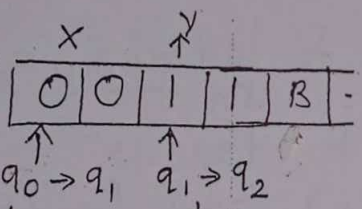
MODELS:

1. Construct a Turing Machine for $L = \{0^n 1^n \mid n \geq 1\}$

Solution:

* Initially the Turing Machine M contains $0^n 1^n$ followed by an infinity of Blanks.

For eg:



M repeatedly replaces the leftmost 0 by X and moves right to the leftmost 1, replacing it by Y, moves left to find the rightmost X, then moves one cell right to the leftmost 0 and repeats the cycle.

M =

	0	1	X	Y	B
q_0	(q_1, X, R)			(q_3, Y, R)	-
q_1	$(q_1, 0, R)$	(q_2, Y, L)		(q_1, Y, R)	-
q_2	$(q_2, 0, L)$	-	(q_0, X, R)	(q_2, Y, L)	-
q_3				(q_3, Y, R)	$(q_4$
q_4	-	-	-	-	-

$M = (\{q_0, q_1, q_2, q_3, q_4\}, \{0, 1\}, \{0, 1, X, Y, B\}$
$\delta, q_0, B, \{q_4\})$

To verify the string $w = 0011$

$q_0 0011 \vdash X q_1 011 \vdash X 0 q_1 11 \vdash$

$X q_2 0 Y 1 \vdash q_2 X 0 Y 1 \vdash X q_0 0 Y 1 \vdash$

$X X q_1 Y 1 \vdash X X Y q_1 1 \vdash X X q_2 Y Y \vdash$

$X q_2 X Y Y \vdash X X q_0 Y Y \vdash X X Y q_3 Y \vdash$

$X X Y Y q_3 \vdash X X Y Y B q_4$

* The Turing Machine accepts $\{0^n 1^n \mid n \geq 1\}$