



LECTURE 03



Deterministic Finite Automata

Course Code : CSE 3103

Course Title : Theory of Computation

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Deterministic Finite Automata(DFA)

Characteristics of DFA

- There is no Null Transition.
- There is only one transition for a specific input symbol.
- For any state, there must be one transition for each input symbol.

Definition of DFA

Definition of DFA

DFA is defined as a 5 tuple: $M = (Q, \Sigma, \delta, q_0, F)$ where:

1. Q is a finite set of all possible states.
2. Σ is the finite set of symbol Called Alphabet.
3. δ is the transition function and consists of transitions like $Q \times \Sigma \rightarrow Q$.

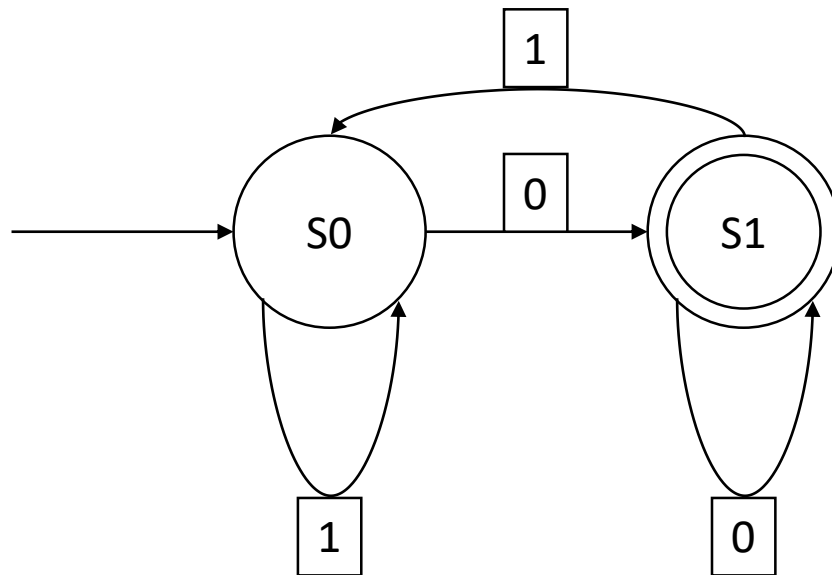
Two method for representing transition function:

1. Transition table
 2. Transition diagram
4. q_0 belongs to Q and it is the start state.
 5. F is a subset of Q and is the set of accepted states.

Example of DFA

All binary even numbers.

Language = $\{0, 10, 010, 100, 110, \dots\}$



$Q = \{S0, S1\}$

$\Sigma = \{0, 1\}$

δ

$Q0 = \{S0\}$

$F = \{S1\}$

Example of DFA(Cont...)

MORE EXAMPLE

1. All binary even numbers.
2. All three digit binary even numbers.
3. All binary number starting with 101.
4. All binary number ending with 111.
5. All binary number starting with 111 and ending with 101.
6. All binary numbers that contains even number of 0's.
7. All binary numbers that contains odd number of 1's.

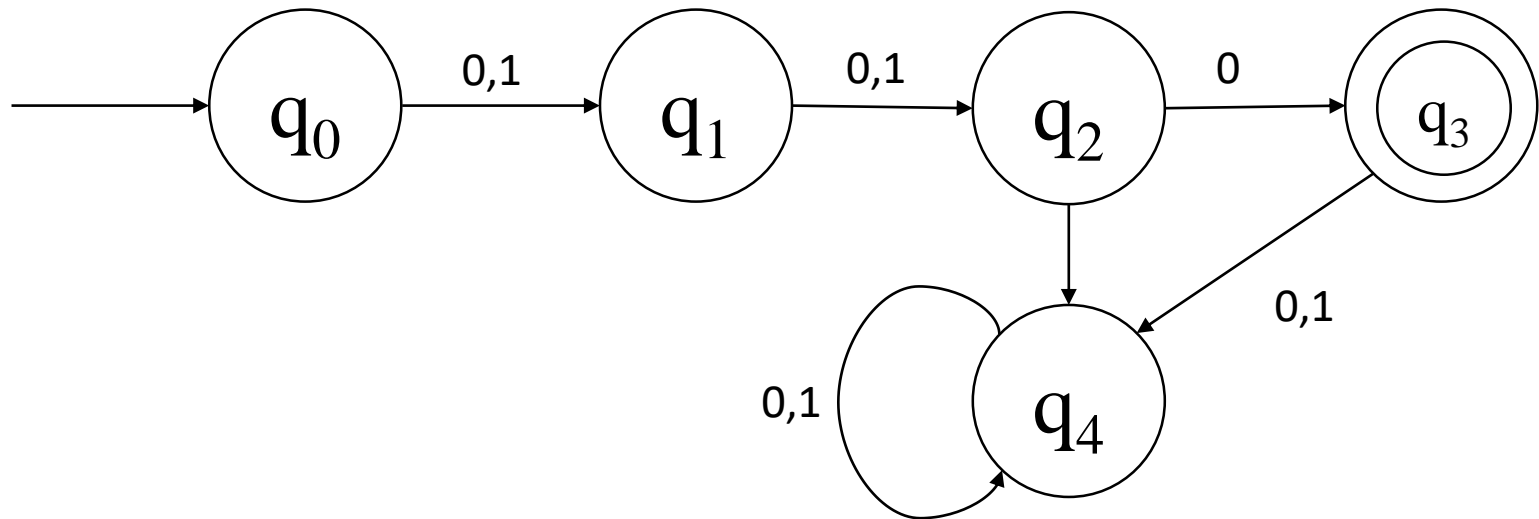
Example of DFA(Cont...)

MORE EXAMPLE

8. All binary number that contain even number of 0's and even number of 1's.
9. All binary number that contain n number of 0's followed by n number of 1's for some $n \geq 0$.
10. All string that contains "aba" as sub string over the alphabet $\Sigma = \{a, b, c, d\}$.
11. All identifier(variable name & function name) in C programming Language.
12. All Comment(Single line or Multi-line) in C programming Language.
13. All integer number in C programming Language.
14. All float number in C programming Language.

Designing DFA

2. All three digit binary even numbers.



Designing DFA

11. Identifier in C programming Language.

