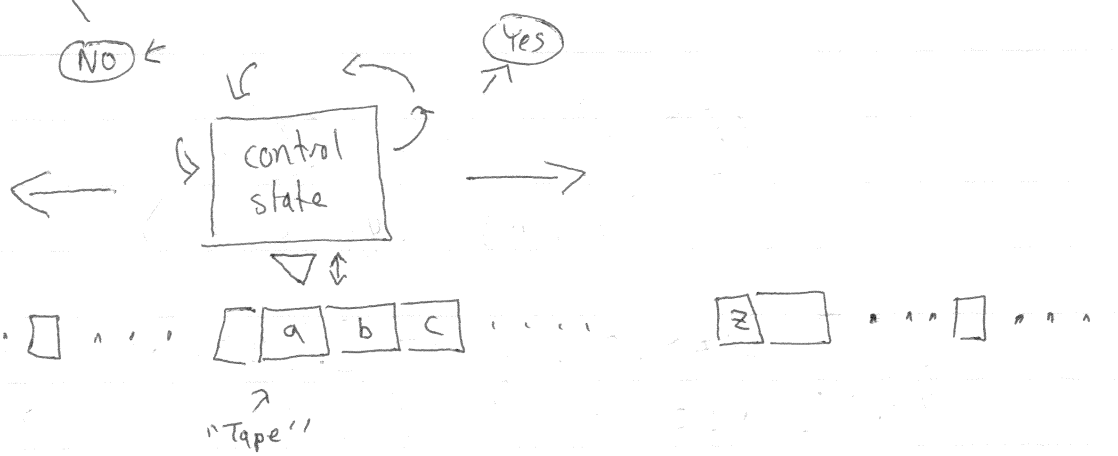
TM-1

Turing Machines

DFA { control state [finite],
incremental viewing of input ("real time" / "on line")

PDA { ++ non-determinism
++ stack-based recall
— infinite space, but finite reach

TM { −− non-determinism
++ infinite-space & infinite "reach"
−− online, kind of



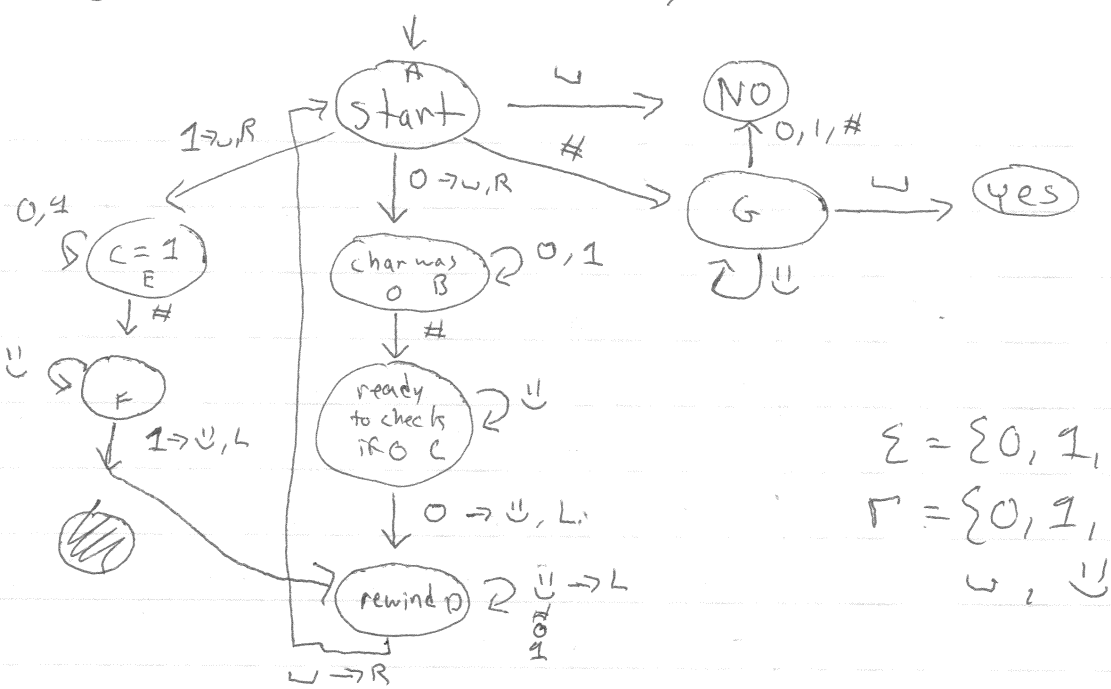
DFA δ: $Q \times \Sigma \to Q$

PDA δ: $Q \times \Sigma_\varepsilon \times \Gamma_\varepsilon \to P(Q \times \Gamma_\varepsilon)$

TM δ: $Q \times \Gamma \to Q \times \Gamma \times \{L,R\}$ $(\Sigma \subset \Gamma)$

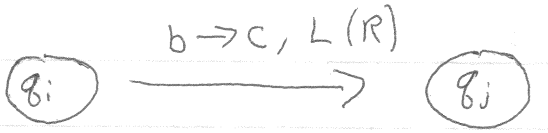
14-2

$B = \{ w\#w \mid w \in \{0,1\}^* \}$



$\Sigma = \{0, 1, \#\}$

$\Gamma = \{0, 1, \#, \text{␣}, \text{⊔}\}$



$\delta(q_i, b) = (q_j; c, L)$

␣ ∉ Σ

␣ ∈ Γ

..., ␣ [S] 010#010 ␣ ... ⇒ [B] 10#010 ⇒ 1[B]0#010 ⇒ 10[B]#010 ⇒ 10#[C]010 ⇒ 10[D]#␣10 ⇒⇒⇒ [D]␣10#␣10 ⇒ [S]10#␣10 ⇒ [E]0#␣10 ⇒⇒⇒ 0#␣[F]10 ⇒ 0#[D]␣␣0 ⇒⇒⇒ [D]␣0#␣␣0 ⇒ [S]0#␣␣0 ⇒^{9} [D]␣#␣␣␣ ⇒ [S]#␣␣␣ ⇒ #[G]␣␣␣ ⇒^{3} #␣␣␣[G]␣ ⇒ YES