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| Rachna College of Engineering and Technology, Gujranwala | **Rachna College of Engineering and Technology, Gujranwala**  (A Constituent College of UET, Lahore)  **Department of Computer Science** |

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**Student Management System Project**

**1. Project Overview**

This proposal outlines the development of a **Student Management System** that will help manage student data, including personal details and academic records. The system will provide an easy-to-use interface for administrators to securely log in, add new students, search, update, and manage student records. The project will be implemented in **C++**, using a linked list structure to store data, and it will include file storage to ensure data is saved for future use.

**2. Objectives**

- Build a simple, efficient system for managing student records.

- Ensure secure access by implementing an admin login system.

- Provide functionality to add, update, search, and delete student records.

- Implement file storage to save and retrieve student data, even after the program is closed.

**3. Key Features to Implement**

**1.Admin Login System:**

- A login feature will be implemented to ensure only authorized administrators can access the system. The administrator will be prompted to enter a username and password to log in securely.

**2.Student Record Management:**

- The system will allow the administrator to add, update, and delete student records. Each student’s record will contain fields such as:

- Student ID

- Name

- Phone number

- Qualification

- Course enrolled

- Marks

**3.Data Persistence (File Storage):**

- The system will use file handling to store student data in a file. This ensures that student records are saved when the program is closed and can be retrieved when it is reopened.

**4.Search Functionality:**

- The administrator will be able to search for a student by their ID or name. This will make it easier to find specific records, especially in larger databases.

**5.Update and Delete Features:**

- The system will include options for updating an existing student’s details and deleting records. This will give the administrator full control over the management of student data.

**4. Data Structures and Algorithms**

**1.Linked List Data Structure:**

- A **linked list** will be used to store student records. Each record (or node) will contain the student's information and a pointer to the next record. This structure is dynamic, allowing for easy addition and deletion of records.

**2.Planned Algorithms:**

**-Insertion Algorithm:**

- A new node (student record) will be created and added to the end of the linked list.

**-Search Algorithm:**

- The system will implement a search function that traverses the linked list to find a student by their ID or name.

**-Update Algorithm:**

- The update function will locate the node corresponding to the student to be updated and modify the relevant details.

**-Delete Algorithm:**

- The delete algorithm will remove a student record from the linked list by adjusting the pointers between nodes to maintain the list’s integrity.

**-File I/O Algorithm:**

- File input/output algorithms will be used to store student data in a file and retrieve it when the program restarts, ensuring data persistence.

**5.Planned Development Features**

**1. Admin Login:**

- The login system will ensure that only authorized administrators can access and modify student data.

**2. Data Persistence (File Storage):**

- All student data will be saved to a file to ensure it is not lost when the system is closed. On startup, the system will read the file and load the student records.

**3. Search Functionality:**

- The system will include a search feature allowing administrators to find students by their ID or name quickly.

**4.Update and Delete Student Records:**

- Administrators will be able to update student records if there are changes or remove records if a student is no longer part of the system.

**5.Text-based Interface:**

- The system will be implemented with a text-based interface for simplicity and ease of use. Commands will be entered via the console, with future potential to upgrade to a graphical user interface (GUI).

**7.Conclusion**

The **Student Management System (SMS)** will be a simple, secure, and efficient way to manage student records. The use of linked lists will allow for flexible data handling, while file storage will ensure data is not lost when the system is closed. With functionalities for adding, updating, deleting, and searching student records, the system will provide all the basic tools needed to manage student information effectively.