



Project Report

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Project Report: Simple Student Management System

Introduction: -

The project is designed to implement a **Student Management System** in C++ that manages data for students, administrators, doctors, and assistants. The system uses various data structures such as linked lists, stacks, and binary trees to organize and process information efficiently. Key functionalities include managing applicants, tracking accepted and rejected students, and handling course and salary details for doctors and assistants.

Techniques Used and Their Purpose: -

1. Linked List

- **Reason:** Used for dynamic and sequential storage of data such as admin IDs, student lists, and queue operations. The linked list allows flexible memory usage and ease in insertion/deletion operations.

2. Queue

- **Reason:** Used to manage the sequence of applicants in the system. The queue structure ensures a first-in-first-out (FIFO) processing of student applications.

3. Stack

- **Reason:** Utilized for handling salary details of doctors and assistants. The stack structure allows efficient addition and

removal of salary entries with a last-in-first-out (LIFO) approach.

4. Binary Tree

- **Reason:** Implemented for organizing courses based on their attributes, such as payment rates. The binary tree enables efficient search and traversal of course data.

Functions Overview: -

1. Admin Functions

- **Create_Admins_List:** Builds a linked list of admin IDs.
- **Display_Admins_List:** Displays all admin IDs in the linked list.
- **Search_Admins_List:** Searches for a specific admin ID in the linked list.
- **Display_Admin:** Authenticates an admin by verifying ID and password.

2. Applicants Functions

- **enqueue:** Adds a new applicant to the queue.
- **dequeue:** Removes and processes the first applicant in the queue.
- **displayQueue:** Displays the list of all applicants in the queue.

3. Applicants Status Functions

- **insert:** Adds a student to the accepted or rejected list (linked list).
- **display:** Displays the details of students in a specific list.

4. Doctor and Assistant Functions

- **addCourses_Doctors / addCourses_Assistants:** Adds courses to a binary tree.
- **InorderDisplayCourses_Doctors / InorderDisplayCourses_Assistants:** Displays all courses in an in-order traversal.
- **pushSalary_Doctors / pushSalary_Assistants:** Adds salary details to a stack.
- **popSalary_Doctors / popSalary_Assistants:** Removes the latest salary entry from the stack.
- **calculateTotalSalary_Doctors / calculateTotalSalary_Assistants:** Computes the total salary based on hours and rate.
- **displaySalaryDetails_Doctors / displaySalaryDetails_Assistants:** Displays the total salary details.

Sample Outputs with all possible options: -

Admin: first possibility

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for ' Admin ' or (2) for ' User ': 3
Invalid Choice, Please try again.
Press (1) for ' Admin ' or (2) for ' User ': 1

Valid IDs:-
50000
50010
50020
50030
50040
50050

Enter your ID: 40000
ID not found, Please try again.
Enter your ID: 50000
Valid ID!
Enter your password: 11111
Invalid password, Please try again!
Enter your password: 12345
Access Granted! Welcome back :)

Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 5
Invalid Choice, Please try again.
Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 1

Applicants in the Queue:
ID: 100001, Age: 20, Name: Mohamed, Phone: 0123456789, Gender: m
ID: 100002, Age: 19, Name: Dina, Phone: 0107654321, Gender: f
ID: 100003, Age: 25, Name: Mostafa, Phone: 0112233445, Gender: m
ID: 100004, Age: 18, Name: Mahmoud, Phone: 0123456789, Gender: m
ID: 100005, Age: 22, Name: Aya, Phone: 0107654321, Gender: f
ID: 100006, Age: 29, Name: Ahmed, Phone: 0112233445, Gender: m
ID: 100007, Age: 21, Name: Khaled, Phone: 0112233445, Gender: m
ID: 100008, Age: 20, Name: Youssef, Phone: 0153456789, Gender: m
ID: 100009, Age: 19, Name: Yousra, Phone: 0107654321, Gender: f
ID: 100010, Age: 25, Name: Mohamad, Phone: 0112233445, Gender: m
ID: 100011, Age: 18, Name: Ziad, Phone: 0123456789, Gender: m
ID: 100012, Age: 22, Name: Sara, Phone: 0107654321, Gender: f
ID: 100013, Age: 20, Name: Ali, Phone: 0112233445, Gender: m
ID: 100014, Age: 21, Name: Waleed, Phone: 0112233445, Gender: m

C:\Users\M A\OneDrive\Desktop\Codes VS 2022\C++ projects\Simple Student Management System\Debug\Simple Student Management System.exe (process 10960) exited with code 0 (0x0).
Press any key to close this window . . .
```

Admin: second possibility

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for ' Admin ' or (2) for ' User ': 3
Invalid Choice, Please try again.
Press (1) for ' Admin ' or (2) for ' User ': 1

Valid IDs:-
50000
50010
50020
50030
50040
50050

Enter your ID: 30000
ID not found, Please try again.
Enter your ID: 50050
Valid ID!
Enter your password: 44444
Invalid password, Please try again!
Enter your password: 12345
Access Granted! Welcome back :)

Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 0
Invalid Choice, Please try again.
Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 2

Rejected students' list:-
ID: 100003, Age: 25, Name: Mostafa, Phone: 0112233445, Gender: m
ID: 100005, Age: 22, Name: Aya, Phone: 0107654321, Gender: f
ID: 100006, Age: 29, Name: Ahmed, Phone: 0112233445, Gender: m
ID: 100010, Age: 25, Name: Mohamad, Phone: 0112233445, Gender: m
ID: 100012, Age: 22, Name: Sara, Phone: 0107654321, Gender: f
ID: 100013, Age: 20, Name: Ali, Phone: 0112233445, Gender: m

C:\Users\M A\OneDrive\Desktop\Codes VS 2022\C++ projects\Simple Student Management System\Debug\Simple Student Management System.exe (process 18820) exited with code 0 (0x0).
Press any key to close this window . . .
```

Admin: third possibility

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for 'Admin' or (2) for 'User': 3
Invalid Choice, Please try again.
Press (1) for 'Admin' or (2) for 'User': 1

Valid IDs:-
50000
50010
50020
50030
50040
50050

Enter your ID: 20000
ID not found, Please try again.
Enter your ID: 50040
Valid ID!
Enter your password: 33333
Invalid password, Please try again!
Enter your password: 12345
Access Granted! Welcome back :)

Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 8
Invalid Choice, Please try again.
Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 3

Accepted students' list:-
ID: 100001, Age: 20, Name: Mohamed, Phone: 0123456789, Gender: m
ID: 100002, Age: 19, Name: Dina, Phone: 0107654321, Gender: f
ID: 100004, Age: 18, Name: Mahmoud, Phone: 0123456789, Gender: m
ID: 100007, Age: 21, Name: Khaled, Phone: 0112233445, Gender: m
ID: 100008, Age: 20, Name: Youssef, Phone: 0153456789, Gender: m
ID: 100009, Age: 19, Name: Yousra, Phone: 0107654321, Gender: f
ID: 1000011, Age: 18, Name: Ziad, Phone: 0123456789, Gender: m
ID: 1000014, Age: 21, Name: Waleed, Phone: 0112233445, Gender: m

C:\Users\VI A\OneDrive\Desktop\Codes VS 2022\C++ projects\Simple Student Management System\x64\Debug\Simple Student Management System.exe (process 9872) exited with code 0 (0x0).
Press any key to close this window . . .
```

Admin: fourth possibility

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for 'Admin' or (2) for 'User': 3
Invalid Choice, Please try again.
Press (1) for 'Admin' or (2) for 'User': 1

Valid IDs:-
50000
50010
50020
50030
50040
50050

Enter your ID: 10000
ID not found, Please try again.
Enter your ID: 50000
Valid ID!
Enter your password: 999999
Invalid password, Please try again!
Enter your password: 12345
Access Granted! Welcome back :)

Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 7
Invalid Choice, Please try again.
Press (1) to view 'Admissions list' or (2) to view 'Rejected Students' or (3) to view 'Accepted Students' or (4) to view 'Current Students': 4

Current students' list:-
ID: 100001, Age: 20, Name: Mohamed, Phone: 0123456789, Gender: m
ID: 100002, Age: 19, Name: Dina, Phone: 0107654321, Gender: f
ID: 100004, Age: 18, Name: Mahmoud, Phone: 0123456789, Gender: m
ID: 100007, Age: 21, Name: Khaled, Phone: 0112233445, Gender: m
ID: 100008, Age: 20, Name: Youssef, Phone: 0153456789, Gender: m
ID: 100009, Age: 19, Name: Yousra, Phone: 0107654321, Gender: f
ID: 1000011, Age: 18, Name: Ziad, Phone: 0123456789, Gender: m
ID: 1000014, Age: 21, Name: Waleed, Phone: 0112233445, Gender: m

C:\Users\VI A\OneDrive\Desktop\Codes VS 2022\C++ projects\Simple Student Management System\x64\Debug\Simple Student Management System.exe (process 15508) exited with code 0 (0x0).
Press any key to close this window . . .
```

User: Doctor

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for ' Admin ' or (2) for ' User ': 2
Welcome :)
Press (1) for ' Doctor ' or (2) for ' Assistant ': 3
Invalid Choice, Please try again.
Press (1) for ' Doctor ' or (2) for ' Assistant ': 1

Valid IDs:-
90000
90010
90020
90030
90040
90050

Enter your ID: 7
ID not found, Please try again.
Enter your ID: 90000
Valid ID!
Enter your password: 4
Invalid password, Please try again!
Enter your password: 678910
Access Granted! Welcome back :)

Press (1) to display the Courses: 2
Invalid Choice, Please try again.
Press (1) to display the Courses: 1

Your Courses:
Course Name: Linear Algebra
Hours: 3
Money Per Hour: 150
-----
Course Name: Electronics
Hours: 3
Money Per Hour: 90
-----
Course Name: Physics
Hours: 3
Money Per Hour: 100
-----

Press (2) to display the Salary: 1
Invalid Choice, Please try again.
Press (2) to display the Salary: 2
Total Salary: 2340$
```

User: Assistant

```
Microsoft Visual Studio Debug Console
----- Student Management System -----

Welcome :)
Press (1) for ' Admin ' or (2) for ' User ': 2
Welcome :)
Press (1) for ' Doctor ' or (2) for ' Assistant ': 3
Invalid Choice, Please try again.
Press (1) for ' Doctor ' or (2) for ' Assistant ': 2
Added to salary list: Hours = 12, Rate = 70

Valid IDs:-
70000
70010
70020
70030
70040
70050

Enter your ID: 9
ID not found, Please try again.
Enter your ID: 70000
Valid ID!
Enter your password: 1
Invalid password, Please try again!
Enter your password: 678910
Access Granted! Welcome back :)

Press (1) to display the Courses: 2
Invalid Choice, Please try again.
Press (1) to display the Courses: 1

Your Courses:
Course Name: Electronics
Hours: 3
Money Per Hour: 50
-----

Press (2) to display the Salary: 1
Invalid Choice, Please try again.
Press (2) to display the Salary: 2
Total Salary: 840$

C:\Users\W A\OneDrive\Desktop\Codes VS 2022\C++ projects\Simple Student Management System\x64\Debug\Simple Student Management System.exe (process 4616) exited with code 0 (0x0).
Press any key to close this window . . .
```