Compiler Design

Assignment – 7: Implement LALR parser

Implement the functionalities of LALR parser using C language

CODE:

```
  #include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<string.h>

void push(char *,int *,char);
char stacktop(char *);
void isproduct(char,char);
int ister(char);
int isnter(char);
int isstate(char);
void error();
void isreduce(char,char);
char pop(char *,int *);
void printt(char *,int *,char [],int);
void rep(char [],int);
struct action
{
char row[6][5];
};

const struct action A[12]={
{"sf","emp","emp","se","emp","emp"},
{"emp","sg","emp","emp","emp","acc"},
```

```
{"emp","rc","sh","emp","rc","rc"},
{"emp","re","re","emp","re","re"},
{"sf","emp","emp","se","emp","emp"},
{"emp","rg","rg","emp","rg","rg"},
{"sf","emp","emp","se","emp","emp"},
{"sf","emp","emp","se","emp","emp"},
{"emp","sg","emp","emp","sl","emp"},
{"emp","rb","sh","emp","rb","rb"},
{"emp","rb","rd","emp","rd","rd"},
{"emp","rf","rf","emp","rf","rf"}
};
struct gotol
{
char r[3][4];
};
const struct gotol G[12]={
{"b","c","d"},
{"emp","emp","emp"},
{"emp","emp","emp"},
{"emp","emp","emp"},
{"i","c","d"},
{"emp","emp","emp"},
{"emp","j","d"},
{"emp","emp","k"},
{"emp","emp","emp"},
{"emp","emp","emp"},
 };
char ter[6]={'i','+','*',')','(','$'};
char nter[3]={'E','T','F'};
char states[12]={'a','b','c','d','e','f','g','h','m','j','k','l'};
char stack[100];
int top=-1;
char temp[10];
```

```
struct grammar
{

char left;
char right[5];
};
const struct grammar rl[6]={
{'E',"e+T"},
{'E',"T"},
{'T',"T*F"},
{'T',"F"},
{'F',"(E)"},
{'F',"i"},
 };
void main()
{
char inp[80],x,p,dl[80],y,bl='a';
int i=0,j,k,l,n,m,c,len;

printf(" Enter the input :");
scanf("%s",inp);
len=strlen(inp);
inp[len]='$';
inp[len+1]='\0';
push(stack,&top,bl);
printf("\n stack \t\t\t input");
printt(stack,&top,inp,i);
do
{
x=inp[i];
p=stacktop(stack);
isproduct(x,p);
if(strcmp(temp,"emp")==0)
```

```
error();
if(strcmp(temp,"acc")==0)
break;
else
{
if(temp[0]=='s')
{
push(stack,&top,inp[i]);
push(stack,&top,temp[1]);
i++;

}
else
{
if(temp[0]=='r')
{
j=isstate(temp[1]);
strcpy(temp,rl[j-2].right);
dl[0]=rl[j-2].left;
dl[1]='\0';
n=strlen(temp);
for(k=0;k<2*n;k++)
pop(stack,&top);
for(m=0;dl[m]!='\0';m++)
push(stack,&top,dl[m]);
l=top;
y=stack[l-1];
isreduce(y,dl[0]);
for(m=0;temp[m]!='\0';m++)
push(stack,&top,temp[m]);
}
}
}
```

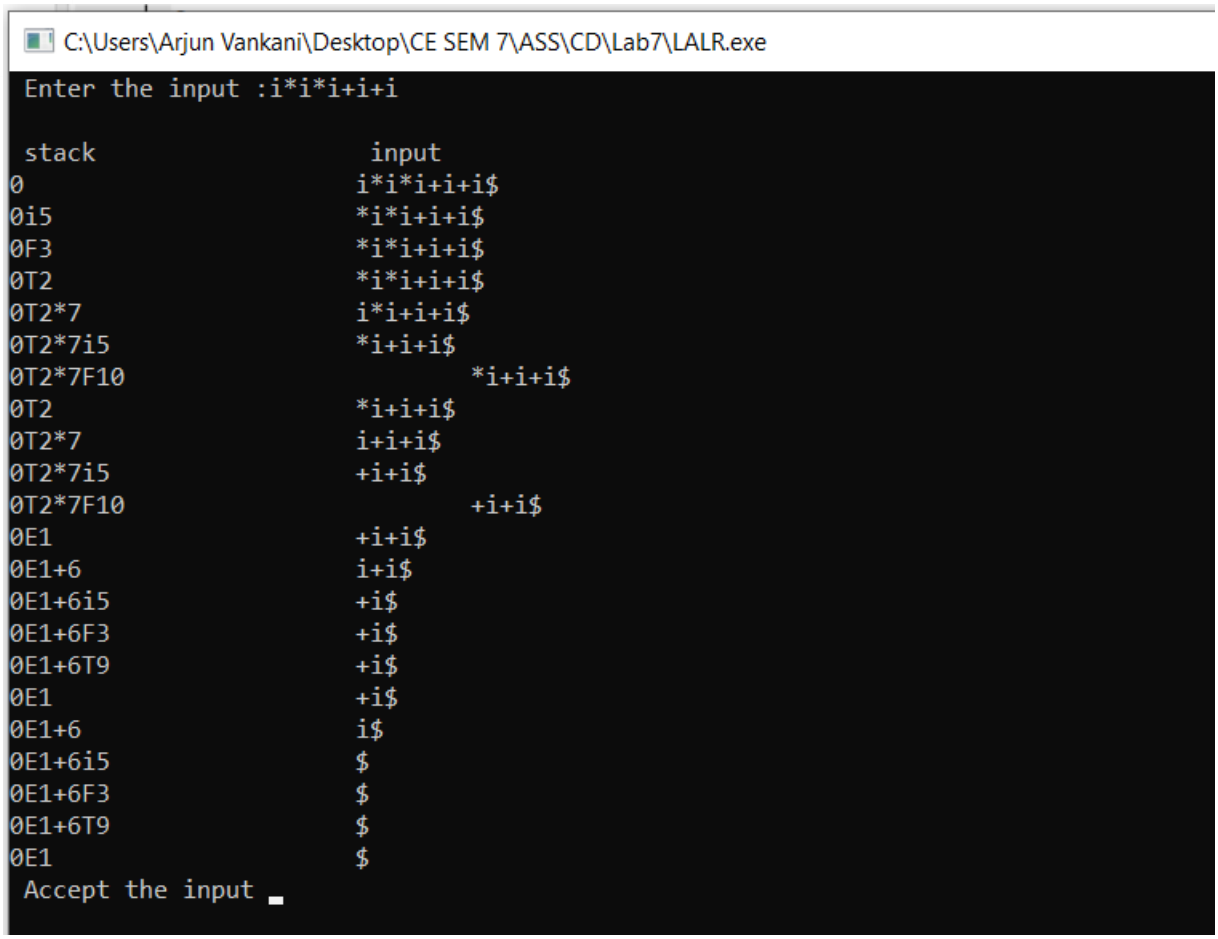
```
printt(stack,&top,inp,i);
}while(inp[i]!='\0');
if(strcmp(temp,"acc")==0)
printf(" \n accept the input ");
else
printf(" \n do not accept the input ");
getch();
}
void push(char *s,int *sp,char item)
{
if(*sp==100)
printf(" stack is full ");
else
{
*sp=*sp+1;

s[*sp]=item;
}
}
char stacktop(char *s)
{
char i;
i=s[top];
return i;
}
void isproduct(char x,char p)
{
int k,l;
k=ister(x);
l=isstate(p);
strcpy(temp,A[l-1].row[k-1]);
}
int ister(char x)
```

```
{
int i;
for(i=0;i<6;i++)
if(x==ter[i])
return i+1;
return 0;
}
int isnter(char x)
{
int i;
for(i=0;i<3;i++)
if(x==nter[i])
return i+1;
return 0;
}
int isstate(char p)
{
int i;
for(i=0;i<12;i++)
if(p==states[i])

return i+1;
return 0;
}
void error()
{
printf(" error in the input ");
exit(0);
}
void isreduce(char x,char p)
{
int k,l;
k=isstate(x);
```

```
l=isnter(p);
strcpy(temp,G[k-1].r[l-1]);
}
char pop(char *s,int *sp)
{
char item;
if(*sp==-1)
printf(" stack is empty ");
else
{
item=s[*sp];
*sp=*sp-1;
}
return item;
}
void printt(char *t,int *p,char inp[],int i)
{
int r;
printf("\n");
for(r=0;r<=*p;r++)
rep(t,r);
printf("\t\t\t");
for(r=i;inp[r]!='\0';r++)

printf("%c",inp[r]);
}
void rep(char t[],int r)
{
char c;
c=t[r];
switch(c)
{
case 'a': printf("0");
```

```
break;
case 'b': printf("1");
break;
case 'c': printf("2");
break;
case 'd': printf("3");
break;
case 'e': printf("4");
break;
case 'f': printf("5");
break;
case 'g': printf("6");
break;
case 'h': printf("7");
break;
case 'm': printf("8");
break;
case 'j': printf("9");
break;
case 'k': printf("10");
break;
case 'l': printf("11");
break;
default :printf("%c",t[r]);
break;
}
}
```

Output:


C:\Users\Arjun Vankani\Desktop\CE SEM 7\ASS\CD\Lab7\LALR.exe
Enter the input :i*i*i+i+i
stack input
0 i*i*i+i+i$
0i5 *i*i+i+i$
0F3 *i*i+i+i$
0T2 *i*i+i+i$
0T2*7 i*i+i+i$
0T2*7i5 *i+i+i$
0T2*7F10 *i+i+i$
0T2 *i+i+i$
0T2*7 i+i+i$
0T2*7i5 +i+i$
0T2*7F10 +i+i$
0E1 +i+i$
0E1+6 i+i$
0E1+6i5 +i$
0E1+6F3 +i$
0E1+6T9 +i$
0E1 +i$
0E1+6 i$
0E1+6i5 $
0E1+6F3 $
0E1+6T9 $
0E1 $
Accept the input