Computer System

COS10004

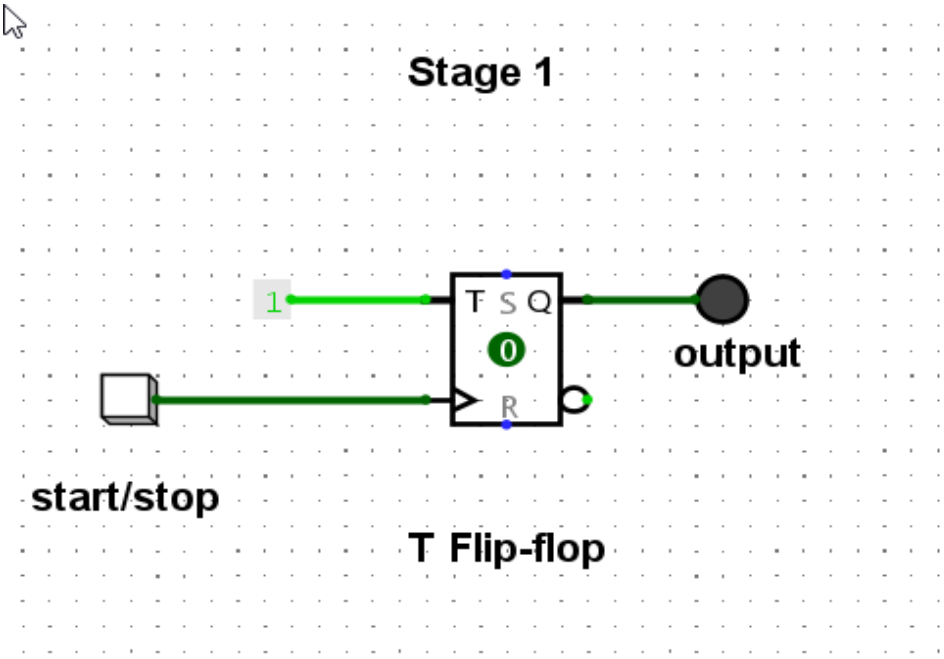
Assignment-1

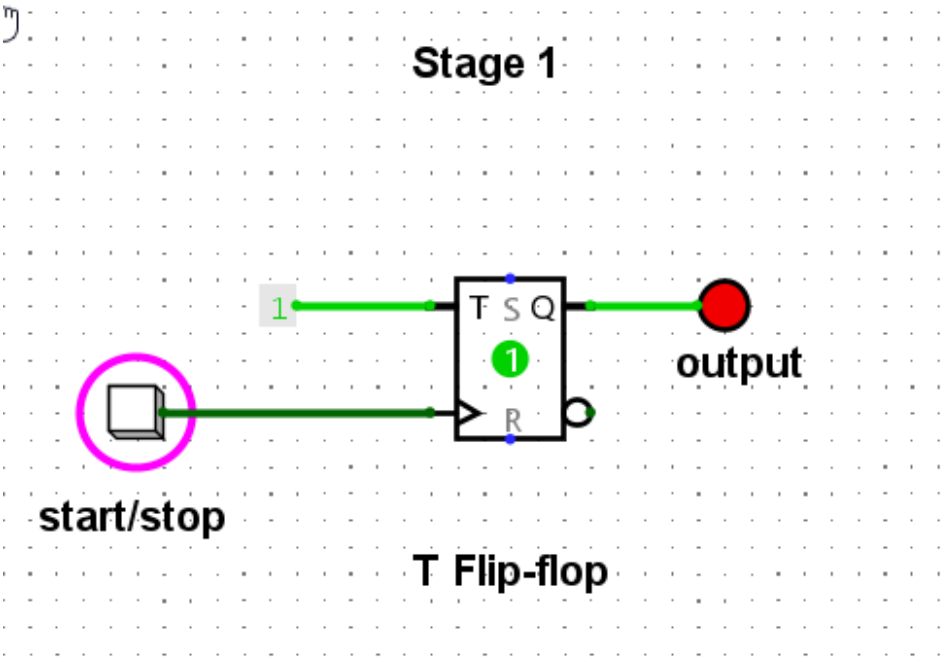
Digital Stopwatch

We were given to make a stopwatch in Logisim as an individual assignment. Initially it looked easy but as the stages progressed it became more challenging. But all the stages were based on each other. Overall, it was fun and challenging to attempt .

Stage 1

In stage 1 I had to implement a start/stop circuit which toggled between the states every time the button was pressed/clicked to do that I used T-flip to toggle the states and a constant data unit as well.



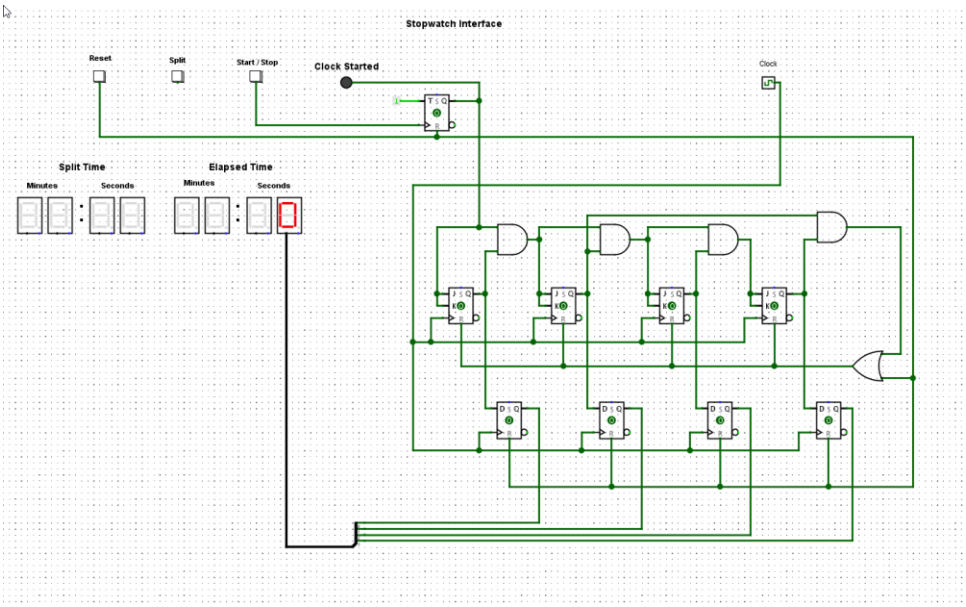


Stage 2

In this I implemented the single digit from 0-9 using a counter attached to a hex display. So, what happens is when the start/sop button is pressed it starts counting from 1-9 through the JK flip flops and d flip flops up to 9 and when it reaches 10 it resets itself through the OR gate which is connected to the AND gate connected fourth and second flip-flop.

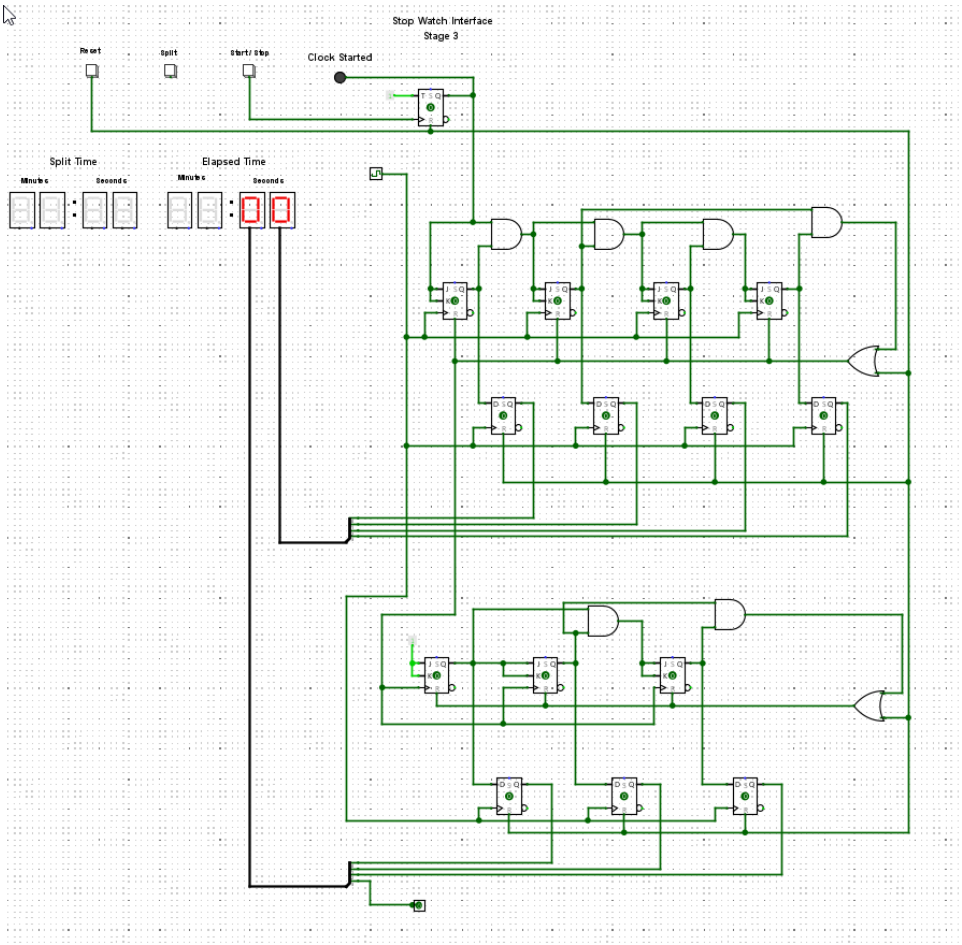
There is hex display connected through splitter through the d flip flop so there is no illegal state and also to store when in stop state.

We have done this in week 4 lab class. MOD-10 counter



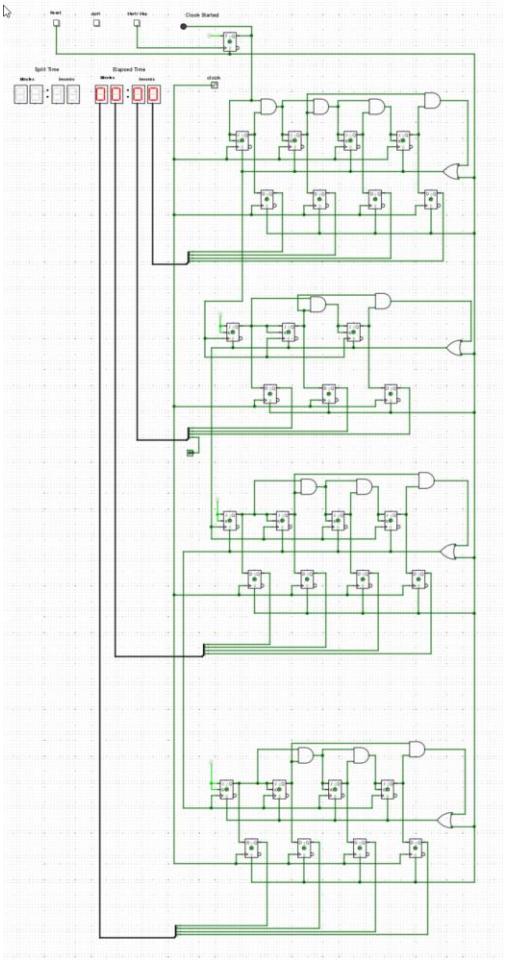
STAGE 3

In stage 3 I implemented the full two-digit “seconds” display. Using the concept as shown in stage 2 I made a tents place counter connected it to the one place (d-flipflop) and as we had to do it till 59 and then rap back to 00. It the input pulse form ones the ones place when it reaches 10. MOD-6 counter till 5.



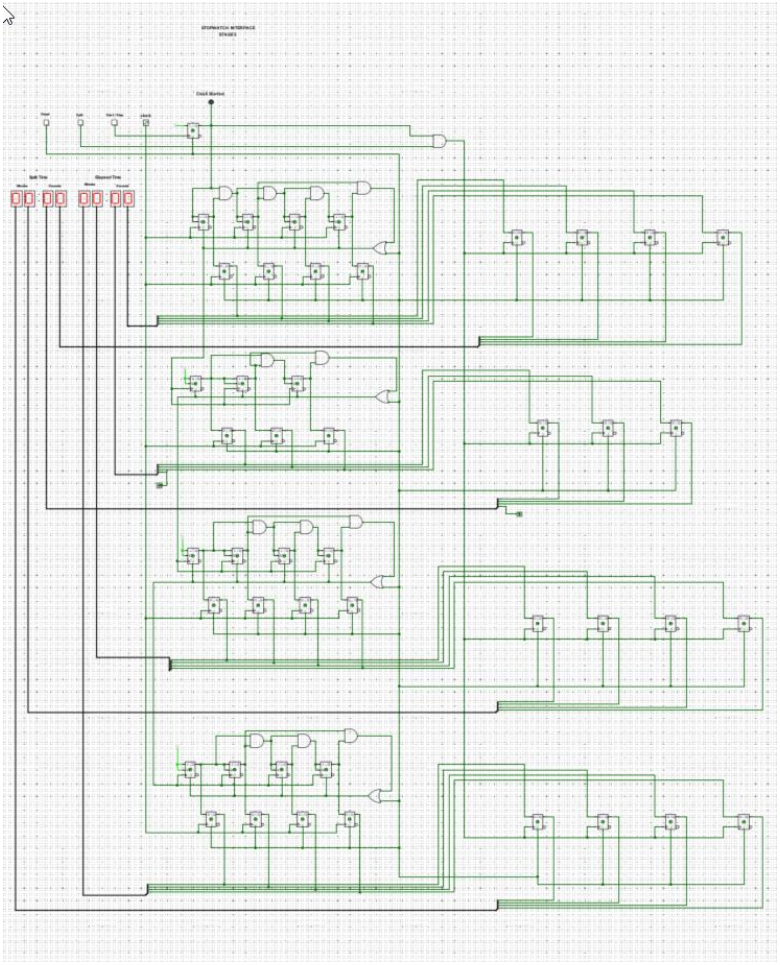
Stage 4

I implement the minutes display in this stage. I applied the same thing from stage 3 by using 2 MOD-10 counter so that when it reaches 59 it adds 1- 99 to the minutes display.



STAGE 5

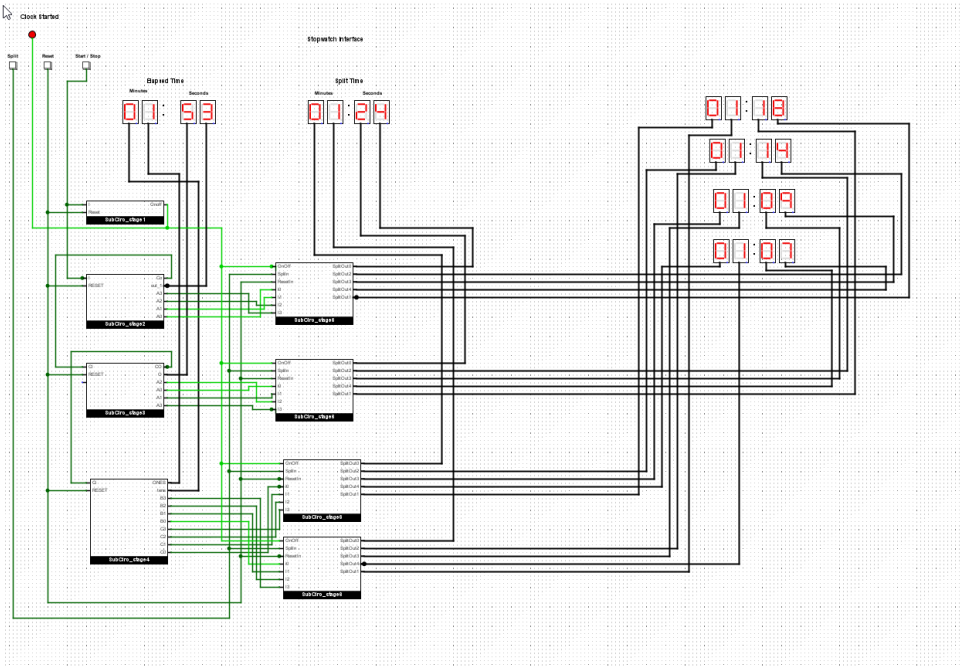
In this stage I implemented the split button to record the time. For this I had to record the lap time when the split button was clicked so I wired the circuit from the previous stage to D flip flops that would store when the split button was clicked. I wired the D flips flops to the T flip flop though and gate so that it only saves the time from when the split was pressed and resets when pressed again.



STAGE 6

In this I had to make multi-split display for each time (5) the split button was clicked. I used sub circuits so that it's easier and a lot neater. Inside the sub circuits there are the concepts from the stage 1-5 and the use of stack for storing the multiple lap times. In the sub circuits I had to use pins and name them so that when connecting to the main circuit it's easier also with the 5 displays. I am using LIFO concept so that when a new lap time is stored it removes the last lap time in the 5 th display.

Although I admit it’s a little buggy as I was not able to perfect it, so it fulfils the major purpose of stage 6 but with some downsides as well. For the split time in the stop state is not working (6b)



I have 2 main Logisim files, one up to stage 5 complete. One up to stage 6 with some problems.