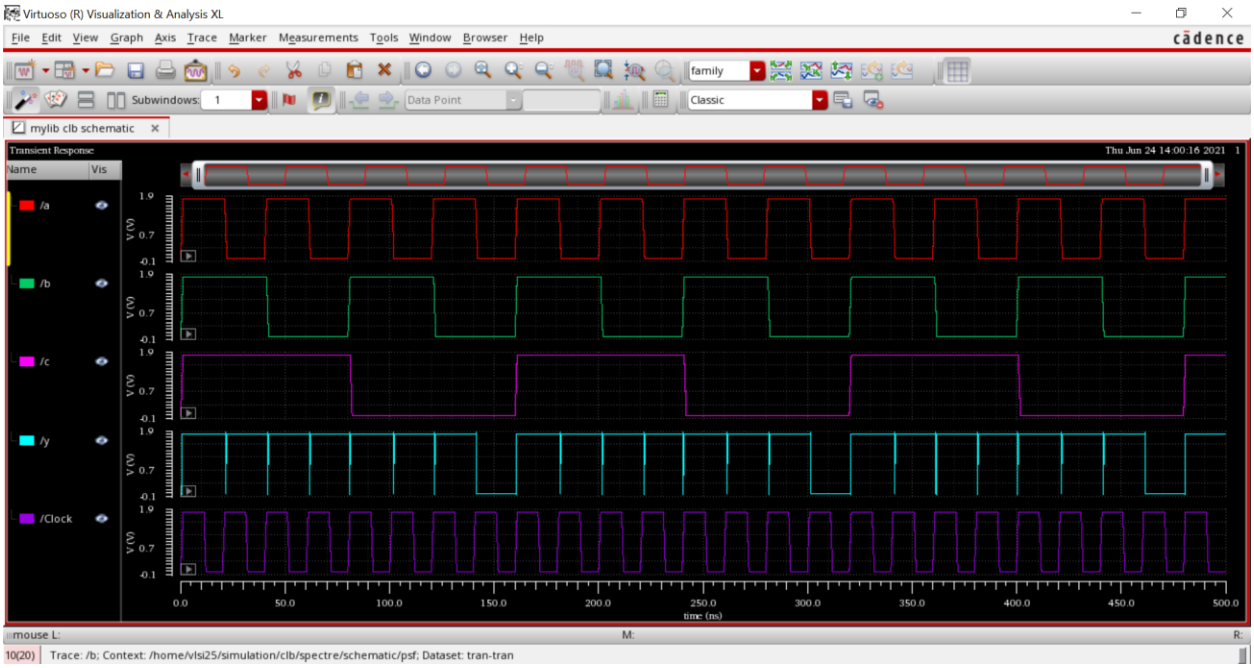
Tasks to be done –

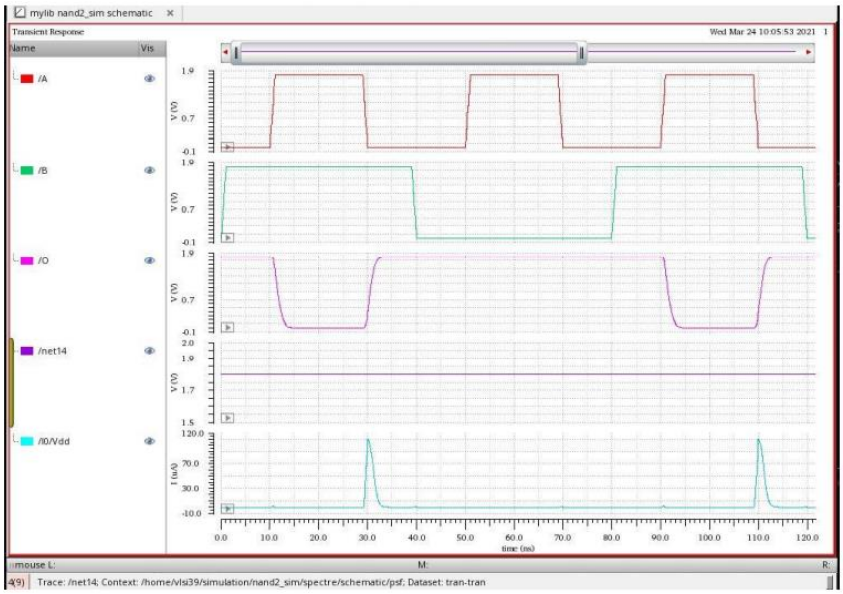
1. Optimize the widths of nmos and pmos in the circuits (most probably make the rise time and the fall time equal to each other)
2. Optimizing can be done by reducing the capacitance values which is also adjustment of the widths of the mosfets

Which one is to be done is not entirely sure yet but most probably we'll do the first one.

Design Metrics (to be done after optimization) –



1. Delay – Two inputs are to be made 0 one by one while keeping only one input pulsating and measuring the output delay with respect to that input (abc → x00,0x0,00x; where x means pulsating value). The greatest delay will be the worst case delay
2. Frequency - Two inputs are to be made 0 one by one while keeping only one input pulsating and reducing the time period gradually and noticing whether the output can track the input. Do it for the other two inputs too and note down the lowest time period (where the output is still correct) for each one. The lowest time periods (or frequency) for each input will be different. (If A, B, C have 2, 4, 6ns as lowest time period, then the maximum operating frequency will be that of C which is 6ns)
3. Active Energy – As the inputs are pulsating, the output is actually continuously switching ports (when ABC is 111, output of LUT comes from 7 port; ABC is 110, output of LUT comes from 6 port and so on). Thus, there is a switching event going on when inputs change their states. From the following figure, we can see that there is an energy dissipation in this switching event. So, we have to calculate the energy at that switching interval. (plot the source current and voltage and integrate V*I to get the energy for the cases when output is 1; when output is 0, that will be a bit different I guess). We have to calculate for all 8 switching events and take the average.



4. Leakage Energy – When the inputs are stable, there should not be any current flow from voltage source to ground but there will be a little current flow. We have to plot the current and take the integral (V*I) for the interval when the inputs are stable to determine leakage energy.