Compiler Design Lab (CS 306)

Week 7: Implementation of LL(1) parser using C

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Week 7 Program

1. Implement non-recursive Predictive Parser for the grammar

S -> aBa
B -> bB | ε

	a	b	$
S	S → aBa		
B	B → ε	B → b B	

Programs:

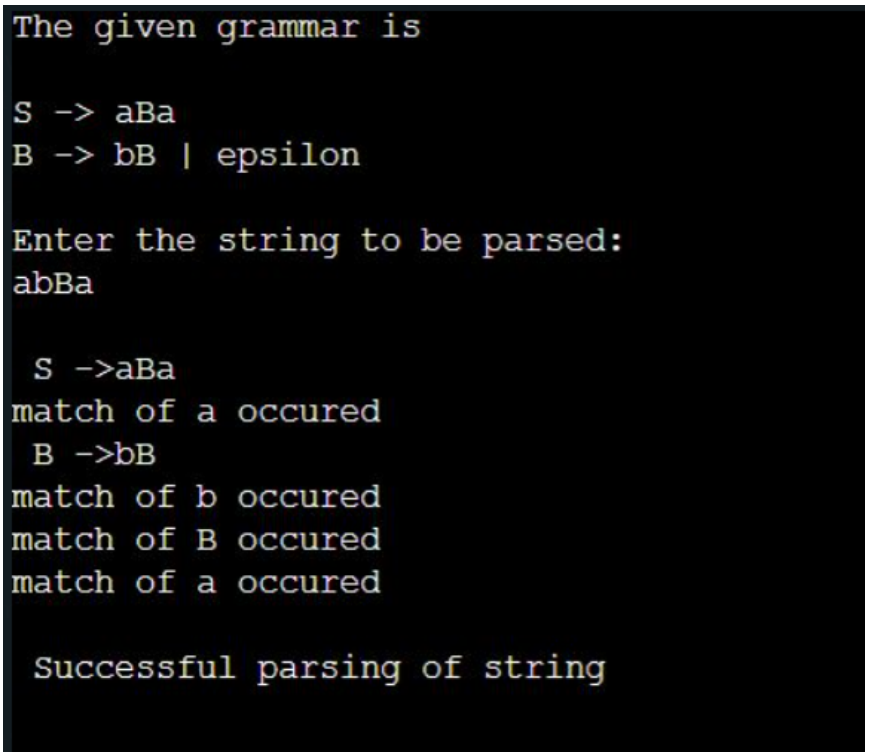
Code of first program:

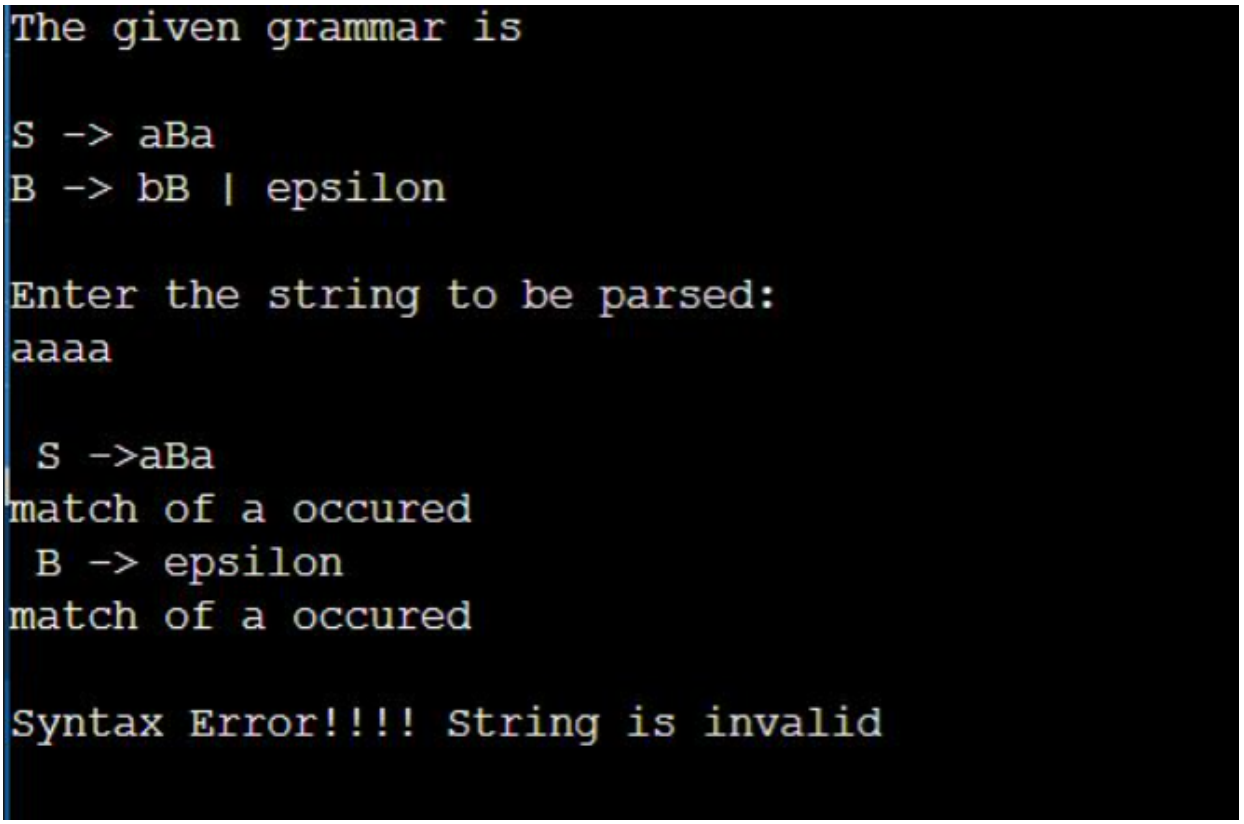
```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<string.h>
int i=0,top=0;
char stack[20],ip[20];

void push(char c)
{
    if (top>=20)
            printf("Stack Overflow");
    else
             stack[top++]=c;
}
void pop(void)
{
    if(top<0)
            printf("Stack underflow");
    else
            top--;
}

void error(void)
{
```

```
printf("\n\nSyntax Error!!!! String is invalid\n");
exit(0);
}

int main()
{
int n;

printf("The given grammar is\n\n");
printf("S -> aBa\n");
printf("B -> bB | epsilon \n\n");
printf("Enter the string to be parsed:\n");
scanf("%s",ip);
n=strlen(ip);
ip[n]='$';
ip[n+1]='\0';
push('$');
push('S');
while(ip[i]!='\0')
{ if(ip[i]=='$' && stack[top-1]=='$')
 {
     printf("\n\n Successful parsing of string \n");
     return 1;
 }
 else
     if(ip[i]==stack[top-1])
     {
      printf("\nmatch of %c ",ip[i]);
      i++;pop();
     }
     else
     {
               if(stack[top-1]=='S' && ip[i]=='a')
               {
                printf(" \n S ->aBa");
                pop();
                push('a');
                push('B');
 push('a');
               }
               else
               if(stack[top-1]=='B' && ip[i]=='b')
               {
                        printf("\n B ->bB");
                        pop();push('B');push('b');
               }
                else
                if(stack[top-1]=='B' && ip[i]=='a')
                {
                        printf("\n B -> epsilon");
                        pop();
```

```
                }
                else
        error();
            }
        }
        }//end of main

        }
```

Testcases:





2. **Lab Assignment:** Implement Predictive Parser using C for the Expression Grammar

E → TE'
E'→ +TE' | ε
T → FT'
T'→ *FT' | ε
F → (E) | d

Program :

```
#include<stdio.h>

#include<conio.h>

#include<stdlib.h>

#include<string.h>
```

```
int i=0,top=0;
char stack[20],ip[20];

void push(char c)
{
   if (top>=20)
        printf("Stack Overflow");
   else
        stack[top++]=c;
}

void pop(void)
{
   if(top<0)
        printf("Stack underflow");
   else
        top--;
}

void error(void)
```

```
{
        printf("\n\nSyntax Error!!! String is invalid\n");
        getch();
        exit(0);
}

int main()
{
        int n;

        printf("The given grammar is\n\n");
        printf("E -> TC\n");
        printf("C -> +TC | epsilon\n");
        printf("T -> FD\n");
        printf("D -> *FD | epsilon\n");
        printf("F -> (E) | d\n\n");
        printf("Enter the string to be parsed:\n");
        scanf("%s",ip);
        n=strlen(ip);
        ip[n]='$';
```

```
ip[n+1]='\0';

push('$');

push('E');

printf("\ninput\t\taction\n");

while(ip[i]!='\0')

{

if(ip[i]=='$' && stack[top-1]=='$')

{

printf("\n\n Successful parsing of string \n");

return(1);



}

else if(ip[i]==stack[top-1])

 {

        printf("match of %c occured ",ip[i]);

        i++;

        pop();

 }

 else

 {
```

```
if(stack[top-1]=='E' && ip[i]=='d')
{
        printf("\nE ->TC\t\t");
        pop();
        push('C');
        push('T');
}
else if(stack[top-1]=='E' && ip[i]=='(')
{
        printf("\nE ->TC\t\t");
         pop();
         push('C');
         push('T');
}
else if(stack[top-1]=='C' && ip[i]=='+')
{
        printf("\nC -> +TC\t");
        pop();
        push('C');
        push('T');
```

```
        push('+');
}
else if(stack[top-1]=='C' && ip[i]==')')
{
        printf("\nC -> epsilon\t");
        pop();
}
else if(stack[top-1]=='C' && ip[i]=='$')
{
        printf("\nC -> epsilon\t");
        pop();
}
else if(stack[top-1]=='T' && ip[i]=='d')
{
        printf("\nT ->FD\t\t");
        pop();
        push('D');
        push('F');
}
else if(stack[top-1]=='T' && ip[i]=='(')
```

```
{
        printf("\nT ->FD\t\t");
         pop();
         push('D');
         push('F');
}
else if(stack[top-1]=='D' && ip[i]=='+')
{
        printf("\nD -> epsilon\t");
        pop();
}
else if(stack[top-1]=='D' && ip[i]=='*')
{
        printf("\nD -> *FD\t");
        pop();
        push('D');
        push('F');
        push('*');
}
else if(stack[top-1]=='D' && ip[i]==')')
```

```
{
        printf("\nD -> epsilon\t");
        pop();
}
else if(stack[top-1]=='D' && ip[i]=='$')
{
        printf("\nD -> epsilon\t");
        pop();
}
else if(stack[top-1]=='F' && ip[i]=='d')
{
        printf("\nF -> d\t\t");
        pop();
        push('d');
}
else if(stack[top-1]=='F' && ip[i]=='(')
{
        printf("\nF -> (E)\t");
        pop();
        push(')');
```

```
                push('E');
                push('(');
            }
            else
            {
                error();
            }
        }
    }
}
```

Output :

```
The given grammar is

E -> TC
C -> +TC | epsilon
T -> FD
D -> *FD | epsilon
F -> (E) | d

Enter the string to be parsed:
d+d*d+d

input            action

E ->TC
T ->FD
F -> d           match of d occured
D -> epsilon
C -> +TC         match of + occured
T ->FD
F -> d           match of d occured
D -> *FD         match of * occured
F -> d           match of d occured
D -> epsilon
C -> +TC         match of + occured
T ->FD
F -> d           match of d occured
D -> epsilon
C -> epsilon

 Successful parsing of string
```