Student Progressive Attendance Record Keeper

(SPARK)

A Project Report

Submitted to the APJ Abdul Kalam Technological University

in partial fulfillment of requirements for the award of degree

Bachelor of Technology

in

Information Technology

by

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CERTIFICATE

This is to certify that the report entitled **Student Progressive Attendance Record Keeper (SPARK)** submitted by **Adwaid M** (TRV19IT005), **Ratan Thomas David** (TRV19IT043), **Ron Regi Zacharia** (TRV19IT045) & **Roshan Aji Cherian** (TRV19IT046) to the APJ Abdul Kalam Technological University in partial fulfillment of the B.Tech. degree in Information Technology is a bonafide record of the project work carried out by him under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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DECLARATION

We hereby declare that the project report **Student Progressive Attendance Record Keeper (SPARK)**, submitted for partial fulfillment of the requirements for the award of the degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by us under supervision of Dr.Haripriya A P

This submission represents our ideas in our own words and where ideas or words of others have been included, we have adequately and accurately cited and referenced the original sources.

We also declare that I have adhered to the ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

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Abstract

In the present scenario, accurate and timely attendance recording has become very important, mainly since the current grading systems in various educational institutes include attendance as a parameter. Hence in order to avoid any overlooked errors in recording, students must be able to view the status of their attendance at any given instant; at the same time giving teachers and/or the administrator the authorization control. Most attendance systems in institutions are not maintained properly or are not very user-friendly.

SPARK (Students Progressive Attendance Record Keeper) makes it easy to view information for both teachers and students alike. The organized user interface of SPARK enables teachers and students to access authorized information very quickly making it less frustrating. The unsophisticated design of the system helps in smooth maintenance. The proposed system is also virtually flawless in terms of recording attendance as the teachers and administrators are the final authority, and they have the ultimate control, increasing the reliability of the system. SPARK provides information such as attendance percentage, number of days absent, and number of classes a student must attend to obtain a minimum attendance percentage. A messaging system will allow parents to receive messages on their phones when the attendance percentage of their ward drops below the required minimum.

Acknowledgement

We take this opportunity to express my deepest sense of gratitude and sincere thanks to everyone who helped us to complete this work successfully. We express our sincere thanks to Dr. Vijayanand K.S, Head of Department, Information Technology, Government Engineering College, Barton Hill, for providing us with all the necessary facilities and support.

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Contents

List of Figures

Chapter 1

Introduction

Nowadays, as technology is advancing it becomes very essential and beneficial for different systems to adapt and integrate different technologies. Accurate and timely attendance recording has become very important, mainly since the current grading systems in various educational institutions include attendance as a parameter. Hence in order to avoid any overlooked errors in recording, students must be able to view the status of their attendance at any given instant, at the same time giving teachers and the administrator the authorization control. Most attendance systems in institutions are not very user-friendly. SPARK (Students Progressive Attendance Record Keeper) makes it easy to view information for both teachers as well as students.

Chapter 2

Literature Review

Accurate and timely attendance recording has become very important, mainly since the current grading systems in various educational institutions include attendance as a parameter. Nowadays, as technology is advancing it becomes very essential and beneficial for different systems to adapt and integrate different technologies. The use of conventional and manual methods for monotonous tasks is being replaced with technology that makes them effortless. Managing attendance is no different and must make use of such technologies.

2.1 Traditional Method

Manual attendance marking is a tedious task and is counter-productive. Institutes that employ this method for marking attendance will find it difficult to manage large data. It is also very tiring for the teachers and students and also may lead to inaccuracies if not done properly.

2.2 Attendance using Bio-metric System

Many companies and institutes use biometrics to record attendance. But, such a biometric system is bound to have some flaws because it uses physical devices and interaction. The rate of error for biometric systems is higher than the manual methods. There are mainly two types of errors that can arise; *False Acceptance Rate (FAR)* and *False Rejection Rate (FRR)*. FAR happens when the device accepts an unauthorized

person, and FRR occurs when an authorized person is rejected. Data stored in these systems like fingerprints and retina is very unique and sensitive. If this information is hacked it causes huge security issues.

2.3 Attendance using Face Recognition

Using face recognition is another popular method for taking attendance. It may seem to be hassle-free but has its own disadvantages. Image quality affects how well facial-recognition algorithms work. Compared to a digital camera the video scanning takes in lower quality video and therefore, inaccuracies can occur. Students wearing masks or are far away from the cameras may not be detected properly and will be marked as absent. Processing every frame is a humongous task and might cause performance issues.

2.4 Traditional Method

Manual attendance marking is a tedious task and is counter-productive. Institutes that employ this method for marking attendance will find it difficult to manage large data. It is also very tiring for the teachers and students and also may lead to inaccuracies if not done properly.

2.5 Attendance Management through Web Application

The internet has made it easy for managing systems through a wide range of devices. Marking attendance through the internet enables various features and easier maintenance of the system. Through different tools, the application can be made to be user-friendly, effective, and secure.

2.5.1 Secure Authentication

On the login page, there's a radio button with an option for the user which indicates whether he/she is a teacher or student. This makes the system insusceptible to unauthorized access. The **passport module** is used here along with ***bcrypt* middleware**.

2.5.2 Responsive and Organized Layout

The web pages, created using **bootstrap** and **CSS**, are responsive i.e., they can adjust according to the screen size making them easy to use across various devices. The coherent layout makes the web pages easy to navigate conspicuously.

2.5.3 Functions for Teachers and Students

Both teachers and students, upon logging in, are taken to a landing page which is differentiated by data received from the database. Teachers have at their disposal features to add and remove students, view student details, view course details, add and view courses, enroll and unenroll students (including enrolling as a batch), and mark the students' attendance. Students, on the other hand, can view their attendance.

2.5.4 Benefits of using MongoDB and the Mongoose Schema

- **Real-time availability** of attendance details enables students to stay updated on their progress and helps them in maintaining a good attendance score.
- **Scalability** is another important feature that the system offers owing to MongoDB's optimal load balancing. MongoDB also offers better execution of queries making it a low-maintenance application.
- Schema using Mongoose makes **collection validation** and applying constraints on collection facile.

Chapter 3

System Development

SPARK has been developed using a host of essential web development technologies. The way the system has been developed has been elaborated on in this section.

3.1 Database Design

SPARK Attendance Management System has been developed keeping the following database schema under consideration

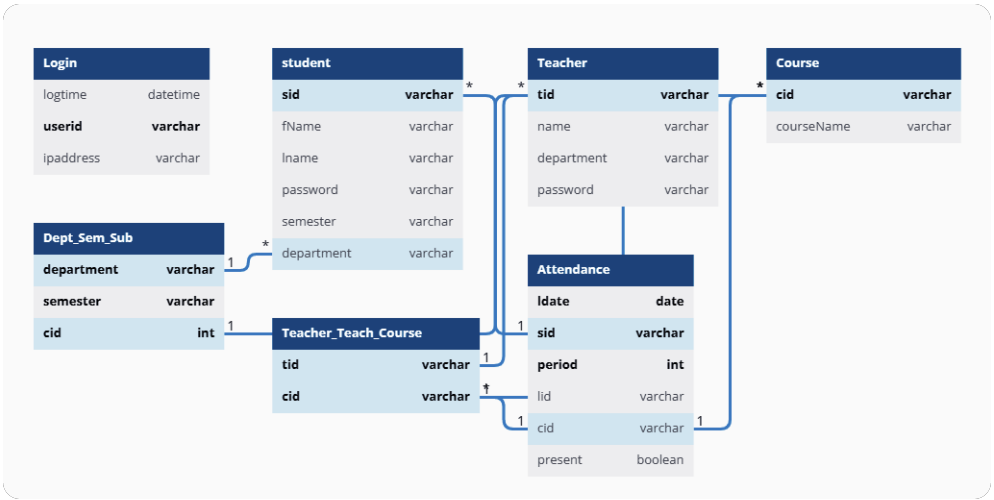

Figure 3.1: Database Schema

The LOGIN table has the fields login time, username, and IP address. Both the student and teacher login details when they login to the application get stored in this table. The username of the person who is logging in is used as the primary key of the table.

The STUDENT table has all the details of a student who is enrolled in the college including the student ID, student name, student password, current semester, and the department to which the student belongs. Student id is used as a primary key in this table.

The TEACHER table, similar to the STUDENT table stores all the details of a TEACHER such as a teacher ID and password which are used to login into the application. The COURSE table stores the details of a course begin provided within the college. The course ID is used as a primary key in this table.

The TEACHERTEACHESCOURSE table stores a mapping of each teacher and the courses that they teach. The combination is used as a composite key in this table.

The DEPTSEMSUB table stores the mapping of different subjects associated with a particular department. The ATTENDANCE table stores the attendance details of each student along with the course and the day on which the attendance was obtained.

A student has a one-to-many relationship with the attendance table because an individual student can have multiple attendance entries. Similarly, a course can also have multiple entries within the attendance table and therefore a one-to-many relationship exists between a course and attendance.

3.2 Technologies Used

The following technologies were used to develop SPARK :

1. HTML with EJS - Basic structure of the different web pages.
2. CSS - Basic layout of web page elements.
3. Bootstrap Framework - For styling and creating responsive UI elements such as buttons and cards.
4. Node.js - Environment for integrating back-end and front-end aspects and generating dynamic web pages.
5. Express - Used for routing to move through multiple pages for various functions

6. MongoDB and Mongoose - For creating the schema and database and creating collections in the database containing documents and establishing relationships between the different documents

3.2.1 Login and Logout System

This project's login and logout system has been implemented using the passport module, an authentication middleware listed on *npm*. The local Strategy of Passport module has been used to authenticate users. Login and Logout systems for students and teachers have been implemented using two different strategies which do not interfere with each other. *bcrypt* middleware has also been used to ensure that the user passwords are hashed before storing them in the database.

3.2.2 Route Handling

Route handling in the project is handled by the Express framework of Node.js. Different routes which are encountered in accessing different functions of the application have been defined using express. Post routes, in which the user makes a form submission has been handled using the body-parser middleware of Node.js.

3.2.3 Database Interaction

The Cloud version of MongoDB is used in the application which ensures the real-time updation of data among different types of users. Connection to the MongoDB database and the database operations have been implemented using the mongoose module.

3.2.4 Responsiveness

Responsiveness has become a major requirement in the current world of mobile devices. Responsiveness in SPARK has been ensured using the Bootstrap CSS Framework. By using the responsive classes available within Bootstrap, we can ensure that the application is compatible across different screen sizes.

3.2.5 Hosting

The project has been hosted on the Internet using Heroku's Free Cloud Hosting Feature. Heroku enables a user to deploy a website with minimal knowledge of server hosting.

Chapter 4

Results and Discussion

An attendance management system that can be easily used and maintained by the students and the teachers is developed. This newly developed system is highly scalable and can meet the needs of the college authorities which requires systems that would be able to process large amounts of student data. The system helps the students to keep track of their attendance as it's getting updated on a real-time basis. As in for privacy and data breach, unauthorized access to restricted functions is shut out and security for the data is provided within the system. The UI design adopted is very minimal to impart an aesthetic finish to the users.

4.1 Login Page

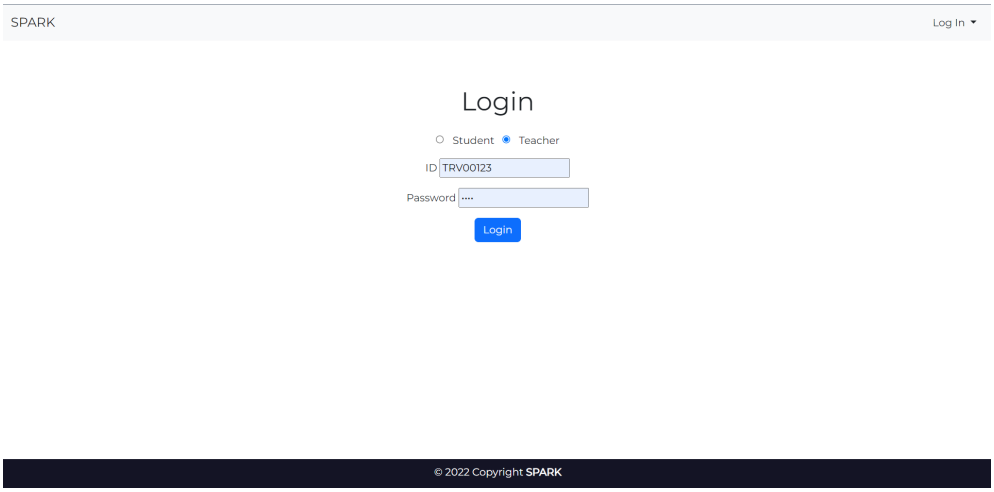

Figure 4.1: Login Page

Login page: A common login and logout system has been developed for both the students and teachers. Two different strategies have been developed to allow specific user authentication. Access rules have also been specified which prevent unauthorized access to different routes. (Fig 4.1)

4.2 Landing Pages

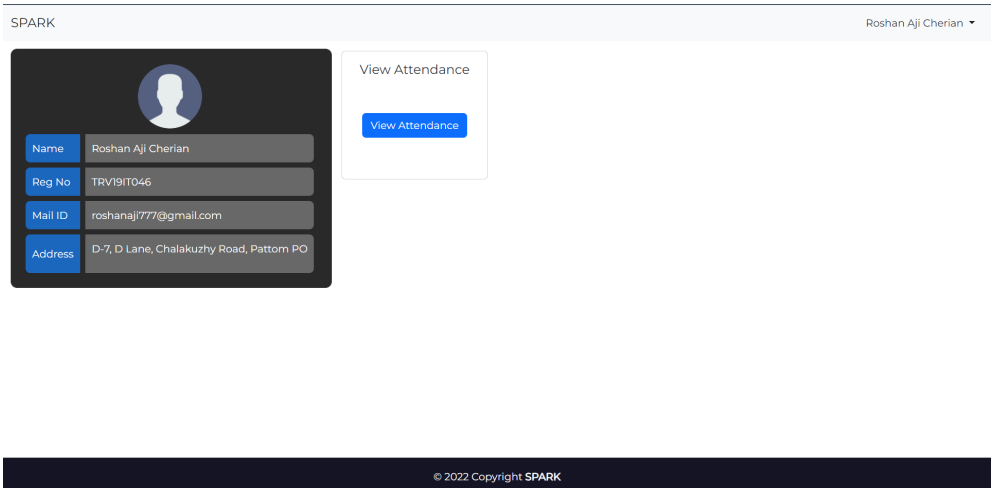

Figure 4.2: Student Landing

The student landing (Fig 4.2) page consists of a dashboard with personal information. Along with that, there is a view attendance feature that allows the student to see his/her attendance for various courses he/she is enrolled in.

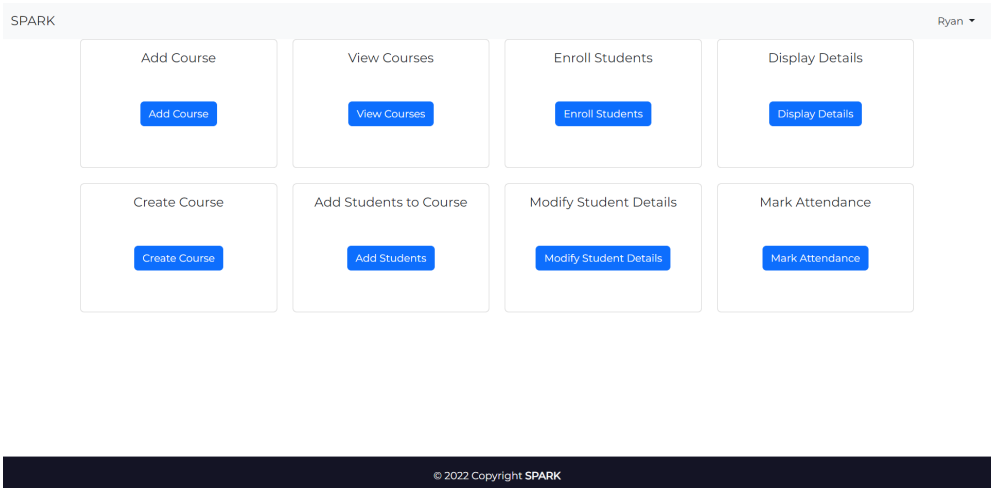

Figure 4.3: Teacher Landing

The teacher landing page provides the teacher with all the functions that a teacher

can perform. This includes Adding Students, Adding Students to a Course, Creating a Course, Marking Attendance, Enrolling a Teacher in a Course, and Viewing Student Details.

Chapter 5

Conclusion

A sound attendance management system is the expectation of parents and it is the need for educational institutions to bring efficient and effective administrative management. Overall, a sound attendance management system simplifies the tedious traditional process of marking attendance. In a world that's moving fast, everything needs to be up to date and in real-time. Integrating systems like SPARK enables institutions to keep their attendance management hassle-free. Hence it is important for institutes to implement it and improve institute management.

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