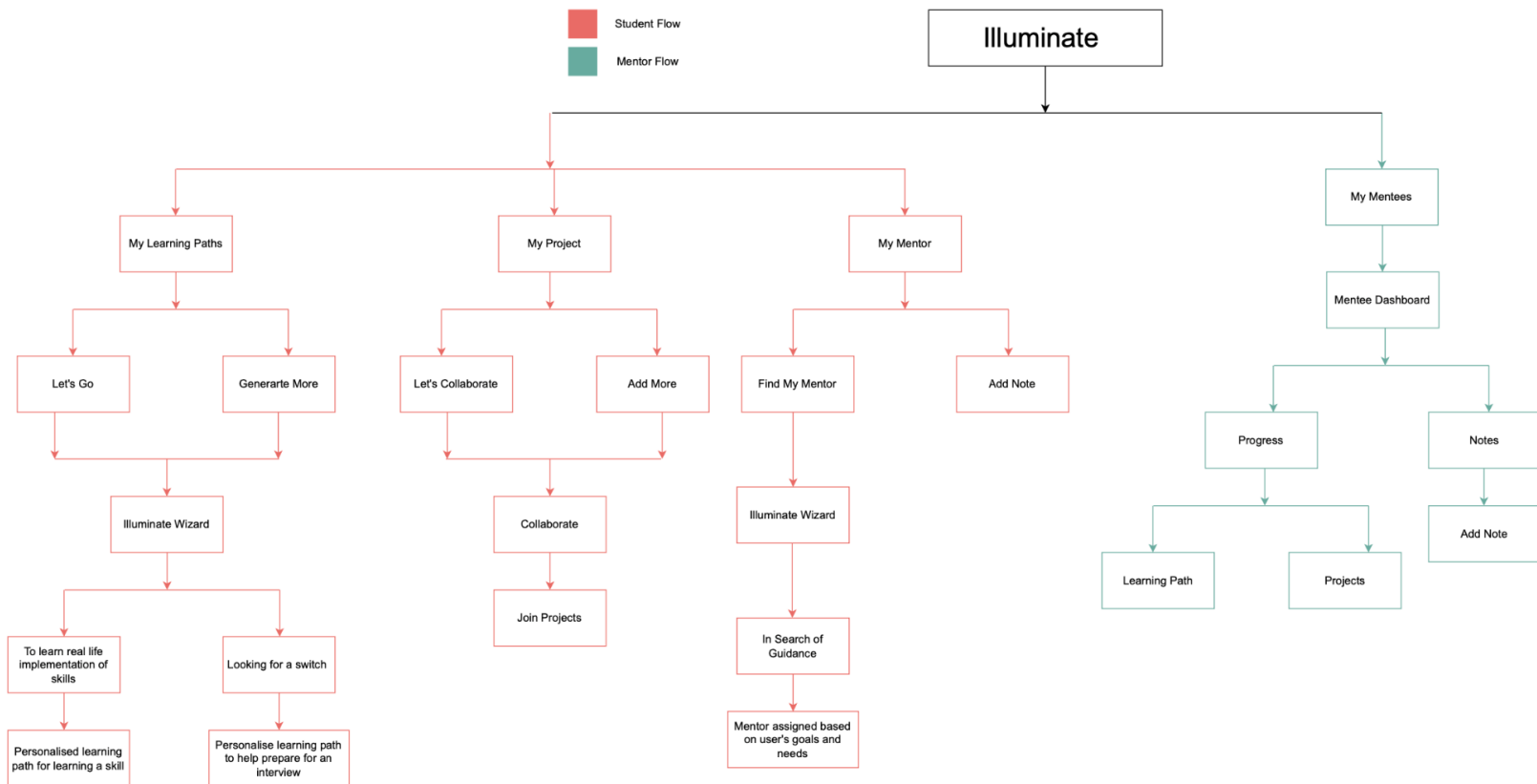


## Brief Product Description

Welcome to Illuminate, the future of e-learning in software engineering. In today's rapidly evolving tech world, software engineers often face challenges in skill development, mentorship, and practical application. That's where Illuminate steps in. Imagine a platform where you can access cutting-edge courses tailored to your career goals and receive one-on-one mentorship from industry experts. Illuminate offers a unique blend of personalized learning paths, collaborative project opportunities, and continuous professional guidance. Whether you're starting out or looking to advance in your career, our platform caters to every step of your journey, transforming how you learn, grow, and succeed in the tech industry. Join Illuminate and bring your career under the spotlight.

## Product functionalities

Illuminate has two major users, students and mentors. We decided to create two different interface, representing each user as their requirements and goals from the website are unique. The image below shows the information architecture of Illuminate that helps understand the functionalities and the navigation of the website. The red flow represents all the functionalities used by students and the green flow represents the same for the mentors. Before jumping into individual flows, we will be listing the functionalities for our product so it becomes easier to follow the flows.

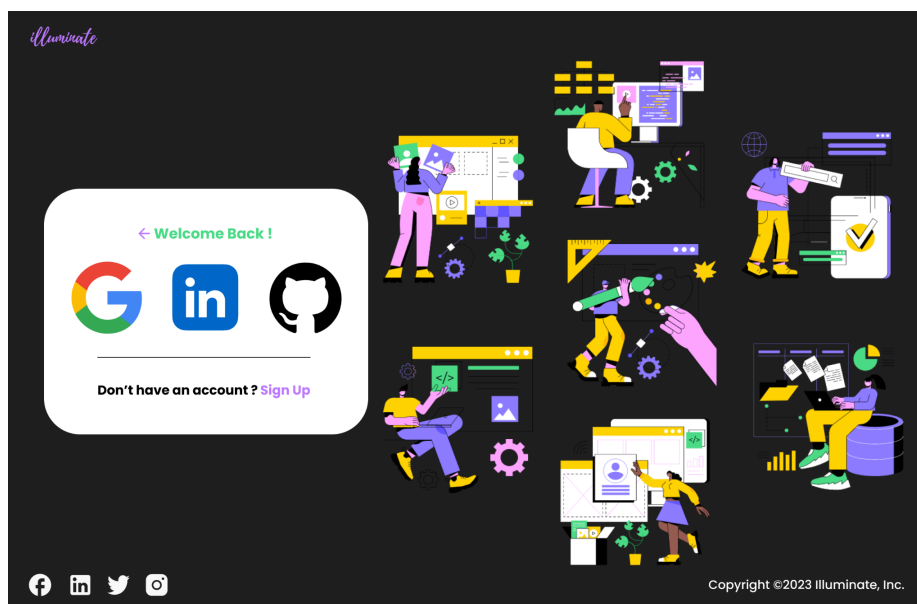
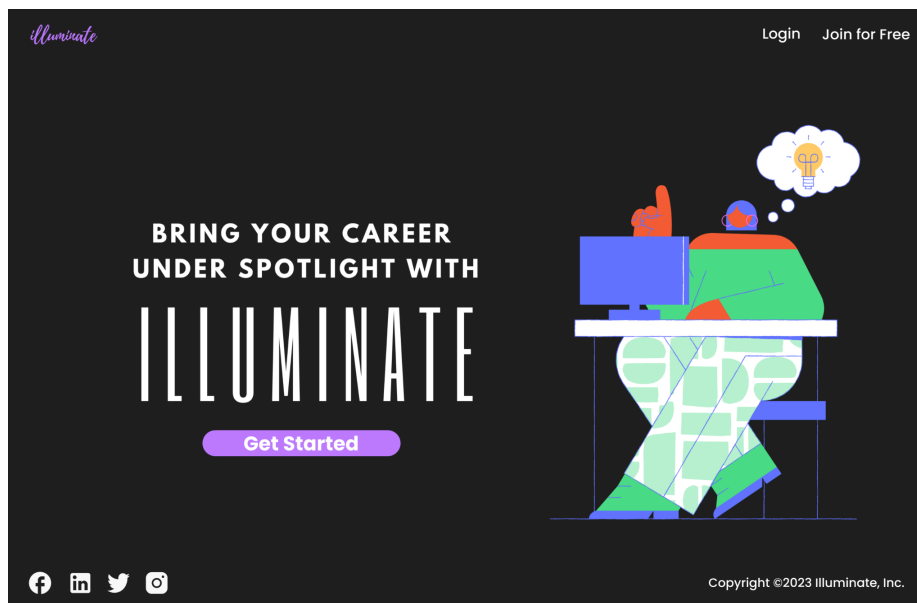


## Functionalities

- Personalized learning paths generated as per users need enlisting free courses
- Potential Project topics and problem statements to work on
- Collaboration with skilled professionals
- Helps build your profile for your industry
- Mentor guidance and support throughout your journey and beyond.

## Student Flow:

Once the user comes on the landing page, they have an option for login-in or sign-up and they can do it through Google-OAuth.



After signing up the user will see the dashboard which is divided into three sections. My personalised path , my project and my mentor. Each section has the information about what they are and how the user can use these functionalities. These three sections are showed below.

The screenshot shows a dark-themed dashboard for 'Illuminate'. At the top left is the 'Illuminate' logo. At the top right are links for 'Collaboration' and 'My Mentor' next to a profile icon. The main heading is 'Hi, Welcome to Illuminate!'. Below this are three navigation tabs: 'My Learning Paths', 'My Projects', and 'My Mentor'. The 'My Learning Paths' tab is active. The main content area is titled 'Get your Personalized Path' and includes a sub-heading: 'All our Personalized Paths are carefully curated to help you achieve a specific learning goal. Find the perfect path for your needs here.' A purple 'Let's go!' button is centered below the text. Three illustrations follow: 1) A person sitting on a laptop with code symbols and gears. 2) A hand pointing at a tablet displaying a document with a gear icon. 3) A person sitting at a desk with a laptop, a calendar, and a lightbulb. Below these is the section 'How it works?' with three steps: 1) 'Share your learning objectives' with an illustration of a person at a checklist. 2) 'Get a personalized Path' with an illustration of a person at a checklist with a gear. 3) 'Start learning' with an illustration of a person at a desk with a laptop and a lightbulb. At the bottom left are social media icons for Facebook, LinkedIn, Twitter, and Instagram. At the bottom right is the copyright notice: 'Copyright ©2023 Illuminate, Inc.'

Illuminate

Collaboration My Mentor




# Hi, Welcome to Illuminate!

My Learning Paths My Projects My Mentor


## Get your Personalized Path

All our Personalized Paths are carefully curated to help you achieve a specific learning goal. Find the perfect path for your needs here.

Let's go!




### How it works?




**Share your learning objectives**

Answer a few questions to share your learning goals and preferences.



**Get a personalized Path**

Based on your responses, we recommend a personalized path tailor-made to achieve your learning objectives.



**Start learning**

Make the most out of the Illuminate platform and achieve your learning goals.

Facebook LinkedIn Twitter Instagram

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# Hi,Welcome to Illuminate!

My Learning Paths

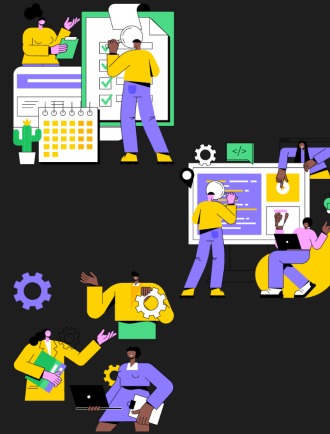
My Projects

My Mentor

## Collaboration

The best way to learn is by doing and working with peers. Get hands-on with real world projects and experience what it is like working with a team.

- ✓ Search for skills you want to implement
- ✓ Analyze the tasks for
- ✓ Join the project that matches best to your expectations



Let's Collaborate!



# Hi,Welcome to Illuminate!

My Learning Paths

My Projects

My Mentor

## In Search of Guidance?

We can help you get the help you need to kick-start your career. Be it deciding where to start, what would be the next step or how to tackle challenge. Your mentor can help you get through it all.

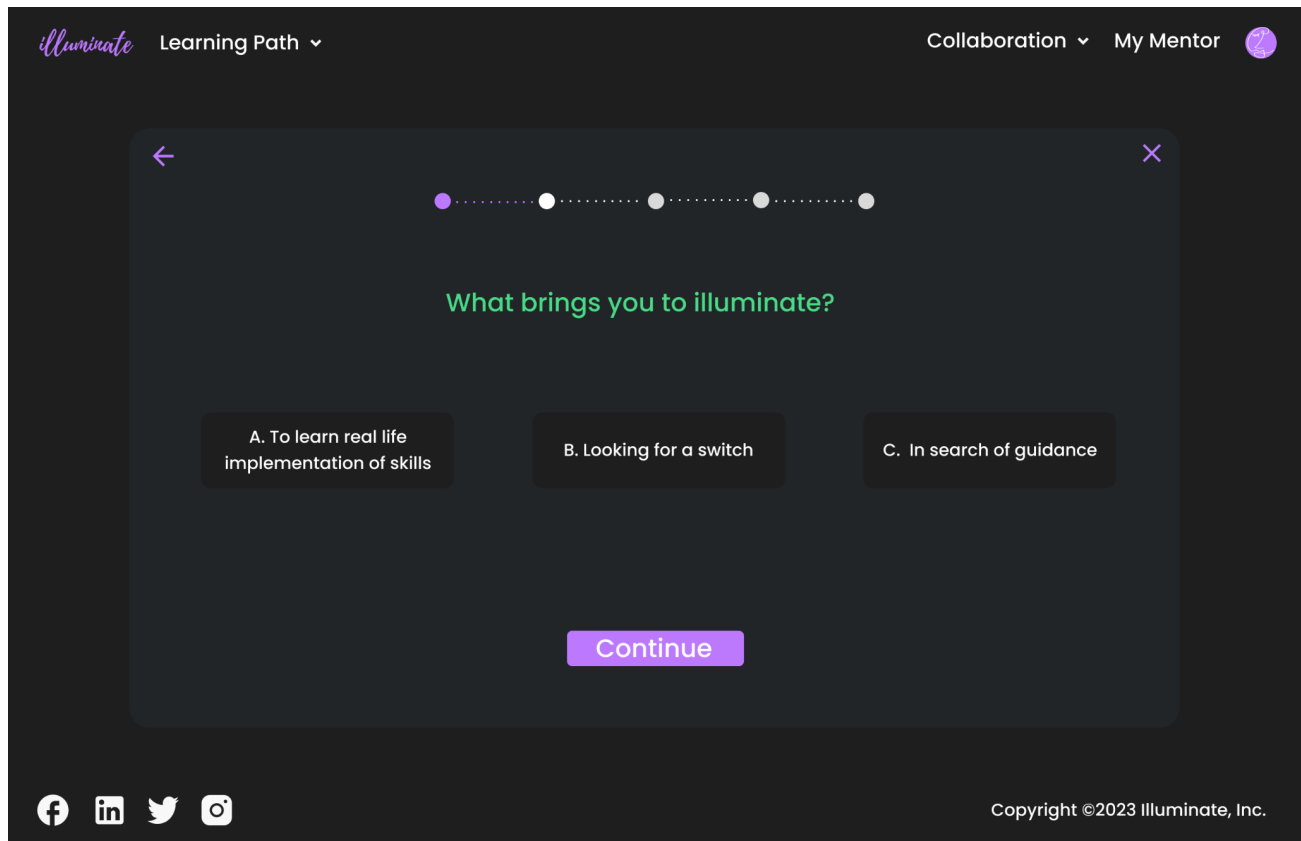


Find your Mentor



Once the user clicks on the ‘Lets go’ and ‘Find my mentor’ button on my learning paths and my mentor respectively, it opens the Illuminate wizard where users can select the reason for coming to illuminate and curating their journeys.

When the user clicks on option A ‘ To learn real life implementation of skills’ or option B ‘looking for a switch’, they are asked a few more questions resulting a personalised learning path catering to their their goals and needs. For option A, the path focuses on learning new skills and for option B the path is curated to help them prepared for an interview.



The images below show the paths generated for options A and B respectively. The first path is for learning essentials of Spring and Spring boot and the second is for Python entry level software engineer interview prep.



## Spring and Spring Boot Essentials

Learn the essentials of Spring and Spring Boot

### Learning Objectives

- Understand the basic concepts of the Spring Framework.
- Learn about the Spring architecture.
- Master the concepts of beans, bean scope, bean lifecycle, contexts, and dependency injection framework.
- Learn how Spring searches for beans found in different packages.
- Learn about Spring Boot.
- Learn to create a REST controller using Spring Boot.



🕒 28 hours 📖 122 lessons 📝 11 Quizzes 🏆 24 Challenges

**Begin!**



### Module 1 - Java Basics

1.1 : Getting Started with Java!
1.2 : Variables & User Input
1.3 : Simple Maths & Logic
1.4 : Strings and String Processing
1.5 : Conditional Statements
1.6 : Loops
1.7 : Methods
1.8 : Arrays
1.9 : Classes and Inheritance
1.10 : Generics
1.11 : ArrayLists



### Module 2 - Spring Basics

2.1 : Introduction
2.2 : Spring Basics



### Module 3 - Spring Boots Essentials



### Module 4 - Spring Boot

**Begin!**



## Python Entry Level Software Engineer



Interview Preparation

### Learning Objectives

- Brush up on basics of Python.
- Revisit basic data structures in Python.
- Revisit the algorithms and practice measuring Time Complexity.
- Revisit the different types of sorting algorithms.
- Revisits lists and how to use them in real world scenarios.



🕒 38 hours 📖 147 lessons 📝 39 Quizzes 📁 34 Challenges 🎮 146 Playgrounds

[Begin!](#)



### Module 1 - Lists

Learn about Python list, its coding challenges, and solutions.



### Module 2 - Linked Lists

Learn about the implementation of linked lists and hands-on practice coding challenges



### Module 3 - Stacks and Queues

Learn about data structures in Python, stack and queue, its implementation, and hands-on practice challenges.



### Module 4 - Introduction to Complexity Measures

Learn about the measuring time complexity of any algorithm using Asymptotic and Big O notation.



### Module 5 - Sorting and Searching

Learn how to sort any array using famous sorting algorithms like Bubble and Insertion sort.



### Module 6 - Two Pointer Algorithms

The fast and slow pointers pattern uses two pointers to traverse an iterable data structure at different speeds.



### Module 7 - Fast and Slow Pointers

The two heaps pattern uses either two min-heaps, two max-heaps, or a min-heap and a max-heap.

[Begin!](#)

Once these paths are generated and user goes again on My learning paths, they would be able to see the paths they curated and also have an option of adding more paths.

illuminate

Collaboration My Mentor

## Welcome Back, Mahesh !

My Learning Paths My Projects My Mentor

### Your Personalized Paths

Generate More

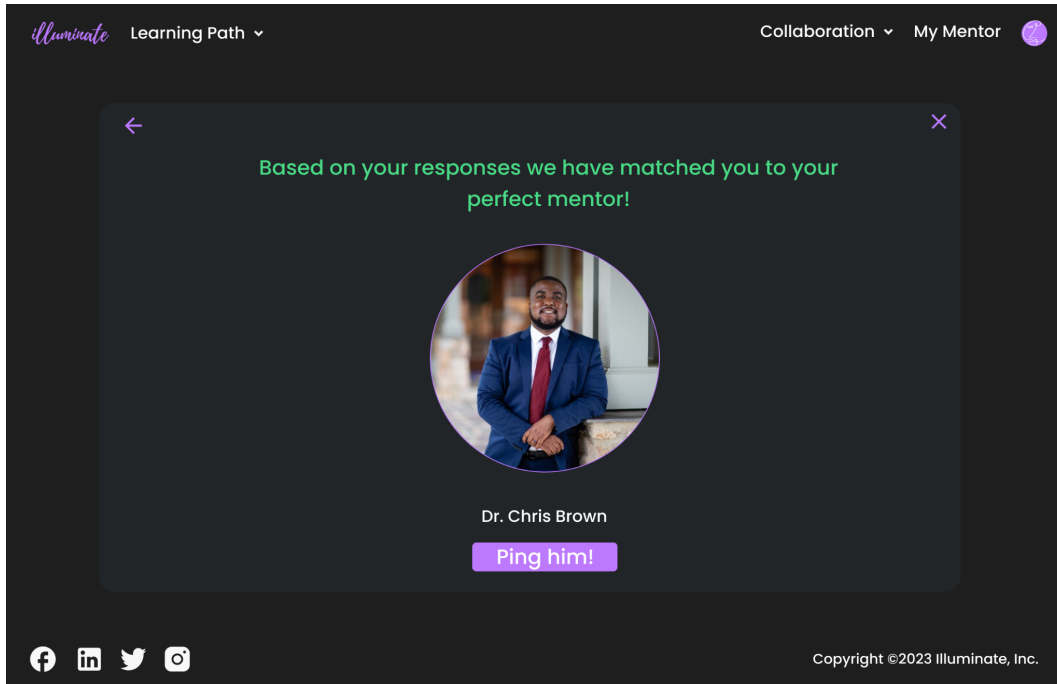
Created on 17 Oct, 2023  
**Spring and Spring Boot Essentials**  
4 Modules [Preview >](#)

Created on 18 Oct, 2023  
**Python Entry level Software Engineer Interview Preparation**  
7 Modules [Preview >](#)

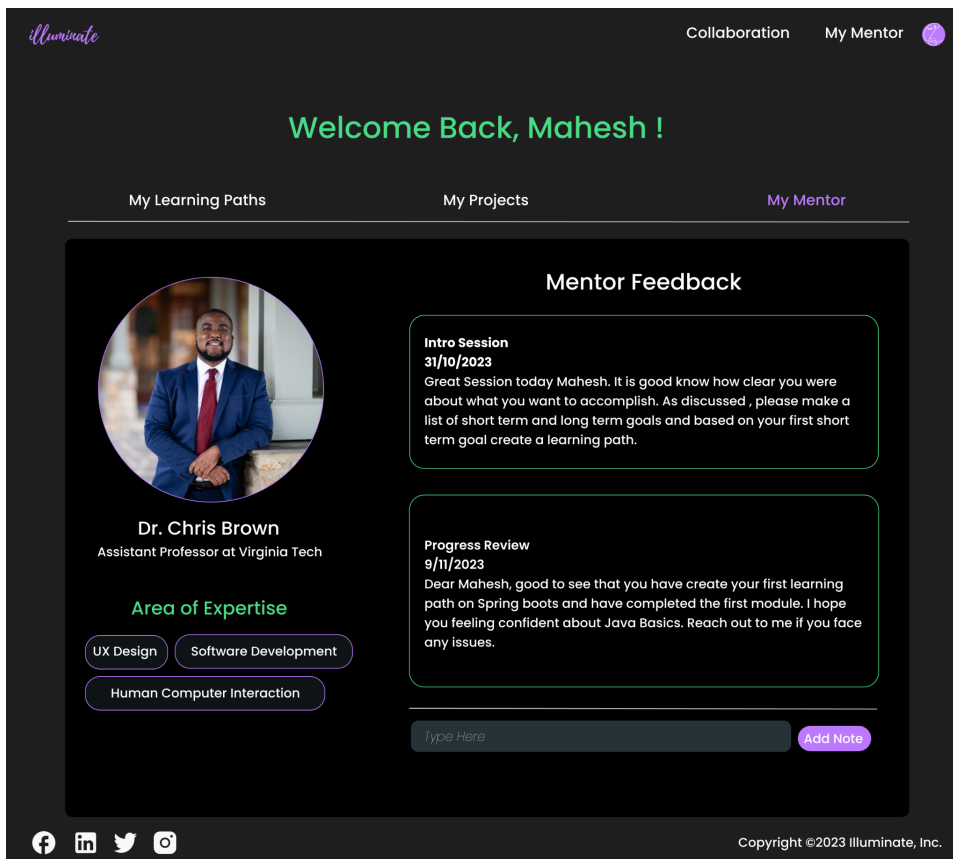
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In the my mentor page, the user would see the same wizard but would be prompted to click on option C. In search of guidance. The user would be asked a set of questions like the industries they have worked with, their area of expertise, their experience level and list of needs and goals. Based on these responses the user is assigned a mentor.



After the mentor is assigned and the user clicks on My mentor page, it shows the information about the mentor and gives them an option to send a note to the mentor. They can also see any notes sent by the mentor on the same page.



On the my projects page, the user has the information about what collaboration is and once they click on 'Lets collaborate', it takes the user to a page where they can search for projects based on any topic of interest or skill. After searching, they have an option to view each project. Once they open the project, it gives them all the information about the project and tasks it consists. If the user wants to join the project, they can simply click on join project option and become a part of it. When the user clicks on my project tab again, they would be able to see the projects they are enrolled in and the option to add more projects.

## Web Crawling in JavaScript Using Cheerio

In this project, we will crawl a real-world website using features provided by the Cheerio library in Node.js. We will learn to automatically extract URLs from link HTML elements across an entire site. Lastly, we will export the collected data to CSV.



### Prerequisites

- Basic understanding of HTTP and the client/server architecture
- Basic understanding of JavaScript
- Basic understanding of Node.js

### You will learn to:

- Understand the fundamentals of crawling a site.
- Build an automated software tool that can crawl an entire site.
- Populate a set of URLs discovered in the target site.
- Export the discovered URLs to CSV.

### Skills

HTML Elements

Data Collection

Web Scrapping

### Technologies

HTML

Node.js

Cheerio

Java Script

Project Author(s) - Mathew Long

### Project Description

The Cheerio library in Node.js provides a powerful API for parsing HTML documents. It can easily traverse and manipulate HTML structures, making it an ideal choice for data collection and web crawling.

In this project, we will build a Node script to crawl an entire site with Cheerio and its capabilities. We will download one page of a target site with the Node.js Fetch API. Next, we will use Cheerio's functions to select HTML link elements using CSS selectors, extract their URLs, and repeat this procedure for other site URLs until all pages have been discovered.

Finally, we will take advantage of the Node I/O capabilities to export the scraped data in human-readable CSV format.

### Project Tasks

#### 1 Initial Setup

Task 0: Get Started

#### 2 Implement Link Discovery Logic

Task 1: Navigate to a Web Page

Task 2: Select All Link HTML Elements

Task 3: Extract URLs from the Links

Task 4: Filter Out Undesired URLs

Task 5: Encapsulate the Link Discovery Logic in a Function

#### 3 Crawl the Entire Site

Task 6: Initialize Data Structures for Web Crawling

Task 7: Loop through the Pages to Crawl

Task 8: Create a CSV File from the Pages Discovered

Congratulations!

[Join Project](#)



## Welcome Back, Mahesh !

[My Learning Paths](#)[My Projects](#)[My Mentor](#)

Project

Web Crawling in JavaScript  
Using Cheerio

10 Tasks

Resume >

The project card features a dark blue background with a grid pattern. At the top, there are three icons: a browser window with a bug, a 'C' in a square (Cheerio), and 'JS' in a square (JavaScript). Dashed lines connect these icons. Below the icons, the text 'Project' is followed by the project title 'Web Crawling in JavaScript Using Cheerio' in green. Underneath, it says '10 Tasks' and a 'Resume >' button.

[Add Projects](#)

### Mentor Flow:

Once the mentor logs in, the home page is the list of students assigned to them, where they also have an option for searching the students. When they click on individual student, it shows mentor a dashboard for that student that consists two sub tabs - progress and notes. Under progress the mentor can see all the learning paths and projects the student is enrolled in and how much progress they have made in each of them. Under notes section, the mentor can see the notes sent by the student and can also send them.

# Hello, Dr. Brown !

It is a beautiful day to impact lives.

## My Mentees

Search Mentees



**Ujjwal Maheshwari**

Recent Graduate | Virginia Tech



**Rose Boyle**

Recent Graduate | Virginia Tech



**Amy Wanderblit**

Recent Graduate | Virginia Tech



**Brian Bogert**

Recent Graduate | Virginia Tech



**Mathew Shaw**

Recent Graduate | Virginia Tech



**Rohan Vijay**

Recent Graduate | Virginia Tech

# Ujjwal Maheshwari's Dashboard

Progress

Notes

## Mahesh's Learning Path



Created on 17 Oct, 2023

### Spring and Spring Boot Essentials

4 Modules

[View >](#)



Created on 18 Oct, 2023

### Python Entry level Software Engineer Interview Preparation

7 Modules

[View >](#)

## Mahesh's Projects



Project

### Web Crawling in JavaScript Using Cheerio

10 Tasks

[View >](#)

## Mahesh Maddhuru's Dashboard

Progress

Notes

### Intro Session

31/10/2023

Great Session today Mahesh. It is good know how clear you were about what you want to accomplish. As discussed , please make a list of short term and long term goals and based on your first short term goal create a learning path.

### Progress Review

9/11/2023

Dear Mahesh, good to see that you have create your first learning path on Spring boots and have completed the first module. I hope you feeling confident about Java Basics. Reach out to me if you face any issues.

Type Here

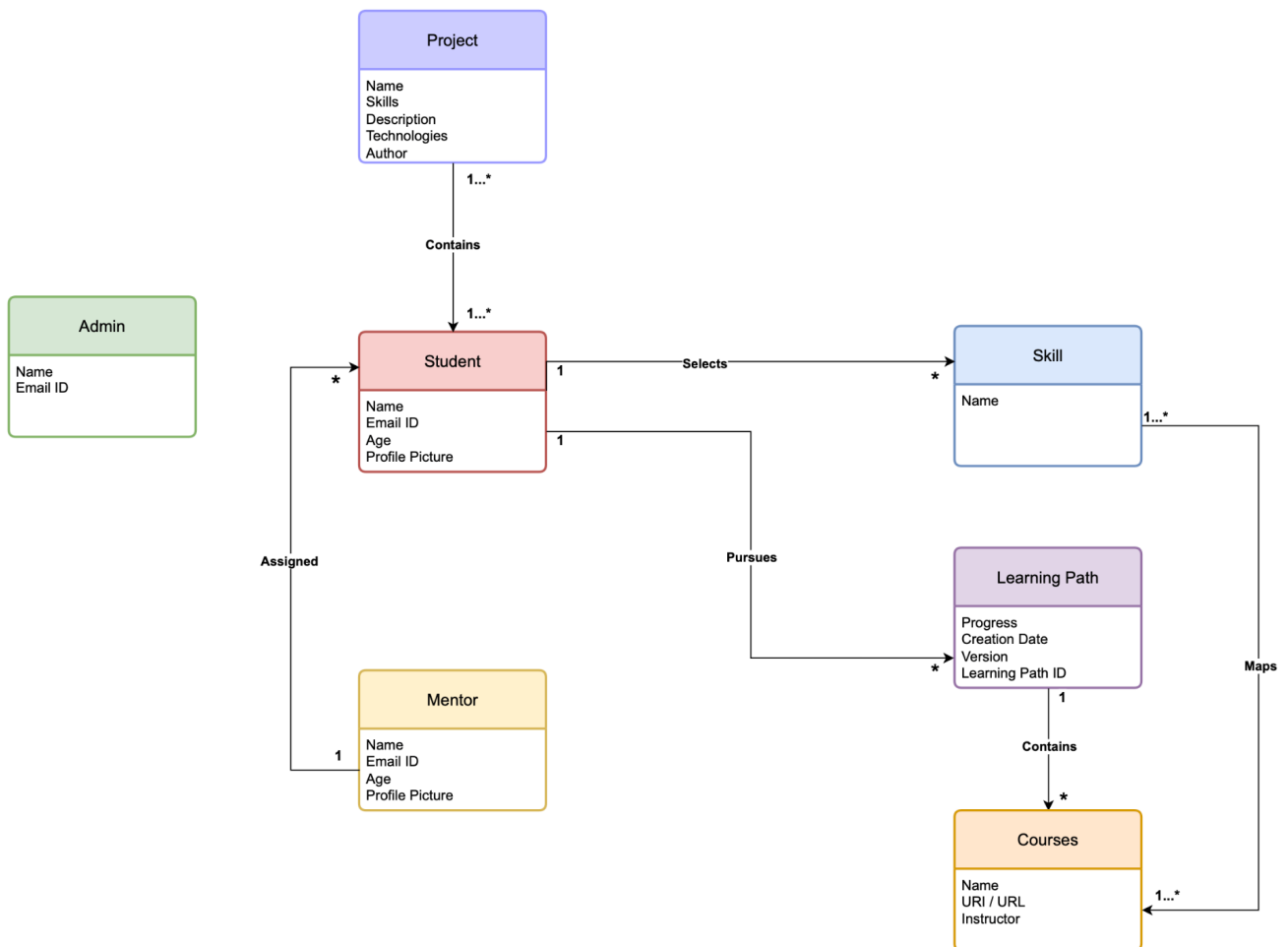
Add Note



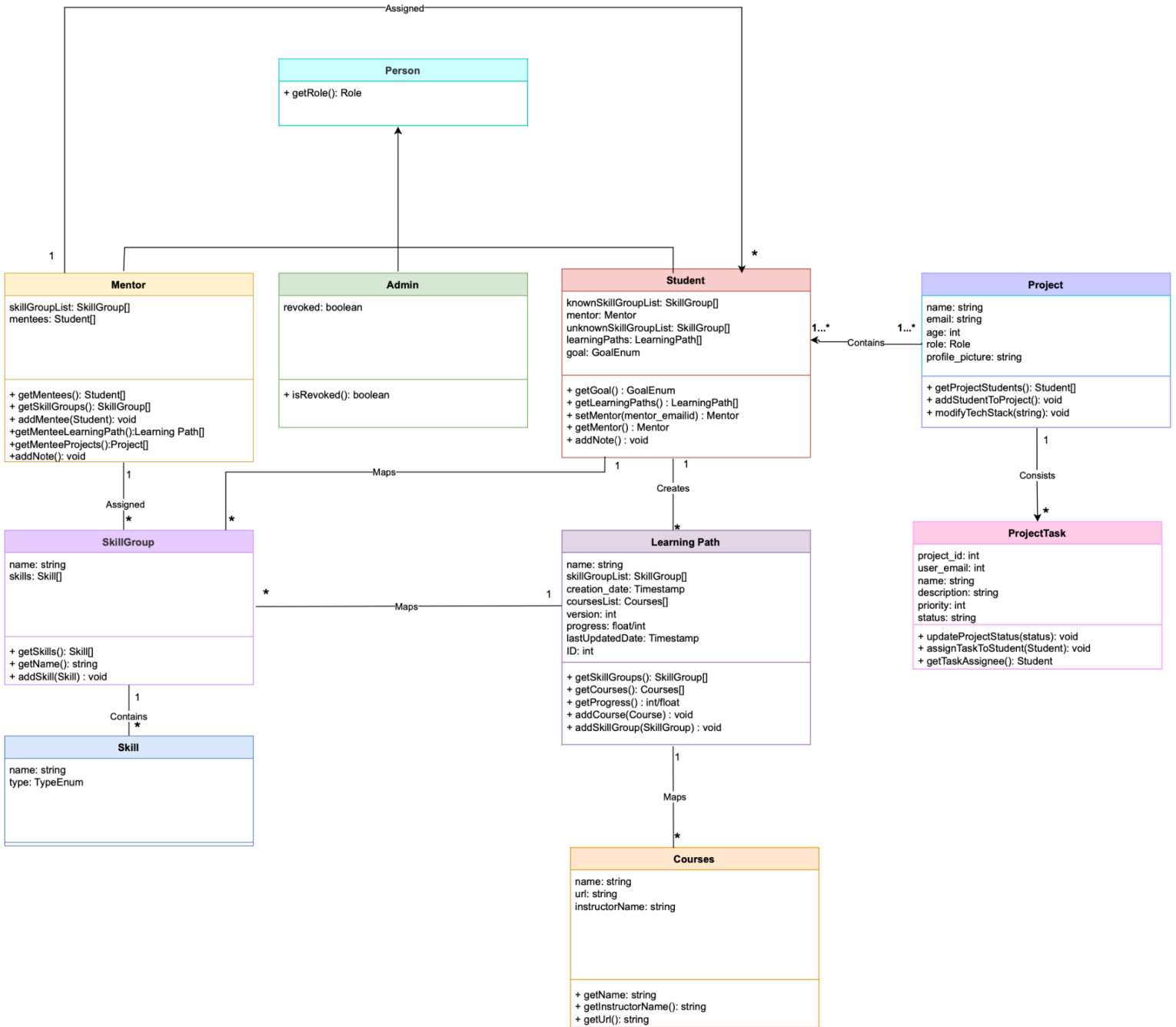
# Design

We designed domain model for the project showing all the domain concepts, their associations and attributes. We showed concepts such as Admin, mentor, students, projects, learning paths, skills and courses. Our domain model shows associations among all these concepts and their attributes. Further we designed interaction diagrams, a mix of sequence and collaboration diagrams by applying GRASP patterns, showing how each class interacts with the other. In our Design Class Diagram we showed all our software classes, their associations, attributes, and methods.

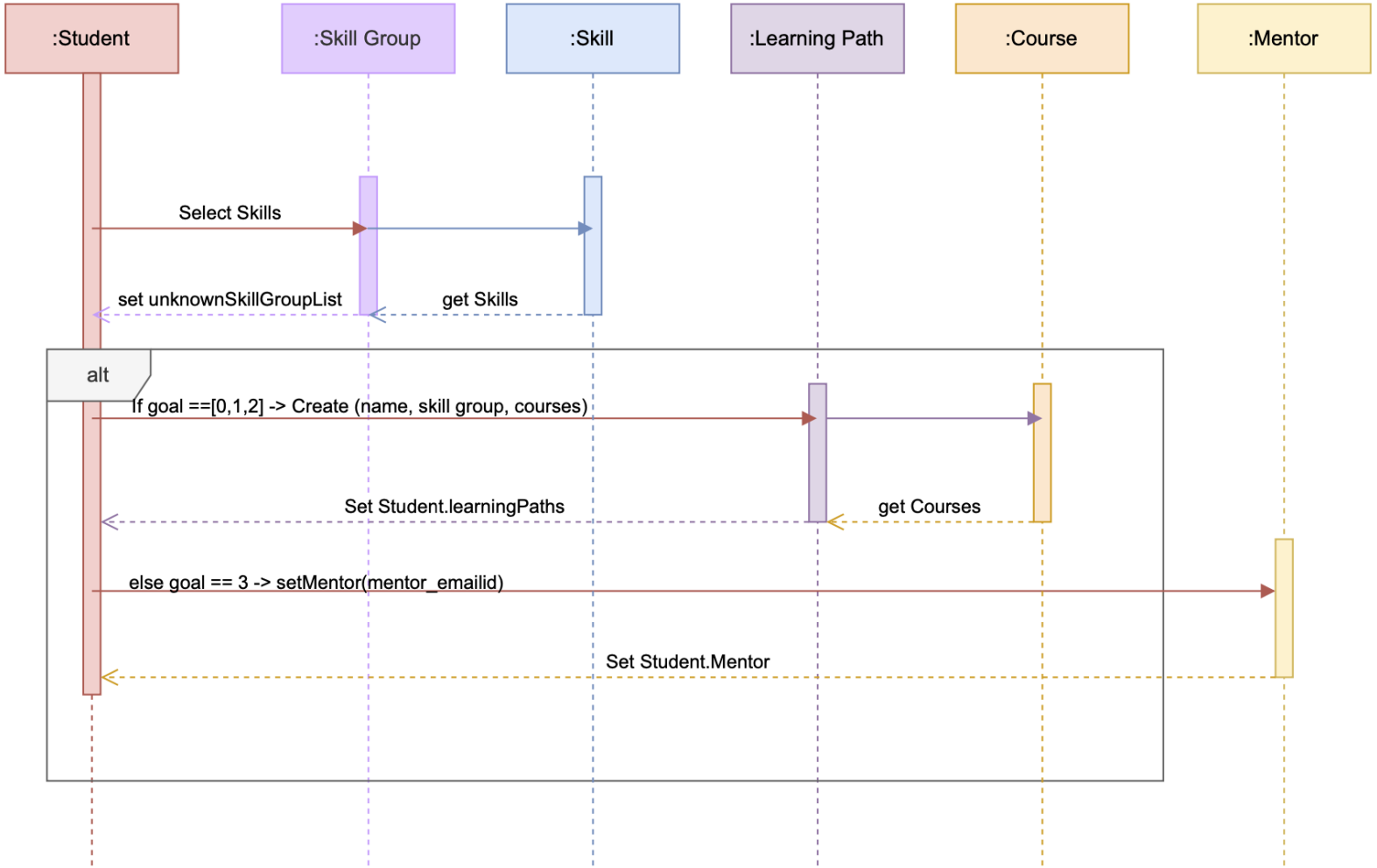
## Domain Model

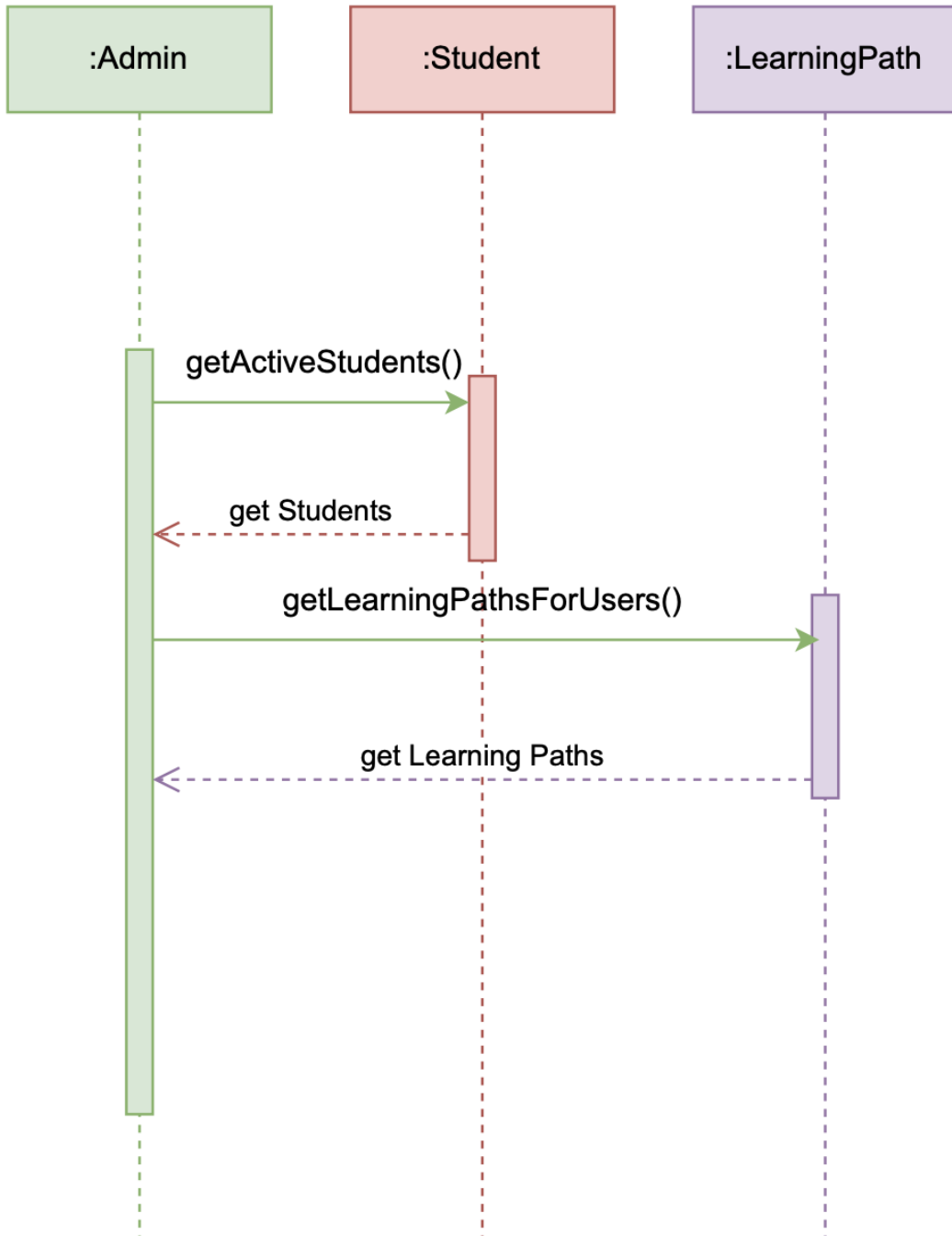


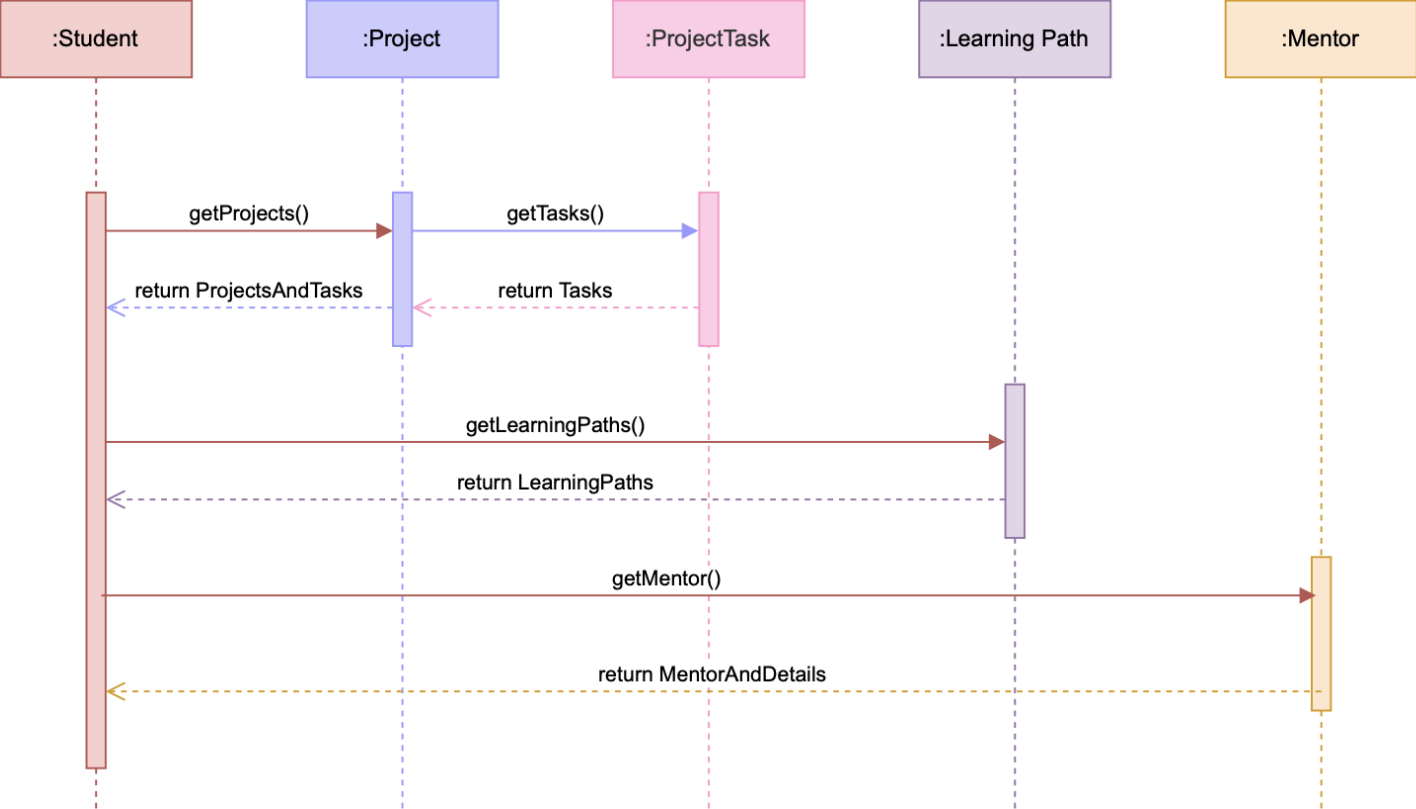
# Design Class Diagram

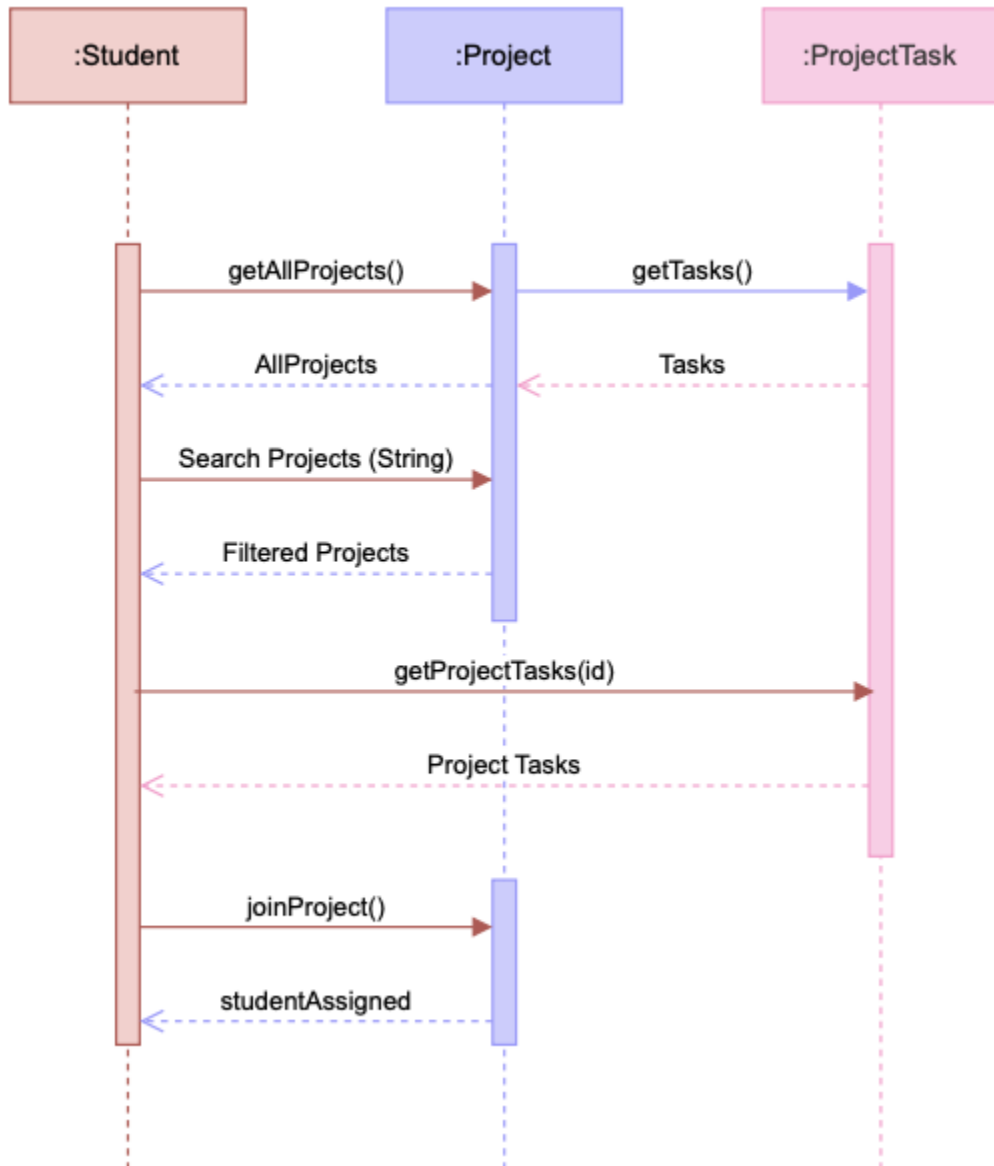


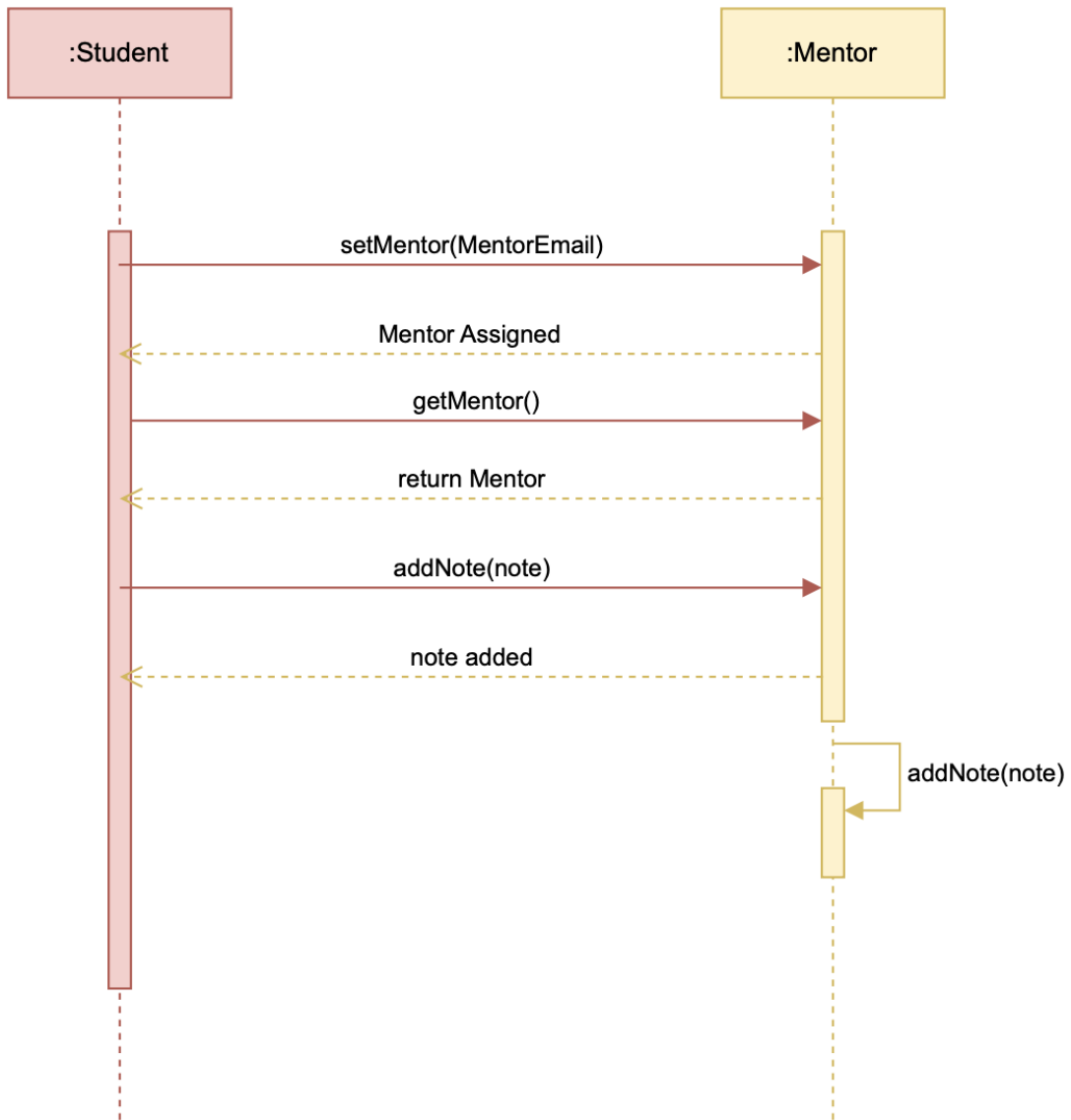
# Interaction Diagrams

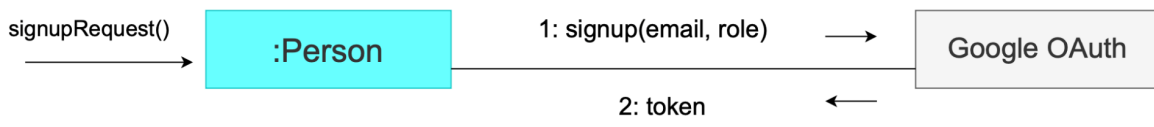
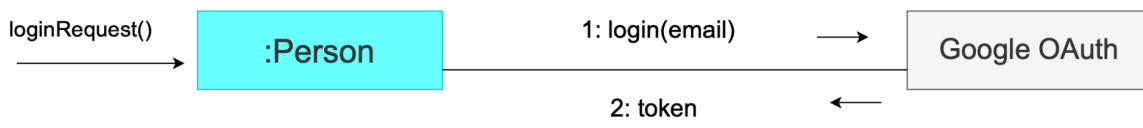
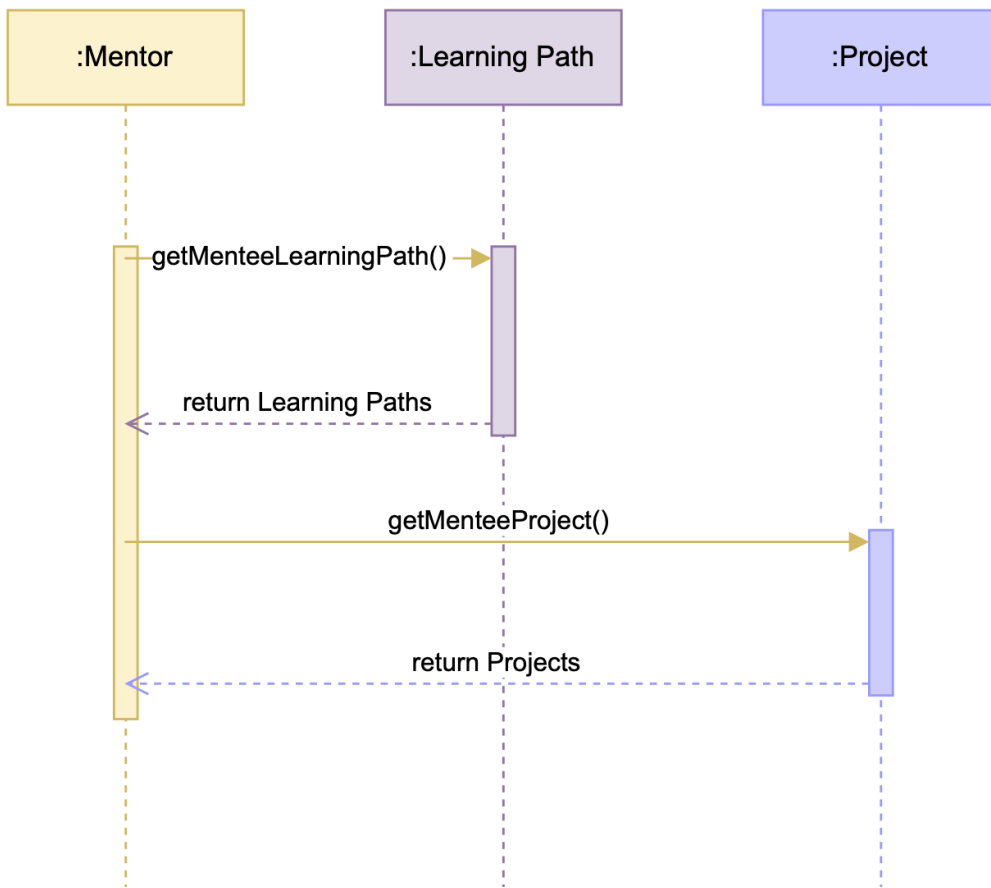


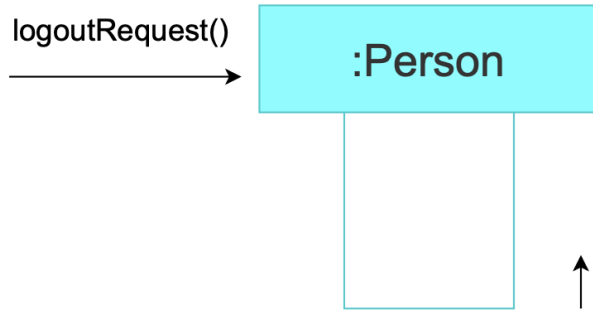




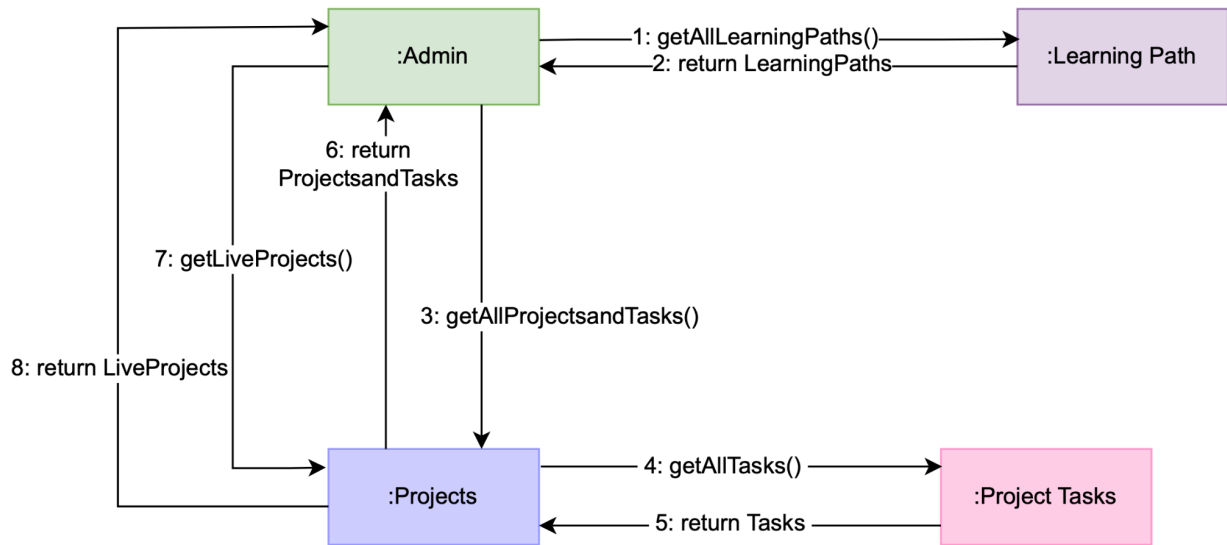


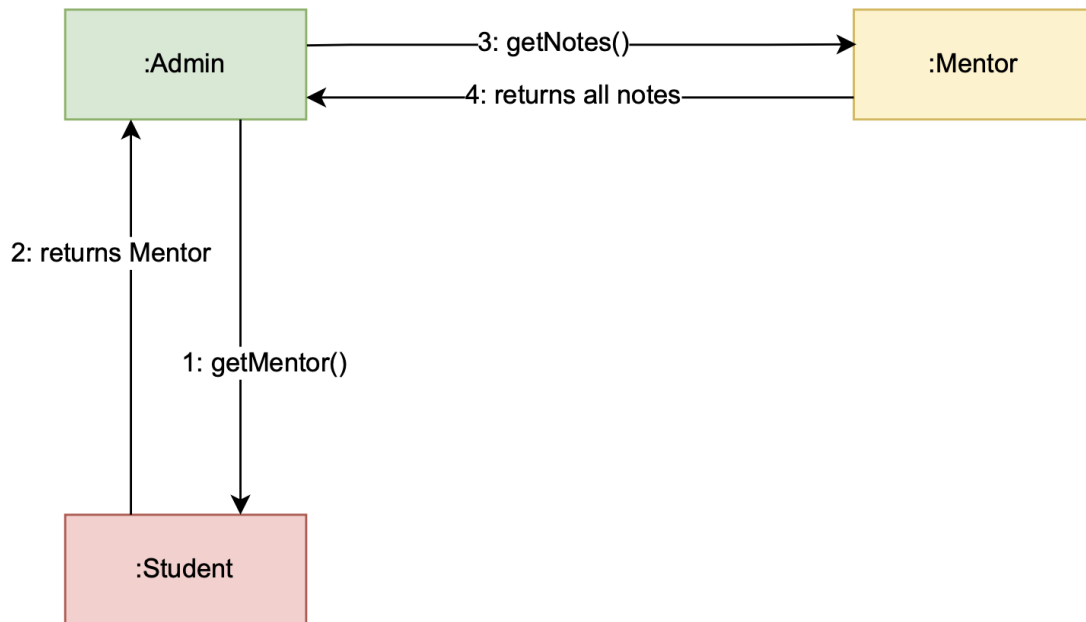






1: deleteUserToken(token)





## Technologies

- FastAPI (v0.104.0)
- Postgres DB
- VueJS (v3.2.0)

## Server-side

We have used FastAPI as our Python backend. FastAPI is a modern, fast (as the name suggests), web framework for building APIs with Python 3.7+ based on standard Python-type hints. We picked Python for two main reasons-

- Speed of development - Python is a relatively easy language to pick up for someone with a background in Computer Science. We needed to develop and change things fast through each sprint.
- Rapid deployment and testing - The Python development environment is very flexible in deployment and allows us to collaborate easily on local networks. We were able to test our changes immediately by starting a local server. The developer working on the client side could quickly connect and test. This process is easy with Python because FastAPI allows us to define CORS policies, authentication, and DB models easily.

We created APIs in Python, querying from the database and inserting items using an ORM. It allows us to model our database design in Python and then easily interact with the data in Python classes and attributes.

For our database, we decided on Postgres DB. Starting from our domain and class model, we replicated the tables in the DB, creating the related connections and keys where relevant.

For testing purposes, we created a local Postgres server instance where the server was benignly executed. The server also creates the tables the first time they are executed if the database does not exist.

FastAPI also inserts some mock data on startup and allows us to test with our chosen development users.

## **Client-side**

For our client-side framework, we chose VueJS 3. We decided on this framework because it was similar to standard HTML and the normal development process. It was something we all were familiar with and were able to start developing fast. VueJS gives us the following advantages:

- Declarative Rendering:
  - Vue.js uses a declarative approach to define the UI. This makes the code more readable and easier to understand. With Vue.js, you describe "what" you want to achieve, and the framework takes care of the "how", abstracting away many of the complexities associated with managing the DOM.
- Detailed Documentation:
  - Vue.js has extensive and well-documented guides and documentation. This makes it easy for developers to get started, learn the framework, and find solutions to common problems. The documentation is clear, concise, and includes examples, making it a valuable resource for beginners and experienced developers.

## **Google OAuth**

We used the node package “vue3-google-login” to integrate our application with Google OAuth sign-in.

The client side first authenticates with Google API and obtains a token on successful login. It then uses this token on subsequent communications with the server.

The server validates this token using middleware, extracts the user information, and uses it for queries into the database.

## Competitive Analysis - How is our product different from other similar products?

Key Functionalities	Udemy	Coursera	Skillshare	Unacademy	Edx	Udacity	LinkedIn	FreeCodeCamp
Free Courses and Resources	✓	✓	✓	✓	✗	✗	✗	✓
One on One Mentoring	✗	✗	✗	✗	✗	✗	✗	✗
24x 7 Chat support	✓	✓	✓	✓	✓	✓	✓	✗
Project Ideas and Challenges	✗	✗	✗	✗	✗	✗	✗	✓
Project Collaboration	✗	✗	✗	✗	✗	✗	✗	✗
Jobs	✗	✗	✗	✗	✗	✗	✓	✗

Figure 1. Competitive Analysis of Related E-learning Apps

Based on the concept of Illuminate, we listed eight applications that share a similar core idea with our product, i.e., a learning platform for a target audience. We compared these websites based on six critical functionalities designed for Illuminate. The features are as follows: free courses and resources, one-on-one mentoring, 24/7 chat support, project ideas and challenges, project collaboration, and jobs.

We aim to have links to free courses, resources, and courses uploaded directly to our platform as a later functionality. Furthermore, we want to give the user access to one-on-one mentoring where they can connect to a mentor through different means (messages, emails, chats, calendar appointments, etc.) and 24/7 chat support. In addition, we aim to provide the user with a means to collaborate on projects with others and pitch their ideas or projects they're working on. Lastly, we aim to show job listings related to the skills or positions the user shows interest in.

Our analysis noted that none of the e-learning platforms have the means to show job listings in addition to courses. In addition, these e-learning platforms need to provide a specific platform dedicated to project collaboration. While LinkedIn Learning provides courses and job listings, it does not give free access to everyone. Moreover, while it does provide a way for users to collaborate, the process is more streamlined than we aim to make ours. As a general observation from our own experience and competitive analysis in the tech industry, many tools are available for different aspects of personal and professional growth, but keeping track of a growing set of tools can stretch one thin. We noticed that not only does no platform encompass all features that we plan to implement, but also only implements up to two of the features we have listed because we see a lack of a congregation of these features, a "one-stop shop" for software.

# Retrospection

## What Went Well:

Our product development's backend design and coding phase proved significant success. Leveraging the expertise of experienced team members in this domain, we established a robust and efficient foundation. This solid backend infrastructure facilitated the smooth functioning of our software and ensured scalability for future enhancements. Effective communication within the team was another highlight of our project. Regular and transparent communication channels were established, fostering a collaborative environment. This played a pivotal role, especially during critical phases of the project when deadlines were imminent. As deadlines approached, the team rallied together, demonstrating a strong collective commitment to completing tasks on time. The cohesive teamwork ultimately enabled us to deliver a working product that met the core objectives of our project.

## What Did Not Go Well:

The initial planning phase of our project faced challenges, primarily stemming from an overly aggressive timeline and an underestimation of the complexity involved in building high-quality software. The need for more expertise in User Interface (UI) software coding became apparent, leading to delays and additional efforts in this area. One specific aspect that encountered unforeseen difficulties was the role management component, which consumed more time than initially anticipated. This revealed a gap in our understanding of the intricacies of this particular feature. Moving forward, these lessons learned during the planning and UI coding stages will serve as valuable insights for future projects, prompting a more realistic and comprehensive approach to project management and skill assessment.

## What We Learned:

Working on this project highlighted the importance of effective teamwork and communication, revealing their indispensable roles in overcoming challenges and achieving project objectives. The experience highlighted the need for meticulous attention during the design and planning phase, emphasizing the value of setting realistic expectations.

The hands-on involvement in UI coding significantly augmented our skill set, providing us with practical expertise in creating user-friendly interfaces. Simultaneously, the project sharpened our design skills, deepening our understanding of the intersection between aesthetics and usability.

In addition to technical proficiency, the project significantly contributed to our project management skills. Navigating tight deadlines and efficiently allocating resources honed our ability to prioritize tasks, ensuring the project remained on track. These lessons and acquired skills have provided us with a more comprehensive and adaptable approach to future projects.

### **What We Could Have Done Differently:**

In retrospect, several vital actions could have been taken to mitigate the challenges encountered during the development of the Illuminate e-learning platform. Firstly, dedicating more time to a thorough requirements analysis would have laid a robust foundation by clearly defining the project scope and expectations.

Effective communication channels, enforced through regular stand-ups and updates, facilitated early issue identification and ensured alignment within the team. Proactive risk management, including a comprehensive risk assessment and periodic reviews, allowed for anticipating and mitigating potential issues. In hindsight, integrating these actions would have positioned the Illuminate project for more tremendous success and minimized the encountered challenges.

### **How We Can Improve Illuminate:**

Several areas of improvement can be considered to enhance the Illuminate e-learning platform. Firstly, user experience refinement is crucial; gathering user feedback and conducting usability testing can identify pain points and areas for improvement in the platform's interface and navigation. Expanding and enriching the content library with diverse and engaging educational materials will contribute to a more comprehensive learning experience. Implementing personalized learning paths and adaptive algorithms could tailor the platform to individual user needs, optimizing the learning journey. Strengthening collaboration features, such as discussion forums and group projects, can foster a sense of community among learners.

Performance optimization and scalability enhancements should be prioritized to ensure the platform can accommodate a growing user base without compromising speed and reliability. Continuous integration of emerging technologies, such as artificial intelligence for advanced analytics or virtual reality for immersive learning experiences, can keep the platform at the

forefront of educational innovation. Regular security audits and updates must be implemented to safeguard user data and maintain the platform's integrity. Finally, fostering an active user feedback loop and maintaining an agile development approach will ensure that the product remains responsive to evolving user needs and technological advancements.