

Stopwatch : **process** (Play, Rst, Clock)

**variable** Count: **integer** := 0;

**begin**

**if** Rst = '1' **then**

Count := 0;

Digit1 <= 0; -- Controls the first digit of the seven segment

Digit2 <= 0; -- Controls the second digit of the seven segment

Digit3 <= 0; -- Controls the third digit of the seven segment

Digit4 <= 0; -- Controls the fourth digit of the seven segment

Fail <= '0'; -- Fail is our fail signal, which once triggered, will go to the stage "111011"

**elsif** Play = '0' **then** -- If Play is off, then count will be held to the value as it was

Count := Count;

**elsif** Play = '1' **and** rst = '0' **then**

**if** (rising\_edge(Clock)) **then**

Count := Count + 1;

**if** Count = 10000000 **then** -- Count will only increment Digit0 every thousandth of a

second

Digit1 <= Digit1 + 1;

Count := 0;

**if** Digit1 = 9 **then**

Digit2 <= Digit2 + 1;

Digit1 <= 0;

**if** Digit2 = 9 **then**

Digit3 <= Digit3 + 1;

Digit2 <= 0;

**if** Digit3 = 9 **then**

Digit4 <= Digit4 + 1;

Digit3 <= 0;

**if** Digit4 = 9 **then** -- Once the last digit rolls over

digit4 <= 0;

Fail <= '1';

**end if;**

**end if;**

**end if;**

**end if;**

**end if;**

**end if;**

**end if;**

**end process;**

Seven\_Seg\_Display : **process** (Clock, Digit1, Digit2, Digit3, Digit4) -- Controls the 7 Segment Display on the Basys Board

**variable** counting : **integer** := 0;

```

begin
  if (rising_edge(Clock)) then
    Counting := counting +1;
    If Counting = 1 then
      Anode <= "1110"; --Utilize Right-Most Digit of 7-Segment Only
      If Digit1 = 0 then --0
        Cathode <= "0000011";
      elsif Digit1 = 1 then --1
        Cathode <= "10011111";
      elsif Digit1 = 2 then --2
        Cathode <= "00100101";
      elsif Digit1 = 3 then --3
        Cathode <= "00001101";
      elsif Digit1 = 4 then --4
        Cathode <= "10011001";
      elsif Digit1 = 5 then --5
        Cathode <= "01001001";
      elsif Digit1 = 6 then --6
        Cathode <= "01000001";
      elsif Digit1 = 7 then --7
        Cathode <= "00011111";
      elsif Digit1 = 8 then --8
        Cathode <= "00000001";
      elsif Digit1 = 9 then --9
        Cathode <= "00011001";
      end if;
    elsif Counting = 40000 then -- Refreshes the Second Right-Most Segment
      Anode <= "1101";
      If Digit2 = 0 then --0
        Cathode <= "00000010";
      elsif Digit2 = 1 then --1
        Cathode <= "10011110";
      elsif Digit2 = 2 then --2
        Cathode <= "00100100";
      elsif Digit2 = 3 then --3
        Cathode <= "00001100";
      elsif Digit2 = 4 then --4
        Cathode <= "10011000";
      elsif Digit2 = 5 then --5
        Cathode <= "01001000";
      elsif Digit2 = 6 then --6
        Cathode <= "01000000";
      elsif Digit2 = 7 then --7

```

```

    Cathode <= "00011110";
elseif Digit2 = 8 then --8
    Cathode <= "00000000";
elseif Digit2 = 9 then--9
    Cathode <= "00011000";
end if;
elseif Counting = 800000 then -- Refreshes the Second Left-Most Segment
Anode <= "1011";
If Digit3 = 0 then --0
    Cathode <= "00000011";
elseif Digit3 = 1 then --1
    Cathode <= "10011111";
elseif Digit3 = 2 then --2
    Cathode <= "00100101";
elseif Digit3 = 3 then --3
    Cathode <= "00001101";
elseif Digit3 = 4 then --4
    Cathode <= "10011001";
elseif Digit3 = 5 then --5
    Cathode <= "01001001";
elseif Digit3 = 6 then --6
    Cathode <= "01000001";
elseif Digit3 = 7 then --7
    Cathode <= "00011111";
elseif Digit3 = 8 then --8
    Cathode <= "00000001";
elseif Digit3 = 9 then--9
    Cathode <= "00011001";
end if;
elseif Counting = 1200000 then --Refreshes the Left-Most digit of the 7 Segment
Anode <= "0111";
If Digit4 = 0 then --0
    Cathode <= "00000011";
elseif Digit4 = 1 then --1
    Cathode <= "10011111";
elseif Digit4 = 2 then --2
    Cathode <= "00100101";
elseif Digit4 = 3 then --3
    Cathode <= "00001101";
elseif Digit4 = 4 then --4
    Cathode <= "10011001";
elseif Digit4 = 5 then --5
    Cathode <= "01001001";

```

```
    elsif Digit4 = 6 then --6
        Cathode <= "01000001";
    elsif Digit4 = 7 then --7
        Cathode <= "00011111";
    elsif Digit4 = 8 then --8
        Cathode <= "00000001";
    elsif Digit4 = 9 then --9
        Cathode <= "00011001";
    end if;
    elsif Counting = 1600000 then -- Resets Counting to 0, which repeats this process
        Counting := 0;
    end if;
end if;
end process;
```