

FCS Week 8 Lecture Note

Notebook: Fundamentals of Computer Science

Created: 2021-04-13 10:30 AM

Updated: 2021-04-28 6:31 PM

Author: SUKHJIT MANN

Cornell Notes

Topic:
Automata Theory Part 2

Course: BSc Computer Science

Class: CM1025 Fundamentals of Computer Science[Lecture]

Date: April 28, 2021

Essential Question:

What is an automata?

Questions/Cues:

- What is Deterministic Finite Automaton?
- What Non-Deterministic Finite Automaton?

Deterministic Finite Automaton, DFA

- Simplest form of finite automata.
- They are well-behaved in terms of reading all input.

Well-behaved means:

1. For each state in DFA, there is exactly one transition for each letter of the alphabet
2. There is a unique starting state.

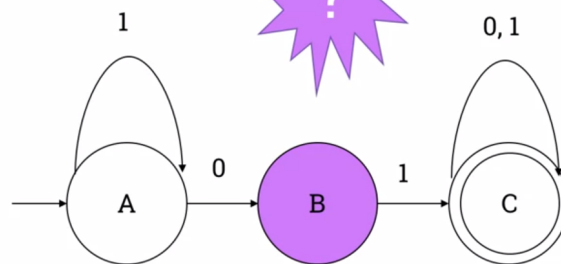
If 1 or 2 are not met; **Non-deterministic!**

Nondeterministic Finite Automaton, NFA

- Similar to DFA
- There may be many choices at one particular point
- There may be no path spelling the input
- An input is accepted if at least one sequence of choices leads to an accepting state
- Can be more complex than DFA.

Getting stuck

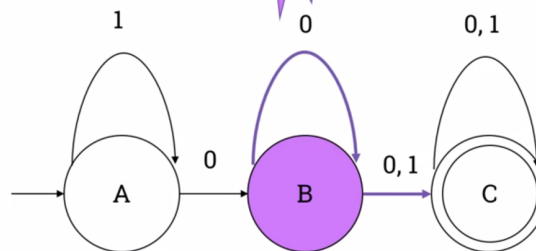
- Input 1100



Not enough transitions

Getting stuck

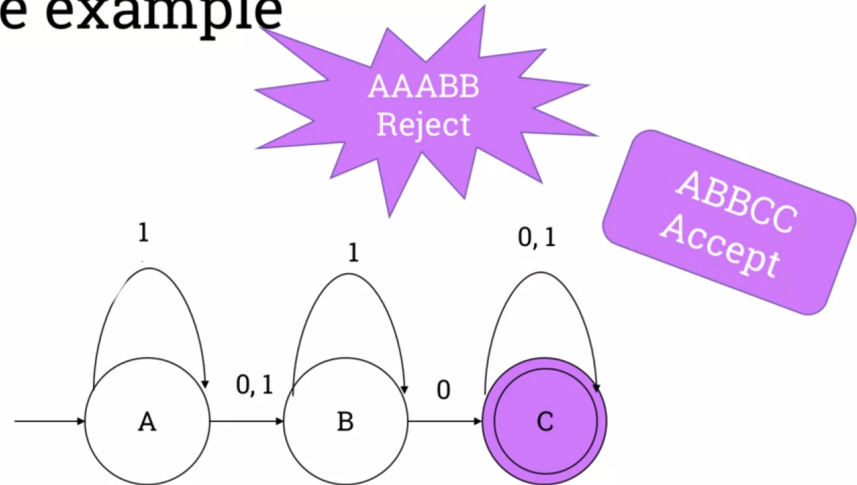
- Input 11001



Too many transitions

A simple example

- 1101

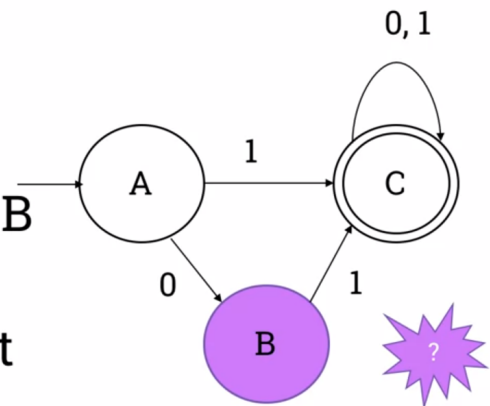


Example of NFA with too few transitions

- 001101



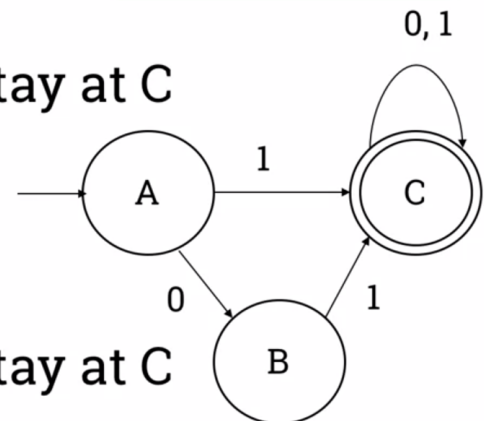
- No transition exists from B
- Does not accept this input



Language of NFA

- Input starting with 1
- Anything after that will stay at C
- Input starting with 0
- Next letter must be 1
- Anything after that will stay at C

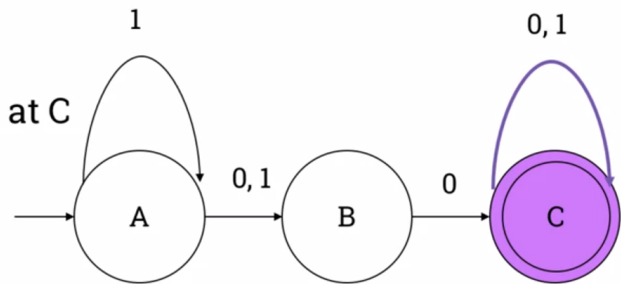
Accept input
starting with 1 or 01



Language of NFA – a complex example

- Input starting with 0
- Next letter must be 0
- Anything after that will stay at C
- Input starting with 1...1
- Next letter 0
- Anything after that will stay at C

- Input starting with 00 or
- starting with 1 with at least one 0



Summary

In this week, we learned about Deterministic Finite Automaton and Non-Deterministic Finite Automaton.