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Assignment Description: Data Structures and Algorithm Design

Introduction

Understanding data structures and algorithm design is essential for producing compelling and efficient software in developing mobile applications (Jung, C. 2013).

According to B'Far, R. (2004), mobile applications may face several problems if they do not have a solid foundation in Data Structures.

This assignment will discuss the significance of data structures and algorithm design in creating mobile applications and understand how to construct high-quality mobile applications using data structures and algorithms.

Main Research

Skill Development Tracker is an application that can help users track their skills and development progress. Moreover, it could include a skills library, tests, assessments, and personalised learning plans.

In addition, the application aims to gather data that will influence the hiring process, give the applicant and hiring managers the knowledge they need to craft interview questions and establish the suitability for the position (Cueva-Fernandez et al. 2015).

The user can perform the following steps to execute the Skill Development Tracker App': Launch the application and create an account; Set the skills objectives that need development and improvement; Add new accomplishments to the list so the user can keep track of the progress; Analyse the progress to see how far it has come and where it needs improvement.

The application uses the Linked List data structure to execute the following operations: insertion, deletion, sorting and searching.

Aguilera et al. (2011) state that a linked List data structure is defined as a data structure used to store and organise a collection of data elements.

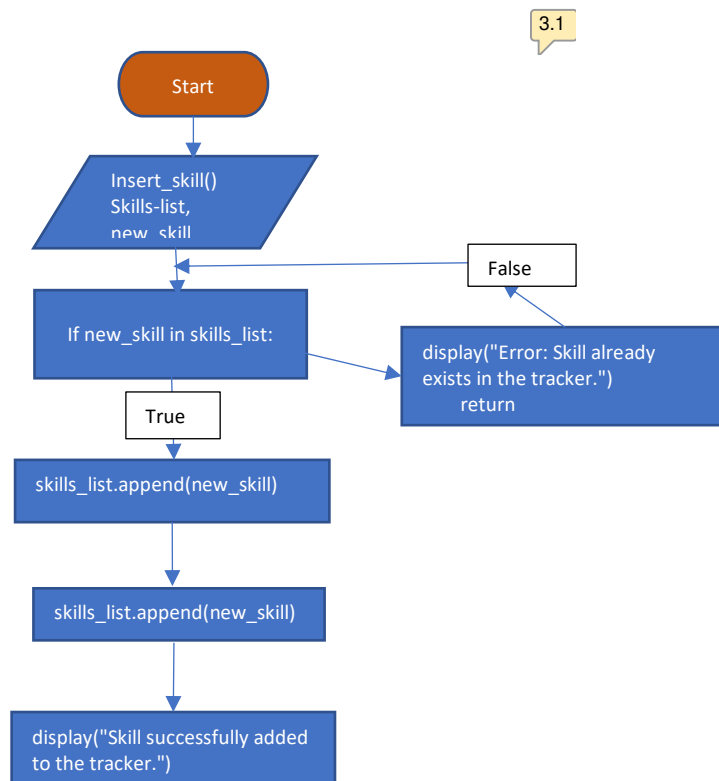
Here are some presentations and definitions of the data structure for this application:

1. Insertion is the process of adding new data to the App

```
function insert_skill(skills_list, new_skill):  
    if new_skill in skills_list:  
        display("Error: Skill already exists in the tracker.")  
        return  
    skills_list.append(new_skill)  
    display("Skill successfully added to the tracker.")
```

This function aims to add a new skill to a list of skills. The process accepts two arguments: a list of skills to be added and a new skill to be added. The function then determines whether the new skill already exists in the list of skills. If it exists, the function returns an error message. If not, the process adds the unique skill to the list of available skills and displays a success message (Stack Overflow, n.d.).

Here's a flowchart of the insertion algorithm:



(Kumar, 2022).

2. Deletion removes a node from the Skill Development Tracker (Code Review Stack Exchange, n.d.).

Here is the pseudocode for the deletion process:

```
function delete_skill(skills_list, skill_to_delete):  
    if skill_to_delete not in skills_list:  
        display("Error: Skill not found in the tracker.")  
        return  
    skills_list.remove(skill_to_delete)  
    display("Skill successfully deleted from the tracker.")
```

The function's purpose is to remove a skill from a list of skills. The process accepts two arguments: a list of skills to be deleted and a skill to be deleted. The function then determines whether the skill to be deleted is included in the list of skills. If the skills do not exist, the process displays an error message. If so, the function removes the skill from the list and displays a success message (Code Review Stack Exchange, n.d.).

3. Sorting is arranging the skills in the Skill Development Tracker in a specific order (Chiluka, 2022).

4.1

Here is how could be implemented a simple sorting algorithm like bubble sort:

```
def bubbleSort(arr):  
    n = len(arr)  
    for i in range(n):  
        for j in range(0, n-i-1):  
            if arr[j] > arr[j+1]:  
                arr[j], arr[j+1] = arr[j+1], arr[j]
```

4. The linked list is traversed to search for an element until the node with the matching element name is found. If the node is found, the element name and level are returned. If the node is not found, a message indicating that the element was not found is returned (Chiluka, 2022).

Here is an example of a Python function that searches for an element in the linked list:

```
def search_element(head, element):
    current_element = head
    while current_element is not None:
        if current_element.element == element:
            return current_element
        current_element = current_element.next
    return None
```

To test the Skills Development Tracker application, we can use the following test plan:

Create a new skill and add a goal to achieve within a specific timeframe. Log progress towards the goal and verify that the progress is appropriately monitored and tracked. Review progress on the dashboard and ensure that it is accurate. Update the plan if necessary and continue monitoring progress (Zun et al. 2016).

Conclusions and future recommendations:

This assignment has reviewed a mobile application's design and algorithms to explain the critical importance of understanding Data Structures and programming. They are fundamental tools for solving problems, implementing algorithms, and designing efficient software systems. Therefore, Data Structures and Programming concepts will be critical in software development as technology evolves.

Subsequently, for the future, here are some recommendations: Stay up-to-date with new developments in data structures and programming concepts; Learn multiple programming languages; Use design patterns; Focus on algorithms and, last but not least, continue to practice because proficiency in data structures and programming concepts comes with practice.

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Index of comments

- 2.1 very good structure
- 3.1 very good use of the flowchart
- 4.1 good idea to have the pseudocode here