22.write a c program to implement single linked list with insertion and deletion at begin,middle and last?

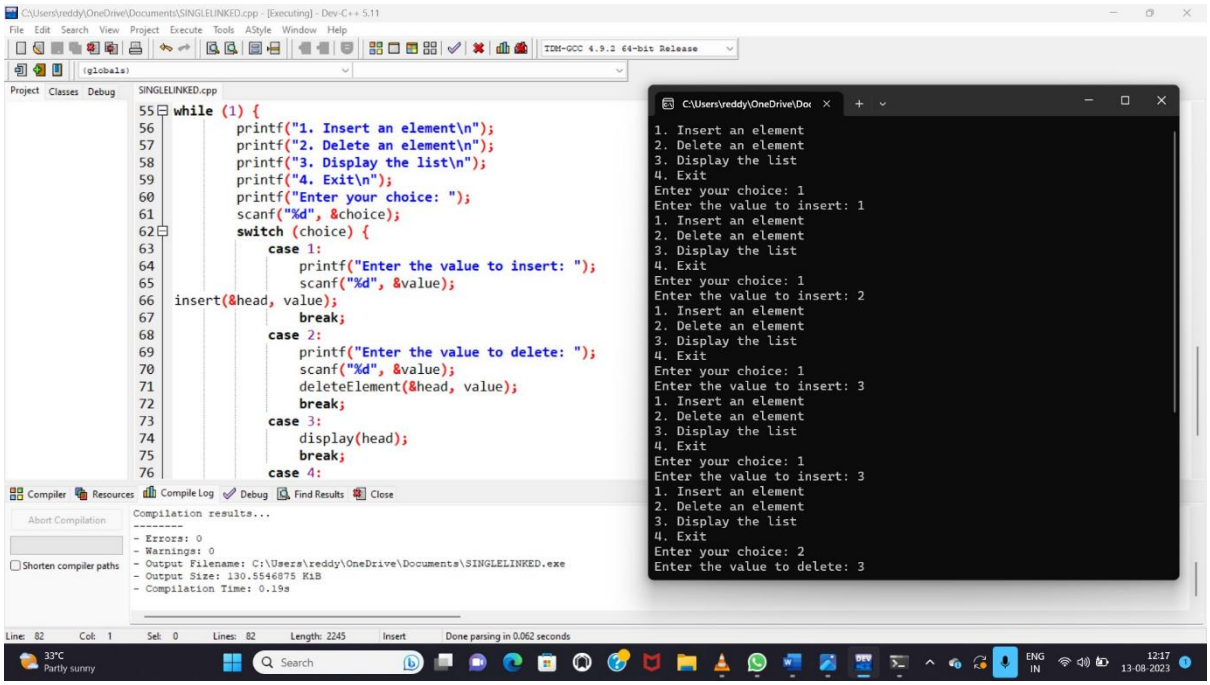
PROGRAM:

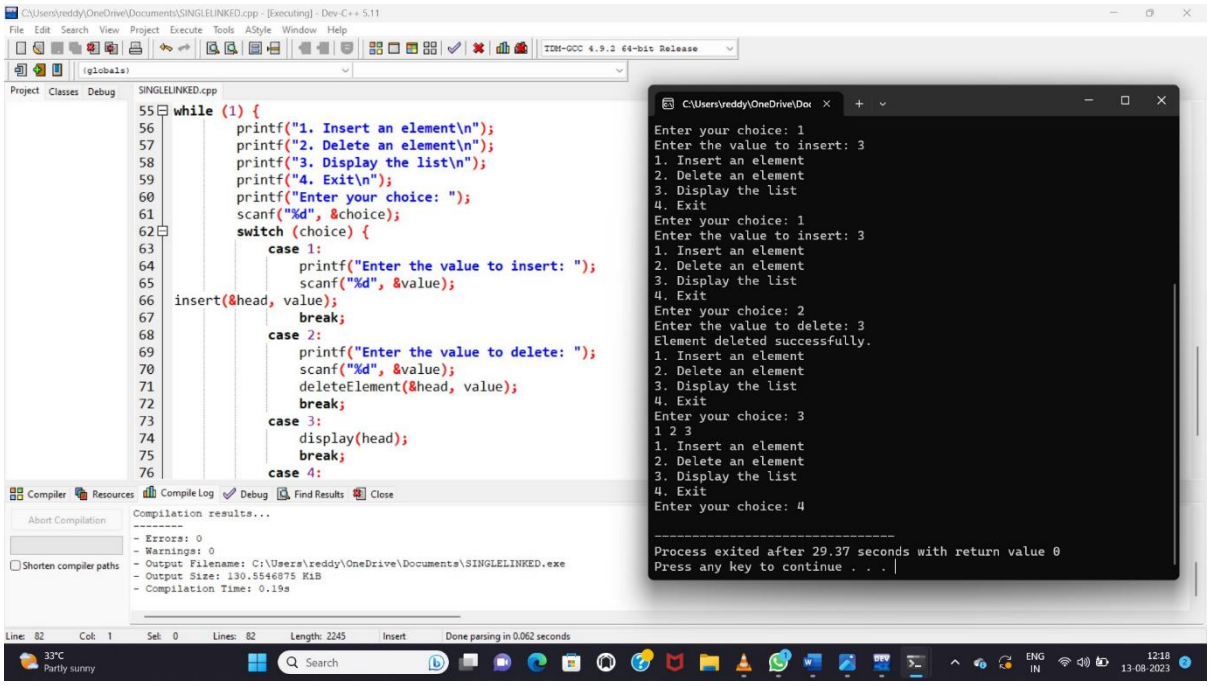
```
#include <stdio.h>
#include <stdlib.h>
struct Node {
   int data;
   struct Node* next;
};
void insert(struct Node** head, int value) {
   struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
   newNode->data = value;
   newNode->next = NULL;
if (*head == NULL) {
      *head = newNode;
   } else {
      struct Node* current = *head;
      while (current->next != NULL) {
         current = current->next;
      }
      current->next = newNode;
   }
}
void deleteElement(struct Node** head, int value) {
   if (*head == NULL) {
      printf("List is empty.\n");
      return;
   }
struct Node* current = *head;
   struct Node* previous = NULL;
```

```
while (current != NULL && current->data != value) {
        previous = current;
        current = current->next;
    }
if (current == NULL) {
        printf("Element not found in the list.\n");
        return;
    }
    if (previous == NULL) {
        *head = current->next;
    } else {
        previous->next = current->next;
    }
    free(current);
    printf("Element deleted successfully.\n");
}
void display(struct Node* head) {
    struct Node* current = head;
    while (current != NULL) {
        printf("%d ", current->data);
        current = current->next;
    }
    printf("\n");
}
int main() {
    struct Node* head = NULL;
    int choice, value;
while (1) {
        printf("1. Insert an element\n");
```

```
        printf("2. Delete an element\n");
        printf("3. Display the list\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);
        switch (choice) {
            case 1:
                printf("Enter the value to insert: ");
                scanf("%d", &value);
insert(&head, value);
                break;
            case 2:
                printf("Enter the value to delete: ");
                scanf("%d", &value);
                deleteElement(&head, value);
                break;
            case 3:
                display(head);
                break;
            case 4:
                exit(0);
            default:
                printf("Invalid choice. Please try again.\n");}}
return 0;
}
```

OUTPUT:





23.write a c program to implement stack data structure with push,pop and diplay elements?

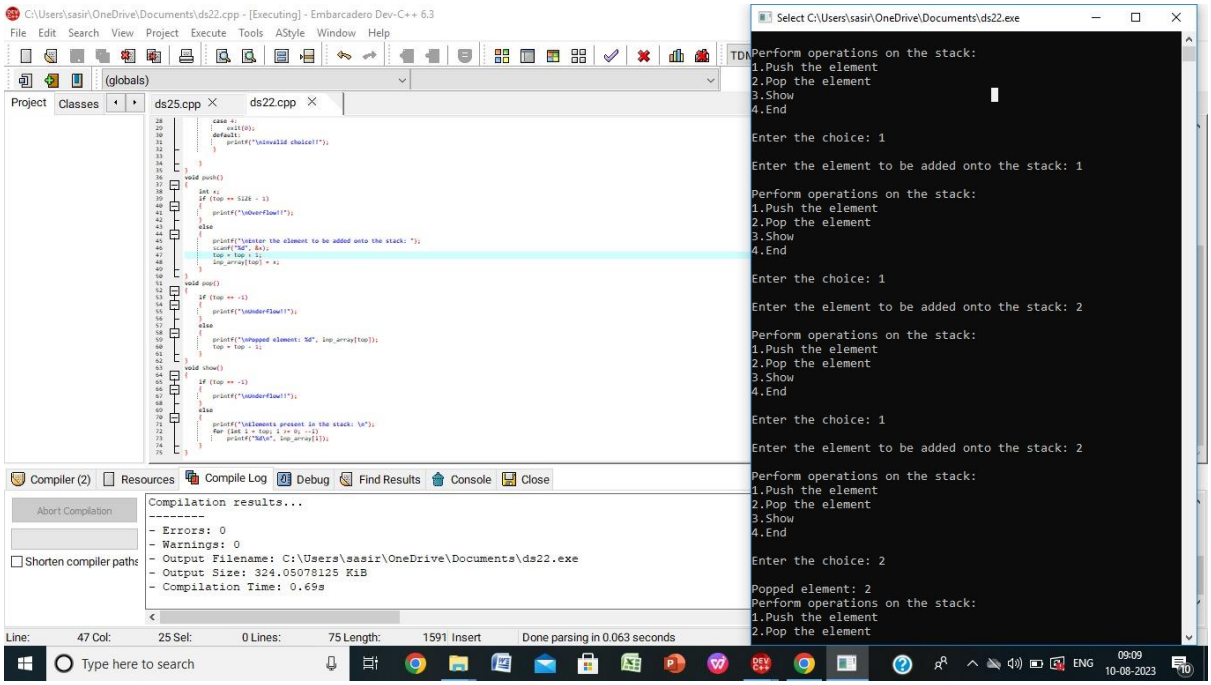
PROGRAM:

```
#include <stdio.h>
#include <stdlib.h>
#define SIZE 5
int top = -1, inp_array[SIZE];
void push();
void pop();
void show();
int main()
{
   int choice;
   while (1)
   {
      printf("\nPerform operations on the stack:");
      printf("\n1.Push the element\n2.Pop the element\n3.Show\n4.End");
      printf("\n\nEnter the choice: ");
      scanf("%d", &choice);
      switch (choice)
      {
      case 1:
         push();
         break;
      case 2:
         pop();
         break;
      case 3:
         show();
         break;
      case 4:
```

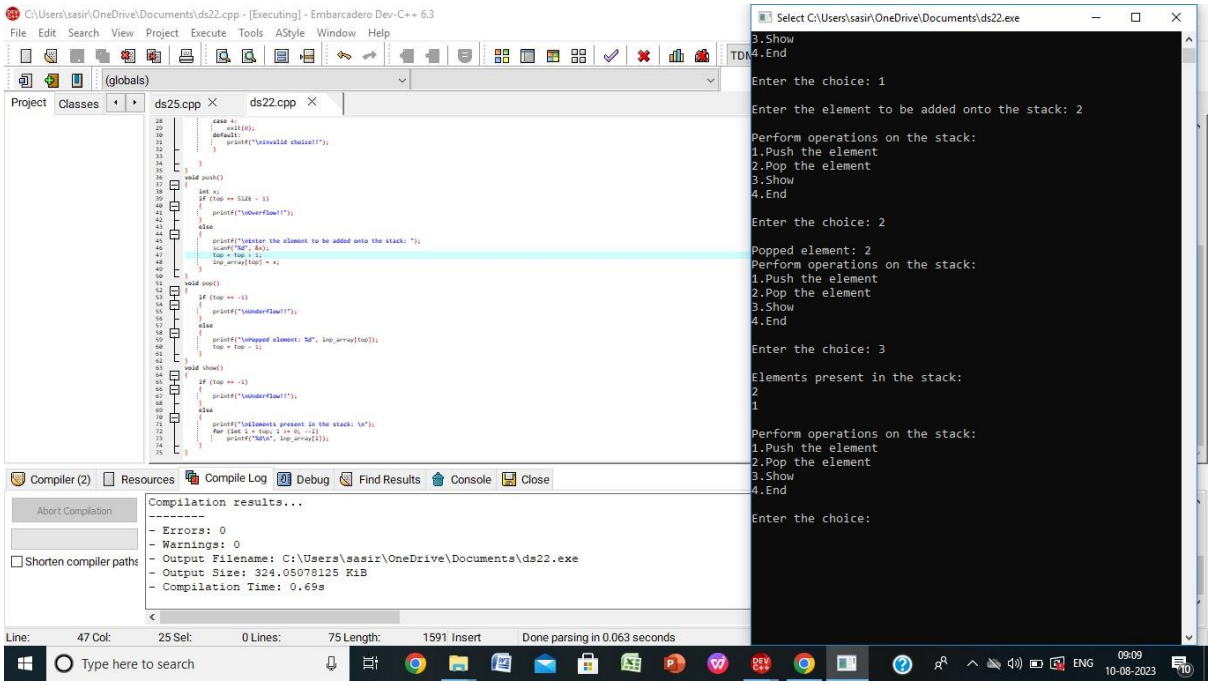
```
            exit(0);
        default:
            printf("\nInvalid choice!!");
        }
}
}
void push()
{
   int x;
   if (top == SIZE - 1)
   {
      printf("\nOverflow!!");
   }
   else
   {
      printf("\nEnter the element to be added onto the stack: ");
      scanf("%d", &x);
      top = top + 1;
      inp_array[top] = x;
   }
}
void pop()
{
   if (top == -1)
   {
      printf("\nUnderflow!!");
   }
   else
   {
```

```
        printf("\nPopped element: %d", inp_array[top]);
        top = top - 1;
    }
}
void show()
{
    if (top == -1)
    {
        printf("\nUnderflow!!");
    }
else
    {
        printf("\nElements present in the stack: \n");
        for (int i = top; i >= 0; --i)
            printf("%d\n", inp_array[i]);
    }
}
```

OUTPUT:


C:\Users\sasir\OneDrive\Documents\ds22.cpp - [Executing] - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
(globals)
Project Classes
ds25.cpp
ds22.cpp
Compiler (2) Resources Compile Log Debug Find Results Console Close
Abort Compilation
Shorten compiler paths
Compilation results...

- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\sasir\OneDrive\Documents\ds22.exe
- Output Size: 324.05078125 KiB
- Compilation Time: 0.69s
Line: 47 Col: 25 Sel: 0 Lines: 75 Length: 1591 Insert Done parsing in 0.063 seconds
Select C:\Users\sasir\OneDrive\Documents\ds22.exe
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 1
Enter the element to be added onto the stack: 1
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 1
Enter the element to be added onto the stack: 2
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 1
Enter the element to be added onto the stack: 2
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 2
Popped element: 2
Perform operations on the stack:
1.Push the element
2.Pop the element
Type here to search
ENG
09:09
10-08-2023


C:\Users\sasir\OneDrive\Documents\ds22.cpp - [Executing] - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
(globals)
Project Classes
ds25.cpp
ds22.cpp
Compiler (2) Resources Compile Log Debug Find Results Console Close
Abort Compilation
Shorten compiler paths
Compilation results...

- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\sasir\OneDrive\Documents\ds22.exe
- Output Size: 324.05078125 KiB
- Compilation Time: 0.69s
Line: 47 Col: 25 Sel: 0 Lines: 75 Length: 1591 Insert Done parsing in 0.063 seconds
Select C:\Users\sasir\OneDrive\Documents\ds22.exe
3.Show
4.End
Enter the choice: 1
Enter the element to be added onto the stack: 2
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 2
Popped element: 2
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice: 3
Elements present in the stack:
2
1
Perform operations on the stack:
1.Push the element
2.Pop the element
3.Show
4.End
Enter the choice:
Type here to search
ENG
09:09
10-08-2023

24.write a c program to implement queue data structure with enqueue,dequeue and display operations?

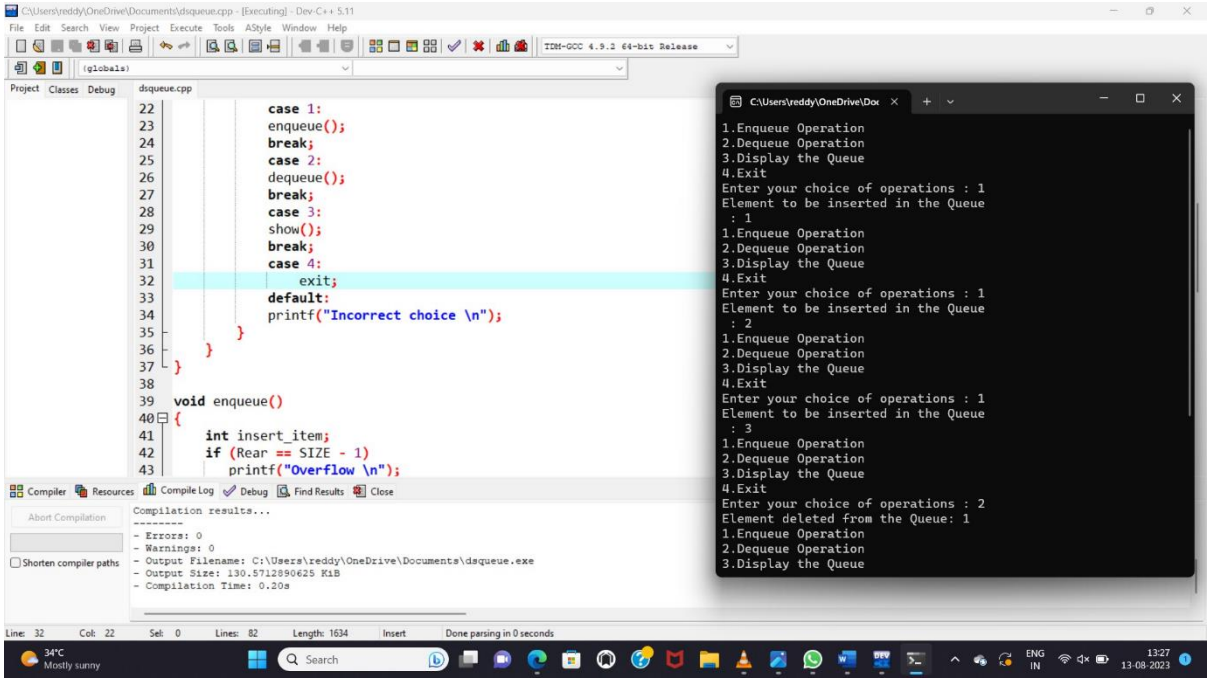
PROGRAM:

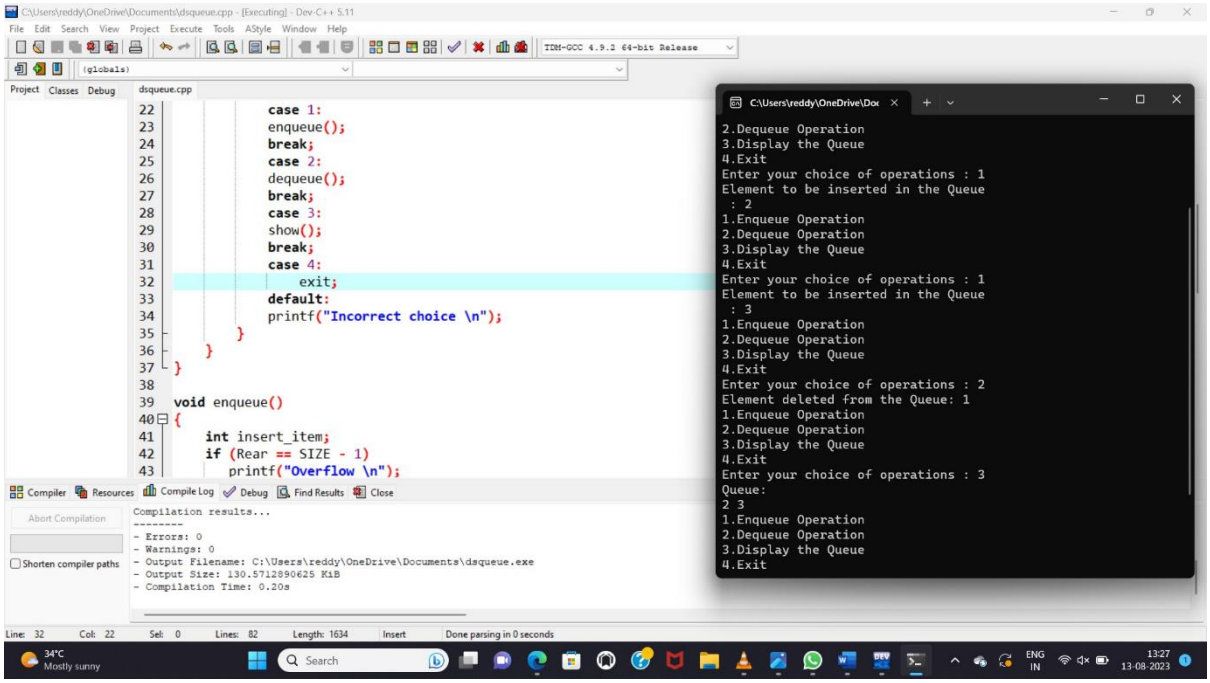
```
#include <stdio.h>
# define SIZE 100
void enqueue();
void dequeue();
void show();
int inp_arr[SIZE];
int Rear = - 1;
int Front = - 1;
main()
{
   int ch,exit;
   while (1)
   {
      printf("1.Enqueue Operation\n");
      printf("2.Dequeue Operation\n");
      printf("3.Display the Queue\n");
      printf("4.Exit\n");
      printf("Enter your choice of operations : ");
      scanf("%d", &ch);
      switch (ch)
      {
         case 1:
         enqueue();
         break;
         case 2:
         dequeue();
         break;
```

```
            case 3:
            show();
            break;
            case 4:
                                                                exit;
            default:
            printf("Incorrect choice \n");
        }
    }
}

void enqueue()
{
    int insert_item;
    if (Rear == SIZE - 1)
       printf("Overflow \n");
    else
    {
        if (Front == - 1)

        Front = 0;
        printf("Element to be inserted in the Queue\n : ");
        scanf("%d", &insert_item);
        Rear = Rear + 1;
        inp_arr[Rear] = insert_item;
    }
}

void dequeue()
```

```
{
   if (Front == - 1 || Front > Rear)
   {
      printf("Underflow \n");
      return ;
   }
   else
   {
      printf("Element deleted from the Queue: %d\n", inp_arr[Front]);
      Front = Front + 1;
   }
}

void show()
{

   if (Front == - 1)
      printf("Empty Queue \n");
   else
   {
      printf("Queue: \n");
      for (int i = Front; i <= Rear; i++)
         printf("%d ", inp_arr[i]);
      printf("\n");
   }
}
```

OUTPUT:


case 1:
enqueue();
break;
case 2:
dequeue();
break;
case 3:
show();
break;
case 4:
exit;
default:
printf("Incorrect choice \n");
void enqueue()
int insert_item;
if (Rear == SIZE - 1)
printf("Overflow \n");
1.Enqueue Operation
2.Dequeue Operation
3.Display the Queue
4.Exit
Enter your choice of operations : 1
Element to be inserted in the Queue
: 1
Enter your choice of operations : 2
Element deleted from the Queue: 1


case 1:
enqueue();
break;
case 2:
dequeue();
break;
case 3:
show();
break;
case 4:
exit;
default:
printf("Incorrect choice \n");
void enqueue()
int insert_item;
if (Rear == SIZE - 1)
printf("Overflow \n");
2.Dequeue Operation
3.Display the Queue
4.Exit
Enter your choice of operations : 1
Element to be inserted in the Queue
: 2
Enter your choice of operations : 1
Element to be inserted in the Queue
: 3
Enter your choice of operations : 2
Element deleted from the Queue: 1
Enter your choice of operations : 3
Queue:
2 3

25.write a c program to convert infix to postfix using stack?

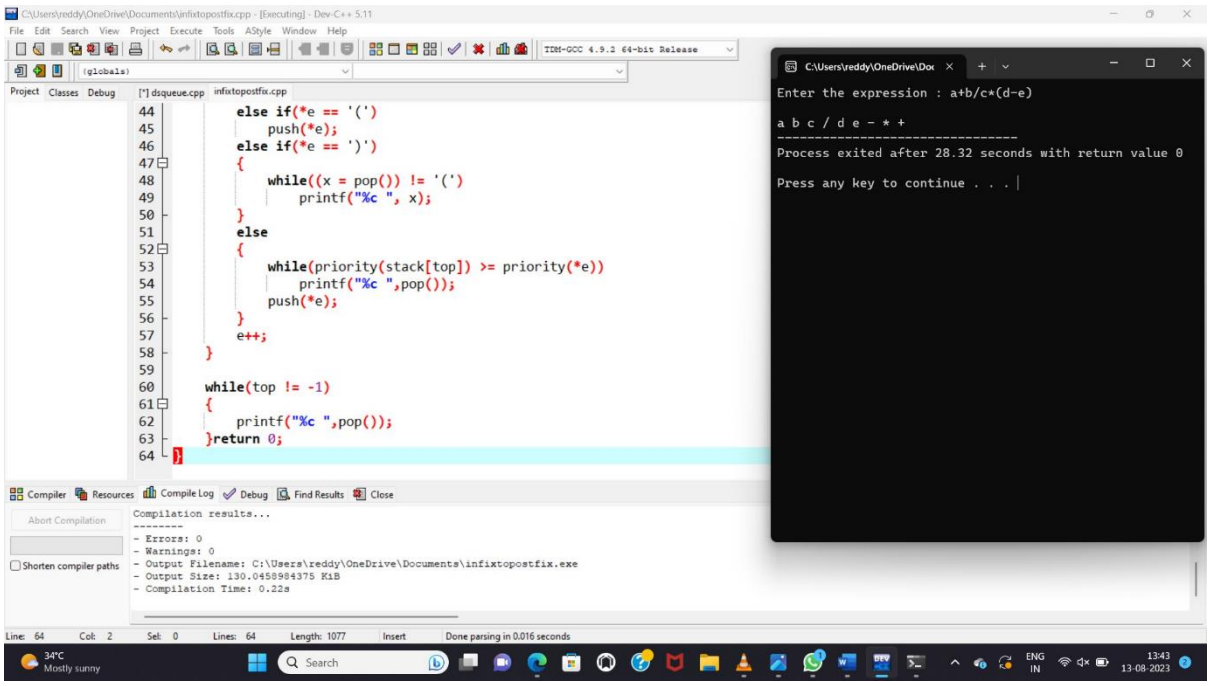
PROGRAM:

```
#include<stdio.h>
#include<ctype.h>

char stack[100];
int top = -1;

void push(char x)
{
   stack[++top] = x;
}

char pop()
{
   if(top == -1)
      return -1;
   else
      return stack[top--];
}

int priority(char x)
{
   if(x == '(')
      return 0;
   if(x == '+' || x == '-')
      return 1;
   if(x == '*' || x == '/')
      return 2;
```

```
    return 0;
}

int main()
{
    char exp[100];
    char *e, x;
    printf("Enter the expression : ");
    scanf("%s",exp);
    printf("\n");
    e = exp;

    while(*e != '\0')
    {
        if(isalnum(*e))
            printf("%c ",*e);
        else if(*e == '(')
            push(*e);
        else if(*e == ')')
        {
            while((x = pop()) != '(')
                printf("%c ", x);
        }
        else
        {
            while(priority(stack[top]) >= priority(*e))
                printf("%c ",pop());
            push(*e);
        }
```

```
        e++;
    }

    while(top != -1)
    {
        printf("%c ",pop());
    }return 0;
}
```

OUTPUT:



26.write a c program evaluate given expression using stack?

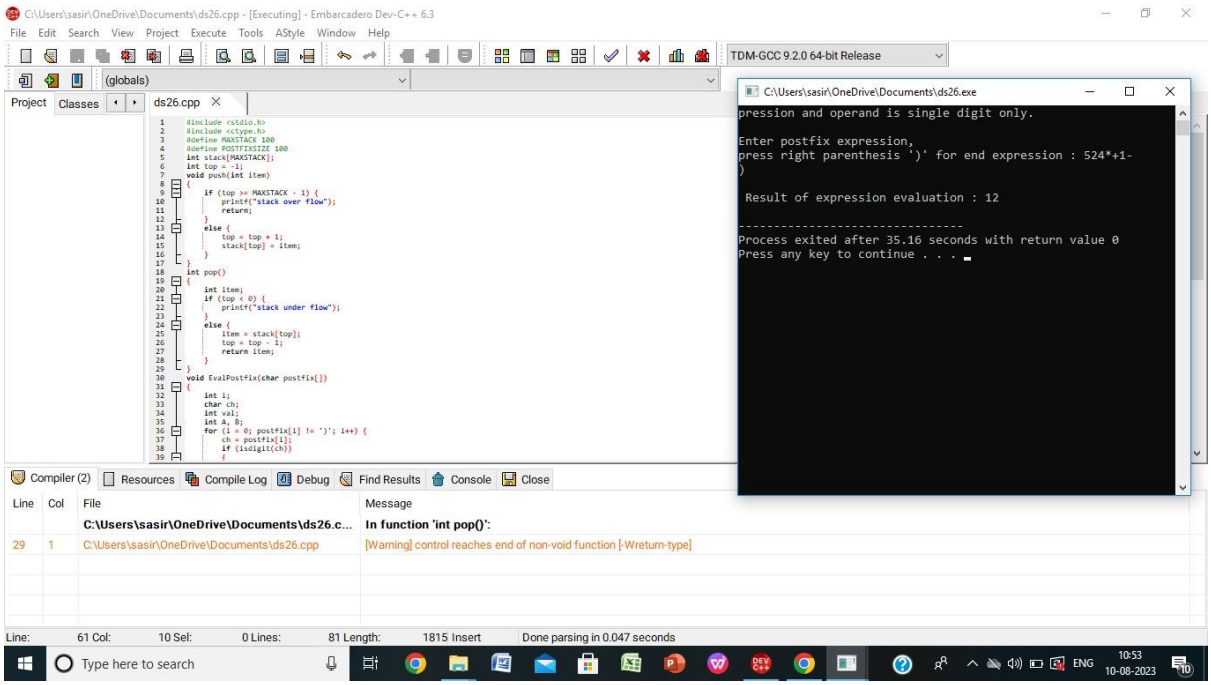
PROGRAM:

```
#include <stdio.h>
#include <ctype.h>
#define MAXSTACK 100
#define POSTFIXSIZE 100
int stack[MAXSTACK];
int top = -1;
void push(int item)
{
   if (top >= MAXSTACK - 1) {
      printf("stack over flow");
      return;
   }
   else {
      top = top + 1;
      stack[top] = item;
   }
}
int pop()
{
   int item;
   if (top < 0) {
      printf("stack under flow");
   }
   else {
      item = stack[top];
      top = top - 1;
      return item;
```

```
    }
}
void EvalPostfix(char postfix[])
{
int i;
    char ch;
    int val;
    int A, B;
    for (i = 0; postfix[i] != ')'; i++) {
        ch = postfix[i];
        if (isdigit(ch))
                                                        {
            push(ch - '0');
        }
        else if (ch == '+' || ch == '-' || ch == '*' || ch == '/') {
            A = pop();
            B = pop();
            switch (ch)
            {
            case '*':
                val = B * A;
                break;
            case '/':
                val = B / A;
                break;
            case '+':
                val = B + A;
                break;
            case '-':
```

```
            val = B - A;
            break;
          }
          push(val);
        }
    }
    printf(" \n Result of expression evaluation : %d \n", pop());
}
int main()
{
    int i;
    char postfix[POSTFIXSIZE];
    printf("ASSUMPTION: There are only four operators(*, /, +, -) in an expression and
operand is single digit only.\n");
    printf(" \nEnter postfix expression,\npress right parenthesis ')' for end expression : ");
    for (i = 0; i <= POSTFIXSIZE - 1; i++) {
        scanf("%c", &postfix[i]);

        if (postfix[i] == ')')
        {
            break;
        }
    }
    EvalPostfix(postfix);
    return 0;
}
```

OUTPUT:


C:\Users\sasir\OneDrive\Documents\ds26.cpp - [Executing] - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 9.2.0 64-bit Release
(globals)
Project Classes
ds26.cpp
#include <stdio.h>
#include <ctype.h>
#define MAXSTACK 100
#define POSTFIXSIZE 100
int stack[MAXSTACK];
int top = -1;
void push(int item)
{
if (top >= MAXSTACK - 1) {
printf("stack over flow");
return;
}
else {
top = top + 1;
stack[top] = item;
}
}
int pop()
{
int item;
if (top < 0) {
printf("stack under flow");
}
else {
item = stack[top];
top = top - 1;
return item;
}
}
void EvalPostfix(char postfix[])
{
int i;
char ch;
int val;
int A, B;
for (i = 0; postfix[i] != ')'; i++) {
ch = postfix[i];
if (isdigit(ch))
{
C:\Users\sasir\OneDrive\Documents\ds26.exe
pression and operand is single digit only.
Enter postfix expression,
press right parenthesis ')' for end expression : 524*+1-
)
Result of expression evaluation : 12

Process exited after 35.16 seconds with return value 0
Press any key to continue . . .
Compiler (2) Resources Compile Log Debug Find Results Console Close
Line Col File Message
C:\Users\sasir\OneDrive\Documents\ds26.c... In function 'int pop()':
29 1 C:\Users\sasir\OneDrive\Documents\ds26.cpp [Warning] control reaches end of non-void function [-Wreturn-type]
Line: 61 Col: 10 Sel: 0 Lines: 81 Length: 1815 Insert Done parsing in 0.047 seconds
Type here to search
ENG
10:53
10-08-2023