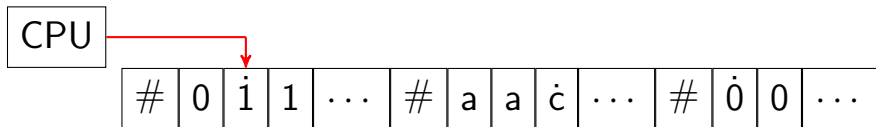
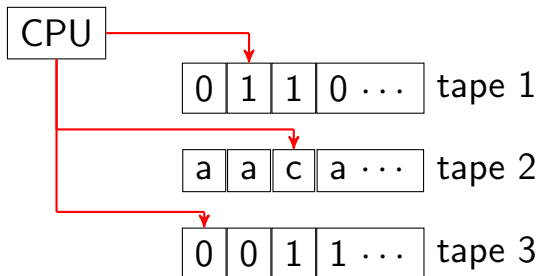


Multi-tape TM \equiv single TM I

- Single-tape TM is a special case of multiple-tape TM
- But how about the other direction?
- Show single-tape TM can simulate multi-tape TM
- Fig 3.14

Multi-tape TM \equiv single TM II



Multi-tape TM \equiv single TM III

- $\#$: a symbol to separate tapes
- $\dot{0}$ is used to store the head position of a tape
- Γ becomes different:

Γ of original multi-tape TM:

$$\{0, 1, a, b, \dots\}$$

Γ of new single-tape TM:

$$\{0, \dot{0}, 1, \dot{1}, a, \dot{a}, b, \dot{b}, \dots\}$$

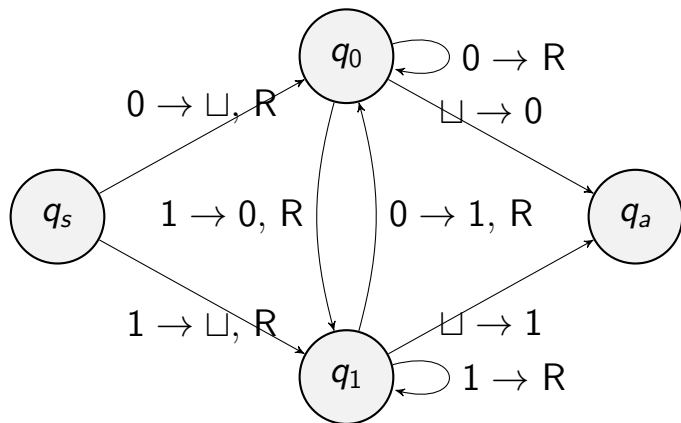
Multi-tape TM \equiv single TM IV

- One multi-tape transition is split to several transitions

We sequentially conduct them

- What if the transition is “move to right (R)” but we see #?
 \Rightarrow insert a \sqcup and shift things after
- How to do the shift? An illustration:

Multi-tape TM \equiv single TM V



- Γ is finite. Use states to remember the current contents