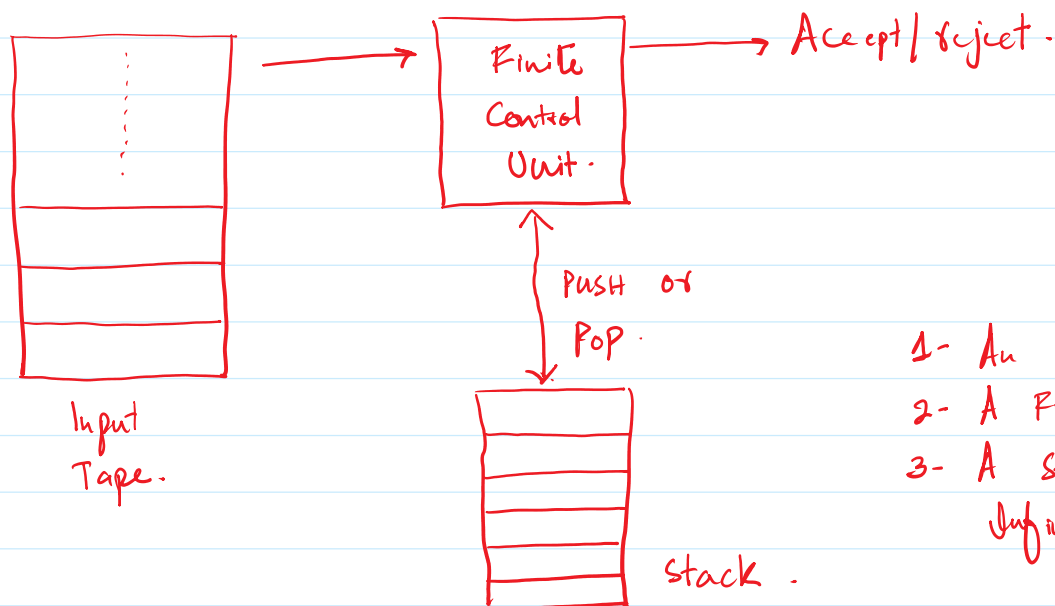
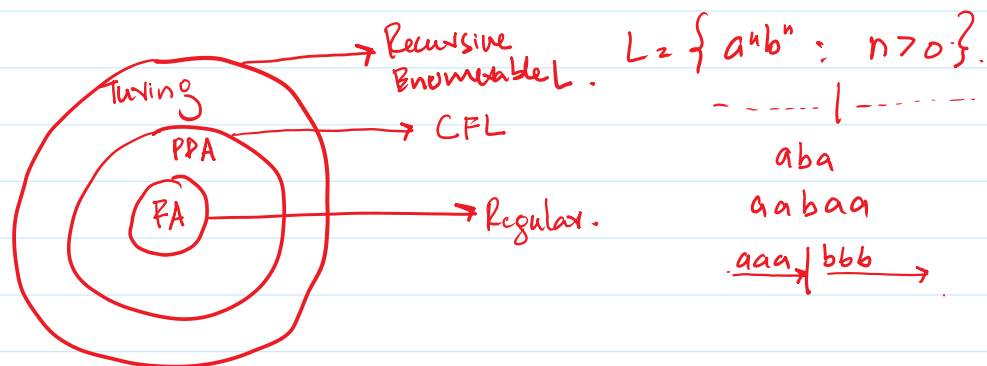


# Lecture 27:

## PUSH DOWN AUTOMATA (PDA).

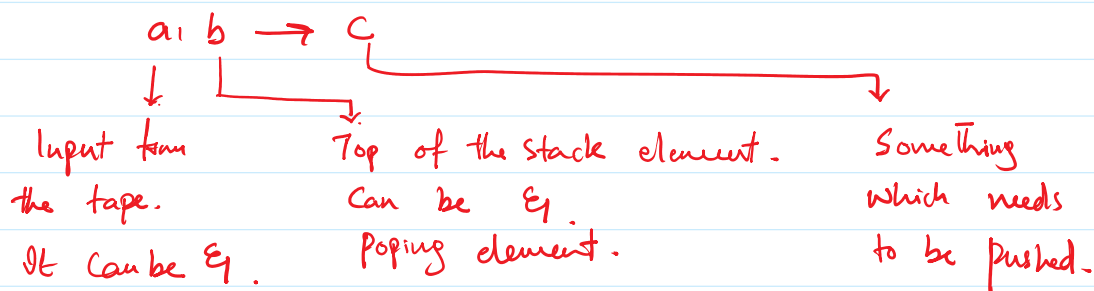


- 1- An Input tape.
- 2- A Finite Control Unit
- 3- A Stack with infinite size.

PDA General form.

$PDA = FA + \text{Memory (Stack)}$ .

Transition.



$L = \{0^n 1^n \mid n > 0\}$ .

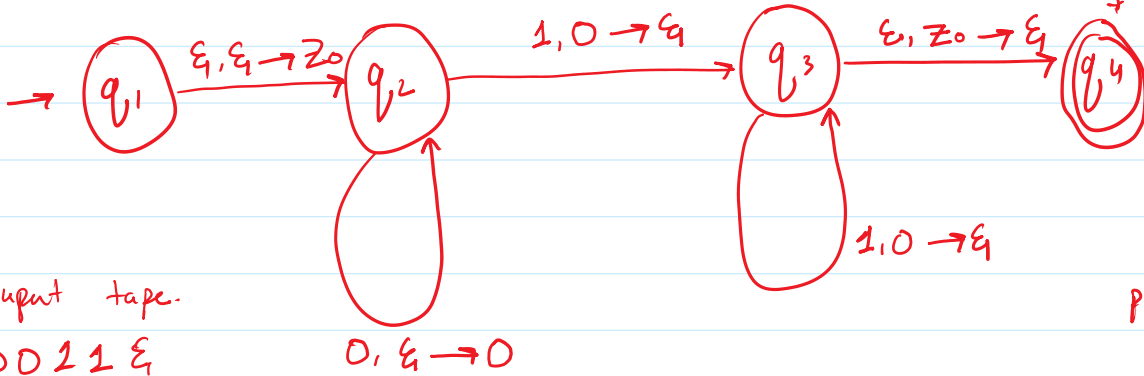
$\epsilon 0 1 \epsilon, \epsilon 0 0 1 1 \epsilon, \epsilon 0 0 0 1 1 1 \epsilon, \dots$

$L_2 = \{0^n 1^n \mid n \geq 0\}$ .

$\begin{matrix} 1, 2 \\ a, b \end{matrix} \rightarrow (c)$

$\epsilon 0 1 \epsilon, \epsilon 0 0 1 1 \epsilon, \epsilon 0 0 0 1 1 1 \epsilon, \dots$   
 $\frac{11}{x}, \frac{10}{x}, \frac{00}{x}, \dots$

$\frac{000111}{x}$

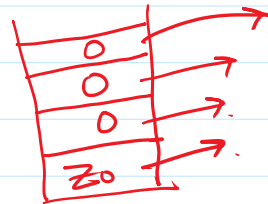


Input tape:

$\epsilon 0 0 1 1 \epsilon$

$\epsilon 0 0 0 1 1 1 \epsilon$

PDA = P + Stack.



Questions:

1- what symbol needs to be stored.

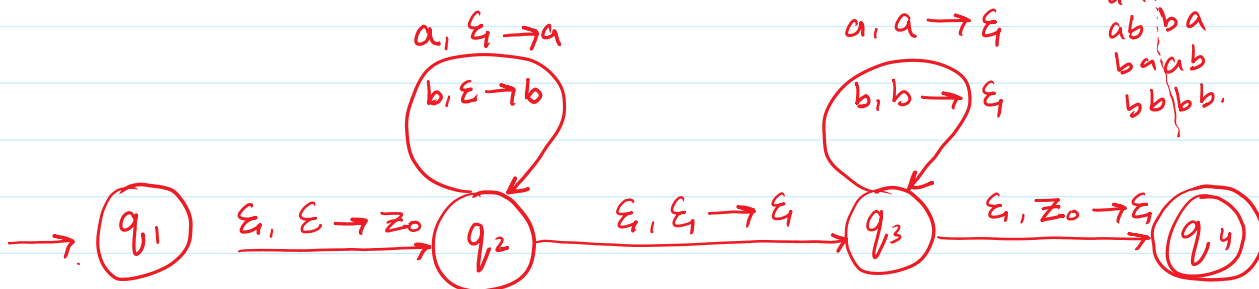
2- when to push  $\epsilon$  when to pop.

Ex:

$L = \{w w^R \mid w \in (a+b)^+\}$ .

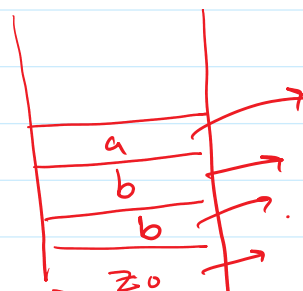
$\begin{matrix} \epsilon \\ a a \\ b b \\ a a a a \\ a b b a \\ b a a b \\ b b b b \end{matrix}$

Even length.

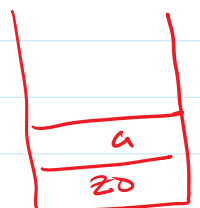


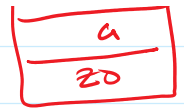
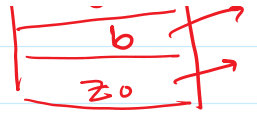
$\epsilon b b a \epsilon a b b \epsilon$

Input tape.



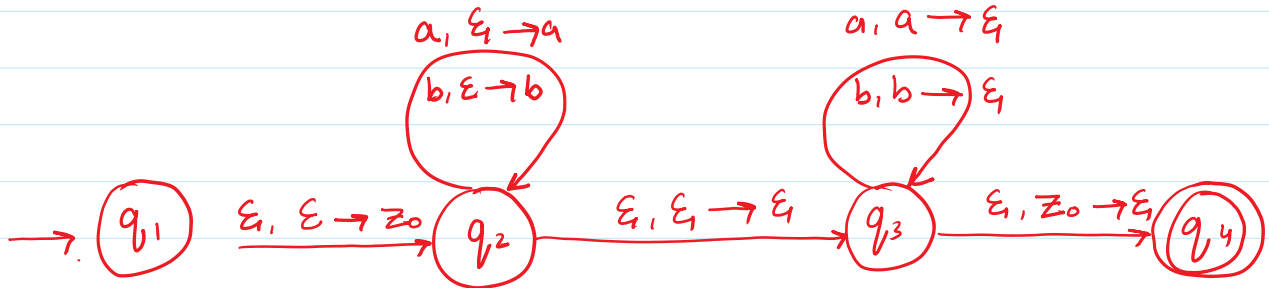
$\epsilon a \epsilon b \epsilon$



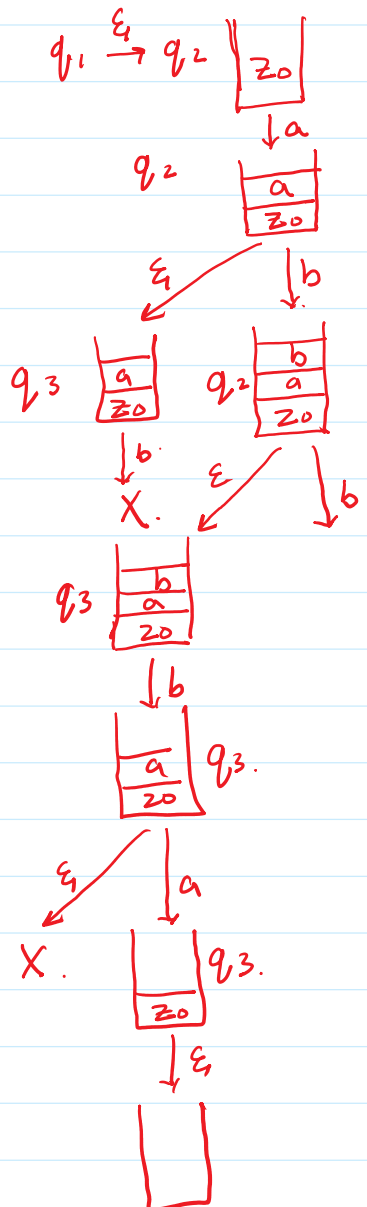


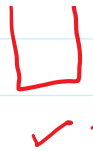
Machine Perspective:-

How to know the middle of the Palindrome String.



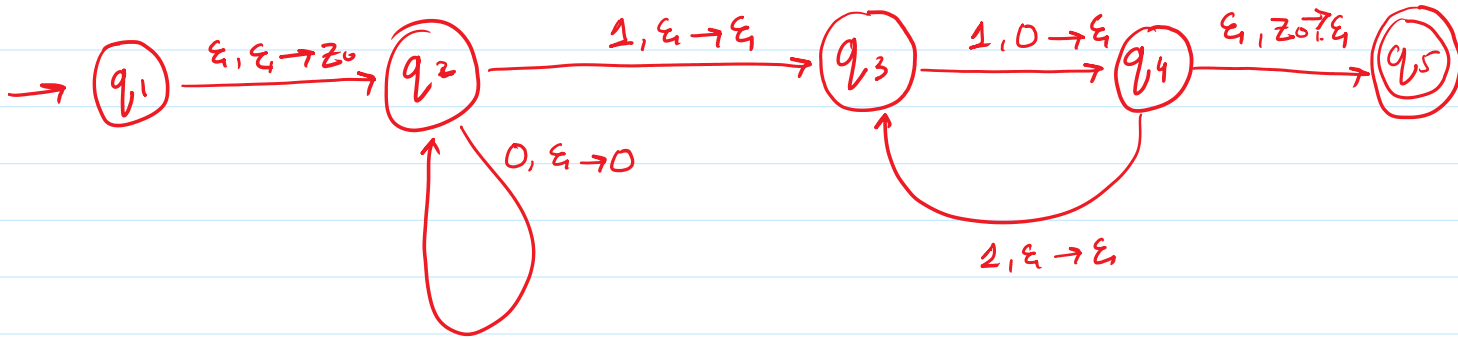
$\epsilon a \epsilon b \epsilon b \epsilon a \epsilon$





Ex:  $L_2 = \{ 0^n 1^{2n} \mid n \geq 0 \}$ .

$\epsilon_0 \underline{0} \underline{1} \underline{1} \underline{1} \underline{1} \epsilon_1$   
 $q_1 q_2 q_4$



$L_2 = \{ 0^{2n} 1^n \mid n \geq 0 \}$ .

