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Real-Time Attendance Management System

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***Abstract*—** The process of recording/managing attendance has been carried out since many decades. Typical process involves calling out the names of each participant serially which is manually noted down using pen-paper. We propose a secure, parallel, centralised and faster process of attendance management. A mobile application needs to be installed on the stakeholder's smart phone. The organiser will start the process of attendance which will generate a unique code. The code is shared with the participants (students) which are required to input it on the application. The application will check for the physical presence of the participants using the GPS co-ordinates. The organiser will immediately get the report which is also stored in a central store which can be on premise or on the cloud. This application can also be configured as a SAAS (Software as a Service) offering where multiple organisations can use the same instance of the backend application as the separation is done at the class level.

***Keywords*—**GPS, Magic Code, React Native, Spring Boot, Android Application

I. INTRODUCTION

Real-time Attendance Management System (RAMS) is the program developed for the students' regular attendance. The college had used to rely heavily on paper records. This paper focuses on the simple and intelligible way of preventing information which reduces paper and time. The system is completely managed by admin on the profile of the staff, student details, and student attendance, the admin will introduce new students, retain existing staff and teachers, and display the student attendance report as well. Through a safe, electronic portal, the faculties can directly access all aspects of student development. After the class is done, the instructor will be able to access the student's information saved on the faculty's server. Many of the other attendance management systems such as biometrics, fingerprinting, and facial recognition will also help us conduct the attendance without the use of pen and paper, but the major downside is the planning of the hardware devices and the low-budget implementation of such devices will lead to disguise. The application is designed to address the limitations of the previous system, and is very useful and can be used easily without the need for any hardware tools. The special feature of this application is that we have used the GPS by setting the latitude and longitude values to the range of the classroom where the students will have to enable their GPS to automatically mark their attendance as present if they are within the specified latitude range and the longitude values defined by the application. Another purpose of the software is to automatically generate the report at the session end. Besides, the proposed system provides a graphical user interface that allows users to handle the application very easily while the information is very accurate and even user friendly. This project's research is the program is built i.e. the project is established as the mobile application that will operate on any of the platforms.

The Main contribution of our paper is
We are developing real time attendance management system using react native technology which supports both android and IOS platform to reduce the manual attendance system which is integrated with the GPS. It also facilitates to access the attendance information of a particular student in a particular class.

By developing this application it has provided very good accurate result for monitoring the attendance system through mobile app.

The accuracy of particular method is it records all the data from day one of student attendance to the completion of the course. And it also gives the brief information about the student, teacher, and the admin modules.

II. RELATED WORK

[1] The paper gives us the information about how the android mobile application is developed. This mobile application will require connecting to the internet through Wi-Fi (Wireless Fidelity) technology or GPRS (General Packet Radio Service). Lecturers will first have to sign up for this and then they can take attendance any time they wish by first logging in with the help of a smartphone to the server. After attendance has been taken lecturer will send it over to the server via GPRS. The lecturers can also enrol new students, delete information about a particular student, modify some information, etc.

[2] The design and implementation of the system is to provide service in institute and colleges. The system is to provide a comprehensive student information system and the user interface is to replace the current paper records. College Staff uploads attendance, results, and college notifications through a secure, online interface using android devices. All data is thoroughly reviewed and validated on the server before actual record alteration the system plans for student user interface, allowing students to access tips and tricks as provided by their seniors. All data is stored securely on SQL servers managed by the college Administrator.

[3] The rapid progress in mobile technology has created a new area which is known as mobile learning. Mobile learning is the next generation of e-learning that leads an attractive way of knowledge delivery especially used in the teaching and learning process. With the development of this Android application the student preferred to use mobile devices as a technology support educational tool. This system is designed because not education in the class is difficult considering semester duration, the student might miss the exam and important notice displayed due to unawareness, chances of false marking of attendance is more due to more paperwork is done manual attendance entry, evaluation and report generation is tedious and time-consuming job.

[4] In this paper basic problem of student attendance management is defined which is traditionally taken manually by faculty. One alternative to make student attendance system automatic is provided by Computer Vision by using RFID tags and face recognition. In this paper, we review the various computerized system which is being developed by using different techniques. Based on this review a new approach for student attendance recording and management is proposed to be used for various colleges or academic institutes.

[5] The purpose of developing an attendance management system is to computerized the traditional way of taking attendance. Another purpose for developing this software is to generate the report automatically at the end of the session or in the between of the session.

III. METHODOLOGY

We have a mobile phone and desktop application in system architecture. The desktop application is a web-based application that can be accessed via web and linked to the cloud-based network. The mobile client connects with the Java-based cloud server, the spring boot, and the database.

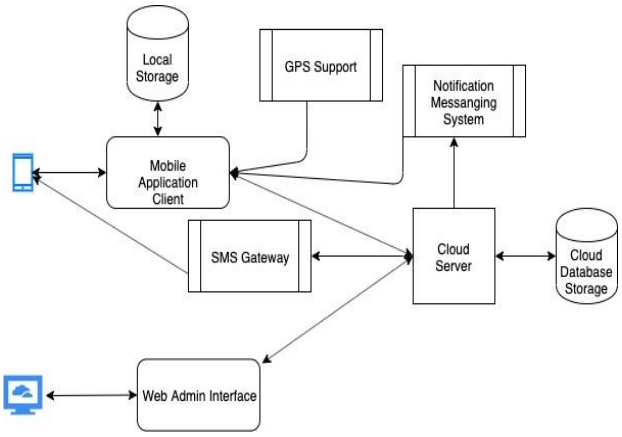

Fig 1: System architecture

The mobile device is the client that queries the cloud server and is stored in the storage of the cloud database. The Client must allow the GPS help. The communication between the client and the server takes place using the rest of the API to build a new session table for each user in the database, there are four interface requirements defined by the API and they are as follows: Create, Update, Delete and Read. Create will help us to create the new entry of the student by the lecturer. Update will help us to constantly keep track of the new data and the new admissions of the student. Delete will help us to delete the records of the passed out students in turn which will help us reduce the space. The final database of the students and lecturers will be stored in the cloud database storage. After the session completes the email will be sent to the faculty which is called a notification messaging system. The web admin interface can be used to upload the data. The SMS gateway is used to send the SMS.

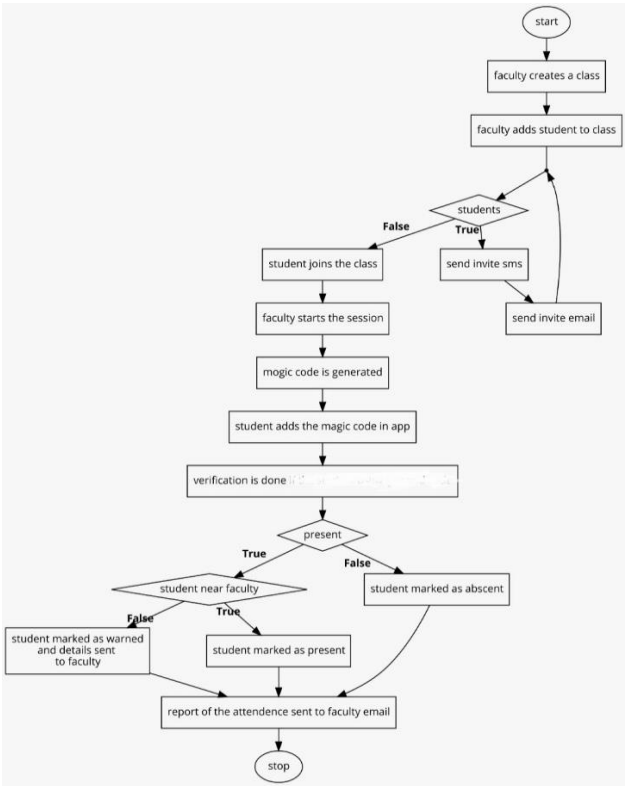

Fig 2: Flow of the application

The flow of the application is explained below, the application starts with the admin creating or bootstrapping the first faculty, the admin can also create multiple faculties. Once the faculty is activated, the faculty will be able to log into the mobile application, once the faculty is logged into the mobile app, a dashboard screen will be shown to the user, and one of the options will be to "create a class". Once the user clicks on create a class the user will be redirected to a new page where they will have an option to add details about the class like a branch, semester, section, etc. The user will then save the class. Once the user successfully creates a class, the next step will have the option to invite the students. The students can be invited individually or via a bulk upload option where the option will be importing a CSV file. Once the details are uploaded the students will be invited via a link. The student needs to click on it so that the application file for android will be downloaded.

When the session starts, the faculty will have an option to start the attendance. Once the faculty clicks on it the magic code will be generated. This magic code is unique in the list of active sessions. The code needs to be shared with the students. The students need to enter this code infinite amount of time. If that time is passed, the attendance will be stopped automatically, this time is configurable by the admin, the faculty can manually also stop the attendance process if the process is completed.

The students will need to login to the app, go to the "give attendance" option, and add the magic code. The system will automatically find the corresponding session which is linked with the magic code by sending it to the backend server. The student also needs to be present physically at a given 'x' distance away from the faculty. This distance is calculated by getting the GPS co-ordinates of the faculty and the students. If the student is situated more than 'x' meters away from the faculty, the student will be suitably flagged in the report.

Once the session is over, the faculty will get a list of all the students who are absent or flagged by the system if they are more than 'x' meters away. At the end of the session, an email with a .csv file is also sent to the email of the faculty which will have the status as 'present', 'absent', or 'flagged'. These details will also be maintained in suitable tables in the backend which is located on the cloud. The cloud server will contain the databases of the students.

IV. RESULTS AND DISCUSSION

We're concentrating mainly on the digitized attendance in this phase. Within the upcoming screenshots, we will clarify how the student and faculty will log in and carry out the further steps. As soon as the user downloads the application onto their android mobile devices, they will have to log in to the application using their valid credentials. Once the faculty is signed in to the application, it will be possible to control the classes and take the attendance while the student will be able to manipulate the databases.

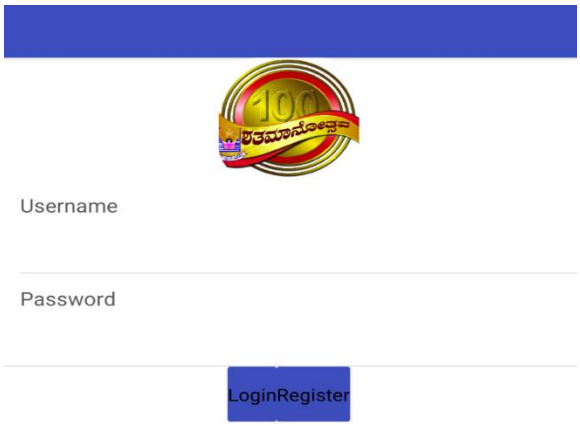

Fig 1: Login page

This is the web page of the login dashboard that appears when we open the attendance management application which asks the user to fill in the username and password to login for the user and the faculty register.

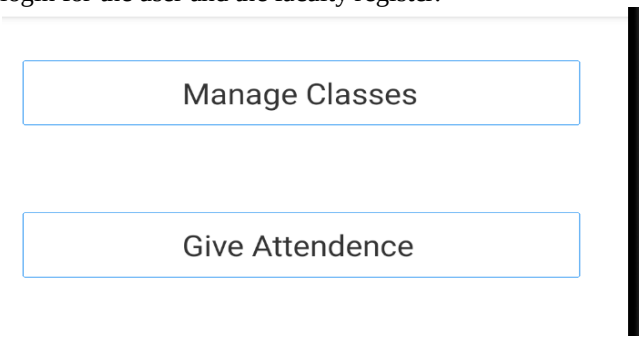

Fig 2: Dashboard page

Once the authentication is checked, it will take control of the above page by asking the user to pick one of the above two choices. If the user is a faculty then they would choose to manage the classes, if the user is a student they would choose to give the attendance.

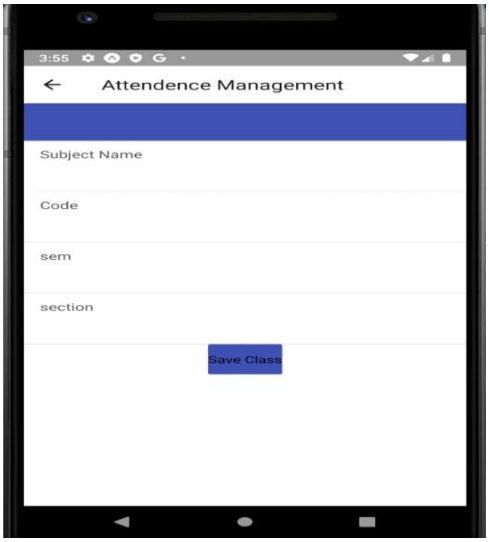

Fig 3: Faculties views of creating the class

Upon entering the faculty to manage the classes they would see the above page which provides the details about the subject name, code, department together with the section by creating the classes they can fix their slots accordingly.

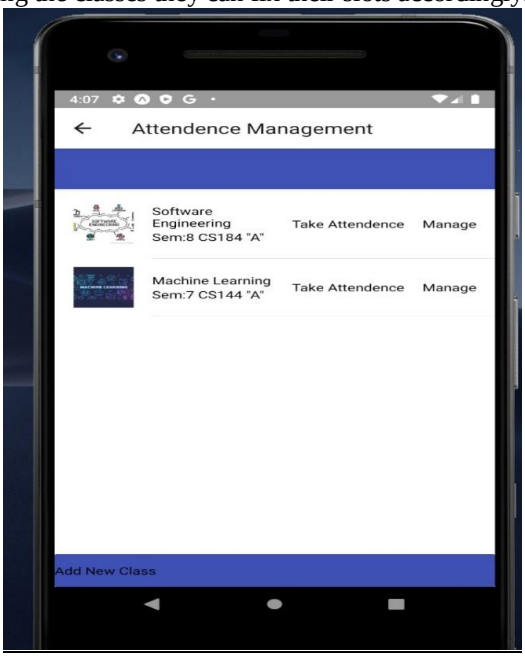

Fig 4: Faculties managing the class

The classes created by the faculty will look like this in the diagram above. They can select the respective classes and start to take the attendance by tapping the Take Attendance button, if they want to edit the classes they have created, they can choose the Manage Classes area.

Fig 5: Magic code display

Once the faculty agrees to take the attendance, they can see the magic code page where together with the timer the 6-digit random magic code is created. The magic code which could be shown to the faculty will be announced to the students and the students will have to enter the magic code within the stated time. Once the lecturer clicks the Finish button, the answer page will stop the students from approving the answers.

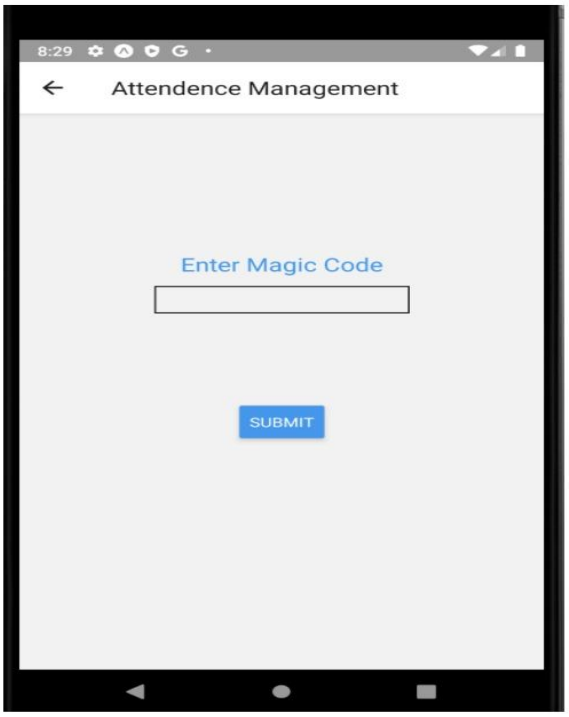

Fig 6: Student entering the Magic code

Here the students need to enter the magic code that is been announced by the lecturer during the process of taking the attendance. Once the student enters the magic code and clicks on the submit button his/her attendance will be marked as present.

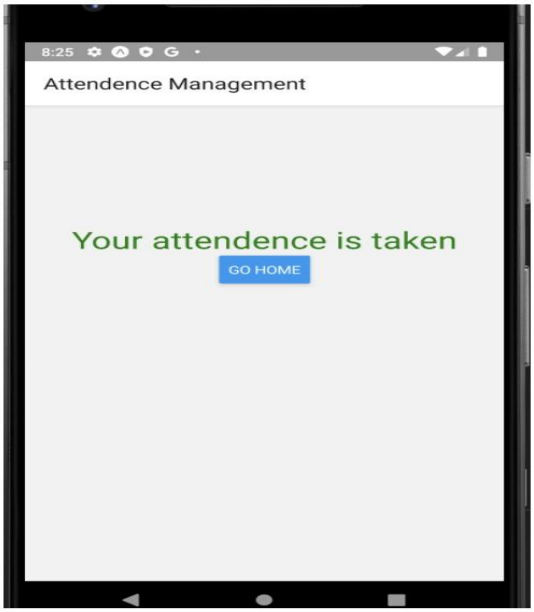

Fig 7: Confirmation screen

Once the student clicks on the submit button, the above message will appear on the screen stating that his/her attendance is been recorded in the database. Once the attendance is taken they can Go Back to the dashboard.

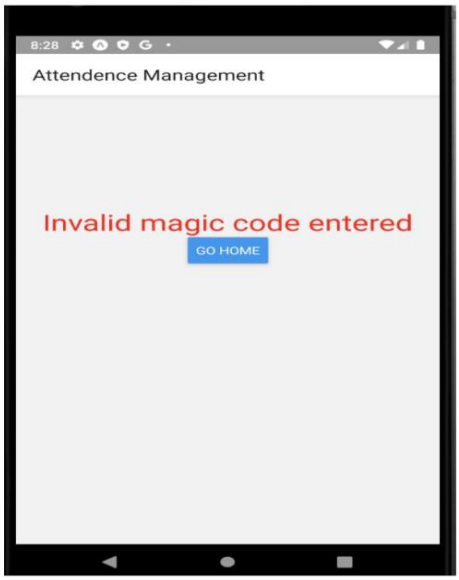

Fig 8: Invalid entry of Magic code

If the student enters the wrong magic code then the message Invalid Magic Code will be printed. If the does the mistake in entering the code they would not be able to re-enter the magic code and their attendance would be marked as absent. This message will also help us in identifying the students who try to hack or who try to hear the magic code and then enter it without staying in classes.

V. CONCLUSION AND FUTURE SCOPE

In this paper, we have presented a new attendance system approach that is quicker and more effective, and the data can be stored in the cloud. The new approach aims to use the mobile phone and features such as GPS to allow safe management of attendance. Also in this phase we created and demonstrated the mobile application for both the faculty and the student to be installed on the user computer. We've been using GCP (Google Cloud Platform) to build a virtual machine and deploy our cloud backend app. This backend framework connects to the mobile clients by using the scalable and versatile Rest protocols so that more functionality can be applied to the device. The system also uses a micro service-based model where the mobile front end application is completely different from the backend application, and because standard protocols have been used the system can be implemented into such apps if there is a need to build other clients. The Rest API's works on JWT (json web tokens) which is a industry standard for authentication and authorisation.

Many organisations have an internal application of management of classes. This application can also be integrated with them using Rest API and information can be shared automatically between them.

This application can also be integrated for online learning and webinars. Since the application collects GPS co-ordinates of the participants, a heat map can be shown to the organiser which can provide data insights to the demographics of the participants.

Future project extensions may include functionality, such as device updates that can be applied to the mobile app for any class details. A discussion board can be set up at the level of the class/session where ideas may be shared between students and faculty. A knowledge base can be applied to the session layer where the video can be stored and played directly in the device in case of virtual sessions, and greater protection can be introduced by using the Bluetooth to boost the accuracy of the distance between the faculty and the student.

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