



Development of a Hybrid Mobile App for Student Management System

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Abstract

In the event that the school or college has a large number of employees and students. Courses, student requirements, and time management are all issues that managers face on a daily basis. As a result, the proposed system in this study aims to create a student management system that utilizes a hybrid mobile application to manage student registration activities in schools. Flutter framework and Firebase database were used to create the hybrid app. This project can assist teachers, managers, and students in any school or institute in setting, selecting, and identifying a suitable time for their courses, as determined by the schedule. This project also provides significant benefits to managers in terms of managing student registrations and information.

1. Introduction

Changes in technology continue to alter possibilities for learning and create new challenges for pedagogy [1,2]. Over the last two decades, colleges and universities adapted and responded to the Internet, email, chat, and instant messaging, course management software, podcasts, personal digital assistants (PDAs), and much more. The growing use of mobile technology at colleges and universities is the most current trend forcing educators to evaluate the merits and limitations of new technology [3,4]. The Pew Internet and American Life Project reports similar trends, particularly among students 12–25-years [5]. Further, Consequently, mobile technology figures prominently in the future of higher education, particularly in its integration into teaching and learning. This project is an application used to help both teachers, students and manager by organize them schedule, time and tasks in the schools. Students are able to chatting and communicate with each other and teachers, also use to share all activates and last news in the school and use by the teachers to publish notifications for exams and other things in a fast way, so my school is more than just management app is like student's home.

The popularity of mobile devices is increasing significantly day by day, as many learners are using mobile technology in their learning environment [10, 11]. Mobile learning has many features such as

flexibility of learning anytime and anywhere which have brought new changes in learning and education environment. Therefore, this feature enables students to take advantage of their free time while they are outside the classroom to complete their studies and homework [12]. In addition, students who are waiting for their flight at the airport, they can use wireless mobile devices such as smartphone, PDA and Tablet PC to access lecture materials or download an assignment or interact with their instructors or friends. Despite m-learning has been developed fast, there is a need to investigate the elements that have influence E-learning acceptance among students in higher education institutions [13, 14]. Without considering the importance of m-learning acceptance among students and explore students' readiness levels to use mobile learning can cause ineffective use of m-learning devices. Therefore, the study of the perceptions of students for using m-learning may help the success of the adoption of m-learning in the higher education environment. Chen et al. [15] pointed out that a better understanding of the students' requirements will help the decision-maker to adopt m-learning successfully. Few empirical research studies on the use of m-learning in higher education institutions have been reported [15]. Some of these studies have suggested some of the factors that influence m-learning acceptance in higher education institutions. However, there is still a gap in the field of m-learning adoption; where many researchers have called for further investigation and research in the field of adoption of m-learning in higher education institution [11, 14, 15]. Mobile Learning for Education: Benefits and Challenges [10]. Therefore, the main objective of this study is to develop a hybrid mobile application for student management system to organize teachers, students' tasks, time and schedule and to manage student information and materials in the school.

2. Background

Using a manual system to manage the students which are records all information and in the paper was causing the job of the teachers becomes more and troublesome. The record has a possible missing or destroys it when happen to an accident. Nowadays, the school have already using the computer to manage the student information, but both of the systems they use are already outdated. The system they use all are standalone and separately, one system only has one function. This caused the teacher harder to use all the systems at the same time. The separate system without connection with each other also causes the same data and information the needed key in every system. Besides that, the system that using also does not have the communication platform for the parents to communicate with the parents. This will cause interaction between teachers and parents to become less.

Failed in tests or scores dropped are causing the student was scared to telling their parents. Some of the parents are busy with their own carrier, both of them may indifferent their child's results. Besides that, also have some student prevent their parents to know their test result, they may cheat their parents with multiple reasons like teachers haven't given back the report card or others to avoid their parents know the result. This was causing the parents does not know their children's exam or test results.

Every student's learning ability is different, some of them are good, some of them are weak. The results that get also different. As a teacher, they need to know every exam results of each student to know which subject is the weakness of students. But all the student's results are recorded and printed in paper, teachers are harder to know the performance of the students results if do not organize in tables data or graphical images. This is because, through the graph, the teacher can know if any improvement of students in terms of status, progress or performance.

3. Methodology

This section describes the process of design the study project. This methodology steps have been involved in order to ensure the software development developed systematically and provide better results.

3.1 Identifying Interface Design and Functions

In the design of the system, modular programming was adopted. Here, where used a simple, friendly, and familiar interface it's based on the Instagram interface the design was focused on the objective, quick access, and usability.

3.2 Identifying The Frontend Platforms and Tools

In this project flutter used as frontend language because it's a modern framework. In addition, flutter have provided many features to create mobile applications with it. Comparing with Java, Swift, or React Native, flutter is easier and more reliable from for hybrid applications. I personally never liked mobile application development before starting using Flutter framework. Lovely part is to can create a real native application without a bunch of code and is so easy to connect with firebase.

3.3 Identifying Database Structure and Platform

In this project firebase used to create database structure because the firebase Database let's programmer build rich, collaborative applications by allowing secure access to the database directly from client-side code. Data is persisted locally, and even while offline, real time events continue to fire, giving the end-user a responsive experience. Unlike relational databases Firebase do not contain tables and primary keys but has documents and these are the biggest problems because there is no possibility to create relation between documents instead of that, in this project the relationship was created by using the firebase function that allows the programmer to create actions between documents and make them work together.

4. Hyper Mobile Applications

A hybrid app is a software application that combines elements of both native apps and web applications [16]. Hybrid apps are essentially web apps that have been put in a native app shell. Once they are downloaded from an app store and installed locally, the shell is able to connect to whatever capabilities the mobile platform provides through a browser that's embedded in the app. The browser and its plug-ins run on the back end and are invisible to the end-user. Hybrid apps are popular because they allow developers to write code for a mobile app once and still accommodate multiple platforms. Because hybrid apps add an extra layer between the source code and the target platform, they may perform slightly slower than native or web versions of the same app.

4.1 Features of Hybrid Applications

Hybrid applications features include:

- The ability to function whether or not the device is connected.
- Integration with the mobile device's file system.
- Integration with Web-based services.
- An embedded browser to improve access to dynamic online content.

4.2 How Hybrid Applications Work

Hybrid apps work similar to Web apps but like native apps, they are downloaded to the device. Similar to Web apps, hybrid apps are typically written in HTML5, CSS, and JavaScript. Hybrid apps run code inside a container. The device's browser engine is used to render HTML and JavaScript and native APIs to access device-specific hardware. Although a hybrid app will typically share similar navigation elements as a Web app, whether or not the application can work offline depends on its functionalities. If an application does not need support from a database, then it can be made to function offline.

4.3 Hybrid vs. Native vs. Web

Native applications are built specifically for the platform they are installed on. They can take advantage of a mobile device's hardware, including the accelerometer, GPS and camera. Native applications are written in the same language the platform's operating system is written in. So, for example, a native iOS app should be written in Objective-C and Swift.

4.4 Flutter

Flutter [17] is a free and open-source mobile UI framework created by Google and released in May 2017. In a few words, it allows to create a native mobile application with only one codebase. This means, that one programming language and one codebase enough to create mobile application for both iOS and Android platform. Flutter consists of two important parts:

- An SDK (Software Development Kit) is a set of tools that assist the development of applications.
- A Framework (Widget-based User Interface Library): A collection of reusable user interface

elements (buttons, text inputs, sliders, and so on) that can customize to fitful of user needs.

4.5 Firebase

It can be defined as Backend as a Service (Baas). It provides developers with a variety of tools and services to help them build high-quality applications, grow their user base, and generate revenue. It is based on Google's infrastructure. Firebase is classified as a NoSQL database program that stores data in JSON-like documents. Firebase includes features like authentication, realtime database, hosting, notifications that make it more useful, secure, and easier to use.

5. Results and discussion

5.1 Database Module

Because firebase is a non-SQL database, we've attempted to make it as relational as possible by using a special technique called firebase functions, which is a serverless framework that allows the user to run backend code in response to events triggered by Firebase features and HTTPS requests [18]. Code written in JavaScript or Typescript is stored in Google's cloud and executed in a controlled environment. It's not necessary to manage and scale servers on your own. The database module is illustrated in the diagram below, in which the user profile is either a student or a teacher, and both of these accounts are linked to posts, feeds, and classes to meet their specific needs.

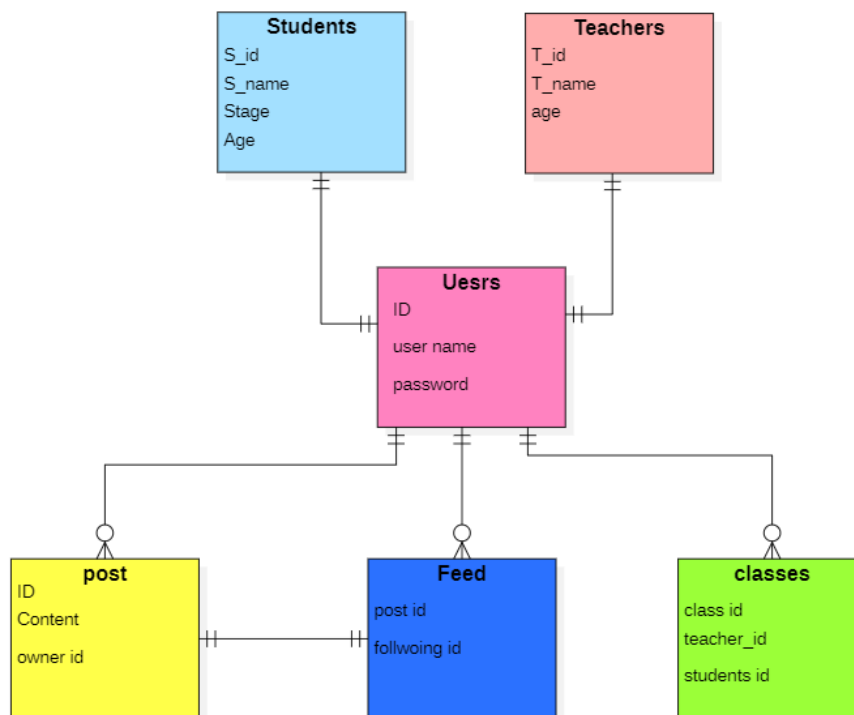


Figure 1. NoSQL Database Module

5.2 Student Management Application

The login and registration form has been designed for both existing and new users using G-Suite email or Gmail to get started with the application. Managers, teachers, and students are among the three types of permissions available through the verification account. The manager has the ability to add new instructions to all students and teachers while also keeping track of all user activity. Teachers can add new material by going to the class page and clicking on the plus icon to open a new page, then typing in the text and attaching a file using the attachment icon (see figure 2).

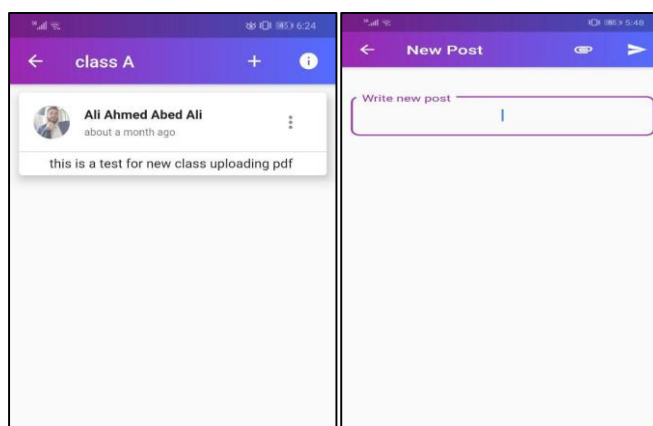


Figure 2. Class home and adding new materials

To improve student-to-student collaboration and knowledge sharing, the app also provides student-to-teacher and student-to-student communication. This section is combined in one app to avoid the use of other social media in the classroom. The app's social media section, where schedules and announcements are used to facilitate the exchange of ideas among students and teachers as a community. User profile tracking and unfollowing locations have also been implemented to give users more flexibility. Firebase provides an admin page for all logged database and system activity to manage and monitor the activity of all users. The administration page also offers additional analysis to help improve the system based on the needs of users or employees.

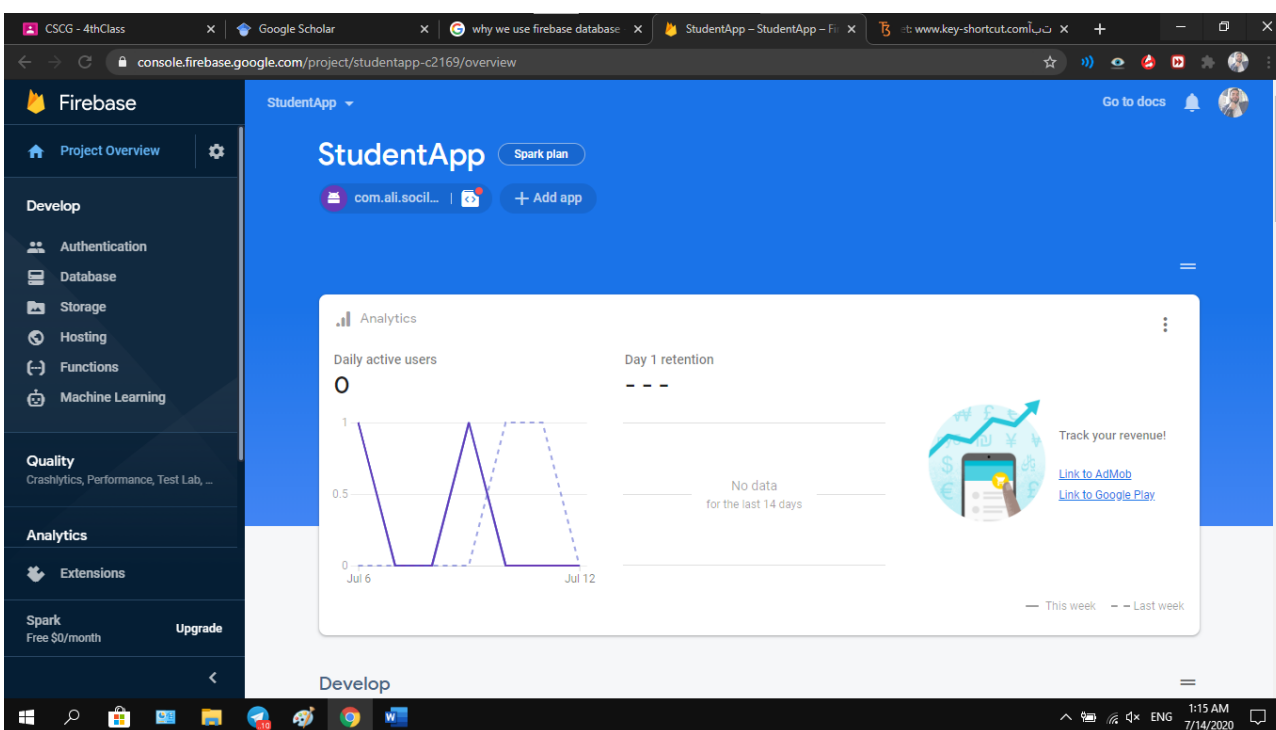


Figure 3. Full Administration Page

6. Conclusion

Developing e-learning application by hybrid mobile application to improve the teaching-learning process in higher educational institutions. This project is unique in that it covers almost every aspect of an educational organization, which is critical for improving educational quality. Almost all methods have been

used in this work to extract knowledge from contributors who are affiliated with educational organizations. Using hyper mobile applications were found more flexible and faster to implement an idea and project for the organization. In which the reliability and flexibility for whole mobile versions as well as quality of performance.

Conflict of Interest

The authors declare that they have no conflict of interest.

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