Digital Stopwatch

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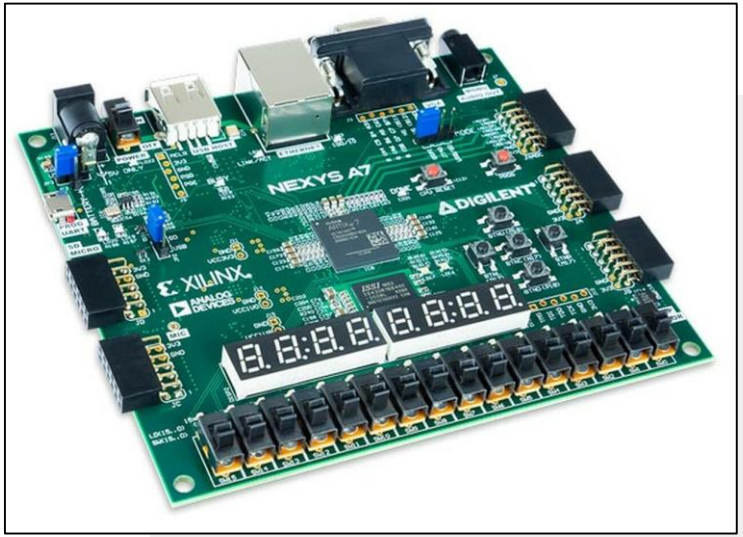
ECE 2700 | Digital Logic Design | Dr. Daniel Llamocca

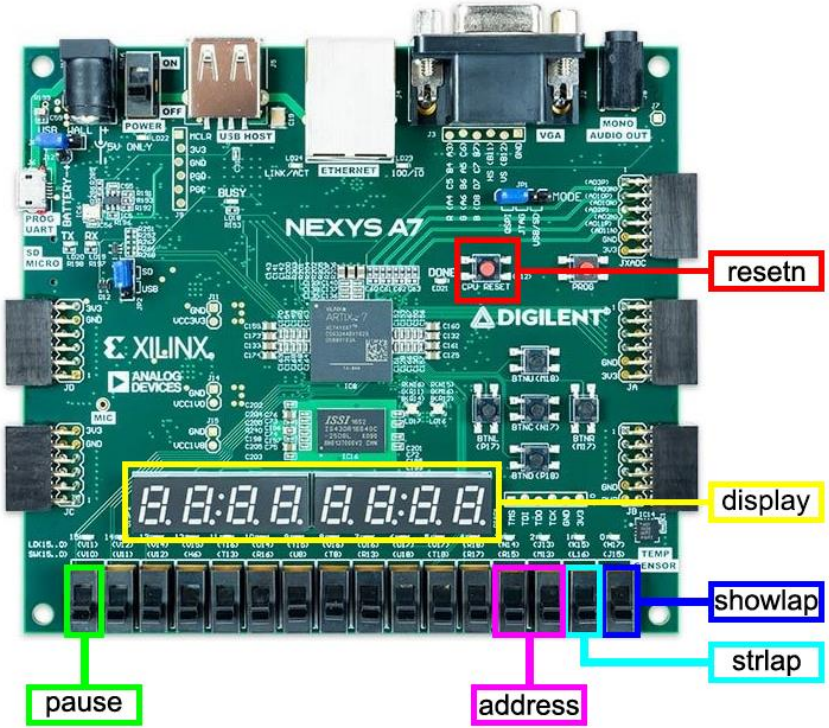
Objective & Functionalities:

This fully functioning digital stopwatch has the ability to:

- Store and display up to four different lap times.
- Display a maximum time of 99:59:59:99

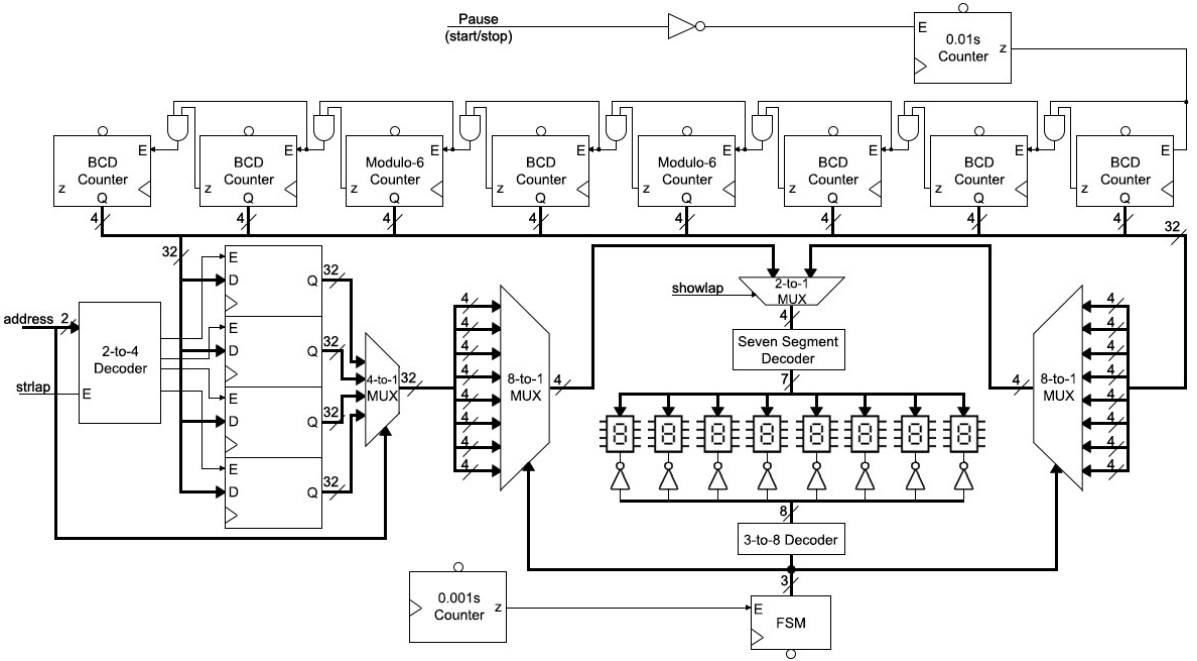


Constrains:

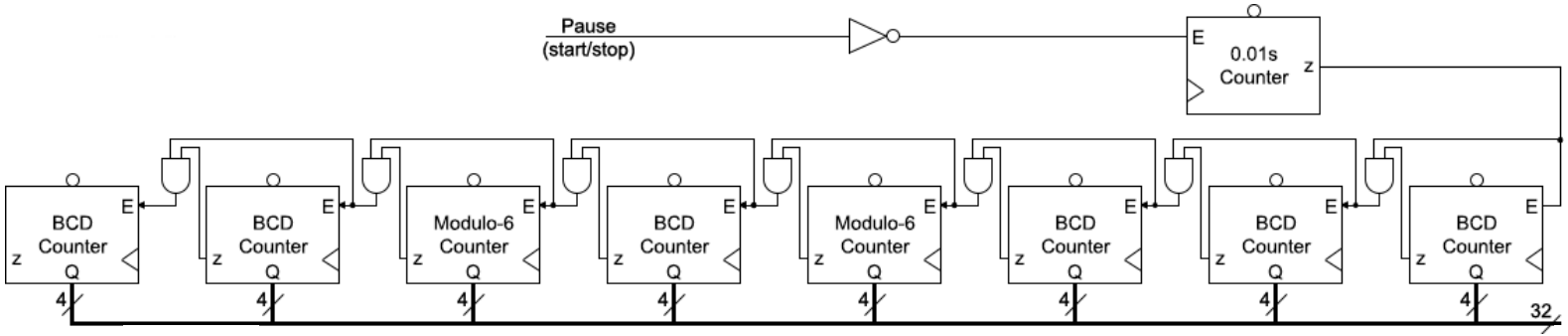


Included Components:

- Counters
- Random Access Memory (RAM) Emulator
- Seven Segment Serializer
  - Finite State Machine



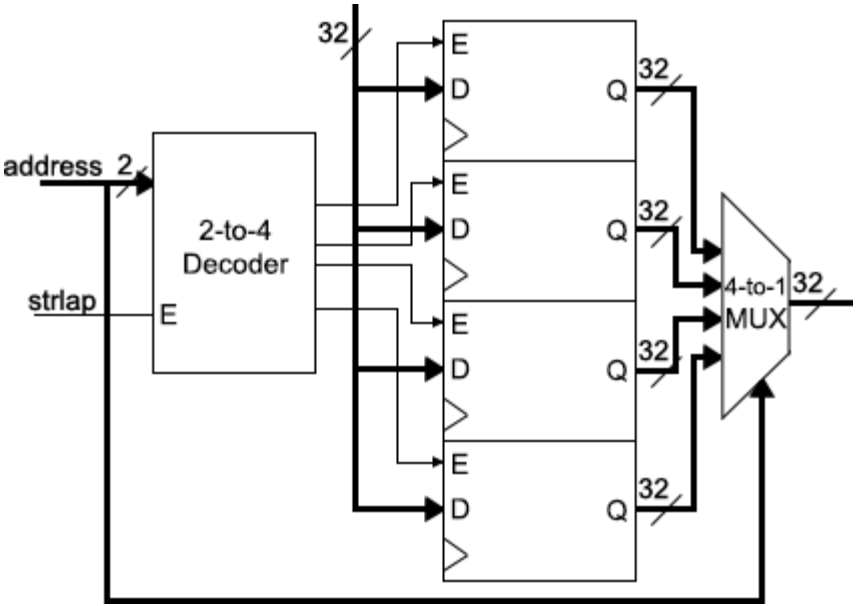
Counters



- 9 counters
  - One counter for increments of 0.01s (a hundredth of a second)
- Start/stop feature to determine when counter is paused

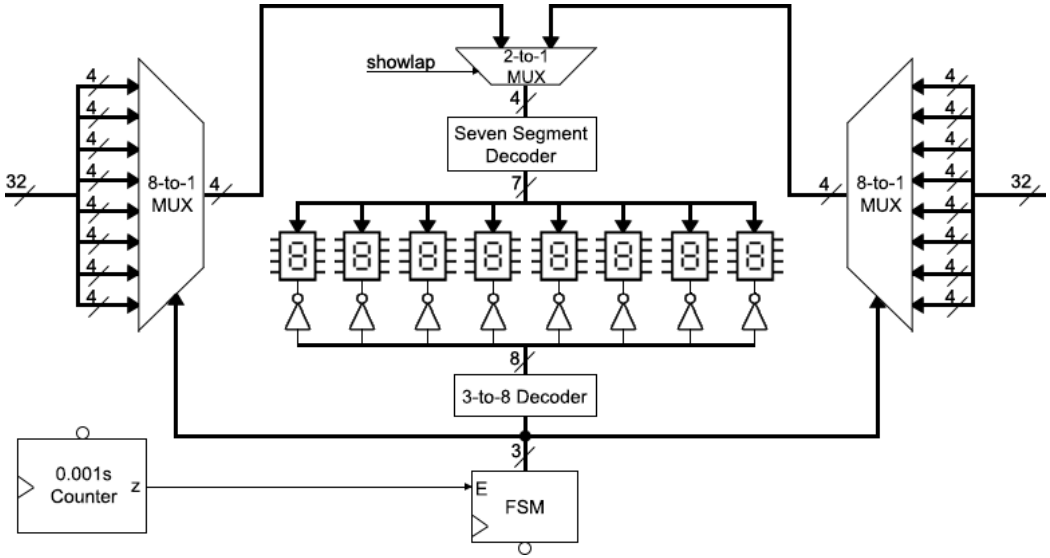
Random Memory Access (RAM) Emulator

- Stores up to four laps.
- strlap is connected to the decoder enable to determine when the user wants to store a lap.
- address input determines which lap is currently selected for both registering or displaying.
- 4-to-1 multiplexor allows only one lap to be selected at a time.



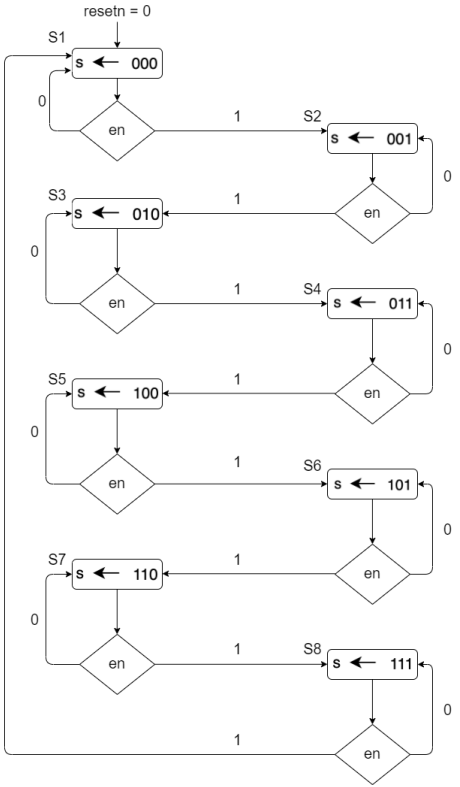
Seven Segment Serializer

- Two 8-to-1 multiplexers:
  - One for the current count
  - One for stored laps
- FSM to control the select of the multiplexers and to control which display is being updated
- The showlap selects whether to display the current count or the stored lap.



Finite State Machine (FSM)

- This FSM has 8 states
  - one for each seven-segment display
- Controlled by a 0.001s (1ms) counter
- Switches between different states at the rate of the counter and attributes values to the output s.



Demonstration

https://www.youtube.com/watch?v=NXjo55t8gvE&ab_channel=MarissaToma

Thank You for Listening

Any questions?