'Cross-over' moves in the simulation of 2-way tape TM;

New state: q_{xy}^* (means next state is x)

On M_2: $\delta(q, \langle b, \dot{0}, \text{bottom}\rangle) = (q_{xy}^*, \langle b, \dot{x}, \text{top}\rangle, R)$

$\delta(q_{xy}^*, \langle a, b, \text{top}\rangle) = (x, \langle a, b, \text{top}\rangle, L)$

- Simulating multitape turing machine using a single tape machine:

$\# \dot{w}_1 w_2 \ldots w_n \# \dot{\sqcup} \# \dot{\sqcup} \# \ldots \# \ldots \#$

k tapes, k+1 # (separator)

$\dot{a}$ means the tape head points to this a.

- In each move, we may have to 'push' symbols right if we write on a blank.

. Non-deterministic Turing Machines:

Just like Non-deterministic finite automata (NFA).

- There could be multiple choices for a move. $\delta(q, 0)$ can be either (r, X, R) or $(q, 0, L)$.

We write

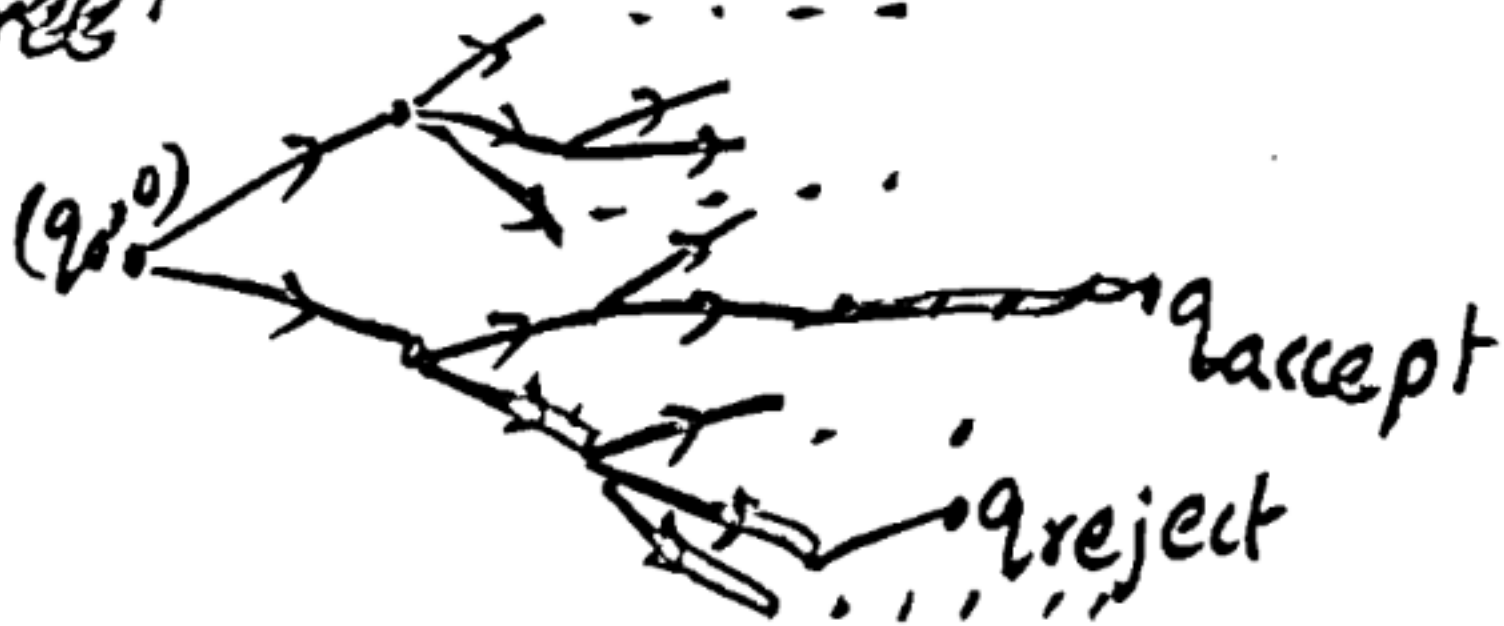
$$\delta(q,0) = \{(r,x,R), (q,0,L)\}$$

This is a set now.

Formally, $\delta: Q \times \Gamma \to \underbrace{2^{(Q \times \Gamma \times \{L,R\})}}_{\text{Power set.}}$

Set of all subsets of $Q \times \Gamma \times \{L,R\}$.

- When do we say a non-deterministic TM "accepts" a string?
- Computation can be thought of as a tree.



- A non-deterministic TM, N, "accepts" a string if it goes to q_accept on any one of these branches!

- What about Reject?