4th Indian International Conference on Industrial Engineering and Operations Management
Hyderabad, Telangana, India, November 07-09, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/IN04.20240125
Published: November 07, 2024

Secure Database Access Management System

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Abstract

A straightforward interface is offered by the student information management system for the upkeep of student data. Colleges and other educational institutions can use it to efficiently store student records. If we require information on our college attendance record or exam outcomes, we must visit the faculty. This technique has many drawbacks because managing paper records is difficult. Using a manual approach makes it challenging to accomplish this goal because the information is diseased, sometimes redundant, and may take a long time to gather. The greatest remedy for this is a website that manages and retains student data in one location. Every student's basic information, attendance record, and roll number are listed. While administrators can log in as admin to handle student details, the user login module handles student login. Our student management system is used to manage the various student-related tasks. It is within the administrator's power to add, edit, and remove users. Students have the ability to register for an account and add, edit, and remove data from it, such as results, placements, and personal data. Admins are able to analyse each student's statistics and provide a thorough summary of the student's feedback. Students will have access to a feedback feature. Faculty and administration will be advised of any respectful input.

Keywords
Big data, details, results, Attendance, SMS

1. Introduction

The previous college student record-keeping system was a manual, paper-based method. Furthermore, there was a possibility of data loss. We must go to the faculty if we require information on our college attendance record, test results, or anything else. If the faculty needs student data, they must search through several files, whether they are paper or desktop files. A website that manages and retains student data in one location is the best way to address this. A straightforward interface is offered by the student information management system for the upkeep of student dataAdministrators and students are two of the user categories that are present. The student profile can be added to or edited by the administrator. The student can maintain an updated profile, and the administrator has access to all of the

student's information. Additionally, it allows for the storage of all student records, including name, ID, and personal as well as academic information. Thus, in a matter of seconds, all of a student's information will be accessible. Additionally, it makes the process of accessing, adding, editing, and removing student details faster. This project provides solutions for each of these issues. [2022 IJPR].

In present era of education, student administration is becoming a necessary requirement, and it involves automating the everyday tasks carried out in the institution. We can quickly obtain all the management data required with the aid of this technology. Module interconnection shortens the time needed to complete various operational tasks. The program assists in automatically compiling the student's fundamental data. It benefits students, professors, and the college's administration department. The system can save and dynamically manage information on students. Each student's attendance is updated regularly. Using this system, the user may access any information about the student. The system's goal is to decrease paperwork, eliminate manual procedures, and save large amounts of time for faculties. [2019 IRJCS].

Implementing a new student management system may significantly increase workplace productivity. As a result, this study develops a Web-based student management system to meet dynamic student management requirements while also achieving systematization, standardization, and high information management efficacy. [2021 conference]

i. Problem Statement: -

- User Acceptance and Testing: - User Acceptance Testing (UAT) is a critical phase of software testing in which end-users evaluate the program in a real-world environment to ensure it satisfies their needs and performs properly. Unlike other types of testing, UAT focuses on assessing software usability, functionality, and performance from the user's perspective.

- Data Security Issues**:** - Data security is the process of protecting digital information throughout its life cycle to prevent corruption, theft, or illegal access. It includes everything: hardware, software, storage devices, and user devices; access and administrative controls; and organizational rules and procedures.
- System Performance and Downtime: By identifying and managing anomalous circumstances, such as errors, a student management system (SMS) may contribute to the safe, dependable, and stable operation of a system. A system's unavailability period, often known as downtime, can be either scheduled or unforeseen. Unexpected events, such as equipment failures, are the source of unplanned downtime. When a system is purposefully taken offline for regular maintenance, this is known as planned downtime.

1.1 Objectives

In order to design or improve a Student Management System (SMS), research objectives are intended to tackle the difficulties that have been discovered and improve the overall functionality and user experience. Here are some significant research objectives:

Some research objectives for a student management system include:

Efficiency: The system should minimize paperwork and manual procedures while being user-friendly and efficient.

Data accuracy: Accurate information and improved data accuracy should be provided by the system.

Data storage: To make managing and retrieving student data easier, the system should store it in a single location.

Data security and privacy: Data security and privacy should be guaranteed by the system.

Scalability: The system must be scalable to accommodate the institution's demands.

Collaboration: The system ought to promote cooperation between various stakeholders.

Administrative processes: The system should digitize administrative processes, such as admissions, attendance tracking, and grading.

Teacher support: The system needs to assist educators with their daily responsibilities.

Parent and teacher portals: The system ought to have gateways for both groups of people.

These study goals offer a methodical framework for creating or improving a student management system. The research attempts to provide a complete and effective solution that satisfies the demands of educational institutions and their

stakeholders by concentrating on data management, user experience, integration, communication, security, reporting, scalability, and support.

2. Literature Review

An overview of the literature on Student Management Systems (SMS) includes case studies, current research, and technical developments in the subject. It outlines the development of SMS as well as its features, advantages, difficulties, and best practices.

1. The development of SMS: - Historically, paper-based methods and manual record-keeping have played a major role in student management procedures. Institutions started implementing software and electronic databases as technology developed to expedite these procedures. Numerous studies have shown the switch from manual techniques to automated SMS, demonstrating increased accuracy and efficiency in the management of student data. (Al-Azawei et al., 2019).

2. Core Functions and Features
Typical SMS main functions are as follows: - Enrollment Management: Automated enrollment procedures lighten the administrative burden while improving the educational experience for students. Studies show that enrolling online greatly increases enrolment efficiency (Chen et al., 2020). Academic Tracking: SMS enables teachers to monitor student performance, attendance, and grades. Research indicates that having instant access to academic data facilitates prompt responses for pupils who are having difficulties (Higgins et al., 2021). Effective communication characteristics are essential while using communication tools. Studies highlight how SMS combined with integrated messaging systems improves parent, teacher, and student involvement (Burgess & Hughes, 2019).

3. Benefits of Implementing SMS: -SMS installation has several benefits, including: Enhanced Efficiency: According to Kumar and Bhattacharya (2020), automating administrative chores results in considerable time savings and operational efficiency. Improved Data Accuracy: Centralized databases improve data integrity by minimizing mistakes related to human data entry (Jiang et al., 2021). Making Informed Decisions: SMS analytics solutions offer insightful data on student performance, assisting institutions in making data-driven choices (Singh & Zadeh, 2020).

4. Challenges and Limitations: - Despite the advantages, a number of difficulties still exist: Problems with Integration: It might be difficult to integrate SMS with current systems (such as learning management systems). Interoperability has been shown to be a major obstacle to the successful application of SMS in research (Oluoch et al., 2019). User Resistance: Because new systems are unfamiliar or seem complicated to them, faculty and staff members may be reluctant to adopt them. To overcome this reluctance, assistance and training are essential (Lee et al., 2020). Data Security Issues: Since SMS manages sensitive student data, it is crucial to ensure data security and compliance with laws like FERPA and GDPR. Research indicates that in order to reduce hazards, strong security measures are necessary (Martin & Shapiro, 2021).
5. Best Practices for Implementation: - Research suggests several best practices for successfully implementing an SMS: Stakeholder Engagement: Involving all stakeholders (students, faculty, administration) in the planning and implementation process fosters acceptance and usability (Harrison & Renshaw, 2020). User Training and Support: Providing comprehensive training and ongoing support ensures that users can navigate the system effectively (Brown et al., 2018). Iterative Development: Adopting an agile approach to development allows institutions to adapt the SMS based on user feedback and changing requirements (Smith & Roberts, 2021).

6. Future Directions: - Artificial intelligence and machine learning developments will enable SMS to offer individualized learning experiences, predictive analytics, and improved administrative skills in the future. The integration of mobile technology and SMS's ability to enable distant and hybrid learning settings are the subjects of ongoing study (Thompson & Garcia, 2022). Student management system literature emphasizes how important these systems are to contemporary educational settings. SMS has several advantages, but for deployment to be effective, issues including data security, user resistance, and integration must be resolved. Future SMS capabilities will probably be shaped by ongoing research and technology developments, making them even more crucial to academic performance.

3. Methods

The method to successful development of this software includes- designing, development and testing part. The design of web pages for different modules are carried out by using HTML, CSS & JS. The development of web pages is done in such a way that the user can use it in quite efficient manner. The software also includes various registration forms in order to get user registered. At the backend, which is generally known as developer module, the language use to

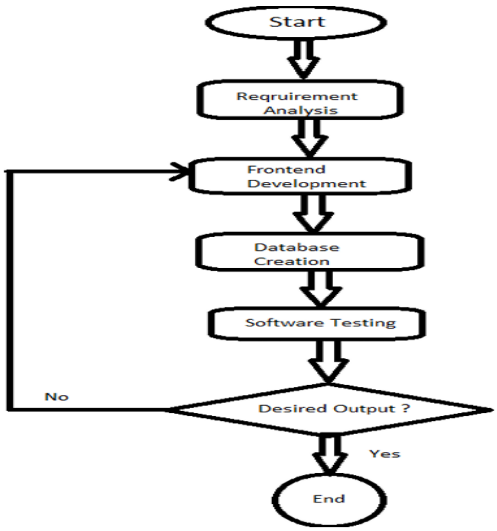

Figure 1. Flow Chart

develop the software is Advanced Java & mainly Java Servlet are used to make the operations smooth (Figure 1). Now main part is about database where all the data will be stored and retrieved, the database used in the software is MySQL database in order to make efficient working of database. This is translational from a user-based document to a data-oriented programmers. In order to make it possible, this provides the procedural details necessary for implementation. In order to understand the development and operation procedure of this software we initially created a Flowchart which ultimately pointed out every scope and possibility of success and failure of the software. Thus, the system which we develop is reliable, easy to use and its maintenance costs is also very less. The software is developed in such a way that it eliminates all the drawbacks of old traditional files/paper-based documents. The Student Information software is useful as here paper work is nil and user can store the data more efficiently and securely. The methodology carried out in this software development process is very systematically done in order to obtain smooth operation of the software. A flow chart diagram shows the various steps of the development process (Figure 2).

Technical Details

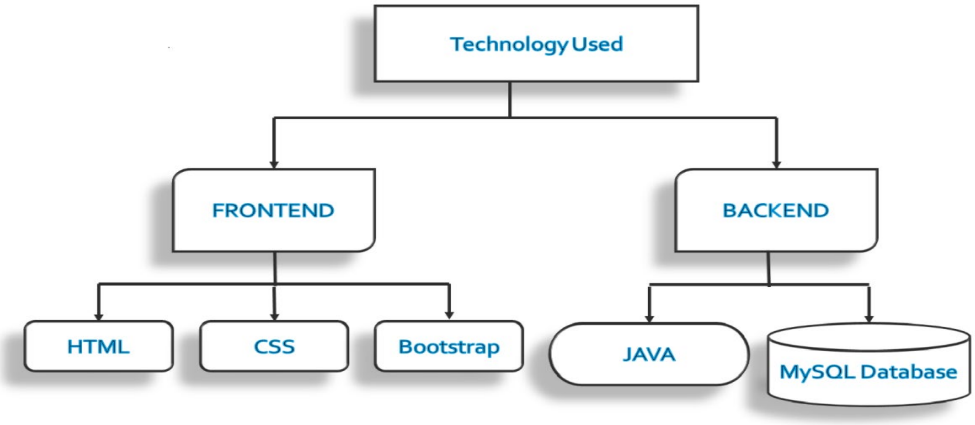

Figure 2. Technique used

HTML: Hypertext mark-up language is used for developing web pages for a website. Internet browsers read HTML files and convert them into websites which is the combination of web pages. HTML objects are the basic requirement for building all websites. It permits pictures and items to be included which is useful in the construction of user-friendly forms. It gives a way to construct structural format such as heading, paragraph, list, references (links), quotes, and other objects.

CSS: It provides the layout for styling the web pages. The Cascading Style Sheet is a recommendation from the W3C, which specifies the possible style sheets that help to decide how elements are existing in a website and visualizes how HTML objects are presented online.

Bootstrap: Bootstrap is an HTML, CSS & JS Library that focuses on simplifying the development of informative web pages. It will help ease the implementation of certain elements such as modals and make responsive web design.

JQuery : jQuery is a fast, small, and feature-rich JavaScript library. It makes coding in JavaScript simplified. It will be used to handle the event and for the Ajax function, making our web page dynamic in nature. Java is an advanced object-oriented programming language and is designed and created in such a way that the developer or the user will have as few implementation dependencies as possible. Java is both, general purpose programming language and also it is an advance programming language which is significantly in use these days to develop various object-based applications

MySQL: MySQL is a freely available open-source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). It will be used to store and retrieve data provided by the user and manage relationships between them.

STUDENT: -Once the student has registered in college the administration provides them with user credentials to log into the system. Due to the role-based access model the user will get only those privileges for which one has registered. Here, the user is a student, so the privileges of students are: Viewing and editing profile dashboard. Viewing timetable, calendar, and notice boards. Access to fee payment gateway. On the self-help portal, students can fill railway concession form and request for organizing any events in the college. Contact/ Complain/ Request Form (Figure 3).

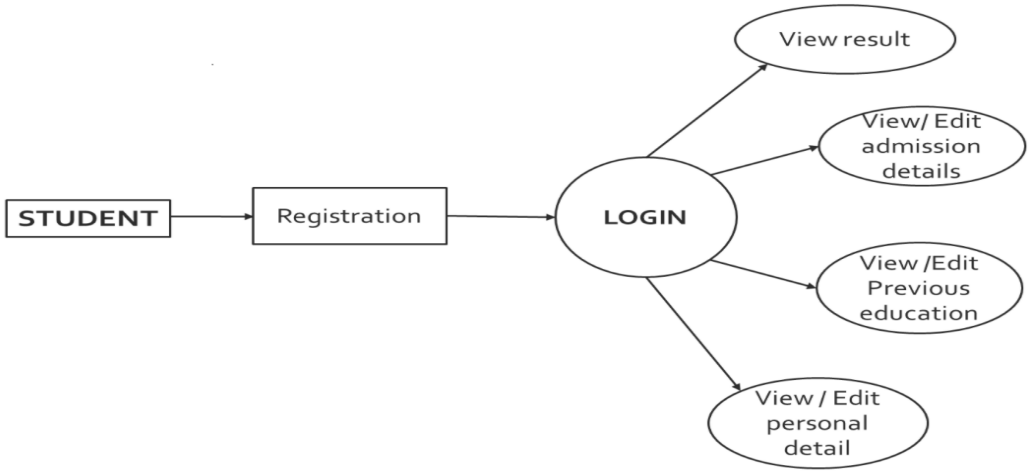

Figure 3. Student

TEACHER: Attendance management system: Teachers can take attendance by selecting the section of a given department they need. Teachers will also be able to modify the attendance of a student if wronged by chance. Students can only view the attendance for their respective lectures. Wronged attendance can only be amended within a week followed which it cannot be changed (Figure 4).

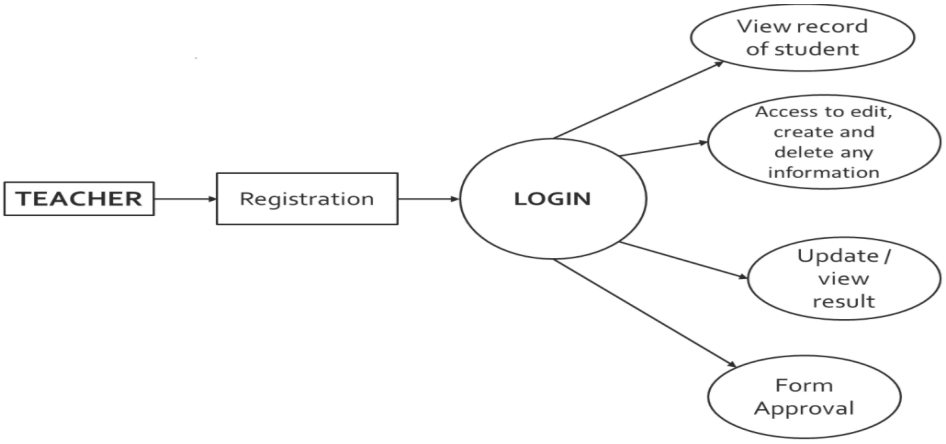

Figure 4. Teacher

Info displayed on the webpage:

Here, the student inputs their registration email address and cap ID, after which the system generates an OTP. The registration form will open once this OTP is entered, and the student must fill it out with all the necessary information and papers before submitting it. Details about their internship and placement can be added by students to their profile.

1. Home Page: The home page is where the system launches. The college's information, including its mail ID, is available on the home page.
2. Login Page: To access the system, users must enter their username and password. Users that have the proper login information can access the system and log in successfully. Additionally, it gives new users the chance to register.
3. Dashboard: Links to the user's academic information are available on the dashboard.
4. Attendance Page: Students can examine their attendance information on this page.
5. Marks website: Students can examine their internal marks on this website.
6. Fundamental Information: Students can access their fundamental information on this website (Figure 5).

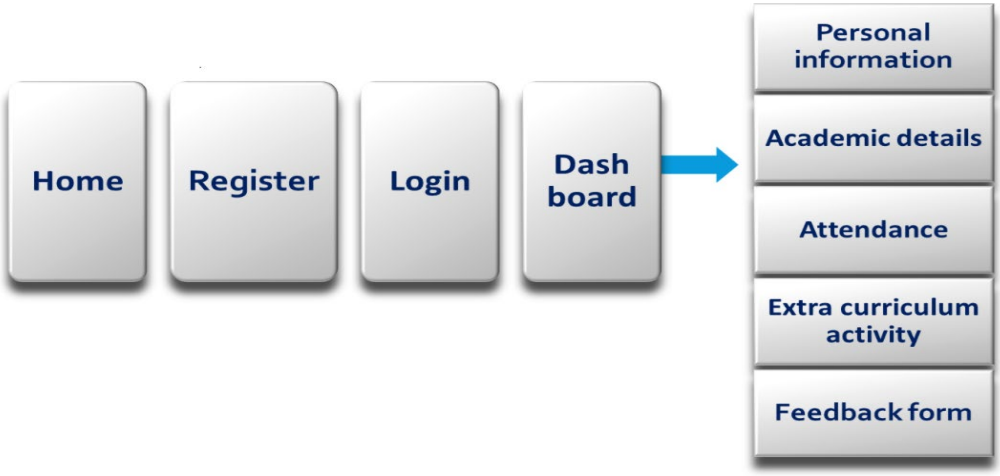

Figure 5. Information to display

Student management web-based system is the process of managing student's record in an institutional organization. It is done through the online method which traditionally, was prepared using papers and manual ledgers. It preserves student's and administrator's resources. This system provides a simple interface for the maintenance of student information. It involves procedures like registering the scholar's details, assignment

of the department according to the course chosen, and maintaining records. This data is stored safely in the repository that makes it simple to acquire and data modification can be done whenever required. It is the software created for everyday student record management in academic institutes. It helps to fetch the data of student just by few clicks. This system will also help in generating a status report of a student such as total attendance. Click on the mouse and the system will produce the students' report which reduces the requirement for manual labor which is vulnerable to errors and time expenditure.

4. Data Collection

Personal Information: - Personal information of a student typically refers to any data that can identify them or is related to their identity and educational experience. Parent details of a student refer to the specific information about the student's guardians or parents that is relevant for educational and administrative purposes (Figure 6).
Academic Details: - Academic details of a student refer to the specific information related to their educational achievements, enrollment, and performance.

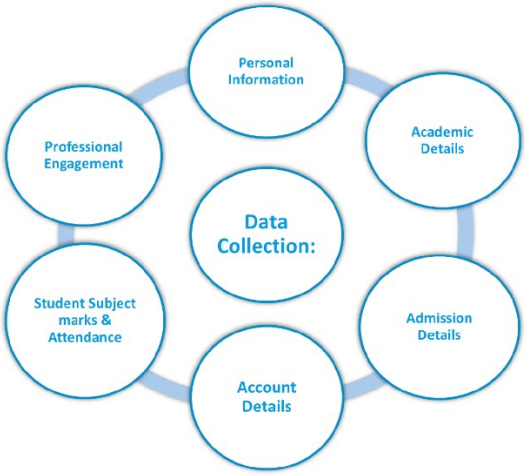

Figure 6. Data collection

Account Details: - Account details of a student refer to the specific information related to their educational accounts, often used for administrative purposes within a school or educational institution.

Student Subject Marks & Attendance: - Student Subject Marks and Attendance is the comprehensive log of a student's attendance in class as well as their academic achievement in a variety of topics. This data is essential for evaluating a student's academic performance and involvement.

Professional Engagement: - When a student is involved with an organization or firm, especially through internships, part-time work, or cooperative education programs, it is sometimes referred to as their "company details." A student's "job description" is a comprehensive summary of the duties, responsibilities, and expectations related to a particular position that they hold.

5. Results

This Secure Database Access Management System aims to provide a user-friendly interface while ensuring high levels of security and data integrity (Figure 7). It is committed to fostering an environment of secure and efficient data access for all users. By continuously evolving based on user feedback and technological advancements, the system will maintain its relevance and effectiveness in supporting the academic community (Figure 8).

Figure 7. Home Page

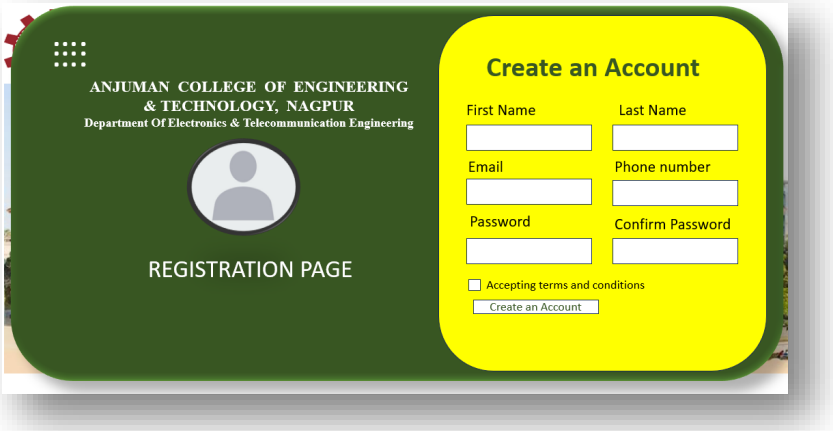

Figure 8. Registration page

The account creation process in the Secure Database Access Management System is designed to be straightforward, secure, and user-friendly. By incorporating validation features and a confirmation step, we aim to ensure that all users have a positive registration experience, ultimately fostering a sense of trust and confidence in the system. In the registration process, students must create an account by entering their first name, last name, email ID, creating a password, and confirming the password, among other details (Figure 9).

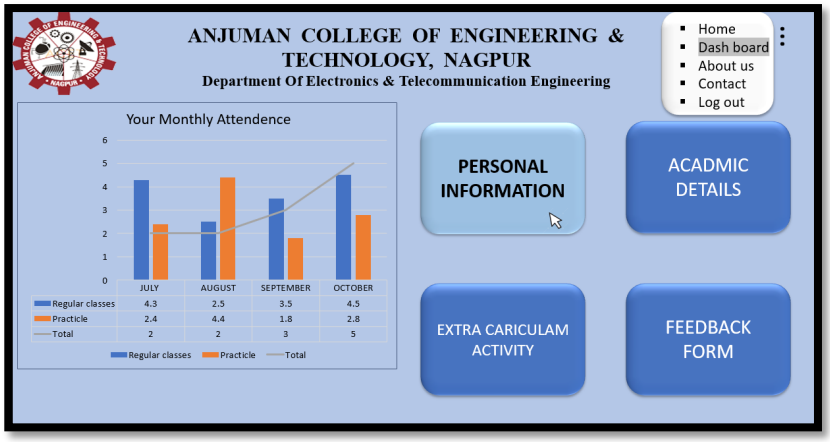

Figure 9. Dash board

The dashboard is designed to provide students with comprehensive access to their academic life and activities. By consolidating important information and tools in one location, the dashboard enhances the user experience, promotes engagement, and supports academic success. In the dashboard, we will see student attendance, personal information, academic details, extracurricular activities, and a feedback form.

6. Conclusion

An easy-to-use interface is offered by this system for maintaining student data. Colleges and other educational institutions can use it to efficiently store student records. Using a manual approach makes it challenging to accomplish this goal, since the data is dispersed, often duplicated, and may take a long time to gather. A student information management system accessible online is used to tackle each of these issues. The work's main goal is to make information easily understandable by offering features like online student registration and profile development, which cut down on paperwork and automate the process of creating records at educational institutions. In this essay, we draw the conclusion that all of our aims and objectives have been effectively met, the software system is performing as predicted, and its operations are running smoothly. Therefore, even though the program is still being hosted on a web portal, it is ready for usage in any educational institution. The program is web-based and works with a variety of browsers, including Internet Explorer, Chrome, and others. The program is fully functional and was created on a Windows operating system. As a result, we can say that the software for the student information system has been developed and tested several times.

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Biographies

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Mohd. Farhat Kausar Sharif
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