Exp 7 - Implement predictive Parsing Table

Aim: To write a program for Implementation of predictive Parsing Table

Algorithm:

1. Start the program.
2. Initialize the required variables.
3. Get the number of coordinates and productions from the user.
4. Perform the following for (each production A → α in G)
   for (each terminal a in FIRST(α))
   add A → α to M[A, a];
   if (ε is in FIRST(α))
   for (each symbol b in
   FOLLOW(A))
   add A →α to M[A,b];
5. Print the resulting stack.
6. Print if the grammar is accepted or not.
7. Exit the program.

Program:

```c
#include <stdio.h>
#include <ctype.h>
#include <string.h>
#include <stdlib.h>
void followfirst(char, int, int);
void findfirst(char, int, int);
void follow(char c);
int count, n = 0;
char calc_first[10][100];
char calc_follow[10][100];
int m = 0;
```

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```
char production[10][10], first[10];
char f[10];
int k;
char ck;
int e;
int main(int argc, char **argv)
{

    int jm = 0;
    int km = 0;
    int i, choice;

    char c, ch;
    printf("How many productions ? :");
    scanf("%d", &count);
    printf("\nEnter %d productions in form A=B where A and B are grammar symbols :\n\n",
count);
    for (i = 0; i < count; i++)
    {
        scanf("%s%c", production[i], &ch);
    }
    int kay;
    char done[count];
    int ptr = -1;
    for (k = 0; k < count; k++)
    {
        for (kay = 0; kay < 100; kay++)
        {
            calc_first[k][kay] = '!';
        }
    }
    int point1 = 0, point2, xxx;
    for (k = 0; k < count; k++)
    {
        c = production[k][0];
        point2 = 0;
        xxx = 0;
        for (kay = 0; kay <= ptr; kay++)
            if (c == done[kay])
                xxx = 1;
        if (xxx == 1)
            continue;
        findfirst(c, 0, 0);
        ptr += 1;
        done[ptr] = c;
        // printf("\n First(%c)= { ", c);
        calc_first[point1][point2++] = c;
        for (i = 0 + jm; i < n; i++)
        {
            int lark = 0, chk = 0;
            for (lark = 0; lark < point2; lark++)
            {
                if (first[i] ==
                    calc_first[point1][lark])
                {
                    chk = 1;
                    break;
                }
            }
```

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```
            if (chk == 0)
            {
                // printf("%c, ", first[i]);
                calc_first[point1][point2++] = first[i];
            }
        }
        // printf("}\n");
        jm = n;
        point1++;
    }
    // printf("\n");
    // printf("----------------------------------------------\n\n");
    char donee[count];
    ptr = -1;
    for (k = 0; k < count; k++)
    {
        for (kay = 0; kay < 100; kay++)
        {
            calc_follow[k][kay] = '!';
        }
    }
    point1 = 0;
    int land = 0;
    for (e = 0; e < count; e++)
    {
        ck = production[e][0];
        point2 = 0;
        xxx = 0;
        for (kay = 0; kay <= ptr; kay++)
            if (ck == donee[kay])
                xxx = 1;
        if (xxx == 1)
            continue;
        land += 1;
        follow(ck);
        ptr += 1;
        donee[ptr] = ck;
        // printf(" Follow(%c) = { ", ck);
        calc_follow[point1][point2++] = ck;
        for (i = 0 + km; i < m; i++)
        {
            int lark = 0, chk = 0;
            for (lark = 0; lark < point2; lark++)
            {
                if (f[i] ==
                    calc_follow[point1][lark])
                {
```

```
                    chk = 1;
                    break;
                }
            }
            if (chk == 0)
            {
                // printf("%c, ", f[i]);
```

```
                calc_follow[point1][point2++] = f[i];
            }
        }
        // printf(" }\n\n");
```

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```
        km = m;
        point1++;
    }
    char ter[10];
    for (k = 0; k < 10; k++)
    {
        ter[k] = '!';
    }
    int ap, vp, sid = 0;
    for (k = 0; k < count; k++)
    {
        for (kay = 0; kay < count; kay++)
        {
            if (!isupper(production[k][kay]) &&
                production[k][kay] != '#' && production[k][kay] != '=' &&
production[k][kay] != '\0')
            {
                vp = 0;
                for (ap = 0; ap < sid; ap++)
                {
                    if (production[k][kay] == ter[ap])
                    {
                        vp = 1;
                        break;
                    }
                }
                if (vp == 0)
                {
                    ter[sid] = production[k][kay];
                    sid++;
                }
            }
        }
    }
    ter[sid] = '$';
    sid++;
    printf("\n\t\t\t\t\t\t\t The LL(1) Parsing Table for the above grammer :-");
```

```
    printf("\n\t\t\t\t\t\t\t^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^\n");
    printf("\n\t\t\t=========================================================================
===========================================\n");
    printf("\t\t\t\t|\t");
    for (ap = 0; ap < sid; ap++)
    {
        printf("%c\t\t", ter[ap]);
    }
    printf("\n\t\t\t=========================================================================
===========================================\n");

    char first_prod[count][sid];
    for (ap = 0; ap < count; ap++)
    {
        int destiny = 0;
        k = 2;
        int ct = 0;
        char tem[100];
        while (production[ap][k] != '\0')
        {
            if (!isupper(production[ap][k]))
            {
```

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```
                tem[ct++] = production[ap][k];
                tem[ct++] = '_';
                tem[ct++] = '\0';
                k++;
                break;
            }
            else
            {
                int zap = 0;
                int tuna = 0;
                for (zap = 0; zap < count; zap++)
                {
                    if (calc_first[zap][0] ==
                        production[ap][k])
                    {
                        for (tuna = 1; tuna < 100; tuna++)
                        {
                            if (calc_first[zap][tuna] != '!')
                            {
                                tem[ct++] =
                                    calc_first[zap][tuna];
                            }
                            else
                                break;
                        }
```

```
                        break;
                    }
                }
                tem[ct++] = '_';
            }
            k++;
        }
        int zap = 0, tuna;
        for (tuna = 0; tuna < ct; tuna++)
        {
            if (tem[tuna] == '#')
            {
                zap = 1;
            }
            else if (tem[tuna] == '_')
            {
                if (zap == 1)
                {
                    zap = 0;
                }
                else
                    break;
            }
            else
            {
                first_prod[ap][destiny++] = tem[tuna];
            }
        }
    }
    char table[land][sid + 1];
    ptr = -1;
    for (ap = 0; ap < land; ap++)
    {
        for (kay = 0; kay < (sid + 1); kay++)
```

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```
        {
            table[ap][kay] = '!';
        }
    }
    for (ap = 0; ap < count; ap++)
    {
        ck = production[ap][0];
        xxx = 0;
        for (kay = 0; kay <= ptr; kay++)
            if (ck == table[kay][0])
                xxx = 1;
        if (xxx == 1)
            continue;
        else
        {
            ptr = ptr + 1;
            table[ptr][0] = ck;
        }
    }
    for (ap = 0; ap < count; ap++)
    {
        int tuna = 0;
        while (first_prod[ap][tuna] != '\0')
        {
            int to, ni = 0;
            for (to = 0; to < sid; to++)
            {
                if (first_prod[ap][tuna] == ter[to])
                {
                    ni = 1;
                }
            }
            if (ni == 1)
            {
                char xz = production[ap][0];
                int cz = 0;
                while (table[cz][0] != xz)
                {
                    cz = cz + 1;
                }
                int vz = 0;
                while (ter[vz] != first_prod[ap][tuna])
                {
                    vz = vz + 1;
                }
                table[cz][vz + 1] = (char)(ap + 65);
            }
            tuna++;
        }
    }
    for (k = 0; k < sid; k++)
    {
        for (kay = 0; kay < 100; kay++)
        {
            if (calc_first[k][kay] == '!')
            {
                break;
            }
            else if (calc_first[k][kay] == '#')
            {
```

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```
                int fz = 1;
                while (calc_follow[k][fz] != '!')
                {
                    char xz = production[k][0];
                    int cz = 0;
                    while (table[cz][0] != xz)
                    {
                        cz = cz + 1;
                    }
                    int vz = 0;
                    while (ter[vz] != calc_follow[k][fz])
                    {
                        vz = vz + 1;
                    }
                    table[k][vz + 1] = '#';
                    fz++;
                }
                break;
            }
        }
    }
    for (ap = 0; ap < land; ap++)
    {
        printf("\t\t\t %c\t|\t", table[ap][0]);
        for (kay = 1; kay < (sid + 1); kay++)
        {
            if (table[ap][kay] == '!')
                printf("\t\t");
            else if (table[ap][kay] == '#')
                printf("%c=#\t\t", table[ap][0]);
            else
            {
                int mum = (int)(table[ap][kay]);
                mum -= 65;
                printf("%s\t\t", production[mum]);
            }
        }
        printf("\n");
        printf("\t\t\t------------------------------------------------------------------------
-----------------------------------------");
        printf("\n");
    }
    int j;
    printf("\n\nPlease enter the desired INPUT STRING = ");
    char input[100];
    scanf("%s%c", input, &ch);
    printf("\n\t\t\t\t\t==========================================================================
=====\n");
    printf("\t\t\t\t\tStack\t\tInput\t\tAction");
    printf("\n\t\t\t\t\t==========================================================================
=====\n");
    int i_ptr = 0, s_ptr = 1;
    char stack[100];
    stack[0] = '$';
    stack[1] = table[0][0];
```

```
    while (s_ptr != -1)
    {
        printf("\t\t\t\t\t\t");
        int vamp = 0;
```

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```
        for (vamp = 0; vamp <= s_ptr; vamp++)
        {
            printf("%c", stack[vamp]);
        }
        printf("\t\t\t");
        vamp = i_ptr;
        while (input[vamp] != '\0')
        {
            printf("%c", input[vamp]);
            vamp++;
        }
        printf("\t\t\t");
        char her = input[i_ptr];
        char him = stack[s_ptr];
        s_ptr--;
        if (!isupper(him))
        {
            if (her == him)
            {
                i_ptr++;
                printf("POP ACTION\n");
            }
            else
            {
printf("\nString Not Accepted by LL(1) Parser !!\n");
exit(0);
            }
        }
        else
        {
            for (i = 0; i < sid; i++)
            {
                if (ter[i] == her)
                    break;
            }
            char produ[100];
            for (j = 0; j < land; j++)
            {
                if (him == table[j][0])
                {
                    if (table[j][i + 1] == '#')
                    {
                        printf("%c=#\n", table[j][0]);
                        produ[0] = '#';
                        produ[1] = '\0';
                    }
                    else if (table[j][i + 1] != '!')
                    {
                        int mum = (int)(table[j][i + 1]);
```

```
                        mum -= 65;
                        strcpy(produ, production[mum]);
                        printf("%s\n", produ);
                    }
                    else
                    {
printf("\nString Not Accepted by LL(1) Parser !!\n");
exit(0);
// break;
                    }
```

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```
                }
            }
            int le = strlen(produ);
            le = le - 1;
            if (le == 0)
            {
                continue;
            }
            for (j = le; j >= 2; j--)
            {
                s_ptr++;
                stack[s_ptr] = produ[j];
            }
        }
    }
    printf("\n\t\t\t================================================================================
==========================================\n");
    if (input[i_ptr] == '\0')
    {
        printf("\t\t\t\t\t\t\t\tYOUR STRING HAS BEEN ACCEPTED !!\n");
    }
    else
        printf("\n\t\t\t\t\t\t\t\tYOUR STRING HAS BEEN REJECTED !!\n");
    printf("\t\t\t================================================================================
==========================================\n");
}
void follow(char c)
{
```

```
    int i, j;
    if (production[0][0] == c)
    {
        f[m++] = '$';
    }
    for (i = 0; i < 10; i++)
    {
        for (j = 2; j < 10; j++)
        {
            if (production[i][j] == c)
            {
                if (production[i][j + 1] != '\0')
                {
                    followfirst(production[i][j + 1], i, (j + 2));
                }
```

```
                if (production[i][j + 1] == '\0' && c != production[i][0])
                {
                    follow(production[i][0]);
                }
            }
        }
    }
}
void findfirst(char c, int q1, int q2)
{
    int j;
    if (!(isupper(c)))
    {
        first[n++] = c;
    }
```

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```
    for (j = 0; j < count; j++)
    {
        if (production[j][0] == c)
        {
            if (production[j][2] == '#')
            {
                if (production[q1][q2] == '\0')
                    first[n++] = '#';
                else if (production[q1][q2] != '\0' && (q1 !=
                                                        0 ||
                                                    q2 != 0))
                {
                    findfirst(production[q1][q2], q1,
                              (q2 + 1));
                }
```

```
                else
                    first[n++] = '#';
            }
            else if (!isupper(production[j][2]))
            {
                first[n++] = production[j][2];
            }
            else
            {
                findfirst(production[j][2], j, 3);
            }
        }
    }
}
void followfirst(char c, int c1, int c2)
{
    int k;
    if (!(isupper(c)))
        f[m++] = c;
    else
    {
        int i = 0, j = 1;
        for (i = 0; i < count; i++)
        {
            if (calc_first[i][0] == c)
                break;
        }
        while (calc_first[i][j] != '!')
        {
            if (calc_first[i][j] != '#')
            {
                f[m++] = calc_first[i][j];
            }
            else
            {
                if (production[c1][c2] == '\0')
                {
                    follow(production[c1][0]);
                }
                else
                {
                    followfirst(production[c1][c2], c1, c2 + 1);
                }
            }
```

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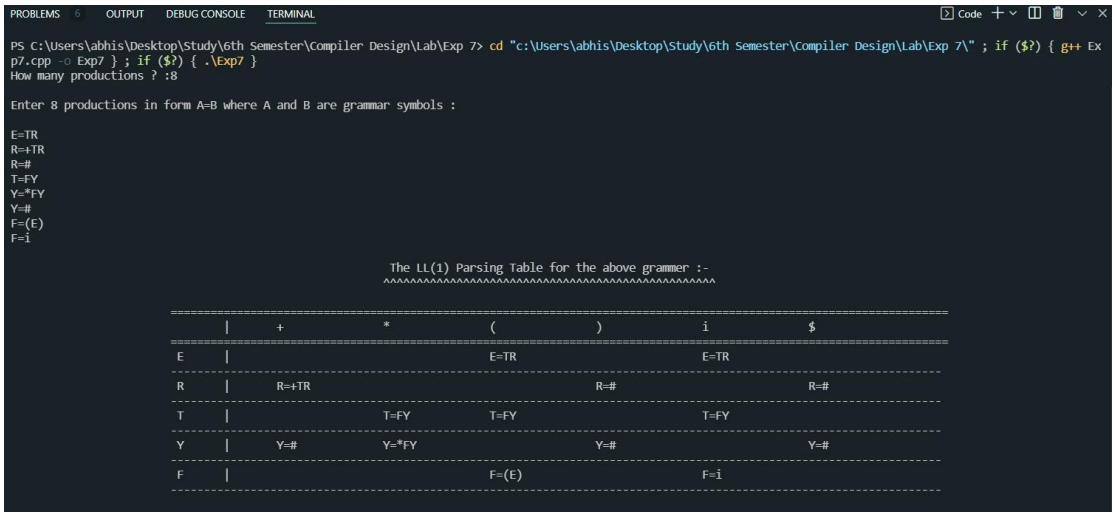
```
            j++;
        }
    }
}
```

Output:



Result: Implementation of predictive Parsing Table was successfully performed.