monthly budget planning for users 2) Implement annual budget planning for users 3) Implement annual consumption reports for users
Carry out test.	Conduct various testing types, including unit testing, integration testing, and user acceptance testing.	None of them have been completed

Present the work to the audience.	Organize presentations to showcase the project to the target audience.	None of them have been completed
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Figure 3. The Objective and Task of Activities.

4.2 Schedule

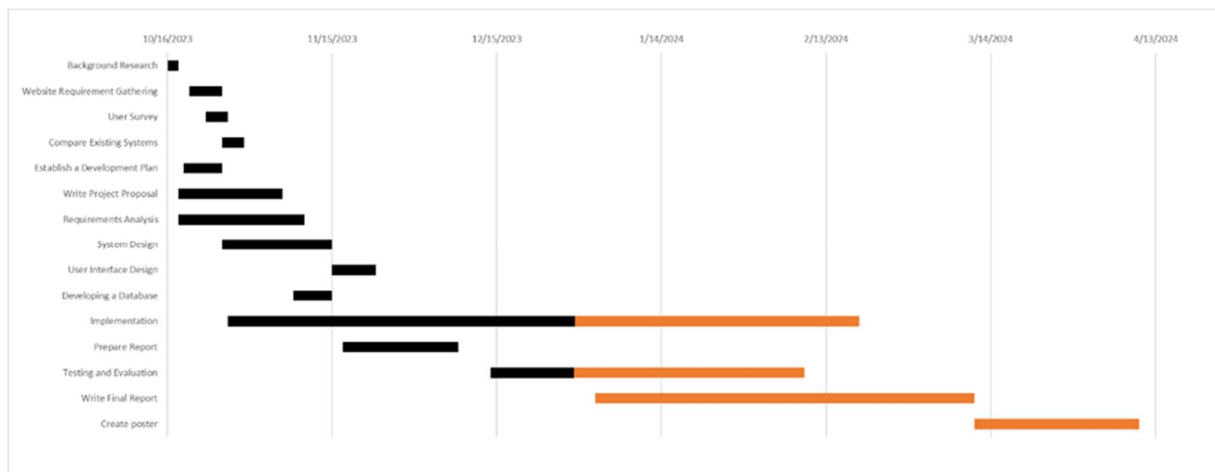


Figure 4. Project Gantt Chart.

The black part represents the completed part, while the yellow part represents the unfinished part.

4.3 Project Version Management

First, I open Git Bash in the Code folder. Then, in the Git Bash command, I entered "git status" to check the status of the git repository, indicating that I have untracked files in the "" directory. Then enter "git add" to temporarily store all changes in the working directory, including untracked files. Then enter "git status" again to check the status display. The new file in the directory is ready for submission. Finally, enter "git push" to push the changes to a remote repository on GitHub.

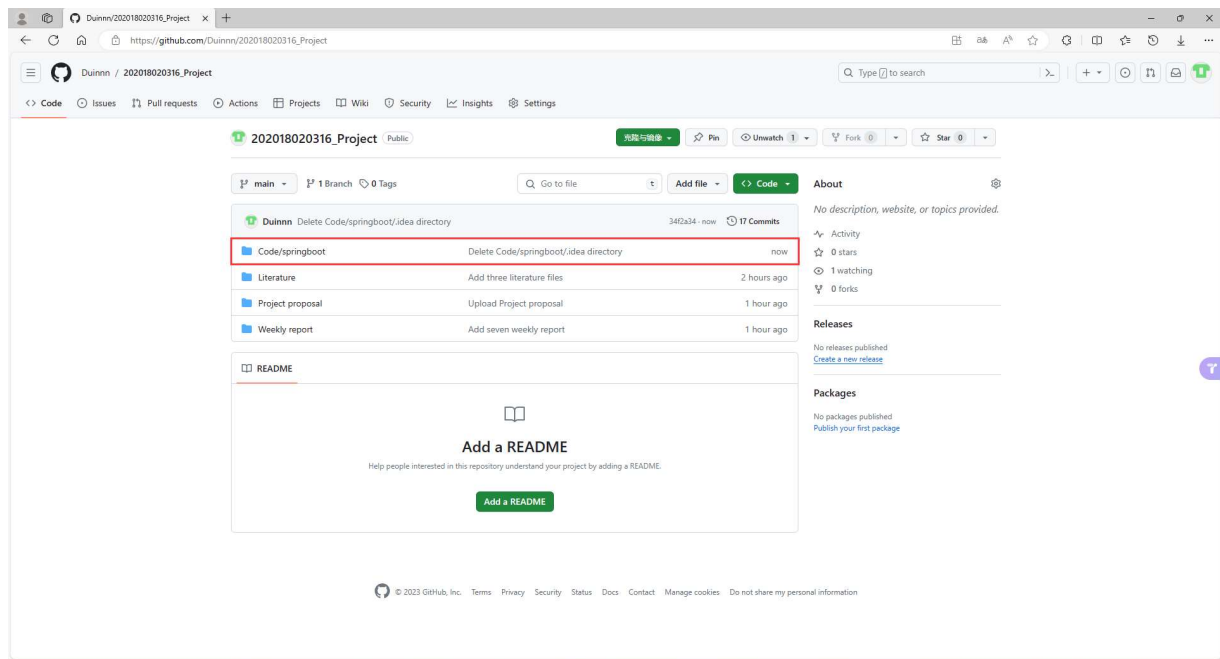


Figure 5. Project Version Management with Git.

4.4 Project Data Management

First, I open Git Bash in the document folder. Then, in the Git Bash command, I entered "git status" to check the status of the git repository, indicating that I have untracked files in the "" directory. Then enter "git add" to temporarily store all changes in the working directory, including untracked files. Then enter "git status" again to check the status display. The new file in the directory is ready for submission. Finally, enter "git push" to push the changes to a remote repository on GitHub.

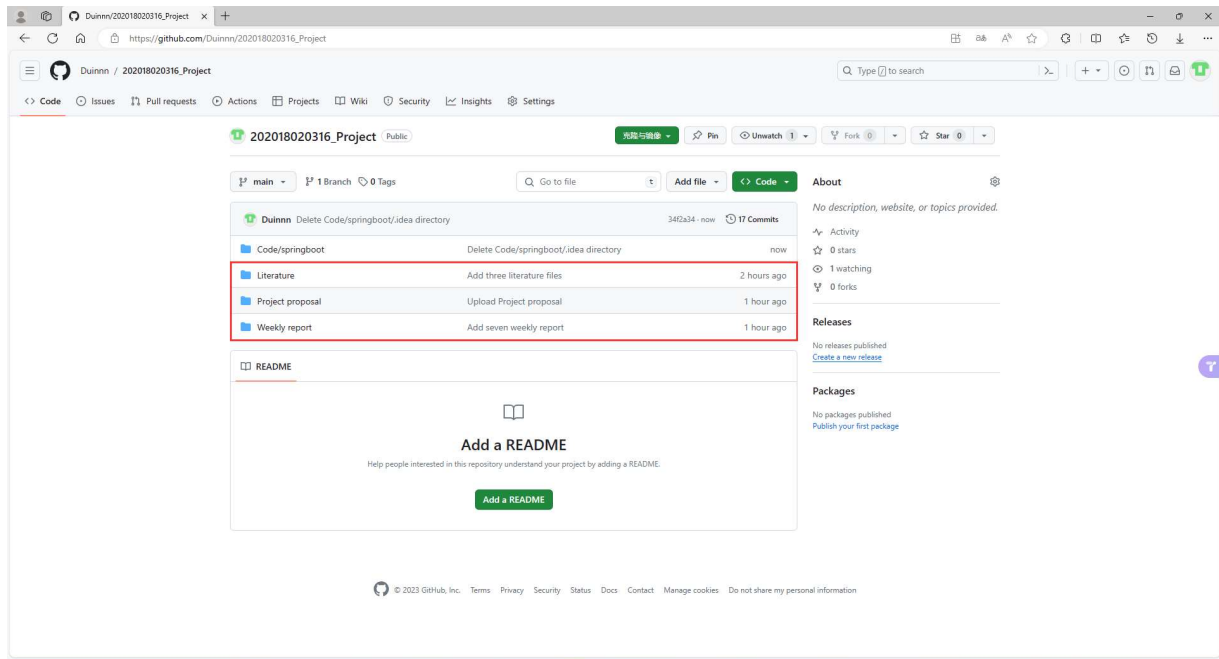


Figure 6. Project Data Management with Git

4.5 Project Deliverables

Submitted documents:

Project proposal, Project code, Literature, Weekly report

Unsubmitted documents:

Project software, Final report, Progress report

5 Professional Issues and Risk:

5.1 Risk Analysis

Cause ID	Potential Causes	Severity (1-5)	Likelihood (1-5)	Risk (1-20)	Mitigation ID	Mitigation
C1	Security breaches (unauthorized access, data leakage)	5	3	15	M 1	Implement robust security protocols, conduct security testing regularly
C2	Data loss (corruption, accidental deletion)	4	2	8	M 2	Implement regular backups, use version control systems
C3	Overdependence on third-party services (APIs, libraries)	3	3	9	M 3	Ensure proper licensing, have backup services or local solutions
C4	Regulatory compliance failure (data protection laws)	5	2	10	M 4	Consult legal experts, ensure the system meets all relevant legal requirements

C5	Technical debt accumulation (due to rushed releases, etc.)	3	4	12	M 5	Adhere to coding standards, allow time for refactoring, use code reviews
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Figure 7. Risk analysis

Current Progress on Risks:

The version has been backed up to reduce the risk of data loss.

All third-party services have been audited for reliability, and backup solutions are in place.

Changes to Project Plan due to Risks:

Additional time has been allocated for security measures and testing.

Future Risks:

Scalability Issues: As user numbers grow, the system may require more resources.

Dependency on Specific Technologies: Technology evolves rapidly, and reliance on current technologies may pose long-term risks.

5.2 Professional Issues

5.2.1 Legal Issues

Data Protection: Compliance with global data protection regulations like GDPR is critical. Personal financial data is sensitive, and the system must include mechanisms to protect user privacy.

Intellectual Property: The software must only include code and libraries that are properly licensed or developed in-house to avoid IP infringement.

5.2.2 Social Issues

Digital Divide: The system should be accessible to users with varying levels of internet access and digital literacy.

5.2.3 Ethical Issues

Data Integrity: Ethical handling of data, ensuring accuracy and preventing manipulation, is crucial.

User Autonomy: The system should not manipulate user behavior but instead provide tools for informed decision-making.

5.2.4 Environmental Issues

Energy Efficiency: The system should be optimized for energy efficiency, reducing the environmental impact of server loads.

Resource Management: Efficient coding practices and server management can reduce the overall carbon footprint.

6 References

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