Data Structure and Algorithm

Laboratory Activity No. 6

Singly Linked Lists

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AUGUST 23, 2025

I.   Objectives

Introduction

       A linked list is an organization of a list where each item in the list is in a separate node. Linked lists look like the links in a chain. Each link is attached to the next link by a reference that points to the next link in the chain. When working with a linked list, each link in the chain is called a Node. Each node consists of two pieces of information, an item, which is the data associated with the node, and a link to the next node in the linked list, often called next.

This laboratory activity aims to implement the principles and techniques in:
-   Writing algorithms using Linked list
-   Writing a python program that will perform the common operations in a singly linked list

II.   Methods

- Write a Python program to create a singly linked list of prime numbers less than 20. By iterating through the list, display all the prime numbers, the head, and the tail of the list. (using Google Colab)
- Save your source codes to GitHub

III. Results

```python
class Node:
    def __init__(self, data):
        self.data = data
        self.next = None

class LinkedList:
    def __init__(self):
        self.head = None

    def append(self, data):
        new_node = Node(data)
        if self.head is None:
            self.head = new_node
        else:
            current = self.head
            while current.next:
                current = current.next
            current.next = new_node

    def display(self):
        current = self.head
        while current:
            print(current.data, end=" -> ")
            current = current.next
        print("None")


def is_prime(num):
    if num < 2:
        return False
    for i in range(2, int(num**0.5) + 1):
        if num % i == 0:
            return False
    return True

linked_list = LinkedList()

for i in range(20):
    if is_prime(i):
        linked_list.append(i)

print("Singly Linked List of Prime Numbers less than 20:")
linked_list.display()

print("Head of the list:", linked_list.head.data)

current = linked_list.head
while current.next:
    current = current.next
print("Tail of the list:", current.data)
```

```
Singly Linked List of Prime Numbers less than 20:
2 -> 3 -> 5 -> 7 -> 11 -> 13 -> 17 -> 19 -> None
Head of the list: 2
Tail of the list: 19
```

IV.   Conclusion

In this lab activity, We used linked list to store the prime number that are lower than 20. And then all numbers we put node to link it. Then this program will show the whole list of numbers with the head being the first number then the tail, which is the last number.

Overall, we learned more about algorithms and how we will apple algorithms using linked list and also strengthened our programming skills in handling fundamental data structures.

References

[1] Co Arthur O.. "University of Caloocan City Computer Engineering Department Honor Code," UCC-CpE Departmental Policies, 2020.