



# A Cloud-Based Academic Web Platform with In-Line Doubt Clarification and Email Notifications

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**Abstract** - This paper introduces a web application that utilizes Amazon Web Services (AWS) to create a secure and efficient learning portal. The portal allows users to access course materials in HTML format, with the option to raise queries by selecting specific lines and receive email notifications to instructors. The conversion of DOCX files to HTML is achieved using the Mammoth library, while PDF files are first converted to Word using pdf2docx before being transformed to HTML. The Flask web application framework was chosen for its lightweight structure and minimal dependencies on Python libraries. The user interface is designed using Bootstrap and React JS, which offers responsive design and faster web page rendering. Bootstrap is a mobile-first design framework that provides a great user experience on a variety of devices and screen sizes, while React JS's component-based architecture allows for code reusability and efficient management. This combination ensures that the application is user-friendly and offers an enjoyable learning experience. AWS provides a secure infrastructure that ensures the application is available and accessible to users while safeguarding against data breaches and other security threats. It offers a robust and scalable infrastructure that can support large volumes of traffic and provide seamless access to resources. This web application provides a modern and efficient way for students to access course materials, raise queries, and clarify doubts in real-time. By leveraging AWS, Flask, Bootstrap, and React JS, the application offers a responsive and secure learning environment that is ideal for today's tech-savvy students. The application is a testament to the power of modern web technologies, which can enable innovative and practical solutions to today's challenges.

**Keywords** - Web application, Amazon Web Services, Flask, Bootstrap, React Js, Mammoth library, pdf2docx, HTML, user experience, course materials, queries, email notifications, SMS notification, security, scalability, modern web technologies, innovative solutions, education, learning portal, user-friendly interface.

## 1. INTRODUCTION

This paper presents a new web application designed to solve the problem of an efficient and user-friendly system for students to ask questions and receive responses in a study room setting <sup>[1]</sup>. The application has been designed with the aim of providing students with an interactive and user-friendly interface to submit queries and receive

responses via email and SMS notification. The application has been hosted on Amazon Web Service (AWS) to provide students with the flexibility to access the application from anywhere with an internet connection <sup>[3]</sup>.

One of the key features of this web application is the ability to convert documents provided by faculty members

into HTML format while viewing. This allows students to conveniently select a particular line and ask a query to the person individually. Students can share their queries with each other or can also tag and ask questions to faculty members. The notifications will be received by the tagged person who can then reply to the query. This feature is particularly useful in situations where students need help but may not have access to a teacher or faculty member at the time.

Today's students have a wealth of information available to them, but finding the right information at the right time can often be challenging. This web application aims to provide students with a more efficient and streamlined way to access course materials and ask questions in real-time. By leveraging the power of AWS, Flask, Bootstrap, and React JS, the application offers a responsive and secure learning environment that is ideal for today's tech-savvy students. The server-side scripting of this application has been done using Python due to the availability of a large number of libraries. The client-side uses React JS, a component-based framework that allows for code reusability and efficient management. The application has been built using the Flask framework, which is a lightweight framework that has minimal dependencies on Python libraries [2]. The library used to convert Word and PDF files to HTML is Mammoth and pdf2docx, respectively.

## 2. LITERATURE REVIEW

### Why Python?

Python has a vast library of frameworks and tools that can speed up the development process, including popular web frameworks such as Django, Flask, and Pyramid. These frameworks provide a structured and

modular approach to building web applications and allow developers to focus on the logic of their application rather than low-level implementation details [7]. This application is built using Flask framework. The fig 1. [8] from stackoverflow at 2022 says, that python is most widely used.

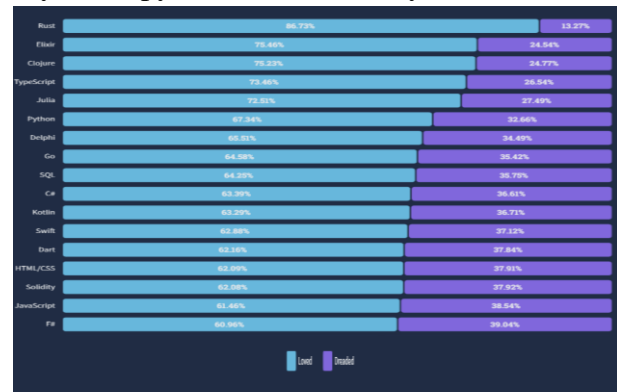


Fig 1

### Why React JS?

React's component-based architecture makes it easy to create reusable UI components. This approach helps reduce development time and improve code maintainability. React can be easily integrated with Flask using tools such as Flask-React and Flask-Webpack. This allows you to bundle and deploy your React application inside your Flask server [9].

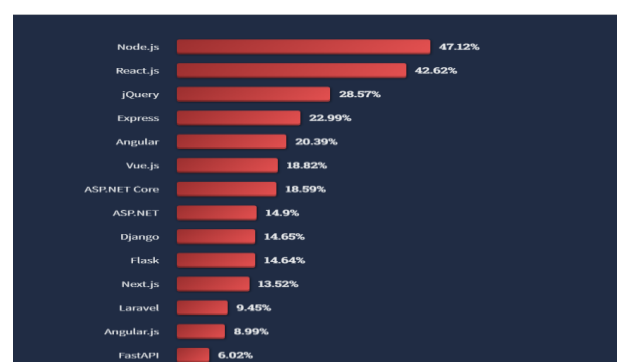


Fig 2

The fig 2. [8] stackoverflow poll shows that React is used all over the world.

### Why AWS?

AWS provides a range of security features and services, including firewalls, access controls, and encryption. This helps to

ensure that your Flask application is secure and protected against common threats. AWS provides a range of pricing options, including pay-as-you-go, which can help you to keep your costs under control. Additionally, you only pay for the resources that you use, which can help reduce your overall costs. AWS provides a range of other services that can be easily integrated with Flask, such as Amazon RDS for database management and Amazon S3 for object storage. This makes it easy to build and deploy a complete web application stack on AWS <sup>[10]</sup>.

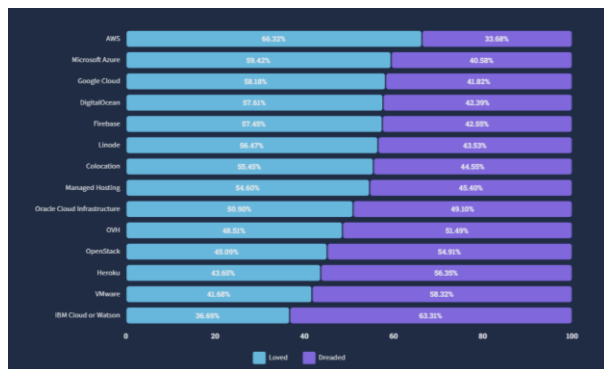


Fig 3

The fig 3. <sup>[8]</sup> survey by stackoverflow for 2022 says AWS is the number one cloud technology used all over the world.

### 3. PROPOSED METHODOLOGY

#### React JS

React is a popular front-end library for building web applications, and it offers several advantages over other front-end frameworks and libraries. Here are some key advantages of React:

**Component-Based Architecture:** React uses a component-based architecture, which makes it easy to create reusable UI components. This can help reduce development time and improve code maintainability.

**Virtual DOM:** React uses a virtual DOM, which is a lightweight representation of the

actual DOM. This makes it faster to render updates to the UI and reduces the number of DOM manipulations required.

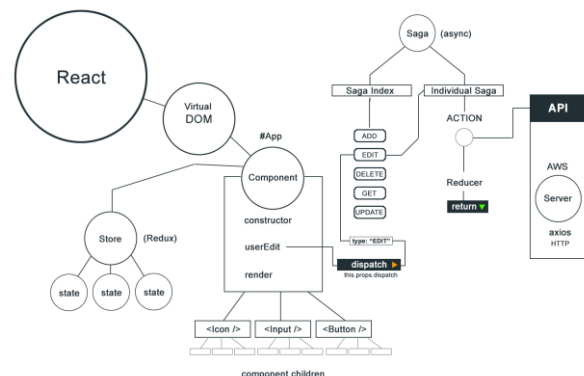


Fig 4

**Performance:** React is known for its high performance, thanks to its virtual DOM, efficient rendering, and other optimization techniques. This makes it a good choice for building complex and high-traffic applications.

**Flexibility:** React is highly flexible, and it can be used with other libraries and frameworks as needed. This means that you can easily integrate React into your existing web application stack.

**Large Community:** React has a large and active community of developers who contribute to its development and maintenance. This community provides support, guidance, and resources to help developers solve problems and build better applications.

**Cross-Platform:** React can be used to build not only web applications but also mobile and desktop applications. This is possible thanks to React Native, a framework that allows developers to build native mobile applications using React.

Overall, React's component-based architecture, virtual DOM, performance, flexibility, large community, and cross-platform capabilities make it a powerful tool for building modern web applications <sup>[9]</sup>.

## AWS

### Beanstalk in elastic (EBS)

Developers only need to submit the code; elastic Beanstalk will take care of everything else, including capacity provisioning, load balancing, automated scaling, monitoring of the health of web applications, and continuous completely managed patch and security upgrades. It is the easiest method for deploying and running your web application on AWS [10].



Fig 5

### Service for Relational Databases (RDS)

Developers may experiment with impending beta, release candidate, and early production versions of the PostgreSQL engine in the RDS database preview environment. Developers may simply test new features and functionality with your apps since preview environment instances are fully functional. The area in which the database instance is built can be chosen by the developer. The fee per request varies by area [11].

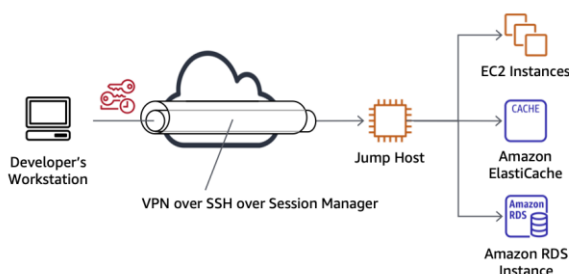


Fig 6

### CodePipeline

With Amazon, we can quickly link our remote repository to our AWS instance. The

creator of CodePipeline may start modelling your software release process right away. No servers need to be provisioned or set up. A fully managed continuous delivery solution that integrates with your current tools and systems is called CodePipeline [12].

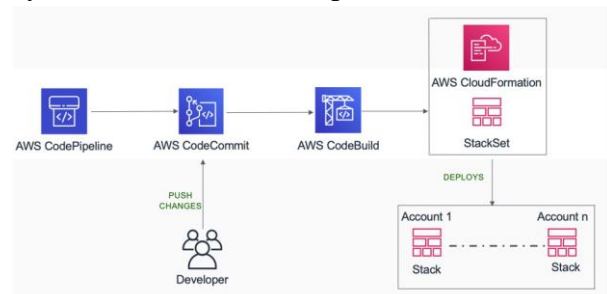


Fig 7

### Route 53

With this service, we can link the Amazon instance to our domain and register a custom domain for our application. Domain registration, DNS routing, and health checking are the three major operations that developers may execute with Route 53 in any combination [5].

### Python – Flask Framework

The Python web framework Flask makes it simple and quick for developers to create web apps. Since it is quick to use, adaptable, and offers a straightforward and intuitive interface for developing online applications, Flask is well-liked among developers.

Because Flask is a lightweight framework, it has few dependencies and requires little setup. As a result, creating web apps rapidly and using Flask is made simple. Because Flask is a modular framework, it only offers the necessary resources for creating web applications. Nonetheless, Flask is a versatile framework for creating web applications since it can readily modify with plugins and extensions as needed. Because to its straightforward and intuitive design, Flask is simple to understand and use [6].

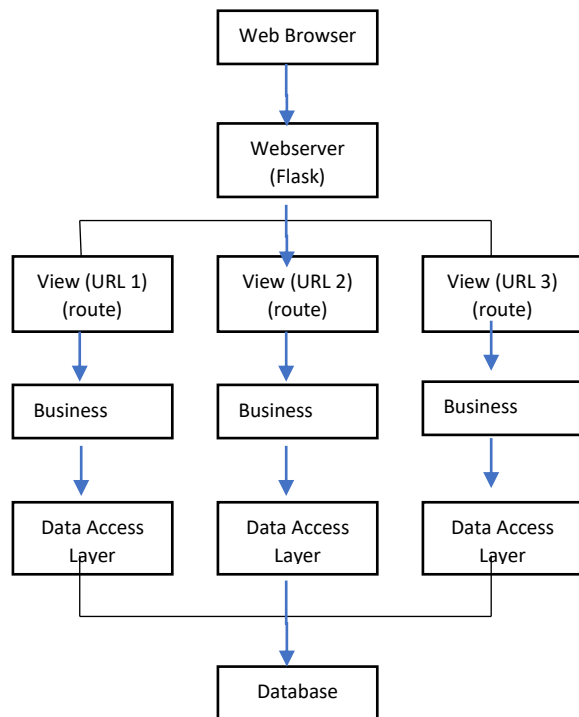


Fig 8

A simple method for handling HTTP requests and answers is provided by Flask, which also covers routine web development chores like routing and tagging. Because to Flask's great degree of adaptability, developers may modify it to meet their own requirements. Flask is a versatile framework for creating online applications since it gives developers the freedom to select their own database, templating engine, and other tools as needed. Developers from a sizable and vibrant community actively participate in Flask's growth and upkeep. This community offers assistance, direction, and tools to developers so they can fix issues and create better programs [2].

#### 4. RESULT AND DISCUSSION

This web application that uses a combination of modern web technologies to create a secure and efficient learning portal. The application allows users to access course materials in HTML format, raise queries by selecting specific lines, and receive email notifications to instructors.

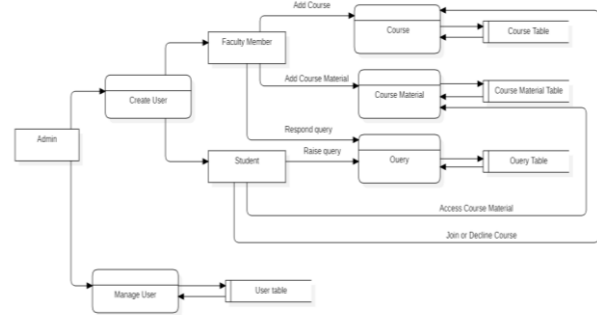


Fig 9. Data Flow Diagram of Proposed System

The application uses Flask web application framework, which is lightweight and has minimal dependencies on Python libraries. Bootstrap and React JS are used for designing the user interface, providing a responsive design that offers a great user experience on a variety of devices and screen sizes. The use of React JS's component-based architecture allows for efficient code management and reusability. The conversion of DOCX files to HTML is achieved using the Mammoth library, while PDF files are first converted to Word using pdf2docx before being transformed to HTML. The use of these libraries ensures that course materials are easily accessible to users in a user-friendly format.

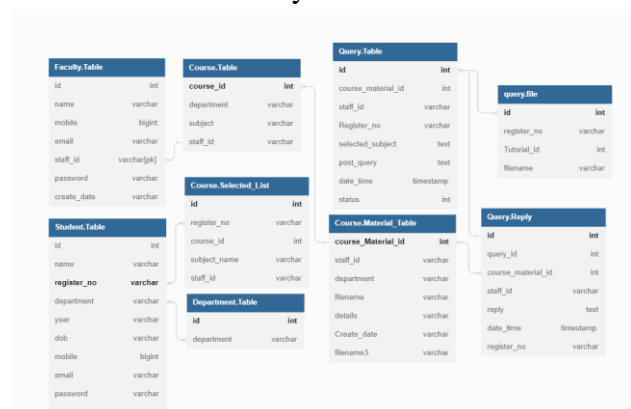


Fig 10. ER Diagram of Proposed System

The application is hosted on AWS, which provides a secure infrastructure that ensures the application is available and accessible to users while safeguarding against data breaches and other security threats. AWS



also offers a robust and scalable infrastructure that can support large volumes of traffic and provide seamless access to resources.



Fig 11. PDF/Word to HTML Page



Fig 12. Query selection and Raised Page

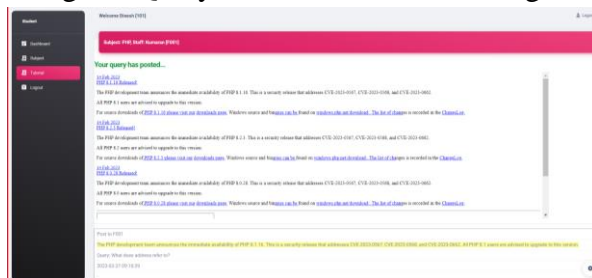


Fig 13. Query Sent Page

## 5. CONCLUSION

In conclusion, this paper presents a web application that uses modern web technologies, such as Flask, Bootstrap, React JS, and AWS, to provide a secure and efficient learning portal. The application allows students to access course materials in HTML format, raise queries, and receive email notifications to instructors. The combination of these technologies ensures that the application is user-friendly, responsive, and offers an enjoyable learning experience. Moreover, the use of AWS guarantees a secure infrastructure that is scalable and capable of handling large

volumes of traffic. Overall, this application demonstrates the potential of modern web technologies to offer innovative and practical solutions to the challenges faced by today's students.

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