

## Creating and Evaluating School Exams with Marks Obtained

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**Abstract**— This research paper explores the development of an educational management system leveraging modern web technologies such as React.js for frontend development, Node.js for backend implementation, and MongoDB for database management. The system comprises two main modules: exam creation and result display. The primary focus is on designing a user-friendly interface for teachers to create exams and for students to access their results. Additionally, a leaderboard feature is integrated to showcase students' rankings based on their performance. This paper discusses the technical architecture, research objectives, and the significance of this system in enhancing educational administration. The module is developed using the MERN stack technology. The ultimate goal of this module is to make the educational system more efficient for both teachers and students.

**Keywords** - Educational Management System, Modern Web Technologies, Exam Creation, Technical Architecture, MERN Stack.

### I. INTRODUCTION

Education management systems are crucial in modern educational institutions, streamlining administrative tasks and improving communication among stakeholders. Traditional systems often lack the flexibility and user-friendliness required to meet the evolving needs of educators and students. The advent of web technologies such as React.js, Node.js, and MongoDB has transformed the development of these systems, offering seamless integration, scalability, and real-time data management. This paper introduces a research project focused on developing an educational management system with key features including exam creation, result display, and leaderboard functionality.

### II. FRAMEWORK OF THE STUDY

The framework of this study encompasses the design, development, and evaluation phases of the educational management system. The development process involves the utilization of React.js for frontend interface development, Node.js for backend logic implementation, and MongoDB for database management. The system architecture is designed to ensure scalability, security, and performance. Key components include user authentication, exam creation, result storage, leaderboard generation, and data visualization. The evaluation phase entails user testing, feedback collection, and system optimization to meet the requirements of educational stakeholders.

### III. RESEARCH OBJECTIVE

- 1)To develop a user-friendly interface for teachers to create exams efficiently.
- 2)To enable students to access their exam results in a timely and organized manner.

- 3) To implement a leaderboard feature that showcases students' rankings based on their performance.
- 4) To evaluate the usability, performance, and effectiveness of the system through user testing and feedback collection.
- 5) To optimize the system architecture for scalability, security, and real-time data management.

#### IV. TECHNICAL BACKGROUD

This section provides different literature and studies from previous researchers. It introduces the available resources and framework for the development of the entire study. The technical background of this research paper revolves around the utilization of React.js, Node.js, and MongoDB for frontend, backend, and database development, respectively. React.js is a popular JavaScript library for building user interfaces, offering component-based architecture and virtual DOM rendering for efficient UI updates. Node.js is a runtime environment for executing JavaScript code on the server-side,

enabling event-driven, non-blocking I/O operations suitable for real-time applications. MongoDB is a NoSQL database solution known for its flexibility, scalability, and document-oriented data model, making it ideal for storing and managing complex data structures in educational management systems. Integrating these technologies provides a robust foundation for developing a modern, responsive, and feature-rich educational management system.

#### V. RESEARCH METHOD

A. Research Design: Software Development Life Cycle (SDLC) is a methodology for planning, designing, building, and maintaining information systems. There is a lot of SDLC model proposed by different researchers [6]. The waterfall model is an SDLC sequential model that comprises five phases. Figure 2 shows the Waterfall model which starts from analysis down to the maintenance phases. It allows returning to the previous stage when the need arises but this provision should be used with care.

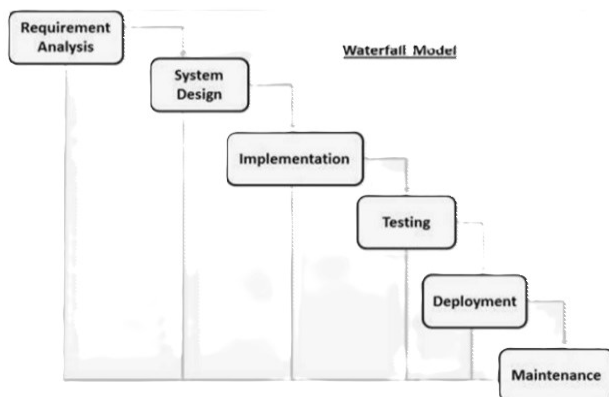


Fig 1. The Waterfall Model

B. Requirements Analysis: The first phase includes the gathering of data from available

- resources and understanding the things needed in designing. This also includes the function, and purpose of the newly developed system. The Algorithm used in the system
- C. was also identified and studied during this phase and the specifications of the input and
- D. output or the final product, are studied and marked. In gathering the data, the overall objective can be drawn based on the data gathered. The researcher conducted intensive research on what are the available tools in the open-source community for the development of exam and result portal. Data gathered from this phase will be used as the basis for designing the system in the next phase.
- E. System Design The requirement specifications from the first phase are being studied in this phase. This is where the designs of the system are prepared. The direction of System Design helps in identifying the hardware specification, and system requirements and also helps in defining the overall system architecture. After all the designs are ready, the coding of the software will be followed. In designing the system, the first objective of this study is initially achieved. The results are based on an interview being used in developing the system. In this phase, the researcher prepared some diagrams to visualize the development of the system. Programming tools were determined in this phase in the development of the exam and result portal.

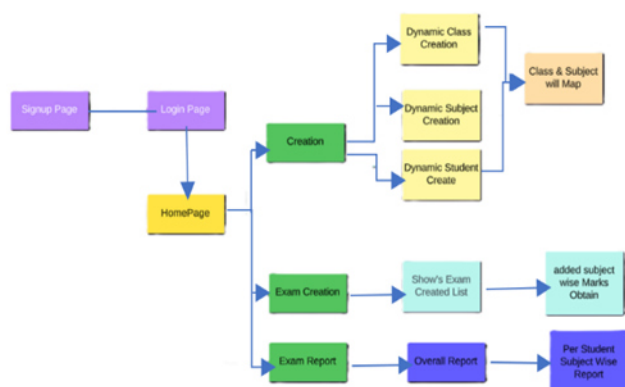


Fig 2. Flow of Model

- F. Implementation Based on the system design, the system is initially developed in small programs called units, and all the units were integrated into the next phase. Every unit is developed and tested for its functionality before it was implemented and tested as a whole system. In this phase, the researcher coded the system in the local machine and continued
- G. debugging the system. The application system was based on the proposed design as
- H. presented in the system design phase of the exam creation and result creation. In this phase, the first objective of this study will also be achieved.
- I. Integration and Testing In the integrating and testing phase, all the units developed in the implementation phase are integrated into a system after testing each unit. The designed system needs to go through a series of software testing to find out flaws or errors. A web-based application was deployed in a cloud server and ready for initial use. The system was

first tested on a limited number of users to determine the errors in the system. Once the system was free from errors after the initial deployment, then officially launching was done. This phase also included the briefing and orientation of the software system to the actual pilot users. The pilot users were oriented on how to use the system and learn about the benefits of using the system.

- J. Maintenance In the maintenance phase, the system was monitored and supervised. It involved making modifications to the system or an individual component to alter attributes or improve performance.

## VI. RESULT ANALYSIS

The results demonstrate the successful implementation of the core functionalities outlined in the project requirements. The exam creation module empowers teachers to design assessments that align with learning objectives effectively, while the result display module offers students valuable insights into their academic performance. The leaderboard feature enhances student engagement by fostering a sense of competition and achievement within the educational community. However, careful consideration should be given to the transparency and fairness of the ranking criteria to avoid potential issues of bias or inequality. Feedback from stakeholders during the development process has been instrumental in refining the system and ensuring that it meets their needs effectively. Ongoing communication and collaboration with end-users are essential for continuous improvement and user satisfaction. Future enhancements to the system could include additional features such as analytics dashboards for administrators, automated notifications for upcoming exams, and integration with learning management systems for seamless data exchange. Overall, the educational

management system represents a significant advancement in educational technology, empowering teachers, students, and administrators with tools to streamline administrative tasks, enhance learning outcomes, and foster a culture of academic excellence.

- A. To identify the tools and resources in the development of the system. Some tools and resources were needed in the development of the system. Some of this was considered open-source. These includes the following:

Software:

- React js
- Node js

Hardware

- 1 GB of RAM (at least 8GB for recommended for web- hosting)
- 40 GB HDD Free Space

- B. To design and develop a School Exam creation with marks Obtained. Designing a database for an application is important. This utilized the storage of data to store more information and it will be available for future use. In this study, the researchers used an Entity Relationship Diagram (ERD) to illustrate the database design used in this study.

## VII. CONCLUSION

In conclusion, the development of the educational management system represents a significant milestone in leveraging technology to enhance educational administration and improve learning outcomes. The system's modules for exam creation, result display, and leaderboard generation provide teachers, students, and administrators with valuable tools to streamline processes, monitor progress, and promote academic excellence. Throughout the development process, stakeholder input has played a pivotal role in shaping the system's features and functionalities, ensuring that it meets the diverse needs and expectations of its users. Continuous communication and collaboration have fostered a user-centered approach, driving the system's effectiveness and usability.

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