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Experiment-5 Computation of FIRST () and FOLLOW ()

Aim:

To write a program to compute the FIRST() and FOLLOW().

Procedure:

a. For computing the first:

1. If X is a terminal then FIRST(X) = {X}

Example: F -> I | id

We can write it as FIRST(F) -> { (, id)

2. If X is a non-terminal like E -> T then to get FIRSTI substitute T with other productions

until you get a terminal as the first symbol

3. If X -> ε then add ε to FIRST(X).

b. For computing the follow:

1. Always check the right side of the productions for a non-terminal, whose FOLLOW set is

being found. (never see the left side).

2. (a) If that non-terminal (S,A,B...) is followed by any terminal (a,b...,*,+,(,)...) , then add that terminal into the FOLLOW set.

(b) If that non-terminal is followed by any other non-terminal then add FIRST of other nonterminal into the FOLLOW set.

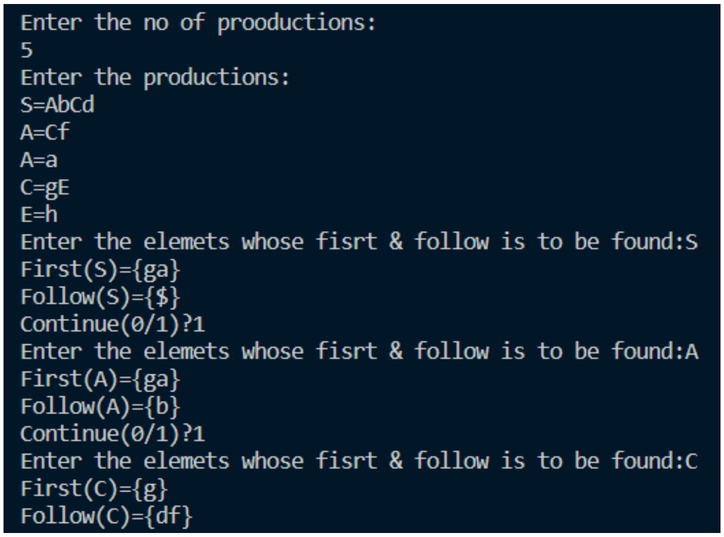
Code:

```
#include <bits/stdc++.h>
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()
{
    system("cls");
    int i, z;
    char c, ch;
    printf("Enter the no of prooductions:\n");
    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);
        for (i = 0; i < m; i++)
            printf("%c", f[i]);
        printf("}\n");
        strcpy(f, " ");
        m = 0;
        follow(c);
        printf("Follow(%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);
    system("pause");
    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]);
            }
        }
    }
}
```

Output:



```
Enter the no of prooductions:
5
Enter the productions:
S=AbCd
A=Cf
A=a
C=gE
E=h
Enter the elemets whose fisrt & follow is to be found:S
First(S)={ga}
Follow(S)={$}
Continue(0/1)?1
Enter the elemets whose fisrt & follow is to be found:A
First(A)={ga}
Follow(A)={b}
Continue(0/1)?1
Enter the elemets whose fisrt & follow is to be found:C
First(C)={g}
Follow(C)={df}
```

Result:

The FIRST and FOLLOW sets of the non-terminals of a grammar were found successfully.