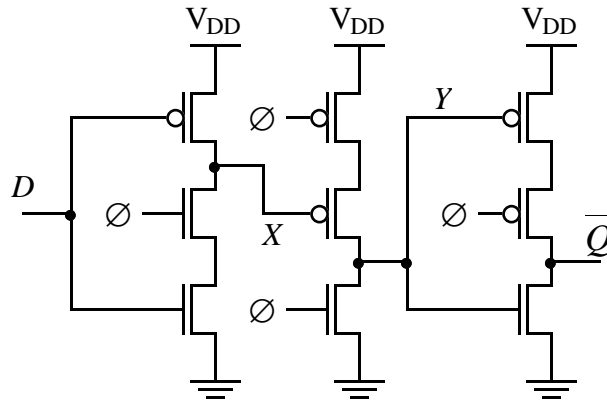# Back to TSPC D Flip-Flops:
Falling Edge-Triggered Observations
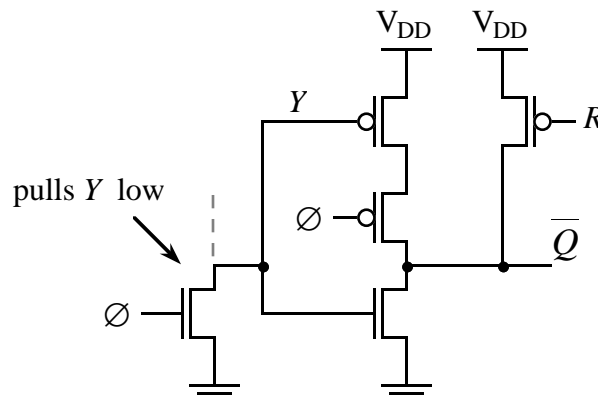

When clock = 0, Y node controls $\overline{Q}$, <u>but</u> X_{old} value controls $\underline{Y}$!
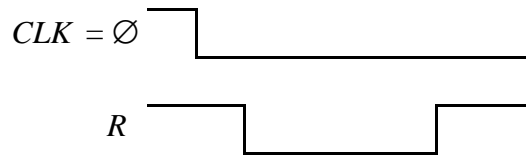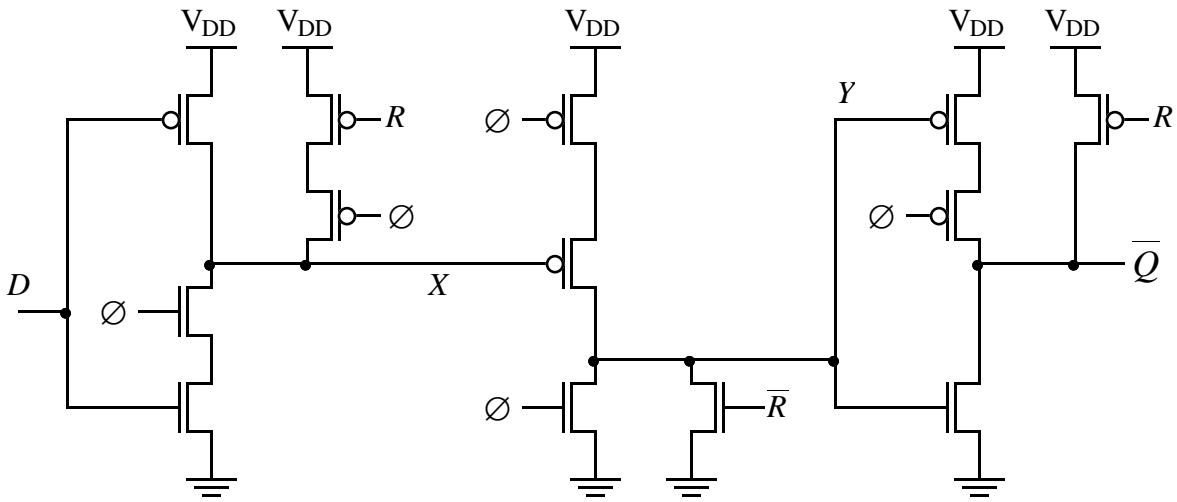
clock	D	X	Y	$\overline{Q}$
0	1	$X_{old} = 0$	1	0
		$= 1$	$Y_{old} = 0$	1
			$= 1$	0

When clock = 0, reset will have to affect both X, Y nodes!!!

When clock = 1, only internal node which can affect $\overline{Q}$ is Y and this is pulled <u>low</u>. This means we will <u>have to</u> put a pullup directly on $\overline{Q}$ (at least), also must set $Y = 0$.

Falling Edge Triggered TSPC D-Flip Flop with Asynchronous Low-True Reset

$$X = 1 \qquad X = 1 \text{ or } X_{old} = 1$$
$$Y = 0 \qquad \underline{Y = Y_{old} = 0}$$
$$\overline{Q} = 1$$

$$Y = 0 \qquad\qquad \overline{Q} = Q_{old} = 1$$
$$\overline{Q} = 1$$
$$X = \text{don't care}$$