

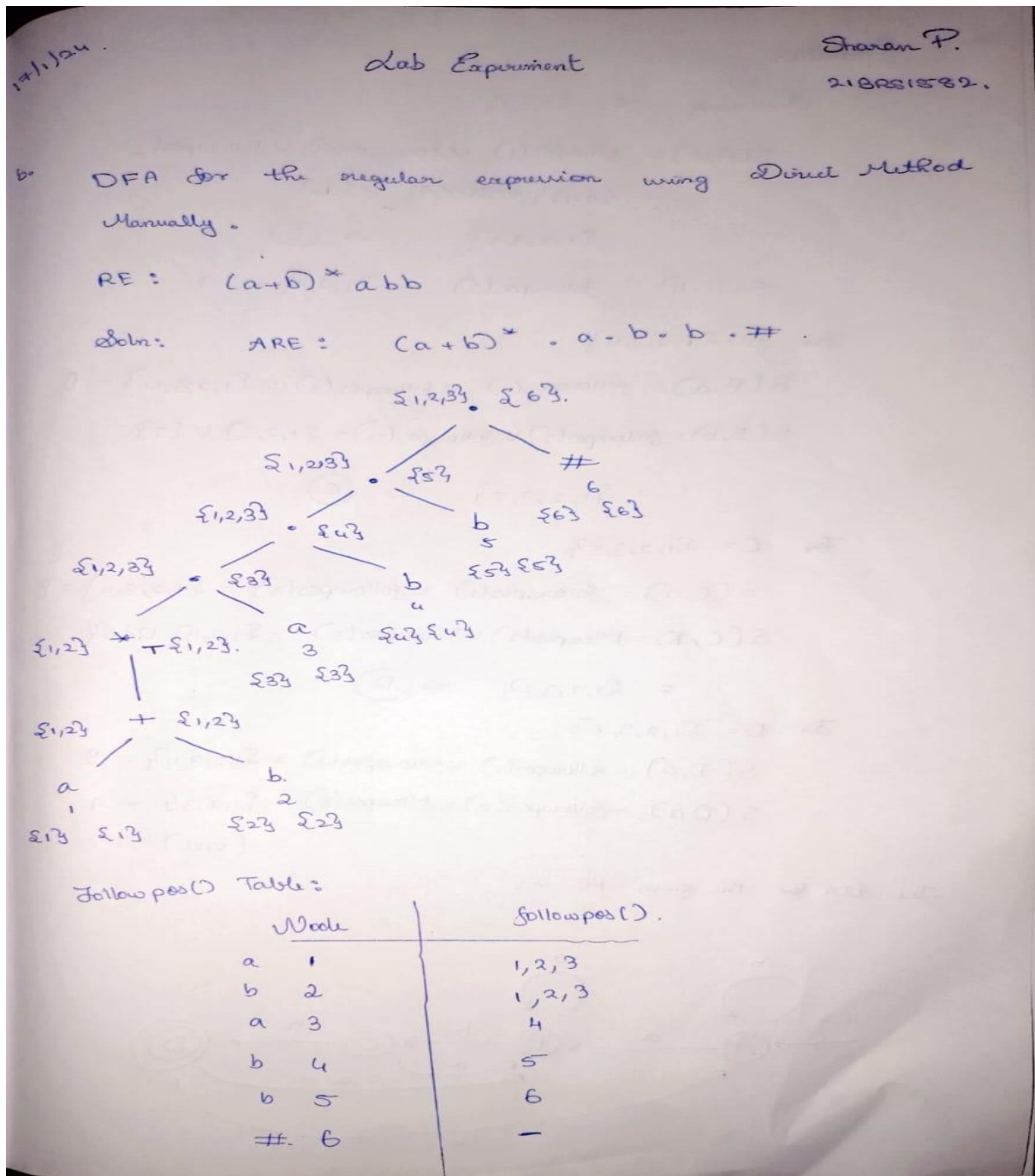
LAB ASSIGNMENT (17-01-2024)

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Aim: To construct a DFA in C for the given RE: $(a+b)^*abb$

DFA Construction:



Production:

Assuming $A = \{1, 2, 3\}$

$$\begin{aligned} S(A, a) &= \text{followpos}(1) \cup \text{followpos}(2) \cup \text{followpos}(3) \\ &= \{1, 2, 3\} \cup \{1, 2, 3\} \cup \{4\} \\ &= \{1, 2, 3, 4\} \Rightarrow \textcircled{B} \end{aligned}$$

$$S(A, b) = \text{followpos}(2) = \{1, 2, 3\} = A.$$

For $B = \{1, 2, 3, 4\}$

$$S(B, a) = \text{followpos}(1) \cup \text{followpos}(3) = \{1, 2, 3, 4\} = B$$

$$\begin{aligned} S(B, b) &= \text{followpos}(2) \cup \text{followpos}(4) = \{1, 2, 3\} \cup \{5\} \\ &= \{1, 2, 3, 5\} \Rightarrow \textcircled{C} \end{aligned}$$

For $C = \{1, 2, 3, 5\}$,

$$S(C, a) = \text{followpos}(1) \cup \text{followpos}(3) = \{1, 2, 3, 4\} = B$$

$$\begin{aligned} S(C, b) &= \text{followpos}(2) \cup \text{followpos}(5) = \{1, 2, 3\} \cup \{6\} \\ &= \{1, 2, 3, 6\} \Rightarrow \textcircled{D} \end{aligned}$$

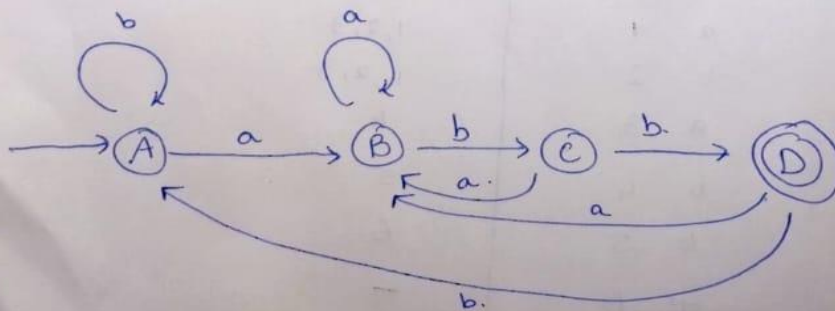
For $D = \{1, 2, 3, 6\}$

$$S(D, a) = \text{followpos}(1) \cup \text{followpos}(3) = \{1, 2, 3, 4\} = B.$$

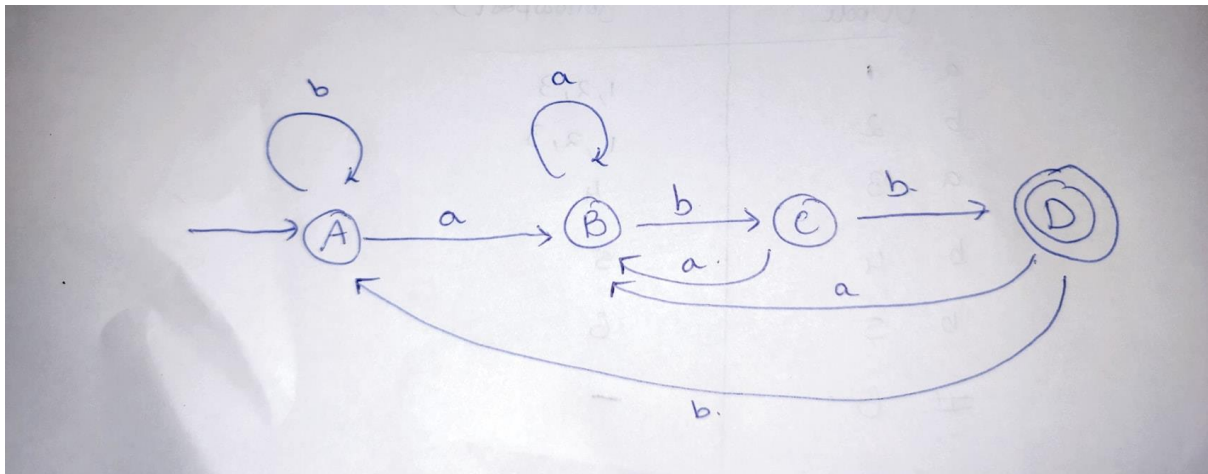
$$S(D, b) = \text{followpos}(2) \cup \text{followpos}(6) = \{1, 2, 3\} = A.$$

(end).

The DFA for the given RE is:



Final DFA :



Code:

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

```
int production(int states,int inputchar){
    switch(states){
        case 0:
            if(inputchar=='a') return 1;
            else return 0;
            break;
        case 1:
            if(inputchar=='a') return 1;
            else return 2;
            break;
        case 2:
            if(inputchar=='a') return 1;
            else return 3;
            break;
        case 3:
            if(inputchar=='a') return 1;
            else return 0;
            break;
    }
}
```

```
int main(){
    int states=0;
    char inputString[100];
    printf("Enter a string: ");
    scanf("%99s", inputString);
```

```

for(int i=0;inputString[i]!='\0';++i){
    states= production(states,inputString[i]);
}
if(states==3) printf("String Accepted");
else printf("String Not Accepted");

return 0;
}

```

Output ScreenShot:

The screenshot shows a C program in a code editor and its execution in a terminal. The code defines a function `production` that takes a state and an input character, and returns the next state based on a switch statement. The main function reads a string and checks if it is accepted by the DFA.

```

1  #include<stdio.h>
2
3  int production(int states,int inputchar){
4      switch(states){
5          case 0:
6              if(inputchar=='a') return 1;
7              else return 0;
8              break;
9          case 1:
10             if(inputchar=='a') return 1;
11             else return 2;
12             break;
13          case 2:
14             if(inputchar=='a') return 1;
15             else return 3;
16             break;
17          case 3:
18             if(inputchar=='a') return 1;
19             else return 0;
20             break;
21      }
22      return 0;
23  }
24
25  int main(){
26      char inputString[100];
27      int states=0;
28      printf("Enter a string: ");
29      fgets(inputString,100,stdin);
30      printf("String ");
31      for(int i=0;inputString[i]!='\0';++i){
32          states= production(states,inputString[i]);
33      }
34      if(states==3) printf("Accepted");
35      else printf("Not Accepted");
36      printf("\n");
37      return 0;
38  }

```

The terminal output shows two runs of the program. In the first run, the input string is "aabbabab" and the output is "String Not Accepted". In the second run, the input string is "aabb" and the output is "String Accepted".

```

C:\Users\shara\Downloads\lab1q2.exe C:\Users\shara\Downloads\lab1q2.exe
Enter a string: aabbabab String Not Accepted
Process exited after 12.92 sec Press any key to continue . . .

C:\Users\shara\Downloads\lab1q2.exe C:\Users\shara\Downloads\lab1q2.exe
Enter a string: aabb String Accepted
Process exited after 2.098 seconds with return value 0
Press any key to continue . . .

```

Result:

A DFa for the given Regular expression is made using the Direct method and is developed in the c code. The strings "aabb" and "aabbabab" are both validated with the later failing the acceptance.