CD WEEK 7

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AP19110010316

CSE-C

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

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

The grammar is renamed for convenience the renamed grammar is as follows:
E → TA
A → +TA | ε
T → FB
B → *FB | 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");
exit(0);
}
int main()
{
int n;
printf("The given grammar is\n\n");
printf("E -> TA\n");
printf("A -> +TA | epsilon \n\n");
printf("T -> FB\n");
printf("B -> *FB | epsilon \n");
printf("F -> (E) | d\n");
printf("Enter the string to be parsed:\n");
scanf("%s",ip);
n=strlen(ip);
ip[n]='$';
ip[n+1]='\0';
```

```
push('$');
push('E');
while(ip[i]!='\0')
{ if(ip[i]=='$' && 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]=='E' && ip[i]=='d') || (stack[top-1]=='E' && ip[i]=='('))
{
printf(" \n E ->TA");
pop();
push('A');
push('T');

}
else
if(stack[top-1]=='A' && ip[i]=='+')

{
printf("\n A -> +TA");
pop();push('A');push('T');push('+');
}
else
if((stack[top-1]=='A' && ip[i]==')') || (stack[top-1]=='A' && ip[i]=='$'))
```

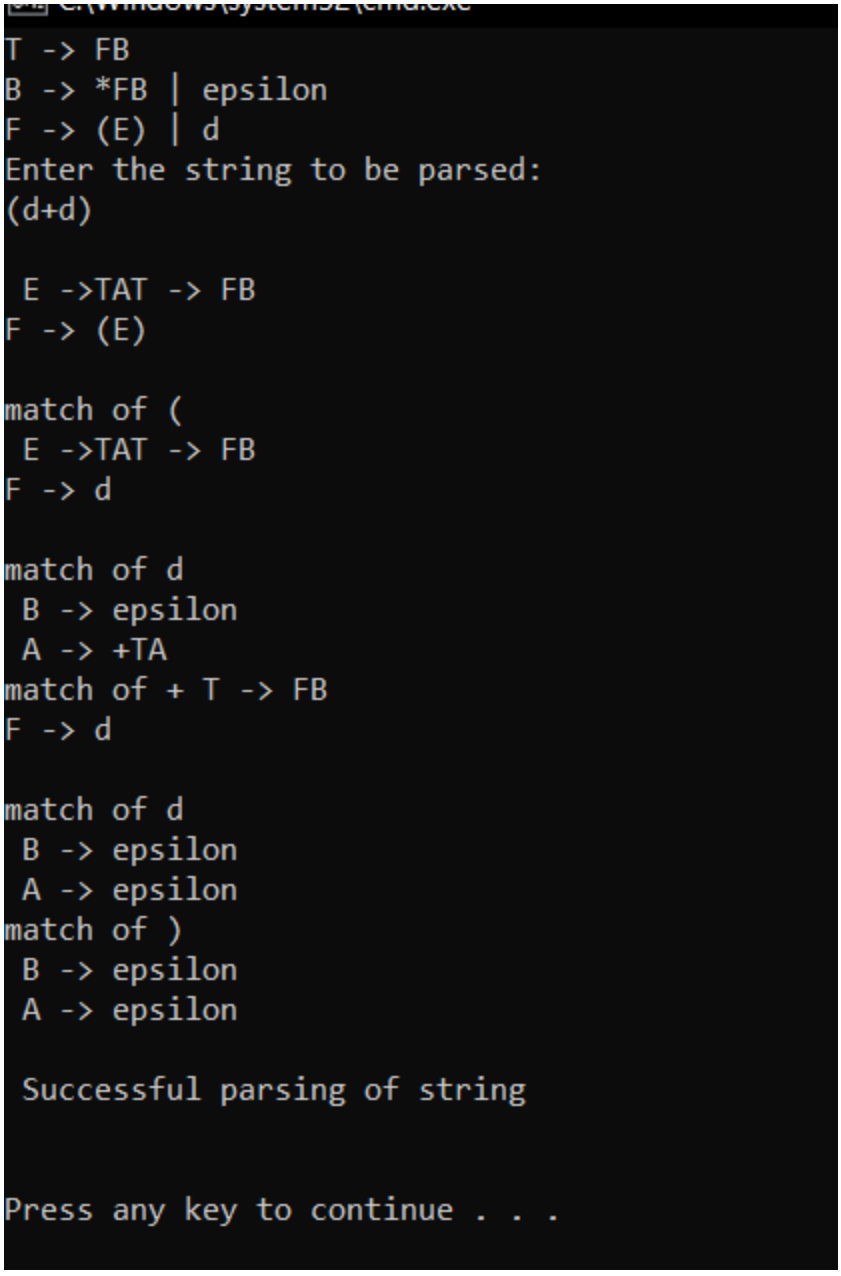
```
{
printf("\n A -> epsilon");
pop();
}
else
        if((stack[top-1]=='T' && ip[i]=='d') || (stack[top-1]=='T' && ip[i]=='(') )
        {
                printf("T -> FB\n");
                pop();
                push('B');
       push('F');
        }
else
        if(stack[top-1]=='B' && ip[i]=='*' )
        {
                printf("B -> *FB\n");
                pop();
                push('B');
       push('F');
       push('*');
        }
else
if((stack[top-1]=='B' && ip[i]=='+') ||  (stack[top-1]=='B' && ip[i]=='$') ||
(stack[top-1]=='B' && ip[i]==')'))
{
printf("\n B -> epsilon");
pop();
}
else
        if(stack[top-1]=='F' && ip[i]=='d' )
        {
                printf("F -> d\n");
                pop();
```

```
                push('d');

        }

else
        if(stack[top-1]=='F' && ip[i]=='(' )
        {
                printf("F -> (E)\n");
                pop();
                push(')');
                push('E');
                push('(');

        }

else
error();

}
}
```
Test cases:

```
The given grammar is

E -> TA
A -> +TA | epsilon

T -> FB
B -> *FB | epsilon
F -> (E) | d
Enter the string to be parsed:
d+d

 E ->TAT -> FB
F -> d

match of d
 B -> epsilon
 A -> +TA
match of + T -> FB
F -> d

match of d
 B -> epsilon
 A -> epsilon

 Successful parsing of string
```

```
The given grammar is

E -> TA
A -> +TA | epsilon

T -> FB
B -> *FB | epsilon
F -> (E) | d
Enter the string to be parsed:
d*d

 E ->TAT -> FB
F -> d

match of d B -> *FB

match of * F -> d

match of d
 B -> epsilon
 A -> epsilon

 Successful parsing of string
```

```
E -> TA
A -> +TA | epsilon

T -> FB
B -> *FB | epsilon
F -> (E) | d
Enter the string to be parsed:
d*d+d

 E ->TAT -> FB
F -> d

match of d B -> *FB

match of * F -> d

match of d
 B -> epsilon
 A -> +TA
match of + T -> FB
F -> d

match of d
 B -> epsilon
 A -> epsilon

 Successful parsing of string
```


T -> FB
B -> *FB | epsilon
F -> (E) | d
Enter the string to be parsed:
(d+d)
E ->TAT -> FB
F -> (E)
match of (
E ->TAT -> FB
F -> d
match of d
B -> epsilon
A -> +TA
match of + T -> FB
F -> d
match of d
B -> epsilon
A -> epsilon
match of)
B -> epsilon
A -> epsilon
Successful parsing of string
Press any key to continue . . .