Project Report: GNU Utility Students Marks Management System

1. Introduction

Purpose of the Utility:

The GNU Utility - Student Marks Management System is a command-line application designed to manage student records, including their personal information, subject-wise marks, total marks, and average marks. The utility allows users to perform various operations, such as adding new students, updating student details, displaying student information, deleting students, searching for specific students, printing student ranks based on total marks, and finding the total number of records.

Scope and Objectives:

The main objectives of the ABC School Marks Management System are as follows:

- Provide a user-friendly interface for school administrators to manage student records efficiently.
- Allow easy addition and updating of student information, including student number, name, and marks for three subjects.
- Facilitate searching for specific students based on their student number.
- Calculate and display student ranks based on total marks.
- Provide error handling to handle invalid inputs and missing records.

Project Overview:

The ABC School Marks Management System is implemented in the C programming language. It uses file handling to store student records in a file named 'mystudents.txt'. The utility employs a modular approach, dividing different functionalities into separate functions for better code organization and maintainability.

2. Utility Design and Implementation

Functionality and Specifications:

The utility is implemented in C programming language and follows best practices in software development. It utilizes a custom-defined structure, 'student,' to store student details and subject-wise marks. The key features of the utility include:

1.Adding New Student: Users can input the student number, name, and marks for three subjects (Maths, Science, and English). The total marks and average marks are calculated and stored for each student.

2. Updating Student Details: Users can search for a specific student by their student number and update their name and subject-wise marks. The total and average marks are recalculated accordingly.

3.Displaying Student Details: The utility displays a table of all students' information, including student number, name, marks in each subject, total marks, and average marks.

4.Deleting Student: Users can delete a specific student record by providing their student number.

5. Searching Student: Allows the user to search for a specific student by their student number and displays their details.

6.Printing Student Ranks: The utility calculates, and prints student ranks based on total marks, considering ties.

7.Counting Records: Users can find the total number of records (students) stored in the system.

Input/Output Requirements:

The utility interacts with the user through the command-line interface. It accepts user inputs for various functionalities such as adding new students, updating student details, deleting records, searching for students, etc. The utility displays information regarding student records, errors, and results through the console.

Command-Line Options:

The ABC School Marks Management System does not utilize command-line options. All functionalities are accessible through the main menu displayed to the user after successful login.

Expected Behavior:

The utility is expected to handle user inputs gracefully and provide appropriate feedback for successful operations. It should also display informative error messages in case of invalid inputs or when a record is not found.

Modularization and Code Organization:

The code follows a modular approach, where different functionalities are implemented as separate functions. The main menu is organized within the `homepage()` function, and each menu option has its own function to perform the corresponding operation (e.g., `addNewStu()`, `updateDet()`, `display()`, `deleteStu()`, `noRecords()`, `search()`, `printRank()`).

Error Handling and Documentation:

The code includes error handling mechanisms to deal with invalid inputs, missing records, and other exceptional scenarios. It is essential to provide clear and informative messages to guide the user when unexpected situations occur. Additionally, the code is adequately documented using comments to explain the purpose and functionality of each function and its parameters.

3. Version Control and Repository Setup

Version Control System Selection:

For version control, we recommend using a popular distributed version control system like Git. Git allows multiple developers to collaborate on the same codebase efficiently. It tracks changes to the code, facilitates branching for feature development, and provides a history of all modifications.

Repository Initialization:

To set up version control for the ABC School Marks Management System, follow these steps:

1. Create a new repository on a Git hosting service (e.g., GitHub, GitLab, or Bitbucket).

2. Initialize a local Git repository in the project directory using the command: `git init`.

3. Add the remote repository URL as the origin: `git remote add origin <remote_url>`.

4. Dependencies and System Requirements

Dependencies:

The ABC School Marks Management System is implemented in C and does not have external dependencies. It should be compatible with most modern systems that support the C programming language.

System Requirements:

To compile and run the utility, a C compiler (e.g., GCC) must be installed on the system. The utility is designed to be platform-independent and should work on any system supporting a C compiler.

5. Usage Instructions

Compilation and Execution:

To compile and run the ABC School Marks Management System, follow these steps:

1. Clone the source code repository from GitHub.

2. Navigate to the student marks management system directory.

3. Compile the utility using a C compiler:

   gcc -o marks_management student_marks_management.c

Run the executable:

   ./marks_management

Utility Features and Menu Options:

After running the utility, the user will be prompted to enter a username and password for login. The default login credentials are as follows:

- Username: admin

- Password: 2001

Upon successful login, the main menu will be displayed with the following options:

1. Add New Student: Add details of new students, including student number, name, and marks for three subjects.

2. Update Student Details: Update existing student records with new information.

3. Display Student Details: Display all student records stored in the 'mystudents.txt' file.

4. Delete Student: Delete a specific student record based on their student number.

5. No of Records: Count the total number of student records stored in the 'mystudents.txt' file.

6. Search Details: Search for a specific student by their student number and display their details.

7. Print Students Rank: Calculate and print student ranks based on total marks.

0. Exit: Quit the utility.

Functionality:

The user can choose an option from the main menu by entering the corresponding number and pressing "Enter". The utility will then perform the selected operation and return to the main menu. Invalid inputs will be handled with appropriate error messages, and the main menu will be displayed again for further input.

1. Login Screen

```
  ⟨⟩  "D:\1ST YEAR\C PROGRAMMI    ✕    +  ⌄

------------------------------------------------------------------------
|               WELCOME TO ABC SCHOOL MARKS MANAGEMENT SYSTEM          |
------------------------------------------------------------------------
                    ------------------------
                    |         LOGIN         |
                    ------------------------
Enter your Username: admin

Enter your Password: ****
```

You need to Enter Correct Username as **"admin"** and Password **"2001"**

2.Main menu (After giving the correct username and password user can choose an option)

```
  ⟨⟩  "D:\1ST YEAR\C PROGRAMMI    ✕    +  ⌄

------------------------------------------------------------------------
|               WELCOME TO ABC SCHOOL MARKS MANAGEMENT SYSTEM          |
------------------------------------------------------------------------
                    ------------------------
                    |         LOGIN         |
                    ------------------------
Enter your Username: admin

Enter your Password: ****


------------------------------------------------------------------------
[1]  Add New Student                        [2]  Update Student Details
[3]  Display Student Details                [4]  Delete Student
[5]  No of Records                          [6]  Search Details
[7]  Print Students Rank                    [0]  Exit
------------------------------------------------------------------------
Enter your Choice :
```

3.Add New Student: Allows the user to add details of new students, including their student number, name, and marks for three subjects.

```
------------------------------------------------------------------------------------
[1]  Add New Student                              [2]  Update Student Details
[3]  Display Student Details                      [4]  Delete Student
[5]  No of Records                                [6]  Search Details
[7]  Print Students Rank                          [0]  Exit
------------------------------------------------------------------------------------
Enter your Choice : 1

Enter how many students you want to add: 2

Enter the Student Number : 208

Enter the Student Name : Ishanka Perera
Enter Marks of Subject 1 :69
Enter Marks of Subject 2 :79
Enter Marks of Subject 3 :46

Enter the Student Number : 045

Enter the Student Name : Udesh Mihiran
Enter Marks of Subject 1 :72
Enter Marks of Subject 2 :65
Enter Marks of Subject 3 :83
```

4. Display Student Details: Displays all student records stored in the 'mystudents.txt' file, including their student number, name, marks for each subject, total marks, and average.

```
------------------------------------------------------------------------------------
[1]  Add New Student                              [2]  Update Student Details
[3]  Display Student Details                      [4]  Delete Student
[5]  No of Records                                [6]  Search Details
[7]  Print Students Rank                          [0]  Exit
------------------------------------------------------------------------------------
Enter your Choice : 3
No         NAME                    MATHS | SCIENCE |  ENGLISH|  TOTAL| AVERAGE
141    Mihitha Wanniarachchi         65 |     75 |      90 |    230 |   76.67
221    Piyumi Nadeera                78 |     58 |      89 |    225 |   75.00
120    Tharusha Kavindi              58 |     74 |      81 |    213 |   71.00
332    Dehemi Weerakoon              62 |     78 |      92 |    232 |   77.33
345    Pethum Jeewantha              68 |     50 |      71 |    189 |   63.00
125    Sandasi Savindi               60 |     72 |      81 |    213 |   71.00
455    Lithili Perera                45 |     78 |      90 |    213 |   71.00
208    Ishanka Perera                69 |     79 |      46 |    194 |   64.67
45     Udesh Mihiran                 72 |     65 |      83 |    220 |   73.33
```

5.Update Student Details: Enables the user to update existing student records with new information.

```
----------------------------------------------------------------------
[1]  Add New Student                       [2]  Update Student Details
[3]  Display Student Details               [4]  Delete Student
[5]  No of Records                         [6]  Search Details
[7]  Print Students Rank                   [0]  Exit
----------------------------------------------------------------------
Enter your Choice : 2
Enter the Student Number to Update : 455

Enter the New Name : Lithuli Lewmini
Enter New Marks of Subject 1 :55
Enter New Marks of Subject 2 :80
Enter New Marks of Subject 3 :85
```

After updating the details, we can see updated details ---------→

```
----------------------------------------------------------------------
[1]  Add New Student                       [2]  Update Student Details
[3]  Display Student Details               [4]  Delete Student
[5]  No of Records                         [6]  Search Details
[7]  Print Students Rank                   [0]  Exit
----------------------------------------------------------------------
Enter your Choice : 3
No        NAME                   MATHS | SCIENCE |  ENGLISH|  TOTAL|  AVERAGE
141    Mihitha Wanniarachchi      65 |    75 |      90 |   230 |   76.67
221    Piyumi Nadeera             78 |    58 |      89 |   225 |   75.00
120    Tharusha Kavindi           58 |    74 |      81 |   213 |   71.00
332    Dehemi Weerakoon           62 |    78 |      92 |   232 |   77.33
345    Pethum Jeewantha           68 |    50 |      71 |   189 |   63.00
125    Sandasi Savindi            60 |    72 |      81 |   213 |   71.00
455    Lithili Perera             45 |    78 |      90 |   213 |   71.00
208    Ishanka Perera             69 |    79 |      46 |   194 |   64.67
45     Udesh Mihiran              72 |    65 |      83 |   220 |   73.33
```

```
----------------------------------------------------------------------
[1]  Add New Student                       [2]  Update Student Details
[3]  Display Student Details               [4]  Delete Student
[5]  No of Records                         [6]  Search Details
[7]  Print Students Rank                   [0]  Exit
----------------------------------------------------------------------
Enter your Choice : 3
No        NAME                   MATHS | SCIENCE |  ENGLISH|  TOTAL| AVERAGE
141    Mihitha Wanniarachchi      65 |    75 |      90 |   230 |   76.67
221    Piyumi Nadeera             78 |    58 |      89 |   225 |   75.00
120    Tharusha Kavindi           58 |    74 |      81 |   213 |   71.00
332    Dehemi Weerakoon           62 |    78 |      92 |   232 |   77.33
345    Pethum Jeewantha           68 |    50 |      71 |   189 |   63.00
125    Sandasi Savindi            60 |    72 |      81 |   213 |   71.00
455    Lithuli Lewmini            55 |    80 |      85 |   220 |   73.33
208    Ishanka Perera             69 |    79 |      46 |   194 |   64.67
45     Udesh Mihiran              72 |    65 |      83 |   220 |   73.33
```

6. No of Records: Counts the total number of student records stored in the 'mystudents.txt' file.

```
---------------------------------------------------------------------------
[1]   Add New Student                           [2]   Update Student Details
[3]   Display Student Details                   [4]   Delete Student
[5]   No of Records                             [6]   Search Details
[7]   Print Students Rank                       [0]   Exit
---------------------------------------------------------------------------
Enter your Choice : 5


NO OF RECORDS = 9
```

7. Delete Student: Allows the user to delete a specific student record based on their student number.(After deleting a record, you can see Total number of records have decreased.)

```
---------------------------------------------------------------------------
[1]   Add New Student                           [2]   Update Student Details
[3]   Display Student Details                   [4]   Delete Student
[5]   No of Records                             [6]   Search Details
[7]   Print Students Rank                       [0]   Exit
---------------------------------------------------------------------------
Enter your Choice : 4
Enter the Student Number to Delete : 208



---------------------------------------------------------------------------
[1]   Add New Student                           [2]   Update Student Details
[3]   Display Student Details                   [4]   Delete Student
[5]   No of Records                             [6]   Search Details
[7]   Print Students Rank                       [0]   Exit
---------------------------------------------------------------------------
Enter your Choice : 5


NO OF RECORDS = 8
```

8. Search Details: Allows the user to search for a specific student by their student number and displays their details.

```
---------------------------------------------------------------------------
[1]   Add New Student                           [2]   Update Student Details
[3]   Display Student Details                   [4]   Delete Student
[5]   No of Records                             [6]   Search Details
[7]   Print Students Rank                       [0]   Exit
---------------------------------------------------------------------------
Enter your Choice : 6
Enter the Student Number to Search : 120
No            NAME                    MATHS | SCIENCE |  ENGLISH|  TOTAL| AVERAGE
120     Tharusha Kavindi               58 |     74 |      81 |   213 |   71.00
```

9. Print Students Rank: Calculates and prints student ranks based on total marks.

```
------------------------------------------------------------------------------------
[1]  Add New Student                           [2]  Update Student Details
[3]  Display Student Details                    [4]  Delete Student
[5]  No of Records                              [6]  Search Details
[7]  Print Students Rank                        [0]  Exit
------------------------------------------------------------------------------------
Enter your Choice : 7
No          NAME                 MATHS | SCIENCE |  ENGLISH|  TOTAL| AVERAGE | RANK |
332    Dehemi Weerakoon            62 |      78 |       92 |   232 |  77.33 |   1  |
141    Mihitha Wanniarachchi       65 |      75 |       90 |   230 |  76.67 |   2  |
221    Piyumi Nadeera              78 |      58 |       89 |   225 |  75.00 |   3  |
455    Lithuli Lewmini             55 |      80 |       85 |   220 |  73.33 |   4  |
45     Udesh Mihiran               72 |      65 |       83 |   220 |  73.33 |   4  |
125    Sandasi Savindi             62 |      72 |       81 |   215 |  71.67 |   6  |
120    Tharusha Kavindi            58 |      74 |       81 |   213 |  71.00 |   7  |
345    Pethum Jeewantha            68 |      50 |       71 |   189 |  63.00 |   8  |
```

10. Invalid input handling - Application displays necessary error messages to user when user input an invalid input.

```
------------------------------------------------------------------------------------
|              WELCOME TO ABC SCHOOL MARKS MANAGEMENT SYSTEM               |
------------------------------------------------------------------------------------
                      ------------------------
                      |         LOGIN        |
                      ------------------------
Enter your Username: adnim

Enter your Password: ****

      **************Invalid Username or Password**************


------------------------------------------------------------------------------------
|              WELCOME TO ABC SCHOOL MARKS MANAGEMENT SYSTEM               |
------------------------------------------------------------------------------------
                      ------------------------
                      |         LOGIN        |
                      ------------------------
Enter your Username: |
```

```
------------------------------------------------------------------------------------
[1]  Add New Student                           [2]  Update Student Details
[3]  Display Student Details                    [4]  Delete Student
[5]  No of Records                              [6]  Search Details
[7]  Print Students Rank                        [0]  Exit
------------------------------------------------------------------------------------
Enter your Choice : 8

************************  Invalid Input! Try Again  ************************
```

```
------------------------------------------------------------------------------------
[1]  Add New Student                           [2]  Update Student Details
[3]  Display Student Details                    [4]  Delete Student
[5]  No of Records                              [6]  Search Details
[7]  Print Students Rank                        [0]  Exit
------------------------------------------------------------------------------------
Enter your Choice : 6
Enter the Student Number to Search : 560
No          NAME                 MATHS | SCIENCE |  ENGLISH|  TOTAL| AVERAGE

      **************************Record Not Found**************************
```

6. License

The ABC School Marks Management System is open-source software. Marks Management Utility is distributed under the MIT License, allowing users to use, modify, and distribute the code freely.

7.Conclusion

ABC School Marks Management System is a command-line utility designed to efficiently manage student records and marks. It provides a user-friendly interface for adding, updating, and displaying student details. With proper error handling and code organization, the utility offers an effective solution for school administrators to handle student information conveniently. Further improvements and testing can enhance its functionality and performance.

Contributors:

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