

Compiler Design Lab 6(Week 5): Recursive Descent Parser

Write a recursive descent parser for the following simple grammars:

1. **S -> a | > | (T)**
 T -> T, S|S

Code:

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

int curr = 0;
char str[100];
void S();
void T();
void tPrime();

void printValid(){
    printf("\n *** Sucessful! ***\n");
    exit(0);
}

void printInvalid(){
    printf("\n *** Unsuccesful! ***\n");
    exit(0);
}

void S(){
    if(str[curr] == 'a' || str[curr] == '>'){
        curr++;
        return;
    }
    else if(str[curr] == '('){
        curr++;
        T();
        if(str[curr] == ')'){
            curr++;
            return;
        }
        else
            printInvalid();
    }
    else
        printInvalid();
}

void T(){
```

```

        S();
        tPrime();
    }

void tPrime(){
    if(str[curr] == ','){
        curr++;
        S();
        tPrime();
    }
}

void main(){
    printf("Enter the String: \n");
    scanf("%s",str);
    S();
    if(str[curr] == '$')
        printValid();
    else
        printInvalid();
}

```

Output:

```

ugcse@pglab-cp: ~/Desktop/AyushGoyal_CDLab/Lab_5
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ gcc l6q1.c -o l6q1
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q1
Enter the String:
(a,>)$

*** Sucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q1
Enter the String:
a,(a,>)$

*** Unsucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$

```

2. $S \rightarrow UVW$
 $U \rightarrow (S) \mid aSb \mid d$
 $V \rightarrow aV \mid \epsilon$
 $W \rightarrow cW \mid \epsilon$

Code:

```

#include<stdio.h>
#include<stdlib.h>

```

```

#include<string.h>

int curr = 0;
char str[100];
void S();
void U();
void V();
void W();

void printValid(){
    printf("\n *** Sucessful! ***\n");
    exit(0);
}

void printInvalid(){
    printf("\n *** Unsuccesful! ***\n");
    exit(0);
}

void S(){
    U();
    V();
    W();
}

void U(){
    if(str[curr] == '('){
        curr++;
        S();
        if(str[curr] == '){
            curr++;
            return;
        }
        else
            printInvalid();
    }
    else if(str[curr] == 'a'){
        curr++;
        S();
        if(str[curr] == 'b'){
            curr++;
            return;
        }
        else
            printInvalid();
    }
    else if(str[curr] == 'd'){
        curr++;
        return;
    }
    else
        printInvalid();
}

```

```

}

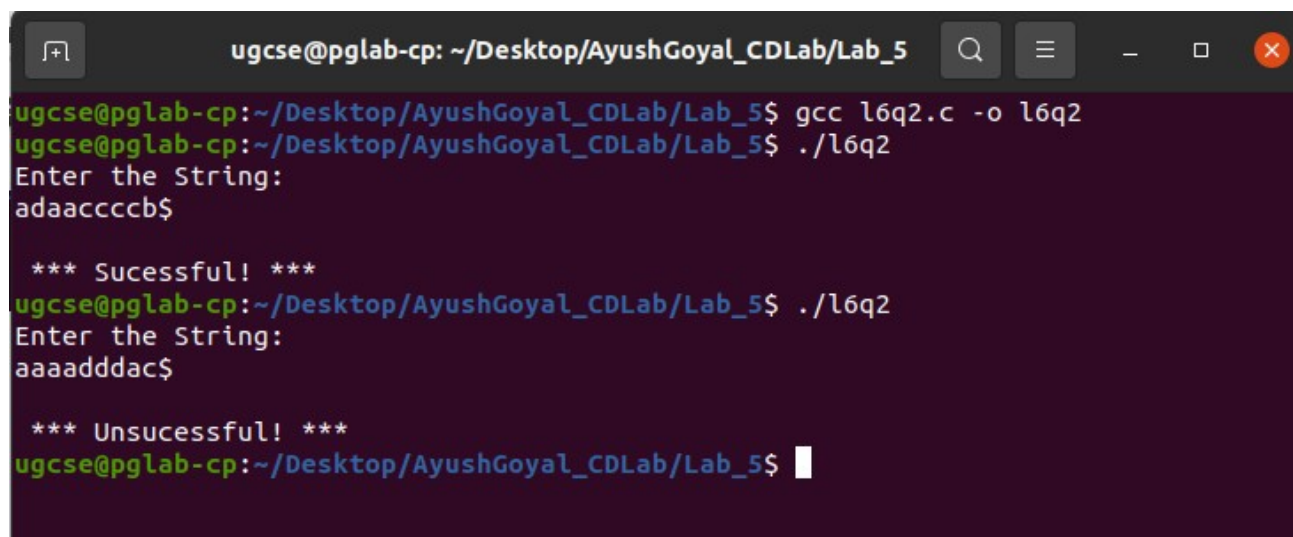
void V(){
    if(str[curr] == 'a'){
        curr++;
        V();
    }
}

void W(){
    if(str[curr] == 'c'){
        curr++;
        W();
    }
}

void main(){
    printf("Enter the String: \n");
    scanf("%s",str);
    S();
    if(str[curr] == '$')
        printValid();
    else
        printInvalid();
}

```

Output:



```

ugcse@pglab-cp: ~/Desktop/AyushGoyal_CDLab/Lab_5
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ gcc l6q2.c -o l6q2
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q2
Enter the String:
adaaccccb$

*** Sucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q2
Enter the String:
aaaadddac$

*** Unsucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$

```

3. **S -> aAcBe**
 A -> Ab|b
 B -> d

Code:

```

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

int curr = 0;
char str[100];
void S();
void A();
void B();
void aPrime();

void printValid(){
    printf("\n *** Sucessful! ***\n");
    exit(0);
}

void printInvalid(){
    printf("\n *** Unsuccesful! ***\n");
    exit(0);
}

void S(){
    if(str[curr] == 'a'){
        curr++;
        A();
        if(str[curr] == 'c'){
            curr++;
            B();
            if(str[curr] == 'e'){
                curr++;
                return;
            }
            else
                printInvalid();
        }
        else
            printInvalid();
    }
    else
        printInvalid();
}

void A(){
    if(str[curr] == 'b'){
        curr++;
        aPrime();
    }
    else
        printInvalid();
}

void aPrime(){

```

```

        if(str[curr] == 'b'){
            curr++;
            aPrime();
        }
    }

void B(){
    if(str[curr] == 'd'){
        curr++;
        return;
    }
    else
        printInvalid();
}

void main(){
    printf("Enter the String: \n");
    scanf("%s",str);
    S();
    if(str[curr] == '$')
        printValid();
    else
        printInvalid();
}

```

Output:

```

ugcse@pglab-cp: ~/Desktop/AyushGoyal_CDLab/Lab_5
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ gcc l6q3.c -o l6q3
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q3
Enter the String:
abbbbbcde$

*** Sucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q3
Enter the String:
aaabcde$

*** Unsucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$

```

4. $S \rightarrow (L) \mid a$
 $L \rightarrow L,S \mid S$

Code:

```

#include<stdio.h>
#include<stdlib.h>

```

```

#include<string.h>

int curr = 0;
char str[100];
void S();
void L();
void lPrime();

void printValid(){
    printf("\n *** Sucessful! ***\n");
    exit(0);
}

void printInvalid(){
    printf("\n *** Unsucessful! ***\n");
    exit(0);
}

void S(){
    if(str[curr] == 'a'){
        curr++;
        return;
    }
    else if(str[curr] == '('){
        curr++;
        L();
        if(str[curr] == '){
            curr++;
            return;
        }
        else
            printInvalid();
    }
    else
        printInvalid();
}

void L(){
    S();
    lPrime();
}

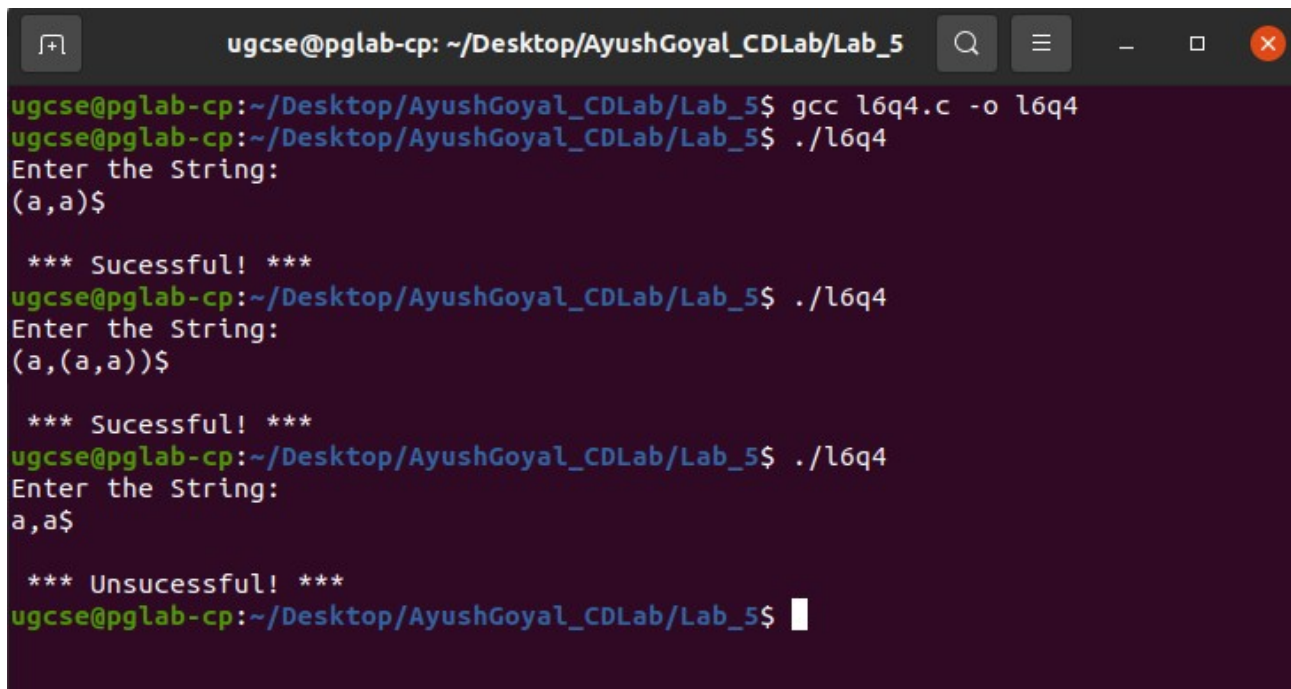
void lPrime(){
    if(str[curr] == ','){
        curr++;
        S();
        lPrime();
    }
}

void main(){
    printf("Enter the String: \n");

```

```
scanf("%s",str);
S();
if(str[curr] == '$')
    printValid();
else
    printInvalid();
}
```

Output:



```
ugcse@pglab-cp: ~/Desktop/AyushGoyal_CDLab/Lab_5
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ gcc l6q4.c -o l6q4
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q4
Enter the String:
(a,a)$

*** Sucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q4
Enter the String:
(a,(a,a))$

*** Sucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$ ./l6q4
Enter the String:
a,a$

*** Unsucessful! ***
ugcse@pglab-cp:~/Desktop/AyushGoyal_CDLab/Lab_5$
```

THE END