# CS6612 – Compiler Lab

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## Specification

Write a program in C to construct Recursive Descent Parser for the following grammar which is for arithmetic expression involving + and *. Check the Grammar for left recursion and convert into suitable for this parser. Write recursive functions for every non-terminal. Call the function for start symbol of the Grammar in main().

**G: E→E+T|E-T|T**

**T→T*F | T/F|F**

**F→(E)|i**

## Code

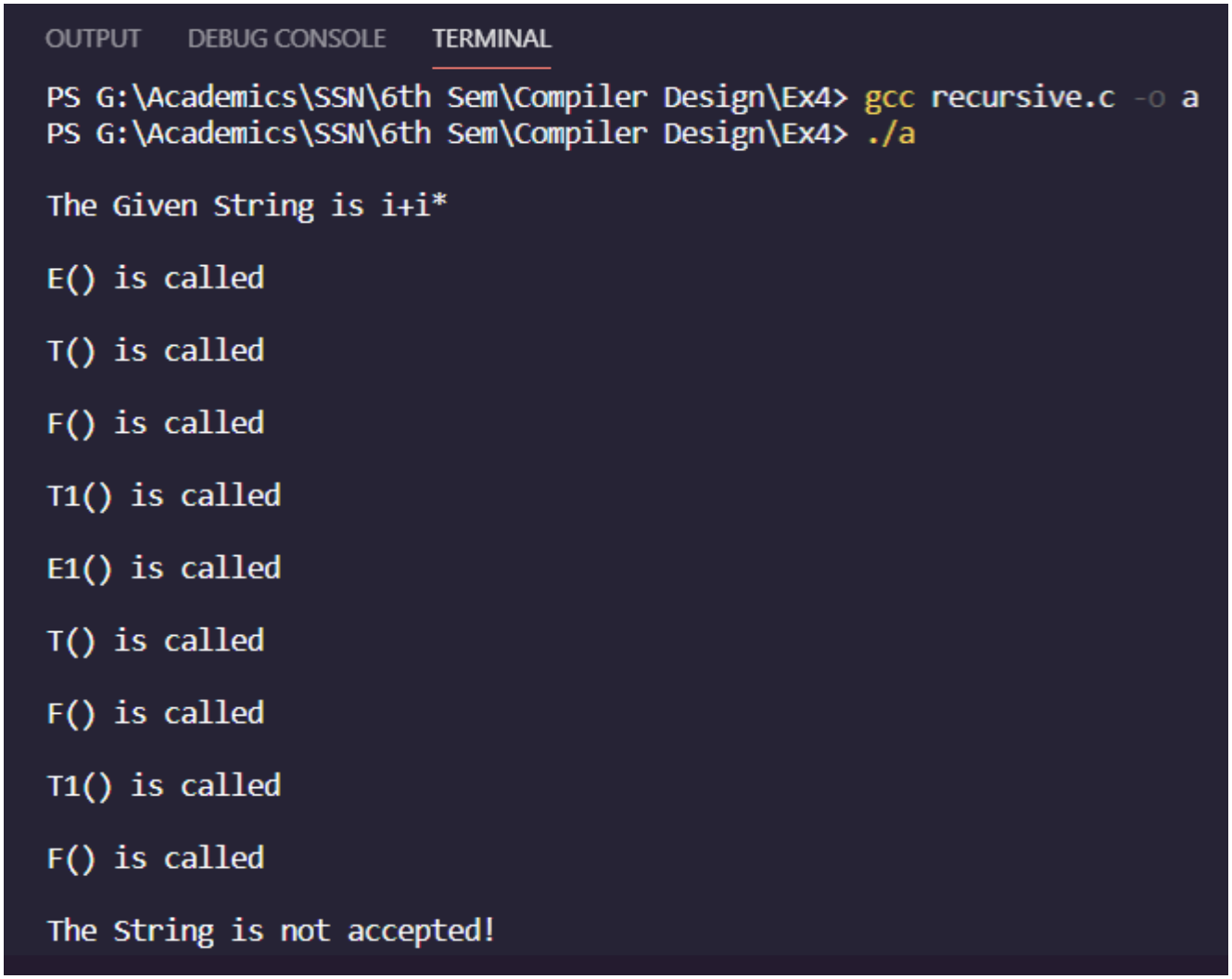
```
/*E->TE'
E'-> +TE' | -TE' | epsilon
T->FT'
T'->*FT'| /FT' | epsilon
F->(E) | id*/
#include<stdio.h>
#include<stdlib.h>
#include<ctype.h>
#include<string.h>
char str[100];
int i=0;
int E();
int E1();
int T();
int T1();
int F();
void print_tab(int depth);
void main()
{
    strcpy(str,"i+i");
    printf("\nThe Given String is %s\n",str);
    if(E(0))
```

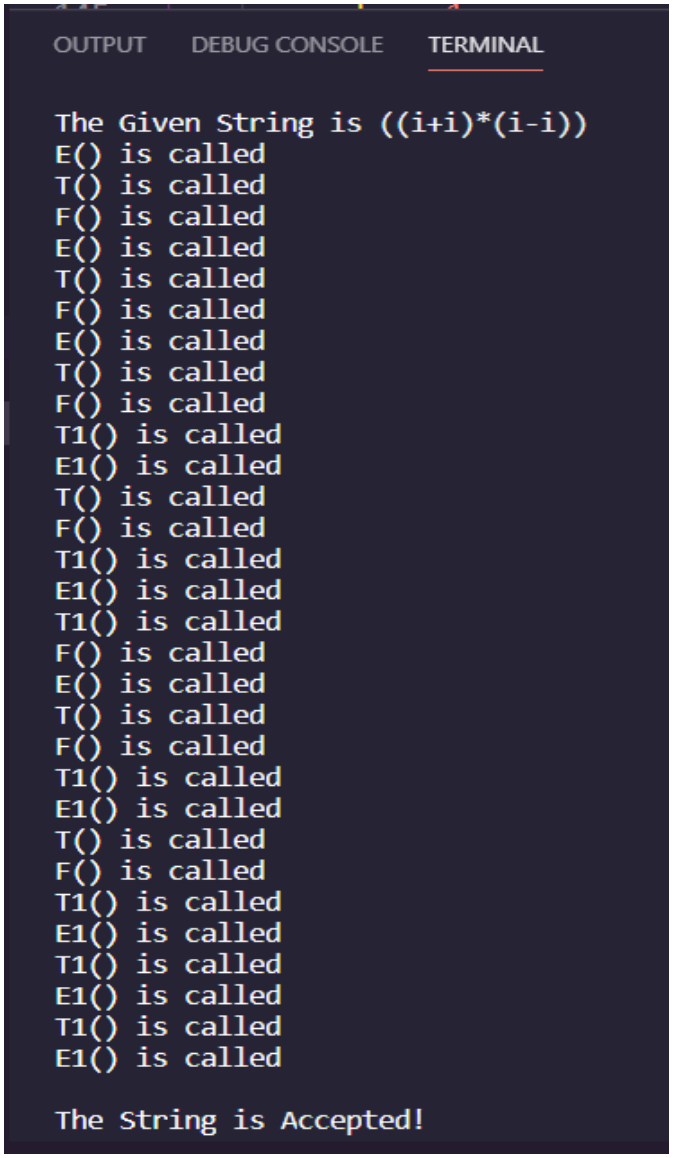
```
        printf("\nThe String is Accepted!\n");
    else
        printf("\nThe String is not accepted!\n");
}
int E()
{
    printf("\nE() is called\n");
    if(T())
    {
        if(E1())
            return 1;
        else
            return 0;
    }
    else
        return 0;
}
int E1()
{
    printf("\nE1() is called\n");
    if(str[i]=='+')
    {
        i++;
        if(T())
        {
            if(E1())
                return 1;
            else
                return 0;
        }
        else
            return 0;
    }
    else if(str[i]=='-')
    {
        i++;
        if(T())
        {
            if(E1())
                return 1;
            else
                return 0;
        }
        else
            return 0;
    }
```

```
    else if(str[i]=='\0')
    {
        //i++;
        return 1;
    }
}
int T()
{
    printf("\nT() is called\n");
     if(F())
    {
        if(T1())
            return 1;
        else
            return 0;
    }
    else
        return 0;
}
int T1()
{
    printf("\nT1() is called\n");
    if(str[i]=='*')
    {
        i++;
        if(F())
        {
            if(T1())
                return 1;
            else
                return 0;
        }
        else
            return 0;
    }
    else if(str[i]=='/')
    {
        i++;
        if(F())
        {
            if(T1())
                return 1;
            else
                return 0;
        }
        else
```

```
            return 0;
    }
    else if(str[i]=='\0')
    {
        //i++;
        return 1;
    }
}
int F()
{
    printf("\nF() is called\n");
    if(str[i]=='(')
    {
        i++;
        if(E())
        {
            if(str[i]==')')
            {
                i++;
                return 1;
            }
            else
                return 0;
        }
        else
            return 0;
    }
    else if(str[i]=='i')
    {
        i++;
        return 1;
    }
}
void print_tabs(int depth)
{
    int i=0;
    for(i=0;i<depth;i++)
        printf("\t");
}
```

*(Output)*


OUTPUT
DEBUG CONSOLE
TERMINAL
PS G:\Academics\SSN\6th Sem\Compiler Design\Ex4> gcc recursive.c -o a
PS G:\Academics\SSN\6th Sem\Compiler Design\Ex4> ./a
The Given String is i+i*
E() is called
T() is called
F() is called
T1() is called
E1() is called
T() is called
F() is called
T1() is called
F() is called
The String is not accepted!




## Learning Outcome:

- I've learnt how to construct the recursive decent parser for the given input grammar
- I've learnt the internal working of the recursive parser and able to trace the input string whether it's accepted or not.