Theory of Computation

Game of Marbles

Example

▶Consider the toy shown on the right:

▶Game of Marbles
  ▶A marble is dropped in at A or B
  ▶Levers X1, X2, and X3 cause the marble to fall either to the left or right
  ▶Whenever a marble encounters a lever, it causes the lever to change state, so that the next marble to encounter the lever will take the opposite branch
  ▶Model this toy by a finite automaton (FA)
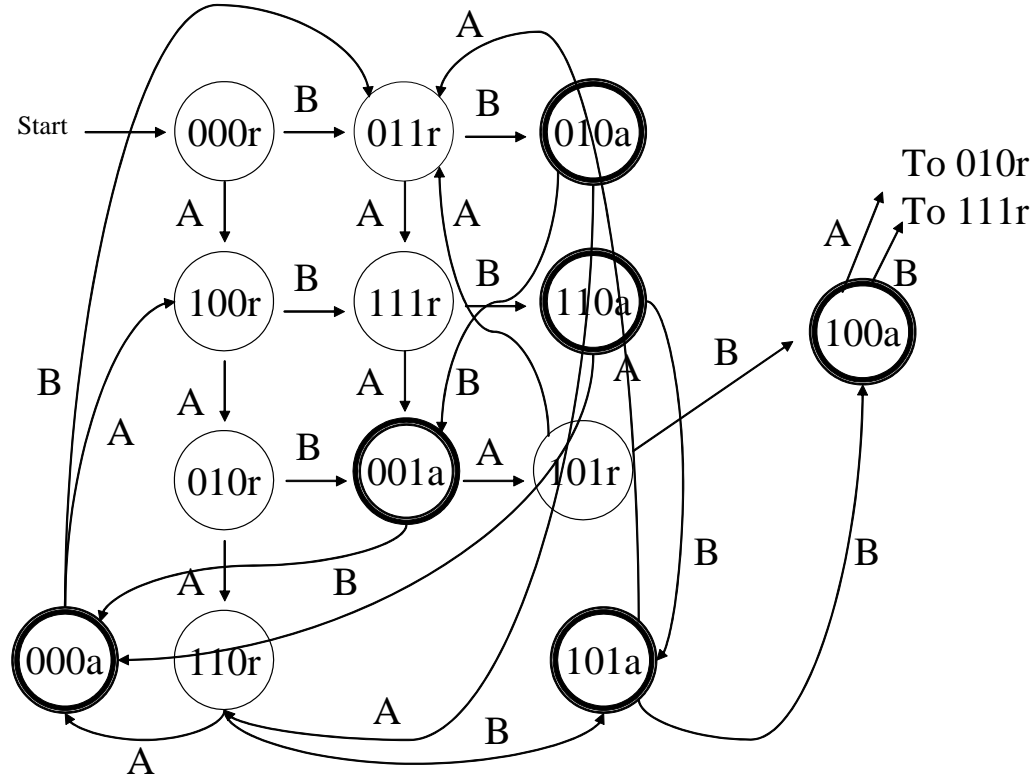 ▶A sequence of inputs is accepted if the last marble comes out at D
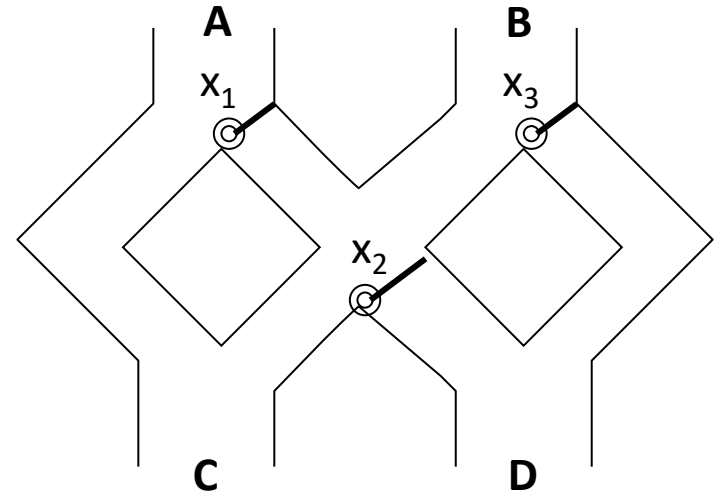
FA – State Diagram

States are labelled with
the states of the levers
X1X2X3 (0: right, 1: left)
'a' is in ACCEPT states
and 'r' in REJECT states

Start state: 000r (all
levers to the right and
start is a REJECT state)

FA – Transition Table

	A	B
->000r	100r	011r
*000a	100r	011r
*001a	101r	000a
010r	110r	001a
*010a	110r	001a
011r	111r	010a
100r	010r	111r
*100a	010r	111r
101r	011r	100a
*101a	011r	100a
110r	000a	101a
*110a	000a	101a
111r	001a	110a