Shifting Banner Utilizing Seven Segment Displays

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How it works

- A selected message is output through a mux to the shift registers.
- Shift registers store and display the base value before initiating banner shifting.
- The display control circuit, utilizing two counters and muxes, gives us the ability to select from two different shifting speeds and allows us to pause the display mid shift.
- Our FSM coordinates with the 8-to-1 mux and 3-to-8 decoder to ensure synchronization between the selected character and the correct display.
- Output passes through hex2_7seg before reaching the display.

# Complete Circuit Diagram
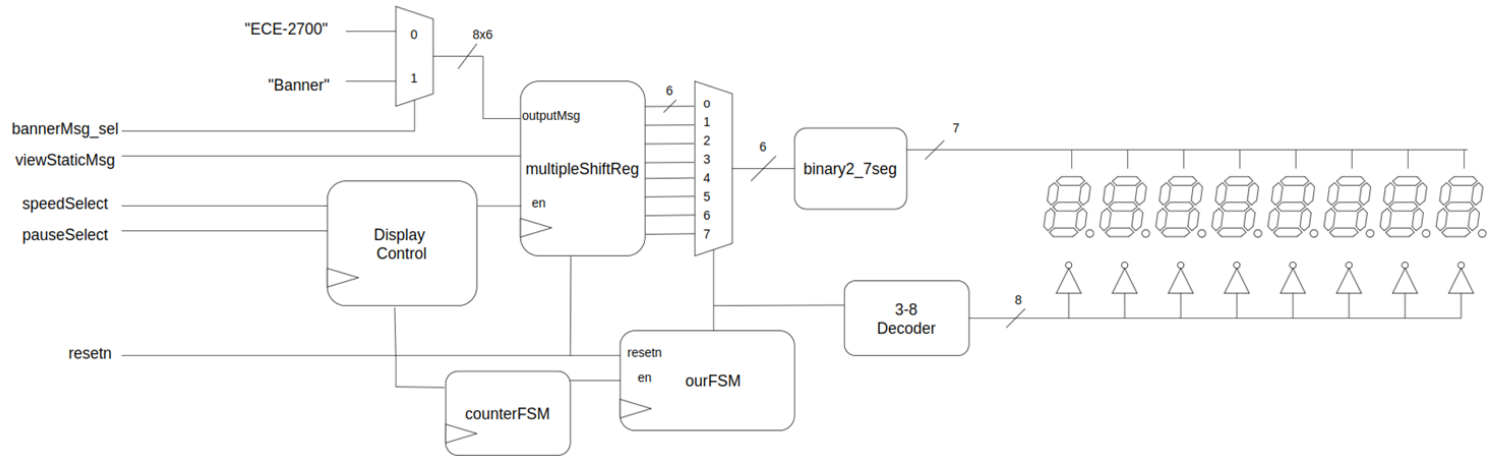
Message Select Mux

- Selects one of the two messages from a switch
- Coded in 6 bit binary
- Outputs to the shift register
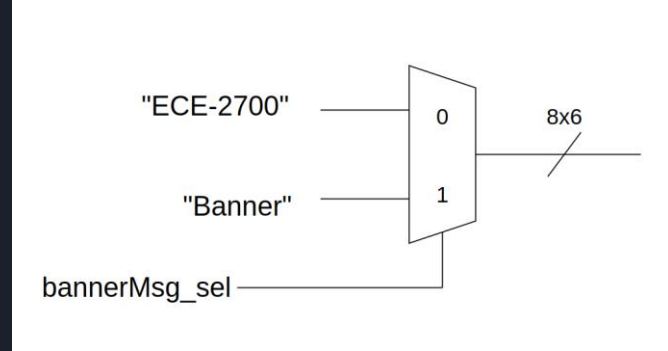

```
bannerMessage1(47 downto 0) <= "000100" & "000010" & "000100" & "001010" & "011100" & "100001" & "011010" & "011010"; -- ECE 2700
bannerMessage2(47 downto 0) <= "000001" & "000000" & "001101" & "001101" & "000100" & "010001" & "100100" & "100100"; -- bAnnEr
```
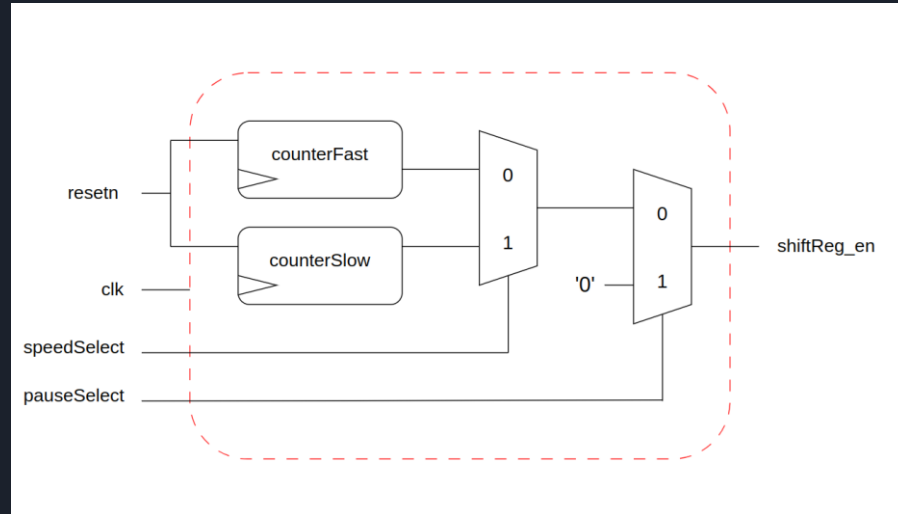
Shift Registers

- Eight shift register units
- Eight Mux 2-to-1
- Enable comes from displayControl
- Input from message select mux, and "ViewStaticMsg" switch
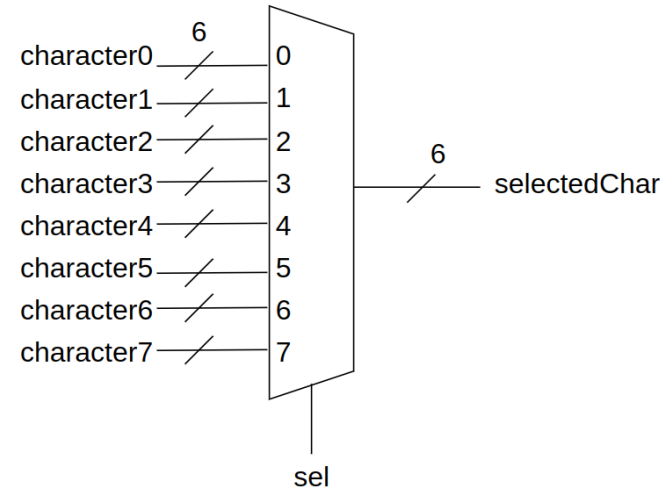- Outputs to Mux 8-to-1
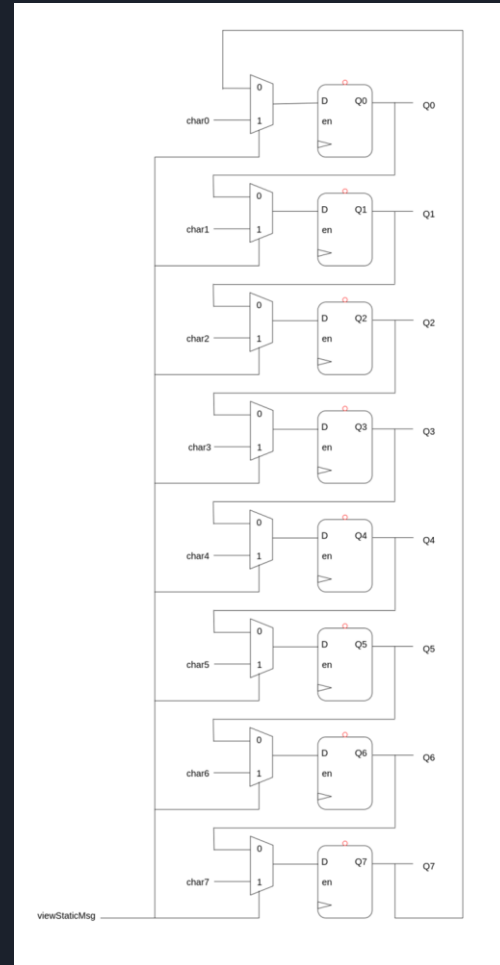
Display Control

- Choose scroll speed
- Pause scroll effect
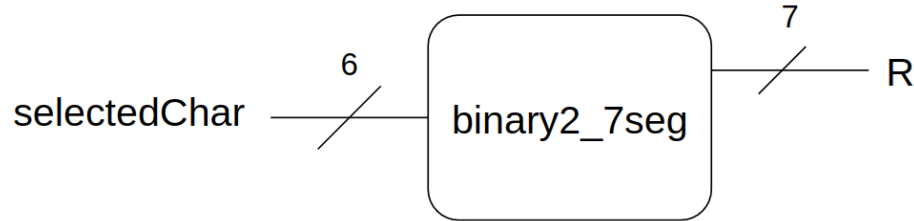- Outputs to the enable of shift register
- Controlled by switches and clock

8-to-1 Mux

- Inputs from the shift registers and FSM
- Selects one of the 8 shifted versions of 6 bit binary, and outputs it to the decoder
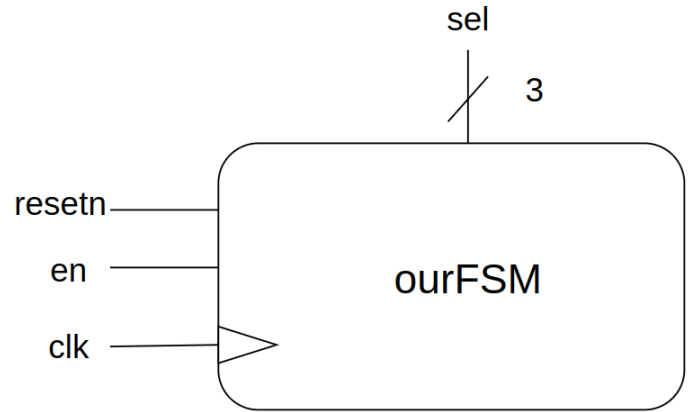
Binary to 7 Segment Decoder

- Decodes the 6 bit binary code into a 7 bit vector
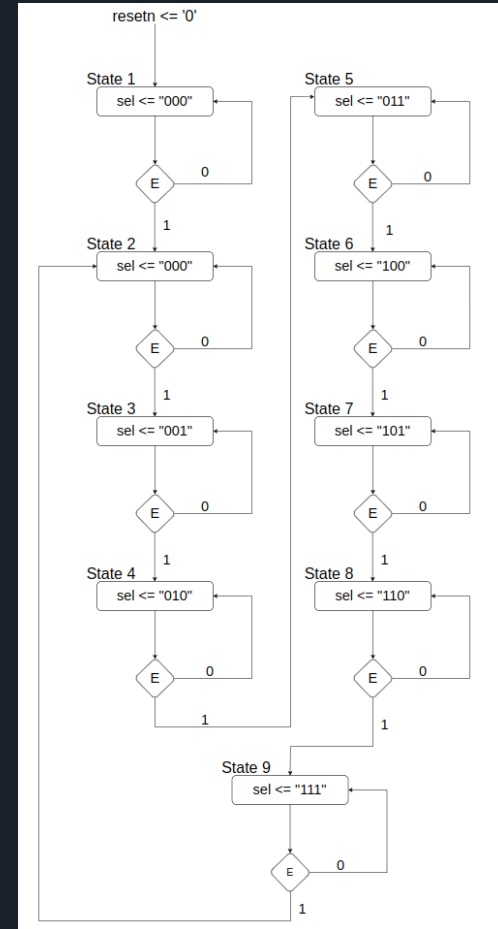- Outputs to 7-segment display

Finite State Machine

- Used to ensure that the correct character is shown on the selected display
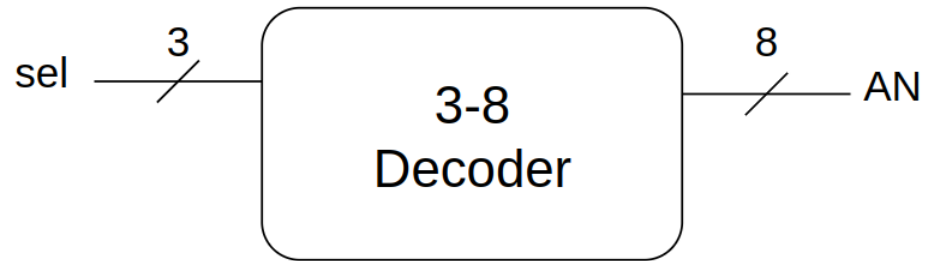- Outputs to the Mux 8-to-1 and the 3-to-8 Decoder

State Diagram

- State 1 then loops from State 2 to State 9
- Outputs a "select" value to the 8-to-1 Mux and 3-8 Decoder depending on state

3-8 Decoder

- Takes the "sel" output from the FSM and turns on the corresponding 7-segment display

Demo