

Overview of Design

The clk_Master is of 100Mhz having a time period of 10ns.

A) Display:

For display purpose there are two modes or states in which time will be shown.

Mode 1(State A0): In this mode, the time will be shown in hr:min format.

Mode 2(State A1): In this mode, the time will be shown in min:sec format.

These two modes will be changed by button B1.

B) Time Setting:

I am using Buttons B2,B3,B4 for time setting.

B2 will decide which is to be changed either hr or min or sec. This will for my 3 modes(States).

Mode 1(State A2): Digits of hr will increment in this mode and only hr will be shown on display.

Mode 2(State A3): Digits of min will increment in this mode and only min will be shown on display.

Mode 3(State A4): Digits of sec will increment in this mode and only sec will be shown on display.

B3 when pressed will increment 1st digit of hr or min or sec depending on states.

B4 when pressed will increment 2nd digit of hr or min or sec depending on states.

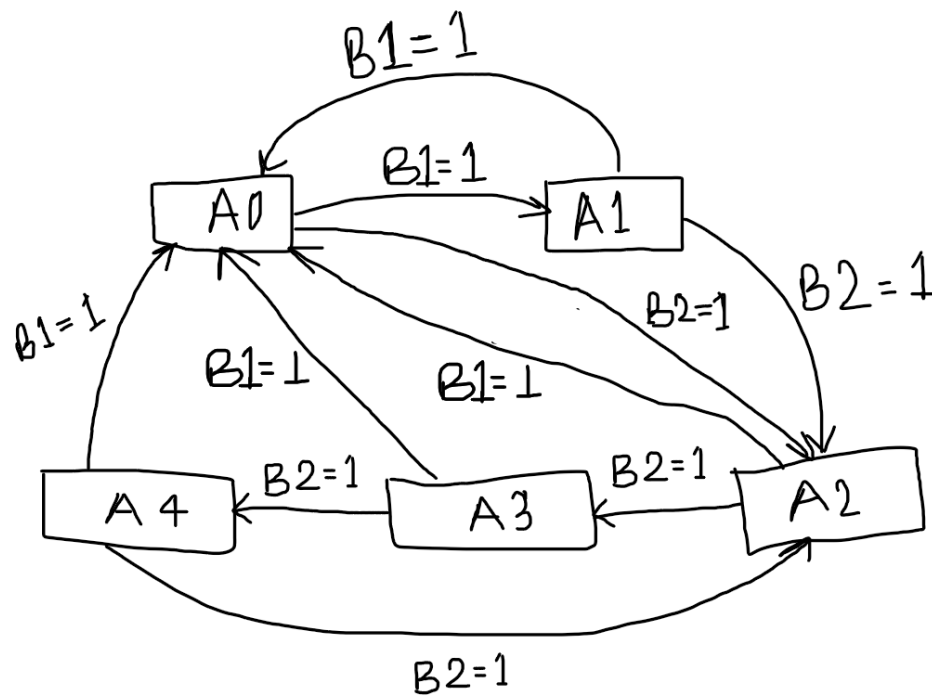
Note: A button is pressed or not will be checked for each 0.2sec.

The one more thing is that there is round off in the increment process. For example, If we are changing 2nd digit of min then after 9 , pushing the button to increment this will make it 0 again from 9 as this digit can take value only from 0 to 9 inclusive.

C) Timing:

As display requires a refresh period of 1 to 16ms, I am using a refresh period of 10.5ms. Using 10.5ms will be better as we will make refresh_counter of 20 bits and the first 18 bit will tell count $10.5/4$ which is approx 0.375ms as $2^{18} \times (\text{time period})$ is around 0.375ms. So that the first 2 bit of this 20 bit vector will be useful to know which digit to display.

Button B0 is used for reset purposes. It has to be pressed once when the clock will start for the first time for the initialisation.



State Diagram

A0: State in which time is shown in format hr:min.

A1: State in which time is shown in min:sec format.

A2: State in which hr value will be changed by manual press button and in this mode, only the last 2 digit of 4 digit display will show hr.

A3: State in which min value will be changed by manual press button and in this mode only the last 2 digit of 4 digit display will show min.

A4: State in which sec value will be changed by manual press button and in this mode only the last 2 digit of 4 digit display will show sec.

This is the overall clock design:

