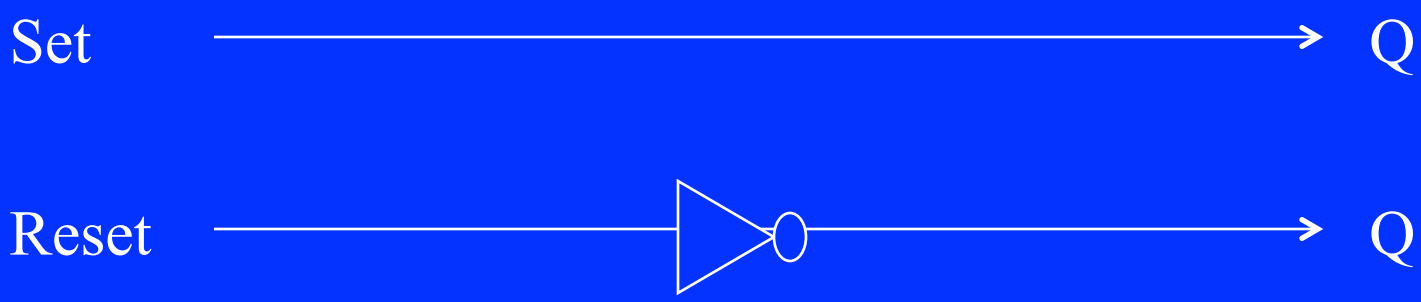
Memory

- Electrical current moves

  How do we store current?

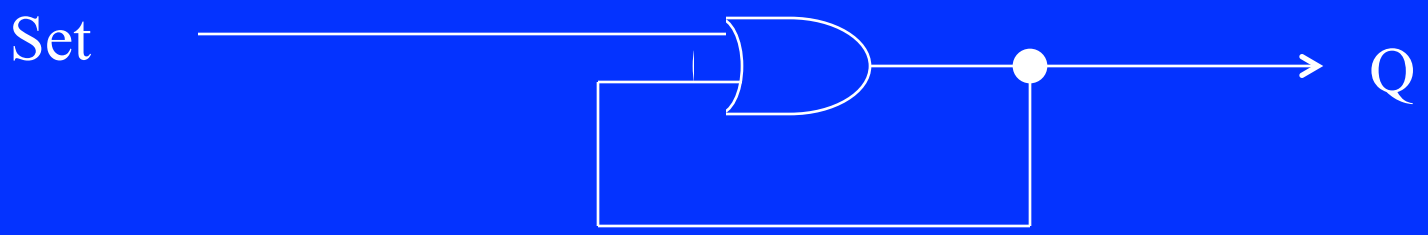
- We want to be able to
  - Set
  - Reset
  - Not change
- Can't represent these 3 states with only 1 bit

Incorrect Solution



- But this has 2 wires for Q and is transient, not persistent

Incorrect Solution 2 (Set Only)



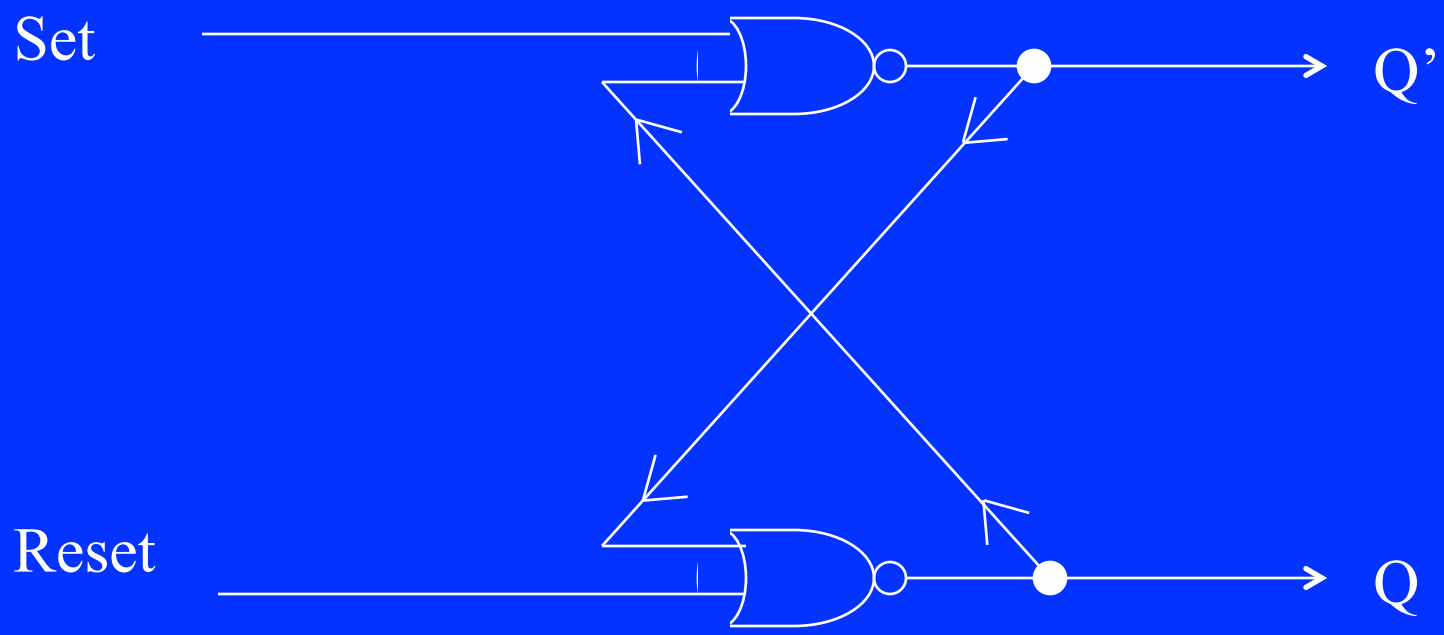
- Once Set is set to true (“asserted”) this “feedback loop” will keep it true (forever!)

Logic for Memory

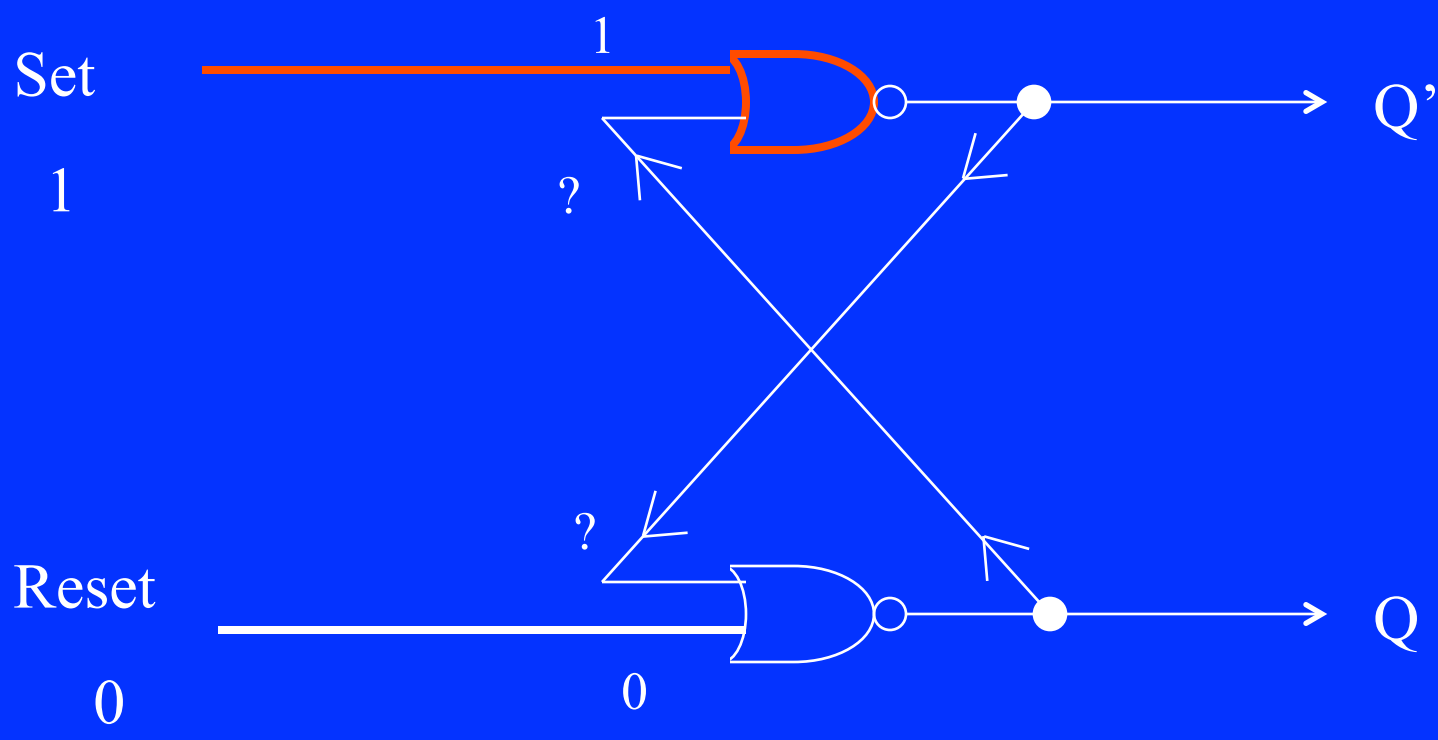
- We want the following:

Set	Reset	Q	
1	0	1	
0	1	0	
0	0		unchanged (i.e., Q)
1	1		undefined (unstable)

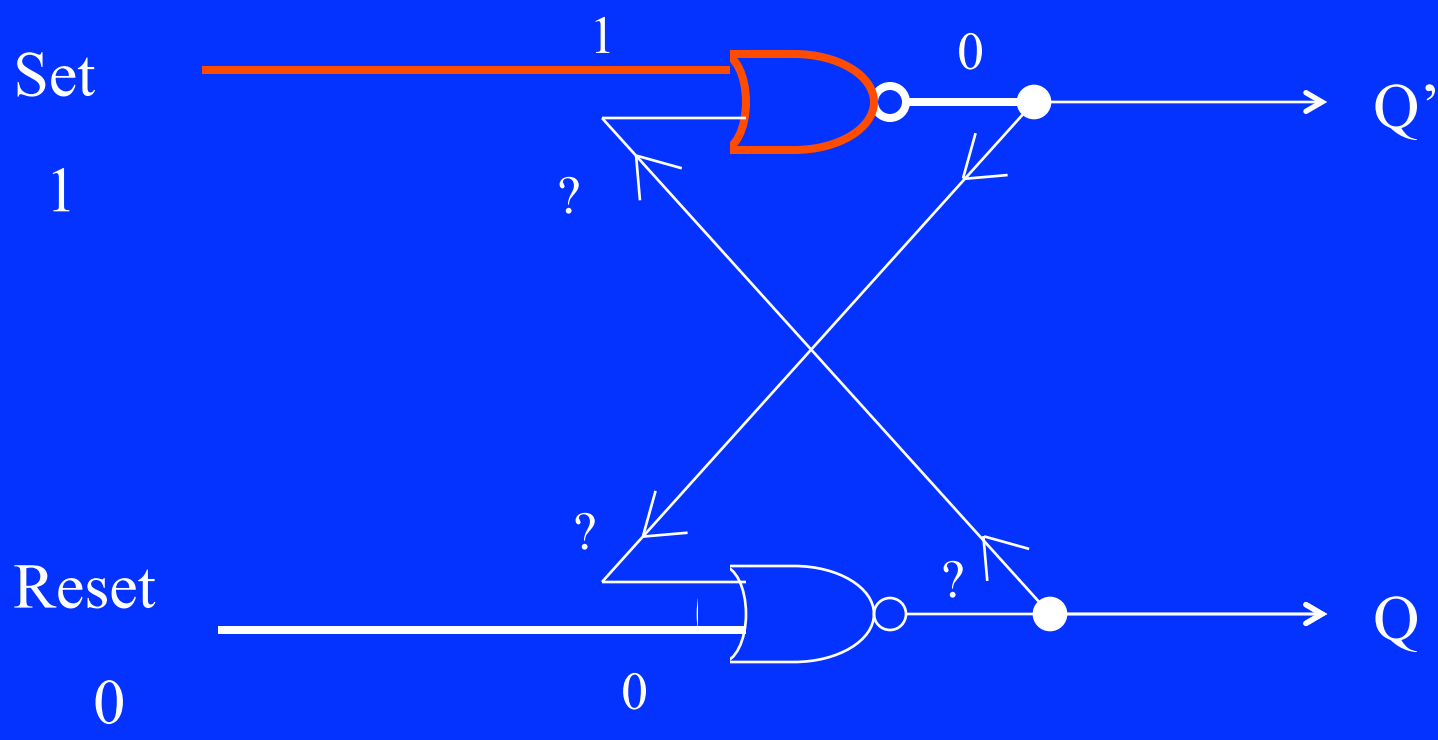
Unclocked Solution



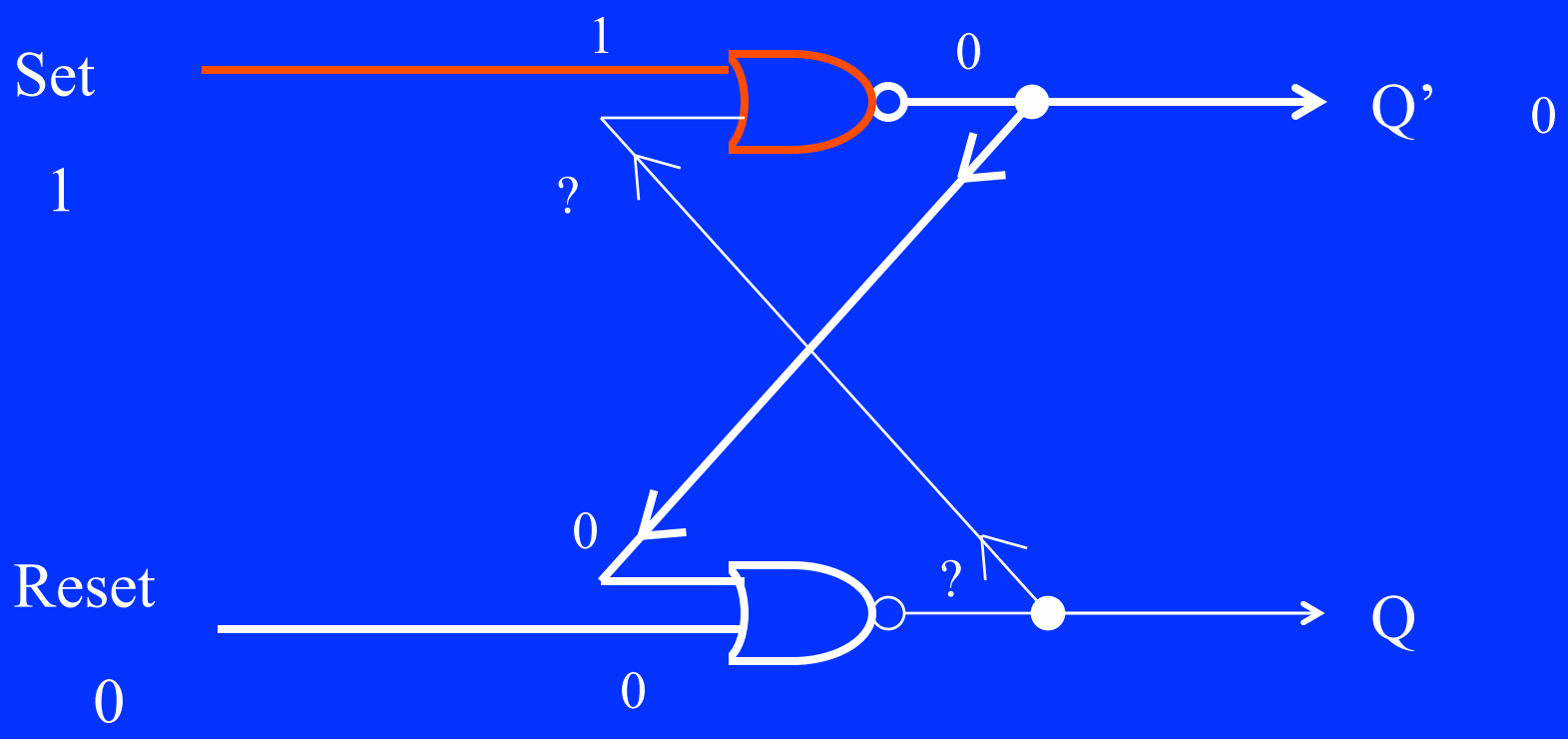
Unclocked Solution: Set



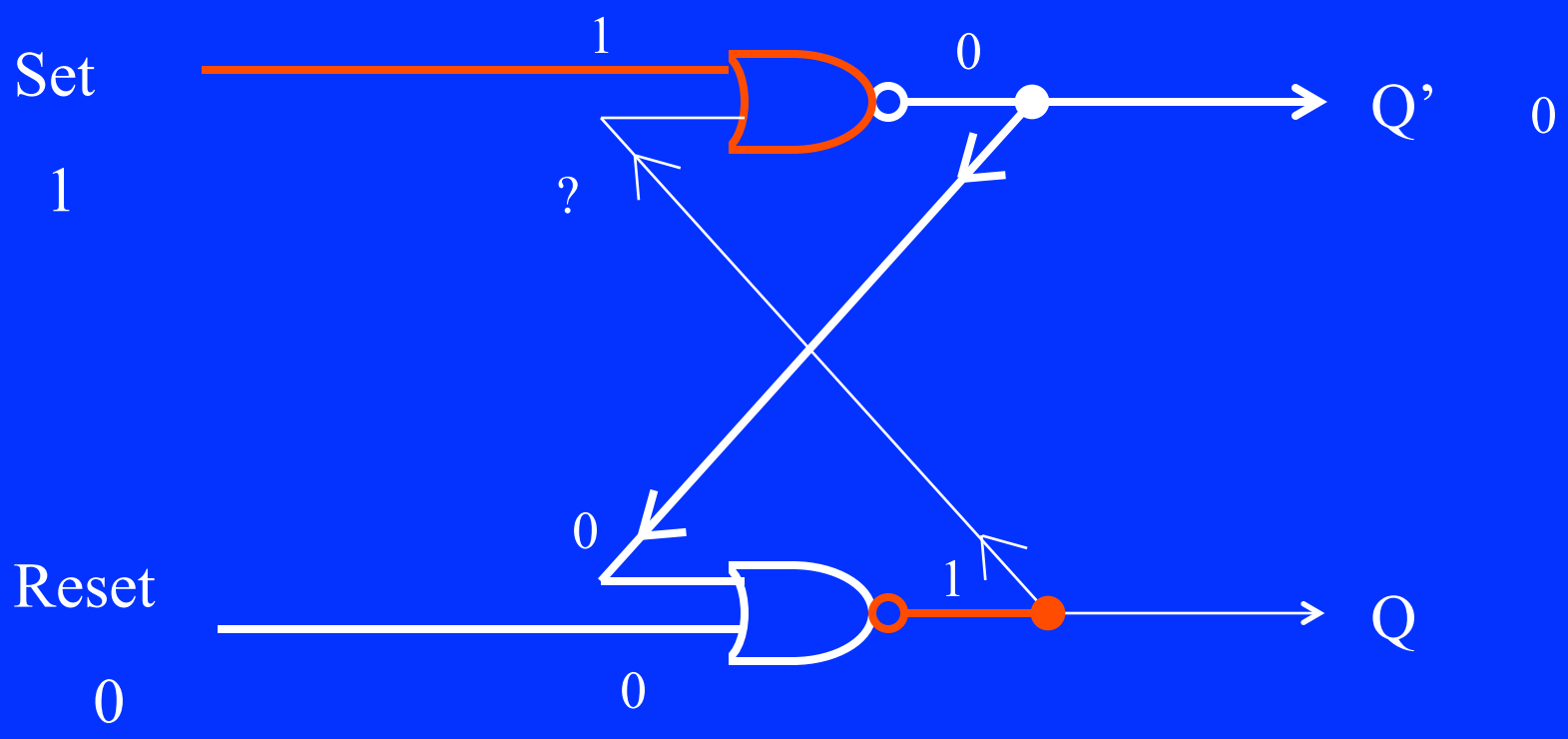
Unclocked Solution: Set



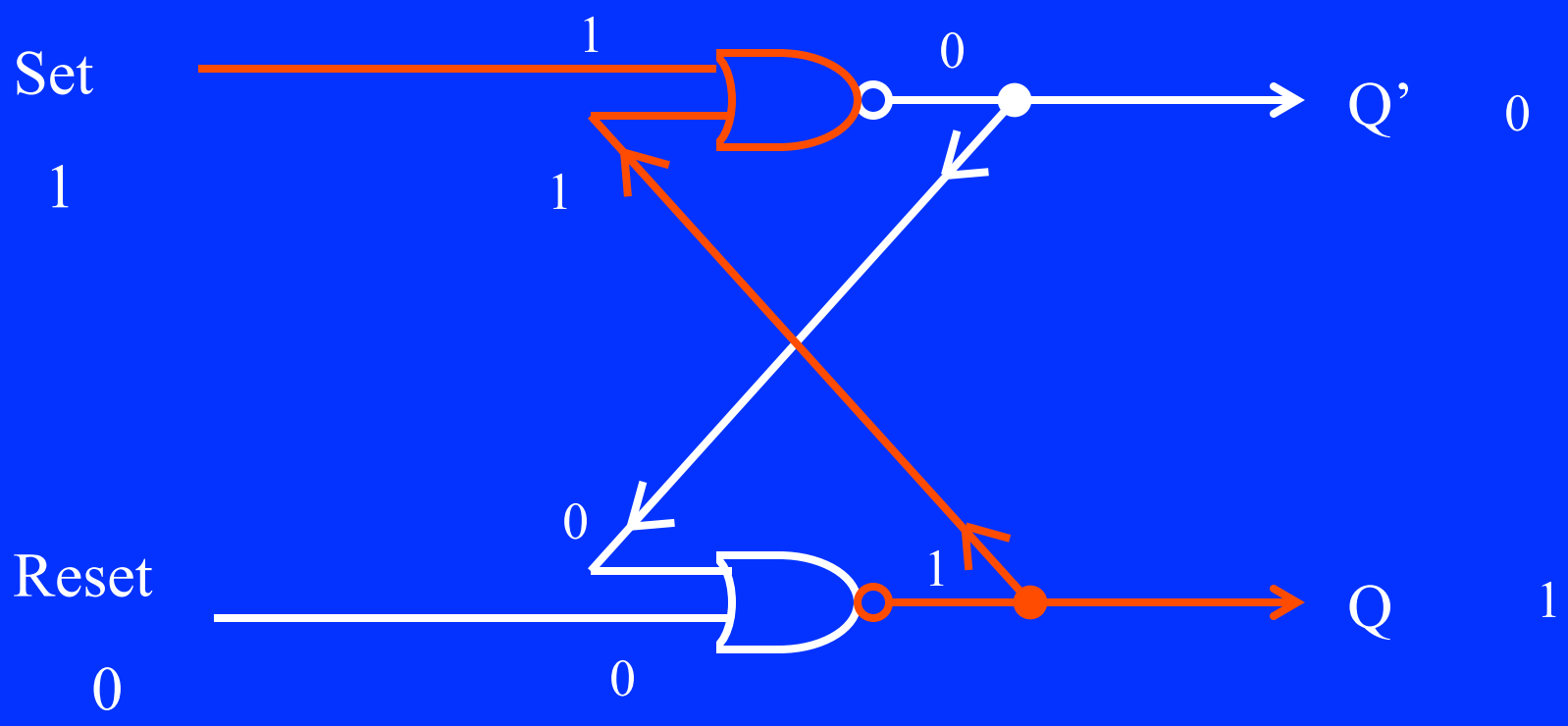
Unclocked Solution: Set



Unclocked Solution: Set

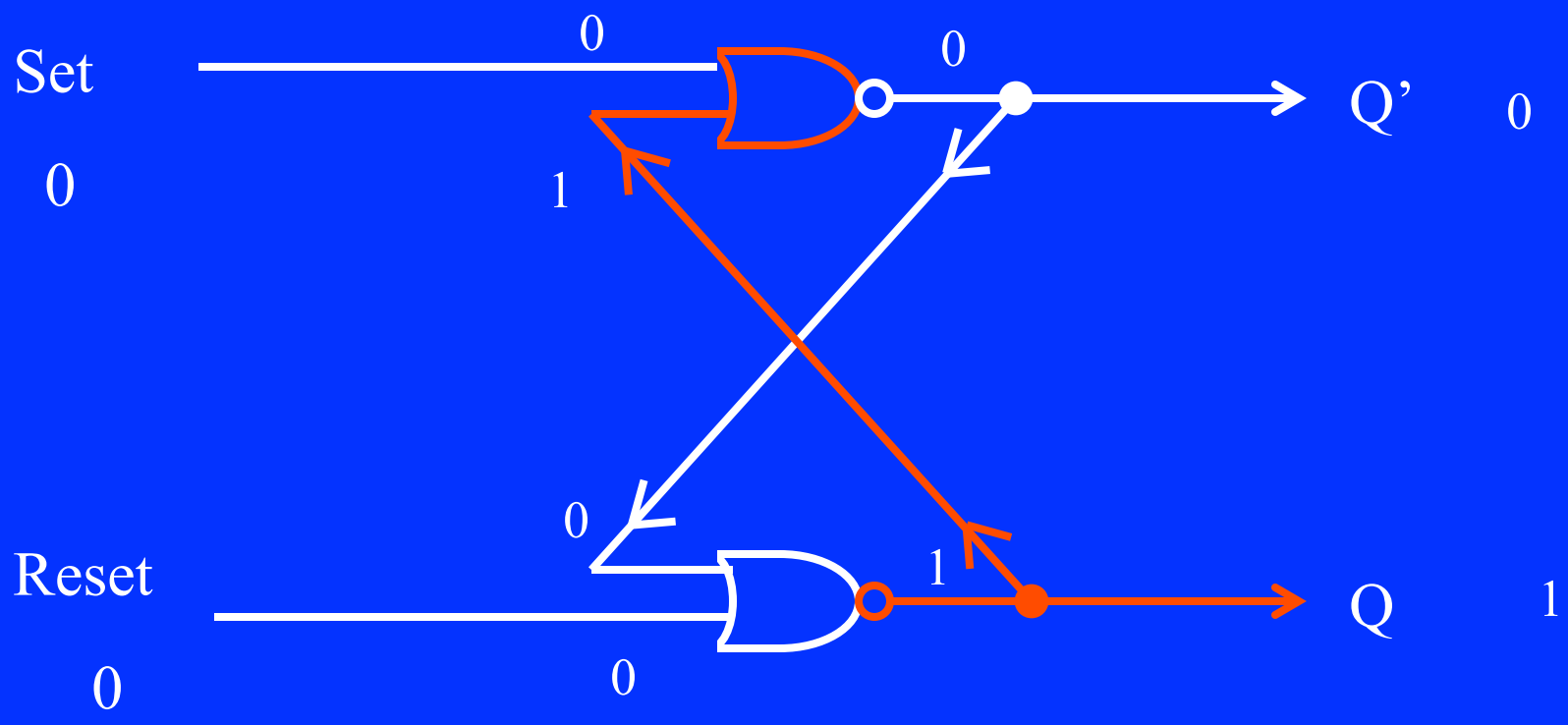


Unclocked Solution: Set



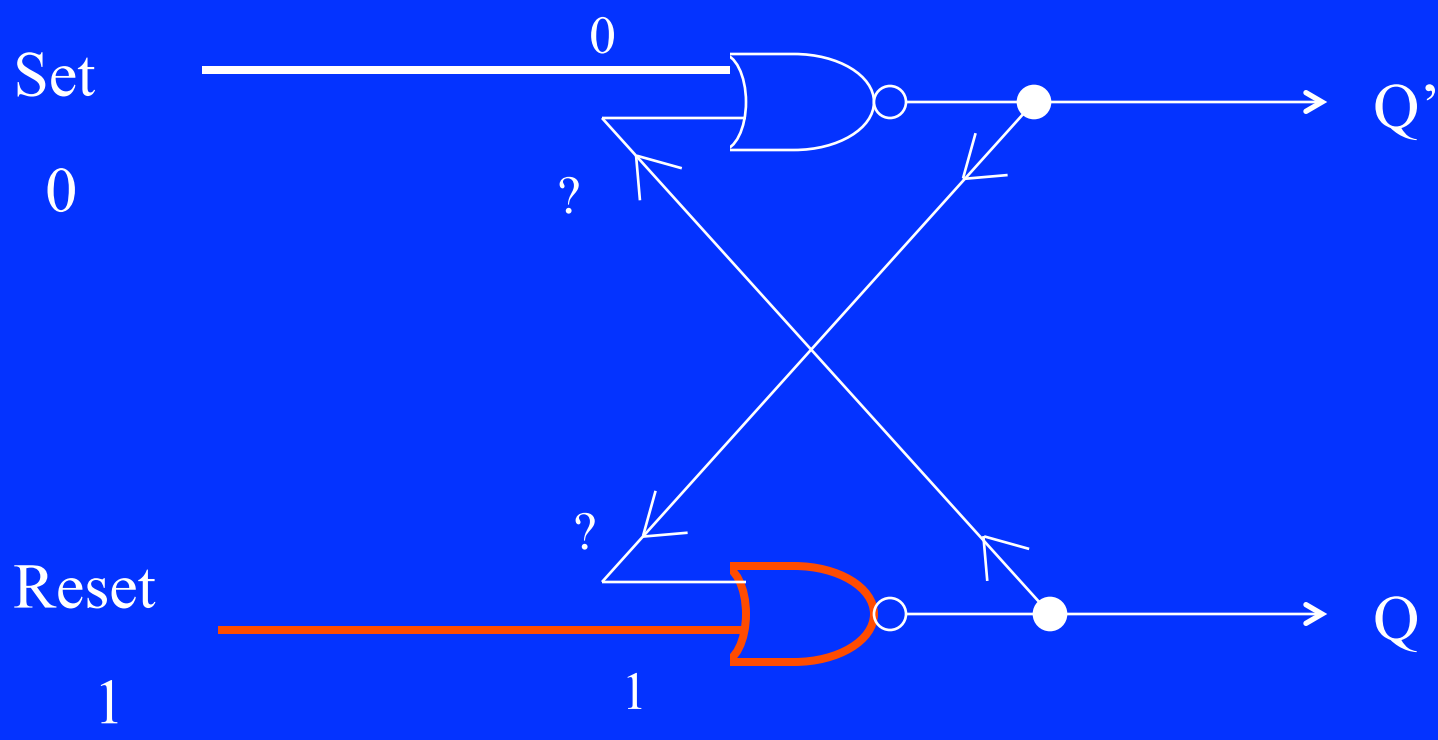
Set = 1 leads to Q = 1 and Q' = 0;
remains steady with these inputs.

Unclocked Solution: Steady State

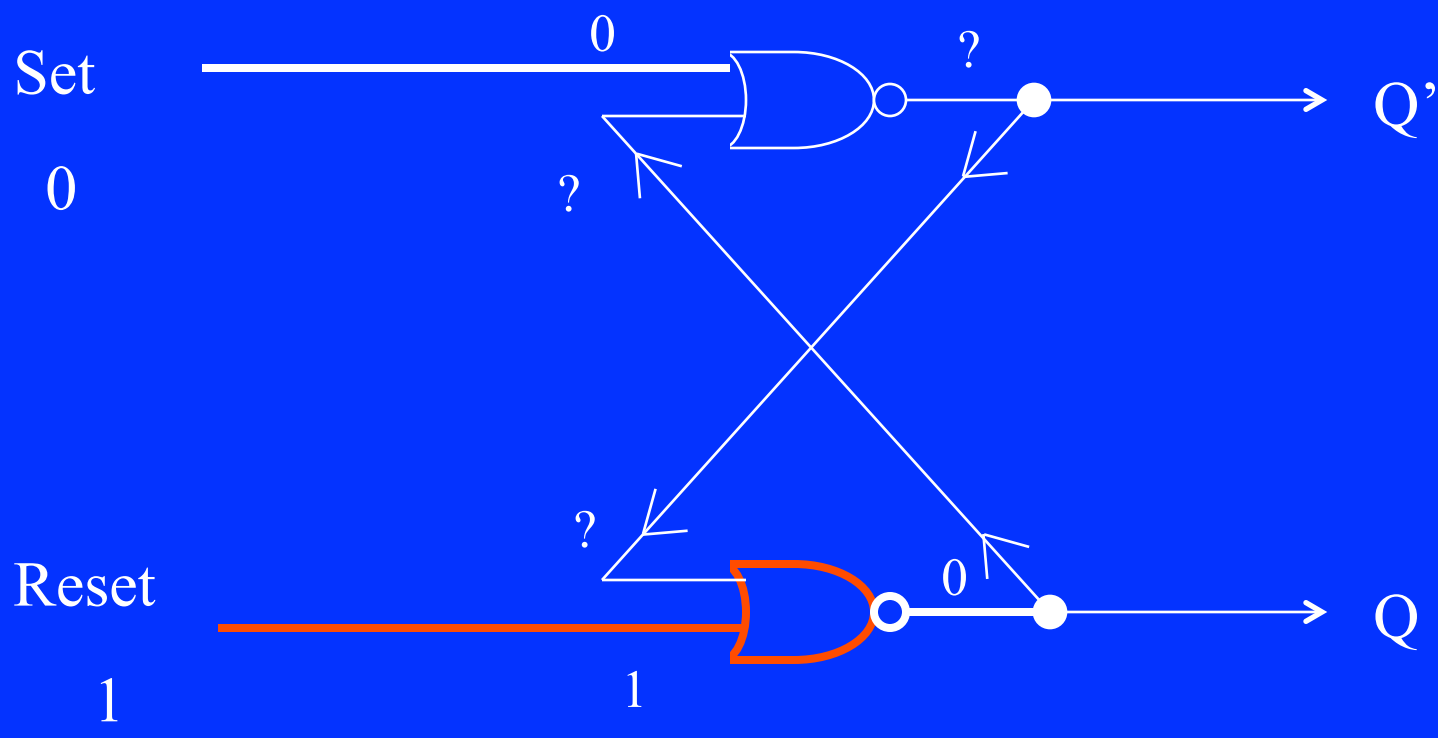


If Set goes to 0, latch remains in steady state until Set or Reset goes to 1.

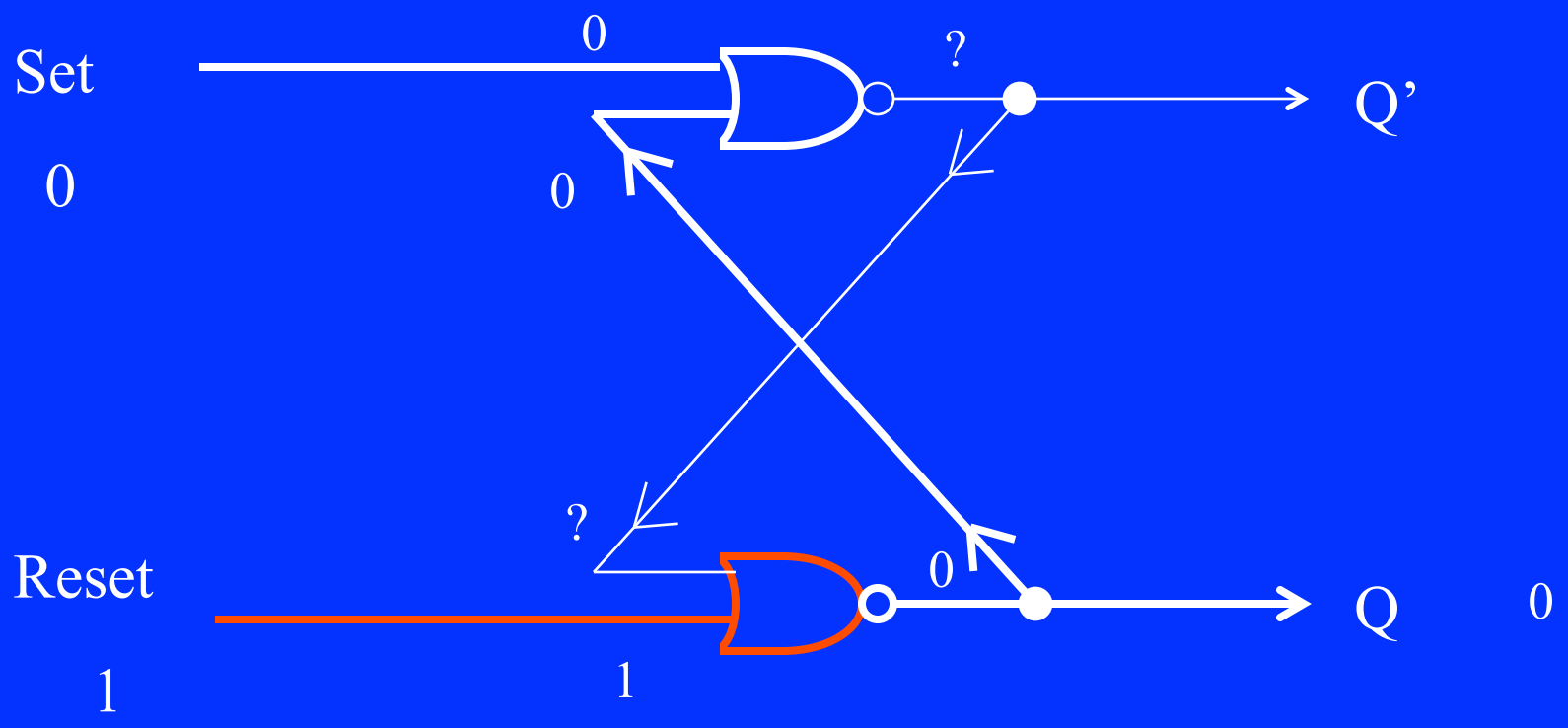
Unclocked Solution: Reset



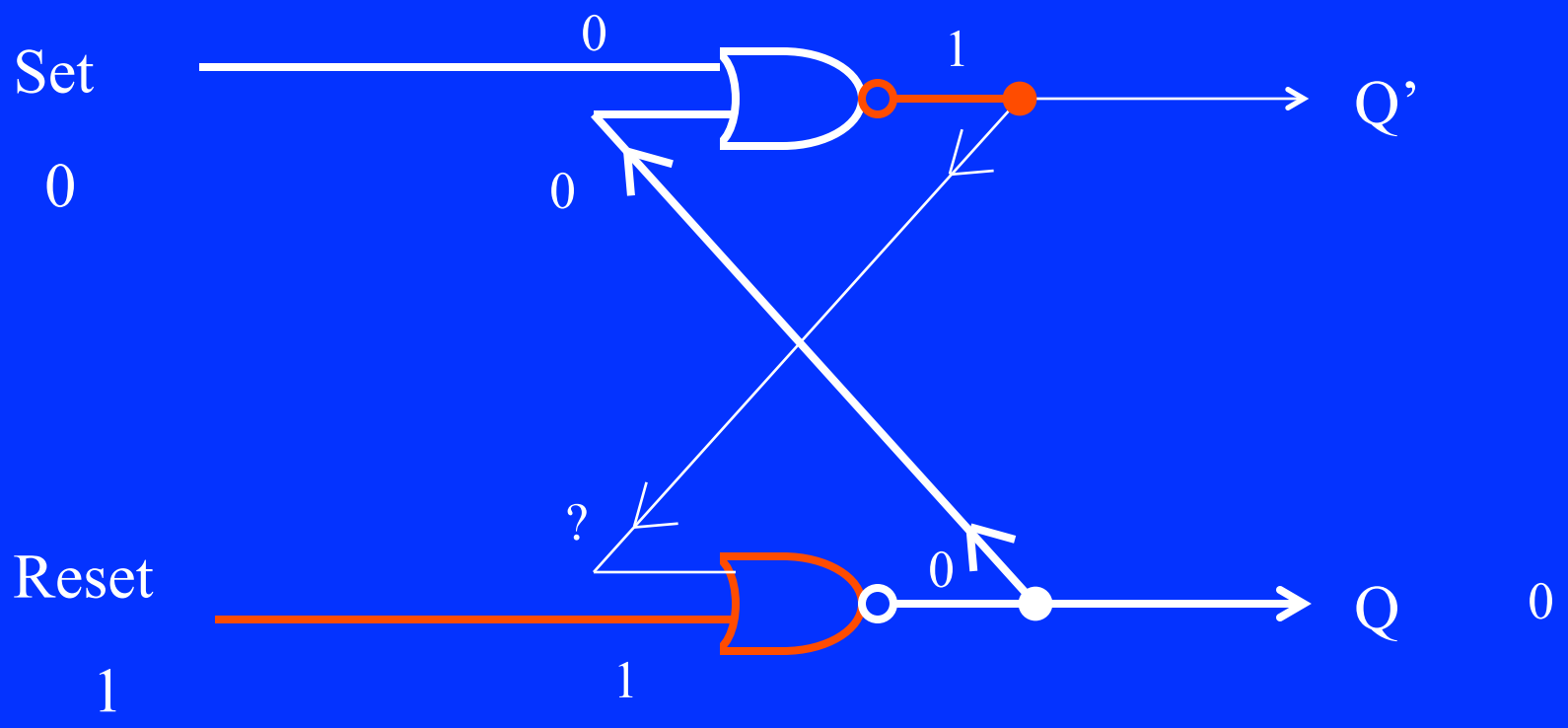
Unclocked Solution: Reset



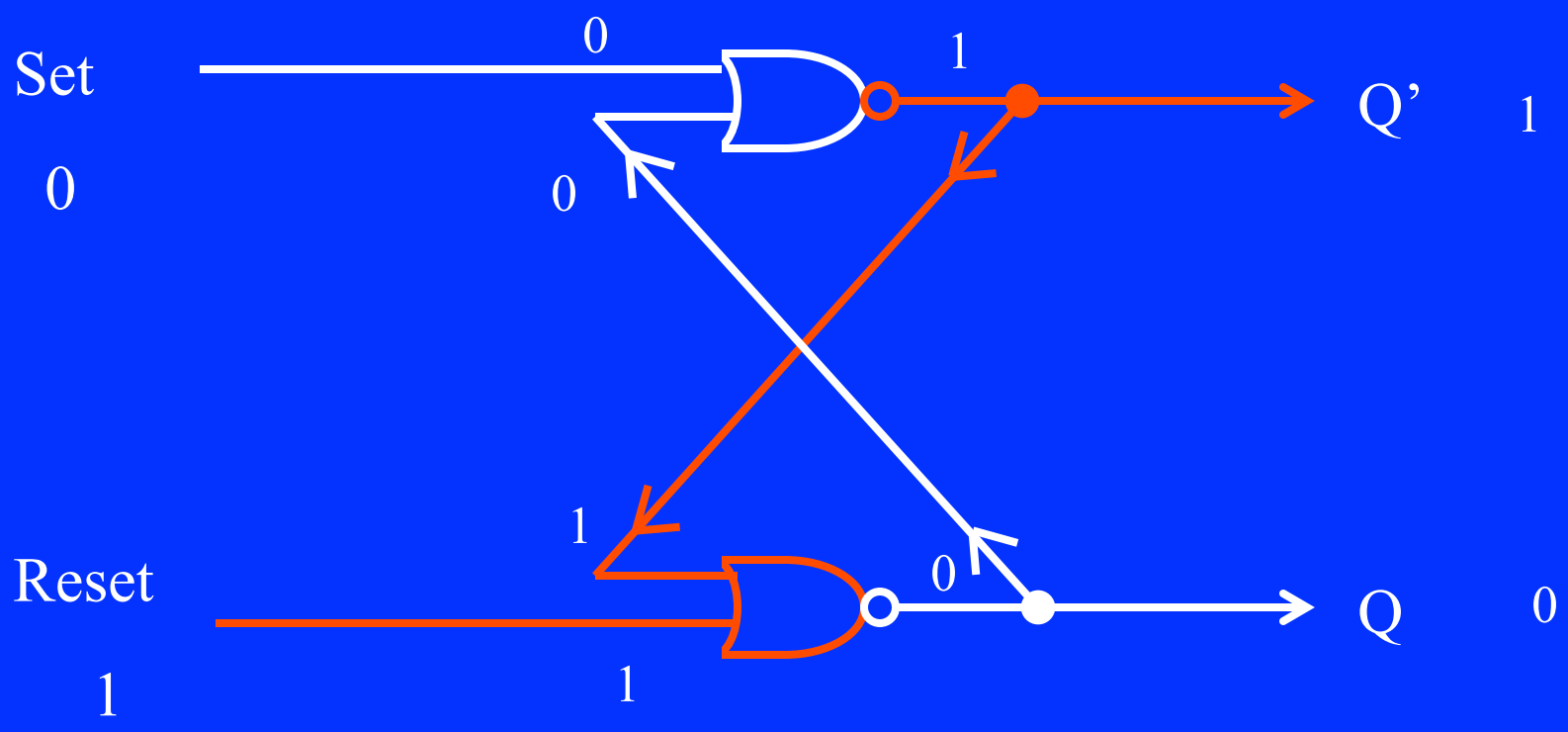
Unclocked Solution: Reset



Unclocked Solution: Reset

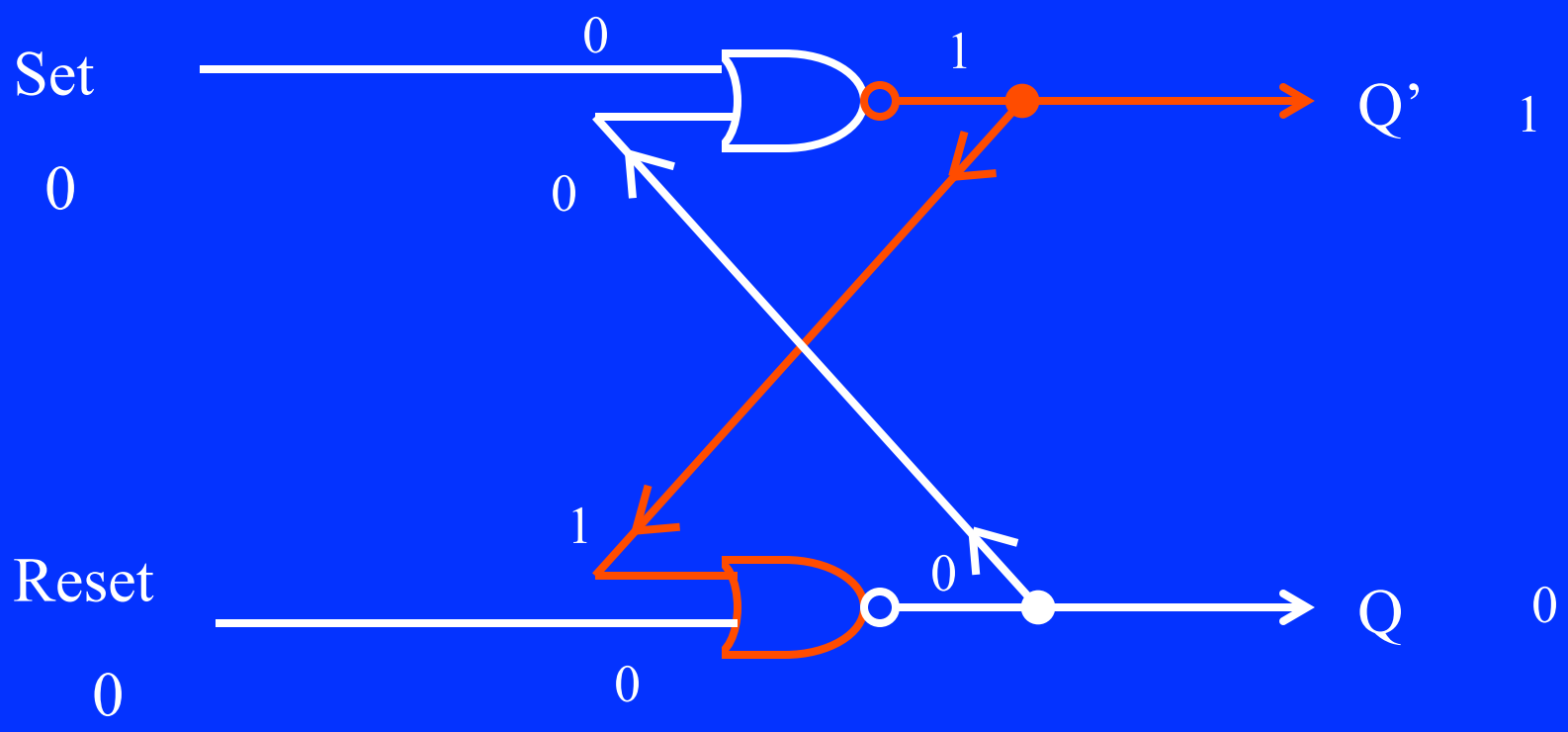


Unclocked Solution: Reset



Reset = 1 leads to Q = 0 and Q' = 1;
remains steady with these inputs.

Unclocked Solution



If Reset goes to 0, latch remains in steady state until Set or Reset goes to 1.