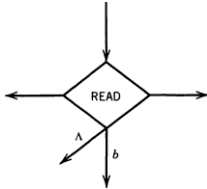**Post Machine:**

A Post machine, denoted PM, is a collection of five things:

1. The alphabet Σ of input letters plus the special symbol #.
2. A linear storage location called the STORE (FIFO).
   a. Initially contains the input string.
   b. Each location can be read.
   c. Characters can also be added to the STORE.
   d. Characters not in Σ can be used in the STORE (Characters from Γ).
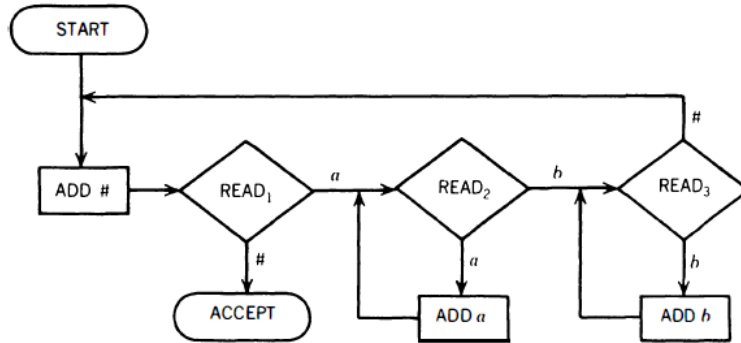3. READ state(s).

4. ADD state(s).
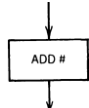
5. A START state (unenterable).

6. Some halt states called ACCEPT and REJECT.

EXAMPLE: $a^n b^n$, $n \geq 1$ – {ab, aabb, aaabbb, aaaabbbb, …}

Task: Study the JAVA sample code for PM and Run it. What is the RE of this machine?
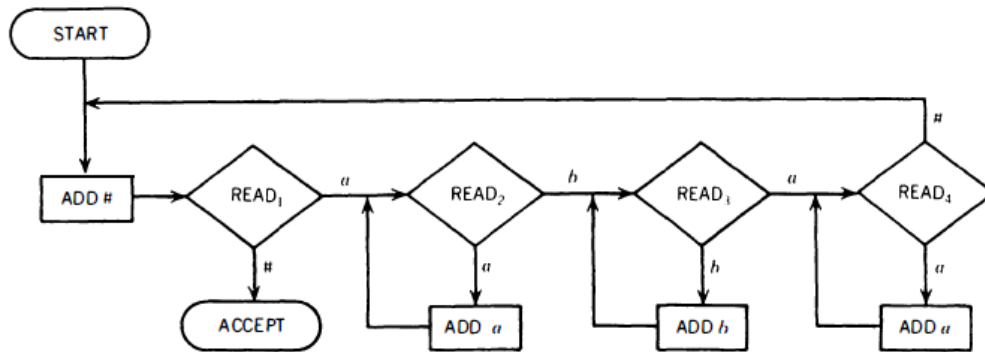
String: aaabbb   STORE: a -> aa -> aaa -> aaab -> aaabb -> aaabbb

STATE	STORE		STATE	STORE		STATE	STORE
START	aaabbb		ADD #	aabb#		ADD #	ab#
ADD #	aaabbb#		READ 1 - a	abb#		READ 1 - a	b#
READ 1 - a	aabbb#		READ 2 - a	bb#		READ 2 - b	#
READ 2 - a	abbb#		ADD a	bb#a		READ 3 - #	
ADD a	abbb#a		READ 2 - b	b#a		ADD #	#
READ 2 - a	bbb#a		READ 3 - b	#a		READ 1 - #	
ADD a	bbb#aa		ADD b	#ab		ACCEPT	
READ 2 - b	bb#aa		READ 3 - #	ab			
READ 3 - b	b#aa						
ADD b	b#aab						
READ 3 - b	#aab						
ADD b	#aabb						
READ 3 - #	aabb						

EXAMPLE: $a^n b^n a^n$, n ≥ 1 – {aba, aabbaa, aaabbbaaa, aaaabbbbaaaa, …}

String: aaabbbaaa

STORE: a -> aa -> aaa -> aaab -> aaabb -> aaabbb -> aaabbba -> aaabbbaa -> aaabbbaaa

STATE	STORE	STATE	STORE	STATE	STORE
START	aaabbbaaa				
ADD #	aaabbbaaa#	ADD #	aabbaa#	ADD #	aba#
READ 1 - a	aabbbaaa#	READ 1 - a	abbaa#	READ 1 - a	ba#
READ 2 - a	abbbaaa#	READ 2 - a	bbaa#	READ 2 - b	a#
ADD a	abbbaaa#a	ADD a	bbaa#a	READ 3 - a	#
READ 2 - a	bbbaaa#a	READ 2 - b	baa#a	READ 4 - #	
ADD a	bbbaaa#aa	READ 3 - b	aa#a	ADD #	#
READ 2 - b	bbaaa#aa	ADD b	aa#ab	READ 1 - #	
READ 3 - b	baaa#aa	READ 3 - a	a#ab	ACCEPT	
ADD b	baaa#aab	READ 4 - a	#ab		
READ 3 - b	aaa#aab	ADD a	#aba		
ADD b	aaa#aabb	READ 4 - #	aba		
READ 3 - a	aa#aabb				
READ 4 - a	a#aabb				
ADD a	a#aabba				
READ 4 - a	#aabba				
ADD a	#aabbaa				
READ 4 - #	aabbaa				

Task: Construct a PM for the language generated by the RE $a^n b^n a^n b^n$, n ≥ 1
L = {abab,aabbaabb,aaabbbaaabbb,…}
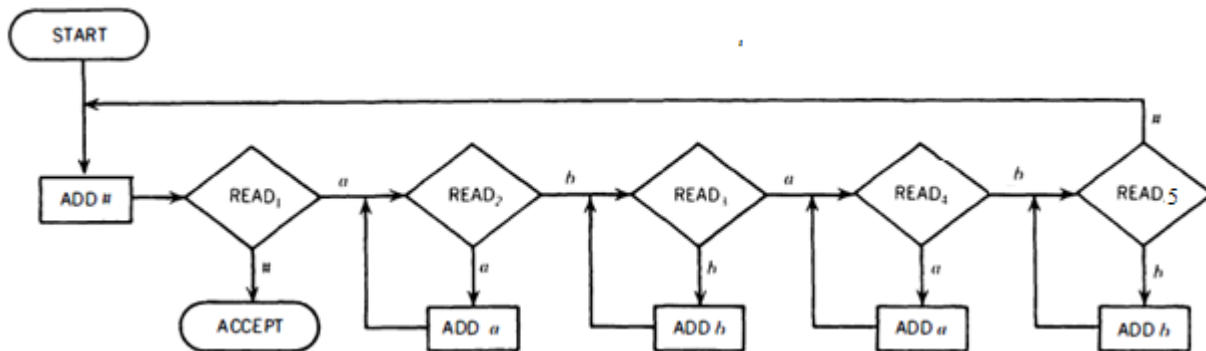
STATE	STORE		STATE	STORE
START	aabbaabb			
ADD #	aabbaabb#		ADD #	abab#
READ 1 - a	abbaabb#		READ 1 - a	bab#
READ 2 - a	bbaabb#		READ 2 - b	ab#
ADD a	bbaabb#a		READ 3 - a	b#
READ 2 - b	baabb#a		READ 4 - b	#
READ 3 - b	aabb#a		READ 5 - #	
ADD b	aabb#ab		ADD #	#
READ 3 - a	abb#ab		READ 1 - #	
READ 4 - a	bb#ab		ACCEPT	
ADD a	bb#aba			
READ 4 - b	b#aba			
READ 5 - b	#aba			
ADD b	#abab			
READ 5 - #	abab			