Finite State Machines (FSM) are Deterministic Finite Automata (DFA) and are characterized by the following:

1. A set of states, S.
2. A set of input symbols, Σ.
3. A transition function, move, that maps state-symbol pairs to a single state
4. A state, s_0, that is distinguished as the *start* or initial state.
5. A set of states, F, distinguished as accepting or *final* states.

- Finite State Machines are synonymous with sequential circuits.
- States are implemented via memory, the characteristic that distinguishes combinational circuits from sequential circuits.
- Memory is typically implemented using flip-flops. A flip-flop stores one (1) bit and has two states zero (0) and one (1).
- States are drawn as circles and transitions are represented as directed edges (arrows).

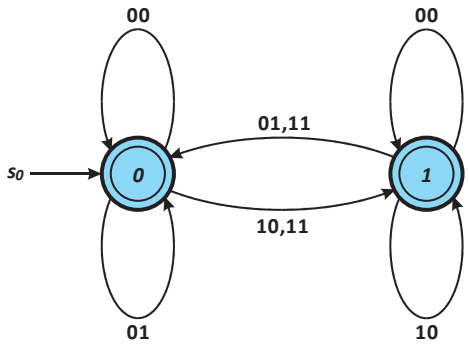
Example: JK Flip-Flop

1. $S = \{0,1\}$
2. $\Sigma = \{00,01,10,11\}$
3. Transition function given by the table below.

State	Input Symbol			
	JK=00	JK=01	JK=10	JK=11
0	0	0	1	1
1	1	0	1	0

JK Flip-Flop State Transition Table

4. $s_0 = 0$
5. $F = \{0,1\}$



JK Flip-Flop State Diagram

Notes:

1. Final states are denotes by two concentric circles. In the case of the JK Flip-Flop both states are final states.
2. The choice of the initial or start state is arbitrary.
3. Transitions are made on the clock pulse, either the rising or falling edge of the clock. For the JK Flip-Flop, transitions are normally made on the falling edge of the clock.