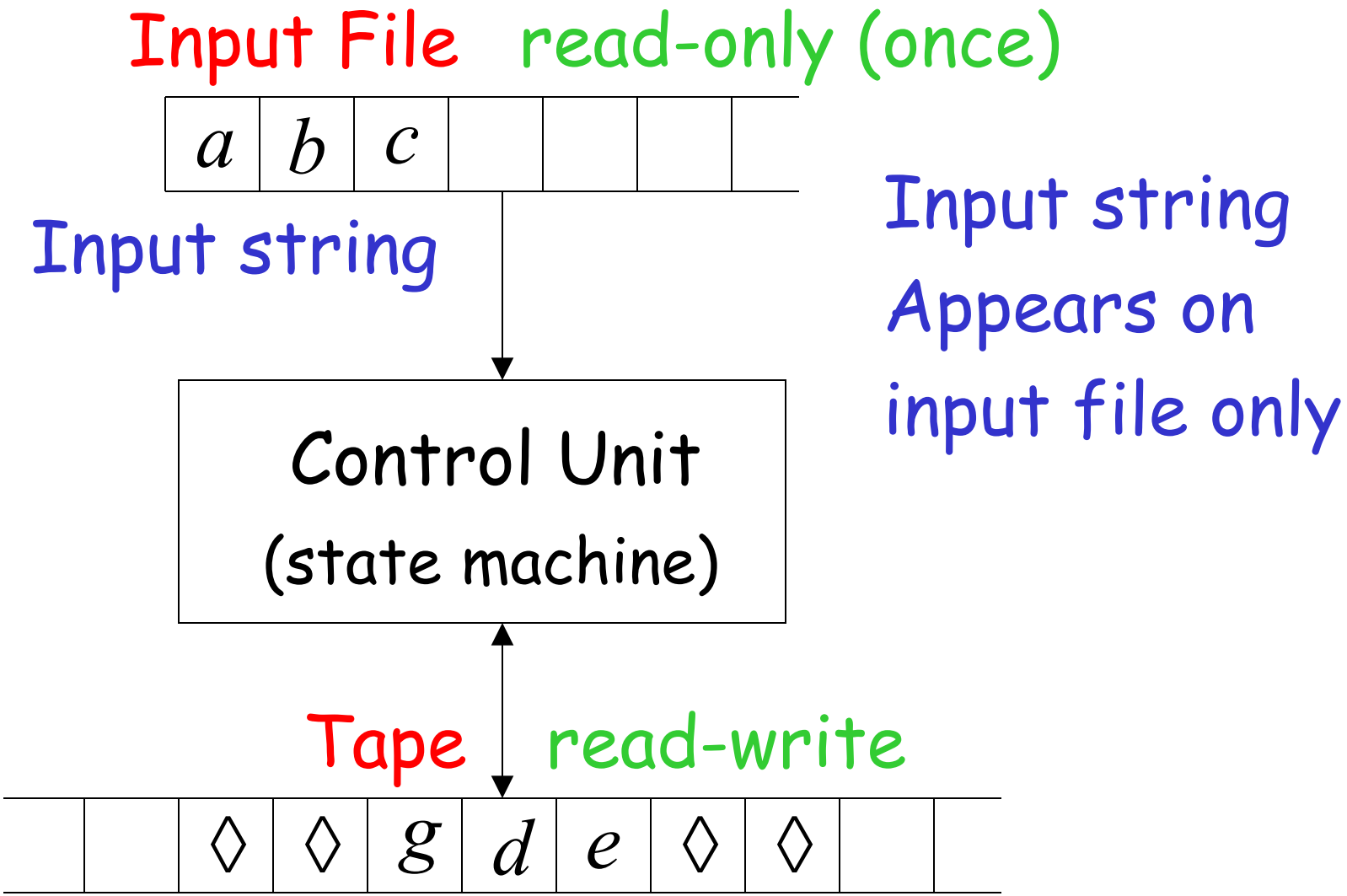
The Off-Line Machine



Theorem: Off-Line machines
have the same power with
Standard Turing machines

Proof: 1. Off-Line machines
simulate Standard Turing machines

2. Standard Turing machines
simulate Off-Line machines

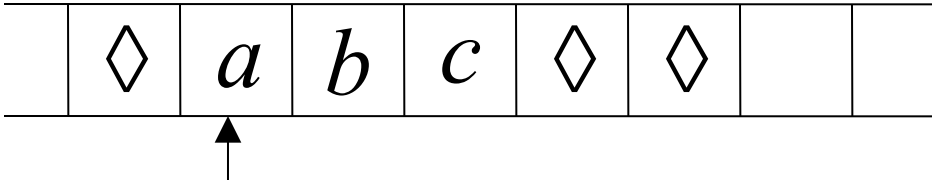
1. Off-line machines simulate Standard Turing Machines

Off-line machine:

1. Copy input file to tape

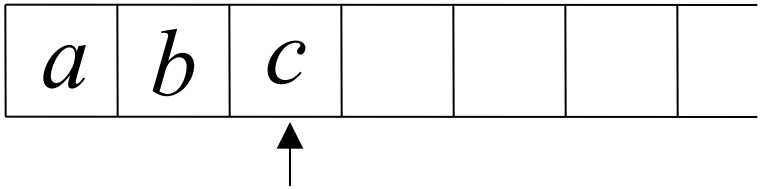
2. Continue computation as in Standard Turing machine

Standard machine

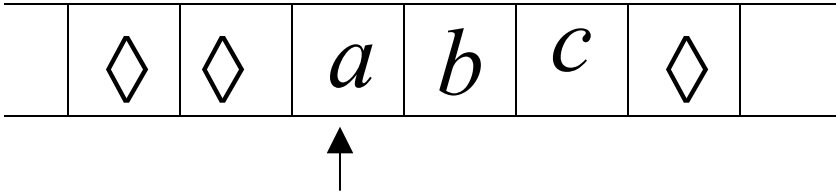


Off-line machine

Input File

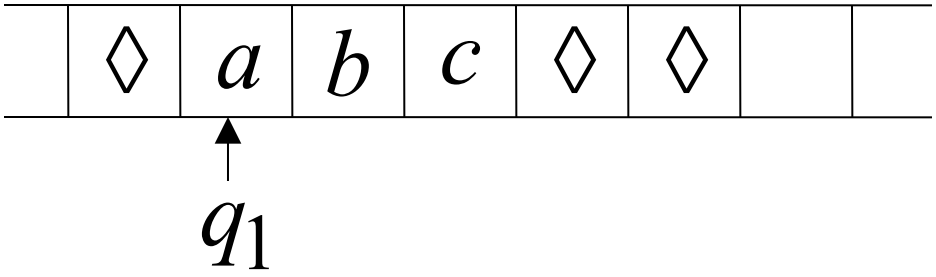


Tape



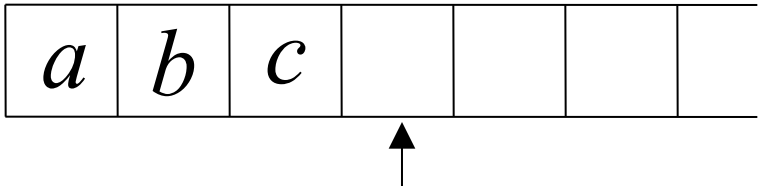
1. Copy input file to tape

Standard machine

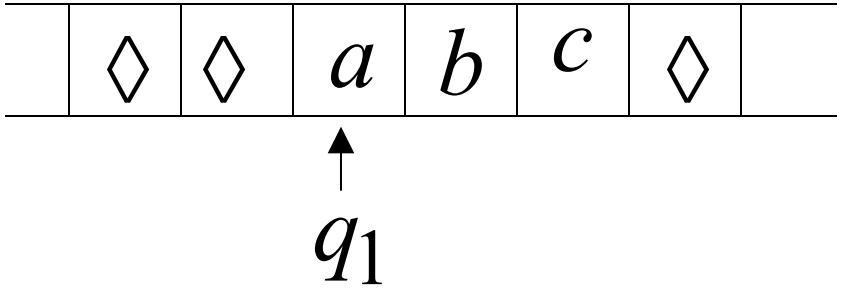


Off-line machine

Input File



Tape



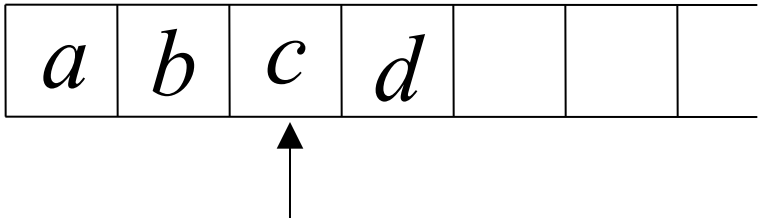
2. Do computations as in Turing machine

2. Standard Turing machines simulate Off-Line machines:

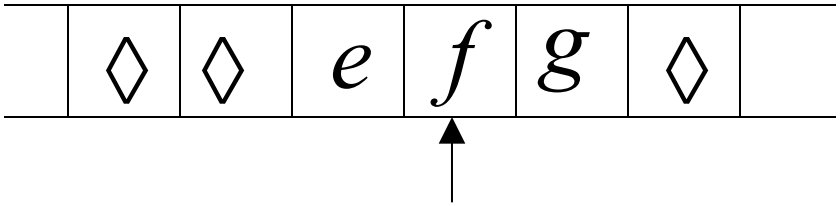
Use a Standard machine with
a four-track tape to keep track of
the Off-line input file and tape contents

Off-line Machine

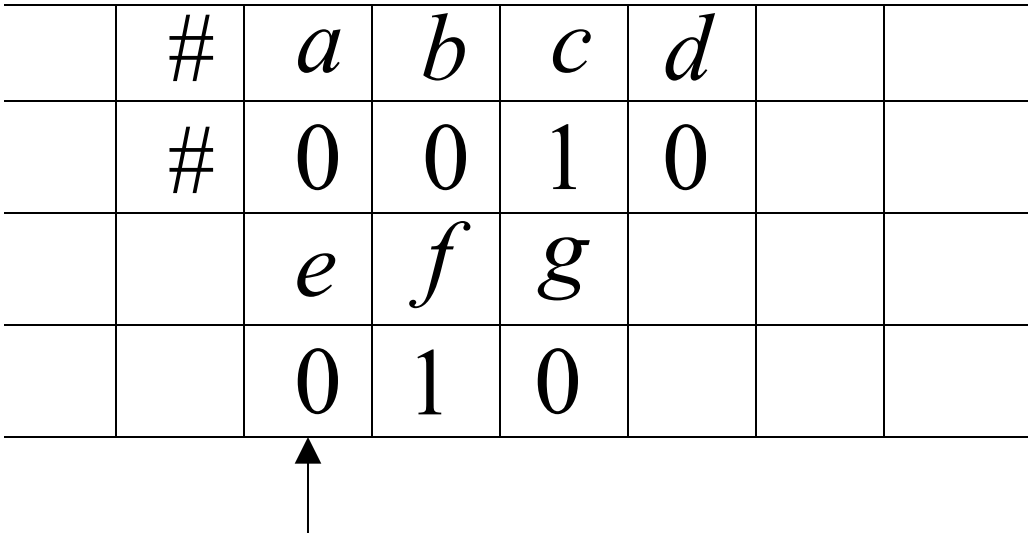
Input File



Tape



Standard Machine -- Four track tape



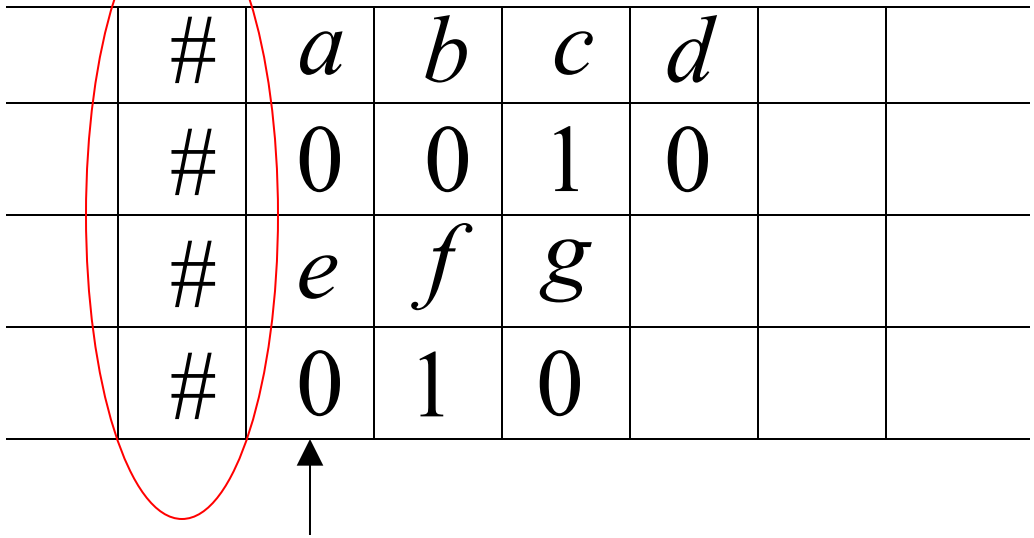
Input File

head position

Tape

head position

Reference point (uses special symbol #)



Input File

head position

Tape

head position

Repeat for each state transition:

1. Return to reference point
2. Find current input file symbol
3. Find current tape symbol
4. Make transition

END OF PROOF