

# SS ASSIGNMENT -01

ROLL NO: U21CS052

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## DFA

### 1. Write a C program to recognize strings under 'a\*',

```
import java.util.Scanner;

public class q1 {
    private static boolean is_valid(String str){
        for(int i=1;i<str.length();i++){
            if(str.charAt(i)!='a'){return false;}
        }
        return str.charAt(0)=='a';
    }
    public static void main(String args[]){
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String input = scanner.nextLine();

        if (is_valid(input)) {
            System.out.println("The string is in the form of a*");
        } else {
            System.out.println("The string is NOT in the form of a*");
        }
        scanner.close();
    }
}
```

## ▼ TERMINAL

```
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java que1.java
Enter a string: ahhel
The string is in the form of a*

C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java que1.java
Enter a string: heajldjakldfj
The string is NOT in the form of a*

C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>
```

## 2. 'a\*b+'.

```
import java.util.Scanner;

public class q2 {
    private static boolean is_valid(String str){
        /*get the first index of b=> if -1=> return false ....
        * if index is valid then check there should be no a after it.
        */
        int idx=str.indexOf('b');
        System.out.println("idx : "+idx);
        /* check for the atleast one occurrence of 'b' */
        if(idx==-1){return false;}
        /* */
        for(int i=idx+1;i<str.length();i++){
            if(str.charAt(i)=='a'){return false;}
        }
        return true;
    }
    public static void main(String args[]){
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String input = scanner.nextLine();

        if (is_valid(input)) {
            System.out.println("The string is in the form of a*b+");
        } else {
            System.out.println("The string is NOT in the form of a*b+");
        }
        scanner.close();
    }
}
```

```
}  
}
```

```
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java que2.java  
Enter the string :  
aaaabb  
Yes it is of the form : 'a*b+'  
  
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>javac q1.java  
  
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q1.java  
Enter a string: aaaaah  
The string is NOT in the form of a*  
  
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q1.java  
Enter a string: aaaaa  
The string is in the form of a*  
  
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q1.java  
Enter a string: a  
The string is in the form of a*  
  
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>
```

2. Create a DFA program that recognizes strings consisting of alternating 0s and 1s (e.g., "0101" or "1010"). Test the DFA with both valid and invalid examples.

You need to output state-wise transitions. E.g., for any given string 101, starting from first state, where DFA is going on each character.

```
import java.util.Scanner;

public class q3 {

    public static boolean check_alternating(String str) {
        boolean zero = str.charAt(0) == '0';
        char prev = '$';
        int n = str.length();
        int steps = 0;

        if (zero) {
            // System.out.println(" q0 -> q1 ");
            for (int i = 0; i < n; i++) {
                char curr = str.charAt(i);
                System.out.println("prev : " + prev + " curr: " + curr);
                if (prev == curr) {
                    if (curr == '0') {
                        System.out.println(" q1 -> qd ");
                    } else {
                        System.out.println(" q2 -> qd ");
                    }
                }
                System.out.println("The String is not alternating ");
                return false;
            }
        }
        if ((prev == '$' || prev == '1') && curr == '0') {
            if (steps == 0) {
                System.out.println(" q0 -> q1 ");
            } else {
                System.out.println(" q2 -> q1 ");
            }
        } else {
            /*curr='0' and prev='1' */
            System.out.println(" q1 -> q2 ");
        }
        prev = curr;
        steps++;
    }
    return true;
} else {
    /*starts with 1 */

```

```
for (int i = 0; i < n; i++) {
    char curr = str.charAt(i);
    System.out.println("prev : " + prev + " curr: " + curr);
    if (prev == curr) {
        if(curr=='1'){
            System.out.println(" q1 -> qd ");
        }else {
            System.out.println(" q2 -> qd ");
        }
        System.out.println("The String is not alternating ");
        return false;
    }
    if ((prev=='$' || prev == '0') && curr == '1') {
        if (steps == 0) {
            System.out.println(" q0 -> q1 ");
        } else {
            System.out.println(" q2 -> q1 ");
        }
    }else {
        /*curr='0' and prev='1' */
        System.out.println(" q1 -> q2 ");
    }
    prev=curr;
    steps++;
}
// return true;
}

return true;
}

public static void main(String args[]) {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a string: ");
    String input = scanner.nextLine();
    // String input="101";

    if (check_alternating(input)) {
        // System.out.println("The string is alternating ");
    } else {
        // System.out.println("The string is NOT alternating ");
    }
    scanner.close();
}
}
```

```
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q3.java
Enter a string: 01010
prev : $ curr: 0
q0 -> q1
prev : 0 curr: 1
q1 -> q2
prev : 1 curr: 0
q2 -> q1
prev : 0 curr: 1
q1 -> q2
prev : 1 curr: 0
q2 -> q1
The string is alternating

C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q3.java
Enter a string: 1010
prev : $ curr: 1
q0 -> q1
prev : 1 curr: 0
q1 -> q2
prev : 0 curr: 1
q2 -> q1
prev : 1 curr: 0
q1 -> q2
The string is alternating

C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>
```

```
C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>java q3.java
Enter a string: 00000000000001
prev : $ curr: 0
q0 -> q1
prev : 0 curr: 0
q1 -> qd
The String is not alternating

C:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\04_ss\01_labs>
```

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