ANVITA KUMAR
C-22
Roll No: 2104097

```
//Write a menu driven code to implement Singly Linked List

#include<stdio.h>

#include<stdlib.h>

#include<malloc.h>

struct node

{

   int data;

   struct node *next;

};

struct node *start = NULL;

struct node *createSLL(struct node *start);

struct node *display(struct node *start);

struct node *InsertAtBeginning(struct node *start);

struct node *InsertAtEnd(struct node *start);

struct node *InsertBefore(struct node *start);

struct node *DeleteBeginning(struct node *start);

struct node *DeleteEnd(struct node *start);

struct node *DeleteNode(struct node *start);

struct node *ForwardTraversal(struct node *start);

struct node *BackwardTraversal(struct node *start);

struct node *Sorting(struct node *start);

struct node *Count(struct node *start);

struct node *Search(struct node *start);

int main()

{

   int choice;

   start = createSLL(start);

   printf("\nSINGLY LINKED LIST CREATED\n");

   start = display(start);

   do {
```

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```
    printf("\n\n****List of Operations****");

    printf("\n 1: Insert at beginning");

    printf("\n 2: Insert at end");

    printf("\n 3: Insert at before a node");

    printf("\n 4: Delete from beginning");

    printf("\n 5: Delete from end");

    printf("\n 6: Delete node before a specified location");

    printf("\n 7: Forward Traversal");

    printf("\n 8: Backward Traversal");

    printf("\n 9: Sorting");

    printf("\n 10: Count number of nodes");

    printf("\n 11: Search an element");

    printf("\n 12: EXIT");

    printf("\n\nEnter your choice: ");

    scanf("%d", &choice);

    switch (choice) {

    case 1:

      start = InsertAtBeginning(start);

      printf("\n");

      start = display(start);

      break;

    case 2:

      start = InsertAtEnd(start);

      printf("\n");

      start = display(start);

      break;

    case 3:

      start = InsertBefore(start);

      printf("\n");

      start = display(start);

      break;
    case 4:

      start = DeleteBeginning(start);

      printf("\n");

      start = display(start);

      break;

    case 5:

      start = DeleteEnd(start);

      printf("\n");

      start = display(start);

      break;

    case 6:

      start = DeleteNode(start);

      printf("\n");

      start = display(start);

      break;

    case 7:

      start = ForwardTraversal(start);

      printf("\n");

      break;

    case 8:

      start = BackwardTraversal(start);

      printf("\n");

      start = display(start);

      break;

    case 9:

      start = Sorting(start);

      printf("\n");

      start = display(start);

      break;

    case 10:

      start = Count(start);
```

```
            printf("\n");

            break;

        case 11:

            start = Search(start);

            printf("\n");

            break;

        case 12:

                printf("\n\tEXIT POINT");

                break;

        }

    } while (choice != 12);

    return 0;

}

struct node *createSLL(struct node *start)

{

    struct node *new_node, *ptr;

    int val;

    printf("\nEnter a value(enter -1 to end): ");

    scanf("%d", &val);

    while (val != -1) {

        new_node = (struct node *)malloc(sizeof(struct node));

        new_node->data = val;

        if (start == NULL) {

            new_node->next = NULL;

            start = new_node;

        }

        else {

            ptr = start;

            while (ptr->next != NULL)

                ptr = ptr->next;

            ptr->next = new_node;
            new_node->next = NULL;

        }

        printf("Enter a value: ");

        scanf("%d", &val);

    }

    return start;

}

struct node *display(struct node *start)

{

    struct node *ptr;

    ptr = start;

    if (ptr == NULL) {

        printf("\tEmpty List!");

    }

    else {

        while (ptr != NULL) {

            printf("\t%d", ptr->data);

            ptr = ptr->next;

        }

    }

    return start;

}

struct node *InsertAtBeginning(struct node *start)

{

    struct node *new_node;

    int val;

    printf("Enter a value: ");

    scanf("%d", &val);

    new_node = (struct node *)malloc(sizeof(struct node));

    new_node->data = val;

    new_node->next = start;
```

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```
    start = new_node;

    return start;

}

struct node *InsertAtEnd(struct node *start)

{

    struct node *ptr, *new_node;

    int val;

    printf("Enter a value: ");

    scanf("%d", &val);

    new_node = (struct node *)malloc(sizeof(struct node));

    new_node->data = val;

    new_node->next = NULL;

    ptr = start;

    while(ptr->next!=NULL)

       ptr=ptr->next;

    ptr->next=new_node;

    return start;

}

struct node *InsertBefore(struct node *start)

{

    struct node *new_node,*ptr,*preptr;

    int val, num;

    printf("Enter a value: ");

    scanf("%d", &val);

    printf("Enter the number before which the data has to be inserted: ");

    scanf("%d", &num);

    new_node = (struct node *)malloc(sizeof(struct node));

    new_node->data = val;

    ptr = start;

    while (ptr->data != num) {

        preptr = ptr;
        ptr = ptr->next;

    }

    preptr -> next = new_node;

    new_node -> next = ptr;

    return start;

}

struct node *DeleteBeginning(struct node *start)

{

    struct node *ptr;

    ptr = start;

    start = start->next;

    free(ptr);

    return start;

}

struct node *DeleteEnd(struct node *start)

{

    struct node *ptr, *preptr;

    ptr = start;

    while (ptr->next != NULL) {

        preptr = ptr;

        ptr = ptr->next;

    }

    preptr->next = NULL;

    free(ptr);

    return start;

}

struct node *DeleteNode(struct node *start)

{

    struct node *preptr, *ptr;

    int val;

    printf("Enter the value before which the data has to be deleted: ");
    scanf("%d", &val);

    ptr = start;

    if(ptr->data == val-1) {

        start = DeleteBeginning(start);

        return start;

    }

    else {

        while(ptr->data != val-1) {

            preptr = ptr;

            ptr = ptr->next;

        }

        preptr->next = ptr->next;

        free(ptr);

        return start;

    }

}

struct node *ForwardTraversal(struct node *start)

{

    struct node *ptr;

    ptr = start;

    if (ptr == NULL) {

        printf("\tEmpty List!");

    }

    else {

        printf("\n");

        while (ptr != NULL) {

            printf("\t%d", ptr->data);

            ptr = ptr->next;

        }

    }

    return start;
```

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```
}

struct node *BackwardTraversal(struct node *start)

{

   struct node* prev = NULL;

   struct node* current = start;

   struct node* next = NULL;

   while (current != NULL) {

       next = current->next;

       current->next = prev;

       prev = current;

       current = next;

   }

   start = prev;

}

struct node *Sorting(struct node *start)

{

   struct node *ptr1, *ptr2;

   int temp;

   ptr1 = start;

   while (ptr1->next != NULL) {

       ptr2 = ptr1->next;

       while (ptr2 != NULL) {

           if (ptr1->data > ptr2->data) {

               temp = ptr1->data;

               ptr1->data = ptr2->data;

               ptr2->data = temp;

           }

           ptr2 = ptr2->next;

       }

       ptr1 = ptr1->next;

   }
```

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```
   return start;

}

struct node *Count(struct node *start)

{

   int i;

   i=0;

   while(start!=NULL) {

      i=i+1;

      start=start->next;

   }

   printf("Number of nodes in the list: %d", i);

}

struct node *Search(struct node *start)

{

   struct node* current;

   int val;

   printf("Enter a value that is to be searched: ");

   scanf("%d", &val);

   if(start == NULL)     printf("\tEmpty List!");

   else {

      current = start;

      while (current != NULL) {

         if (current -> data == val)    printf("\tElement found");

         break;

      }

      current = current->next;

   }

   if(current == NULL) {

      printf("\tElement not found");

   }

}
```

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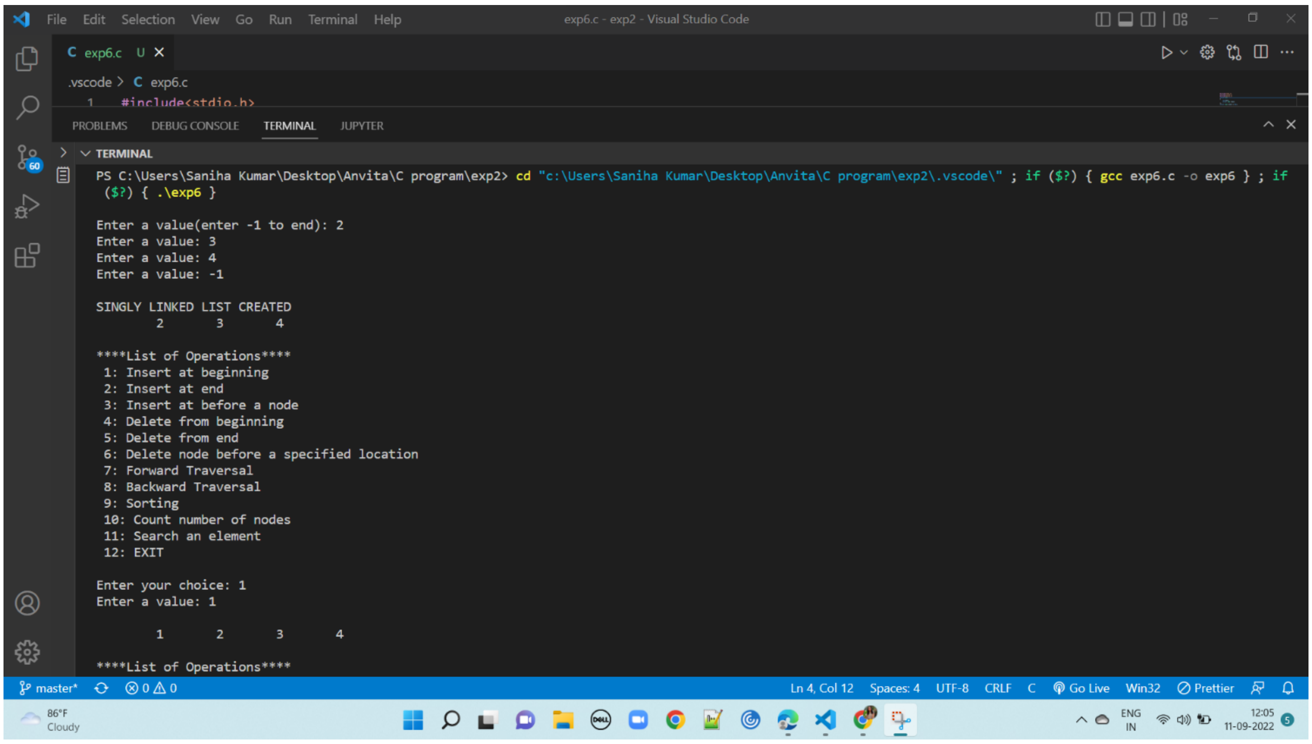
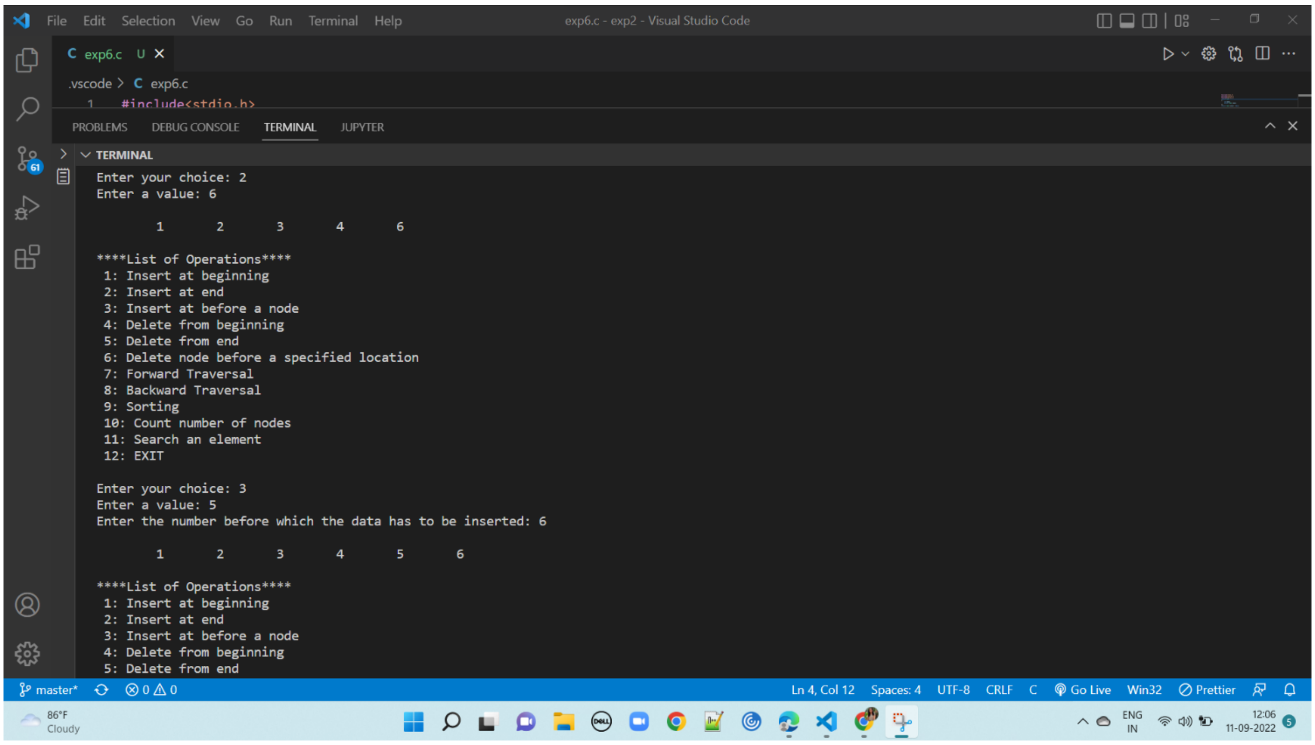


```
PS C:\Users\Saniha Kumar\Desktop\Anvita\C program\exp2> cd "c:\Users\Saniha Kumar\Desktop\Anvita\C program\exp2\.vscode\" ; if ($?) { gcc exp6.c -o exp6 } ; if
 ($?) { .\exp6 }

Enter a value(enter -1 to end): 2
Enter a value: 3
Enter a value: 4
Enter a value: -1

SINGLY LINKED LIST CREATED
        2       3       4

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 1
Enter a value: 1

        1       2       3       4

****List of Operations****
```



```
Enter your choice: 2
Enter a value: 6

        1       2       3       4       6

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 3
Enter a value: 5
Enter the number before which the data has to be inserted: 6

        1       2       3       4       5       6

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
```

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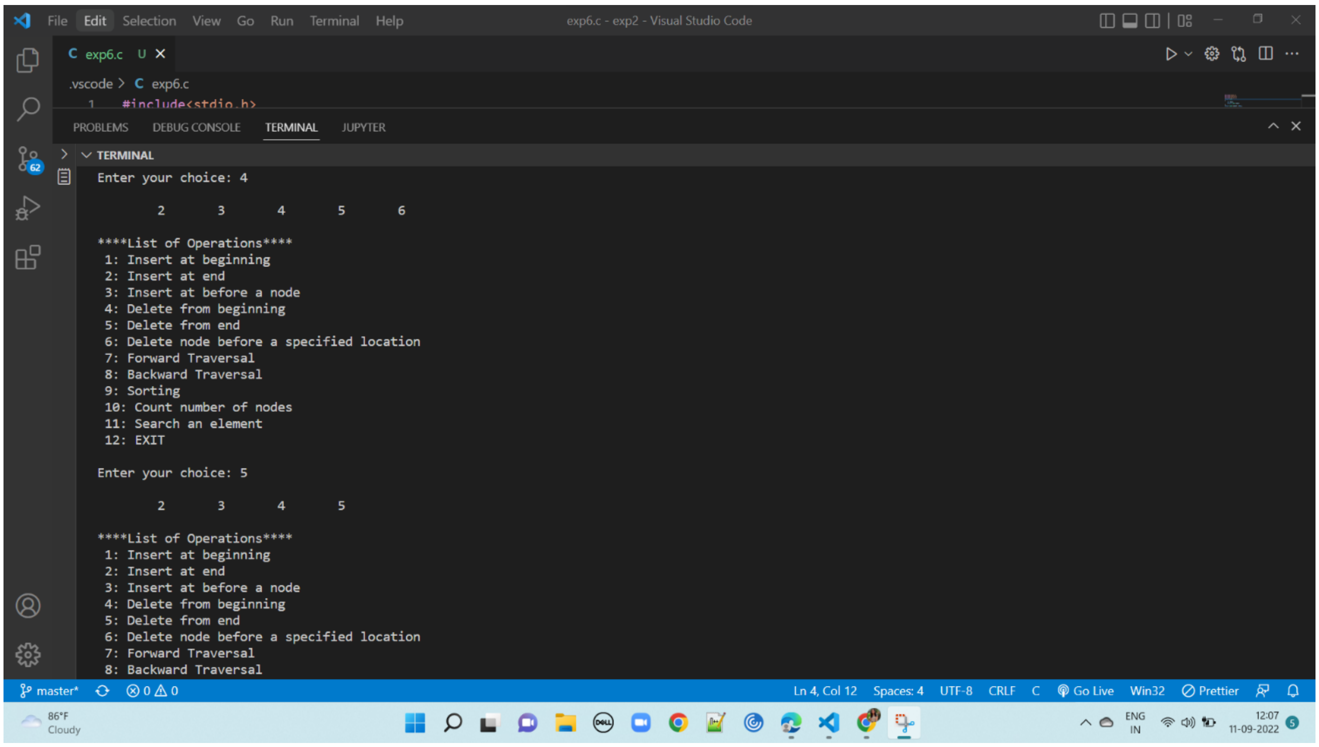
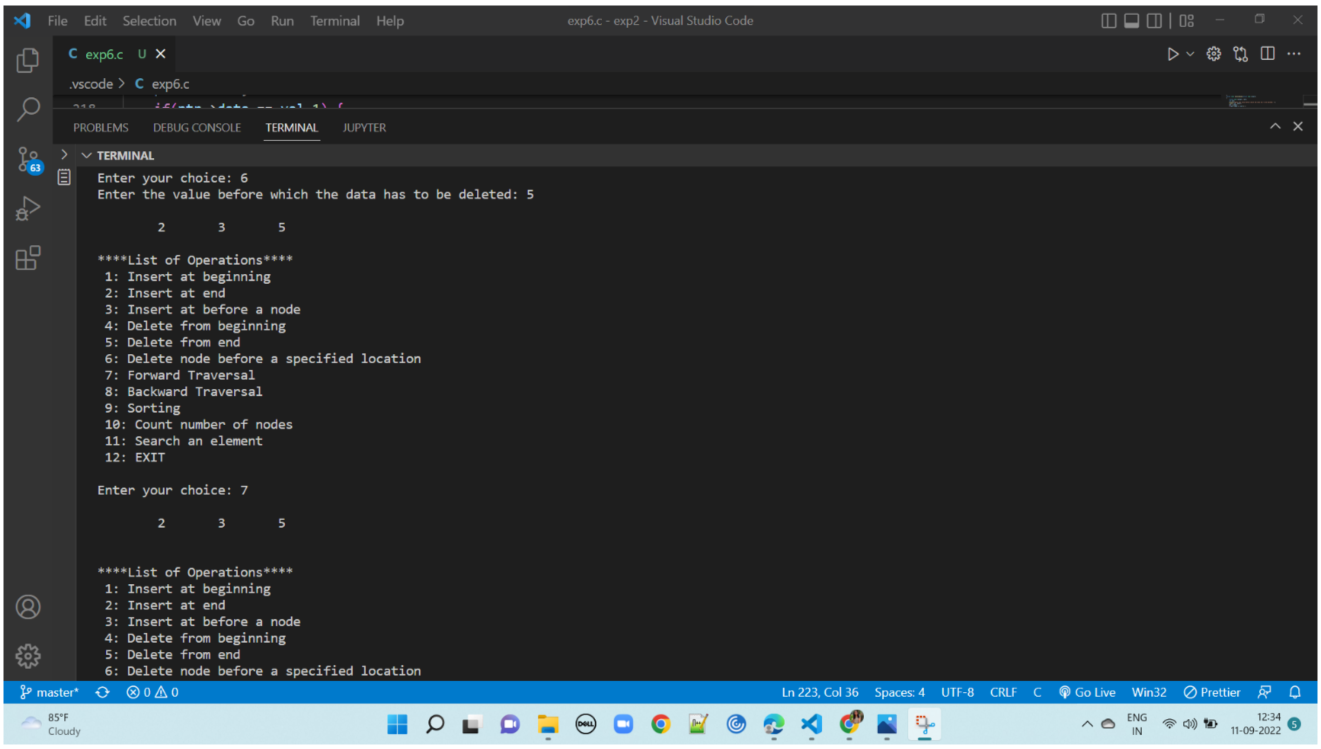


```
Enter your choice: 4

        2       3       4       5       6

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 5

        2       3       4       5

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
```



```
Enter your choice: 6
Enter the value before which the data has to be deleted: 5

        2       3       5

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 7

        2       3       5


****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
```

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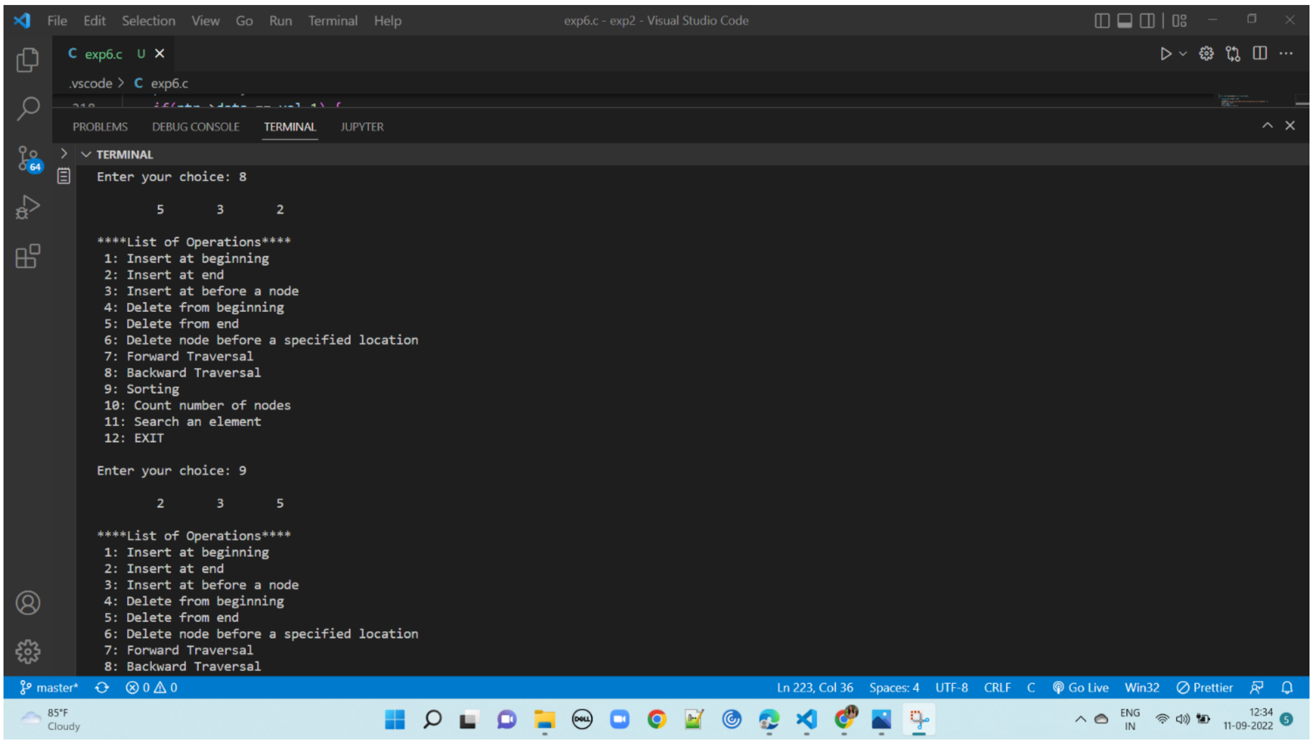
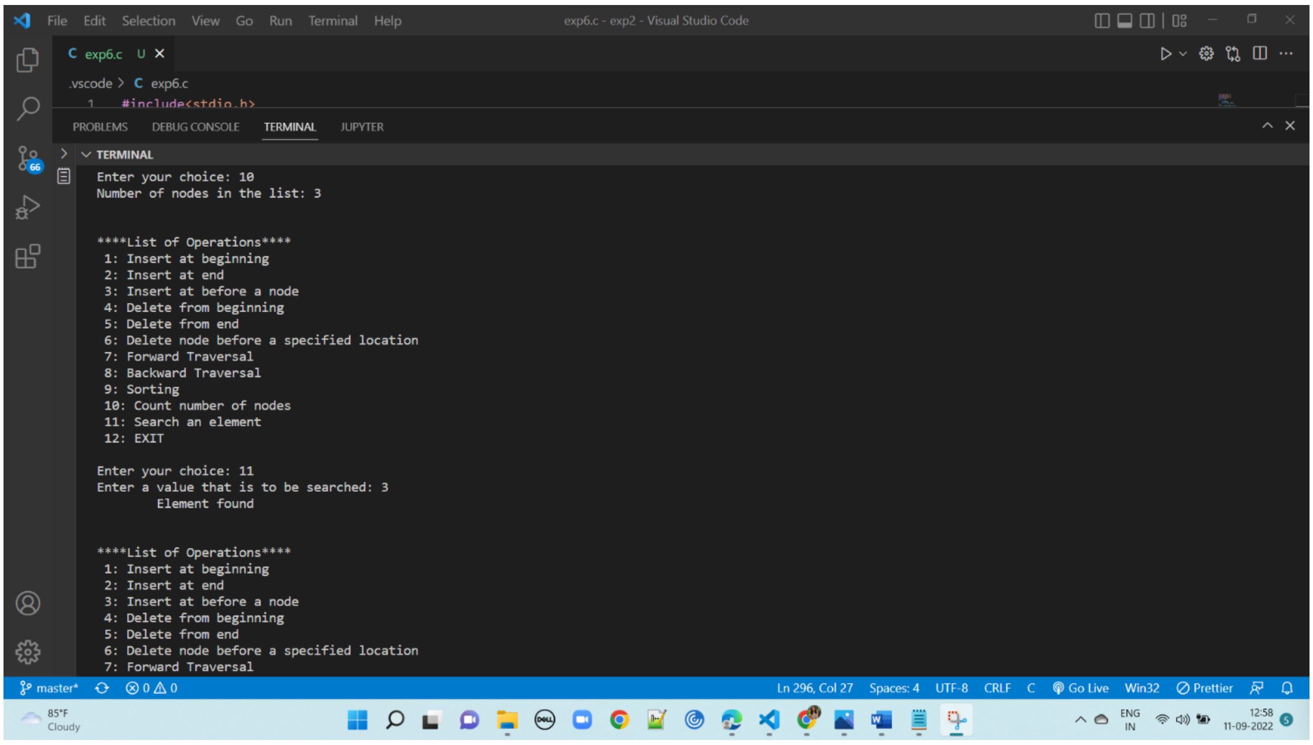


```
Enter your choice: 8

        5       3       2

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 9

        2       3       5

****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
```

File Edit Selection View Go Run Terminal Help
exp6.c - exp2 - Visual Studio Code
exp6.c U
.vscode > exp6.c
PROBLEMS DEBUG CONSOLE TERMINAL JUPYTER
TERMINAL
master* 0 0
Ln 223, Col 36 Spaces: 4 UTF-8 CRLF C Go Live Win32 Prettier
85°F Cloudy
ENG IN 12:34 11-09-2022



```
Enter your choice: 10
Number of nodes in the list: 3


****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
 8: Backward Traversal
 9: Sorting
 10: Count number of nodes
 11: Search an element
 12: EXIT

Enter your choice: 11
Enter a value that is to be searched: 3
        Element found


****List of Operations****
 1: Insert at beginning
 2: Insert at end
 3: Insert at before a node
 4: Delete from beginning
 5: Delete from end
 6: Delete node before a specified location
 7: Forward Traversal
```

File Edit Selection View Go Run Terminal Help
exp6.c - exp2 - Visual Studio Code
exp6.c U
.vscode > exp6.c
#include<stdio.h>
PROBLEMS DEBUG CONSOLE TERMINAL JUPYTER
TERMINAL
master* 0 0
Ln 296, Col 27 Spaces: 4 UTF-8 CRLF C Go Live Win32 Prettier
85°F Cloudy
ENG IN 12:58 11-09-2022

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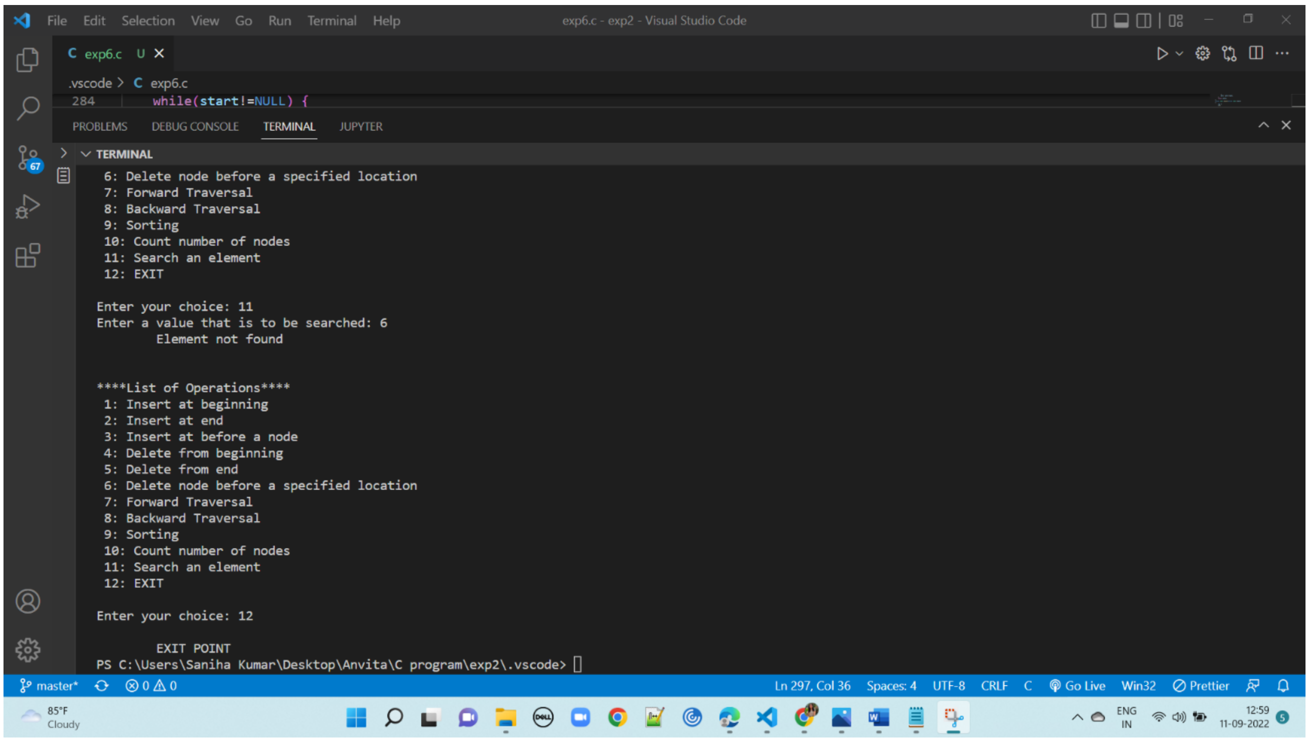
File Edit Selection View Go Run Terminal Help
exp6.c - exp2 - Visual Studio Code
exp6.c U
.vscode > C exp6.c
PROBLEMS DEBUG CONSOLE TERMINAL JUPYTER
TERMINAL
master* ⊗ 0 ⚠ 0
Ln 297, Col 36 Spaces: 4 UTF-8 CRLF C Go Live Win32 Prettier
85°F Cloudy
ENG IN 12:59 11-09-2022

```
284        while(start!=NULL) {
```

```
  6: Delete node before a specified location
  7: Forward Traversal
  8: Backward Traversal
  9: Sorting
  10: Count number of nodes
  11: Search an element
  12: EXIT

Enter your choice: 11
Enter a value that is to be searched: 6
        Element not found


****List of Operations****
  1: Insert at beginning
  2: Insert at end
  3: Insert at before a node
  4: Delete from beginning
  5: Delete from end
  6: Delete node before a specified location
  7: Forward Traversal
  8: Backward Traversal
  9: Sorting
  10: Count number of nodes
  11: Search an element
  12: EXIT

Enter your choice: 12

        EXIT POINT
PS C:\Users\Saniha Kumar\Desktop\Anvita\C program\exp2\.vscode>
```