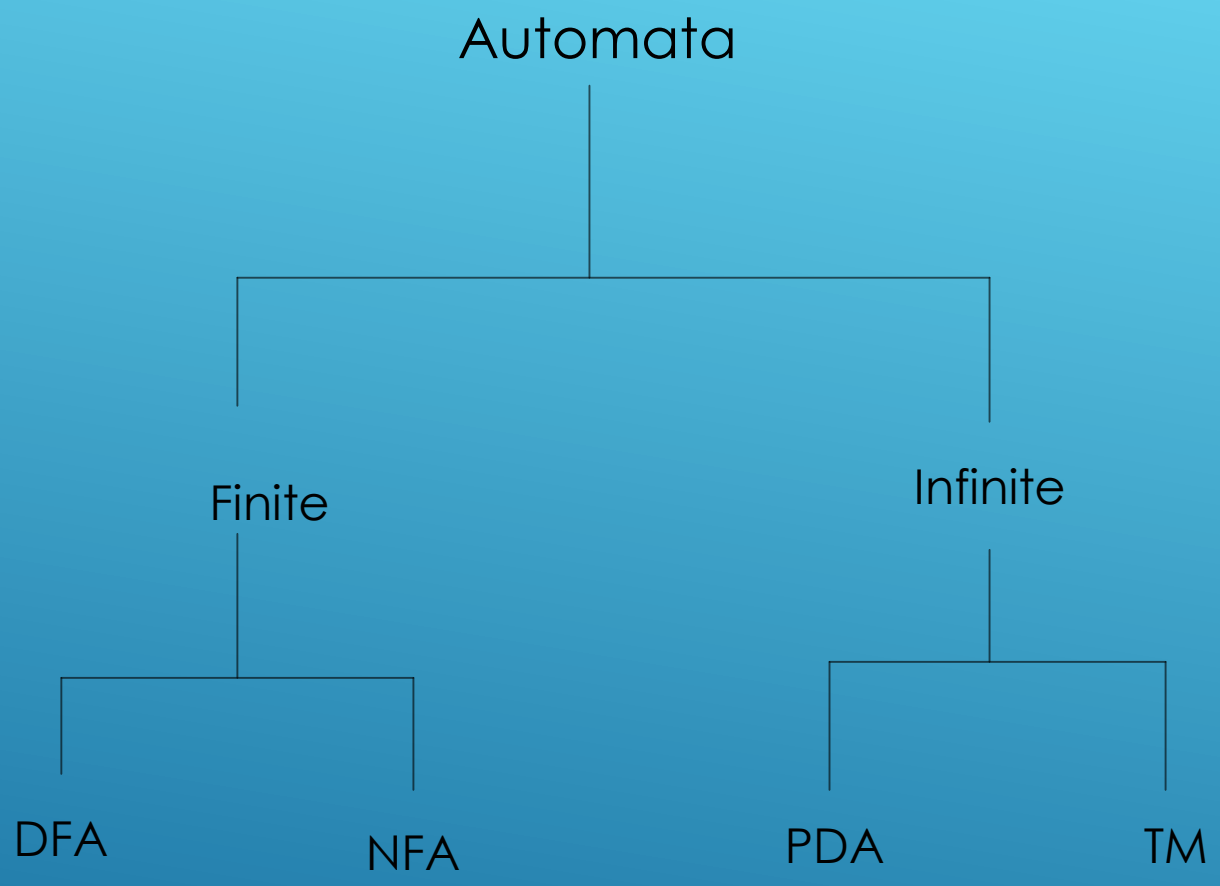
What Is Automata

Abstract models of machines that perform computations on an input by moving through a series of states.

The major objective of automata theory is to develop methods for describe and analyze the dynamic behaviour of discrete systems

This automaton consists of states and transitions. The State is represented by circles, and the Transitions is represented by arrows.

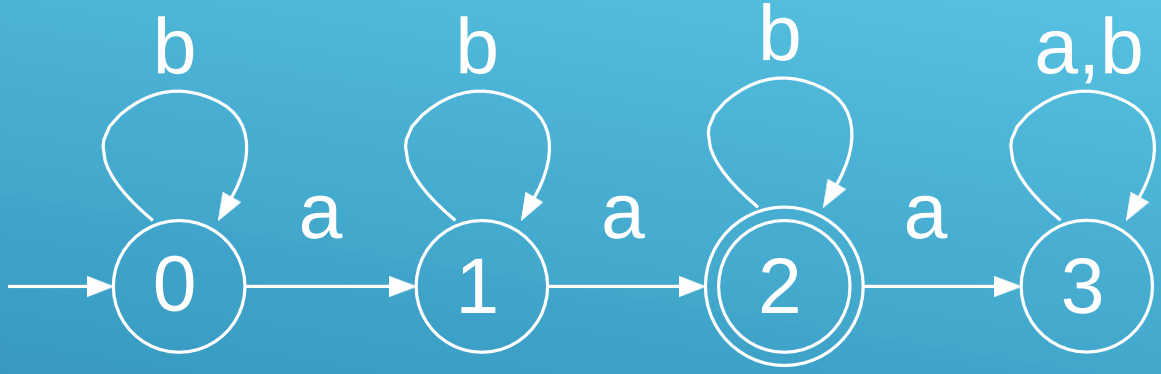

Automata
Finite
Infinite
DFA
NFA
PDA
TM

Type	Language	Automate
Type 0	Recursively Enumerable	Turing machines
Type 1	Context-sensetive	Linear-bounded non-deterministic Turing machine
Type 2	Context-free	Non-deterministic pushdown automaton
Type 3	Regular	Finite state automaton

DFA DEFINITION

- A DFA is a 5-tuple $M = (Q, \Sigma, \delta, q, F)$
  - Q Set of states
  - Σ Alphabet
  - $\delta : (Q \times \Sigma) \rightarrow Q$ is a Transition function
  - $q \in Q$ Initial state
  - $F \subseteq Q$ Set of final states

DFA DEFINITION



- $Q = \{q_0, q_1, q_2, q_3\}$
- $\Sigma = \{\mathrm{a}, \mathrm{b}\}$
- $\delta =$
  $\{((q_0, \mathrm{a}), q_1), ((q_0, \mathrm{b}), q_0), ((q_1, \mathrm{a}), q_2), ((q_1, \mathrm{b}), q_1),$
  $((q_2, \mathrm{a}), q_3), ((q_2, \mathrm{b}), q_2), ((q_3, \mathrm{a}), q_3), ((q_3, \mathrm{b}), q_3)\}$
- $q = q_0$
- $F = \{q_2\}$