# Building an AI Assistance Application: Full-Stack Development Internship at Planet X Inc..

by

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An internship report submitted to the Department of Computer
Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science

Department of Computer Science and Engineering
Brac University
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# Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing my degree at Brac University.

2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.

3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.

4. We have acknowledged all main sources of help.

**Student's Full Name & Signature:**

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# Approval

The project titled "Scholar Jimmy Library Project" submitted by

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# Abstract

This report is a documentation of a six-month internship I undertook at Planet X Inc. as a full-stack development intern with full responsibility for various projects centered on web application development. My main assignment was the Scholar Jimmy Library project, which is an artificial intelligence-based application aimed at providing teachers, students, and researchers with customized content materials. The features developed in this project were a user-specific chat interface, a chatbot for PDF files, and a token-based subscription system using the technical parts Next.js, MySQL, Prisma ORM, and Flask. Also, I included OpenAI's API for the response with specific consideration of different groups of users and a payment solution appropriate for Liberia's market: MoMo MTN. During this internship, I saw an actual example of a healthy work environment and successfully attended the daily standups, client debriefs, and weekly business planning and backlogs. I was able to deal with typical problems, such as concerning the connection of payment gateways, as well as cultural differences connected with interaction with the clients. This internship helped me to build up my technical skills with regard to full-stack web development and to further my knowledge of working in an agile project environment. In a nutshell, the entire experience has been very fruitful and enriching for me as a professional and as a person; it has given me all the tools and confidence I need to be a professional software developer.

# Dedication

This report is dedicated to my family They have been my source of encouragement as I worked on this project. To my parents, who continue to inspire and encourage me through words of wisdom, and my friends and teachers who have inspired me all throughout the way. Shout out to my advisers who continuously remind and push me to persist and perform at my best. Its presence is an evidence of its impact to my academic and professional development.

# Acknowledgment

In this regard, I would like to thank my supervisor, Arif Shakil for his immense support and useful advice on my internship at Planet X Inc. He's wise, tolerant, and committed, and he has led me in the right direction, and the best part of the personal and career life I am in today. I am highly thankful to him for his support for me for which not only my technical abilities have improved but also I have learned much about tolerance and problem-solving skills regarding the software issues that encountered while working on the project. I shall also extend my appreciation to all the people that I worked with at Planet X Inc.; they were so kind and willing to share their time while helping me to carry out my internship. Finally, I acknowledge my family and friends for always being my source of reinforcement in what I do best as I was completing this task.

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# Chapter 1

# Introduction

## 1.1 Preamble

Internships are a critical means by which students are able to make the transition from the classroom to practice. They allow students to use the acquired academic knowledge in the practicing field, acquire a certain degree of competencies necessary to function within a specific organizational environment and gain some understanding of the processes occurring in a given occupation. At Planet X Inc., I had the opportunity to titillate my skills and knowledge as a Fulfullack Development Intern and develop solutions that incorporated divergence technologies to augment company operations. This paper encapsulates the overall observations, impact, and learning that evolved during the period of the six-month internship from June 20, 2023, to December 20, 2023.

## 1.2 Objective

This paper's main purpose is to give a detailed description of the internship undertaken at Planet X Inc. It shows the projects I am involved in, emphasizing the Scholar Jimmy Library project, an artificial intelligence-based project for education and research. It is also a goal of the report to define the daily tasks carried out, skills acquired, as well as considerations met. In this analysis, I will try to provide some understanding of the professional competence I built, and what I need to do in my future job.

## 1.3 Information Sources

Most of the information used herein has been obtained through my interaction as an employee of Planet X Inc., consulting with my immediate supervisor, Arif Shakil, and using project documents where necessary. Furthermore, I have incorporated different technical sources and development applications to provide proper definitions of the technologies and procedures being used in the projects.

## 1.4 Document Overview

To make it easier to read, this report is divided into several chapters that focus on distinct stages of the internship experience. Chapter 2 is a description of Planet X Inc. its company culture, and the environment of the administrative center. As earlier mentioned in the work, Chapter 3 of the research describes the daily tasks and the teamwork aspect of the process. In addition, Chapter 4 explores my experience in several key projects, with a focus on Scholar Jimmy Library in relation to the following: objectives of the project, methods of development, and technological challenges. The internship experience and the professional growth and skills developed are described in the fifth chapter of the thesis. Finally, Chapter 6 presents a conclusion based on my observations and lessons learned during the internship, as well as the general implications of the study for personal and professional development.

# Chapter 2

# Company Profile

## 2.1 Company Overview

Planet X Inc. is a technology and IT company with its origin in 2018. Targeting software development and application scalability, Planet X Inc. aims to deliver sophisticated solutions for new start-ups and large-scale enterprises. The firm currently has over twenty software engineers on staff and helps clients create new applications, modify old software products, and construct systems that are maintainable and adhere to best practices. Planet X Inc. has established a good market image in the delivery of services to local clients as well as international organizations, hence being a reliable solution provider for technological solutions. The employees have elaborated a unique organizational culture at Planet X Inc., and they always aim to satisfy the client's needs and expectations towards a particular project. Applying digital solutions and IT-savvy approaches, the company solves sophisticated issues and helps businesses grow successfully.

## 2.2 First Day at Planet X Inc.

My first day at Planet X Inc. was a blend of confidence and excitement. I entered the company with open arms and the first person I talked to was the CEO of the company, Ali Hafiz. It can be recalled that through the interview, Ali Hafiz Bhai conveyed a very strong passion for the company's vision of success as well as for innovation. Later, after our discussion, I had an opportunity to sit with the Managing Director of Planet X Inc. who took his time to explain the company culture and expectations. My project manager at the company, Muhtasim Bhai, later brought me to meet the rest of the team, and I immediately felt quite comfortable. My co-workers were very nice and asked about my past experiences. They were interested in asking about my education experience and also asked me about their experience, which made me feel so comfortable. This enabled me to look at them working and provided me with some insight into additional tasks they are perhaps working on apart from the ones specified in their job descriptions. This helped me develop my desire to be part of the team as well as the company. This friendly approach used in the interactions

## 2.3 Products and Services

Planet X Inc. focuses on providing comprehensive tech and software services, primarily in two areas:

- **Application Development**: We at Planet X Inc. provide full application services, where your ideas are transformed into concepts that are developed into efficient, reliable, and effective applications. It can range from young start-ups, which are interested in their first application, to seriously developed companies that need to update their digital services in the company of Planet X Inc.

- **Application Scaling and Optimization**: Aside from new solutions creation, Planet X Inc. offers a wide range of services focused on the adaptation and refinement of an application that was initially designed and deployed to adapt to a wider audience. The team here at Selle always designs applications with scalability in mind to facilitate growth, and cloud implementations make secure growth easy for clients.

Altogether, Planet X Inc. has become a technology supplier that many both domestic and global corporations prefer to work with. Thus, having a passionate team and a clear client orientation perspective, the company is to expand its operations in the sphere of IT.

# Chapter 3

# Workplace Details

## 3.1 Organization Structure

The organization structure of Planet X Inc. includes a team of over twenty software engineers working under the guidance of the CEO and managed by project managers and team leads. The company operates with a relatively flat organizational structure, allowing open communication and efficient collaboration across various levels of the team.
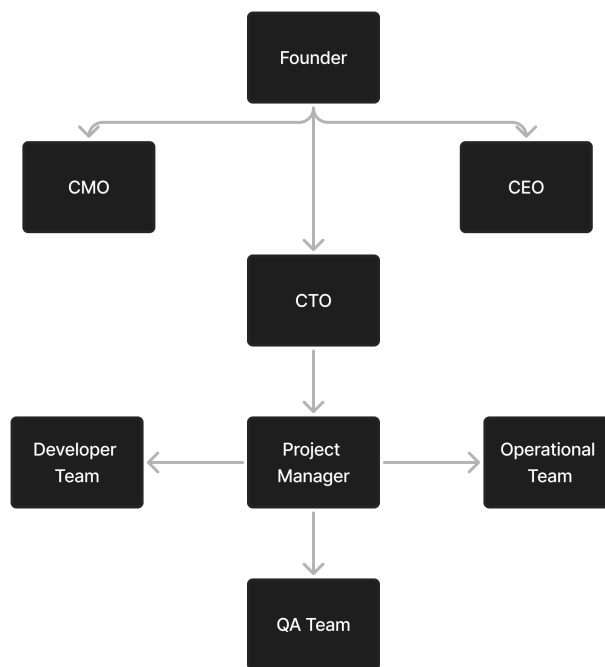


Figure 3.1: Organization Structure of Planet X Inc.

## 3.2   Communication

Planet X Inc. has carefully designed a communication strategy to enhance the flow of information to all employees in all the activities of the organization. We use Discord as our main means of interacting, discussing daily activities, sharing team updates and news, and other things. Discord uses channels that are then grouped by project and/or topic, meaning it's very easy to keep track of certain conversations and to join in with the rest of the team on both work and pleasure chats.

For project management, we employ ClickUp to take care of all project-related tasks together with resources to work with agile and scrum frameworks. Due to ClickUp, our teams can easily assign tasks, monitor the progress, and work with the backlog. The project manager develops the to-do list according to the scrum model to provide clear and definite task descriptions for each kind of sprint. In this way, the team continues to remain aware of timelines, priorities, and deadlines within each ClickUp project and communicates that effectively to the other members.

## 3.3   Daily Routine

My usual day at Planet X Inc. involves starting work at 10 AM and a bit of relaxation to ease into work for the day. We have a brief morning meeting at 11 AM with the project manager, where he/she discusses the current work, objectives for the day, and any emergent issues from team members. These stand-ups give a rigid framework towards the beginning to the day, to make sure everyone is on the same page with their work and to lessen confusion on certain tasks.

Following the stand-up, more focused activities are worked on and in the morning, I can attend clients by noon to listen to their opinions on the latest delivered project changes. Such interactions provide valuable information in relation to the client's expectations and are important for making modifications on the deliverables of a project. I usually assemble my team at around 1 PM and we really get deep into a project and discuss all sorts of things that might come into our way without any reference to the time by going around the project and sharing any information that has been gathered and together we try to find out the possible solution to any technical hitch that we may encounter on the project.

We usually have a lunch break at 2 PM but during this period, we usually have lunch, usually served by the office catering service. This time should be embraced because it gives an opportunity to those involved to have additional time to interact with other colleagues before going back to work. The afternoon is dedicated to focused project work until about 4 PM This is especially so since we come together at 30 PM to review what has been accomplished. Get Business Done By 5 PM Each team member sits down and gives an account of work completed for the day and goals achieved.

## 3.4 Work-Life Balance

At Planet X Inc., it is crucial that the business have a positive work-life environment. Like any organization, the office follows a schedule, but under some circumstances, remote work is allowed, and the company grants employees 10 paid vacation days besides sick days. They also have every Friday as an off day but there are board and team meetings every Saturday to discuss strategies and pending projects.

While there are times when work pressure might be high or even go into high gear, especially around tight deadlines, Planet X Inc. has stretched an obligation to help the employees deal with these circumstances. For instance, I always find myself receiving more chores on Thursdays to ensure that clients receive our services on Fridays off days. However, the company policies and team setup are very liberal and supportive of addressing the issue of sustainable work-life balance issues.

## 3.5 Team Dynamics

The people who work at Planet X Inc. are team players, friendly, and never hesitate to help their coworkers. My colleagues have proved to be a credible source of help as much as I strive to request help in cases of difficulty. In Clienteo, management values openness, allowing every worker to voice their opinion, ask questions, and contribute to the achievement of employee relations projects. Such a friendly culture has definitely improved my internship and it has given me a chance to work with my peers in a very open, and constructive way.
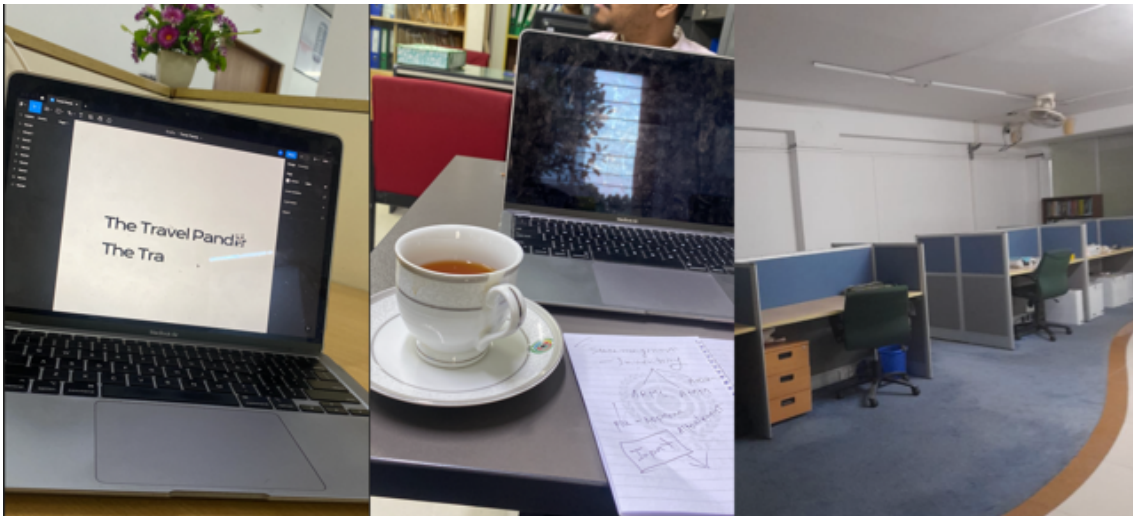


Figure 3.2: Indoor and sitting area of Planet X Inc.

# Chapter 4

# My Contributions

## 4.1 Project Overview

When I was interning at Planet X Inc., I worked on several tasks, but my principal specialization was Scholar Jimmy Library, which is an AI-based project intelligent in content and services for educators, students, and researchers. The software project vision was to create an application that would work like ChatGPT and would be used by users to interact with it for purposes like research and homework help as well as finding educational resources.

Here there were three types of users: teachers, students, and researchers, each of which had different features in the application. Individuals could download their conversation transcript, import PDFs for conversation, and experience pre-set structure templates based on common user requirements. Another feature was the token system, in which some tokens were subtracted for each submission and the paid subscription model was incorporated with the MoMo MTN payment platform for Liberia.

## 4.2 System Analysis and Design

As soon as I received the detailed document regarding the client's requirements, I made an analysis to provide the most effective manner within the sphere of the budget set for this project. Lack of hardware capabilities also played a role in our decision, and instead of running our own homemade AI, we used the OpenAI API. Based on this consideration, I presented a project framework that consists of Next.js for the frontend development, MySQL and Prisma ORM for data handling, and Flask for other server-related operations. The technical stack was selected in order to support the scalability and relevant goals of the project in a cost-efficient manner. This decision guided the design of the project framework, which consisted of:

- **Next.js** for frontend and backend development,

- **MySQL** and **Prisma ORM** for database management, and

- **Flask** for micro-backend server operations.

The chosen technology stack was selected to support the scalability goals and meet the client's requirements in a cost-effective manner.
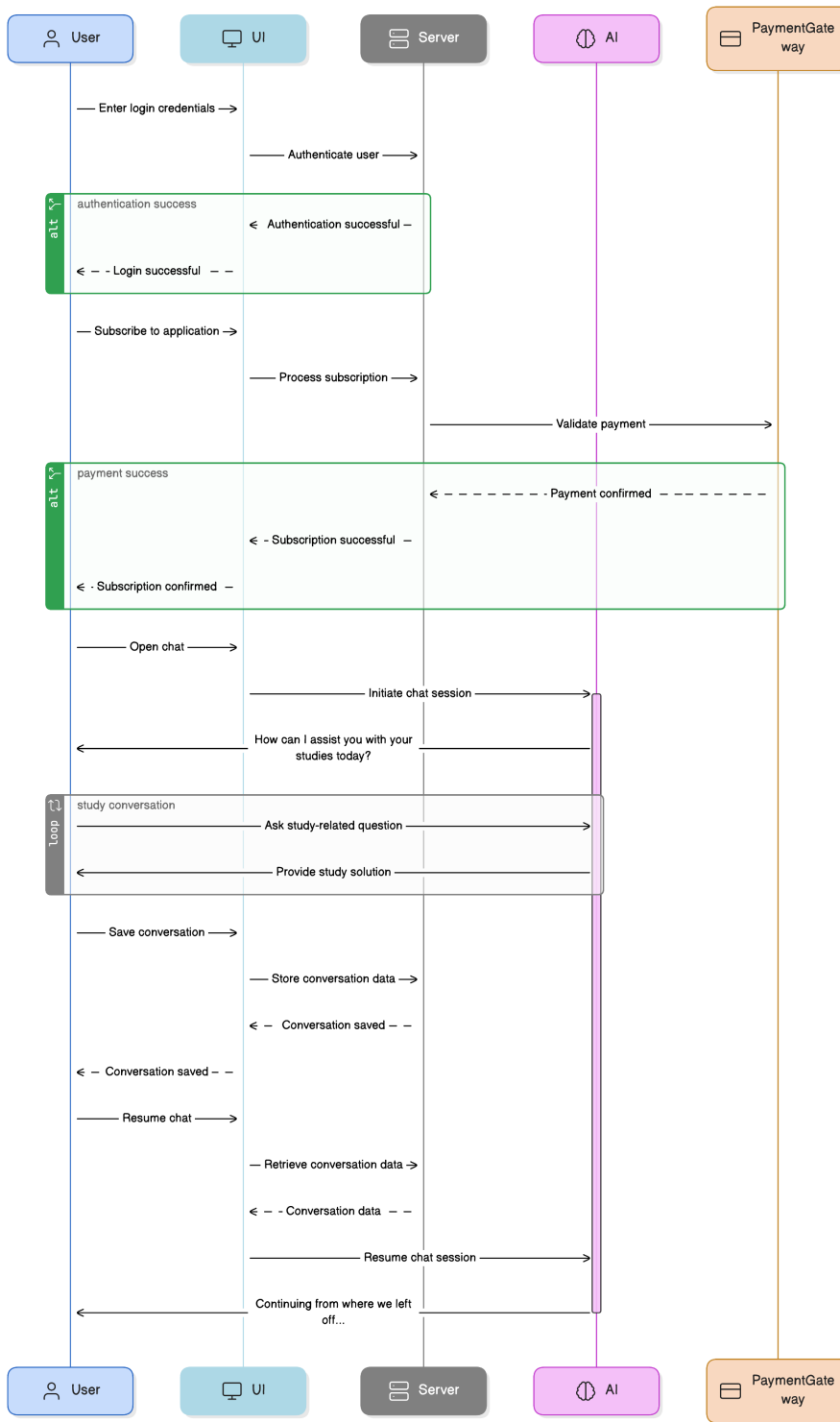
**AI Study Companion**

| User | UI | Server | AI | PaymentGateway |
|------|-----|--------|-----|----------------|

— Enter login credentials →

— Authenticate user →

**alt** [authentication success]

← Authentication successful —

← − − Login successful − − −

— Subscribe to application →

— Process subscription →

— Validate payment →

**alt** [payment success]

← − − − − − − − Payment confirmed − − − − − − −

← − Subscription successful —

← · Subscription confirmed —

— Open chat →

— Initiate chat session →

How can I assist you with your studies today?

**loop** [study conversation]

— Ask study-related question →

← Provide study solution —

— Save conversation →

— Store conversation data →

← − Conversation saved − −

← − Conversation saved − −

— Resume chat →

— Retrieve conversation data →

← − · Conversation data − −

— Resume chat session →

Continuing from where we left off...

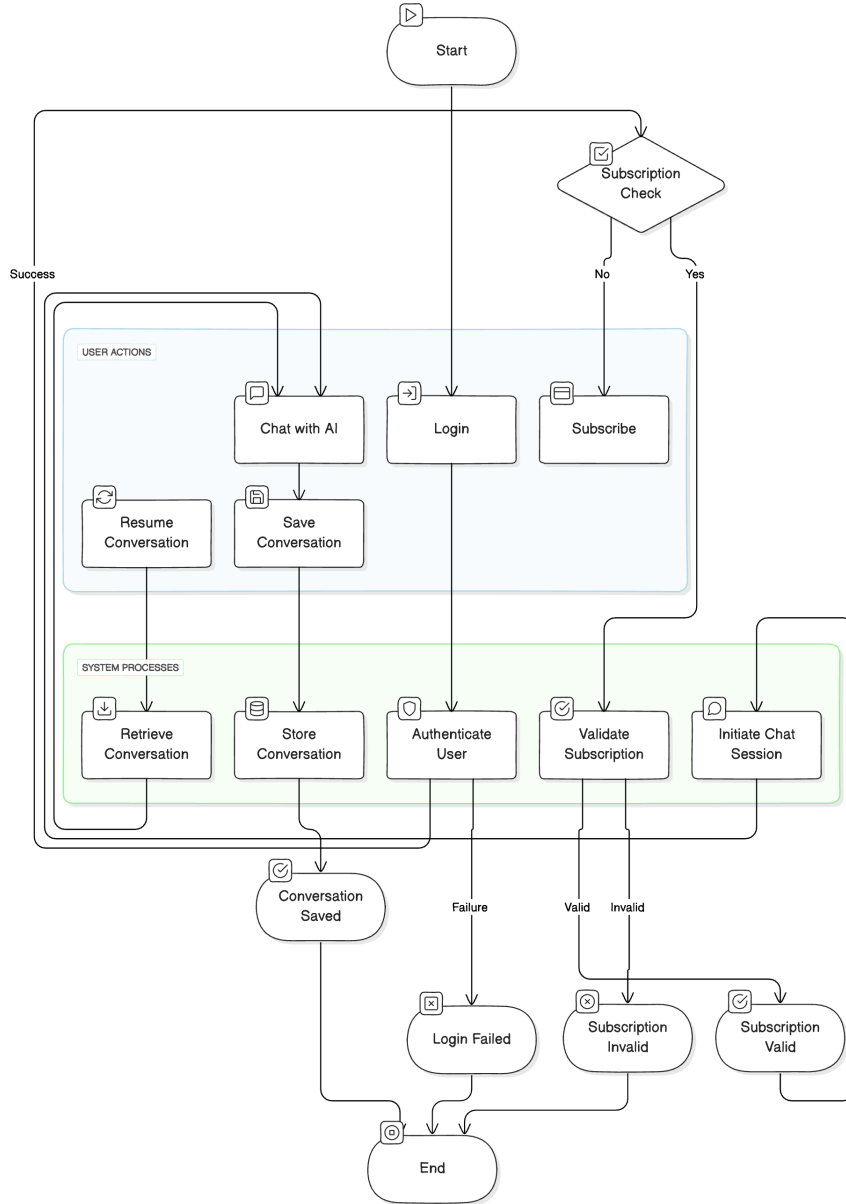Figure 4.1: Sequence Diagram of Scholar Jimmy Library

Figure 4.2: Activity Diagram of Scholar Jimmy Library

## 4.3 Development Process

In order to start the project, I initialized all the development environments that are required and also created Git under organization for version control. Primarily on integrating both the frontend and the backend layers as well as working on user-specific features and responsiveness of the system to the various roles of a user. The development process was structured as follows:

1. **Environment Setup**: I Initialize Next js using cli with TypeScript support. Additionally configured Next app router, React Server component, Tailwind CSS. Also, Added Shadcn UI in the repository. Shadcn UI is an UI library that comes with various Prebuilt UI designs with the react code component with cli support.

2. **Folder Setup**: Folder structure is one of the crucial parts during the development. It makes the developer experience better. As Next js boilerplate already gives me a standard structure out of the box, I only need to structure the components, lib and pages structures.
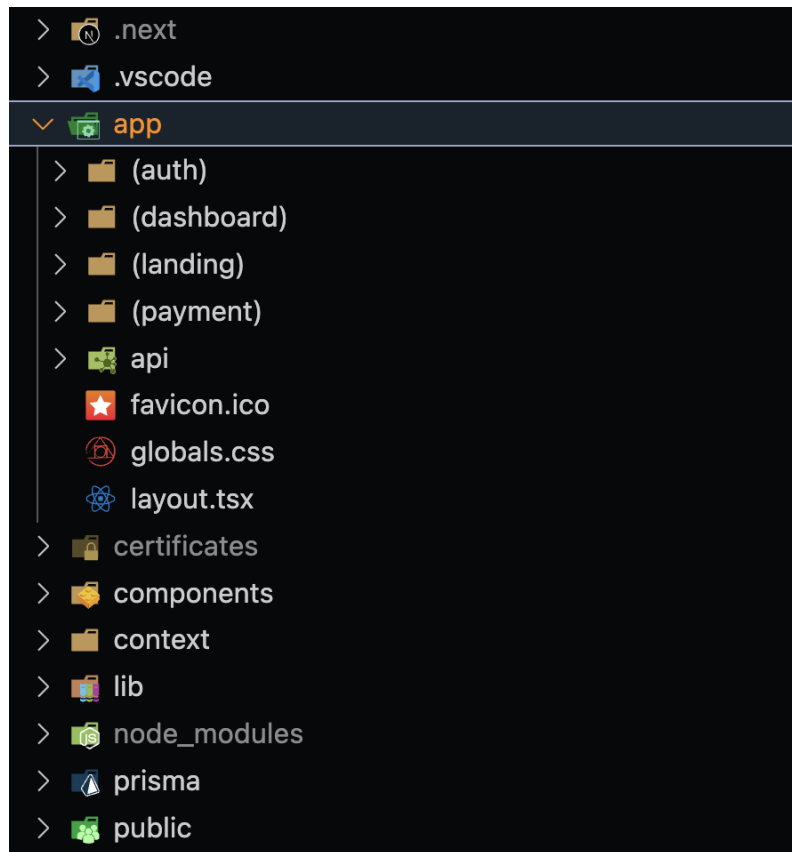


Figure 4.3: Code Folder Setup

11

3. **Authentication and Authorization**: I used Clerk, a third party authentication and authorisation library. Which is a great package and ready to use in the application. It has private route protection middleware by default. All I need to do is specify the routes in the environment file. Also, I can specify the Login and Signup pages in the env file.

```
NEXT_PUBLIC_CLERK_SIGN_IN_URL=/sign-in
NEXT_PUBLIC_CLERK_SIGN_UP_URL=/sign-up
NEXT_PUBLIC_CLERK_AFTER_SIGN_IN_URL=/dashboard
NEXT_PUBLIC_CLERK_AFTER_SIGN_UP_URL=/dashboard
```

Figure 4.4: Clerk Sign in, sign up and after login page declaration

4. **Interface and UI Development**:

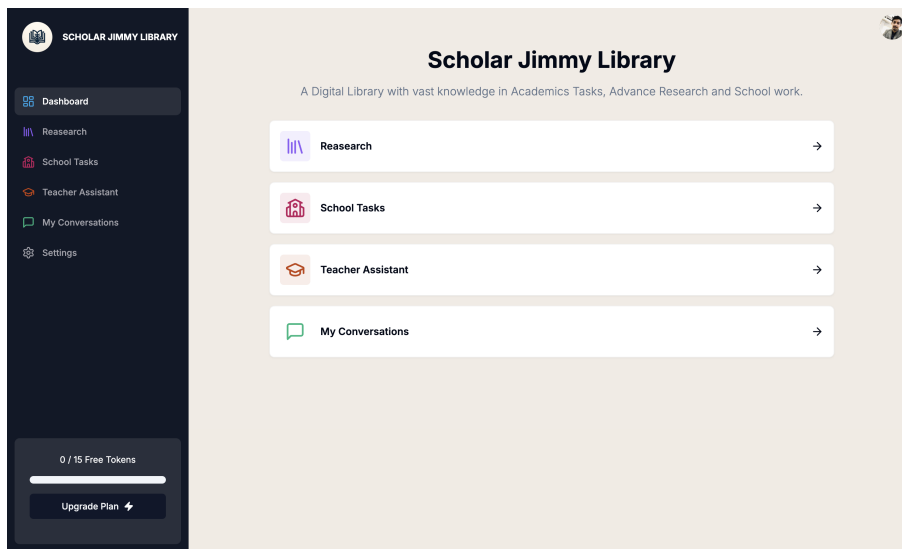   - Designed a responsive layout with reusable components like the sidebar and header.



Figure 4.5: Scholar Jimmy Library Dashboard and Sidebar

   - Created separate routes for each user group (Researcher, Teacher, Student) and built specific conversational interfaces.
   - Developed a page for viewing previous conversations, enabling users to access and continue past chats.
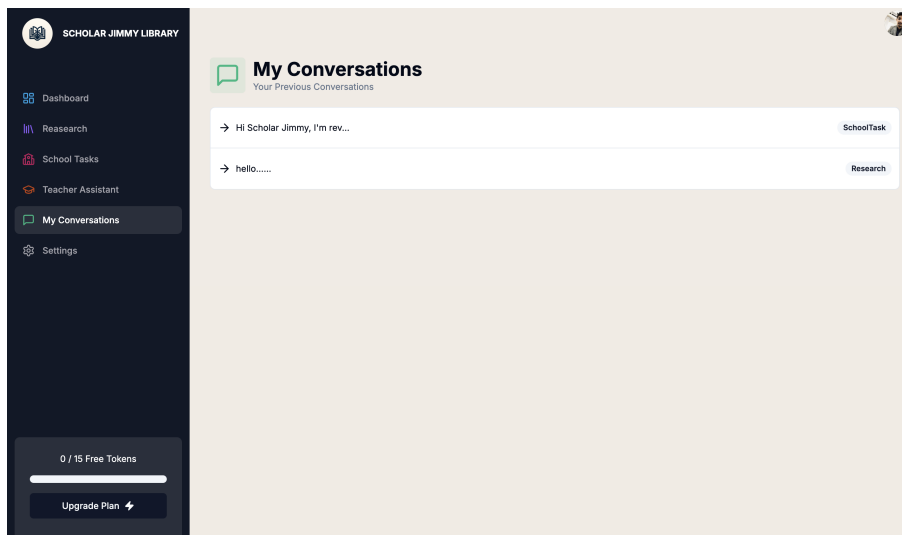
Figure 4.6: Previous Conversation List

- Integrated the Clerk authentication pages for seamless sign-in and sign-up experiences.
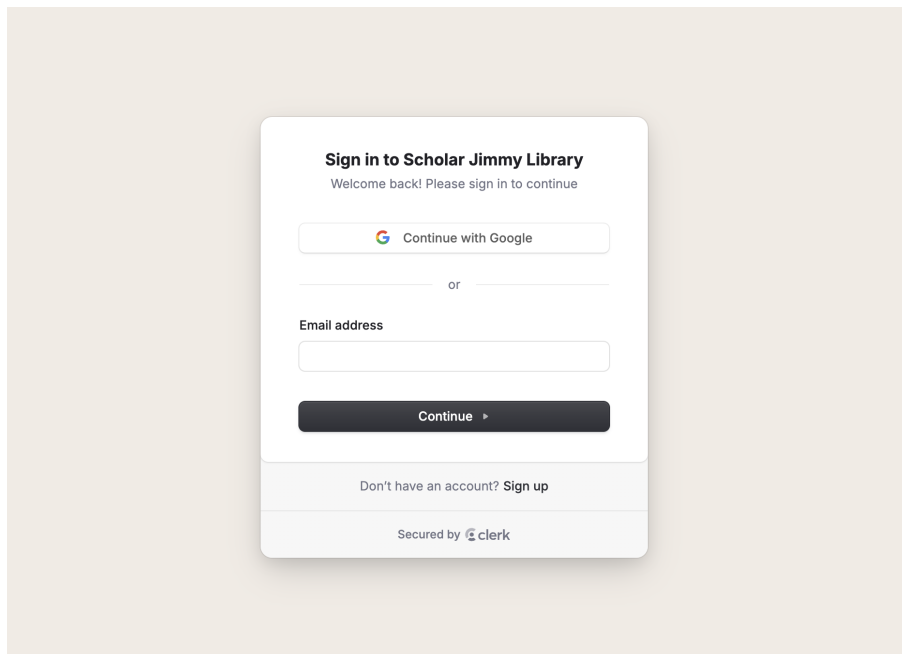


Figure 4.7: Clerk Sign in Page

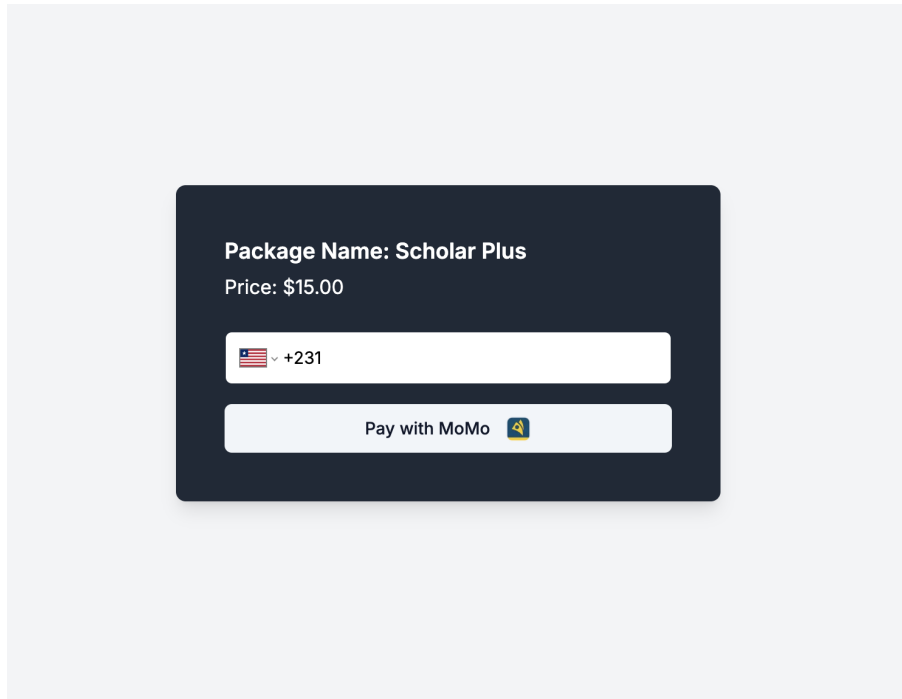- Designed and implemented the payment page as part of the subscription process.



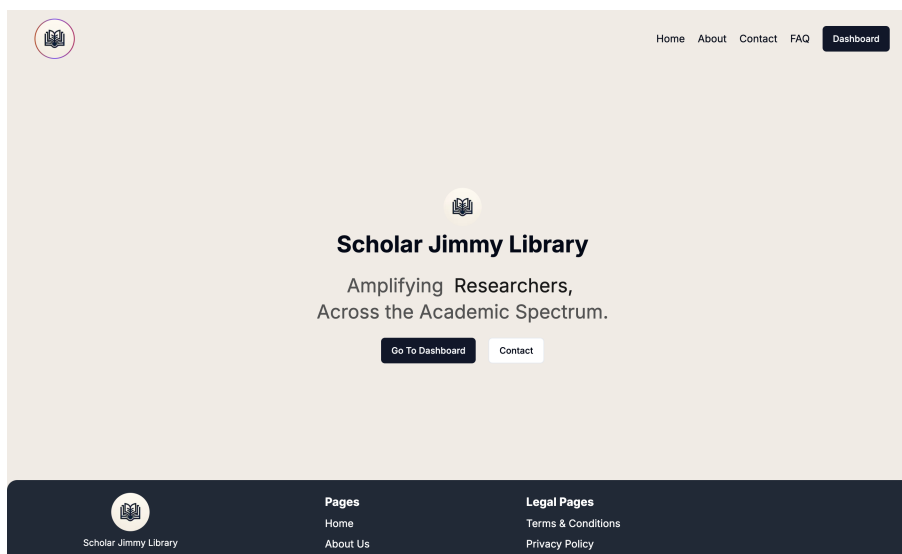Figure 4.8: Payment Page

- Designed landing page.



Figure 4.9: Landing Page

5. **Backend Development**:

- **Making API Routes**: Next Js has its full support building backend API routes via its file structure. There are three routes for each request from the separated users. Also, there are other routes to make payment and callbacks.
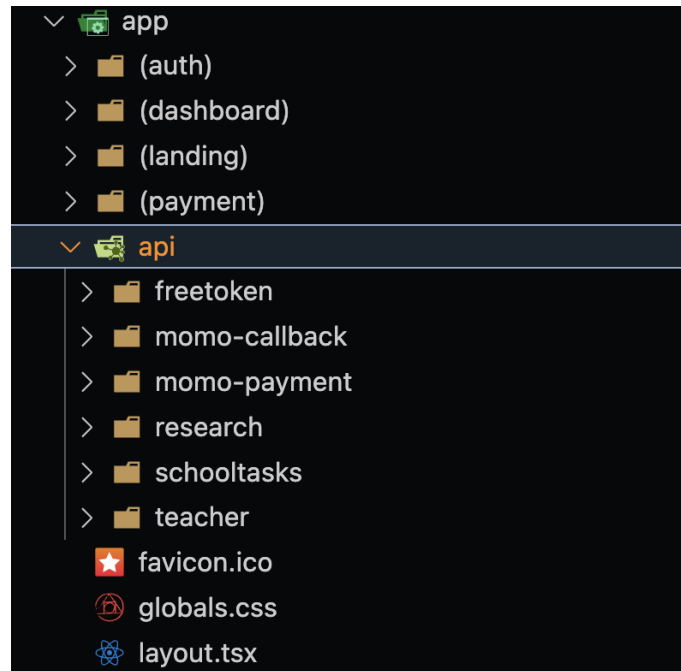


Figure 4.10: API routes

- **Handling Route Methods**: In Next js, each route has functions which define the methods. There we can handle the route.



Figure 4.11: Route Post Method Handle

- **Implementing Open AI request**: On the post request we can initial the API from the Open AI api. To initialize that we need an api key that was specified on the .env file.

```
const response = await openAiClient.chat.completions.create({
  model: "gpt-3.5-turbo",
  messages: [
    instructionMessage,
    greetingMessage,
    researchMessage,
    ...prompt,
  ],
});
```

Figure 4.12: Open AI API implementation with GPT-3.5 Turbo

6. **Database Integration**: I set up a MySQL database on a VPS and integrated it with the Prisma ORM to help handle data efficiently. Conversations and the client's subscription details were easily archived and easily retrieved using this configuration. The creation of the database was aimed at the possibility of its use by different types of users as well as the device of an effective data search and input mechanism for the application.

7. **Payment Gateway Implementation**: The decision to integrate the MoMo MTN payment gateway was also a learning experience because it was something I had never used before. After going through the documentation, I did my research to ensure that users were able to make payments based on the different token packages they signed up for. This integration enabled users to subscribe to the service for a particular package type of their choice and in different durations; daily, weekly, or monthly, and the tokens were in different quantities for each package.

## 4.4 Key Challenges

Working at Scholar Jimmy Library posed several challenges, primarily related to technical integrations and client interactions:

- **Payment Gateway Integration**: MoMo MTN was relatively new to me and required some time to learn how to incorporate it into the API into the application systematically. This demanded initial and regular attention to process security details and the transfer of digital assets between the API and user to guarantee a secure payment experience.

- **Language Barriers**: Sometimes, there was a language barrier with the client, who was located in a different country. Because of this, I employed the use of visual aids, including screenshots, and documented the specifications we discussed during our meetings to enhance clarity.

- **Workload and Deadlines**: Due to the pressure of working hours, especially before Friday, there was always the challenge of how to meet the organization's project demands while at the same time ensuring one gets adequate rest. Of course, there were instances when it was necessary to stay past the shift in order to ensure that the client's requirements and expectations were

met with sufficiently frequent updates. In so doing, I managed to understand the concept of time within the working environment and how priorities work.

## 4.5 Learning and Growth

A project known as Scholar Jimmy Library helped me enhance my technical experience and professional expertise to a great extent. I consolidated my knowledge of full-stack development by enabling frontend and backend work: Next.js, Flask, and Prisma ORM. Moreover, I got experience in project management by engaging in scrum meetings and client briefings, which showed me the value of effective communication and professional organization of work in computer software creation.

In conclusion, this internship at Planet X Inc. has been a vital addition to my skills in the field of software development as well as in my preparation for future Advanced Placement's of my education. It is always nice to know that one gets to work on projects that will definitely help improve the company's goals and objectives.

# Chapter 5

# Growth

## 5.1 Professional Growth

This internship at Planet X Inc. matters a lot because it helps me to make a difference between theory and what I have learned in college and practice. Employment of actual projects such as Scholar Jimmy Library has helped in developing agile workflows and working within deadlines as well as in cooperation on behalf of a working enterprise. While at Planet X Inc., the structure displayed helped me to learn punctuality, how to manage my time, and how to multitask. In the organization, I learned how various projects are divided into specific workable activities, which are known as scrum sessions and daily stand-up meetings. Also, engaging with clients and stakeholders assisted me in gaining a better understanding of how clients drive software development projects and how effectively all their requirements need to be captured and communicated. All these experiences have prepared me to work by my own and in collaboration with others and form a strong base for me in my future career, which should be related to software development.

## 5.2 Technical Growth

Throughout my internship, I had the opportunity to work with a variety of technologies, expanding my technical skill set in significant ways:

- **Next.js and Frontend Development**: I got to learn to use router hook and other features of Next.js, including routing, state management, among other things, and designing responsive UIs. Some of the important skills that I have developed include frontend development for which I have received enhancements through this experience to face tasks that may be challenging in as much as regarding UI.

- **Backend Development with Flask and OpenAI API**: Creating the backend with Flask acquainted me with the web frameworks of Python and allowed me to use REST to develop APIs and connect them to another service like OpenAI. The integration was important in building real-time and AI-based user interfaces, especially for the Scholar Jimmy Library project.

- **Database Management with MySQL and Prisma ORM**: Interacting with MySQL through Prisma ORM was an opportunity to practice creating a database and modeling data. I gained knowledge on how to present data to various users, an efficient way of using database queries in full-stack, and how to manage error-checking in the database.

- **Payment Gateway Integration**: I had to discover new APIs for the MoMo MTN payment gateway and integrate proper and secure payment transaction procedures. The added experience I gained in API integration and made me understand the basics of payment processing, which I had less knowledge about.management.

- **Project Management Tools**: Adopting ClickUp to manage my tasks introduced me to the use of project management tools for agile development. I discovered how to schedule work based on priority, monitor task completion, as well as how to deal with the team properly. Such understanding of project management has been very helpful when it comes to sustaining productivity while remaining on the right track with the team.

## 5.3 Personal Growth

The internship also played a role in the enhancement of my personal development. I built up my interpersonal skills by working with my colleagues and attending or being involved in client sessions. I was able to learn to communicate across different cultural and language barriers, as well as being able to complete tasks in a short amount of time.

- **Problem-Solving and Adaptability**: The particular projects, especially those where the time was limited, showed me lessons about how to establish an efficient problem-solving approach with consideration of possible changes. For instance, while using SerpAPI and while solving various technical difficulties as a task, I enhanced my problem-solving skills and learned how to search for a solution on my own.

- **Communication and Teamwork**: The ability to work with a team with open communication fostered my ability in communication. Everyone was open to sharing their learning and kind enough to help me out, and I was quickly able to understand the need for precise language. This experience made me understand how to formulate the right questions, how to put forward proposals, and how to critique.

## 5.4 Lessons Learned

This internship made a clear message that learning and development should be an ongoing activity. There is nothing that I came across that taught me that one can only practice and be so confident with an instrument, only for other challenges to crop up and new aspects to be discovered. Clearly, being able to respond to the individuals' needs and needs of a project in general and being able to receive critical comments were crucial here. Furthermore, the important focus on the importance of satisfying clients stipulated that alongside and in conjunction with professional knowledge and competency, a project requires empathy and attention to detail.

## 5.5 Future Aspirations

While at the company, I have gained all the necessary knowledge that can help me to further devote myself to the sphere of software development, with a key focus on full-stack development and artificial intelligence. In the future, I hope to progress

in my technical specialization in fields like machine learning acolytes and other technologies so that I can begin building more complicated and elastic solutions. I am also willing to go for any opportunities that involve clients and projects because it offers both uniqueness and accomplishment.

# Chapter 6

# Conclusion

The internship opportunity that I've undertaken at Planet X Inc. has been a marvelous part of my professional training as it made me achieve full-stack development, interact with clients directly, and work in an agile environment. Thus, I had the opportunity to work on stimulating projects during the last six months, predominantly the Scholar Jimmy Library, that let me use various technologies and deal with the actual problems. I have also been able to acquire technical prowess in Next.js, Flask, and MYSQL onsite, strengthen my problem-solving competence, and improve on flexibility and overall positive attributes of professionalism expected in software development.

It had a good working environment with plenty of opportunities to learn at Planet X Inc.; no one discouraged any questions that I might have and even where I was employed, team members did not mind helping out. The working environment allowed me to slave with professionals and academicians and showed me that time management, proper coordination, and planning go hand and hand. Moreover, my concern with customer satisfaction and quality work taught me the purpose of the company and made me want to provide the best solutions in an organization.

Reviewing my internship let me conclude that this internship has provided me with a significant number of skills and experiences that I will need in my future career in software development. I want to express my appreciation to my supervisor, Arif Shakil for providing me guidance while working with such colleagues that helped to grow personally and professionally. For this reason, and I wish to extend this platform and grow as a software engineer, taking with me the knowledge gained at Planet X Inc. to address new challenges in the technological sector.

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