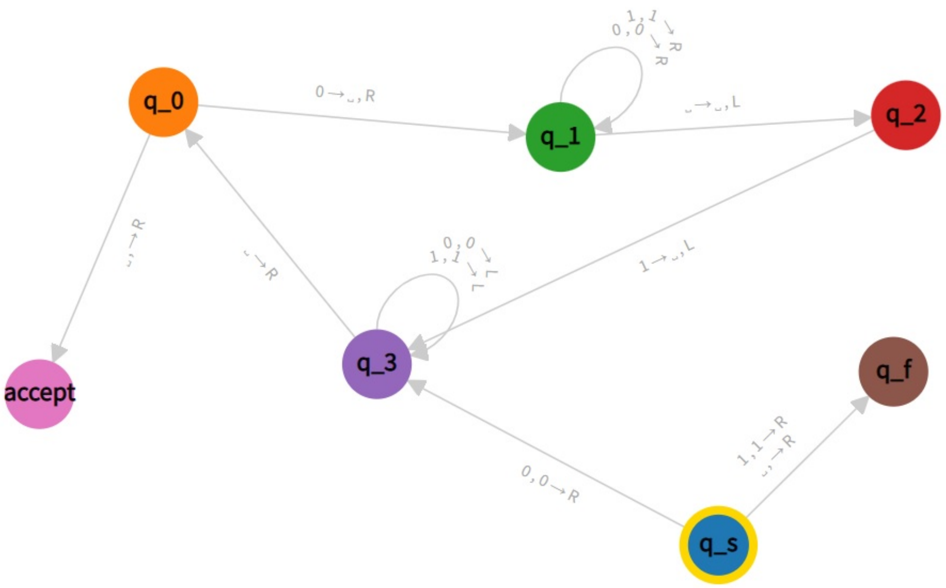
Student Information

Name : Satılmış ÖRENCİK

ID : 2396273

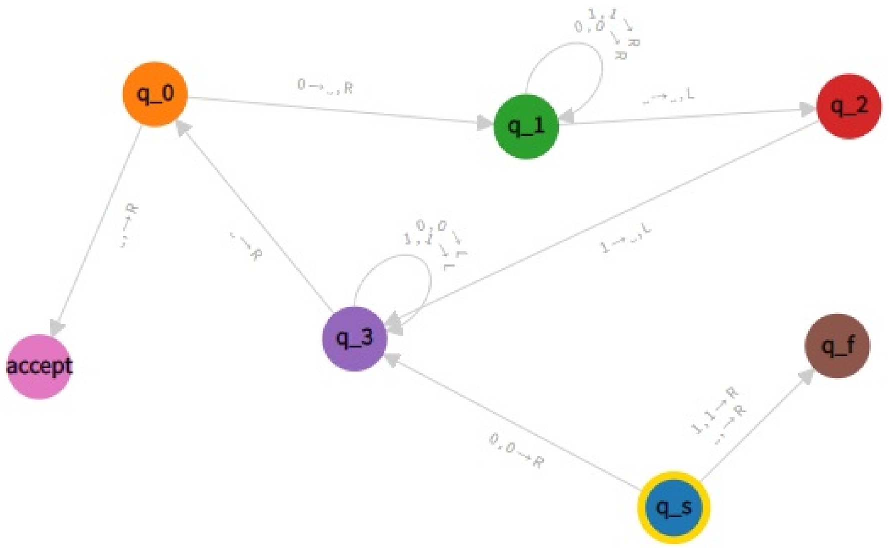
Answer 1

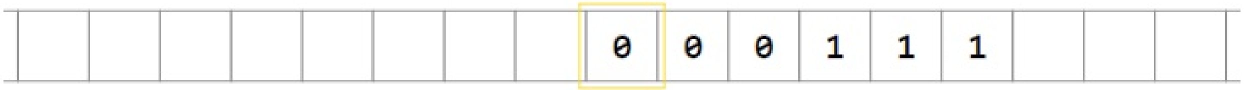
Turing Machine:



Our algorithms purpose write blank symbol for leftmost ”0” and rightmost ”1” each cycle. Machine starts with q_s state. If there is only blank input or starts with input ”1” it goes to q_f and remain there.
q_0 state: Starting Cycle State if input 0 then tape goes to right and machine goes to the next state q_1 if there is only blank symbol then it is ACCEPTED!
q_1 state: To find right most ”1” it goes to right of the tape. If there is blank symbol machine goes to q_2 state.
q_2 state: Write replace blank with ”1” and machine goes to q_3 state.
q_3 state: It find leftmost ”0” then machine goes to again q_0 state.
q_f state: trap state if there is only blank input or input starts with ”1”. accept state: if q_0 take input blank there are same amount of 0’s and 1’s in the input and input is ACCEPTED.

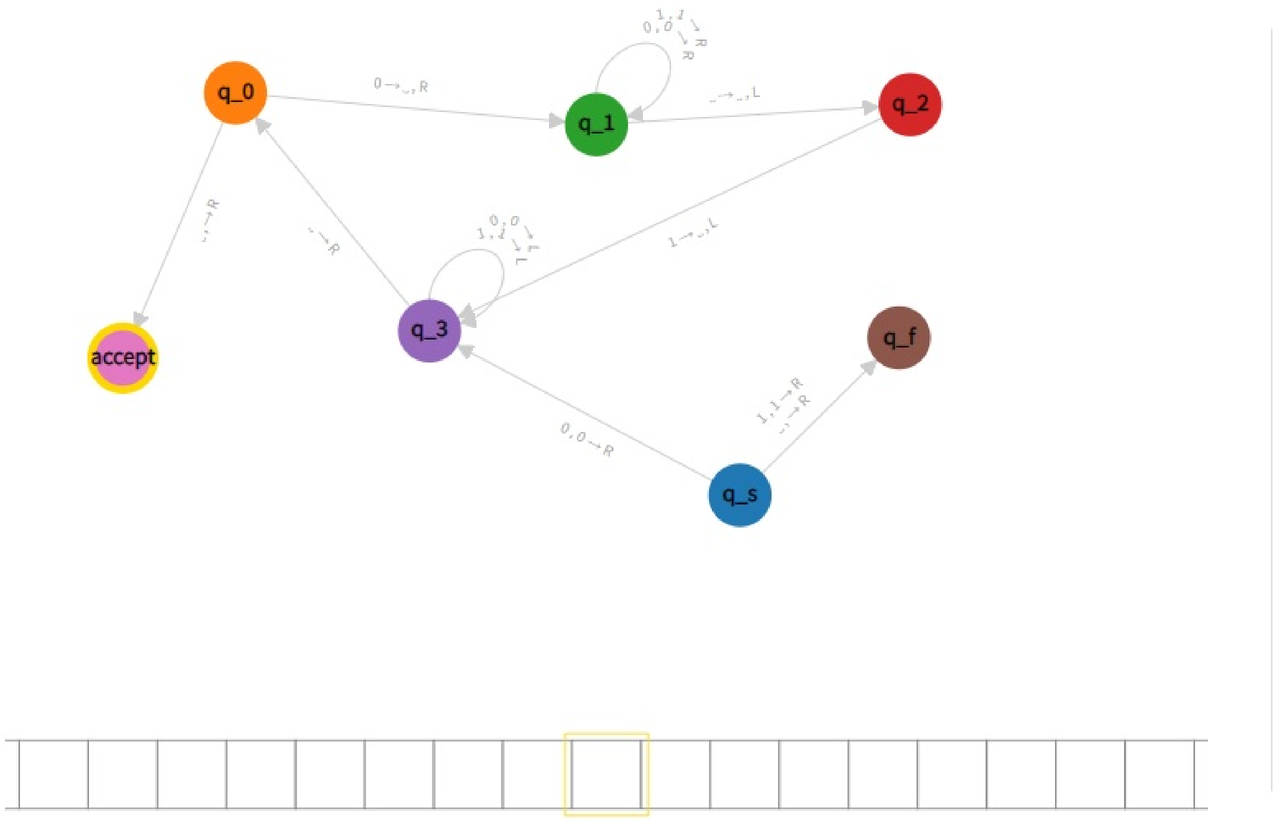
For Inputs: 000111
Initial State:





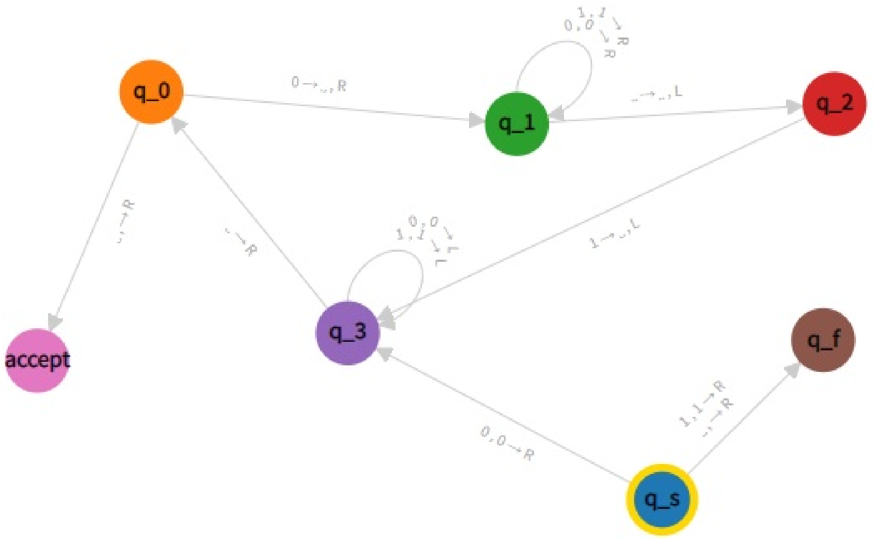
								0	0	0	1	1	1			

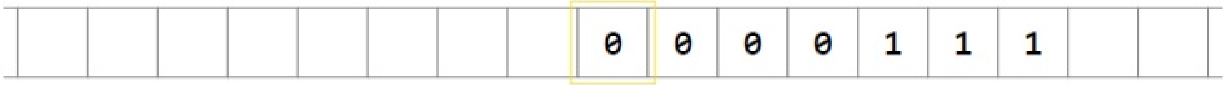
Final State:



For Inputs: 0000111

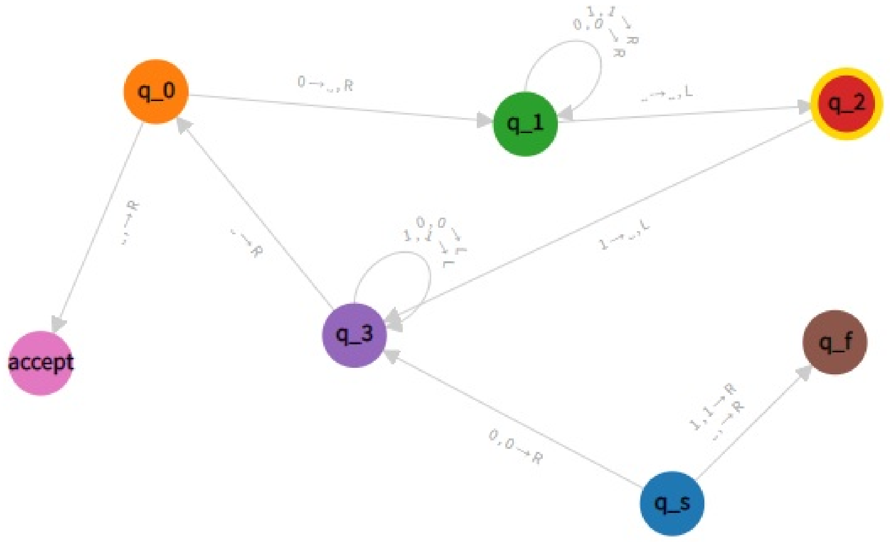
Initial State:

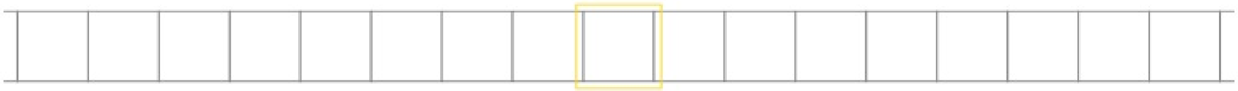




							0	0	0	0	1	1	1		

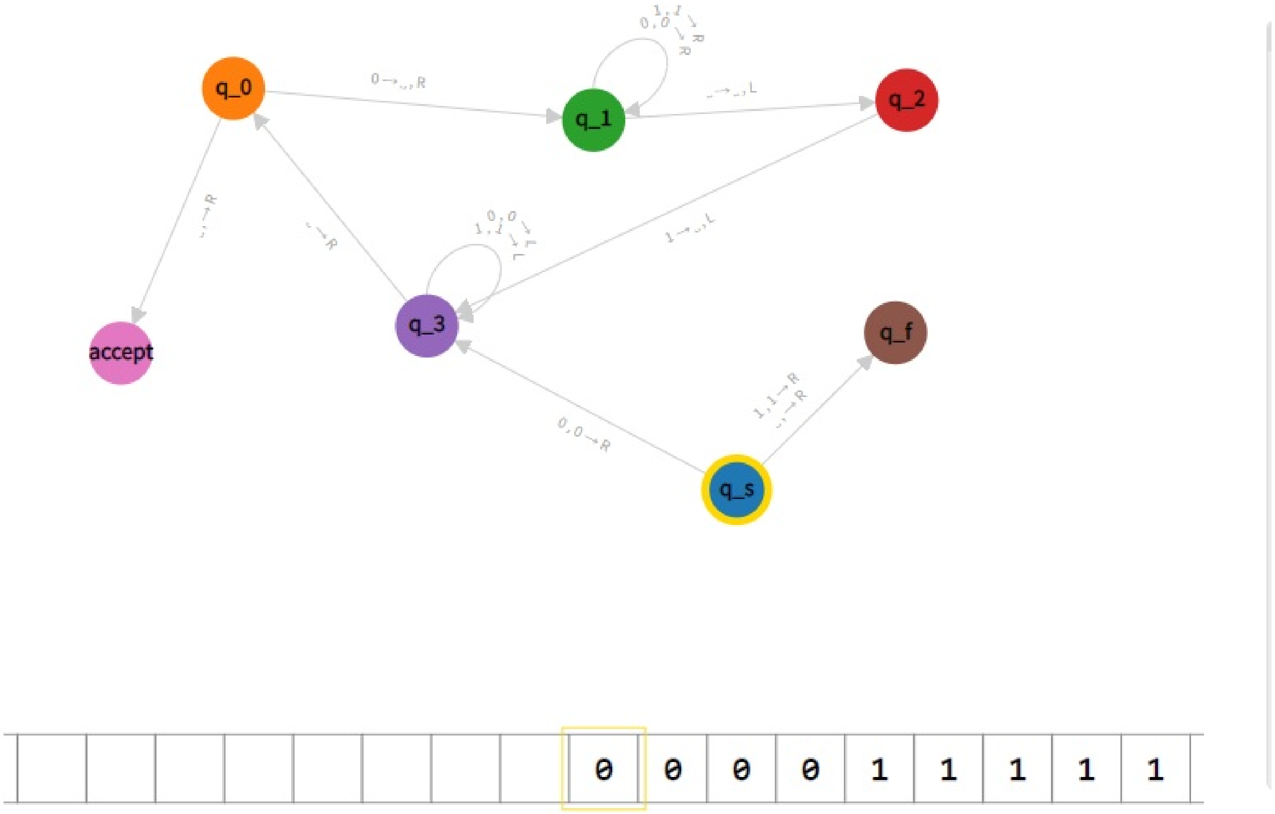
Final State:





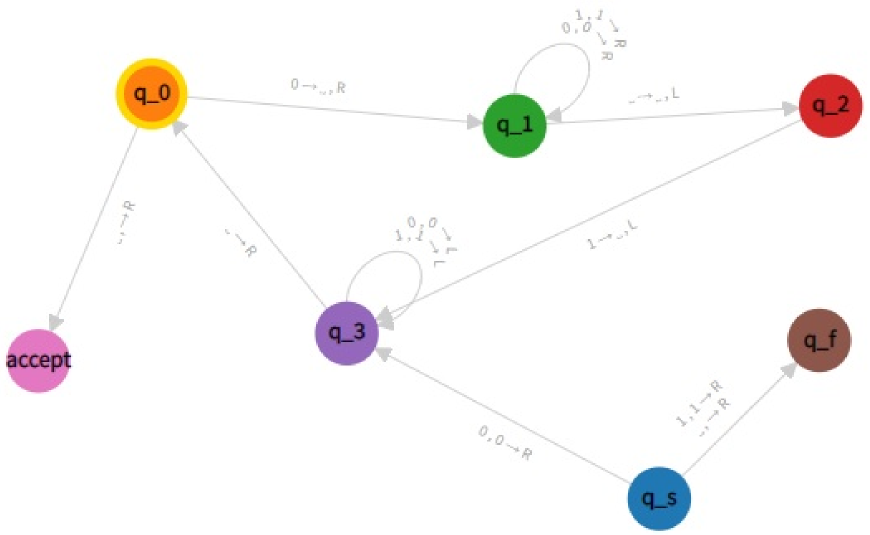
For Inputs: 000011111

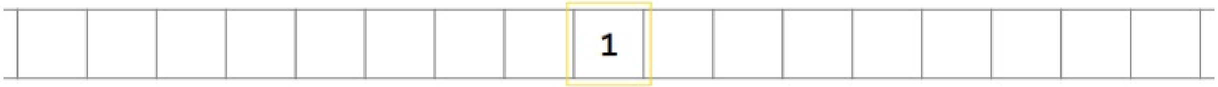
Initial State:



0 0 0 0 1 1 1 1 1

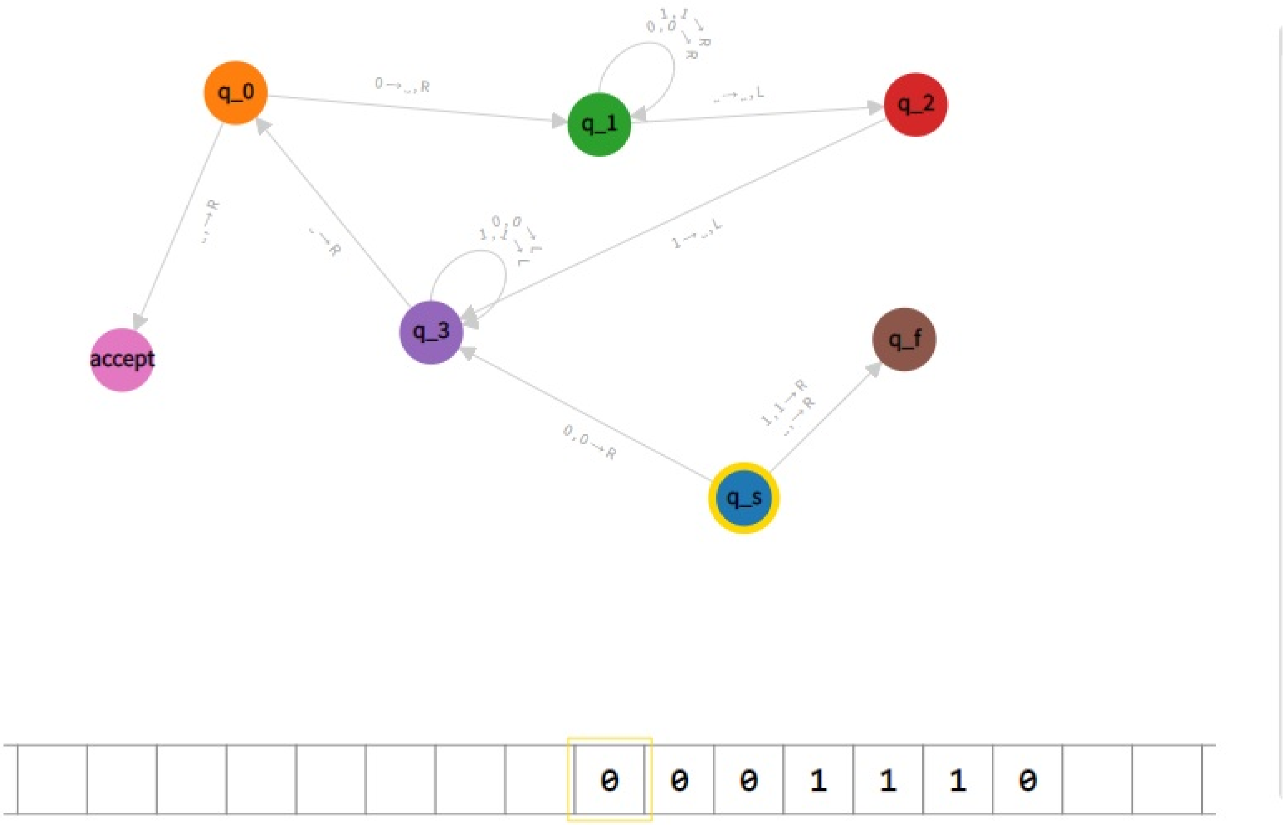
Final State:





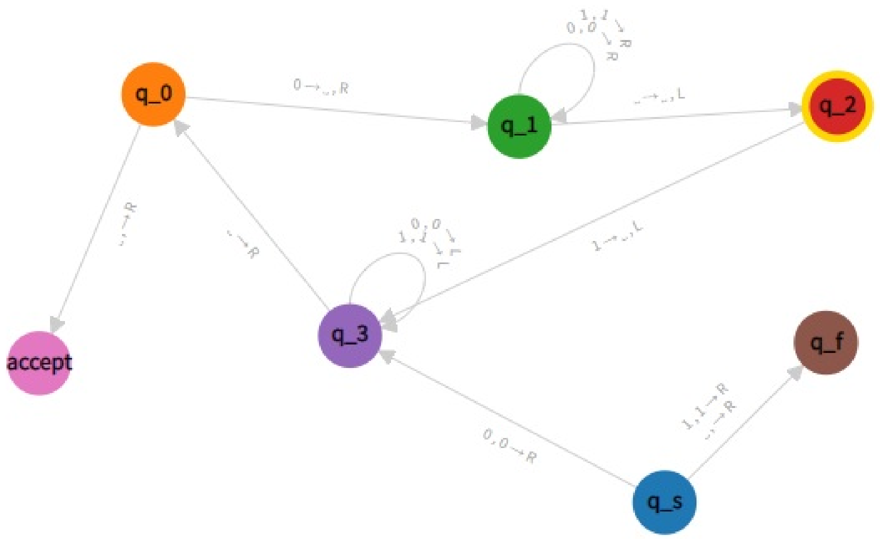
For Inputs: 0001110

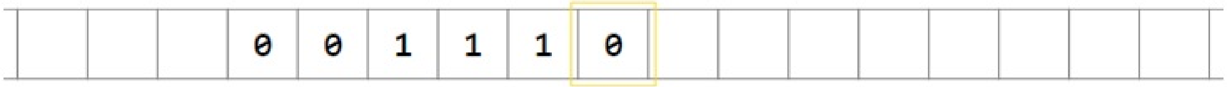
Initial State:



								0	0	0	1	1	1	0		

Final State:

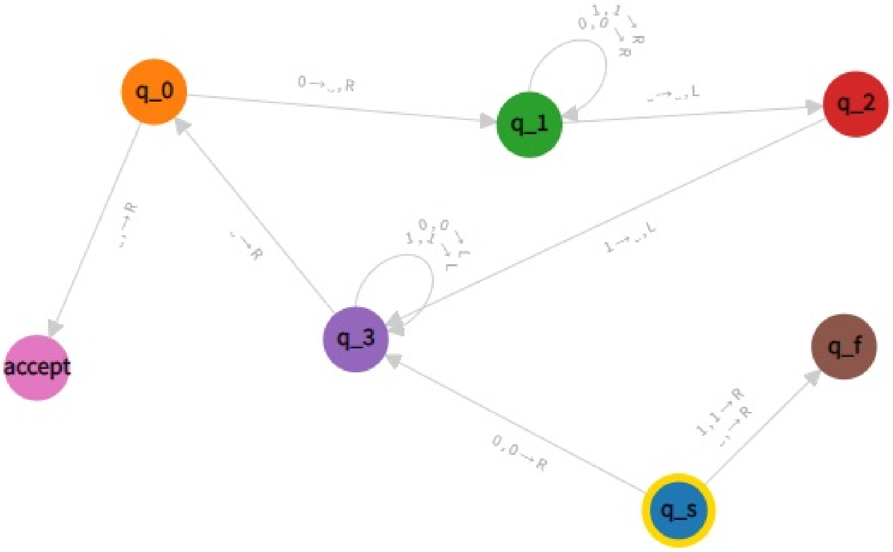


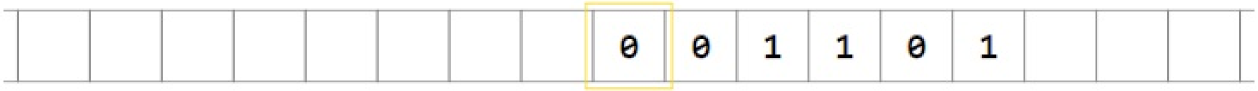


			0	0	1	1	1	0							

For Inputs: 001101

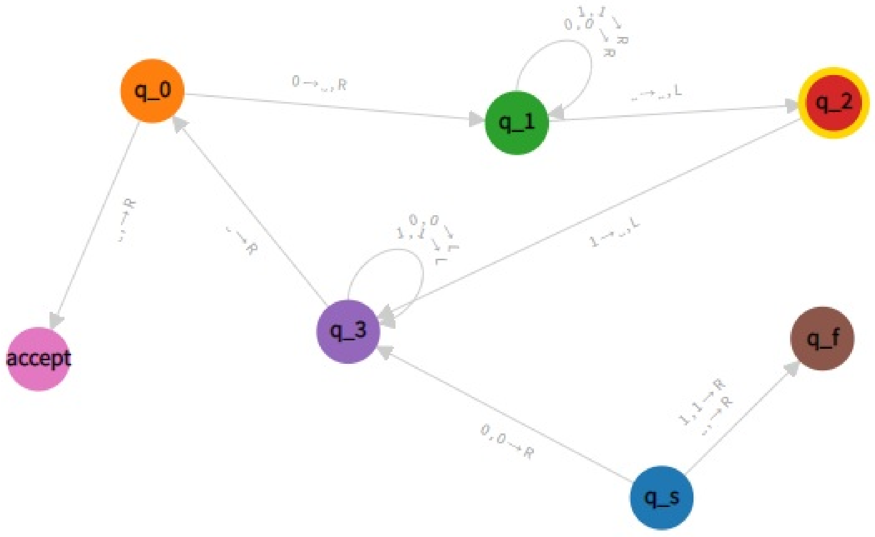
Initial State:

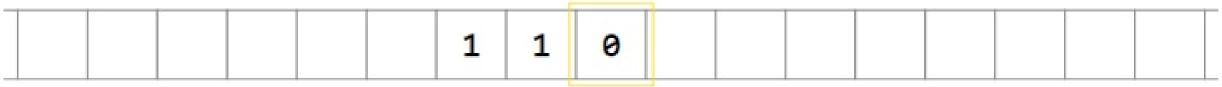




								0	0	1	1	0	1			

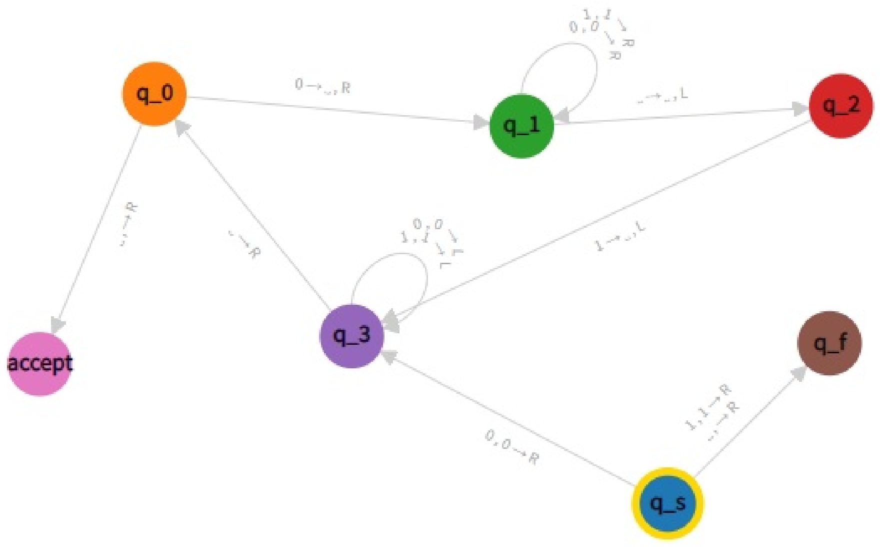
Final State:

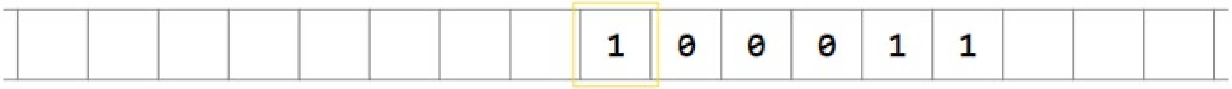




For Inputs: 100011

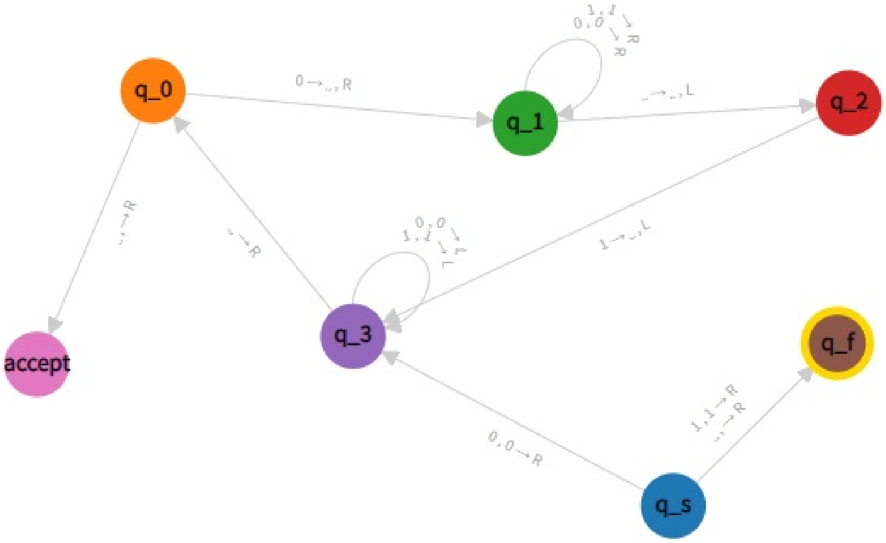
Initial State:

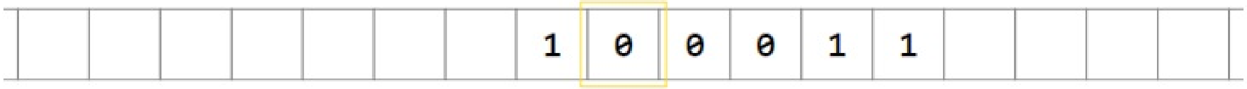




1 0 0 0 1 1

Final State:

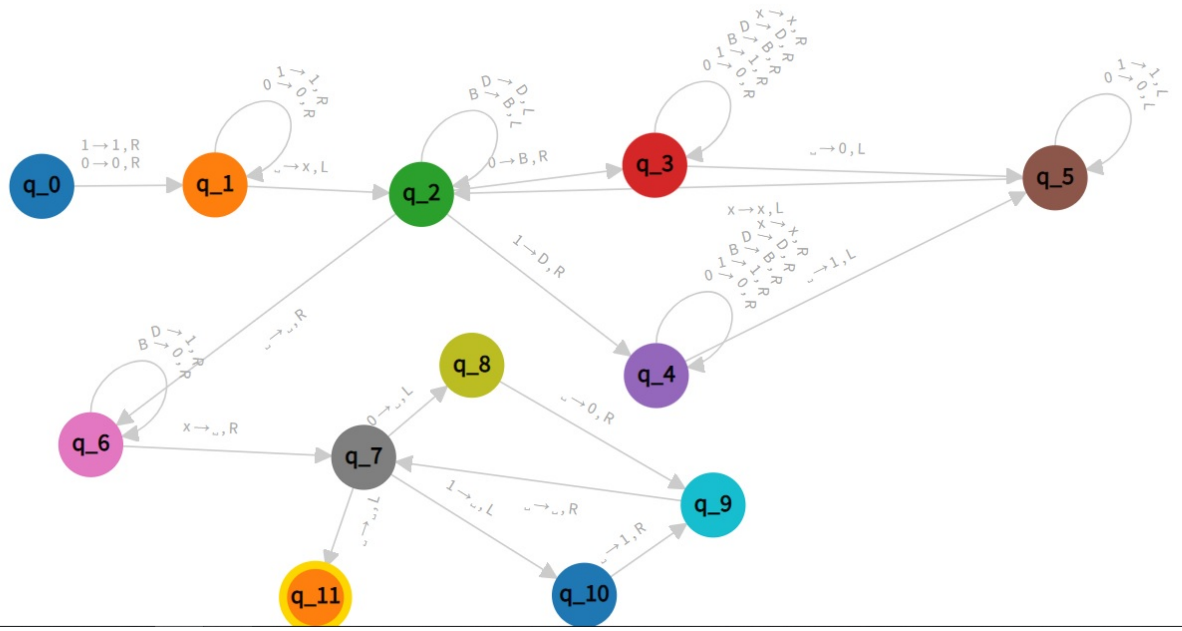




							1	0	0	0	1	1				

Answer 2

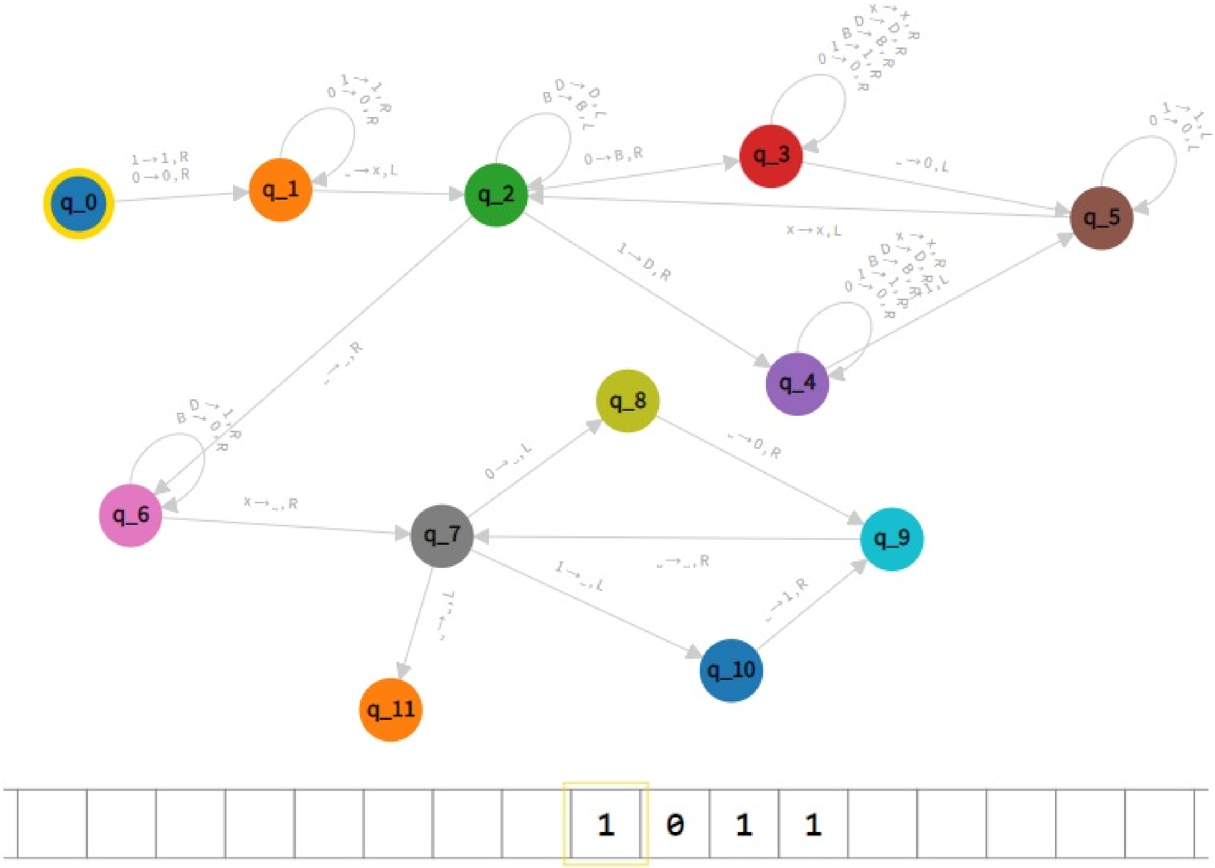
Turing Machine:



Turing Machine consists of 3 parts. First find the right most input. Second make a cycle change main inputs and create new palindromic string. Third make a new cycle and reverse inputs starting values.
q_0 and q_1 states: Find the right most input and write ”x” to first blank, machine goes to q_2 state.
q_2 state: First Loop State it changes ”0” to ”B” and ”1” to ”D” and if last input is ”0” machine goes to q_3 state, if last input ”1” machine goes to q_4 state. In addition, if there is no 0’s or 1’s in first string it goes to q_6,
q_3 state: insert first blank ”0” otherwise tape went right machine goes to q_5.
q_4 state: insert first blank ”1” otherwise tape went right machine goes to q_5.
q_5 state: tape goes to left to find ”x” cross mark between two strings. Then machine goes to loop state q_2.
q_6 state: Reverse first string ”B” to ”0” and ”D” to ”1”. find cross mark ”x” input tape and delete ”x”.
q_7 state: if next input ”0” delete it and tape goes left machine goes to q_8. If next input ”1” delete it and tape goes left machine goes to q_{10}.
q_8 state: insert ”0” and tape goes to right machine goes to q_9.
q_{10} state: insert ”1” and tape goes to right machine goes to q_9.
q_9 state: find to next blank in tape machine goes to q_7. Loop again. q_{11} state: END state.

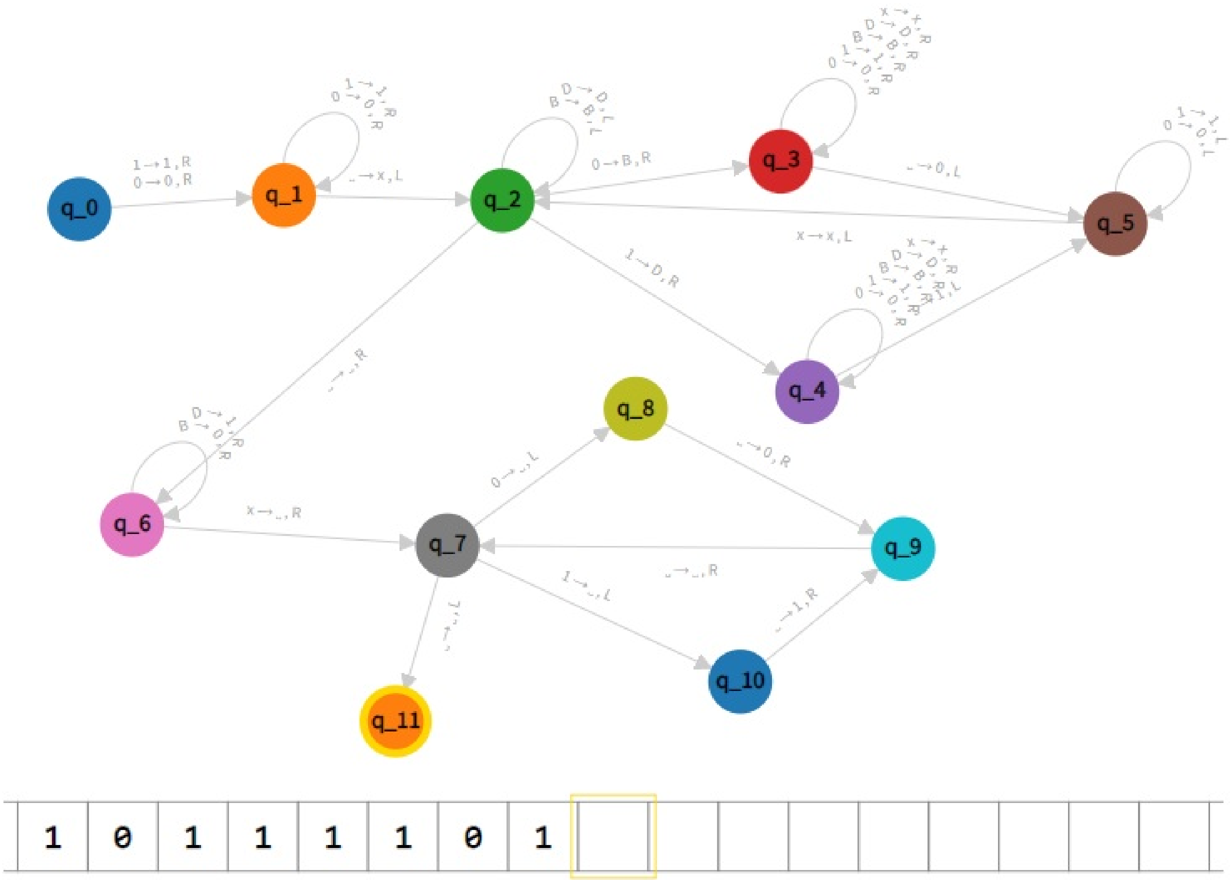
For Inputs: 1011

Initial State:



1	0	1	1

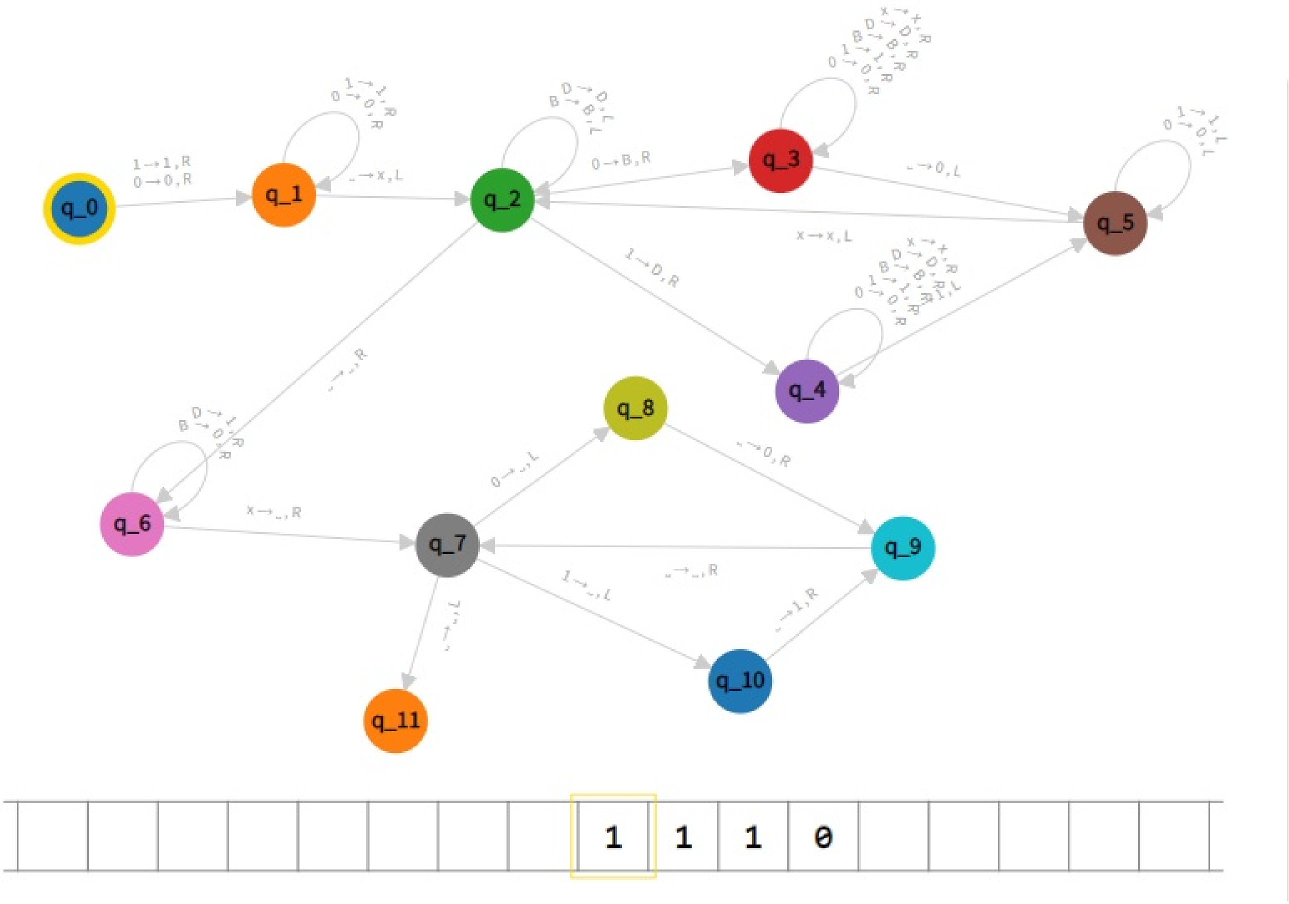
Final State:



1	0	1	1	1	1	0	1								

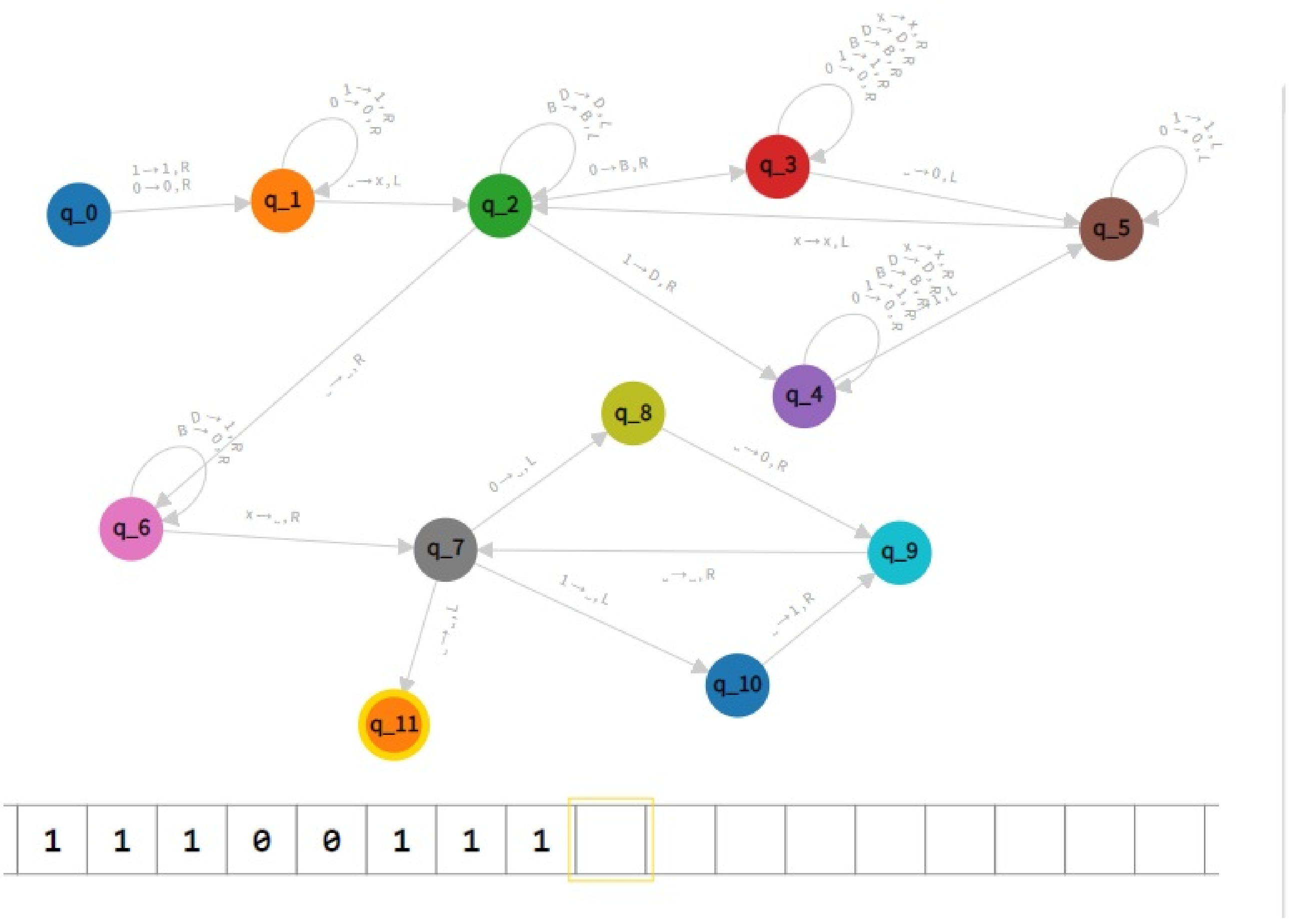
For Inputs: 1110

Initial State:



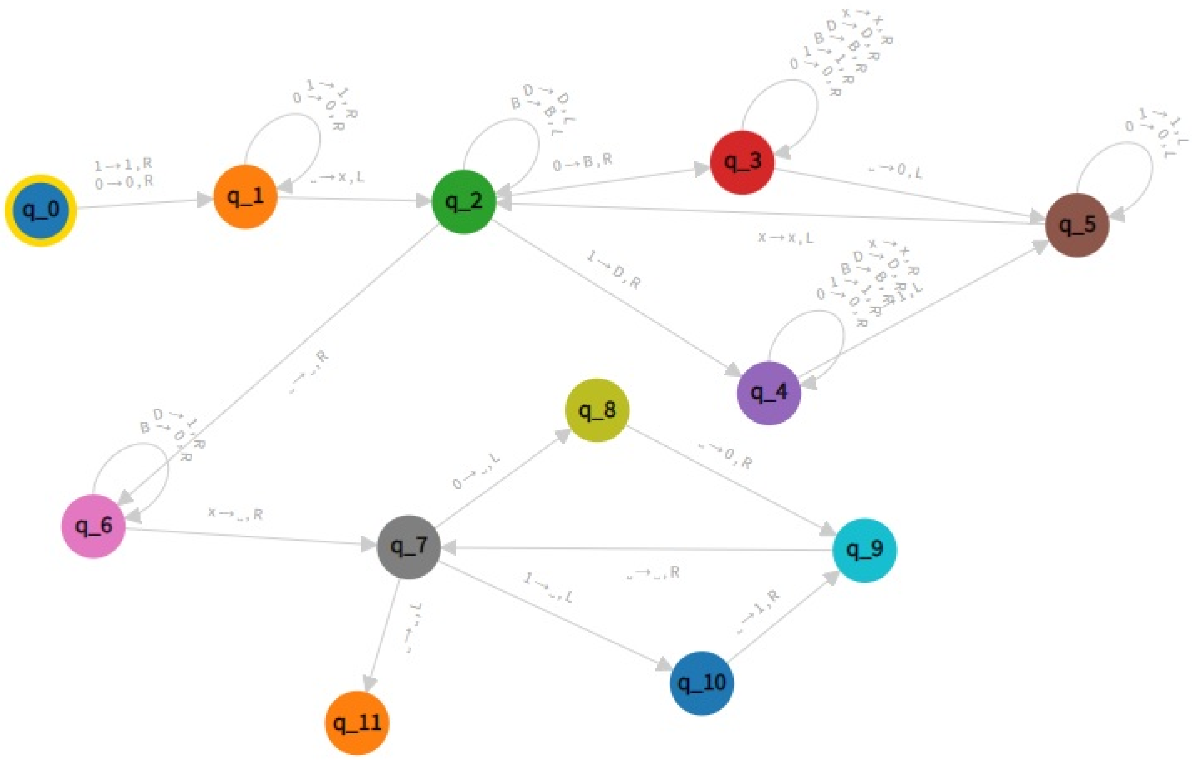
1 1 1 0

Final State:



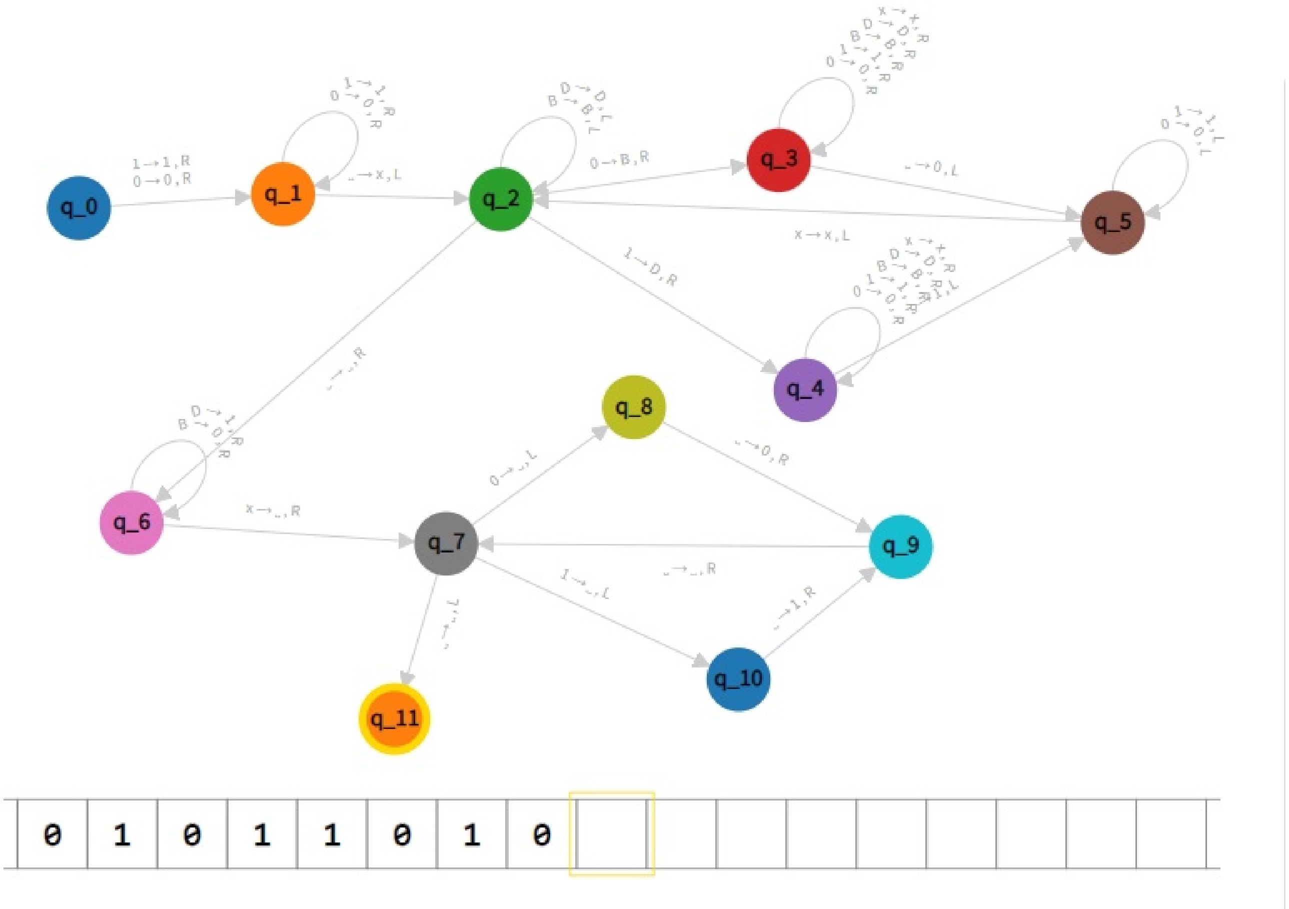
For Inputs: 0101

Initial State:



								0	1	0	1					

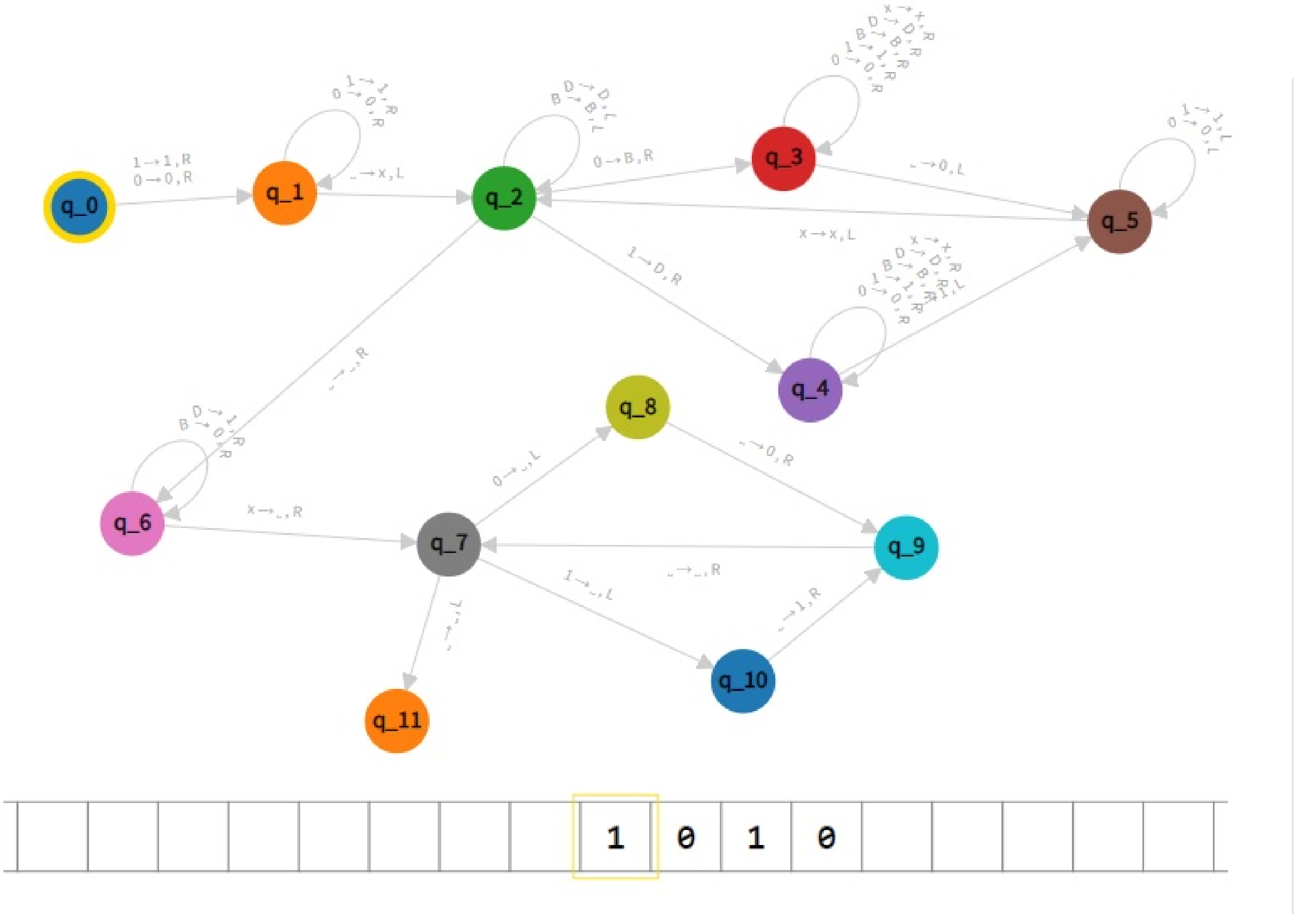
Final State:



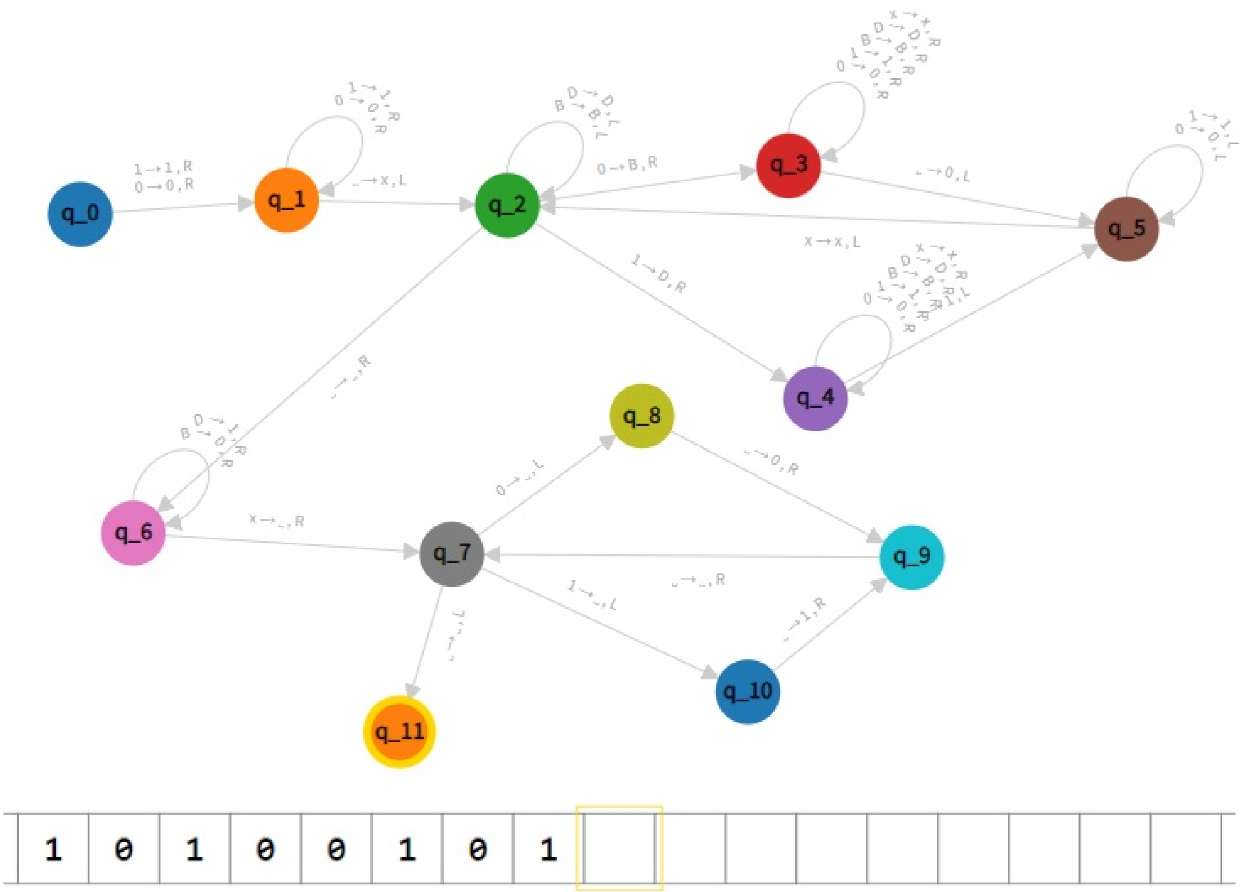
0	1	0	1	1	0	1	0									

For Inputs: 1010

Initial State:


q_0
1 → 1, R
0 → 0, R
q_1
1 → 1, R
0 → 0, R
_ → x, L
q_2
D → D, L
B → B, L
0 → B, R
1 → D, R
_ → _, R
q_3
x → x, R
D → D, R
B → B, R
1 → 1, R
0 → 0, R
_ → 0, L
q_4
x → x, R
D → D, R
B → B, R
1 → 1, R
0 → 0, R
_ → 1, L
q_5
1 → 1, L
0 → 0, L
x → x, L
q_6
D → 1, R
B → 0, R
x → _, R
q_7
0 → _, L
1 → _, L
_ → _, L
q_8
_ → 0, R
q_9
_ → _, R
q_10
_ → 1, R
q_11
1
0
1
0

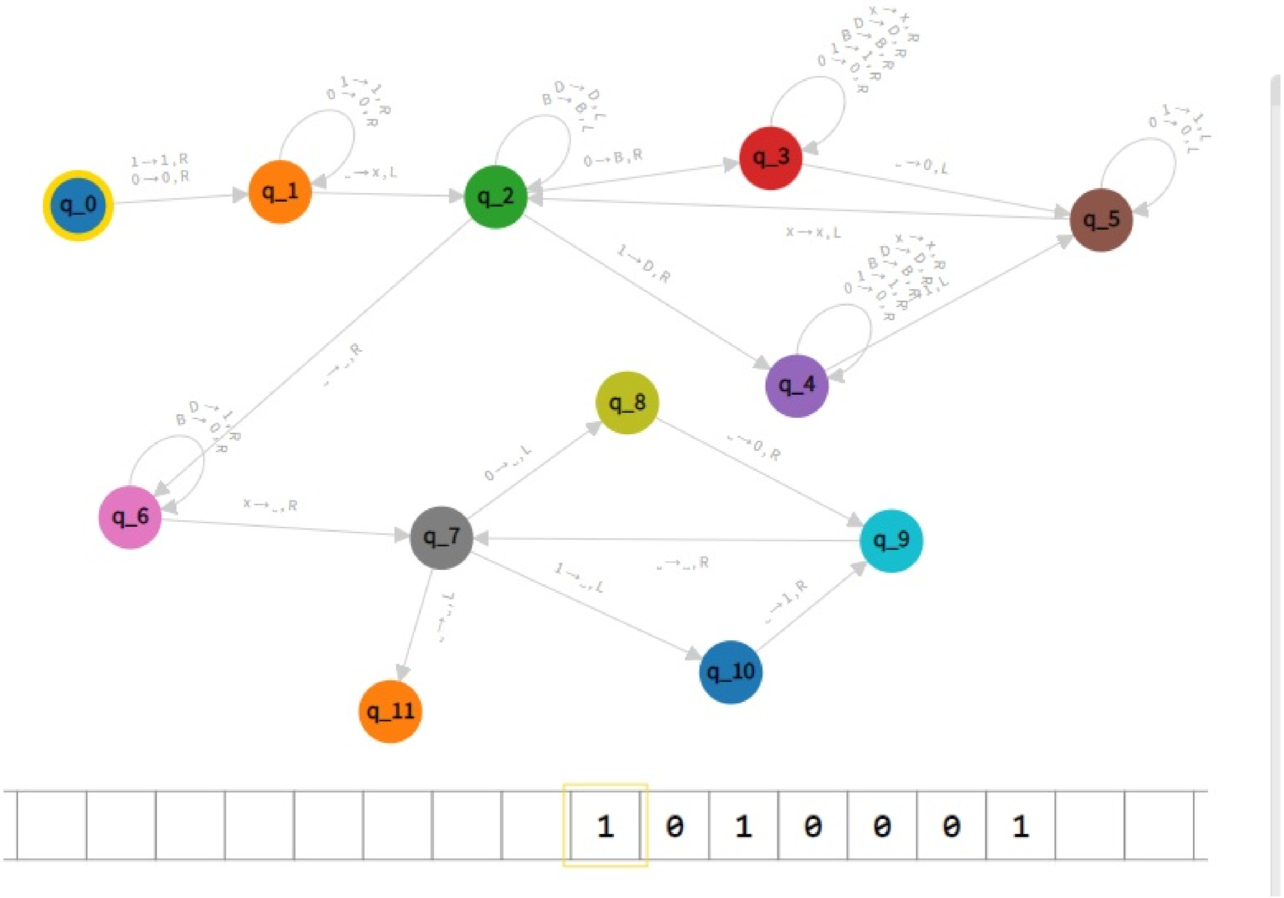
Final State:



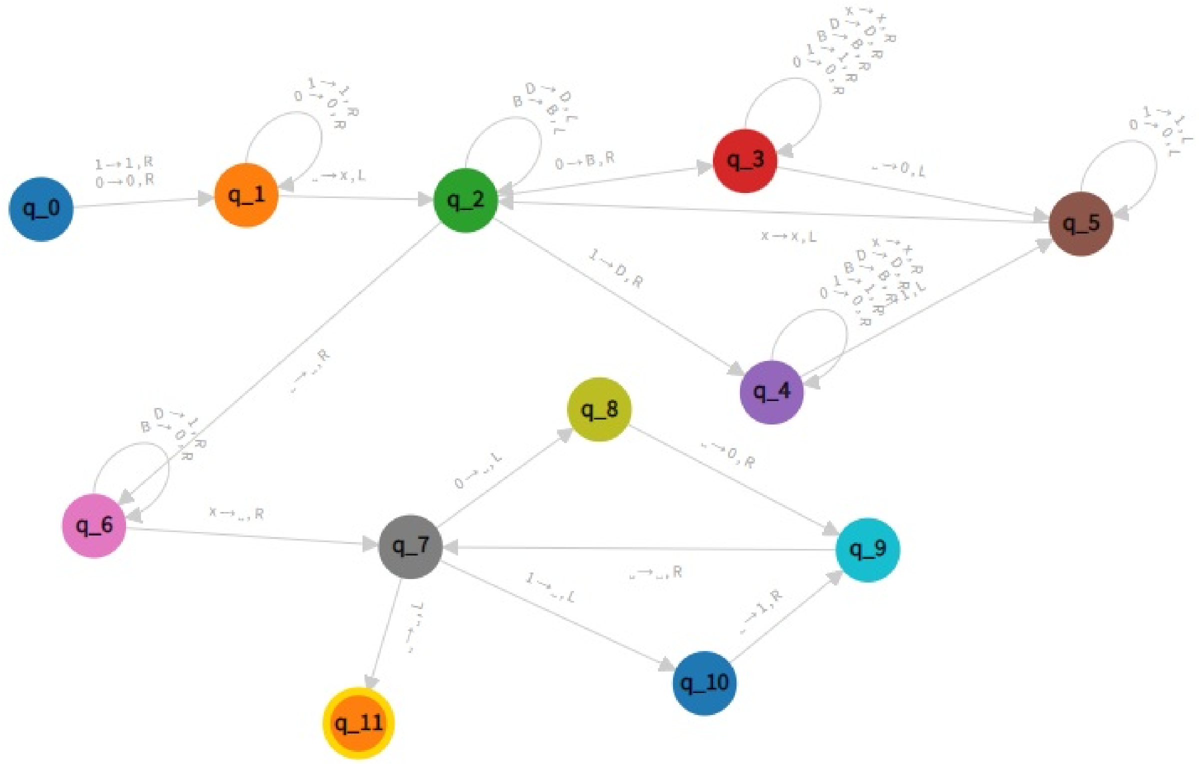
1	0	1	0	0	1	0	1									

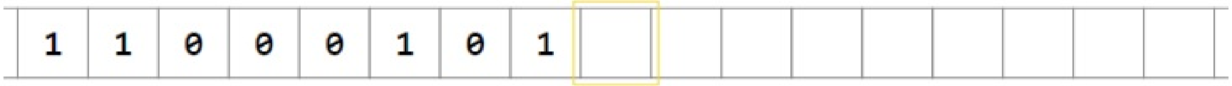
For Inputs: 1010001

Initial State:


q_0
1→1,R
0→0,R
q_1
0→0,R
1→1,R
␣→x,L
q_2
B→B,L
D→D,L
0→B,R
q_3
0→0,R
1→1,R
B→B,R
D→D,R
x→x,R
␣→0,L
q_5
0→0,L
1→1,L
x→x,L
1→D,R
q_4
0→0,R
1→1,R
B→B,R
D→D,R
x→x,R
␣→1,L
␣→␣,R
q_6
B→0,R
D→1,R
x→␣,R
q_7
0→␣,L
q_8
␣→0,R
q_9
␣→␣,R
1→␣,L
q_10
␣→1,R
␣→␣,L
q_11
1
0
1
0
0
0
1

Final State:

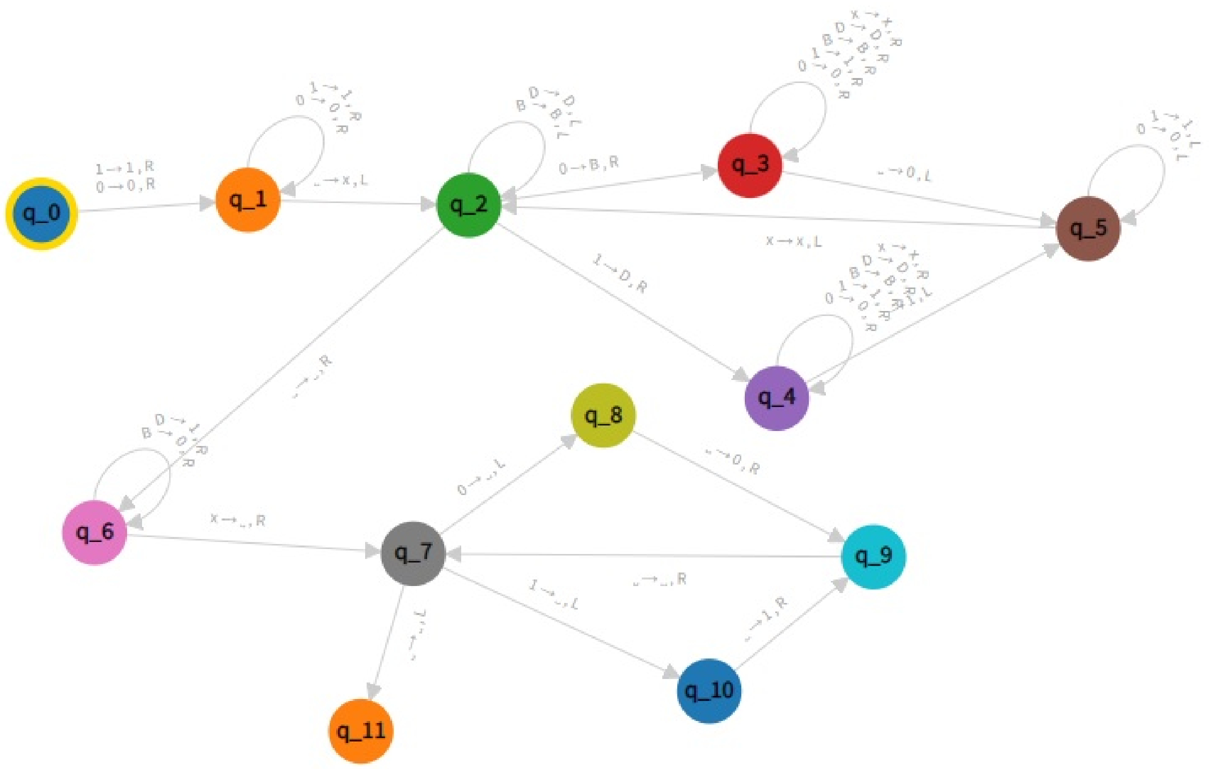




1	1	0	0	0	1	0	1									

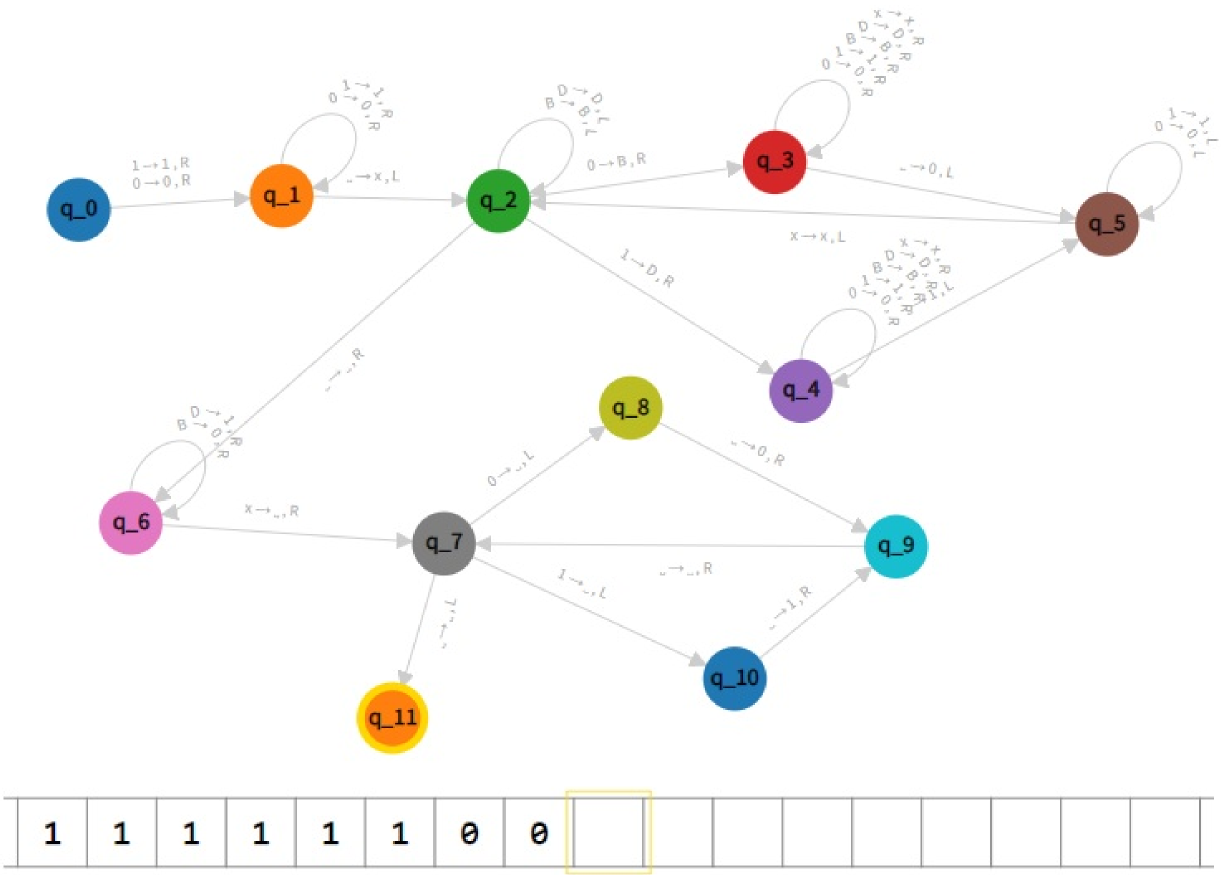
For Inputs: 00111

Initial State:



								0	0	1	1	1				

Final State:



Answer 3

Turing machines with a 2-dimensional tape that have one read-write head, one finite control, and one two dimensional tape. The tape has the left end, and the top end but extends indefinitely to the down and right. It is separated into rows of small squares.
A Turing Machine is quintuple(K,Σ, δ, s, H) where;
K is a finite set of states.
Σ is an alphabet
s $\in$ K is the initial state
H $\subseteq$ K is the set of halting states.
δ is a transition function, and δ: Q $\times \Sigma - > Q \times \Sigma \times \{L, R, U, D\}$
where;
L: Left, R: Right, U: Up and D: Down
A 2-dimensional Turing machine's computation is a series of configurations, starting with an initial configuration, each of which is decided by the preceding configuration and the machine's current state.
A 2-dimensional Turing machine determines a language L if, after a finite number of steps, it halts in a final state for every string w in L and never halts for any string w not in L.