CSE 311: Foundations of Computing

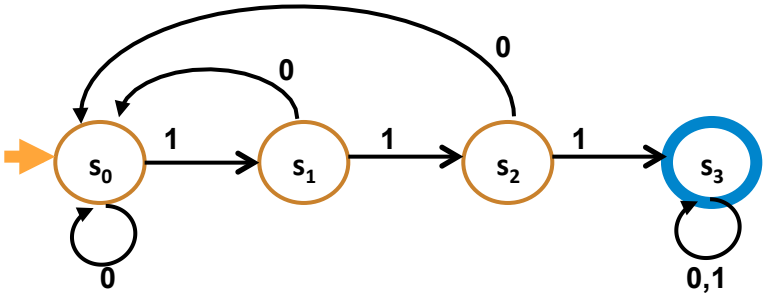
Fall 2014

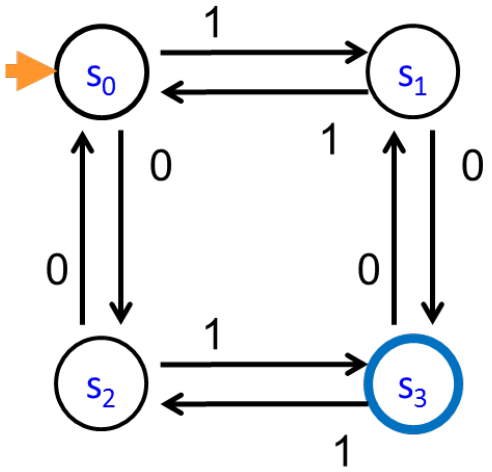
Lecture 22: Finite State Machines with Output

FSM highlights

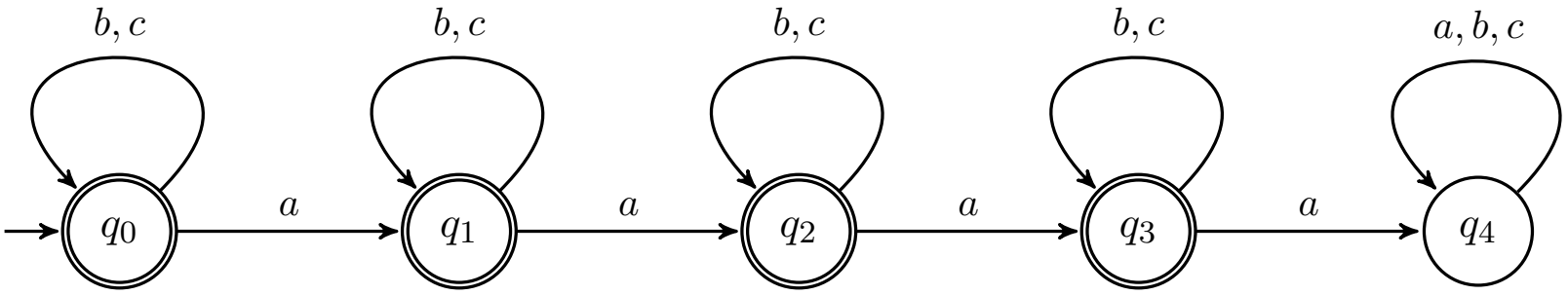
Finite state machines

- States, transitions, start state, final states
- Languages recognized by FSMs

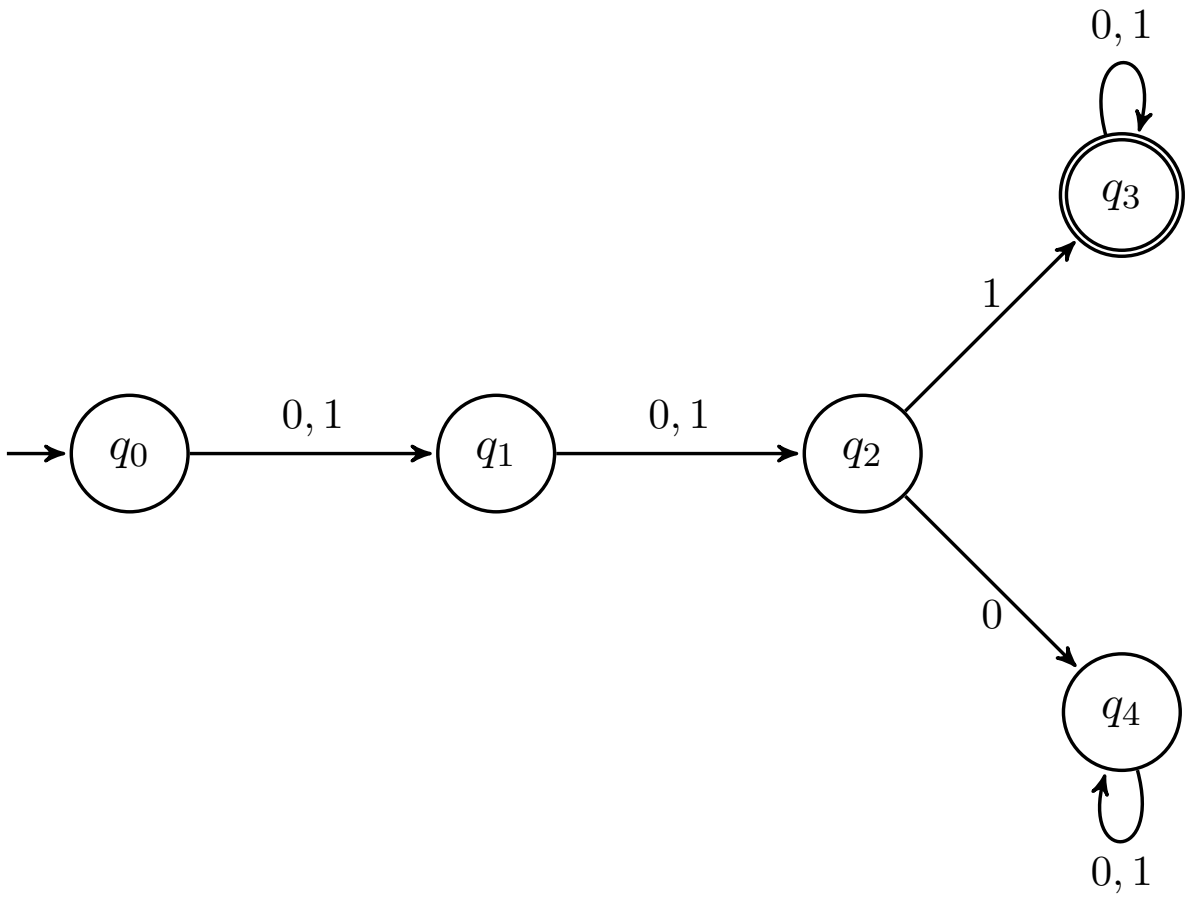




FSM that accepts strings of a's, b's, c's with no more than 3 a's

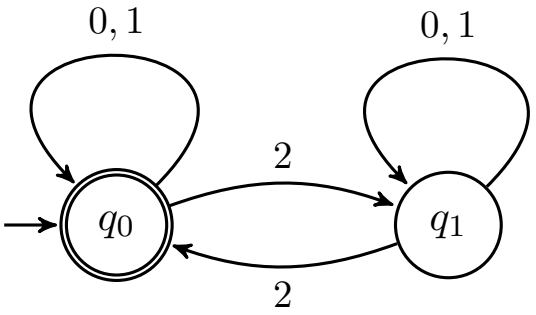


FSM that accepts binary strings with a 1 three positions from the start

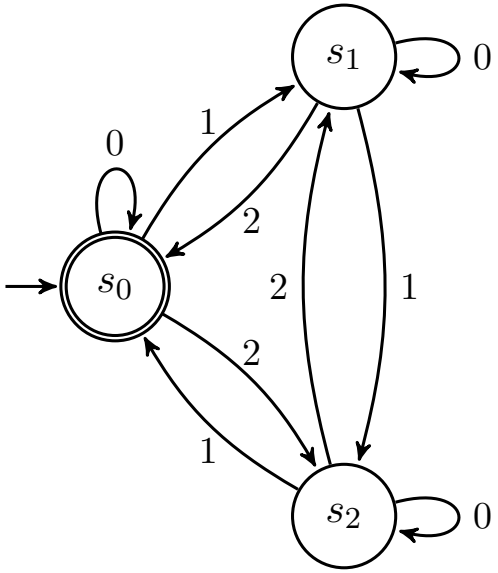


Strings over {0, 1, 2}*

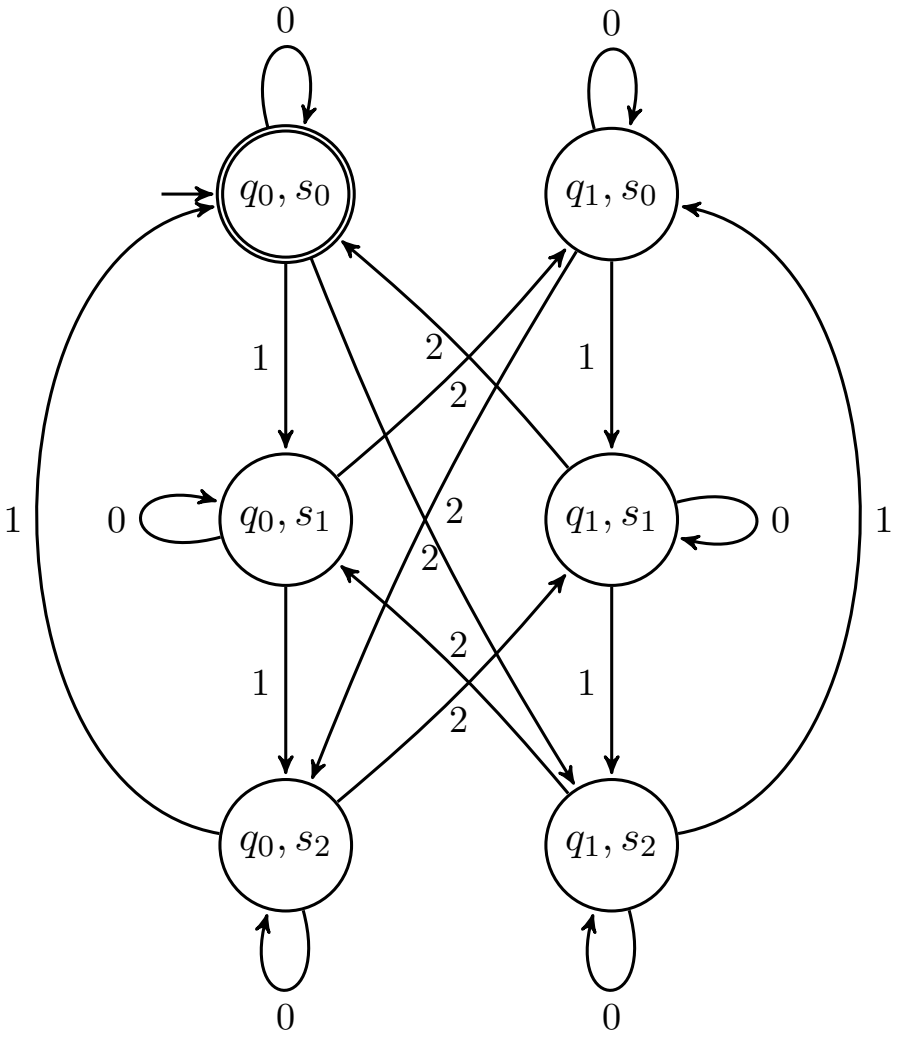
M_1: Strings with an even number of 2's



M_2: Strings where the sum of digits mod 3 is 0

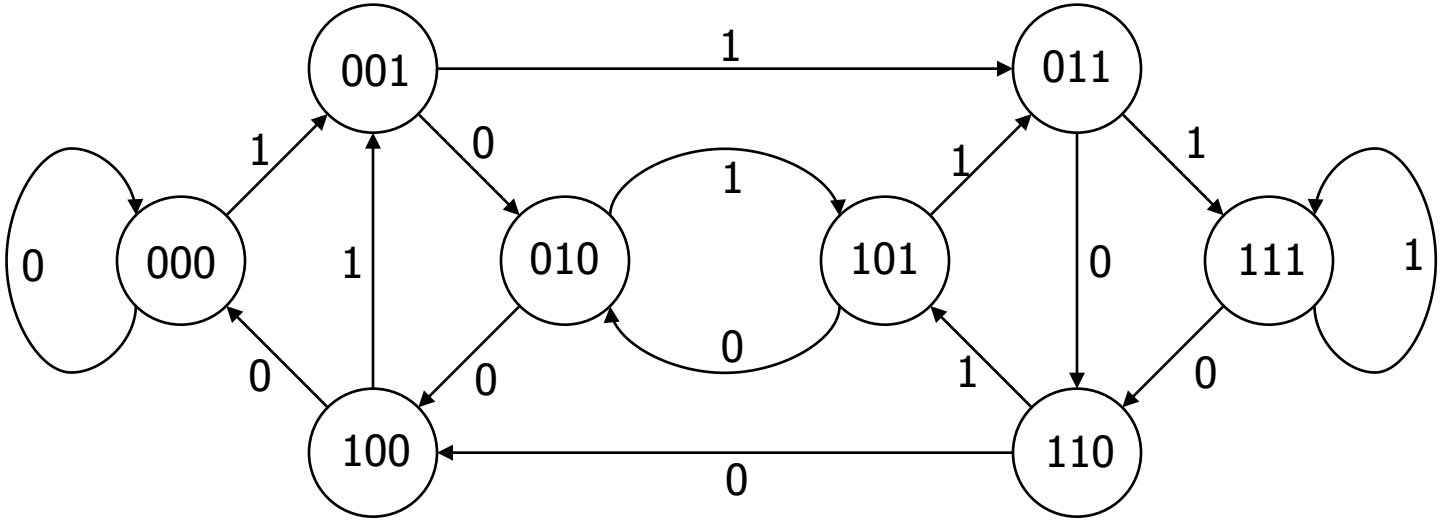


Strings with an even number of 2's and a mod 3 sum of 0

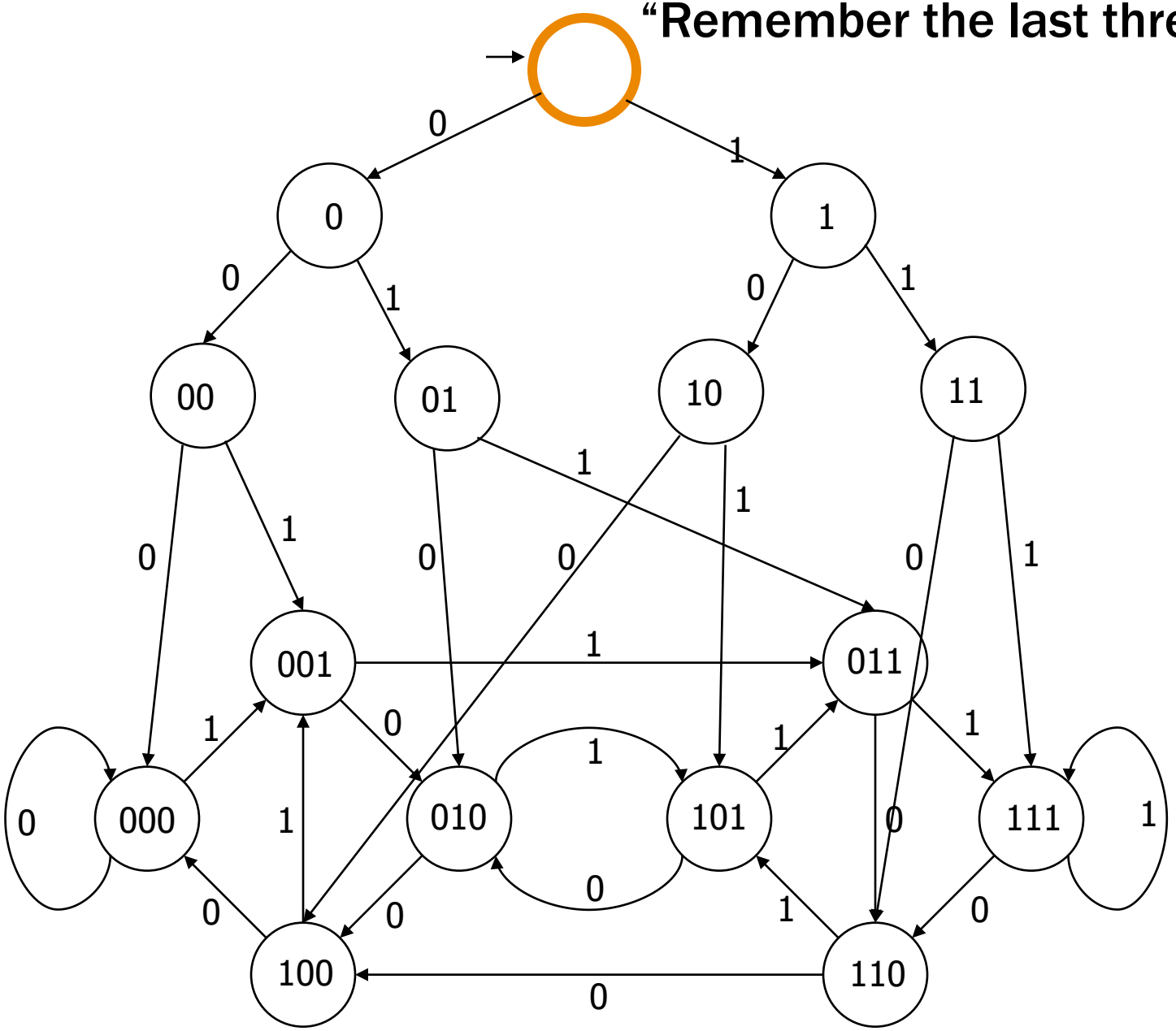


3 bit shift register

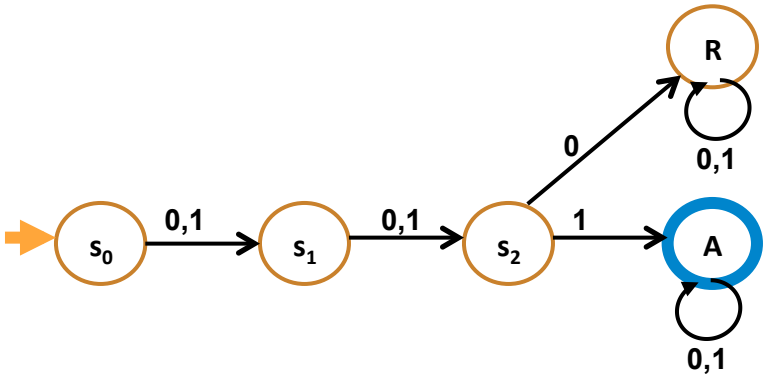
"Remember the last three bits"

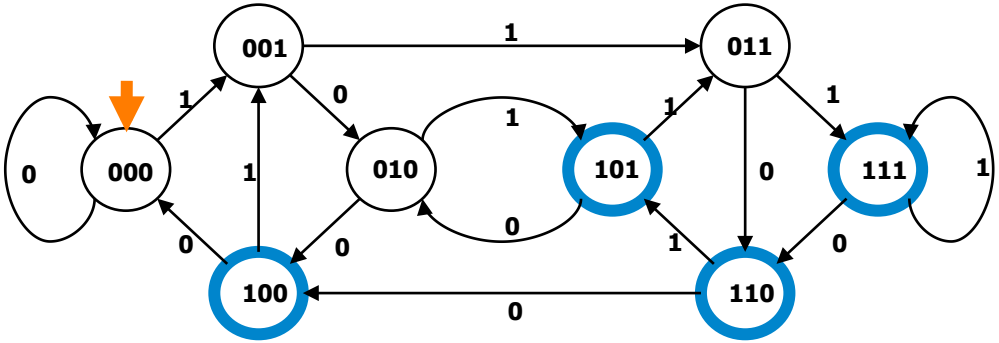


“Remember the last three bits”



The beginning versus the end

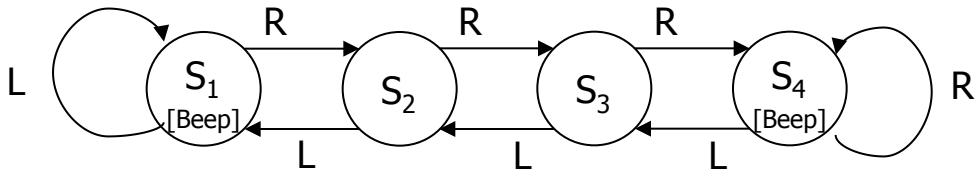




State Machines with Output

	Input		Output
State	L	R	
s_1	s_1	s_2	Beep
s_2	s_1	s_3	
s_3	s_2	s_4	
s_4	s_3	s_4	Beep

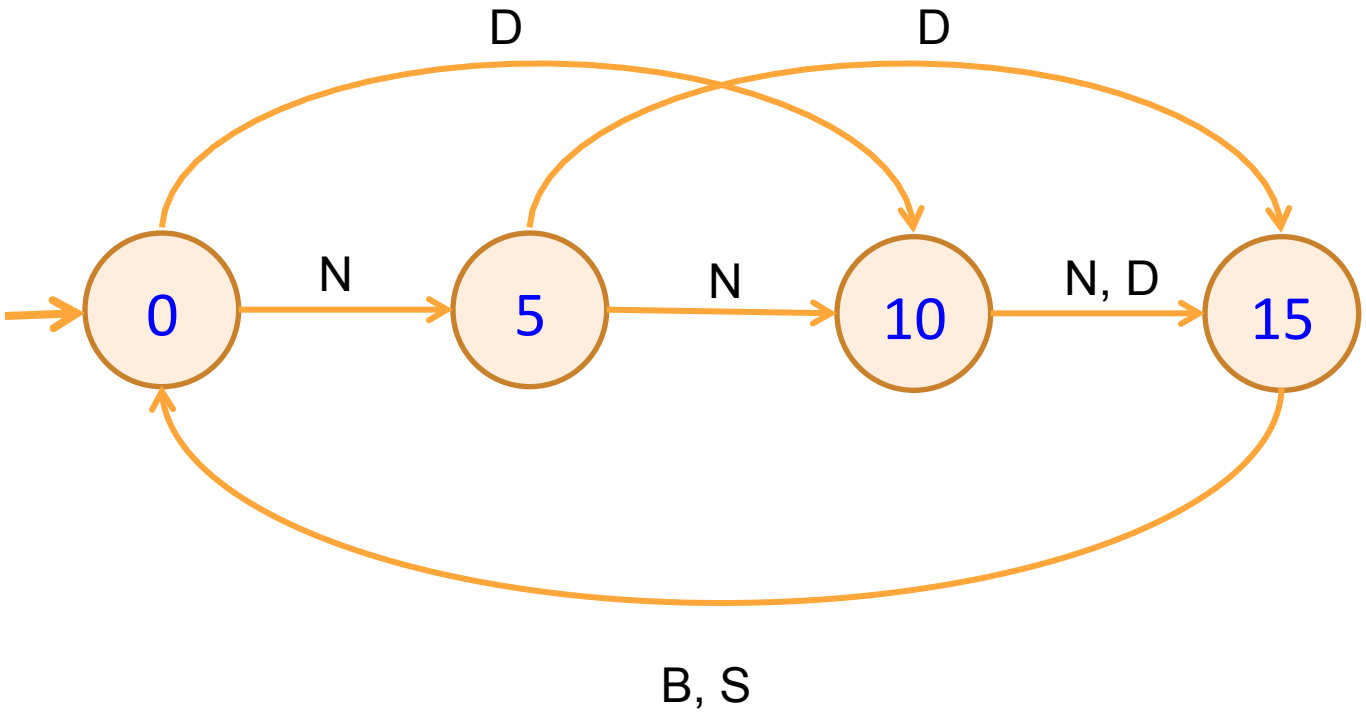
"Tug-of-war"



Vending Machine

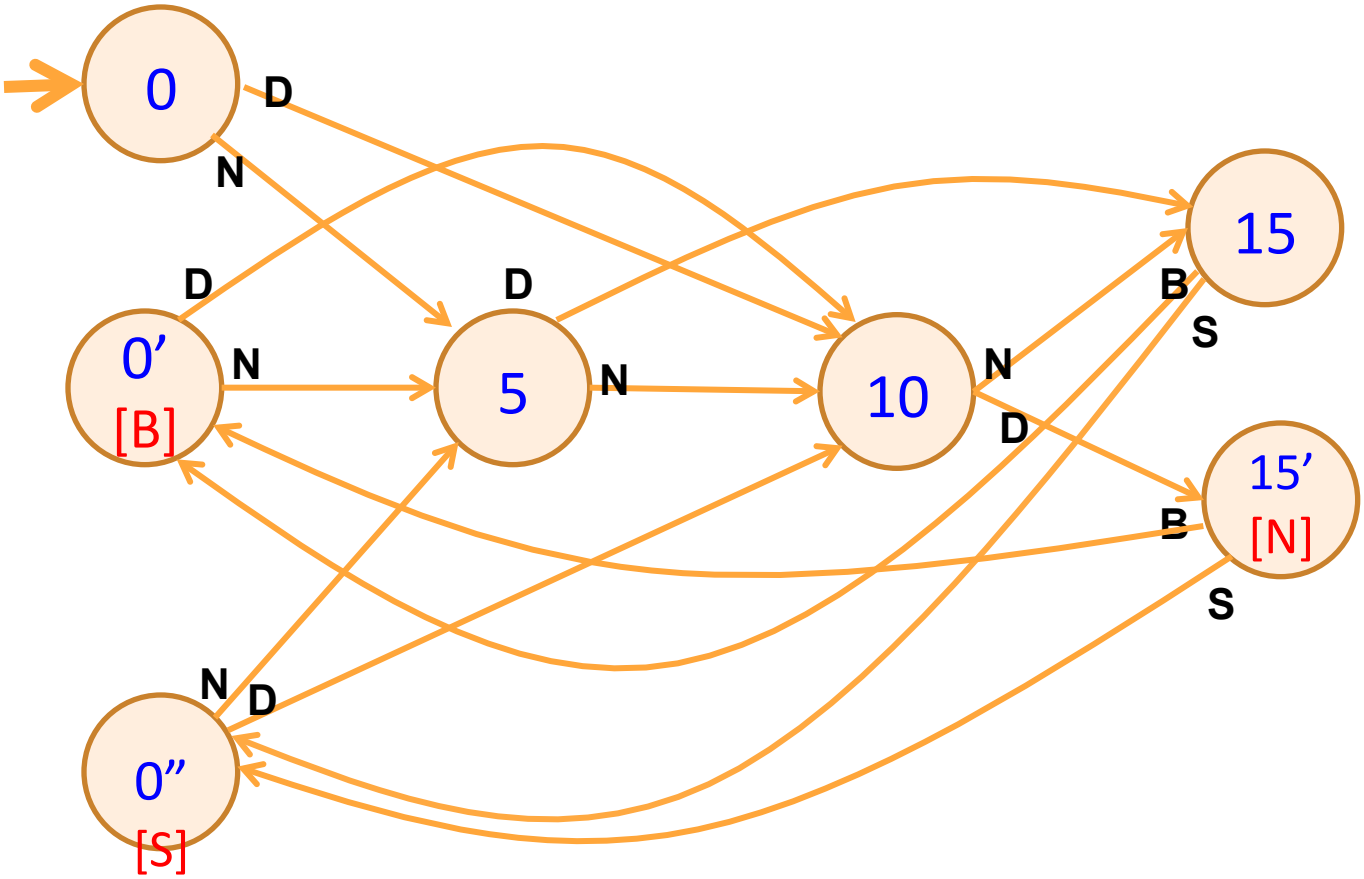
Enter 15 cents in dimes or nickels
Press S or B for a candy bar

Vending Machine, v0.1



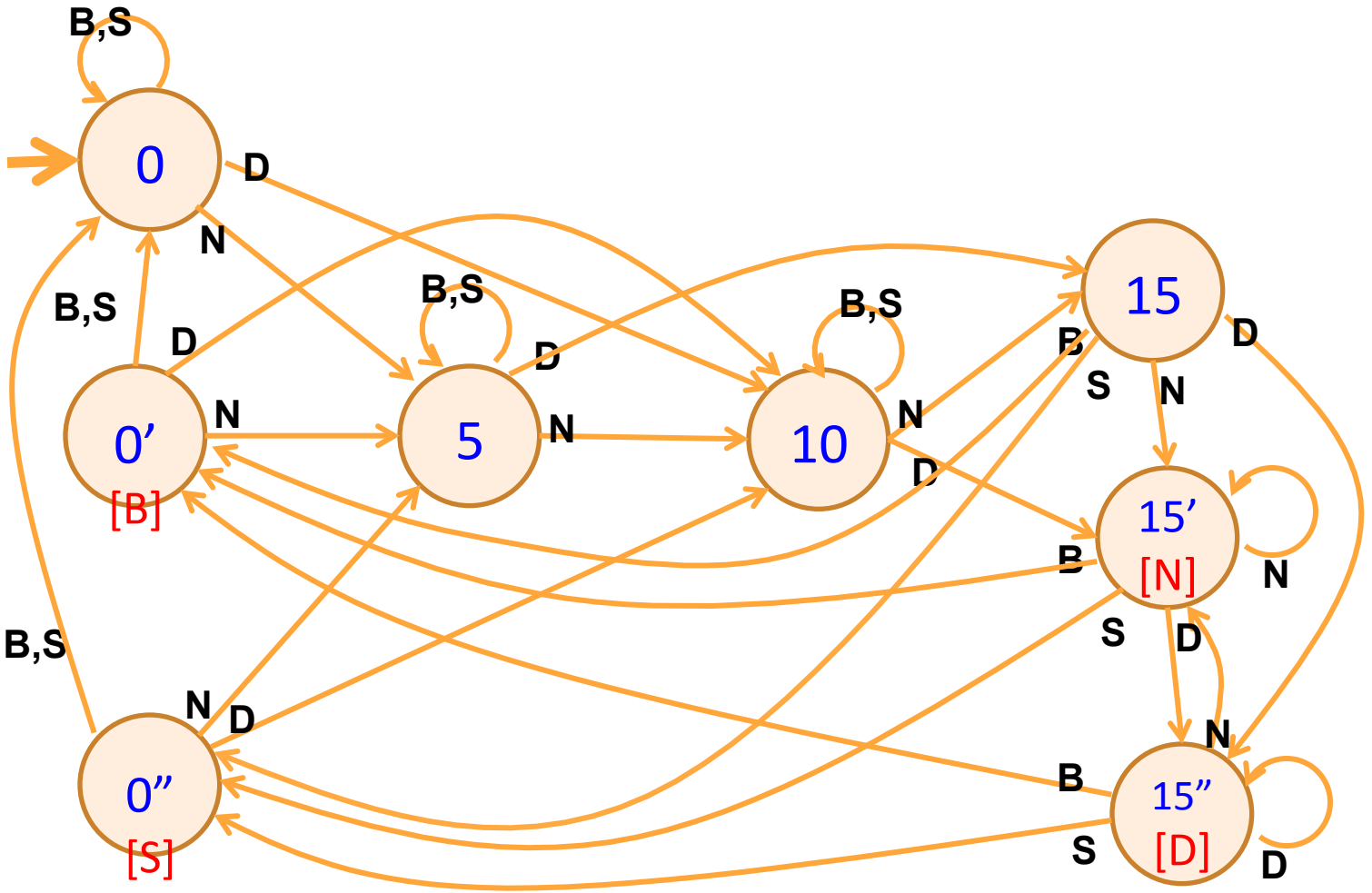
Basic transitions on N (nickel), D (dime), B (butterfinger), S (snickers)

Vending Machine, v0.2



Adding output to states: N – Nickel, S – Snickers, B – Butterfinger

Vending Machine, v1.0



Adding additional “unexpected” transitions