

## Examples of NFA:

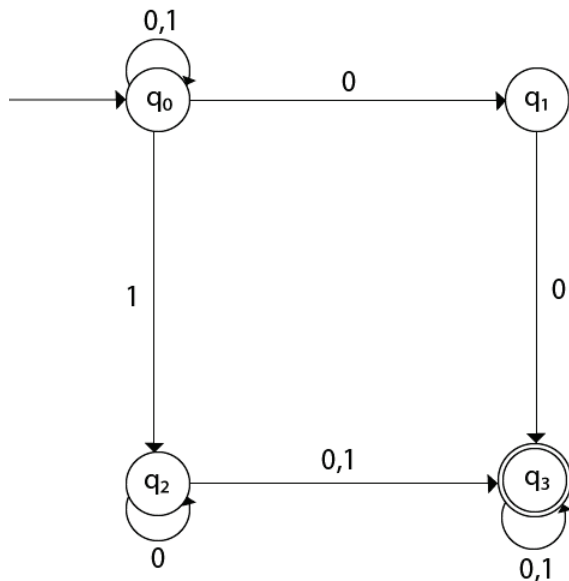
### Example 1:

Design a NFA for the transition table as given below:

Present State	0	1
$\rightarrow q_0$	$q_0, q_1$	$q_0, q_2$
$q_1$	$q_3$	$\epsilon$
$q_2$	$q_2, q_3$	$q_3$
$\rightarrow q_3$	$q_3$	$q_3$

### Solution:

The transition diagram can be drawn by using the mapping function as given in the table.



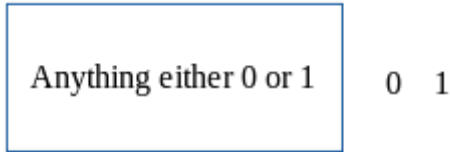
Here,

1.  $\delta(q_0, 0) = \{q_0, q_1\}$
2.  $\delta(q_0, 1) = \{q_0, q_2\}$
3. Then,  $\delta(q_1, 0) = \{q_3\}$
4. Then,  $\delta(q_2, 0) = \{q_2, q_3\}$
5.  $\delta(q_2, 1) = \{q_3\}$
6. Then,  $\delta(q_3, 0) = \{q_3\}$
7.  $\delta(q_3, 1) = \{q_3\}$

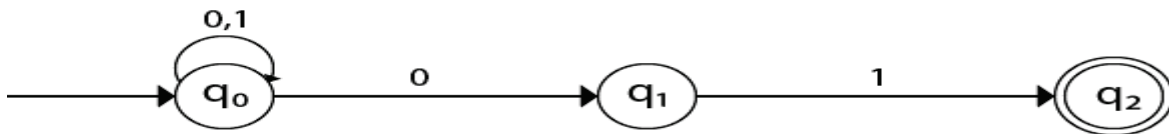
### Example 2:

Design an NFA with  $\Sigma = \{0, 1\}$  accepts all string ending with 01.

**Solution:**



Hence, NFA would be:



**Example 3:**

Design an NFA with  $\Sigma = \{0, 1\}$  in which double '1' is followed by double '0'.

**Solution:**

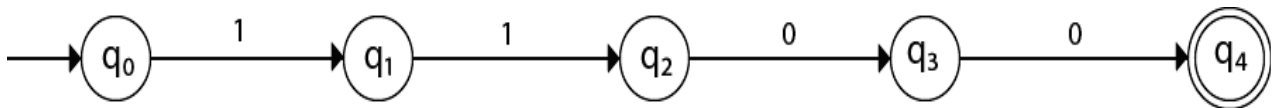
The FA with double 1 is as follows:

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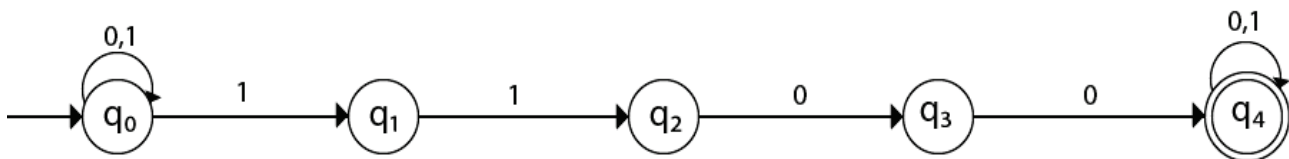
It should be immediately followed by double 0.

Then,



Now before double 1, there can be any string of 0 and 1. Similarly, after double 0, there can be any string of 0 and 1.

Hence the NFA becomes:



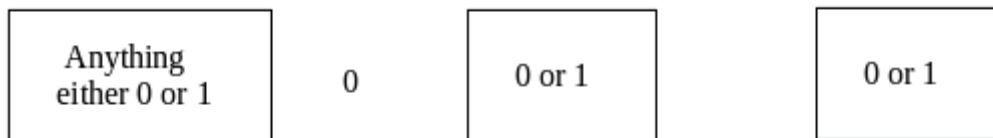
Now considering the string 0110011

1.  $q_0 \rightarrow q_1 \rightarrow q_2 \rightarrow q_3 \rightarrow q_4 \rightarrow q_4 \rightarrow q_4 \rightarrow q_4$

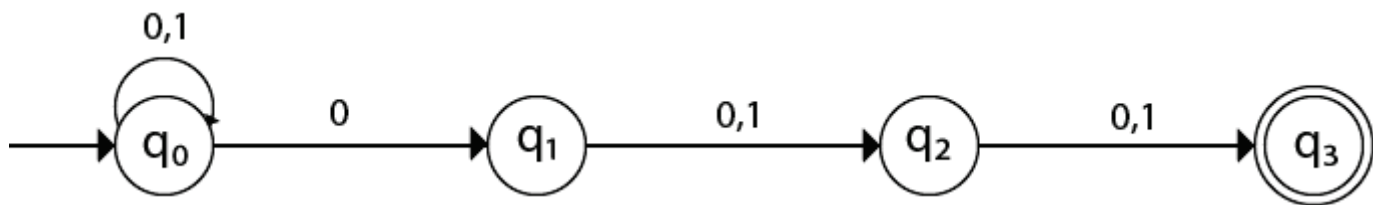
**Example 4:**

Design an NFA with  $\Sigma = \{0, 1\}$  accepts all string in which the third symbol from the right end is always 0.

**Solution:**



Thus we get the third symbol from the right end as '0' always. The NFA can be:



The above image is an NFA because in state  $q_0$  with input 0, we can either go to state  $q_0$  or  $q_1$ .