G LAKSHMI SAI BHARGAVI - AP19110010405 - CSE - C

COMPILER DESIGN LAB - WEEK 8

Q1. Implementation of Shift Reduce parser using C for the following grammar and illustrate the parser's actions for a valid and an invalid string.

E→E+E

E→E*E

E→(E)

E→d

```
#include<stdio.h>
#include<stdlib.h>
void pop(),push(char),display();
char stack[100]="\0", input[100], *ip;
int top=-1;
void push(char c)
{
top++;
stack[top]=c;
}
void pop()
{
stack[top]='\0';
top--;
}
void display()

{
printf("\n%s\t%s\t",stack,ip);
}
int main()
{
printf("E->E+E\n");
printf("E->E*E\n");
printf("E->(E)\n");
printf("E->d\n");
printf("Enter the input string followed by $ \n");
scanf("%s",input);
```

```
ip=input;
push('$');
printf("STACK\t BUFFER \t ACTION\n");
printf("-----\t ------- \t ------\n");
display();
if(stack[top]=='$' && *ip=='$'){
printf("Null Input");
exit(0);
}
do
{
if((stack[top]=='E' && stack[top-1]=='$') && (*(ip)=='$'))
{
display();
printf(" Valid\n\n\n");
break;
}
if(stack[top]=='$')
{
push(*ip);
ip++;
printf("Shift");
}
else if(stack[top]=='d')
{
display();
pop();
push('E');
printf("Reduce E->d");
}
else if(stack[top]=='E' && stack[top-1]=='+' && stack[top-2]=='E'&&
*ip!='*')
{
display();
pop();
pop();
pop();
push('E');
printf("Reduce E->E+E");
```

```
}
else if(stack[top]=='E' && stack[top-1]=='*' && stack[top-2]=='E')
{
display();
pop();
pop();
pop();
push('E');
printf("Reduce E->E*E");
}
else if(stack[top]==')' && stack[top-1]=='E' && stack[top-2]=='(')
{
display();

pop();
pop();
pop();
push('E');
printf("Reduce E->(E)");
}
else if(*ip=='$')
{ printf(" Invalid\n\n\n");
break;
}
else
{
display();
push(*ip);
ip++;
printf("shift");
}
}while(1);
}
```

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Valid String Input->d+d*d

Console Shell

```
> clang-7 -pthread -lm -o main main.c
> ./main
E->E+E
E->E*E
E->(E)
E->d
Enter the input string followed by $
d+d*d$
STACK     BUFFER       ACTION
-----     -------      ------

$    d+d*d$  Shift
$d   +d*d$   Reduce E->d
$E   +d*d$   shift
$E+ d*d$     shift
$E+d     *d$ Reduce E->d
$E+E     *d$ shift
$E+E*    d$  shift
$E+E*d   $   Reduce E->d
$E+E*E   $   Reduce E->E*E
$E+E     $   Reduce E->E+E
$E  $     Valid
```

Invalid String Input->d+*d

Console Shell

```
> clang-7 -pthread -lm -o main main.c
> ./main
E->E+E
E->E*E
E->(E)
E->d
Enter the input string followed by $
d+*d$
STACK     BUFFER       ACTION
-----     -------      ------

$    d+*d$   Shift
$d   +*d$    Reduce E->d
$E   +*d$    shift
$E+ *d$ shift
$E+*     d$  shift
$E+*d    $   Reduce E->d Invalid
```

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Q2. Implementation of Shift Reduce parser using C for the following grammar and illustrate the parser's actions for a valid and an invalid string.

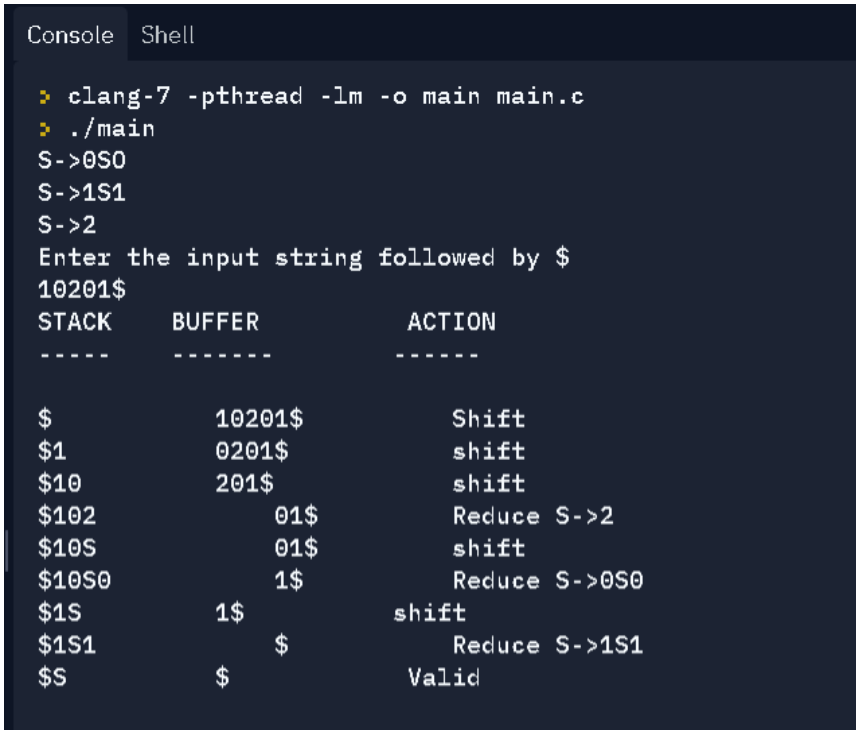
S –> 0S0 | 1S1 | 2

```
#include<stdio.h>
#include<stdlib.h>
void pop(),push(char),display();
char stack[100]="\0", input[100], *ip;
int top=-1;
void push(char c)
{
 top++;
 stack[top]=c;
}
void pop()
{
 stack[top]='\0';
 top--;
}
void display(){
 printf("\n%s\t\t\t%s\t\t\t",stack,ip);
}
int main()
{
 printf("S->0S0\n");
 printf("S->1S1\n");
 printf("S->2\n");

 printf("Enter the input string followed by $ \n");
 scanf("%s",input);
 ip=input;
 push('$');
 printf("STACK\t BUFFER \t\t ACTION\n");
 printf("-----\t ------- \t \t------\n");
 display();
```

```
 if(stack[top]=='$' && *ip=='$'){
   printf("Null Input");
   exit(0);
 }
 do
 {
 if((stack[top]=='S' && stack[top-1]=='$') && (*(ip)=='$'))
 {
   display();
   printf(" Valid\n\n\n");
   break;
 }
 if(stack[top]=='$')
 {
   push(*ip);
   ip++;
   printf("Shift");
 }
 else if(stack[top]=='2')
 {
   display();
   pop();
   push('S');
   printf("Reduce S->2");
 }
 else if(stack[top]=='0' && stack[top-1]=='S' && stack[top-2]=='0'&&
*ip!='*')
 {
   display();
   pop();
   pop();
   pop();
   push('S');
   printf("Reduce S->0S0");
 }
 else if(stack[top]=='1' && stack[top-1]=='S' && stack[top-2]=='1')
 {
   display();
   pop();
```

```
  pop();
  pop();
  push('S');
  printf("Reduce S->1S1");
}

else if(*ip=='$')
{   printf(" Invalid\n\n\n");
  break;
}
else
{
  display();
  push(*ip);
  ip++;
  printf("shift");
}
}while(1);
}
```

Valid String Input :- 10201



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Invalid String Input-> 11012