

## ABSTRACT

This internship report on **Mobile App Development** is prepared as part of the requirements for the BCA degree. It outlines my three-month internship experience at **Crystal Solution**, where I contributed to the development of the **Expense Tracker Mobile App**. The report provides insights into the tasks I performed during my internship, focusing on various stages of mobile app development, from design to implementation.

During the internship, my primary responsibilities involved working on the mobile app's development, which included developing Restful APIs for implementing different features /services like authentication, report generation, budgeting,expenses creation etc. The app was developed using tools like Flutter for the mobile app frontend, Spring Boot for backend development, and Figma for UI/UX design and prototyping. Additionally, MySQL was used for database management to store and manage user data, including expenses, budgets, and analytics.

This internship provided me with valuable hands-on experience in mobile app development, enhancing my technical skills in Flutter, Spring Boot, MySQL, and Figma. It also helped improve my abilities in user interface design, app optimization, and backend integration. Additionally, I gained a deeper understanding of working collaboratively within a development team and adapting to industry standards, while learning about workplace culture and ethical practices in a professional setting.

**Keywords:***Flutter, Spring Boot, MySQL, Figma, Budgeting, Backend, Data Analytics.*

## TABLE OF CONTENT

Chapter 1: INTRODUCTION.....	1
1.1    Project Introduction.....	1
1.2    Problem Statement .....	1
1.3    Objectives.....	2
1.4    Scope and Limitations .....	2
1.5    Report Organization .....	2
Chapter 2: INTRODUCTION TO ORGANIZATION.....	3
2.1    Organizational Details.....	3
2.2    Organizational Hierarchy .....	3
2.3    Working Domains of organization.....	4
2.4    Description of Intern Department/Unit .....	4
Chapter 3: BACKGROUND STUDY AND LITERATURE REVIEW .....	5
3.1    Background Study.....	5
3.2    Literature Review .....	5
Chapter 4: INTERNSHIP ACTIVITIES .....	8
4.1    Roles and Responsibility.....	8
4.2    Description of Project.....	8
4.3    Tasks/Activity Performed .....	8
4.4    Weekly Log .....	8
Chapter 5: CONCLUSION AND LEARNING OUTCOMES.....	20
5.1    Conclusion.....	20
5.2    Learning Outcomes .....	20
REFERENCES .....	21
Appendices.....	22
Screenshots.....	22

**LIST OF FIGURES**

Figure 2-1 Organizational Hierarchy .....3

Figure 2:Expense Page .....22

Figure 3: Add Expense Page .....22

Figure 4: Setting page .....23

**List of Tables**

[Table 1 Existing System Features](#) .....7

## LIST OF ABBREVIATIONS

ORM	Object-Relational Mapping
API	Application Programming interface
JPA	Java Persistence API
JWT	JSON Web token
JDK	Java Development Kit

# **Chapter 1: INTRODUCTION**

## **1.1 Project Introduction**

The Expense Tracker is a web and mobile-based application designed to help users efficiently manage their expenses, budgets, and financial records. Traditional methods such as notebooks or spreadsheets can be time-consuming, error-prone, and difficult to analyze. This system automates and simplifies the process by allowing users to record, categorize, and track their expenses with ease. The Front End is built using Flutter in clean code architecture, ensuring a cross-platform experience with a smooth and responsive UI on both Android and iOS devices. The backend is developed with Spring Boot, providing a robust, scalable, and secure API for data management. MySQL is used as the database to efficiently store, retrieve, and manage financial records.

The system is designed to improve accuracy, reduce manual effort, and provide real-time financial tracking. By integrating a mobile-based frontend, users can log expenses on the go, reducing dependency on traditional record-keeping methods. The backend system, built with Spring Boot, is responsible for securely storing expense records, authenticating users with JWT (JSON Web Token), and generating financial reports. This ensures data security, seamless access across devices, and smooth operation of the system.

Overall, the Expense Tracker Mobile App offers an intuitive and accessible platform for managing personal and organizational finances. By combining expense tracking, budgeting, and detailed analytics in one mobile app, it provides users with the tools they need to stay organized, monitor their financial health, and achieve their financial goals efficiently, all from the convenience of their smartphones.

## **1.2 Problem Statement**

Traditional methods of expense tracking come with several challenges. They often suffer from manual errors, time-consuming data entry, and difficulties in generating financial reports. Unfortunately, many individuals and businesses lack an automated system for managing their expenses efficiently. Some of the key issues include:

- Manual expense tracking lacks efficiency and accuracy, making it difficult to monitor spending habits.

- Manual report generation requires significant effort, costly and is prone to inaccuracies.

### 1.3 Objectives

The main objectives of this project are listed below:

- To develop RESTful APIs for services
- To develop secure authentication using JWTs
- To make the system scalable and robust

### 1.4 Scope and Limitations

The scopes of Expense Tracker are:

- Set spending limits and track budget progress.
- Developing a system that increase efficiency & save time.
- Secure registration, login, and authentication using JWT.

The limitations are:

- Internet Connectivity Requirement.
- Needs to be updated in regular interval of time which is costly and time consuming.

### 1.5 Report Organization

This document contains six chapters which are described below: -

**Chapter 1** deals with the introduction of the system with its objectives and limitation along with the reason why the system is made.

**Chapter 2** describes the details of the organization and its hierarchy. It includes working domains of the organization and talk about the intern department or unit.

**Chapter 3** is about literature review and background study.

**Chapter 4** is about what roles and responsibilities participants played and their weekly log. It deals about the description of project which is involved during internship and the tasks or activities performed while doing this project.

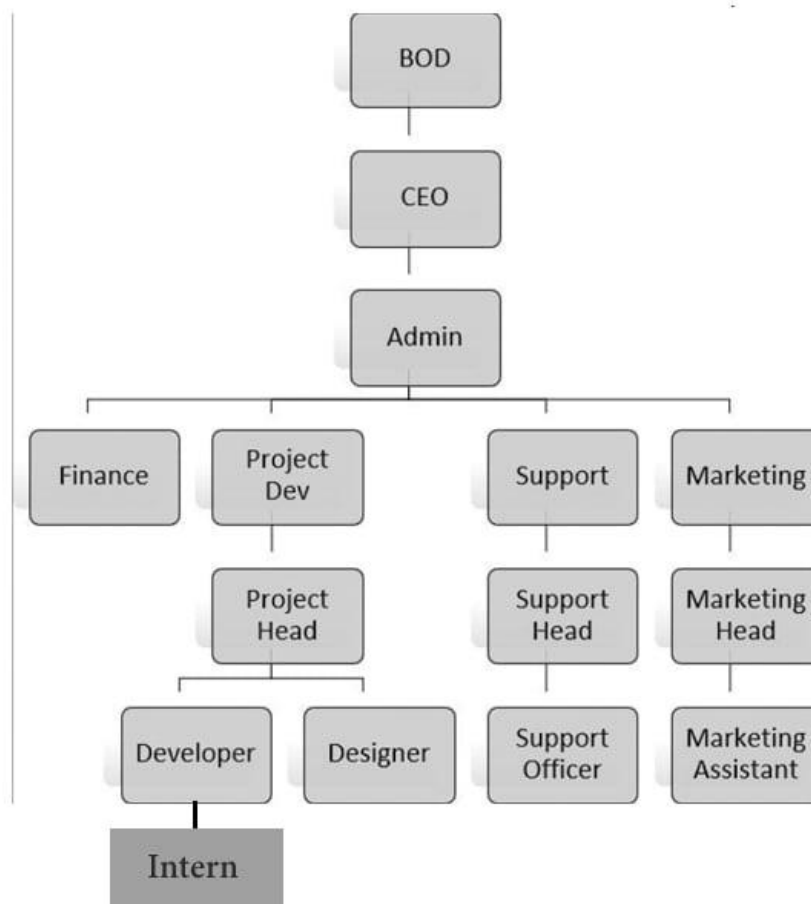
**Chapter 5** describes about Conclusion and Learning Outcome of the internship.

## Chapter 2: INTRODUCTION TO ORGANIZATION

### 2.1 Organizational Details

Crystal Tech is Software Company located in Birtamode-04, Jhapa. The company was registered on 2076/01/21 and engages in business transactions related to computer software. It sells a variety of specialized software products, including school management software, hotel management software, and casino management software. The company's products may include a range of features and functionalities designed to support the specific needs of these industries, such as student and faculty management tools for schools, reservation and billing systems for hotels, and gaming and analytics tools for casinos.

### 2.2 Organizational Hierarchy



*Figure 2-1 Organizational Hierarchy*



## **2.3 Working Domains of organization**

Crystal Tech is a software company which works with Educational and Enterprise software.

Its core working domain includes:

- Software Development
- Mobile Application Development
- Website Design
- Web Hosting
- IT Consulting
- SMS Service

Its main products are Crystal SMS, Crystal ERP for Education, and Crystal ERP. Crystal SMS relates to the SMS system provided by the company for different organization to use SMS Service. Crystal ERP for Education is software which is used by campus and school to automate various administrative and academic processes within a school and campus. Crystal ERP is software used by different hotels and restaurants to manage their day-to-day transaction and activities and automate their tasks.

## **2.4 Description of Intern Department/Unit**

As an intern I worked on developer department. The developer department of a Crystal Tech is responsible for creating and maintaining software products. This may involve a range of activities such as designing and developing new software features, writing, and testing code, debugging and fixing issues, and collaborating with other teams such as product management, design, and quality assurance to ensure that the final product meets the needs of the customer.

Developers in the developer department of a software development company may work on a variety of projects and technologies, depending on the specific focus and expertise of the company. They may use a range of programming languages, frameworks, and tools to create custom software solutions for clients.

## **Chapter 3: BACKGROUND STUDY AND LITERATURE REVIEW**

### **3.1 Background Study**

Traditional methods of expense tracking often rely on manual processes, such as paper-based records or spreadsheet-based tracking. These methods are time-consuming, prone to errors, and lack real-time synchronization. While some web-based platforms exist for expense management, they often require manual input, lack mobility, and are not optimized for use on mobile devices. As a result, these systems fail to provide the flexibility, ease of use, and efficiency needed in today's fast-paced world.

In the mobile application space, there is a gap in dedicated expense tracking applications designed for individual users and small businesses. While a few mobile-based apps offer basic expense management features, many still lack important functionalities such as real-time expense tracking, automatic report generation, or integration with financial tools.

During the requirement gathering phase of the project, the team explored existing mobile applications for expense management, which highlighted several limitations in terms of user experience, functionality, and customizability. This led to the idea of developing a mobile application-based solution using Flutter for the frontend and Spring Boot for the backend, aiming to provide an efficient, accessible, and feature-rich system for expense tracking.

### **3.2 Literature Review**

The adoption of mobile expense tracker apps has seen a rapid increase globally, as individuals strive to manage personal finances with greater efficiency. These apps enable users to track spending, set budgets, and progress toward financial goals through user-friendly digital platforms. This review examines prominent global and local (Nepali) mobile expense tracking apps, highlighting their features, user appeal, and the specific challenges they face in the Nepali context.

Globally, apps such as Mint, You Need A Budget (YNAB), and PocketGuard dominate the personal finance management space. *Mint* is widely favored due to its free cost and its

ability to consolidate all financial accounts into one dashboard. It offers budgeting tools, spending alerts, and bill reminders (Awadalla et al., 2023). *YNAB*, known for its zero-based budgeting method, emphasizes giving every dollar a job, thereby encouraging disciplined financial behavior. *PocketGuard* simplifies expense tracking and shows users how much disposable income remains after accounting for bills and savings goals.

In Nepal, while the market for such apps is still emerging, local applications like *Kharcha Kitab* and *Expense Tracker Nepal* have gained some recognition. *Kharcha Kitab* is tailored to local users, allowing tracking of daily expenses, incomes, and informal lending or borrowing—an important feature in Nepal’s communal and cash-based economy (Khutruke, 2021). *Expense Tracker Nepal* supports budgeting in Nepali Rupees and provides an easy-to-use platform for categorizing daily expenses.

Key features across both global and local apps include expense categorization, budgeting tools, and financial analytics (Pandey et al., 2016; Adhikari, 2019). These help users become more conscious of their financial habits. However, challenges persist, especially in the Nepali context. For example, many users prefer cash transactions and lack the digital literacy needed to adopt such tools (Aryal, 2021). Additionally, limited access to the internet and smartphones, particularly in rural areas, hinders widespread usage.

Localization remains critical for success in Nepal. Apps must include Nepali language support and simple interfaces to appeal to a broader user base. Educational efforts aimed at improving financial literacy could also support the adoption of these apps. Addressing issues such as data security and user privacy, especially in light of growing cybersecurity concerns, is another important consideration (FasterCapital, 2021).

In conclusion, mobile expense tracker apps have the potential to greatly improve financial awareness and discipline among users in Nepal. While there are several international models of success, adapting these concepts to local needs—considering cultural preferences, language, infrastructure, and education—will be essential for the continued growth and impact of these tools in Nepal.

*Table 1 Existing System Features*

S.N	Project	Main Features
1	Mint	<ul style="list-style-type: none"> <li>- <b>Bank Syncing:</b> Imports transactions.</li> <li>- <b>Expense Categorization:</b> Organizes spending.</li> <li>- <b>Budget Setting:</b> Monitors budgets.</li> <li>- <b>Bill Tracking:</b> Sends bill reminders.</li> <li>- <b>Credit Score Monitoring:</b> Provides free credit score.</li> </ul>
2	YNAB (You Need A Budget)	<ul style="list-style-type: none"> <li>- <b>Zero-Based Budgeting:</b> Assigns every dollar a task.</li> <li>- <b>Bank Sync:</b> Updates in real time.</li> <li>- <b>Goal Setting:</b> Tracks savings and debts.</li> <li>- <b>Educational Resources:</b> Provides workshops and guides.</li> </ul>
3	Pocket Guard	<ul style="list-style-type: none"> <li>- <b>Disposable Income Tracker:</b> Shows spendable amount.</li> <li>- <b>Subscription Monitoring:</b> Tracks recurring payments.</li> <li>- <b>Spending Insights:</b> Visualizes spending patterns.</li> </ul>
4	Kharcha Kitab	<ul style="list-style-type: none"> <li>- <b>Expense Tracking:</b> Tracks daily income and expenses.</li> <li>- <b>Nepali Currency Support:</b> Uses Nepalese Rupee (NPR).</li> <li>- <b>Simple Interface:</b> User-friendly design for quick entry.</li> <li>- <b>Categories:</b> Customizable expense categories.</li> <li>- <b>Language Support:</b> Available in Nepali.</li> </ul>
5	Expense Tracker Nepal	<ul style="list-style-type: none"> <li>- <b>Daily Expense Management:</b> Easily records daily expenses and income.</li> <li>- <b>Nepali Currency &amp; Language:</b> Supports NPR and Nepali language.</li> <li>- <b>Bill Reminders:</b> Sends reminders for bill payments.</li> <li>- <b>Reports:</b> Provides reports on income and expenses.</li> <li>- <b>Multiple Accounts:</b> Tracks various accounts (cash, bank).</li> </ul>

## **Chapter 4: INTERNSHIP ACTIVITIES**

### **4.1 Roles and Responsibility**

The Development department consisted of multiple teams that worked on various projects. As I was assigned to work on the Expense Tracker project, I needed to work related to backend and communicate to other developers who were also working on the same project. Tasks were assigned on a weekly basis by the project manager. My typical roles and responsibilities included developing RESTful APIs for handling number of services, solving problems, participating in formal discussion sessions, and most importantly, completing assigned tasks.

### **4.2 Description of Project**

The Expense Tracker System is a mobile application designed to help users efficiently manage and track their expenses. The system provides a user-friendly and automated approach to financial tracking and budgeting.

Key features include real-time expense logging, budget management, expense categorization, and the generation of financial reports for future reference. The system eliminates the need for manual record-keeping, reduces errors, and enhances financial awareness by providing a digital, accessible, and reliable solution to track expenses and manage budgets effectively.

### **4.3 Tasks/Activity Performed**

- Analysis of assigned task
- development of APIs
- API integration of assigned task
- Testing of integration

### **4.4 Weekly Log**

A weekly log is a summary of the work completed during a week. It includes a list of the various roles and responsibilities assigned weekly, as well as a record of the activities and observations made. The log also includes a performance appraisal provided by the team lead overseeing the work. it serves as a summary of the key tasks and accomplishments. The weekly log that describes different activities and task completed in weekly basis is attached with this document:

## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/09/10

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 1

### Responsibilities:

- Understand the company's structure, operations, and workflow.
- Familiarize yourself with the organization's work environment and culture.

### Activities:

- Visit the organization and interact with different departments.
- Install necessary software development tools such as Spring Boot, VS Code, Postman, MySQL workBench and Extensions in vs Code

### Observations:

- The organization has a well-defined structure with departments, including Accounting, IT, and Marketing.
- The company follows an organized software development lifecycle.

### Plan for Next Week:

- Set up the project structure and database schema.

### Performance Appraisal by Mentor:

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<b><u>Mentors' Approval</u></b> <b>Signature:</b>  <b>Name:</b> Roshan Budhathoki <b>Date:</b>	<b><u>Supervisors' Verification</u></b> <b>Signature:</b>  <b>Name:</b> Sunil Sharma <b>Date:</b>
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## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/09/17

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 2

### Responsibilities:

- Learn about the technologies and tools used in the organization.
- Define project architecture and configure the database.
- Study best practices for writing clean and maintainable code.

### Activities:

- Created a Spring Boot project using Maven.
- Configured MySQL database with Spring Data JPA.
- Designed entity classes (User, Expense, Category, Budget).

### Observations:

- Establishing a solid database design is crucial for application performance.

### Plan for Next Week:

- Implement API endpoints for CRUD operations.

### Performance Appraisal by Mentor:

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<u><b>Mentors' Approval</b></u> <b>Signature:</b>  <b>Name: Roshan Budhathoki</b>  <b>Date:</b>	<u><b>Supervisors' Verification</b></u> <b>Signature:</b>  <b>Name: Sunil Sharma</b>  <b>Date:</b>
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### Weekly Internship Log

**Name of the Student: Om Prakash Ganesh**

**Date: 2081/09/24**

**Project/Job Title: Backend Development/ Expense Tracker**

**Week Number: 3**

#### Responsibilities:

- Creating the file structure of clean code approach
- Develop REST APIs for each agent/entities

#### Activities:

- Created API endpoints for User and Budget.
- Implemented CRUD operations using Spring Boot Rest Controller.
- Used Lombok and Builder to reduce boilerplate code .

#### Observations:

- RESTful APIs make the data exchange fast and light weight .

#### Plan for Next Week:

- Develop the APIs for handling the budget related services.
- Make essential documentation and push into version control.

#### Performance Appraisal by Mentor:



<u><b>Mentors' Approval</b></u> <b>Signature:</b>  <b>Name: Roshan Budhathoki</b> <b>Date:</b>	<u><b>Supervisors' Verification</b></u> <b>Signature:</b>  <b>Name: Sunil Sharma</b> <b>Date:</b>
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**Name of the Student: Om Prakash Ganesh** **Date: 2081/10/01**  
**Project/Job Title: Backend Development/ Expense Tracker**  
**Week Number: 4**

- Integrate the previous services with other services .
- Develop REST APIs for entities Category and Expense

- Created API endpoints for Category and Expense
- Implemented CRUD operations using spring Boot REST controller
- Used Lombok and Builder to reduce boilerplate code..

- The clean code architecture work in data, domain and presentation layer.

- Implement Validation and error handling.

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13

## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/10/08

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 5

### Responsibilities:

- Ensure data integrity
- Handle compile time and runtime errors during validation.

### Activities:

- Added validation using spring Boot Validator.
- Implemented global exception handling using @ControllerAdvice.
- Improve error message for API response.

### Observations:

- Proper error handling improves the user experience and debugging.
- validation helps in maintaining integrity among tuples.

### Plan for Next Week:

- Secure API with authentication and authorization

### Performance Appraisal by Mentor:

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<b><u>Mentors' Approval</u></b> <b>Signature:</b>  <b>Name:</b> Roshan Budhathoki <b>Date:</b>	<b><u>Supervisors' Verification</u></b> <b>Signature:</b>  <b>Name:</b> Sunil Sharma <b>Date:</b>
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## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/10/15

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 6

### Responsibilities:

- Protect API endpoints with authentication.
- Provide authorization based on role.

### Activities:

- Added Spring security and JWTs dependencies in project.
- implement the spring security with JWT authentication.
- configured role-based access for different users.
- Secured sensitive API endpoints.

### Observations:

- Jwts helps to maintain the stateless security .
- Secure APIs and authorize based on roles.
- provide strong security.

### Plan for Next Week:

- Test APIs using Postman and optimize performance.

### Performance Appraisal by Mentor:

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<b><u>Mentors' Approval</u></b> <b>Signature:</b>  <b>Name: Roshan Budhathoki</b>  <b>Date:</b>	<b><u>Supervisors' Verification</u></b> <b>Signature:</b>  <b>Name: Sunil Sharma</b>  <b>Date:</b>
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## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/10/22

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 7

### Responsibilities:

- Create test APIs for functionality and optimize performance.
- Perform JUnit /Mockito for testing.

### Activities:

- Create Account in Postman .
- create collection and add requests like , get, post, put, delete etc.
- implement caching using Spring Boot Cache and log.
- Optimize database queries to improve response time.

### Observations:

- Helps to identify the accuracy and responses to fix bugs.
- Logging and exception helps to fix bugs while sending request .

### Plan for Next Week:

- Deploy the project to a cloud environment.

### Performance Appraisal by Mentor:

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<u>Mentors' Approval</u> <b>Signature:</b>  <b>Name:</b> Roshan Budhathoki  <b>Date:</b>	<u>Supervisors' Verification</u> <b>Signature:</b>  <b>Name:</b> Sunil Sharma  <b>Date:</b>
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## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/10/29

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 8

### Responsibilities:

- Develop the project to a cloud environment.
- Set up the environment in cloud .

### Activities:

- Created account in cloud serve (Railway) for Deployment.
- Configured and added repository in Railway platform .
- Set up Using GitHub Actions.
- Created the Development and production setup files.

### Observations:

- Cloud deployment enhances scalability and reliability.
- Increase remote accessibility.

### Plan for Next Week:

- Conduct final testing and bug fixes.

### Performance Appraisal by Mentor:

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<u><b>Mentors' Approval</b></u> <b>Signature:</b>  <b>Name:</b> Roshan Budhathoki <b>Date:</b>	<u><b>Supervisors' Verification</b></u> <b>Signature:</b>  <b>Name:</b> Sunil Sharma <b>Date:</b>
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## Weekly Internship Log

**Name of the Student: Om Prakash Ganesh**

**Date: 2081/11/06**

**Project/Job Title: Backend Development/ Expense Tracker**

**Week Number: 9**

### Responsibilities:

- Identify and fix any application issues.
- Ensure the successful running of application.

### Activities:

- Debugged and fix API response issues.
- Improved database indexing for faster queries. .
- changed mapping among entities for best relationship.

**Observations:**

- Addressing performance issues early prevents scalability problems.
- Reduce the render and processing time .

### Plan for Next Week:

- Complete final documentation and project presentation.

**Performance Appraisal by Mentor:**

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<u><b>Mentors' Approval</b></u> <b>Signature:</b>  <b>Name: Roshan Budhathoki</b>  <b>Date:</b>	<u><b>Supervisors' Verification</b></u> <b>Signature:</b>  <b>Name: Sunil Sharma</b>  <b>Date:</b>
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## Weekly Internship Log

**Name of the Student:** Om Prakash Ganesh

**Date:** 2081/11/13

**Project/Job Title:** Backend Development/ Expense Tracker

**Week Number:** 10

### Responsibilities:

- Submit the System and make presentation.
- Receive the certificate of Inter.

### Activities:

- Created API documentation using swagger.
- Prepared project documentation.
- Delivered final project presentation and demo.
- .Received the Certificate.

### Observations:

- Proper documentation ensure maintainability and future scalability.
- Swagger provides standard and API visualization.

### Final Outcome:

- Successfully built , tested and deployed the Expense Tracker System using Spring Boot and deployed in Cloud .

### Performance Appraisal by Mentor:

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<b><u>Mentors' Approval</u></b> <b>Signature:</b>  <b>Name:</b> Roshan Budhathoki <b>Date:</b>	<b><u>Supervisors' Verification</u></b> <b>Signature:</b>  <b>Name:</b> Sunil Sharma <b>Date:</b>
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## **Chapter 5: CONCLUSION AND LEARNING OUTCOMES**

### **5.1 Conclusion**

This internship was an invaluable learning experience that allowed me to enhance both my technical and professional skills. I successfully contributed to the development of the Expense Tracker mobile application, which fulfilled key objectives: development of RESTful APIs for services like , registration , expense , tracking, summery reports etc, authentication and authorization is based on JWTs .My contributions to these allowed users to better understand and manage their finances, while I gained hands-on experience in mobile app development and software engineering practices.

In addition to achieving these goals, I gained important insights into professional practices, organizational dynamics, and the impact of financial resources on project success. I learned how to adapt to new tools and technologies, work effectively in a team, and manage my time in a professional setting. While I still have much to learn, particularly in research methodologies, this internship has helped me identify both my strengths and areas for growth, giving me a solid foundation for a career as a software engineer.

### **5.2 Learning Outcomes**

After completing my internship and working on the Expense Tracker project, I have gained the following important lessons:

1. Experience in applying software development knowledge in a real-world project context, specifically for a mobile application.
2. Gained hands-on experience with development tools such as Spring Boot, Hibernate, data JPA with REST API.
3. Understanding of the importance of integrating new technical knowledge with existing frameworks for practical application.
4. Improved time management skills by balancing development tasks, designing schema, fixing bugs .
5. Learned to take on significant responsibility within a team, ensuring that tasks were completed efficiently and met the project's requirements.

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# Appendices

## Screenshots

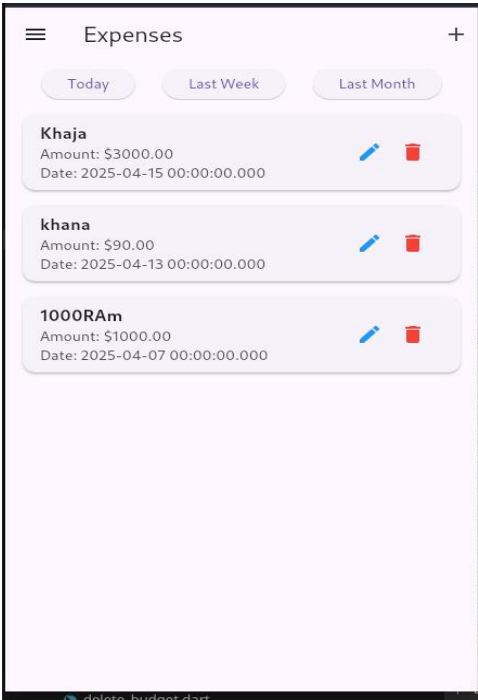


Figure 2:Expense Page

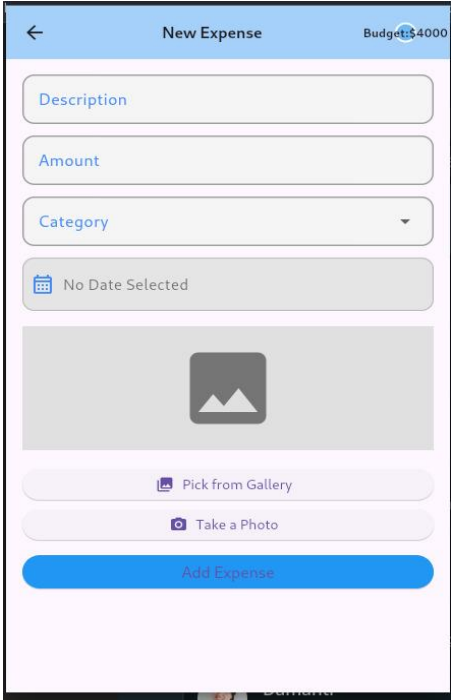


Figure 3: Add Expense Page



Figure4: Expense by Category

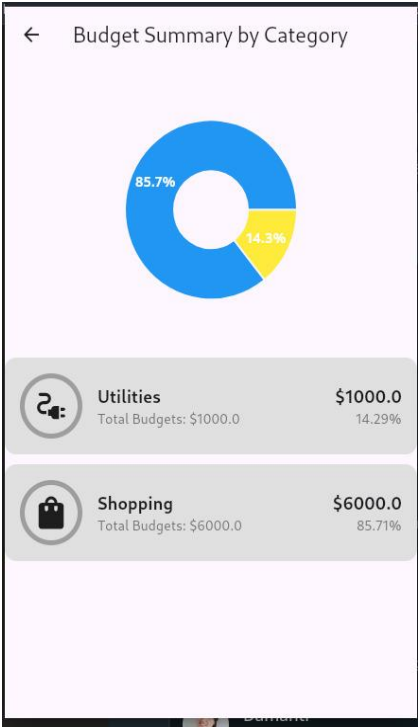
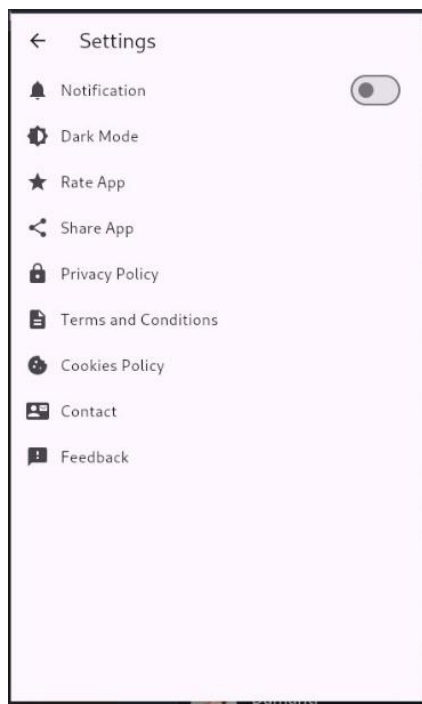
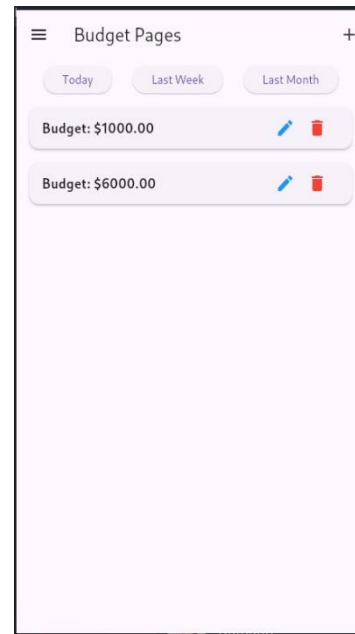


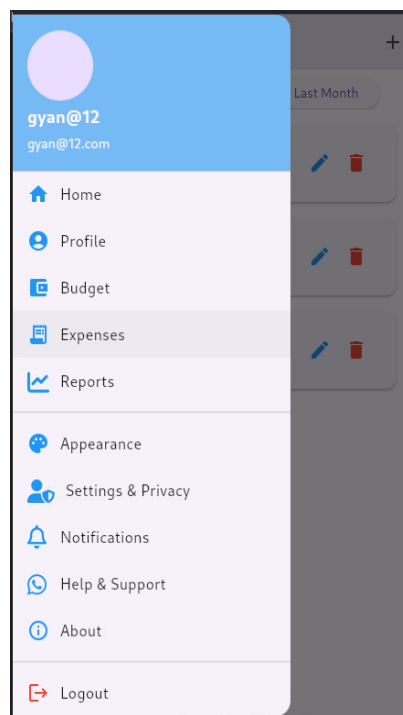
Figure5: Budget by Category



**Figure 4: Setting page**



**Figure 7: Budget Page**



**Figure 8: Drawer**