

## **Exercise 5: Task Management System**

### **a. Understand Linked Lists:**

#### **1. Explain the different types of linked lists (Singly Linked List, Doubly Linked List).**

Singly linked lists and doubly linked lists are two types of Linked lists. A singly-linked list is unidirectional linked list that consists of data and a link to the next element, while a doubly-linked list is a bidirectional linked list that contains a link to the previous node.

### **b. Analysis:**

#### **1. Analyze the time complexity of each operation.**

The time complexity of each operation are the following:

- Add: time complexity is  $O(1)$
- Search: time complexity is  $O(n)$
- Traverse: Time Complexity is  $O(n)$
- Delete: time complexity is  $O(n)$

#### **2. Discuss the advantages of linked lists over arrays for dynamic data.**

The advantages of linked list over array is that linked List is a dynamic data structure which creates memory according to its requirement that is; it can change memory size at run time, so it has no memory loss. Array is a static data structure that is fixed in size and cannot change at run time, so it wastes memory.