**Intermediate Programming Concepts and**

**Applications for Embedded Systems**

Logo

Description automatically generated



**Lab 9- User Details Management System**

**Procedure:**

* All the parts should be executed in Raspberry Pi OS. Create a **lab10** directory. Each part should have a separate
* Provide a flowchart to explain your solution. We recommend using the [Smartdraw Flowchart Editor.](https://cloud.smartdraw.com/editor.aspx?templateId=490dad73-de30-42bf-9a58-1789d56c1afd&flags=128)

**Objective:**

In this lab, students will develop a User Details Management System in C. This system will utilize data structures (specifically structs and linked lists) to store user information and perform various operations such as searching, inserting, deleting, updating, and calculating averages.

**Note – For this lab, create multiple files and a makefile:**

**1. Data Structures: Implement all data structures in one file.**

**2. Data Storage: Store all data in a separate file.**

**3. Functions: Implement all functions in another file.**

**4. Main Menu: Design the main menu in the main file.**

**Steps**:

1. Struct Definition:

- Define a **‘User’** struct with **‘name’**, ‘**age’**, ‘**weight’**, and ‘**height’** as its fields.  
**Note- create a constant that holds the below list as array of struct**

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Age | Height | Weight |
| Olivia | 29 | 1.81 meters | 250.62 lbs |
| Emma | 67 | 1.88 meters | 257.1 lbs |
| Amelia | 28 | 1.5 meters | 247.4 lbs |
| Sophia | 13 | 1.83 meters | 271.03 lbs |
| Charlotte | 87 | 1.8 meters | 105.36 lbs |
| Ava | 72 | 1.92 meters | 114.07 lbs |
| Isabella | 33 | 1.76 meters | 106.93 lbs |
| Mia | 26 | 1.98 meters | 225.74 lbs |
| Olivia | 72 | 1.63 meters | 198.92 lbs |
| Evelyn | 20 | 1.83 meters | 126.25 lbs |

Menu: Select an Option to Perform

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1. Count the Number of Users

2. Search for a User

3. Sort List by Name

4. Add a New User

5. Remove a User

6. Update User Information

7. Calculate Averages

8. Exit

2. **Linked List Creation**:

- Implement linked list creation functions to handle `User` nodes and action to be performed on it in step 3.

3. **Develop Functions for User Operations**:

- Implement functions to add a new user to the list, ensuring the list remains sorted by name.

- Write a function to search for a user by name.

- Develop a function to delete a user from the list.

- Implement a function to update user details.

- Create a function to calculate and display the average weight and height of all users in the list.  
For more clarity on this follow the below task.

**Tasks**:

1. **Count number of Users**:  
 - Write a function to get count number of users within the linked list.

2. **Search a User**:

- Write a function to search for a user by name within the linked list.

3. **Sort the List by Name**:

- Ensure your user insertion function inserts new users in a sorted order.

4. **Insert a New User**:

- Implement a function to insert a new user while maintaining the list's sorted order.

- Print the list to verify the correct insertion.

5. **Delete a User**:

- Write a function to delete a user by name.

- Print the list to confirm the deletion.

6. **Update a User**:

- Implement a function that updates the details of an existing user.

- Print the list to show the updated details.

7. **Calculate Averages**:

- Develop a function to calculate and print the average weight and height of the users.

Note – For this lab Create multifile and makefile   
1. Datastructures in one file

2. Datastored in one file

3. functions to be implemented in one file  
4. Menu in main file

**Submission Criteria:** Submit your answer in a file called lab9.pdf or lab9.doc(x). Add your flowchart and code snippet corresponding to each part and take a screenshot of output of each part.

**Report**

1. Follow the report template of the course.
2. Attach all pictures*/*screenshots to the report (both required pictures and some pictures you took when following steps in the procedure that you think may be important to include them), including with the picture number and a short description of each picture.
3. Include an Analysis part (if any).
4. Include the Conclusion part where you can write down what you’ve learned from the lab session, as well as what can be improved in the future.

Important note: The report template is to be used for the rest of the lab sessions.