**SIMATS SCHOOL OF ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**CHENNAI-602105**

**SCHOOL MANAGEMENT SYSTEM**

**A CAPSTONE PROJECT REPORT**

*Submitted in the partial fulfillment for the award of the degree of*

**BACHELOR OF ENGINEERING**

**Submitted by**

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**DSA0181 Object Oriented Programming with C++ for System Developers**

**JAN 2025**

**BONAFIDE CERTIFICATE**

We**, P.R.Durga prasad [192111578],N.Chanchu Teja [192111553]** students of **Bachelor of Engineering**, Department of Computer Science and Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, hereby declare that the work presented in this Capstone Project Work entitled **School Management System**is the outcome of our own bonafide work and is correct to the best of our knowledge and this work has been undertaken taking care of Engineering Ethics.

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Date:

Place:

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**ABSTRACT:**

The School Management System (SMS) is a comprehensive software solution designed to streamline and enhance the administrative and academic functions of educational institutions. Leveraging modern software engineering practices and technologies, this system facilitates the efficient management of student data, staff records, timetables, attendance, examinations, and communication between stakeholders. The system integrates user-friendly interfaces with robust backend operations to ensure accuracy, scalability, and data security. This document explores the development, features, and benefits of the proposed School Management System, focusing on its ability to reduce manual administrative workload, improve decision-making through data analytics, and foster an environment conducive to learning and teaching.

Overall, this project contributes to the advancement of educational institution management by addressing operational inefficiencies and enhancing user experience. Additionally, the study emphasizes the integration of modern technology to ensure the system's relevance and adaptability to evolving educational needs.

**INTRODUCTION:**

In the dynamic landscape of education, effective management of resources, processes, and communication is pivotal for academic success and organizational efficiency. A School Management System (SMS) serves as a centralized platform to automate and optimize the various administrative and academic tasks within an educational institution. From student enrollment to performance evaluation, the SMS addresses diverse challenges that institutions face, including data redundancy, inefficient workflows, and fragmented communication channels.

This project explores the design and implementation of a School Management System with features tailored to meet the needs of schools, colleges, and universities. Key functionalities include:

1. **Student Information Management**: Centralized storage and retrieval of student records, including personal details, academic history, and disciplinary records.
2. **Staff Management**: Efficient handling of staff recruitment, attendance, payroll, and performance evaluation.
3. **Attendance and Timetable Management**: Automated tracking of student and staff attendance and dynamic timetable generation to optimize resource allocation.
4. **Examination and Grading**: Simplified examination scheduling, grading, and result generation, ensuring transparency and accuracy.
5. **Communication Module**: Enhanced communication channels between administrators, teachers, students, and parents through notifications, messaging, and announcements.
6. **Data Analytics**: Real-time insights and reporting for decision-making, such as enrollment trends, attendance patterns, and academic performance metrics.

By the end of this project, participants will have a clear understanding of the functionalities, implementation, and advantages of a School Management System. The goal is to provide a scalable, secure, and user-friendly solution that enhances educational institution operations and promotes academic excellence.

**STATEMENT OF THE PROBLEM:**

Educational institutions often face challenges related to managing large volumes of data, inefficient administrative workflows, and communication gaps. The lack of an integrated system results in time-consuming manual processes, data inconsistency, and difficulty in monitoring and evaluating academic and administrative activities. Additionally, with the increasing need for remote learning and digital communication, traditional methods of school management are becoming obsolete. Addressing these issues requires a centralized, automated, and scalable solution that can handle the complexities of modern education systems efficiently.

**NEED FOR THE STUDY:**

The need for studying and implementing a School Management System arises from the growing demand for efficiency, transparency, and reliability in educational administration. As institutions evolve to accommodate increasing student enrollments, diverse learning methodologies, and technological advancements, a robust system is essential to ensure seamless management. Moreover, the COVID-19 pandemic has accelerated the adoption of digital tools, making a case for SMS as a critical component of contemporary education infrastructure.

**SCOPE OF THE STUDY:**

The scope of this study includes the development and evaluation of a comprehensive School Management System. Key areas of focus are:

1. **Student Lifecycle Management**: From admission to graduation, the system will manage all stages of a student’s academic journey.
2. **Administrative Automation**: Automating repetitive tasks such as fee collection, attendance tracking, and timetable scheduling.
3. **Data Security and Privacy**: Ensuring secure storage and handling of sensitive information, complying with data protection regulations.
4. **Customizability and Scalability**: Supporting institutions of various sizes and adapting to their unique requirements.
5. **Integration with Modern Technologies**: Incorporating cloud computing, mobile apps, and analytics for enhanced functionality and accessibility.
6. **Performance Metrics**: Establishing benchmarks and KPIs to measure the system’s effectiveness and user satisfaction.

**LITERATURE REVIEW:**

**TITLE**: Advanced School Management Systems: A Comprehensive Review  
**AUTHOR**:Dr.J.Smith,A.Brown  
**YEAR**: 2021

**2.1 Overview**

This literature review explores existing solutions for school management and their evolution. It highlights the importance of integrating technology in educational administration and identifies gaps in current systems, such as limited scalability, lack of analytics, and user interface challenges.

**2.2 Methodologies and Algorithms**

Common methodologies in SMS development include modular architecture for flexibility, relational database management systems (RDBMS) for data handling, and machine learning algorithms for predictive analytics and personalized learning experiences.

**2.4 Performance Evaluation**

Performance evaluation of School Management Systems involves analyzing user adoption rates, operational efficiency gains, and data accuracy improvements. Case studies demonstrate significant reductions in administrative workload and enhanced academic performance tracking.

**2.5 Future Directions and Challenges**

Future advancements in SMS include AI-driven personalized learning plans, blockchain-based credential management, and integration with IoT for resource optimization. Challenges include ensuring affordability, user training, and data privacy compliance.

**EXISTING SYSTEM:**

Several School Management Systems are currently available, addressing specific aspects of educational administration. Examples include:

1. **Student Information Systems (SIS)**: Focused on managing student records.
2. **Learning Management Systems (LMS)**: Used for e-learning and course delivery.
3. **Fee Management Software**: Streamlining financial transactions.
4. **Attendance Tracking Tools**: Automating attendance processes.
5. **Communication Portals**: Enhancing interactions among stakeholders.

While these tools offer valuable functionalities, they often operate in silos, leading to inefficiencies and data duplication. An integrated SMS aims to bridge these gaps.

**PROPOSED SYSTEM:**

The proposed School Management System integrates advanced technologies to provide a unified platform for managing academic and administrative tasks. Key features include:

1. **Centralized Database**: Unified storage for all institutional data, ensuring consistency and accuracy.
2. **Dynamic Timetable Generation**: Optimized scheduling based on resource availability and academic priorities.
3. **Mobile App Integration**: Enabling access to SMS features on-the-go for students, parents, and staff.
4. **AI-Powered Analytics**: Predictive insights for academic performance, enrollment trends, and resource utilization.
5. **Cloud-Based Architecture**: Facilitating remote access, scalability, and disaster recovery.
6. **Customizable Modules**: Tailored features to meet the specific needs of different institutions.

The system prioritizes user experience, data security, and operational efficiency, positioning itself as a future-ready solution for modern educational institutions.

**CODE:**

#include <iostream>

#include <fstream>

#include <vector>

#include <string>

#include <iomanip>

#include <sstream>

#include <limits>

using namespace std;

// Utility function to split strings

vector<string> splitString(const string &data, char delimiter) {

vector<string> tokens;

stringstream ss(data);

string token;

while (getline(ss, token, delimiter)) {

tokens.push\_back(token);

}

return tokens;

}

// Base class for file handling

class FileHandler {

protected:

void writeToFile(const string &filename, const string &data) {

ofstream outFile(filename, ios::app);

if (!outFile) {

cerr << "Error opening file for writing: " << filename << endl;

return;

}

outFile << data << endl;

outFile.close();

}

vector<string> readFromFile(const string &filename) {

vector<string> lines;

ifstream inFile(filename);

if (!inFile) {

cerr << "Error opening file for reading: " << filename << endl;

return lines;

}

string line;

while (getline(inFile, line)) {

lines.push\_back(line);

}

inFile.close();

return lines;

}

};

// Student Class

class Student : public FileHandler {

int id;

string name, address, phone;

public:

void registerStudent() {

cout << "Enter ID: ";

cin >> id;

cin.ignore(numeric\_limits<streamsize>::max(), '\n');

cout << "Enter Name: ";

getline(cin, name);

cout << "Enter Address: ";

getline(cin, address);

cout << "Enter Phone: ";

cin >> phone;

writeToFile("students.txt", to\_string(id) + "," + name + "," + address + "," + phone);

cout << "Student Registered Successfully!" << endl;

}

void displayStudents() {

vector<string> students = readFromFile("students.txt");

if (students.empty()) {

cout << "No students registered yet!" << endl;

return;

}

cout << "Student Records:" << endl;

for (const string &student : students) {

vector<string> fields = splitString(student, ',');

if (fields.size() == 4) {

cout << "ID: " << fields[0] << ", Name: " << fields[1] << ", Address: " << fields[2] << ", Phone: " << fields[3] << endl;

} else {

cout << student << endl;

}

}

}

};

// Teacher Class

class Teacher : public FileHandler {

int id;

string name, subject, qualification;

float experience, salary;

public:

void addTeacher() {

cout << "Enter ID: ";

cin >> id;

cin.ignore(numeric\_limits<streamsize>::max(), '\n');

cout << "Enter Name: ";

getline(cin, name);

cout << "Enter Subject: ";

getline(cin, subject);

cout << "Enter Qualification: ";

getline(cin, qualification);

cout << "Enter Experience (years): ";

cin >> experience;

cout << "Enter Salary: ";

cin >> salary;

writeToFile("teachers.txt", to\_string(id) + "," + name + "," + subject + "," + qualification + "," + to\_string(experience) + "," + to\_string(salary));

cout << "Teacher Added Successfully!" << endl;

}

void displayTeachers() {

vector<string> teachers = readFromFile("teachers.txt");

if (teachers.empty()) {

cout << "No teachers added yet!" << endl;

return;

}

cout << "Teacher Records:" << endl;

for (const string &teacher : teachers) {

vector<string> fields = splitString(teacher, ',');

if (fields.size() == 6) {

cout << "ID: " << fields[0] << ", Name: " << fields[1] << ", Subject: " << fields[2] << ", Qualification: " << fields[3]

<< ", Experience: " << fields[4] << " years, Salary: " << fields[5] << endl;

} else {

cout << teacher << endl;

}

}

}

};

// Class Schedule Class

class ClassSchedule : public FileHandler {

string className, subject, teacherID, time;

public:

void addSchedule() {

cout << "Enter Class Name: ";

cin.ignore(numeric\_limits<streamsize>::max(), '\n');

getline(cin, className);

cout << "Enter Subject: ";

getline(cin, subject);

cout << "Enter Teacher ID: ";

getline(cin, teacherID);

cout << "Enter Time (e.g., 9:00 AM): ";

getline(cin, time);

writeToFile("schedule.txt", className + "," + subject + "," + teacherID + "," + time);

cout << "Class Schedule Added Successfully!" << endl;

}

void displaySchedules() {

vector<string> schedules = readFromFile("schedule.txt");

if (schedules.empty()) {

cout << "No schedules added yet!" << endl;

return;

}

cout << "Class Schedules:" << endl;

for (const string &schedule : schedules) {

vector<string> fields = splitString(schedule, ',');

if (fields.size() == 4) {

cout << "Class: " << fields[0] << ", Subject: " << fields[1] << ", Teacher ID: " << fields[2] << ", Time: " << fields[3] << endl;

} else {

cout << schedule << endl;

}

}

}

};

// Attendance Class

class Attendance : public FileHandler {

string date, studentID;

bool isPresent;

public:

void markAttendance() {

cout << "Enter Date (YYYY-MM-DD): ";

cin >> date;

cout << "Enter Student ID: ";

cin >> studentID;

while (true) {

cout << "Is Present? (1 for Yes, 0 for No): ";

cin >> isPresent;

if (cin.fail() || (isPresent != 0 && isPresent != 1)) {

cin.clear();

cin.ignore(numeric\_limits<streamsize>::max(), '\n');

cout << "Invalid input! Please enter 1 for Yes or 0 for No." << endl;

} else {

break;

}

}

writeToFile("attendance.txt", date + "," + studentID + "," + (isPresent ? "Present" : "Absent"));

cout << "Attendance Marked Successfully!" << endl;

}

void viewAttendance() {

vector<string> attendance = readFromFile("attendance.txt");

if (attendance.empty()) {

cout << "No attendance records yet!" << endl;

return;

}

cout << "Attendance Records:" << endl;

for (const string &record : attendance) {

vector<string> fields = splitString(record, ',');

if (fields.size() == 3) {

cout << "Date: " << fields[0] << ", Student ID: " << fields[1] << ", Status: " << fields[2] << endl;

} else {

cout << record << endl;

}

}

}

};

// Main Menu

int main() {

Student student;

Teacher teacher;

ClassSchedule schedule;

Attendance attendance;

int choice;

do {

cout << "\n--- School Management System ---\n";

cout << "1. Register Student\n";

cout << "2. Display Students\n";

cout << "3. Add Teacher\n";

cout << "4. Display Teachers\n";

cout << "5. Add Class Schedule\n";

cout << "6. Display Class Schedules\n";

cout << "7. Mark Attendance\n";

cout << "8. View Attendance\n";

cout << "0. Exit\n";

cout << "Enter your choice: ";

cin >> choice;

switch (choice) {

case 1:

student.registerStudent();

break;

case 2:

student.displayStudents();

break;

case 3:

teacher.addTeacher();

break;

case 4:

teacher.displayTeachers();

break;

case 5:

schedule.addSchedule();

break;

case 6:

schedule.displaySchedules();

break;

case 7:

attendance.markAttendance();

break;

case 8:

attendance.viewAttendance();

break;

case 0:

cout << "Exiting..." << endl;

break;

default:

cout << "Invalid choice!" << endl;

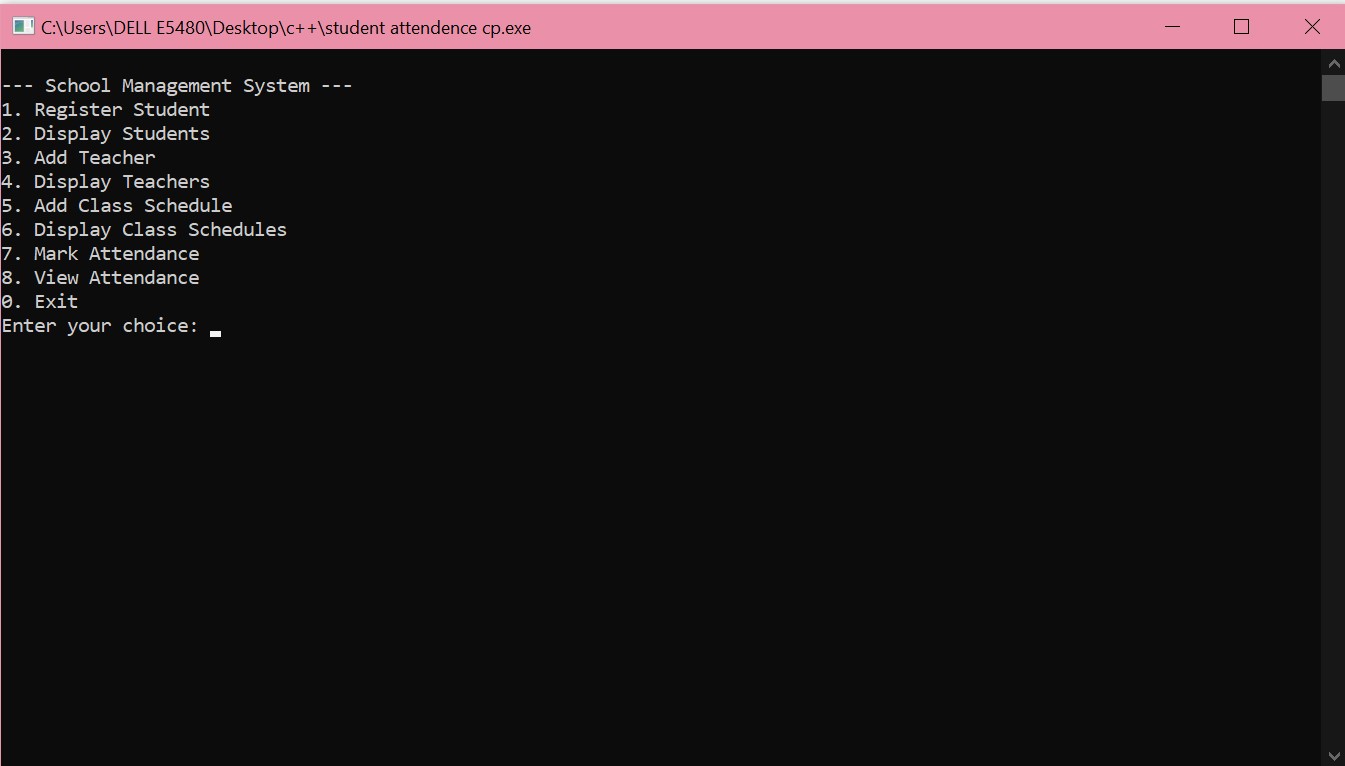
}

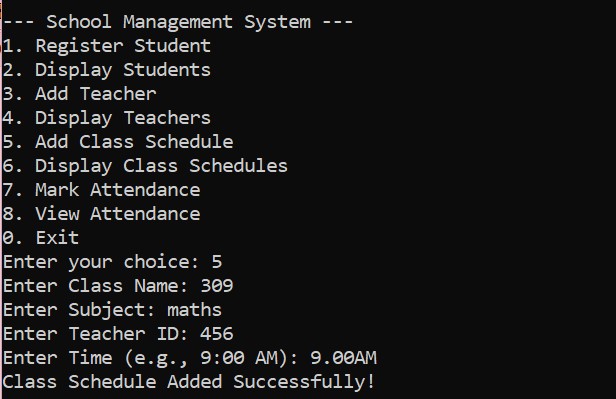
} while (choice != 0);

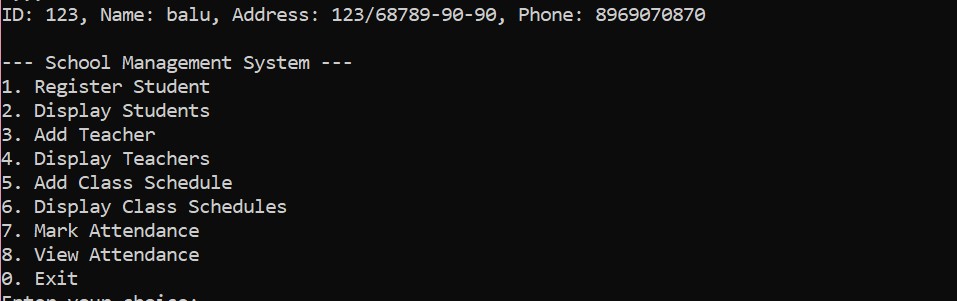
    return 0;

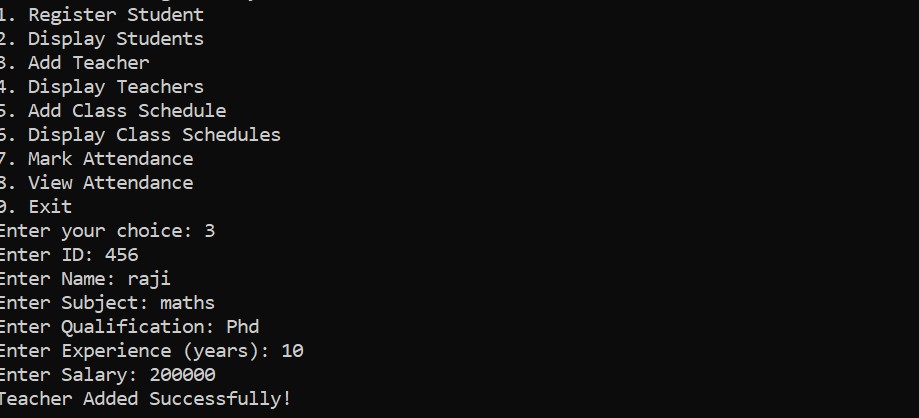
}

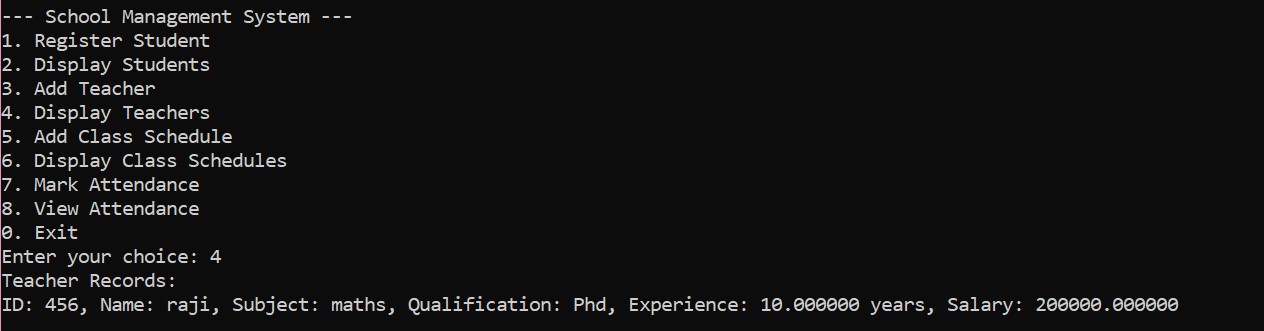
**OUTPUT:**

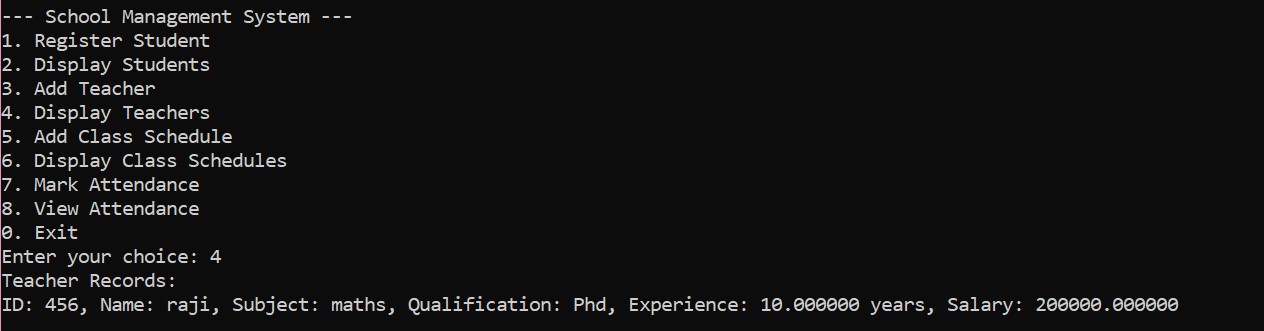


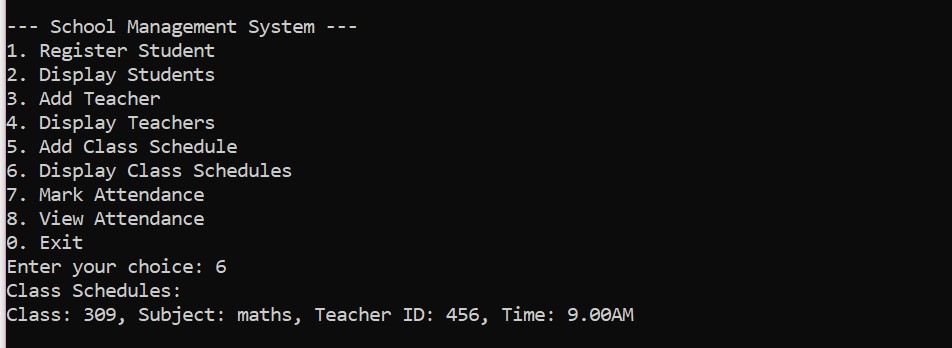


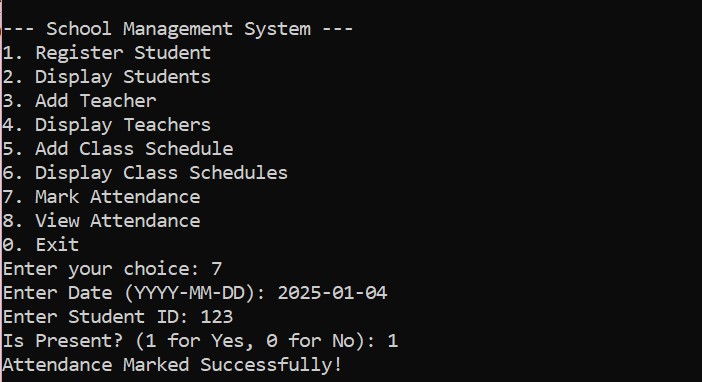
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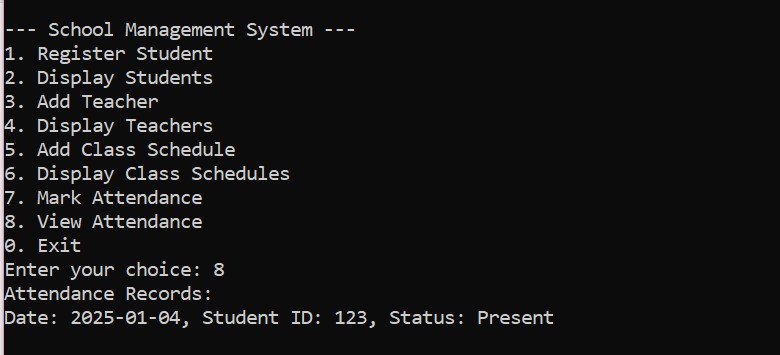
****

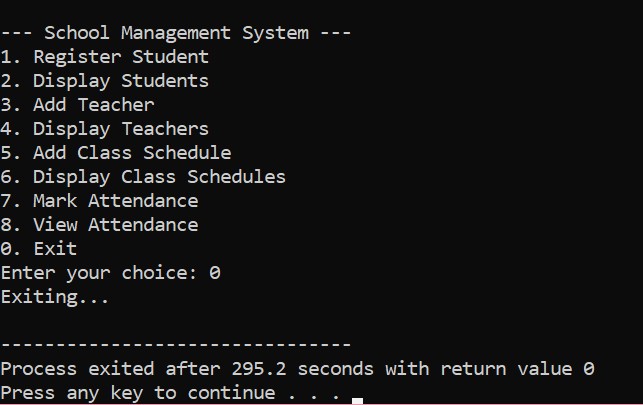
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**CONCLUSION:**

In conclusion, the implementation of a School Management System (SMS) offers transformative benefits for educational institutions by streamlining administrative tasks, enhancing academic management, and fostering effective communication. The proposed system integrates advanced features such as centralized database management, dynamic timetable scheduling, AI-driven analytics, and cloud-based architecture to address operational inefficiencies. With its emphasis on scalability, data security, and user-friendly interfaces, the system caters to the diverse needs of schools, colleges, and universities. By adopting modern technologies and methodologies, the SMS ensures adaptability to evolving educational requirements and prepares institutions for future challenges. This comprehensive solution not only reduces administrative workload but also contributes to improved decision-making, better resource utilization, and enhanced academic outcomes, ultimately creating a more effective and efficient learning environment.

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These references provide insights into the methodologies, technologies, and case studies that underpin the design and implementation of modern School Management Systems, ensuring their relevance and effectiveness in diverse educational contexts.