# Homework 1

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1. Pull down the `prop_delay.zip` folder and simulate it in Modelsim. Include a similar waveform screenshot in your report and explain why each and every signal transition happens between 2 and 3ns.
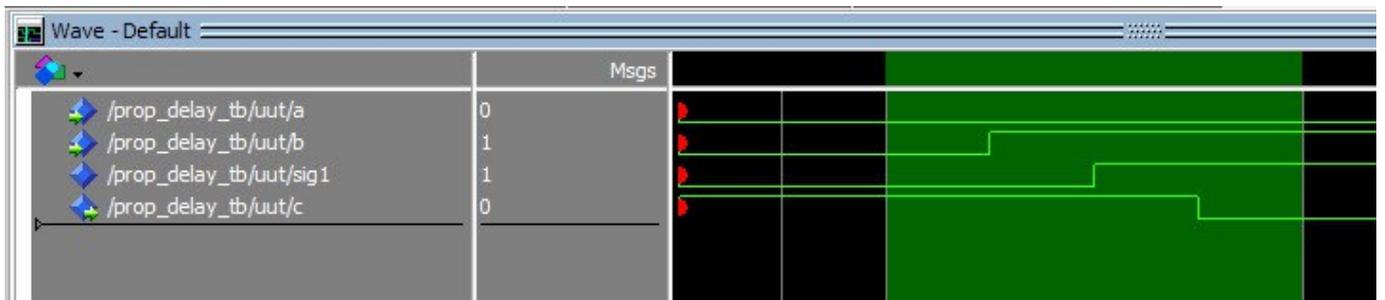
The transition from `2ns` to `+1` is the parsing of the first line of the `vhd` file (that is, `sig1 <= a or b;`). The transition from `+2` is the cascading change (that is, `c <= not sig1;`).

2. Pull down the `concurrency.zip` folder and simulate it in Modelsim. Include a similar waveform screenshot in your report and explain:
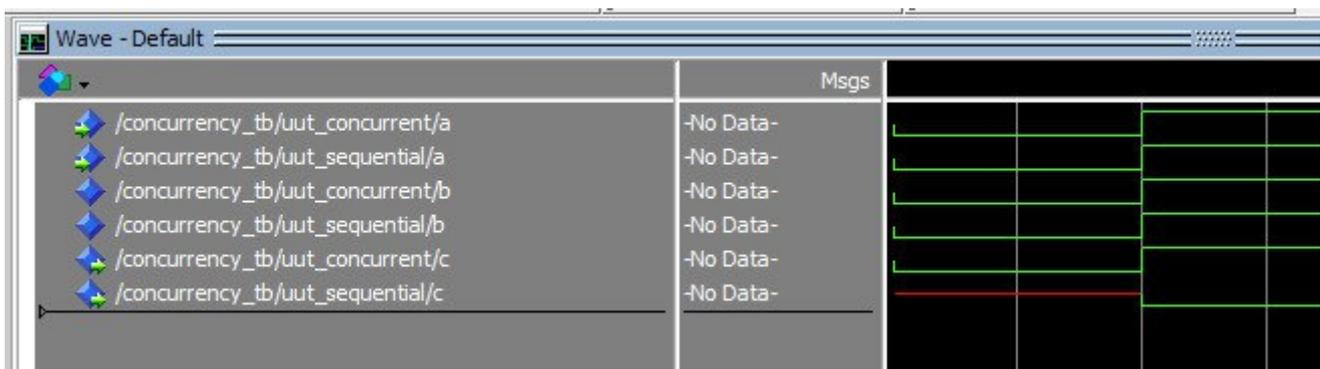
- Why is `sequential c` initially undefined, while `concurrent c` has a starting value of `0`?

Sequential values can only be implied one transition down. Concurrent values can be constantly re-checked, and include mid-state transitions.

- Why are the final values in `sequential c` and `concurrenct c` different?

The final values are different between sequential and concurrent, partially due to sensitivity lists and partially due to the inherent nature of processes. With the sequential version, `c` is set to

the value of `b` *at time of transition*, which is `0`. It then does not change further, since `b` isn't in the sensitivity list. With the concurrent simulation however, all transitions are simulated simultaneously, and signals `a`, `b`, and `c` can be thought of as "strung together". `a` will immediately change `b`, which will in turn immediately change `c`.

3. Pull down the `concurrency.zip` folder and simulate it in Modelsim. Run the program as is, and save a waveform screenshot. Then run the program with `b` added to the sensitivity list shown below, and save a screenshot of this waveform as well. Include both waveforms, and explain why they are different.
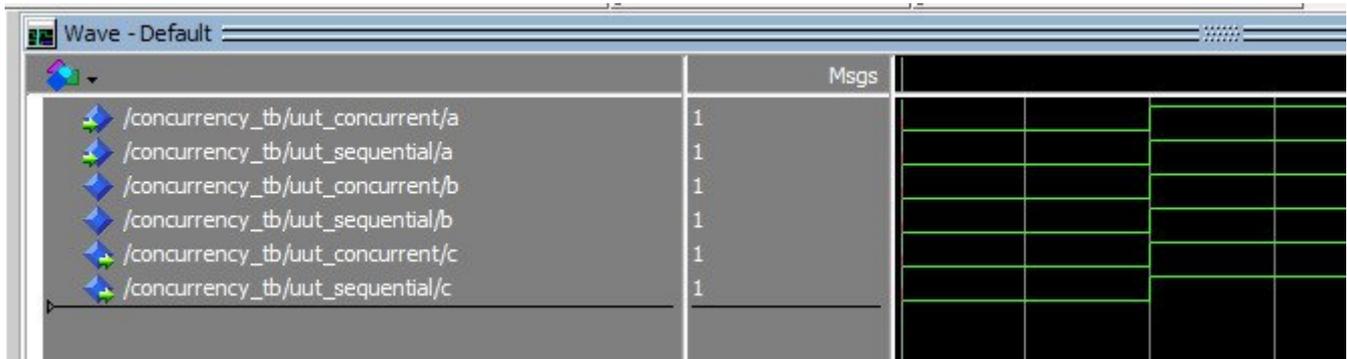
Initially, the process does not include `b` in the sensitivity list. So, when `b` changes, and `s='0'`, no change in `c` happens despite the inclusion of the set statement in the process. This is due to the fact that simulations use sensitivity lists to determine when to recalculate. However, when `b` is added to the sensitivity list, the change successfully happens.