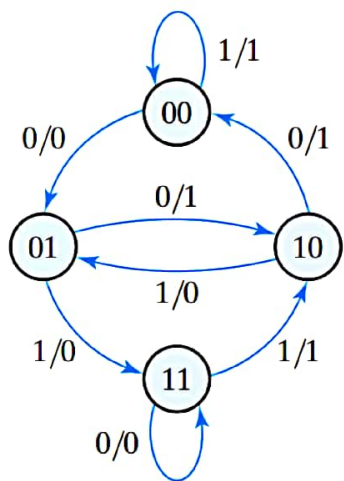


# State Diagram Problem

## State Diagram



## State Table (Using JK-flipflop)

Current State	Next State						Output	
	x = 0			x = 1			x = 0	x = 1
	A B	A	B	A B	A	B	y	y
a b		J1 K1	J0 K0		J1 K1	J0 K0		
0 0	0 1	0 d	1 d	0 0	0 d	0 d	0	1
0 1	1 0	1 d	d 1	1 1	1 d	d 0	1	0
1 0	0 0	d 1	0 d	0 1	d 1	1 d	1	0
1 1	1 1	d 0	d 0	1 0	d 0	d 1	0	1

# Karnaugh map (using JK-flipflop)

$J_0(B)$

$x \backslash ab$	$\overline{a}\overline{b}$	$\overline{a}b$	$a\overline{b}$	$ab$
$x$	1	d	d	
$\overline{x}$		d	d	1

$$J_0 = a\overline{x} + \overline{a}x = a \oplus x$$

$K_0(B)$

$x \backslash ab$	$\overline{a}\overline{b}$	$\overline{a}b$	$a\overline{b}$	$ab$
$x$	d	1		d
$\overline{x}$	d		1	d

$$K_0 = J_0$$

$J_1(A)$

$x \backslash ab$	$\overline{a}\overline{b}$	$\overline{a}b$	$a\overline{b}$	$ab$
$x$		1	d	d
$\overline{x}$		1	d	d

$$J_1 = b$$

$K_1(A)$

$x \backslash ab$	$\overline{a}\overline{b}$	$\overline{a}b$	$a\overline{b}$	$ab$
$x$	d	d		1
$\overline{x}$	d	d		1

$$K_1 = \overline{b}$$

$y$

$x \backslash ab$	$\overline{a}\overline{b}$	$\overline{a}b$	$a\overline{b}$	$ab$
$x$		1		1
$\overline{x}$	1		1	

$$y = \overline{a}\overline{b}\overline{x} + \overline{a}b\overline{x} + a\overline{b}x + abx$$

$$y = \overline{b}(\overline{a}\overline{x}) + b(\overline{a}x)$$

$$\Rightarrow y = b \oplus (a \oplus x)$$