

# Dept. of Computer Science & Engineering



আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম  
الجامعة الإسلامية 国际伊斯兰大学 孟加拉国  
**International Islamic University Chittagong**

**Course Code:** CSE-3528

**Course Title:** Compiler Lab

**Spring-22**

**Submitted By:**

**Name:** Farida Nusrat

**ID:** C201242

**Semester:** 5<sup>th</sup>

**Section:** 5AF

**Email:** [c201242@ugrad.iiuc.ac.bd](mailto:c201242@ugrad.iiuc.ac.bd)

**Submitted To:**

Mrs. Israt Binteh Habib

Dept. Of CSE,IIUC.

**Signature:** Farida Nusrat

**Submission:** 11.11.22

**OBJECTIVE:**

Implement a program to calculate First and Follow sets of given grammar.

**RESOURCE:**

Code-blocks.

**Algorithm:****First ()-**

If  $x$  is a terminal, then  $\text{FIRST}(x) = \{ 'x' \}$   
 If  $x \rightarrow \epsilon$ , is a production rule, then add  $\epsilon$  to  $\text{FIRST}(x)$ .  
 If  $X \rightarrow Y_1 Y_2 Y_3 \dots Y_n$  is a production,  
 $\text{FIRST}(X) = \text{FIRST}(Y_1)$   
 If  $\text{FIRST}(Y_1)$  contains  $\epsilon$  then  $\text{FIRST}(X) = \{ \text{FIRST}(Y_1) - \epsilon \} \cup \{ \text{FIRST}(Y_2) \}$   
 If  $\text{FIRST}(Y_i)$  contains  $\epsilon$  for all  $i = 1$  to  $n$ , then add  $\epsilon$  to  $\text{FIRST}(X)$ .

**Follow ()-**

$\text{FOLLOW}(S) = \{ \$ \}$  // where  $S$  is the starting Non-Terminal  
 If  $A \rightarrow pBq$  is a production, where  $p, B$  and  $q$  are any grammar symbols,  
 then everything in  $\text{FIRST}(q)$  except  $\epsilon$  is in  $\text{FOLLOW}(B)$ .  
 If  $A \rightarrow pB$  is a production, then everything in  $\text{FOLLOW}(A)$  is in  $\text{FOLLOW}(B)$ .  
 If  $A \rightarrow pBq$  is a production and  $\text{FIRST}(q)$  contains  $\epsilon$ ,  
 then  $\text{FOLLOW}(B)$  contains  $\{ \text{FIRST}(q) - \epsilon \} \cup \text{FOLLOW}(A)$

**PROCEDURE:**

Go to debug -> run or press CTRL + F9 to run the program.

**PROGRAM:**

```
#include<bits/stdc++.h>

using namespace std;

int n,m=0,p,i=0,j=0;

char a[10][10],f[10];

void follow(char c);

void first(char c);

int main() {

    int i,z;

    char c,ch;
```

```
printf("Enter the no of productions:");

scanf("%d",&n);

printf("Enter the productions:\n");

for(i=0; i<n; i++)

    scanf("%s%c",a[i],&ch);

do {

    m=0;

    printf("Enter the elemets whose fisrt & follow is to be found:");

    scanf("%c",&c);

    first(c);

    printf("First(%c)=%c",c);

    for(i=0; i<m; i++)

        printf("%c",f[i]);

    printf("\n");

    strcpy(f," ");

    m=0;

    follow(c);

    printf("Follow(%c)=%c",c);

    for(i=0; i<m; i++)

        printf("%c",f[i]);

    printf("\n");

    printf("Continue(0/1)?");

    scanf("%d%c",&z,&ch);

} while(z==1);
```

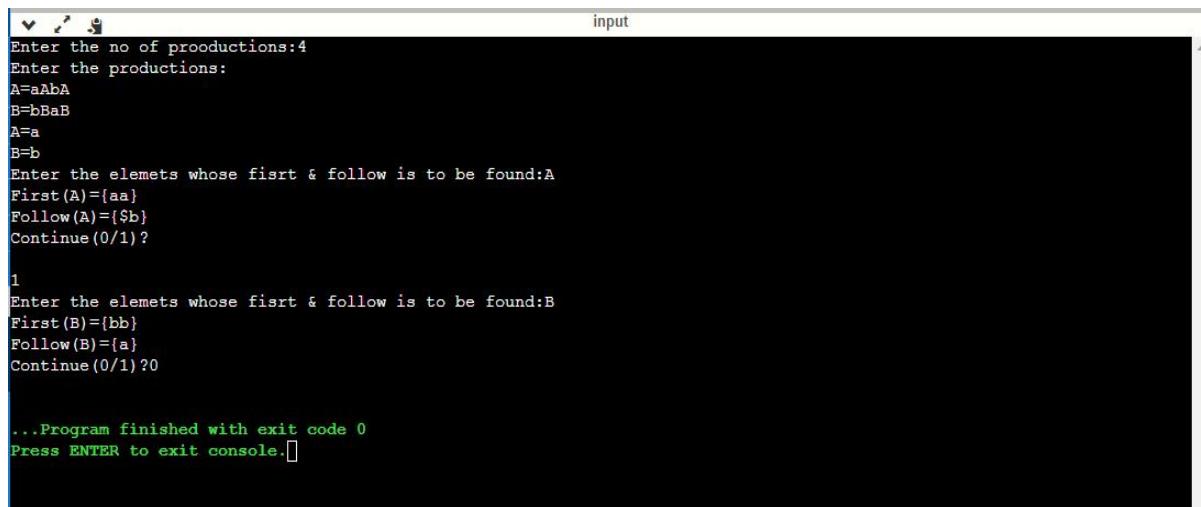
```
return(0);  
}  
  
void first(char c)  
{  
    int k;  
  
    if(!isupper(c))  
        f[m++]=c;  
  
    for(k=0; k<n; k++)  
    {  
        if(a[k][0]==c)  
        {  
            if(a[k][2]=='$')  
                follow(a[k][0]);  
            else if(islower(a[k][2]))  
                f[m++]=a[k][2];  
            else  
                first(a[k][2]);  
        }  
    }  
  
    void follow(char c)  
    {  
        if(a[0][0]==c)  
            f[m++]='$';  
    }
```

```

for(i=0; i<n; i++)
{
    for(j=2; j<strlen(a[i]); j++)
    {
        if(a[i][j]==c)
        {
            if(a[i][j+1]!='\0')
                first(a[i][j+1]);
            if(a[i][j+1]=='\0' && c!=a[i][0])
                follow(a[i][0]);
        }
    }
}

```

### INPUT & OUTPUT:



The screenshot shows a terminal window with the following interaction:

```

input
Enter the no of productions:4
Enter the productions:
A=aAbA
B=bBaB
A=a
B=b
Enter the elements whose fisrt & follow is to be found:A
First(A)={aa}
Follow(A)={$b}
Continue(0/1)?0
1
Enter the elements whose fisrt & follow is to be found:B
First(B)={bb}
Follow(B)={a}
Continue(0/1)?0
...Program finished with exit code 0
Press ENTER to exit console.

```

### OUTCOMES:

The implementation is done successfully.