ECE 574 – VLSI System Design

Homework n°4: GCD engine – Designing with simple data and a mealy state machine

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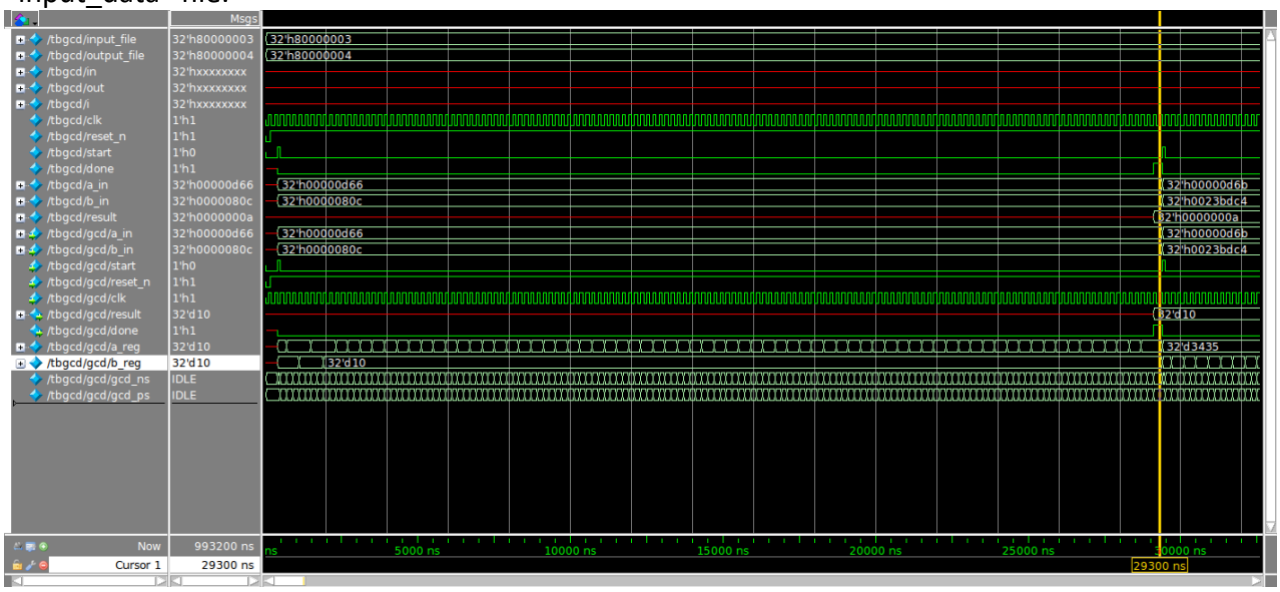
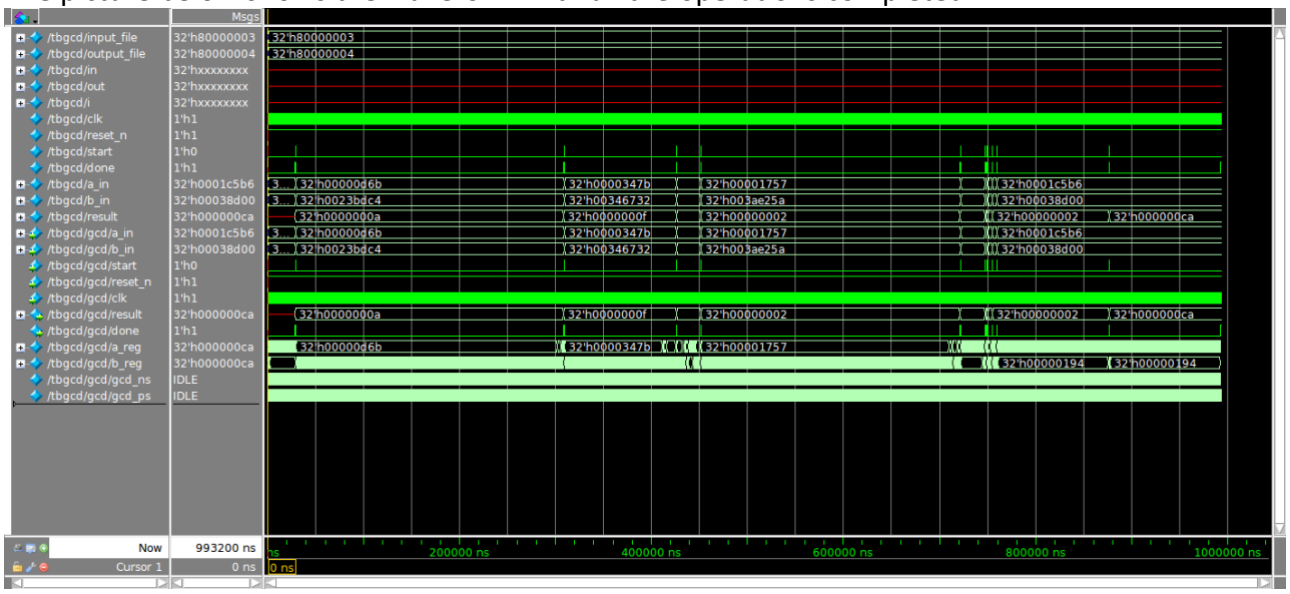
1. Waveforms

The waveform below shows the behavior of the signals for the first operation given in the "input_data" file.

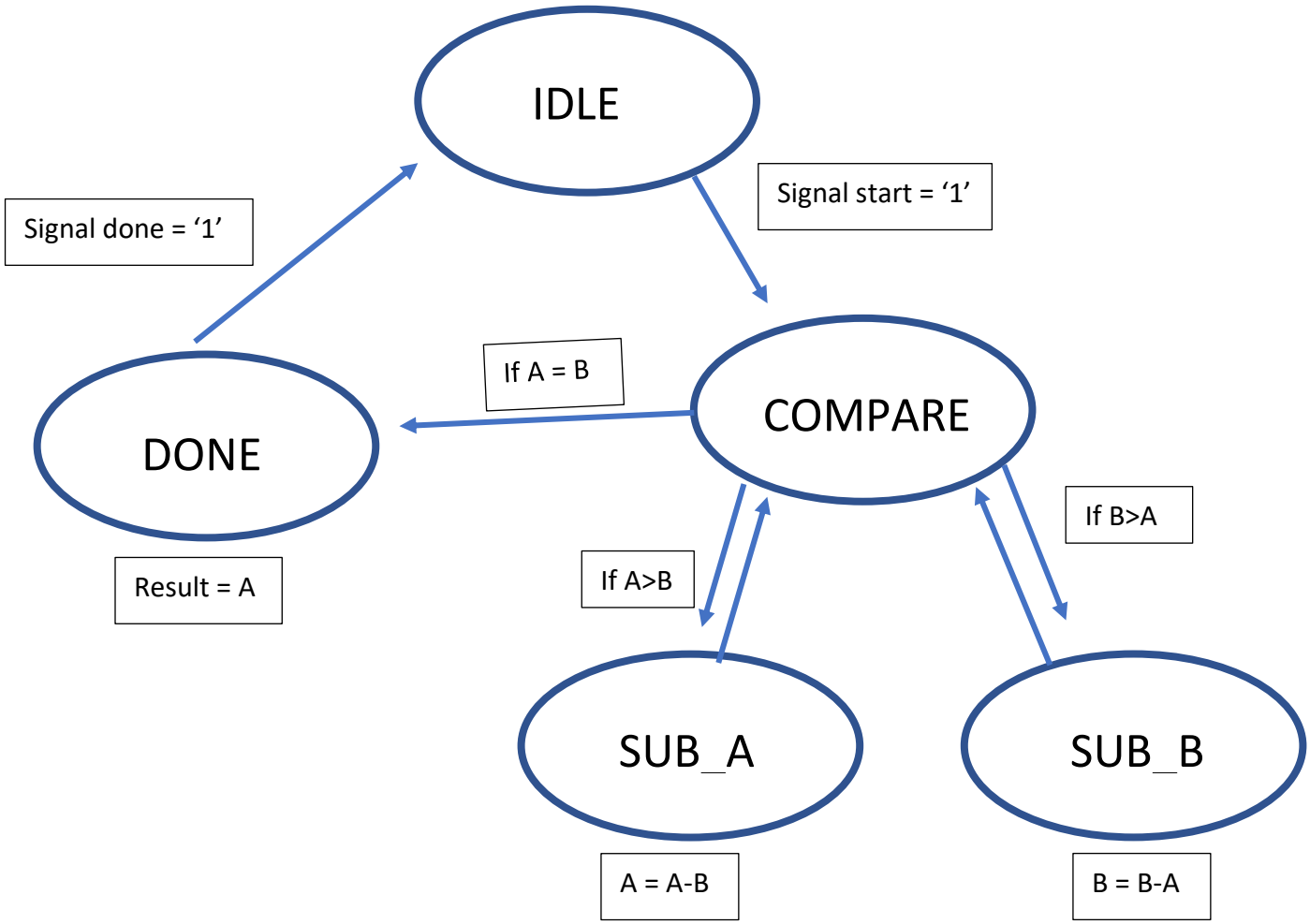


The picture below shows the waveform with all the operations completed.



(both pictures are also available in the "Waveforms" folder of the archive).

2. Mealy State Machine



The state machine works the following way:
At first, we are in the IDLE state waiting for the values of the input to be loaded. The values have been loaded when the signal 'start' is asserted. When 'start' is asserted, we move to the COMPARE state where we look if the input A is bigger, lower or equal to the input B.
If A is superior to B, we go to the SUB_A state and subtract the value of B from A (A = A-B) and automatically return to the COMPARE state.
If B is superior to A, we go to the SUB_B state and subtract the value of A from B (B = B-A) and automatically return to the COMPARE state.
If A equals to B, we move to the DONE state. We save the value of either A or B into the 'result' output and assert the done signal. We then proceed to go back to the IDLE state.