

PRACTICAL - 2

Practical Definition : String Validation Using Finite Automata

Objective : To implement a program that validates a given string against rules defined in terms of finite automata.

Input requirement :

- Accept rules in the form of finite automata (e.g., states, transitions, start state, accept states) as input.
- Accept a string to be validated against the provided finite automata rules.

Expected output :

- If the string adheres to the rules of the finite automata, the program should output: "Valid String".
- If the string does not adhere to the rules, the program should output: "Invalid String".

CODE :

```
#include<bits/stdc++.h>

using namespace std;

int main()
{
    int inputSymbol;

    cout << "No of Input Symbol : ";
    cin >> inputSymbol;

    char array[inputSymbol];
    for (int i = 0; i < inputSymbol; i++) {
        cin >> array[i];
    }

    int states;

    cout << "No of states : ";
    cin >> states;
```

```
int initial;
```

```
cout << "Initial state : ";
```

```
cin >> initial;
```

```
int finals;
```

```
cout << "No Final state : ";
```

```
cin >> finals;
```

```
int finalStates[finals];
```

```
for (int i = 0; i < finals; i++) {
```

```
    cout << "Final state " << i + 1 << ": ";
```

```
    cin >> finalStates[i];
```

```
}
```

```
int transitionTable[states][inputSymbol];
```

```
for (int i = 0; i < states; i++) {
```

```
    for (int j = 0; j < inputSymbol; j++) {
```

```
        cout << "Transition from state " << i + 1 << " on input " << array[j] << " is : ";
```

```
        cin >> transitionTable[i][j];
```

```
    }
```

```
}
```

```
cout << "Transition Table : " << endl;
```

```
for (int i = 0; i < states; i++) {
```

```
    for (int j = 0; j < inputSymbol; j++) {
```

```
        cout << transitionTable[i][j] << " ";
```

```
    }
```

```
    cout << endl;
```

```
}
```

```
string s;
cout << "Enter String: ";
cin >> s;

int currentState = initial;
for (char c : s) {
    int inputIndex = -1;
    for (int i = 0; i < inputSymbol; i++) {
        if (array[i] == c) {
            inputIndex = i;
            break;
        }
    }
    if (inputIndex == -1) {
        cout << "Invalid input symbol: " << c << endl;
        return 1;
    }
    currentState = transitionTable[currentState - 1][inputIndex];
}

bool isAccepted = false;
for (int i = 0; i < finals; i++) {
    if (currentState == finalStates[i]) {
        isAccepted = true;
        break;
    }
}
if (isAccepted) {
    cout << "String is accepted" << endl;
```

```
    } else {  
        cout << "String is not accepted" << endl;  
    }  
    return 0;  
}
```

OUTPUT :

```
No of Input Symbol : 2  
ab  
No of states : 4  
Initial state : 1  
No Final state : 1  
Final state 1: 2  
Transition from state 1 on input a is : 2  
Transition from state 1 on input b is : 3  
Transition from state 2 on input a is : 1  
Transition from state 2 on input b is : 4  
Transition from state 3 on input a is : 4  
Transition from state 3 on input b is : 1  
Transition from state 4 on input a is : 3  
Transition from state 4 on input b is : 2  
Transition Table :  
2 3  
1 4  
4 1  
3 2  
Enter String: abbabab  
String is accepted  
  
=== Code Execution Successful ===|
```

