

Illuminate: The One-Stop E-learning Platform for Working Professionals

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ABSTRACT

Software engineering is a dynamic and rapidly growing field with numerous opportunities for professional development. However, S.E. professionals face various obstacles that hinder their growth and development. Lack of skills while joining or starting a new position, lack of mentors in the workspace, difficulty in implementing knowledge, limited knowledge of expectations in real-life working scenarios, and difficulty collaborating on projects all fueled our motivation for this project. With the current ed-tech solutions, no such platform handles all the problems. As a result, users spend a lot of time finding the correct combination of applications that fulfill their needs and address their pain points. We introduce Illuminate, a new platform that serves as a one-stop shop for all the challenges a software engineer or aspiring engineer might encounter. Our services include free courses and resources according to the current industry demands. These courses can be explored on the basis of job role or the skill one wants to learn. A place catered to one-on-one mentoring: We will assign industry professionals as mentors to help users connect and outline the pathway to achieving their goals. A platform for project collaboration: where members of our community can work together on open-source projects that will strengthen their resumes. A platform that will guide you to the next step no matter on which level you are. Ultimately, the tool aims to provide valuable insights for software engineers seeking to advance their careers and overcome the industry's challenges.

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1 INTRODUCTION

Although the software engineering industry is a hotspot in the job sector, professionals in this field face a variety of problems on a day-to-day basis. These issues range from a lack of required skills when joining a new position to the gap in skill level experienced by working professionals who are trying to get a start in a new role. Additionally, newly graduated students often find that the coursework taught in school does not prepare them for the industry's current requirements.

Even when professionals are familiar with the various technologies and skills, there can be barriers to implementing the knowledge to arrive at a tangible solution. This could be due to a lack of experience, which can lead to confusion regarding expectations while working in real-life scenarios and difficulty collaborating on projects. More specifically, in Radermacher, Walia, and Knudson noted in a study regarding the skill gap between graduating students and industry requirements that students' lack of preparation encompassed "communication ability, familiarity and proficiency with software tools, and an understanding of software engineering concepts such as software development processes" [2]. Although proper support and mentoring can help navigate these issues, finding mentors who are keen and committed can be challenging.

Illuminate offers solutions to these problems through an e-learning platform that acts as a one-stop-shop, guiding working professionals from the beginning to the end. The platform offers a wide variety of features such as free course recommendations and reading materials, suggestions for project topics and problem statements to work on, and the option to collaborate with others who are either learning similar skills or working on similar projects. Users can also get in touch with mentors and experts in the field to get relevant advice and suggestions. As a result, the users also get an opportunity to network and build their profile within the industry.

The platform categorizes users based on several attributes, such as the number of years of working experience, the field in which they have experience, and the skills they are aiming to learn, and curates relevant suggestions. It helps software engineering professionals be more confident in their skills, allowing them to present their views and solutions. Collaborating on projects enables professionals to get hands-on experience while working in a team. Professionals can share the guidance they received from their mentors and help peers improve their work. Overall, Illuminate helps software engineering professionals be industry-ready.

2 MOTIVATING EXAMPLE

During Covid, entertainment industry was in tatters, and there was no platform for aspiring and struggling artists to showcase their talent. We created a one-stop solution called Hunar, which not only helped them learn the skills they needed, but also connect with the community and mentors. It also provided them jobs and helped them create a portfolio that would help them launch themselves. After going through the problem statement mentioned in the class, we thought that the same idea could be implemented for software engineers for all the issues that they face on a daily basis.

3 RELATED WORK

Key Functionalities	Udemy	Coursera	Skillshare	Unacademy	Edx	Udacity	LinkedIn	FreeCodeCamp
Free Courses and Resources	✓	✓	✓	✓	✗	✗	✗	✓
One on One Mentoring	✗	✗	✗	✗	✗	✗	✗	✗
24x7 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 out 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 key functionalities designed for Illuminate. The features are as follows: free courses and resources, one on one mentoring, 24 x7 chat support, project ideas and challenges, project collaboration, and jobs.[1]

We aim to have links to free courses and resources as well as 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 (message, email, chat, calendar appointment, etc), and 24x7 chat support. In addition, we aim to provide the user with a means to collaborate on projects with others and pitch their own ideas or projects they're working on. Lastly, we also aim to show job listings related to the skills or positions the user shows interest in.

In our analysis, we noted that none of the e-learning platforms have a means to show job listings in addition to courses. In addition, none of these e-learning platforms provide a specific platform dedicated to project collaboration. While LinkedIn Learning provides courses along with job listings, it does not give free access to everyone. Moreover, while it does provide a way for users to collaborate, the process is not as streamlined as we aim to make ours. As a general observation from our own experience as well as competitive analysis in the tech industry, we have noticed that there are many tools 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 none implement any more than two of the features we have listed. Because we see a lack of a congregation of these features, a "one-stop shop" for software

professionals as well as amateurs, we believe pursuing this project will be a useful venture.

4 HIGH-LEVEL ARCHITECTURE DESIGN

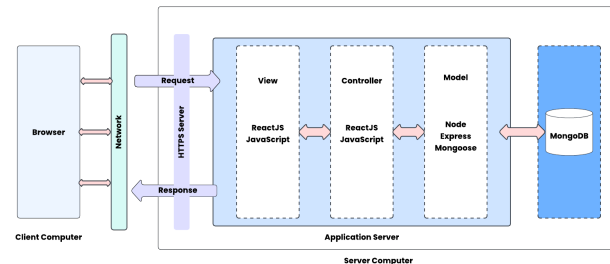


Figure 2: Tiered Architecture Design

We utilized a layered or tiered architecture as this will be a web application. More specifically, we used the MERN (MongoDB, ExpressJS, ReactJS, NodeJS) stack with a Model-View-Controller design pattern. The View layer is what the user's browser directly interacts with over the network, and the Controller layer will serve as the abstraction between the Model and View layers. We intended to use MongoDB which is a NoSQL database. We thought of using NoSQL Database because it has flexible data models which are easier to scale. However, we decided to switch to SQL because we realized our data would be more relational in nature. We used NodeJS and ExpressJS to interact with the database and perform CRUD (Create, Read, Update, Delete) operations, and implemented the business logic Using NodeJS and the Controller using ExpressJS. We implemented the front-end of the application using ReactJS which interacts with the APIs.

5 IMPLEMENTATION

We implemented a MERN stack architecture, except for the database, for which we used SQL. The frontend was created using ReactJS. For some features of our application, such as the personalized path form, we also employed premade components from the MaterialUI component library. We utilized ExpressJS as the middleware and controller between the backend and frontend.

Initially, we intended to utilize MongoDB as our database as we had decided to code a MERN stack application. However, due to the scope of this semester-long project and our realization that the nature of the flows of the website made the data relational, we switched to using SQL for our database. We used Active-record pattern for the database, and we also used the middleware for user authorization.

6 DEPLOYMENT AND MAINTENANCE PLAN

We aim to employ an automated Continuous Integration / Continuous Deployment (CI/CD) Jenkins pipeline to deploy our project. It consists of three stages: building, testing, and deploying. Instructions for all three stages will be encompassed in a Jenkinsfile that will be easy to manage and maintain.

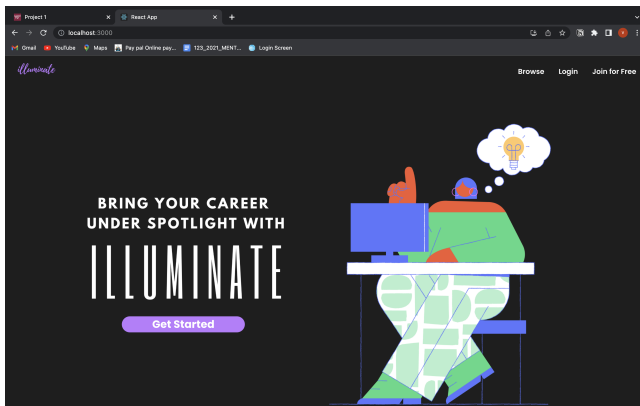


Figure 3: Landing page of the website

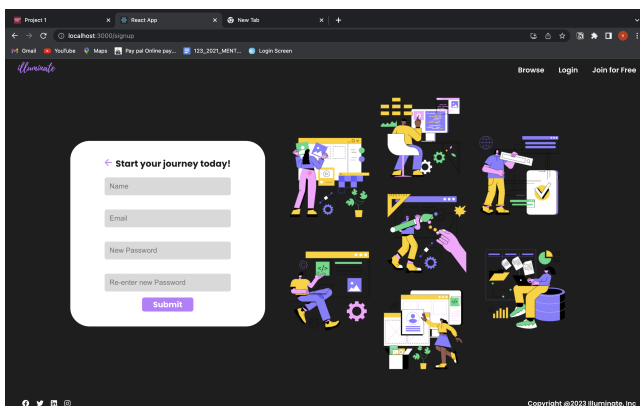


Figure 4: New User Registration Form

In order to develop this project further, we plan to implement all the functionality we intended, ideally without the limitations of time like we had for this semester, and conduct A/B testing to figure out areas for improvement. After modifying our application based on a few rounds of A/B testing and prior to the release, we plan to devote a lot more attention to the security testing of the application. In addition, before the product is released, we plan to ensure we have more robust white-box and black-box tests. Over time, as the scale of this application gets bigger, we plan to automate a lot of the basic tests.

7 DISCUSSION

7.1 Takeaways

One of the major insights gained from this project is a comprehensive understanding of the software development process and the software development life cycle implemented in the industry. We also understood the significance of adaptability in responding to the evolving requirements of a project. Although careful initial planning can provide a robust framework for future work, adjusting to new circumstances based on the issues encountered and expertise ultimately proved to be advantageous. For instance, during the project's early stages, MongoDB was selected as the

database management system. However, it became apparent later that Postgres was more suited to the project due to the data's relational nature. This underscored the importance of being flexible and open to changes throughout the software development process to achieve the most efficient and effective outcome.

7.2 Limitations

Although Illuminate can be a very effective platform that serves as a one-stop shop for all the challenges a software engineer or aspiring engineer might encounter, there are a few drawbacks. 1) The platform does not take into consideration the users who prefer the interactive nature of live class and prefer to join courses live. 2) The website although is related to programming, does not provide any virtual coding environment, thereby not providing users with a platform to engage in practical coding exercises 3) The platform does not have any mechanism for the recruiters to post about the requirements, although it mentions job search from the user end as an appealing feature.

7.3 Future Works

In terms of future work, there are several potential areas for enhancement and development of this platform. Chatting with mentor: While Illuminate already offers a feature for users to connect with mentors, incorporating a direct chatbot for conversations could be a valuable addition. This would allow for more efficient and streamlined communication between users and mentors, potentially leading to a better learning experience. Adding course content: Expanding the available course content on the platform could attract more users and improve the overall learning experience. This could include adding new courses or updating existing ones to reflect the latest developments and trends in the field, Job search and application: While the platform mentions job search as an appealing feature, it currently lacks a mechanism for users to apply for job opportunities. Implementing a job application system could make the platform more useful for those looking to pursue career opportunities in the field of programming. Project collaboration portal: Adding a project collaboration portal could facilitate collaboration among users, allowing them to search for projects, create new ones, and request to join existing ones. This could promote knowledge sharing and foster a sense of community among users, potentially leading to new learning opportunities and collaborations.

8 CONCLUSION

In conclusion, software engineering professionals face various obstacles that hinder their growth and development, including lack of skills, difficulty implementing knowledge, limited knowledge of expectations, and difficulty collaborating on projects. Illuminate is a new e-learning platform that serves as a one-stop-shop for all the challenges a software engineer or aspiring engineer might encounter. It offers free courses and resources according to current industry demands, assigns industry professionals as mentors, and provides a platform for project collaboration. Illuminate aims to provide valuable insights for software engineers seeking to advance their careers and overcome the industry's challenges. With Illuminate, software engineering professionals can be more confident in their skills, collaborate with peers, and be industry-ready.

REFERENCES

- [1] LinkedIn. 2023. LinkedIn. <https://www.linkedin.com/feed/> Accessed: 2023-05-05.
- [2] Alex Radermacher, Gursimran Walia, and Dean Knudson. 2014. Investigating the Skill Gap between Graduating Students and Industry Expectations. In *Companion of the 36th International Conference on Software Engineering* (Hyderabad, India) (*ICSE Companion 2014*). Association for Computing Machinery, New York, NY, USA, 291–300. <https://doi.org/10.1145/2591062.2591159>