

SQUARE WAVE GENERATOR

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OBJECTIVE OF PROJECT

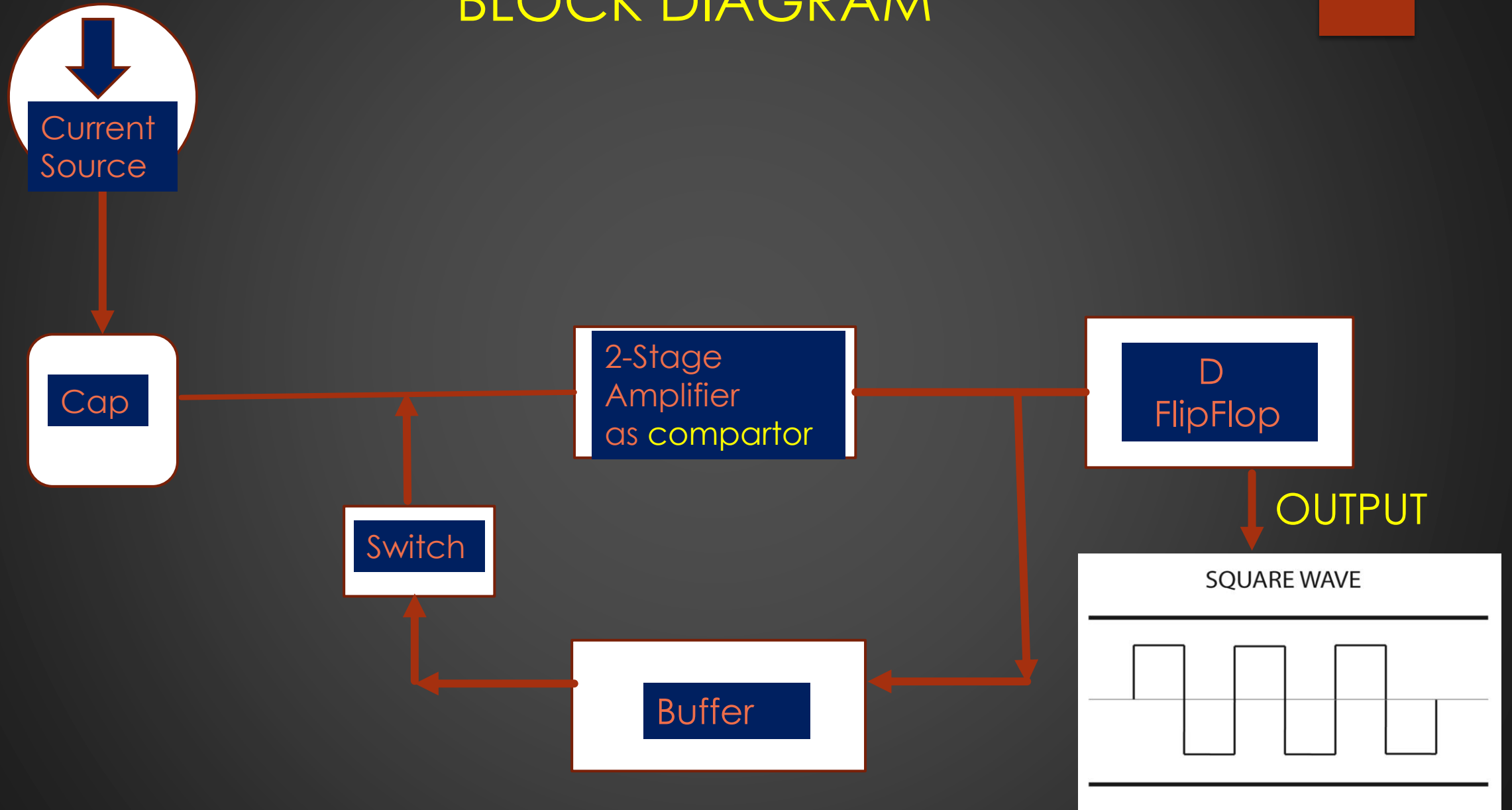
- ❖ To generate a square wave with low frequency and low power.
- ❖ Objective behind our project is to generate a square wave by using a Comparator(2-stage amplifier) ,and D-FlipFlop.

APPLICATIONS OF SQUARE WAVE

Square waves are used as:-

- ❖ Clock pulses in many digital circuits
- ❖ Checking Amplifier response
- ❖ Power Inverters to generate driving pulse in power amplifiers
- ❖ Switching pulses
- ❖ Control motor with pulse width modulation.
- ❖ As baseband signal through wired media

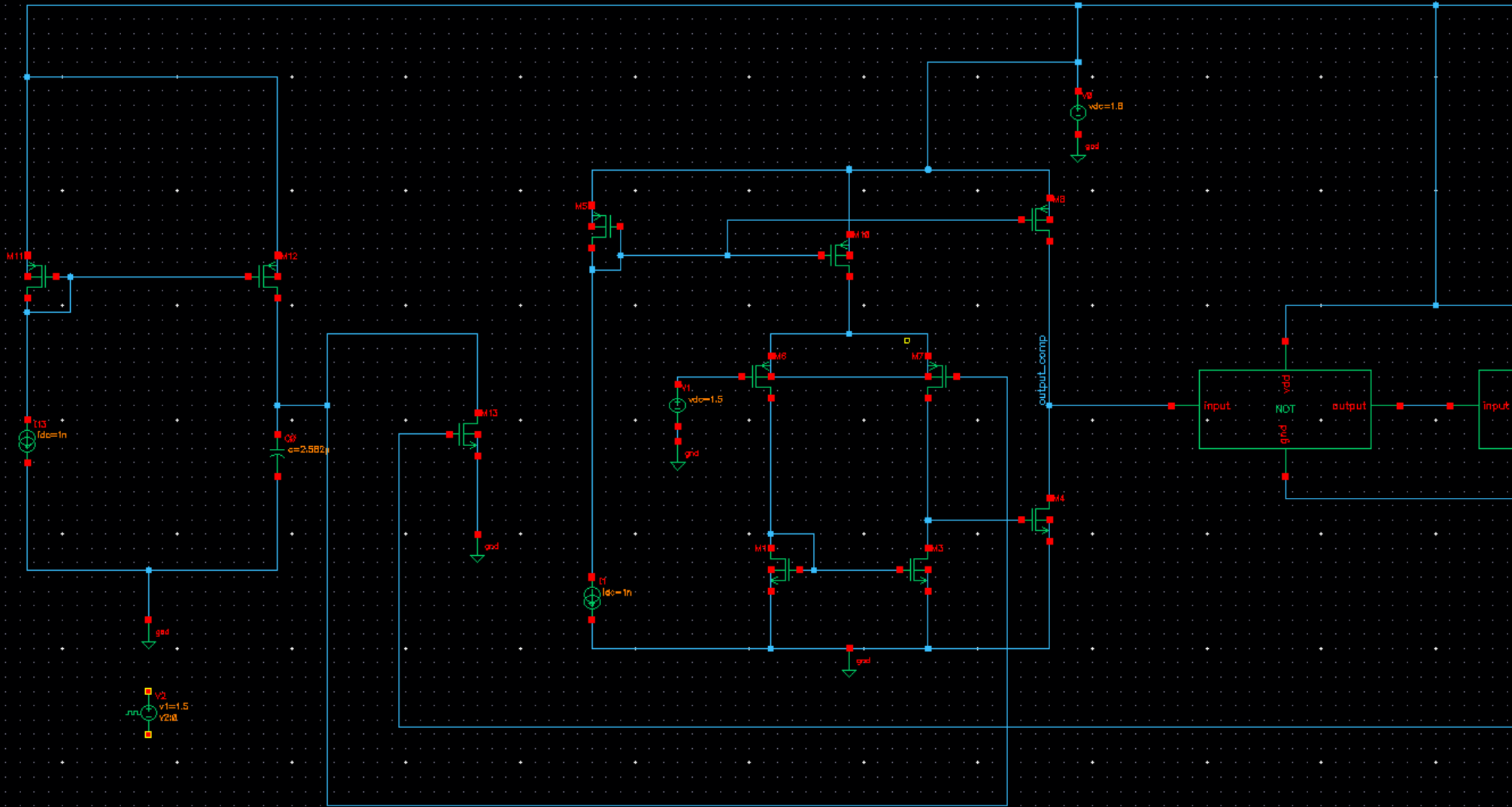
BLOCK DIAGRAM



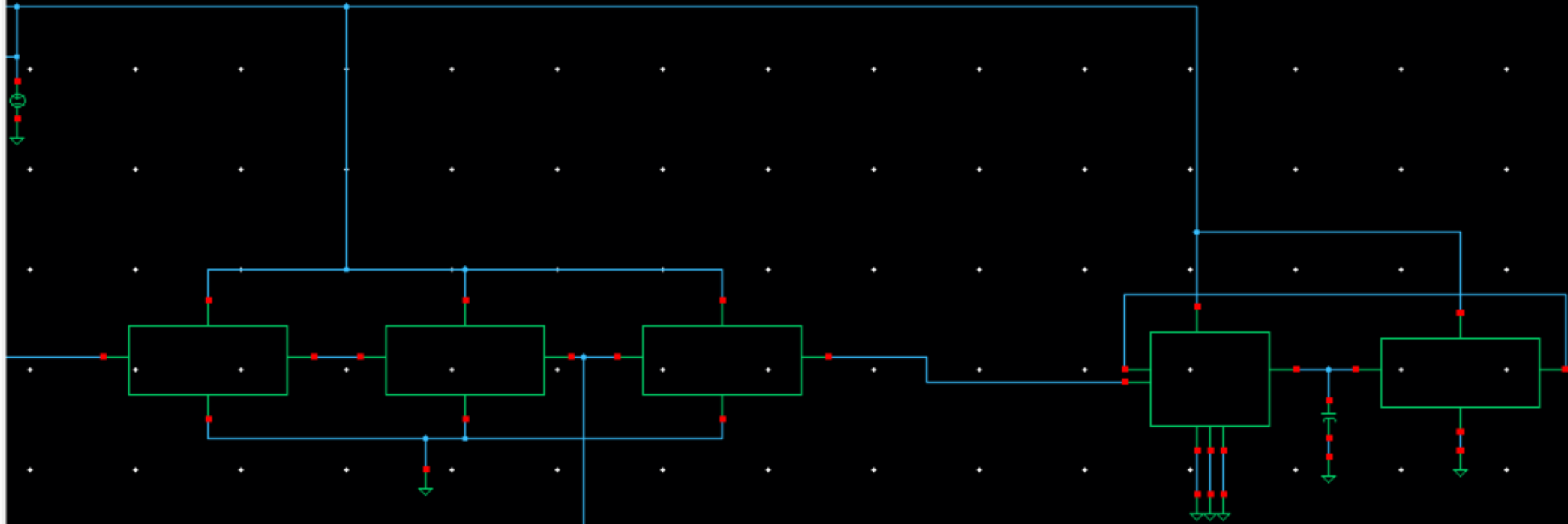
WORKING

- ❖ Initially switch is open . So the current source charges capacitor.
- ❖ We design the switch such a way that it gets charge when capacitor gets charged to reference voltage by giving output of comparator to switch using Inverters.
- ❖ So the input to the +V e terminal of comparator is “Saw Tooth Pulse”
- ❖ Now the output of comparator is given to D_FlipFlop as clk so as to generate a square wave with half the frequency and DutyCycle 50%.

SCHEMATIC OF DIFFERENTIAL AMPLIFIER WITH SWITCH



BUFFER WITH D_FLIP_FLOP



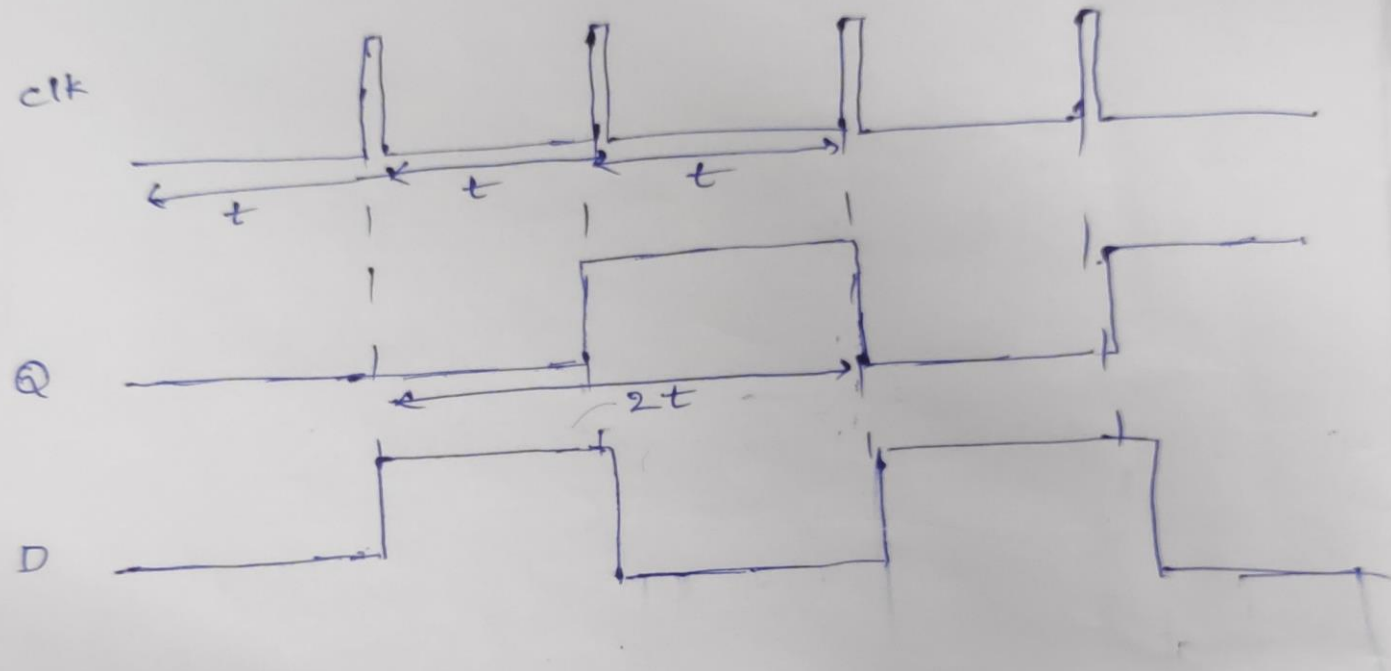
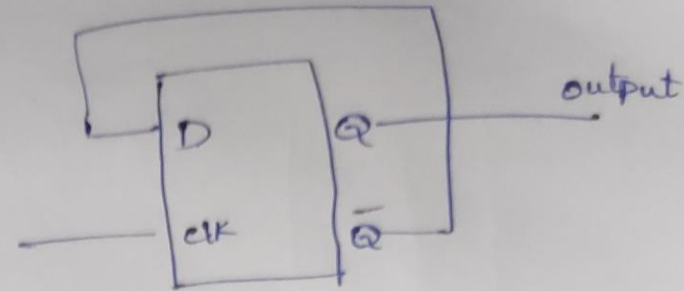
WORKING OF COMPARATOR

- ❖ 2 Stage op-Amps are used to achieve higher gain.
- ❖ We have designed comparator in such a way that the output goes to + V_{dd} when the difference between reference voltage and applied voltage > 0 .
- ❖ We have used currents (order of nA) so that all MOSFETS can be in Sub-Threshold Region and Power Consumption is low.

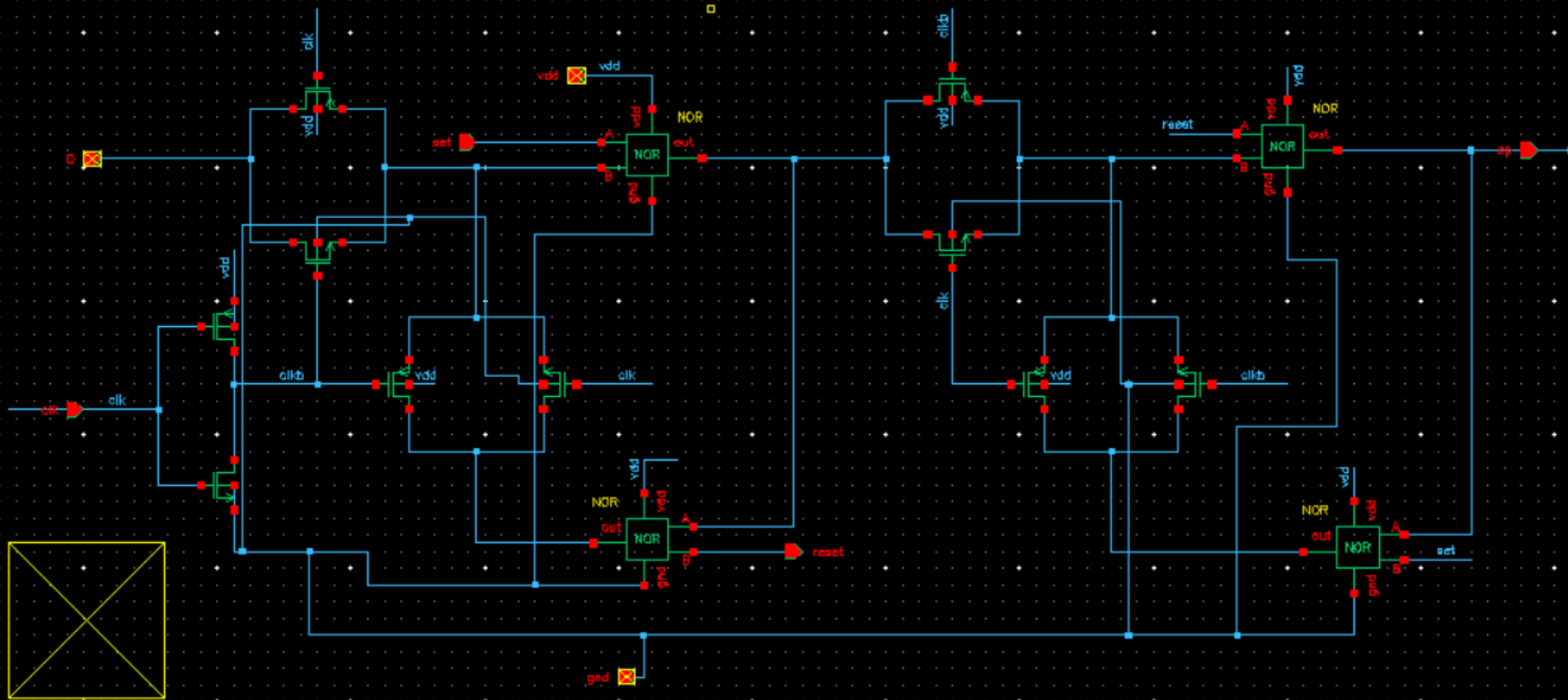
WORKING OF SWITCH

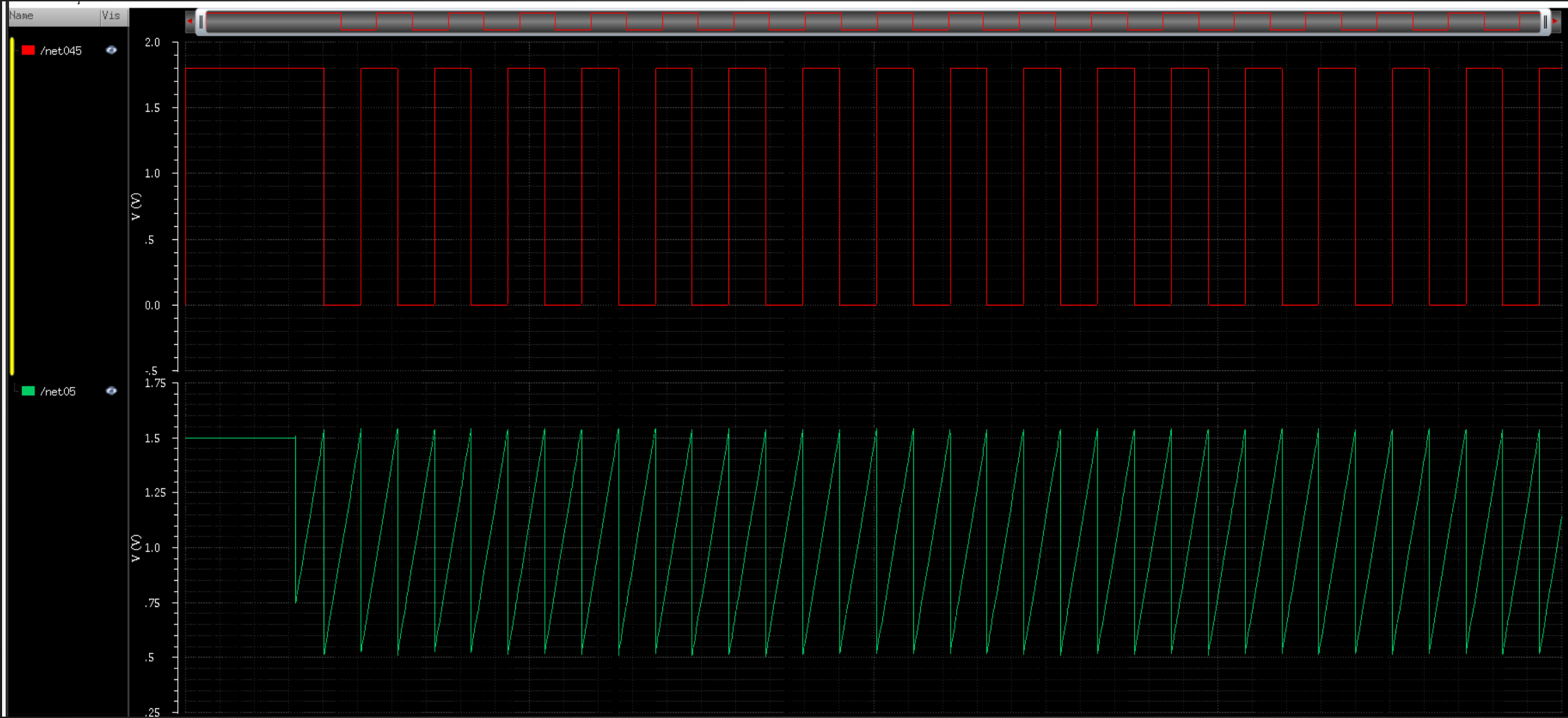
- ❖ We have designed switch using a N-MOS with gate connected to output of comparator
- ❖ So the switch closes when capacitor gets charged to Reference Voltage as the output of comparator is $+V_{dd}$

OUTPUT OF D_FLIPFLOP



SCHEMATIC OF D_FLIPFLOP





THANK YOU

