

St. Francis Institute of Technology, Mumbai-400 103
Department of Information Technology

A.Y. 2023-24

Class: SE-ITA/B, Semester: III

Subject: DATA STRUCTURE LAB

Experiment 2 – : Implementation of linked list

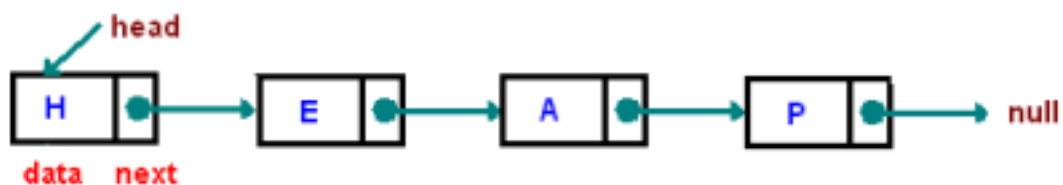
- 1. Aim:** Write a C program to implement Singly linked lists with insert and delete operations.
- 2. Objectives:** After study of this experiment, the student will be able to
 - Understand how to create a linked list
 - Implement an algorithm using computer to solve the given problem
- 3. Outcomes:** Develop algorithms to construct linked list.
- 4. Prerequisite:** Array and Linked list
- 5. Requirements:** PC and Internet and turbo c compiler version 3.0
- 6. Pre-Experiment Exercise:**

Brief Theory:

1. WHAT IS LINKED LIST?

One disadvantage of using arrays to store data is that arrays are static structures and therefore cannot be easily extended or reduced to fit the data set. Arrays are also expensive to maintain new insertions and deletions. In this chapter we consider another data structure called Linked Lists that addresses some of the limitations of arrays.

A linked list is a linear data structure where each element is a separate object.



Each element (we will call it a **node**) of a list is comprising of two items - the data and a reference to the next node. The last node has a reference to **null**. The entry point into a linked list is called the **head/start** of the list. It should be noted that head is not a separate node, but the reference to the first node. If the list is empty then the head is a null reference.

A linked list is a dynamic data structure. The number of nodes in a list is not fixed and can grow and shrink on demand. Any application which has to deal with an unknown number of objects will need to use a linked list.

One disadvantage of a linked list against an array is that it does not allow direct access to the individual elements. If you want to access a particular item then you have to start at the head and follow the references until you get to that item.

Another disadvantage is that a linked list uses more memory compare with an array - we use extra 4 bytes (on 32-bit CPU) to store a reference to the next node.

7. Laboratory Exercise (program code and output Screenshots)

A. Procedure

Write a C program to implement the Singly linked list using switch case that includes operations like

- i. Insert
 - a. In the beginning
 - b. After a node
 - c. At the end
- ii. Delete
 - a. In the beginning
 - b. Given node
 - c. At the end
- iii. Display

B. Result/Observation/Program code: The snapshot of the output obtained is to be printed by students.

8. Post-Experiments Exercise (Handwritten)

A. Question:

1. Implement Stack and queue using linked list
2. Explain Circular linked list and Doubly linked list with all its operations Write Pseudocodes.
2. MCQ

B. Conclusion:

- i. Summary of Experiment
- ii. Importance of Experiment
- iii. Application of Experiment

C. References:

1. Ellis Horowitz, Sartaj Sahni; Fundamentals of Data Structures; Galgotia Publications; 2010.
2. S. K Srivastava, Deepali Srivastava; Data Structures through C in Depth; BPB Publications; 2011.
3. Reema Thareja; Data Structures using C; Oxford.
