BANGLADESH UNIVERSITY OF BUSINESS AND TECHNOLOGY

(BUBT)

Lab Report

Course Code : CSE 324

Course Title : Compiler Design Lab

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Submitted By

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Intake : 41

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Experiment No: 8
Experiment Name: Implementing LL(1) Parser for Given Grammar

Problem Structure
The goal of this experiment is to implement an LL(1) parser for a given grammar. The grammar is as follows:

X -> xYx

Y -> yY

Y -> ε

The LL(1) parser aims to determine whether a given input string belongs to the language defined by the grammar.

Procedure

- Define the grammar productions in a unordered_map<char, vector<string>> data structure.
- Take the input string from the user.
- Initialize the stack with the start symbol followed by $ and append the input string with $.
- Iterate through the input string and stack until the parsing process is complete:
    - If the top of the stack and the current input character match, pop both from the stack and input.
    - If the top of the stack is a non-terminal, replace it with its production rule.
    - If the top of the stack is a terminal and doesn't match the current input, the parsing fails.
- If the stack and input are both empty, or if both contain only the $ symbol, the parsing is successful.

Code:

```
1   #include <bits/stdc++.h>
2   using namespace std;
3
4   unordered_map<char, vector<string>> productions;
5   int main() {
6       string line;
7       cout << "Enter your input: ";
8       getline(cin, line);
9
10      productions['X'] = {"xYx"};
11      productions['Y'] = {"yY", "ε"};
```

```
12
13      string stack = "X$";
14      string input = line+"$";
15      cout << "Stack          " <<"       Input:" << endl;
16      bool ok = true;
17      int y = 0;
18      while (ok)
19      {
20          cout << stack << "                    " << input  <<endl;
21          if(stack == "$" || input == "$"){
22              break;
23          }else if(stack[0] == input[0]){
24              stack.erase(0, 1);
25              input.erase(0, 1);
26          }else if(input == "x$"){
27              stack.erase(0, 1);
28          }else if(stack[0] == 'X'){
29              stack.erase(0, 1);
30              stack = productions['X'][0] + stack;
31          }else if(stack[0] == 'Y'){
32              stack.erase(0, 1);
33              stack = productions['Y'][0] + stack;
34          }
35          y++;
36
37      }
38      return 0;
39  }
40
```

Input and Output

```
C:\Users\Aktaruzzaman\Desktop\LLOne.exe
Enter your input: xyyx
Stack                   Input:
X$                       xyyx$
xYx$                       xyyx$
Yx$                      yyx$
yYx$                       yyx$
Yx$                      yx$
yYx$                       yx$
Yx$                      x$
x$                      x$
$                      $
```