

course: [CSC 135 - Computing Theory and Programming Languages](#)

instructor: [Ted Krovetz](#)

related notes: [2022-05-03](#)

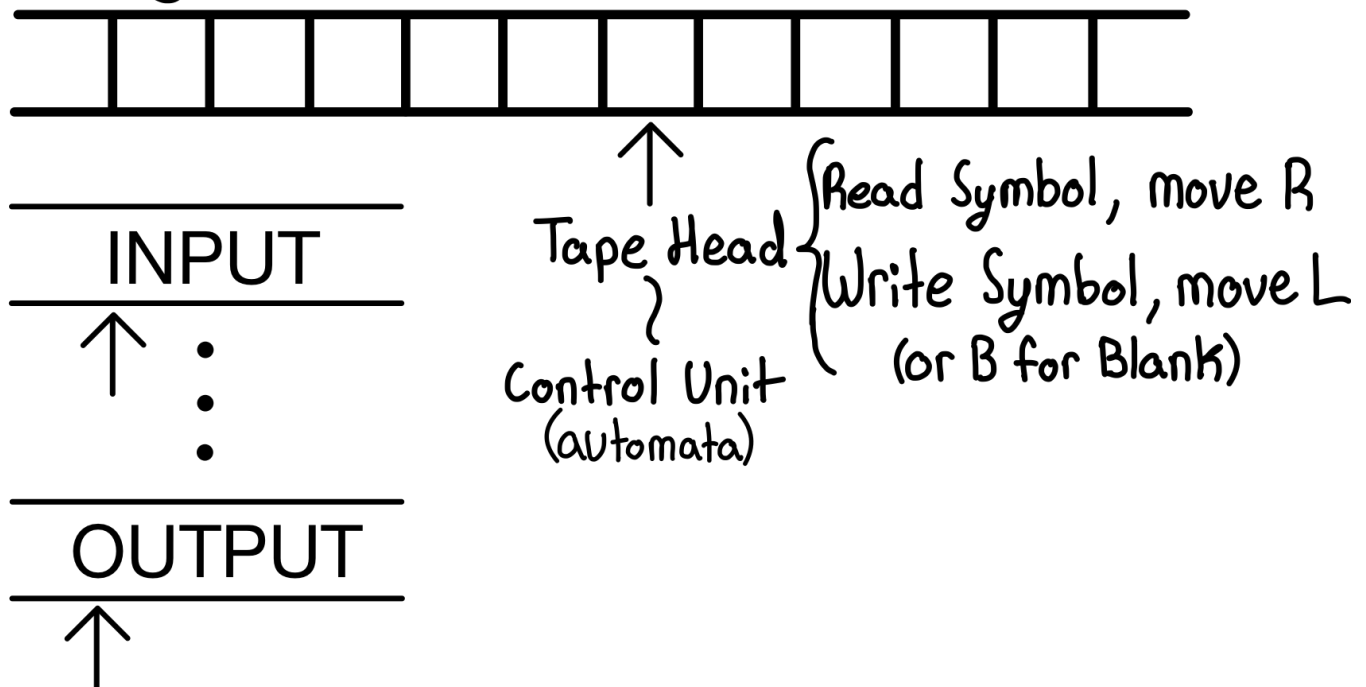
Turing Machine - A control unit with two stacks

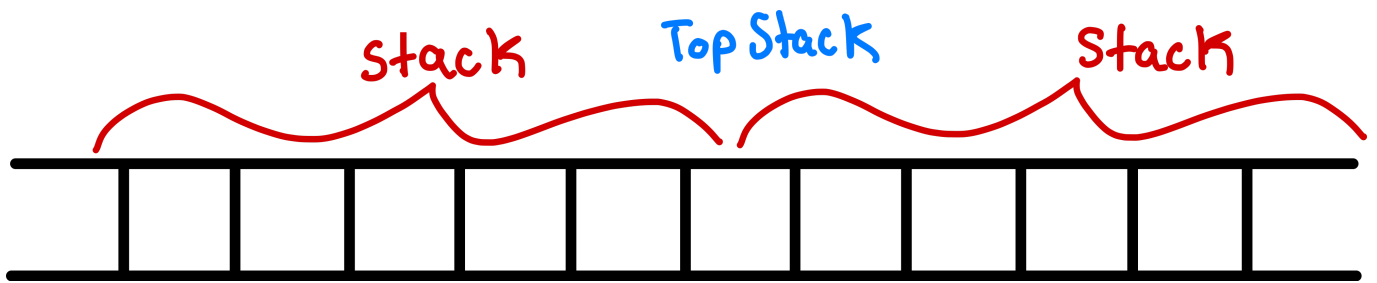
W18.2 | Tuesday, May 3, 2022 | 09:05 AM

Computers were mechanical at the time. Tape was its media of memory.

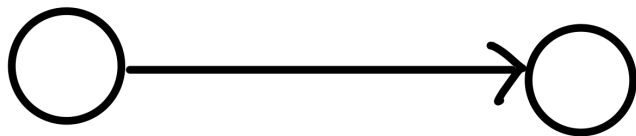
- Is deterministic
 - No λ transitions
 - No multiple arrows (no choice between multiple paths)
- The machine **HALTS** when no arrow out for current configuration
- No **ACCEPT STATES** - has Input/Output only

Turing Machine:





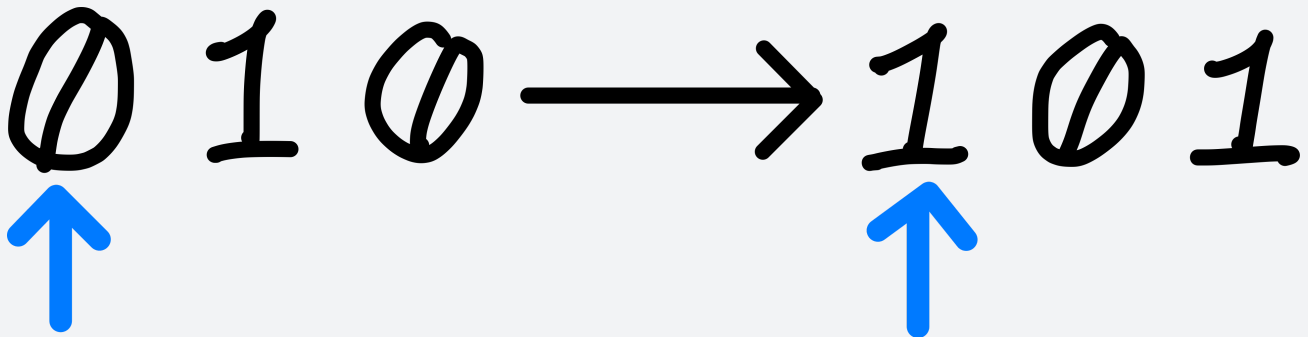
a is what's under head



b is head operation
 R, L write symbol

Turing Machine Example 01

☰ Toggle binary input string



✎ pseudocode

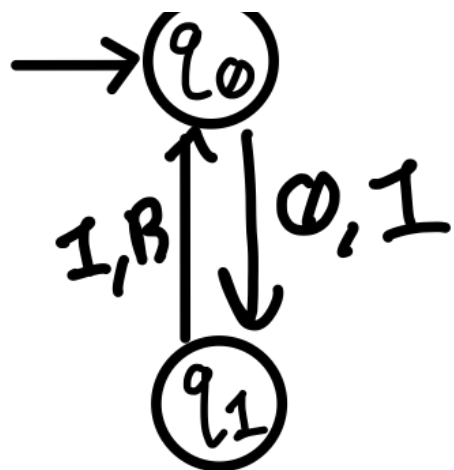
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While head over symbol
  Toggle symbol
  Move R
Move L
While head over symbol
  Move L
Move R

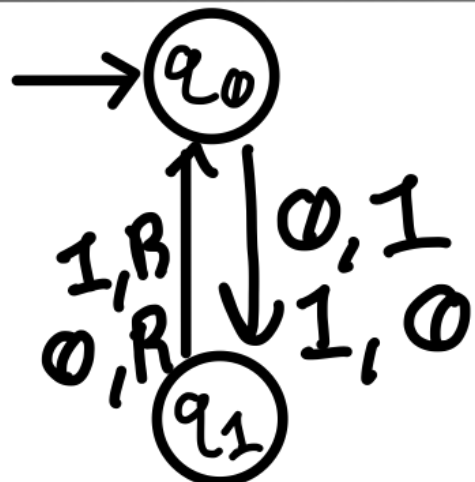
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To be a while loop one must be able to leave a state and come back to it

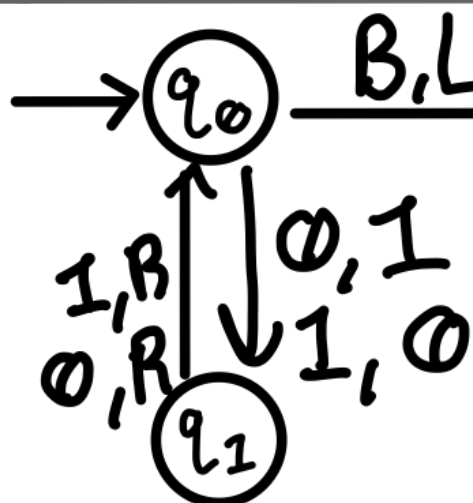




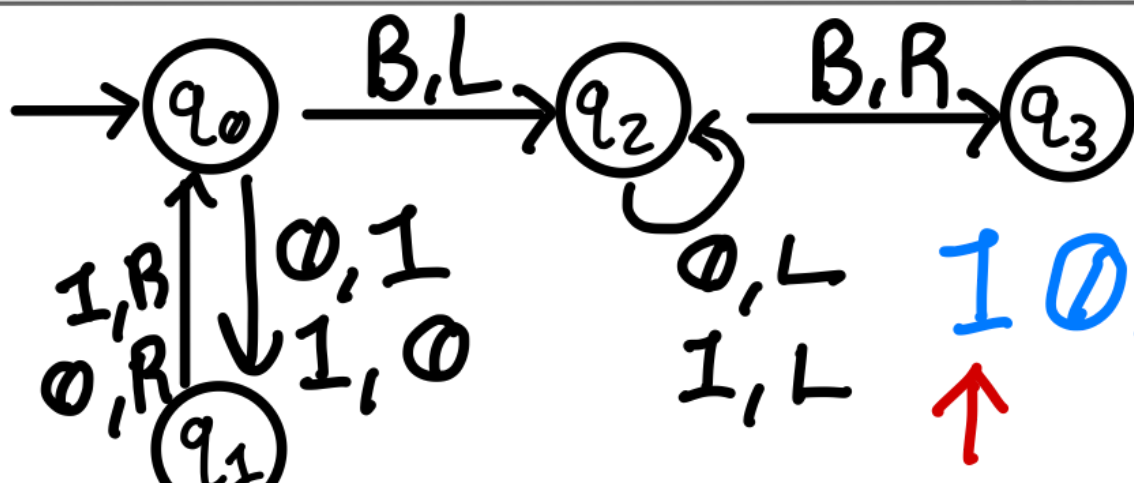
110
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Text Description

A turing machine is a collection of four tuples

(q_0, B, L, q_1)

$(q_0, 0, 1, q_3)$

$(q_0, 1, 0, q_3)$

CONFIGURATION

$[q_0, B, L, q_1]$

$\langle \text{OurState}, \text{underhead}, \text{left}, \text{right} \rangle$

- *underhead*: Single symbol or B (BLANK)
- *left, right* are strings or λ if none

Trace Computation

$\langle q_0, 0, \lambda, 10 \rangle \vdash \langle q_3, 1, \lambda, 10 \rangle \vdash \langle q_0, 1, 1, 0 \rangle$