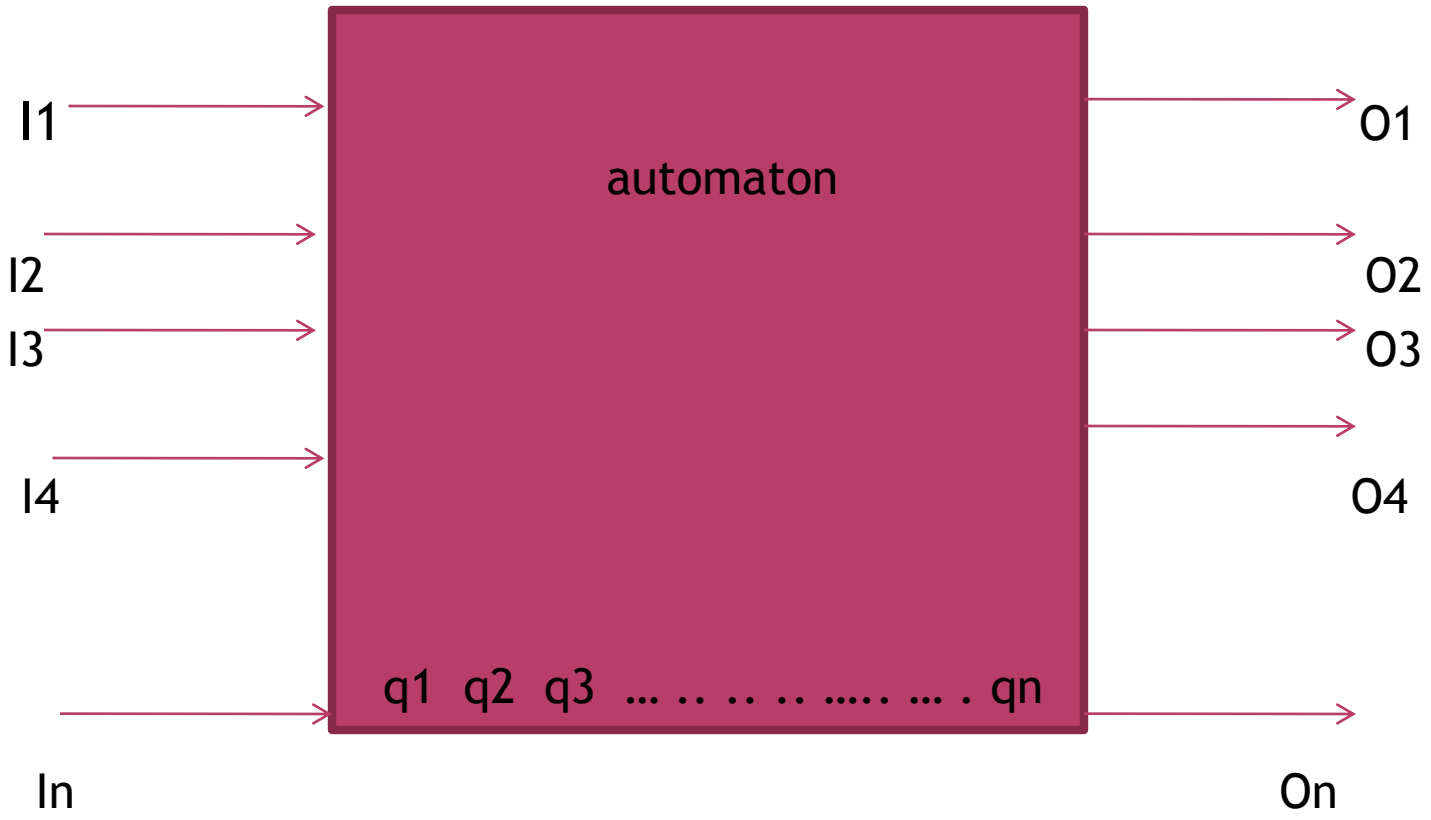
COURSE: THEORY OF AUTOMATA COMPUTATION

TOPICS TO BE COVERED

- Definition Of an automata
- Finite Automaton
- State(transition) Diagram

DEFINITION OF AN AUTOMATON

- An automaton is a system where energy, material and information are transformed, transmitted and used for performing some function without direct participation of man.


I1
I2
I3
I4
In
automaton
q1 q2 q3 … .. .. .. ….. … . qn
O1
O2
O3
O4
On

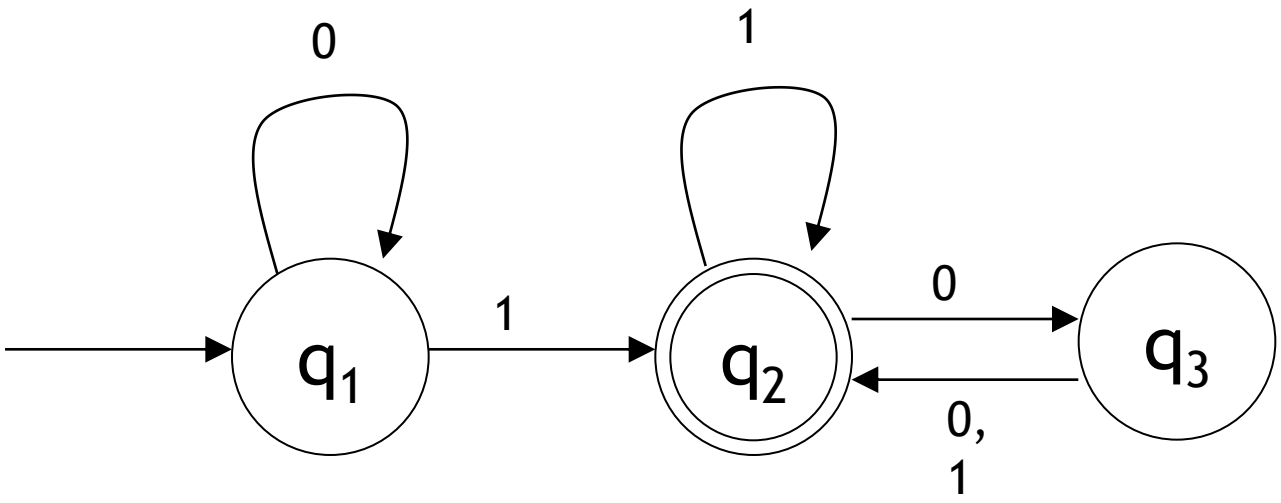
- Input
- Output
- State
- State Relation
- Output Relation

FINITE AUTOMATON

A ***finite automaton*** is a 5-tupple $(Q, \Sigma, \delta, q_0, F)$, where

1. Q is a finite set called the ***states***,
2. Σ is a finite set called the ***alphabet***,
3. $\delta : Q \times \Sigma \rightarrow Q$ is the ***transition function***,
4. $q_0 \in Q$ is the ***start state***, and
5. $F \subseteq Q$ is the ***set of accept states***.

STATE(TRANSITION) DIAGRAM



DATA REPRESENTATION

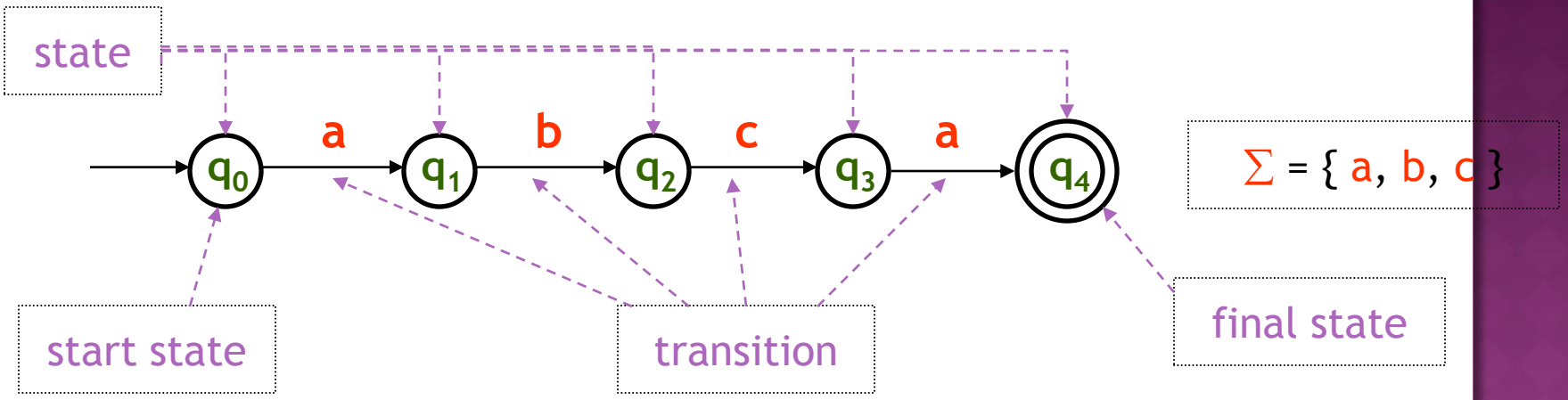
1. $Q = \{q_1, q_2, q_3\}$
2. $\Sigma = \{0,1\}$
3. δ is described as

	0	1
q_1	q_1	q_2
q_2	q_3	q_2
q_3	q_2	q_2

,

4. q_1 is the start state, and
5. $F = \{q_2\}$.

FINITE-STATE AUTOMATA

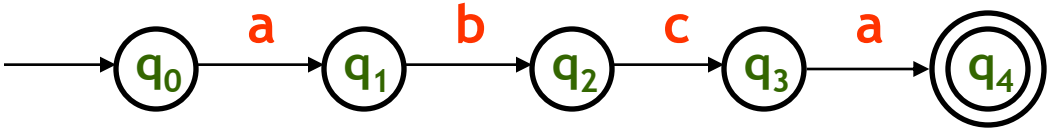


- Representation
  (continued)
  - An FSA may also be represented with a state-transition table. The table for the above FSA:

State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



	Input		
State	a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

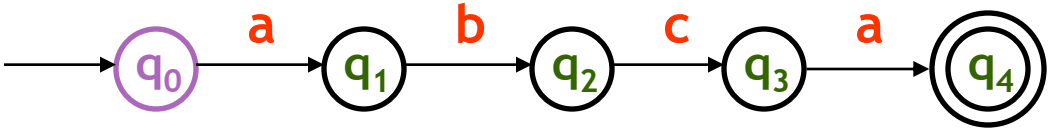
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

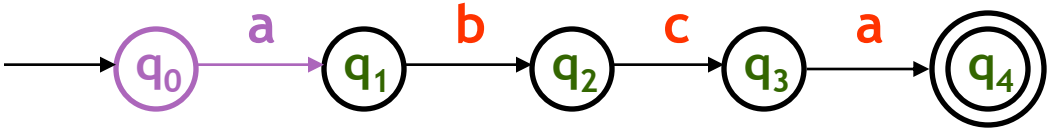
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

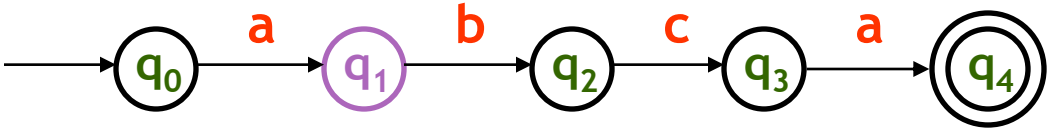
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

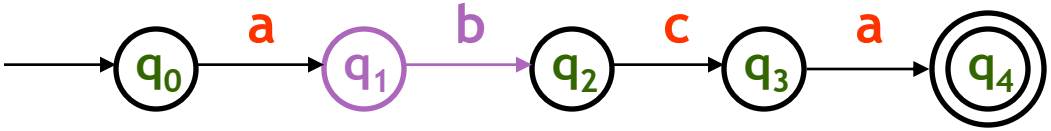
IS_1: | a | b | c | a |

IS_2: | c | c | b | a |

IS_3: | a | b | c | a | c |

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

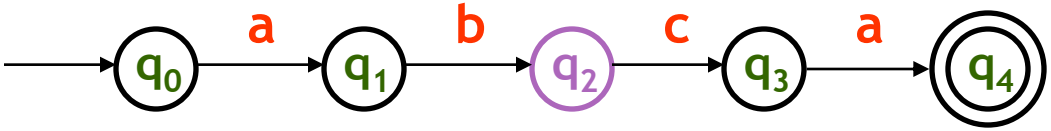
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

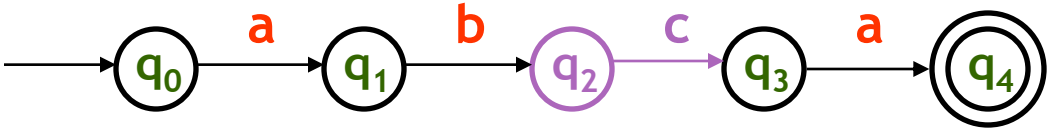
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

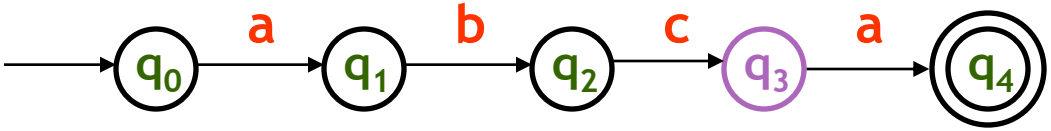
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

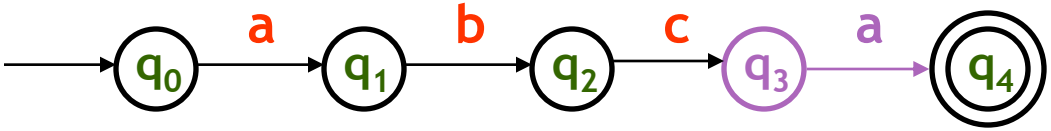
c	c	b	a

IS_3:

a	b	c	a	c

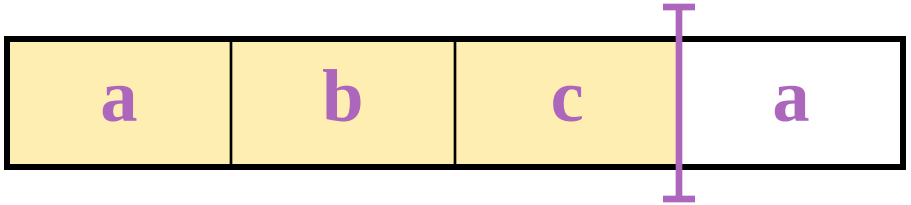
FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$

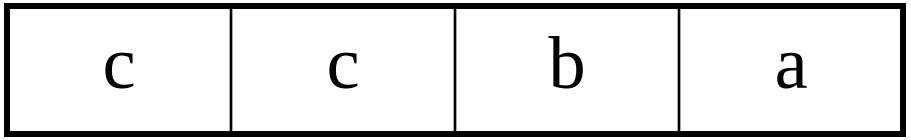


State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

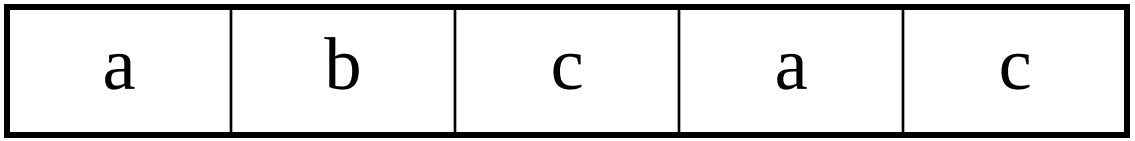
IS_1:



IS_2:

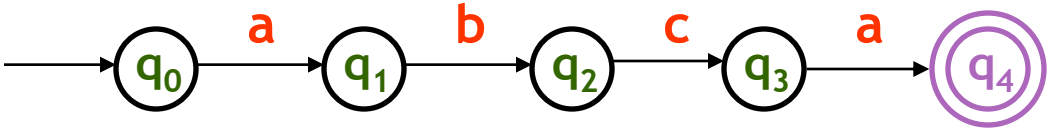


IS_3:



FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



State	Input a	b	c
0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

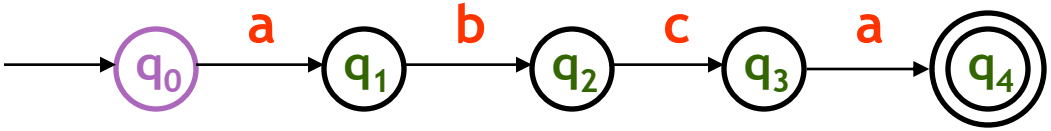
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



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1	∅	2	∅
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3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

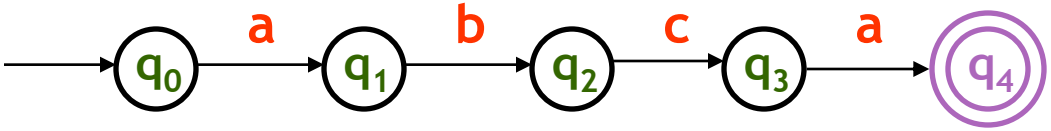
c	c	b	a

IS_3:

a	b	c	a	c

FINITE-STATE AUTOMATA

$\Sigma = \{ a, b, c \}$



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0	1	∅	∅
1	∅	2	∅
2	∅	∅	3
3	4	∅	∅
4	∅	∅	∅

IS_1:

a	b	c	a

IS_2:

c	c	b	a

IS_3:

a	b	c	a	c