



Cloud-Based School Management System Using Flutter and MongoDB

¹Namita Kothali, ²Gayatri Desai, ³Atharvraj Gurav, ⁴Prachi Kandalkar, ⁵Sakshi Mithari, ⁶Pandurang Thombare

^{1,2,3,4,5,6} Department of Information Technology, Dr. J. J. Magdum College of Engineering Jaysingpur, Jaysingpur India

Peer Review Information	Abstract
<p><i>Submission: 16 April 2026</i></p> <p><i>Revision: 08 May 2026</i></p> <p><i>Acceptance: 25 May 2026</i></p> <p>Keywords</p> <p><i>School Management System, Cloud Computing, Flutter, MongoDB, Dotnet, Mobile Application, Educational Technology, Real-Time Database, Authentication, Administrative Automation, Student Management, Educational Communication.</i></p>	<p>The rapid growth of mobile technologies has created new opportunities for improving communication and administrative efficiency in educational institutions. Traditional school management processes rely heavily on manual record keeping, paper-based notices, and delayed communication between teachers, students, and parents. To address these limitations, this research presents a cloud-based School Management System developed as a mobile application using Flutter and MogoDB. Flutter provides a cross-platform framework that enables a single codebase MongoDB, Dotnet offers a serverless backend with real-time database updates, authentication, secure data storage, and push notifications.</p>

Introduction

In recent years, schools have adopted digital technologies to improve efficiency, communication, and transparency. Traditional methods like paper-based attendance, handwritten notices, and physical report cards are time-consuming and error-prone. To overcome these challenges, there is a need for a centralized digital system.

This project develops a School Management Mobile Application using Flutter for the frontend and MongoDB with .NET for the backend. The system includes features like attendance tracking, homework updates, announcements, timetable management, exam results, and communication between teachers, students, and parents.

By using cloud-based and real-time technologies,

the application reduces manual work, improves data accuracy, and enhances overall school management, providing a modern and user-friendly solution.

Efficient Fee Management

- ERP can handle fee collection, invoicing, reminders, and online payments.

Centralized Data Management

- All student, teacher, administrative, and financial data is stored in one system.
- This reduces data silos, avoids duplication, and ensures consistency.

Cost Savings & Paperless Administration

- Reduces paperwork, printing, and administrative overhead.
- Less physical storage, fewer errors, lower running costs.

Automation of Administrative Tasks

- Manual tasks like attendance, admissions, timetable scheduling, and can be automated.
- Saves time for staff and reduces human error.

Better Communication

- Parent-teacher-student communication becomes smoother via portals, notifications, messages.
- Parents can track attendance, grades, homework, school announcements.

Performance Tracking & Analytics

- Schools can monitor student performance, attendance trends, teacher performance.
- Real-time reporting and analytics enable data-driven decision making.

Resource Management

- Efficient use of school resources: classrooms, etc.
- Automates timetable creation, room allocation, substitution.

Security and Compliance

- Sensitive data (student records, financials, HR) is protected centrally.
- Role-based access control ensures only authorized people see relevant data.

Improved Admission Process

- Online admission inquiry, application, enrollment—fully digital.
- Better tracking of prospective students, streamlined onboarding.

Scalability & Accessibility

- Cloud-based ERPs allow access from anywhere: school, home, mobile.

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Objective of ERPBSMS

The main objective the ERPBSMS is to make school operation very easier and to centralize all the records and data at one place to be processed in the form of various reports as and when required. Another very significant purpose behind ERPBSMS is to develop a comprehensive operation software system that ensures the smooth functioning of diurnal operations at a reasonable price.

Students Records Management

Storing all data of each individual student's in a single database and converting those raw data into information for confirmation, modification, academics analysis and personal growth check, keeping attendance and various exam related purposes.

Attendance Management

The school group event management module monitors student attendance. RFID and mobile based auto attendance of student Biometrics based attendance of staffs helps in quick time and tracking which reduces errors in group action calculation.

Fee Management

Collection of fee using various online portals and maintaining records of individuals fee payment is now an easy task by using SMS. The application can generate various fee related reports and auto set to sent fee reminder by email, sms or direct message in the login.

Schedule Management

Also maintains and updates the timetable for students and lecturers. It also sets daily classroom schedules, future events, and vacation announcements.

Report Management

The Reports and Grades module creates a student test analysis report that works between students, teachers, and parents. The grading system also helps the parents as well as the teachers to assess the progress of the students

and then follow up with the necessary mentoring and guidance.

Quiz Management

The Quiz Management module is designed to make assessments easy, interactive, and efficient for both teachers and students. Teachers can create quizzes by adding questions, multiple-choice options, correct answers, marks, and time limits. The system supports different question types such as MCQs, true/false, and short answers.

Smart Video Section

The Smart Video Section is designed to provide an interactive and personalized learning experience for students. It allows teachers to upload subject-wise video lectures, tutorials, and concept explanations that students can access anytime through the mobile app.

Teachers Records Management

Using the application, teachers, admin staffs can maintain all kinds of records on daily basis. One of the advantage of the online application is to have access of all information at fingertip. to enter a brief report in the system and all can see reports of any event or activity at any time.

Achievements Management

One of major concern of all educational organization is to maintain and highlight the records of achievers. Our application is capable enough to keep records in proper format and displays on the web portal.

The Timetabling Problem

School timetabling is a major administrative activity in any school. A number of subjects taught by the corresponding teachers are allocated into a number of available classrooms and a number of timeslots, subject to constraints.

Literature Review

There are numerous academic institutes in India. However, relatively few organisations are up to date and employ software to coordinate daily operations. There are over 1000 schools, more than 100 pre- university colleges, and degree-granting institutions in a city like New Delhi. The majority of these academic institutions still rely on a traditional management style that is primarily paper-based and labor-intensive. The students who are accepted into institutions that rely on the old-fashioned system of running things must work very hard only to obtain a certificate or any other documentation.

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The students who are accepted into institutions that rely on the old-fashioned system of running things must work very hard only to obtain a certificate or any other documentation. Additionally, the administrations have trouble keeping track of all the records and quickly retrieving the ones that pertain to them. The administrations of those institutions must also hire a lot of staff members only to keep the documents necessary to oversee and assist with their daily tasks.

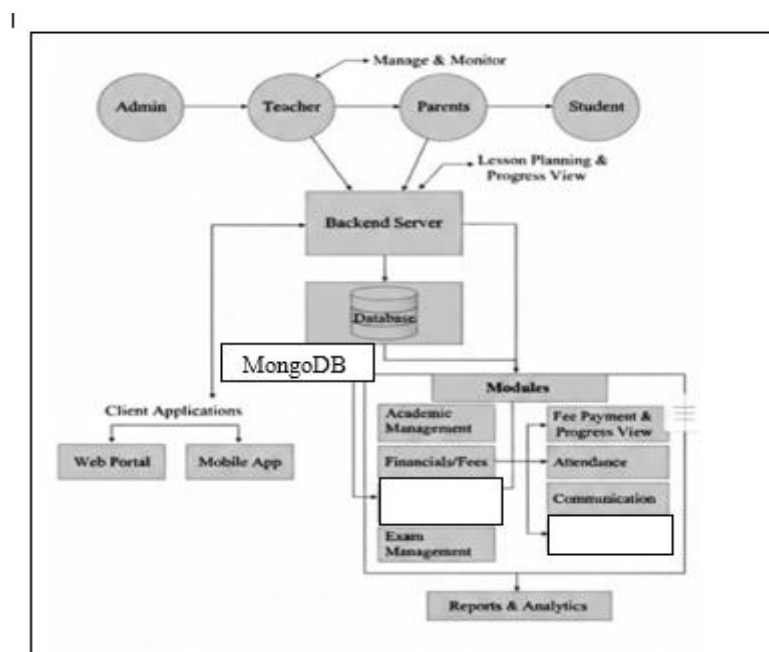
To address the aforementioned problems, certain universities, like Delhi University, Guru Gobind Singh Indraprastha University in Delhi, and DCRUST in Sonapat, Haryana, have their own web applications and pdf format of all the transcripts in a folder which was taking enormous time in finding instantly. It was also a challenging task for another record officer to find the same, if previous record officer gets transferred or leave the job. In such a situation, a centralized record keeping system was very much required to overcome with all such problems.

The previous system was also not so capable to provide the reports of the performance of students to their parents at the right time so that they can take any decision for future preparation of their wards. Some time students used to hide the manual reports and transcripts from parents which show leads to a negative impact on their future. It was not sufficiently producing the required reports to allow parents to view status of their children and reports for officials of DPS Society to help them participate in decision making.

Proposed Methodology

Micro-service architecture is being used as the development and deployment strategy for the application. A quick application development platform and an opinionated version of spring application, is used to create the micro-service architecture. The five stages of the suggested technique are requirement collecting, design, development and implementation, testing, and maintenance.

Here are a few of the application's outcomes. The user interface for the application's screen, as well as its features and functionalities, are depicted in the figures below. In a nutshell, the project's output is a collection of web pages that the web and application server has generated.



Application Design

The needs must be given a suitable structure after being gathered and examined. Based on the requirements gathered in the previous phase, the project architecture will be designed in this phase.

Many architectural diagrams, including:

- ER diagrams
- DFDs (Data Flow Diagrams)
- Use Case Diagrams

and others, are designed during this phase.

The relationship and interdependence between the entities are explained by the ER diagram.

Development and Implementation

Dotnet is used to create applications with a microservices architecture. To communicate with the database MongoDB & Dotnet. Hosted individually in accordance with the specifications and design, resulting in almost complete independence and loose coupling between all applications. The directory structure for each application will be the same to preserve consistency throughout the development process. The front end of the programme is created using Flutter to turn it into a single page web application. The cloud computing service provider AWS is where the application is hosted and delivered.

Testing

Any project must be tested to make sure it operates as expected before being made available to users. In this project, the application is put to the test by receiving various sorts of input to see if it is validating them and if it is acting in accordance with expectations or not.

Maintenance

The application must be maintained to adhere to the numerous restrictions, such as availability, reliability, etc., once it has been tested and deployed. Depending on the user's success or input, future versions of the programmes may be created.

Performance Criteria

The piece of the framework to be utilized for the record office ought to have a quick reaction time (ongoing) with most extreme throughput. Moreover, the framework ought not be occupying a lot of room in memory. The record official has picked quick reaction time over throughput and consequently the framework ought to attempt to be more intuitive. On account of the timetabling subsystem, the framework ought to be more solid to fulfill the imperatives than quick reaction time.

Dependability

The school needs the framework to be exceptionally reliable as it is normal to be utilized by non-IT experts. The framework ought to be hearty and shortcoming lenient. Moreover, as the framework is taking care of delicate information of the schools, high accentuation ought to be given concerning security, as there are subsystems to be gotten to through web.

End User Criteria

Convenience: Usability is the degree to which an item can be utilized by determined clients to accomplish indicated objectives with viability, effectiveness and fulfillment in a predefined setting of purpose. From the end clients' point of

view the framework ought to be planned so that it is not difficult to learn and utilize, productive and having not many blunders if any.

Compromise is unavoidable in attempting to accomplish a specific plan objective. One best case is the issue of safety versus reaction time. Checking User-Id and Password before a part can enter to the SMS makes reaction time issue/above. The other case is the issue of reaction time versus quality. There is some measure of time taken by the framework to create the schedule.

Programming Tool

The framework has two different applications utilizing the same database. These are the Online Application for PC and Online App for Mobile, tablets etc. which is sometimes known as slim client application. Both application are developed utilizing MongoDB and Dotnet which is one of best and secure server sided scripting languages web based application. Flutter is a server-side scripting language planned specifically for the web.

So, the client needs to stand by a short while subsequent to advising the framework to create the plan and come by the outcome to get a quality schedule.

The SMS Prototype

Here, the implemented framework is described. How the client interacts with the framework and some of the outcomes of interaction with the framework along with the screen shots are described.

As the application is completely planned to be operated over LAN, MAN and WAN, any official or teacher has to login at <https://dpssonepat.in/> when a client visit the URL <https://dpssonepat.in/>, a login screen is displayed to authenticate the client. In the event that the client has typed the correct client id and password to the login screen, the framework displays a splash screen for 3 seconds and then a Home Page containing the main menus of the framework. The main window displays menus and sub menus based on the role of the client that has logged in.

Conclusion

An automated school management system was developed to handle various school activities efficiently. The system includes web and mobile applications for teachers, students, and parents, all connected to a single database. It supports features like student registration, attendance tracking, report card and transcript generation, and timetable creation. The timetable is generated using a simple scheduling method that

assigns subjects and teachers to available time slots based on workload and availability. The system was tested using data from Delhi Public School, Sonapat, and proved effective in managing student information, generating reports, and allowing parents to monitor their child's progress online.

Future Scope

An ERP programming framework is frequently one of the most significant ventures an educational organization will make. Not only is it an important financial decision, yet it's also a practical one that can affect all parts of the business, such as human resources, accounting, manufacturing, marketing, and more. The approach which has been implemented in this research, can be expanded as per the future demands of parents, understudies, teachers and authorities.

After combining this whole module under a single head ERP based School Management System, school will not search for any third party software to cater its daily necessity. As research person and being software engineer, any other future necessity of any other educational organization can be taken into consideration and will be implemented inside given deadline.

References

E. Burke and W. Erben. Practice and Theory of Automated Timetabling, Third International Conference, Germany, Springer Private Limited, August 2000

J. G. Hedberget. al. (1992). Educational information systems: Problems of the small educational organisation. Australian Journal of Educational Technology, 8(2), 132-160. <http://www.ascilite.org.au/ajet/ajet8/hedberg.html>

M. Marte. Models and Algorithms for School Timetabling, A Constraint-Programming Approach, Ph.D dissertation, an der Fakultät für Mathematik, Informatik und Statistik der Ludwig-Maximilians-Universität München, July, 2002

R.J. Willemen. School Timetable Construction: Algorithms and Complexity, Thesis, Faculty of Mathematics and Computer Science, Technische Universiteit Eindhoven, 2002

S. Petrovic and E. Burke. University Timetabling, School of Computer Science and Information Technology, University of Nottingham, 2002, pp. 1-4

T. Willis and B. Newsome. Beginning Visual Basic

2005, Wiley Publishing, Inc., 2006

Aladwani, A.M. (2001), 'Change management strategies for successful ERP Implementation', *Business Process Management Journal*

Al-Mudimigh A., Zairi M., Al-Mashiri M. (2001), 'ERP software implementation: an integrative framework', *European Journal of Information Systems*, 10, 216-26

Argyris, C. (1991), 'Management information systems: the challenge to rationality and emotionality', *Management Science*, 291

Bingi, P., Sharma, M.K. and Godla, J. (1999), 'Critical issues affecting an ERP implementation', *Information Systems Management*, 7-14

Cooper, K. 2008, 'ERPs are no simple fix', *Graphic Arts Monthly*, vol. 80

Davenport, T. (2000), *Mission Critical - Realizing the Promise of Enterprise Systems* (Boston, MA: Harvard Business School Publishing)

Davis G.B. and Olson M.H. (1985), *Management Information Systems - conceptual foundations, structure and development*

Dong, L. (2001), 'Modeling top management influence on ES implementation', *Business Process Management Journal*

Eisenhardt, K. (1989), 'Building Theories from Case Study Research', *The Academy of Management Review*, 14:4, 532-50

Falkowski, G., Pedigo, P., Smith, B. and Swanson, D. (1998), 'A recipe for ERP success', *Beyond Computing*, 44-5.