Game Functionality

- The objective of the game is to test your memory.
- In the game, players will be initially shown a diagram of six switches, and their corresponding colors.
- The players have 20 seconds to remember the colors.
- The game commences and progresses through 8 different levels of varying color combinations.
- The player then has to remember which switch to push up based on the colors displayed on the VGA.
Top Level Architecture
Color Selection

- `game_color` receives the two bit output from the counter (count), which creates one second increments and combines it with the six bit output `s_hold` from the multiplexer.

- The color sequences, for each state, are then assigned to each eight bit `game_color` signal.
The FSMs control the sequence of switch inputs. When the correct sequence is detected, it moves to the next state.

The value of s in FSM1 and FSM2 were initially the same, but in order for the color controller to tell the difference between S1 in FSM1 and S1 in FSM2, each s needed to be unique.

Only three states are shown here, each FSM has eight states (or levels) and a ninth state for game over.

Transitions:

```verilog
process (resetn, clock, switch1, switch2, switch3, switch4, switch5, switch6)
begin
    if resetn = '0' then
        x <= S1;
    elsif (clock'event and clock = '1') then
        case x is
            when S1 =>
                if switch1 = '1' then x <= S2; else x <= S1; end if;
            when S2 =>
                if switch2 = '1' then x <= S3; else x <= S2; end if;
            when S3 =>
                if switch3 = '1' then x <= S4; else x <= S3; end if;
            end case;
end process
```

Outputs:

```verilog
process (x)
begin
    case x is
        when S1 => s <= "000000";
        when S2 => s <= "000010";
        when S3 => s <= "000011";
    end case;
end process
```
Demonstration

Purple

Red

White

Black

Green

Blue
Problems/Improvements

- **Problems:**
  - If all six switches are all pushed up at the same time, the game immediately enters the game over state (S9)
  - The game has no lose state

- **Improvements:**
  - Add a lose state where if the wrong switches are pushed, the game is over
  - Add more games (FSMs) and more levels (states) so the game is more robust
  - Varying difficulty levels
THANKS FOR TUNING IN!