Singly Linked List

Insertion and Deletion of a node at first position, at end of list.

```
#include <stdio.h>
#include< stdlib.h>
# include < conio.h>
Struct node {
    int data;
    struct node *next;};

Struct node * start = NULL;
Struct node *insert_beg (struct node*);
struct node * insert_end(struct node*); struct node *insert_at_pos (struct no
struct node * delete_beg (struct node*);
Struct node *delete_end(struct node*); struct node * delete_at_pos (struct no
Struct node * display (struct node*);

int main()
{ int option;
   do {
    printf(" \n *** MENU***");
    printf ("\n 1: Insert at beginning");
    printf (" \n 2: Insert at the end"); printf("\n 3: Insert at a specific po
    printf (" \n 4: Delete at beginning");
    printf (\n 5: Delete at the end"); printf("\n 6: Delete from a specific po
    printf (" \n 7: Display");
    printf (" \n 8: Exit");
    printf (" Enter your option:");
    Scanf (" %d", &option);
    Switch (option)
  { case 1: Start = insert_beg (start);
            break;
    case 2: Start = insert-end (start);
            break;
   case 3: Start = insert_at-pos(start);
             break;
```

```
        case 4: start = delete_beg(start);
                        break;
        case 5: start = delete_end(start);      case 6: start=delete_at_pos
                        break;                              (start);
        case 7: start = display(start);                 break;
                        break;
      }
}while (option != 8);                      struct node *temp;
  getch();                                 while (start != NULL){
  return 0; }                                temp = start;
                                             start = start -> next;
                                             free(temp); }

struct node* insert_beg (struct node *start)
{ struct node ~~[illegible]~~ *new_node;
   int num;
   printf ("Enter the data:");
   scanf("%d", &num);
   new_node = (struct node *)malloc (sizeof(struct node));
   new_node -> data = num;
   new_node -> next = start;
   start = new_node;
   printf ("Inserted at the beginning\n");
   return start; }

struct node * insert_end (struct node *start)
{ struct node *ptr, *new_node;
    int num;
    printf (" Enter the data:");
    scanf ("%d", &num);
    new_node = (struct node *) malloc (sizeof (struct node));
    new_node -> data = num;
    new_node -> next = NULL;
    ptr = start;
    while (ptr -> next != NULL)
            ptr = ptr -> next;
    ptr -> next = new_node;
    printf (" Inserted at the end\n);
    return start; }
```

[illegible] 22/1/[illegible]

```
Struct node *delete-beg (struct node *start)
{  Struct node *ptr;
   ptr = Start;
   if (ptr -> next == NULL)
     { printf (" Empty List. Can't be deleted");
       return Start; }
   else {  Start = Start -> next;
           free(ptr);
           printf (" Deleted at beginning");
           return Start; }
}
Struct node *delete_end (struct node *Start)
{   Struct node *ptr, *ptr1;
     ptr = start;
     if (ptr -> next == NULL)
     { printf (" Empty List. Can't be deleted");
        return start; }
     else {  while (ptr -> next != NULL)
               { ptr1 = ptr;
              ptr = ptr -> next; }
                ptr1 -> next = NULL;
                free(ptr);
                printf (" Deleted at the end");
               return start; }
}

Struct node *display (struct node *start)
{      Struct node *ptr;
       ptr = Start;
       if (ptr -> next == NULL)
       { printf (" Empty List.");
          return start; }
       else {  while (ptr -> next != NULL)
                {   printf (" \t %d", ptr -> data);
                      ptr = ptr -> next;
                } return Start; }
}
```

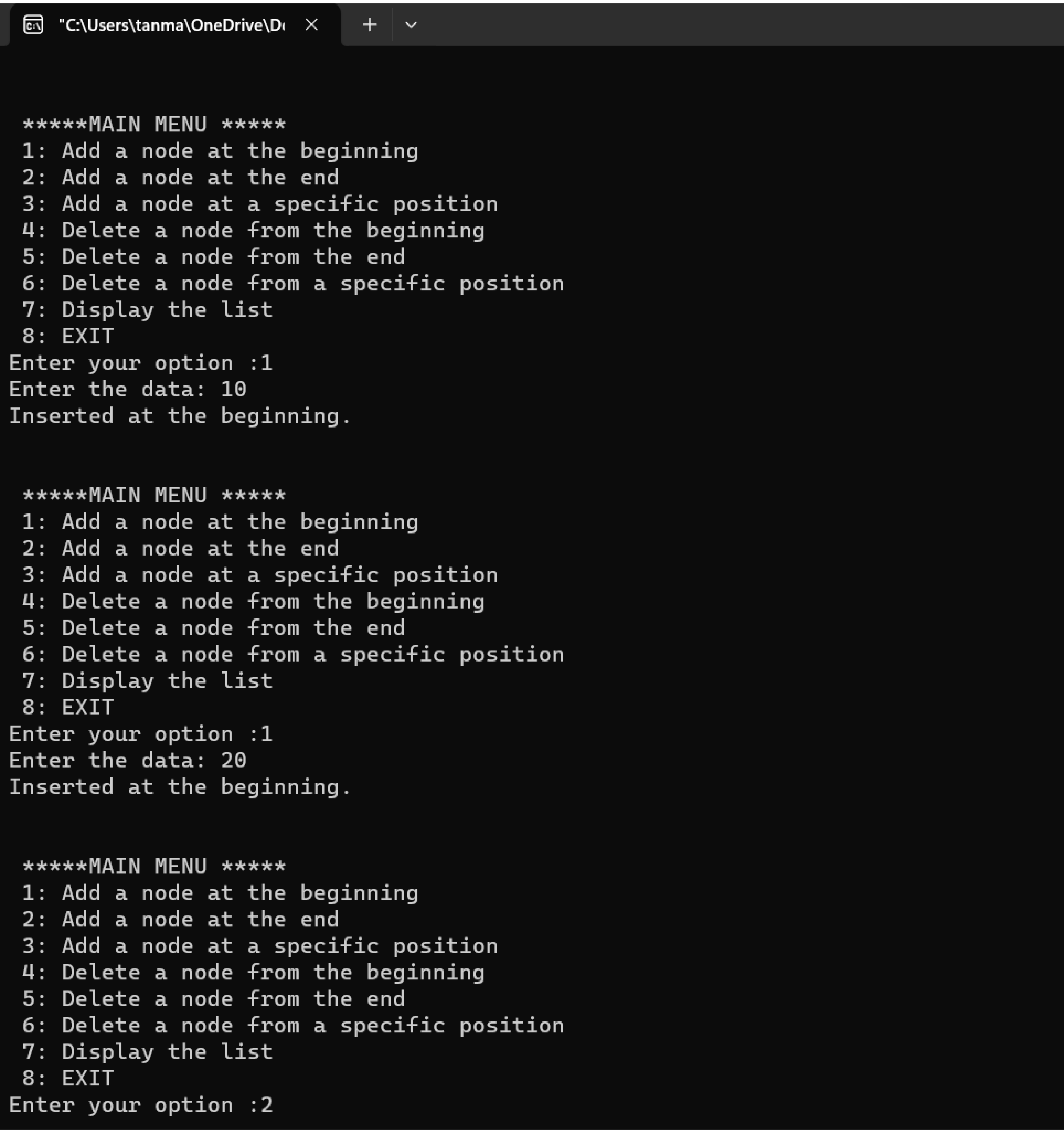
```
Struct node * insert_at_pos (struct node * start)
{  Struct node * new-node, *ptr, * preptr;
   int pos, num;
   printf (" Enter the position to insert at:");
   Scanf (" %d", &pos);
   printf (" Enter the data: ");
   scanf ("%d", &num);
   new_node = (struct node *) malloc (sizeof (struct node));
   new-node -> data = num;
   new-node -> next = NULL;
   if (pos ==1) {
       new_node -> next = start;
       start = new_node;
       printf (" Inserted at position %d \n", pos);
       return Start; }
  else {  ptr = start;
          int i;
       for (int i=1; i< pos && ptr != NULL; i++)
       { preptr = ptr;
          ptr = ptr -> next; }
       if (ptr == NULL && pos>i)
       { printf ("Invalid position. \n");
          return start; }
      preptr -> next = new_node;
      new_node -> next = ptr;
      printf (" Inserted at position %d", pos);
      return start; }
}

Struct node * delete_at_pos (struct node * start)
{ Struct node *ptr, *preptr;
  int pos;
  printf (" Enter the position to delete");
  scanf (" %d", &pos);
  if (start == NULL)
  { printf (" Empty list. Can't be deleted\n");
     return start; }
  }
```

```
    ptr = start;
    if (pos == 1)
   { start = start -> next;
     free(ptr);
     printf ("Deleted at position %d \n", pos);
     return start;
   }
   else {
     for (int i=1; i< pos && ptr != NULL; i++)
      { preptr = ptr;
        ptr = ptr -> next; }
     if (ptr == NULL)
      { printf ("Invalid position \n");
        retun start;
      }
     preptr -> next = ptr -> next;
     free(ptr);
     printf ("Deleted at position %d \n", pos);
     retun start;
   }
}
```

<u>OUTPUT:</u>

```
        ***Main Menu***
1: Add a node at the beginning.
2: Add a node at the end.
3: Add a node at a specific position
4: Delete a node from the beginning.
5: Delete a node from the end.
6: Delete a node from a specific position.
7: Display the list.
8: EXIT.
Enter your option: 1
Enter the data: 10
Inserted at the beginning.
```

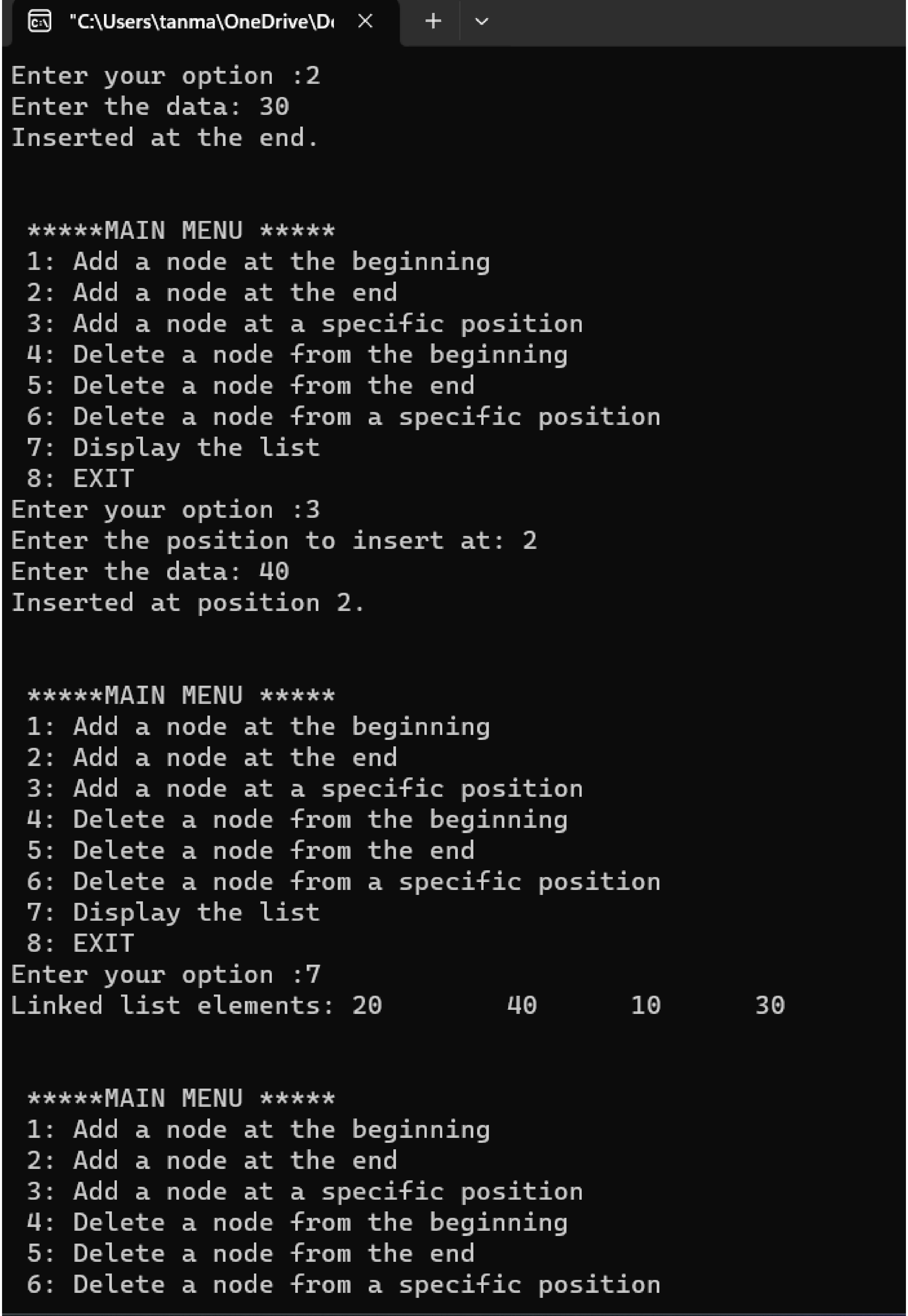

"C:\Users\tanma\OneDrive\D

```


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :1
Enter the data: 10
Inserted at the beginning.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :1
Enter the data: 20
Inserted at the beginning.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :2
```

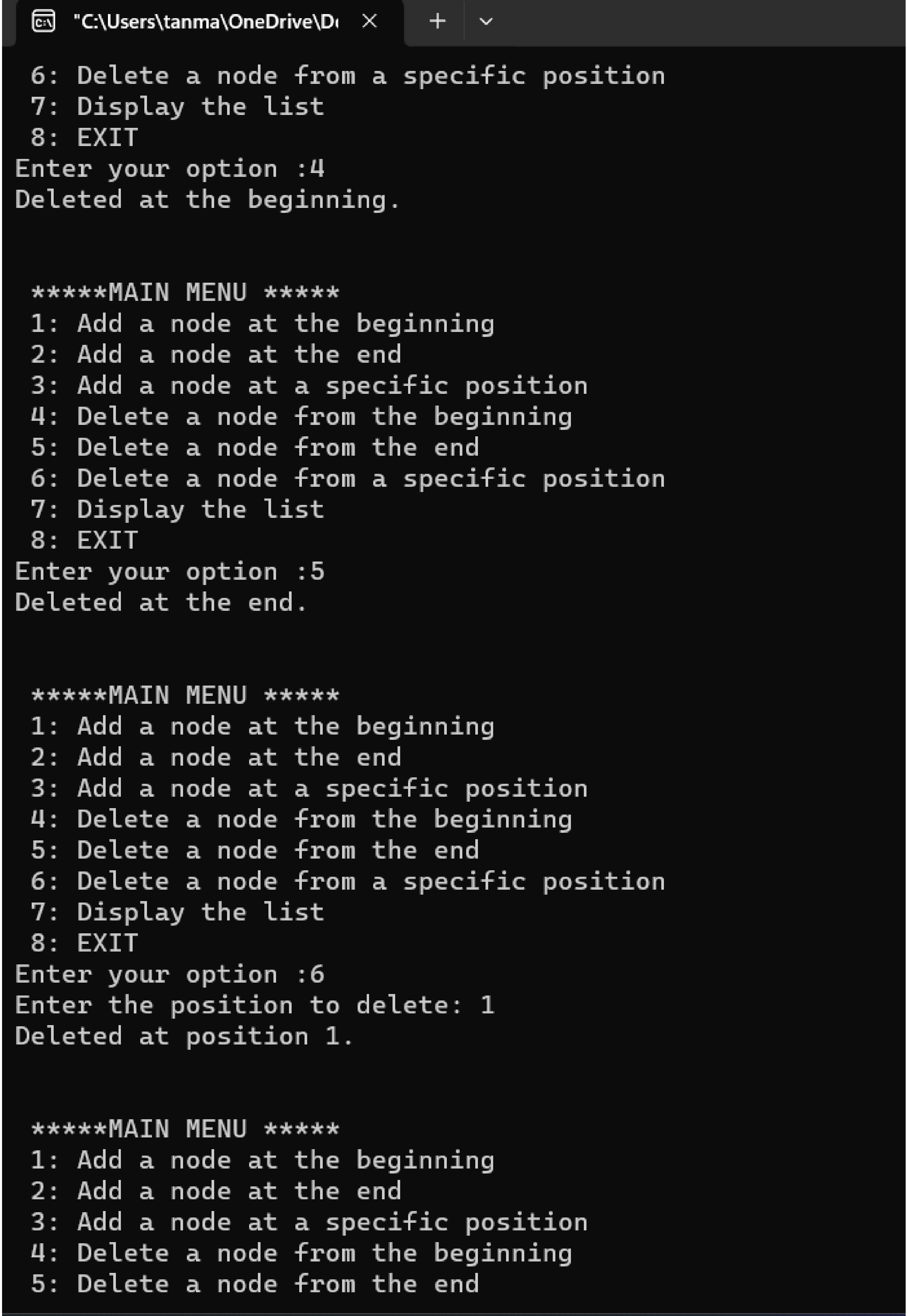


```
Enter your option :2
Enter the data: 30
Inserted at the end.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :3
Enter the position to insert at: 2
Enter the data: 40
Inserted at position 2.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :7
Linked list elements: 20        40      10      30


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
```

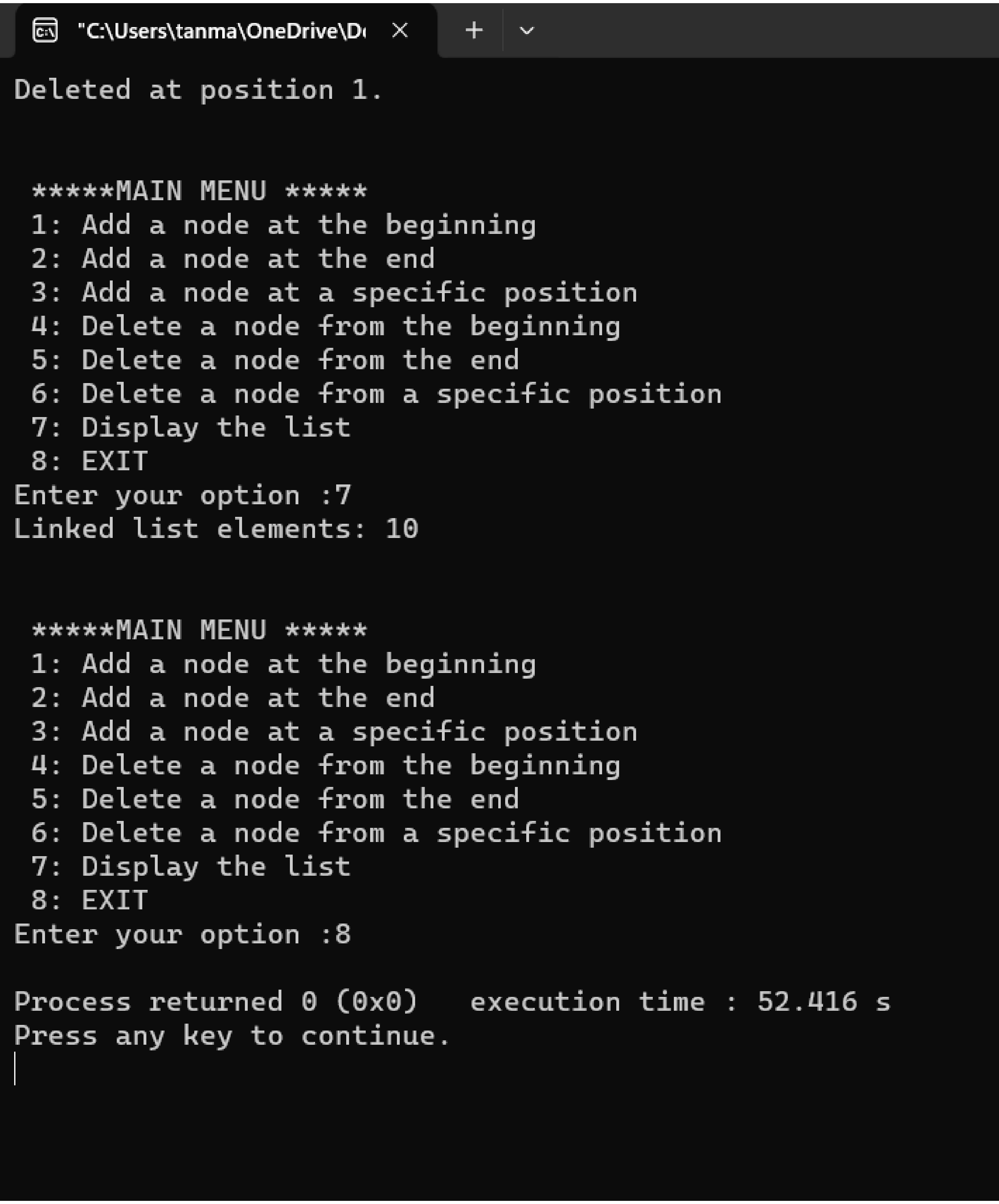


```
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :4
Deleted at the beginning.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :5
Deleted at the end.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :6
Enter the position to delete: 1
Deleted at position 1.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
```



```
Deleted at position 1.


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :7
Linked list elements: 10


 *****MAIN MENU *****
 1: Add a node at the beginning
 2: Add a node at the end
 3: Add a node at a specific position
 4: Delete a node from the beginning
 5: Delete a node from the end
 6: Delete a node from a specific position
 7: Display the list
 8: EXIT
Enter your option :8

Process returned 0 (0x0)   execution time : 52.416 s
Press any key to continue.
```