

TURING MACHINE

Introduction of turing machine



Turing Thesis:

Turing's Thesis states that any computation that can be carried out by mechanical means can be performed by some Turing Machine.

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Few arguments for accepting this thesis are

- Anything that can be done on existing digital computer can also be done by Turing Machine.
- No one has yet been able to suggest a problem solvable by what we consider an algorithm, for which a Turing Machine Program cannot be written

Recursively Enumerable Language:

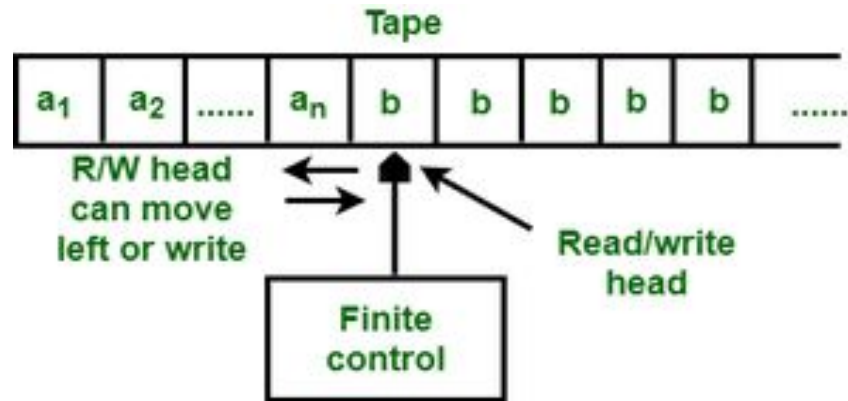
A Language L is said to be Recursively Enumerable if there exists a Turing Machine that accepts it.

A tape

Tape Alphabet: $I = \{0, 1, a, b, x, Z\}$

The Blank is a special symbol.

The blank is a special symbol used to fill the infinite tape



Operations on the Tape:

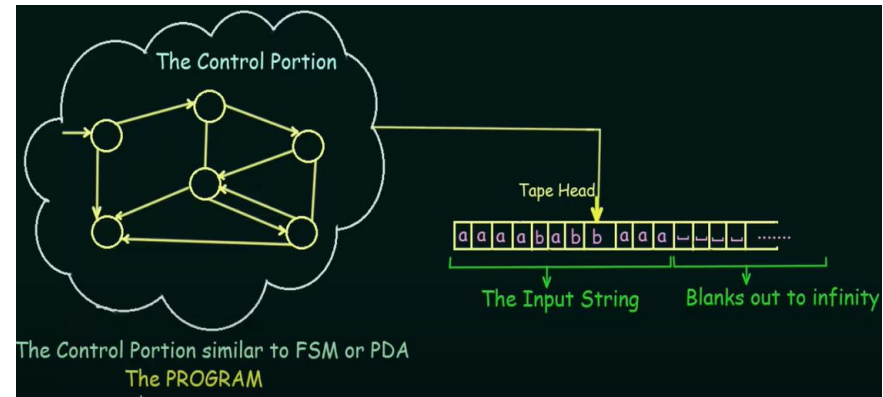
- Read /Scan symbol below the Tape Head
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- Update. / Write a symbol below the Tape Head
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- Move the Tape Head one step LEFT
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- Move the Tape Head one step RIGHT

The control portion

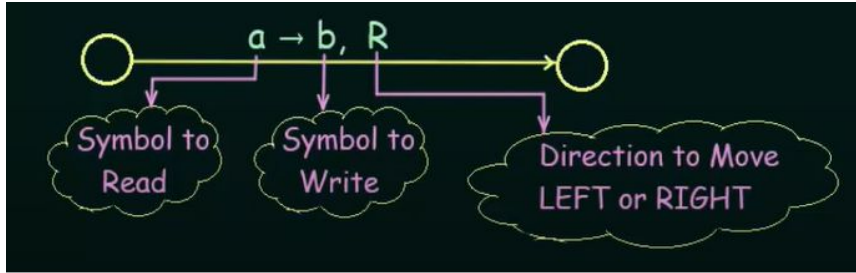
The control portion similar to FSM OR PDA

The program

It is deterministic



Rules of operation - I



At each step of the computation

- ❑ Read the current symbol
- ❑ Update (i.e, write) the same cell
- ❑ Move exactly one cell either LEFT or RIGHT

If we are at the left end of the tape, and trying to move LEFT, then do not move.

Stay at the left end

If you don't want to update the cell

JUST WRITE THE SAME SYMBOL

Rules of operation - II

- ❖ Control is with a sort of FSM
- ❖ Initial State
- ❖ Final States: (there are two final states)

1) The ACCEPT STATE

2) The REJECT STATE

- ❖ Computation can either
 1. HALT and ACCEPT
 2. HALT and REJECT
 3. LOOP (the machine fails to HALT)