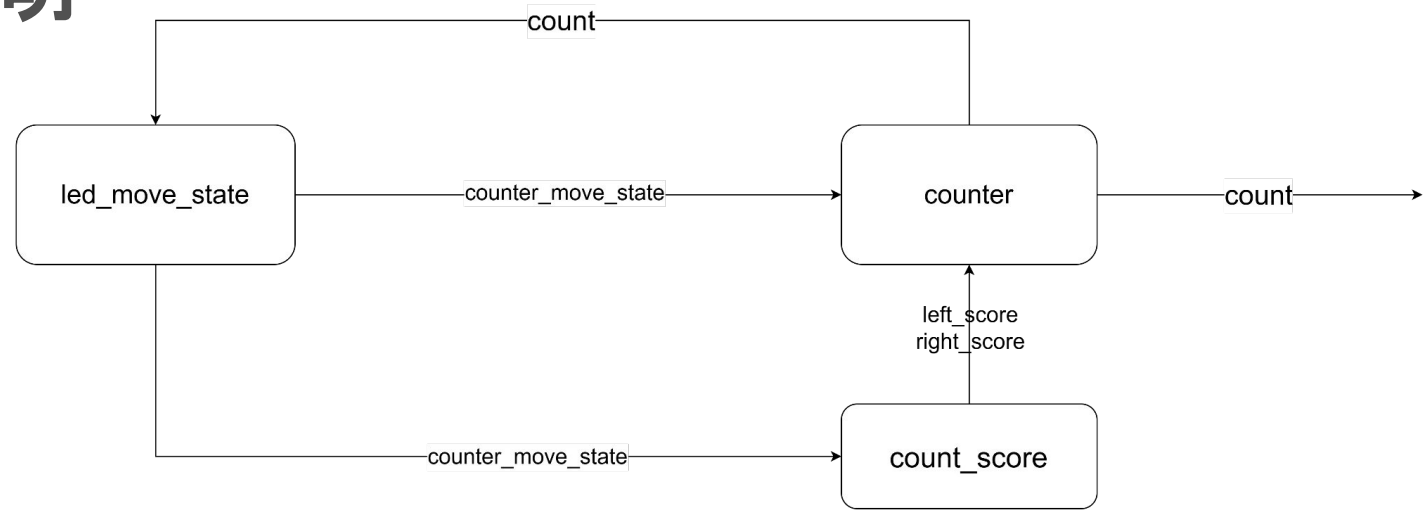
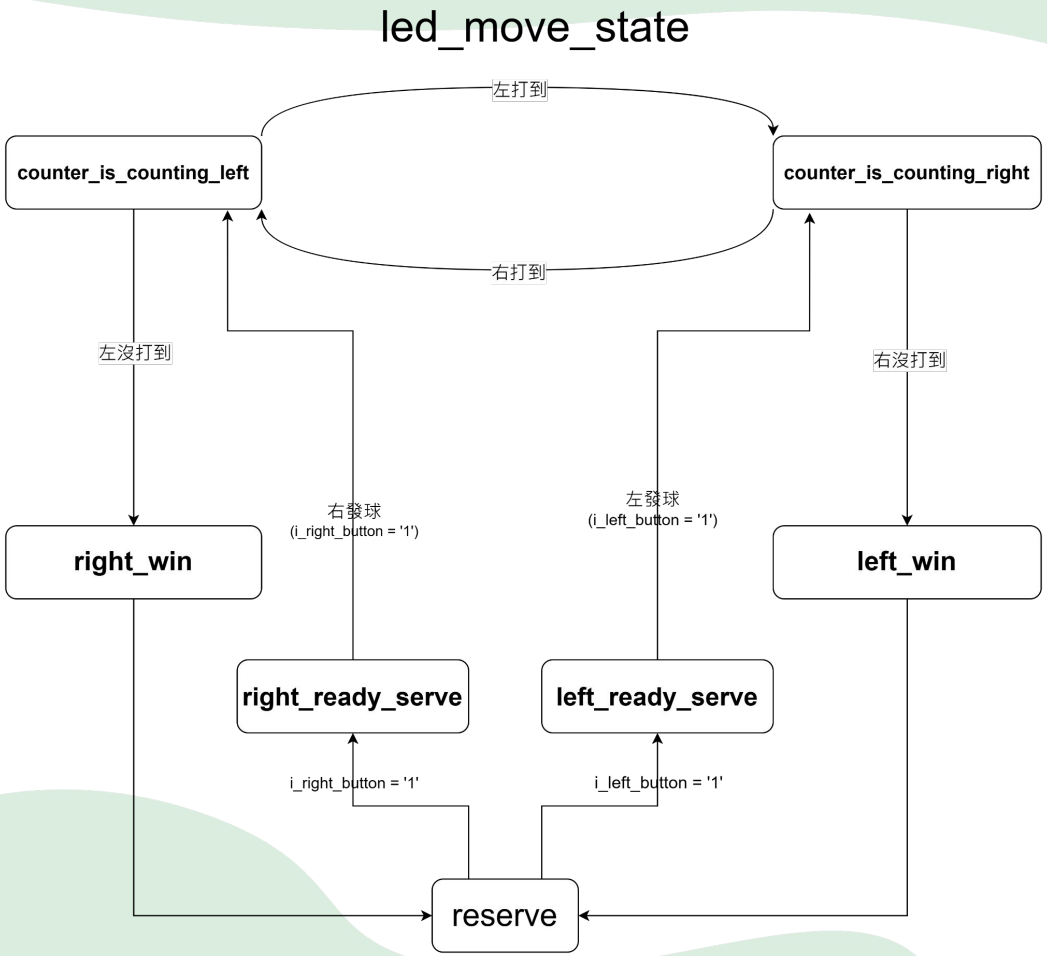
pingpong

C111112132 蕭詠劍

說明



- Led_move_state從led的狀態，更新 counter_move_state傳給 counter和counter_score
- counter是用來位移 led
- counter負責計分假如左邊獲勝左邊就會加分再傳給 counter來顯示



Led_move_state 內部架構圖說明

剛開始狀態從 reserve開始，如果 i_left_button按下進入左發球狀態，如果 i_right_button按下進入右發球狀態，當打出勝負並顯示完分數後會再進入 reserve，以此循環

說明

```
led_move_state :process (i_clk , i_rst , i_left_button , i_right_button)
begin
    if  i_rst = '0'  then
            counter_move_state <= reserve;
    elsif i_clk' event and i_clk = '1' then
        prestate <= counter_move_state;
        left_button <=  i_left_button;
        right_button <= i_right_button;
        case counter_move_state is
            when counter_is_counting_left =>
                if (count = "10000000") and (i_left_button = '1') then
                    counter_move_state <= counter_is_counting_right;
                elsif (i_left_button = '0' and count = "00000000") or (count<"10000000" and i_left_button='1') then
                    counter_move_state <= right_win;
                end if;
            when counter_is_counting_right =>
                if (count = "00000001") and (i_right_button = '1') then
                    counter_move_state <= counter_is_counting_left;
                elsif (i_right_button = '0' and count = "00000000") or (i_right_button = '1' and count > "00000001") then
                    counter_move_state <= left_win;
                end if;
            when right_win =>
                if count = (left_score(0)&left_score(1)&left_score(2)&left_score(3)) & right_score then
                    counter_move_state <= reserve;
                end if;
            when left_win =>
                if count = (left_score(0)&left_score(1)&left_score(2)&left_score(3)) & right_score then
                    counter_move_state <= reserve;
                end if;
            when left_ready_serve =>
                if count = "10000000" then
                    counter_move_state <= counter_is_counting_right;
                end if;
            when right_ready_serve =>
                if count = "00000001" then
                    counter_move_state <= counter_is_counting_left;
                end if;
            when reserve =>
```

reset為0時進入決定由誰發球的狀態

```
            when reserve =>
                if i_left_button = '1' and left_button ='0' then
                    counter_move_state <= left_ready_serve;
                elsif i_right_button = '1'and right_button ='0' then
                    counter_move_state <= right_ready_serve;
                else
                    counter_move_state <= reserve;
                end if;
            when others =>
                null;
        end case;
    end if;
end process;
```

按鈕按下那邊發球

搶拍或是漏接都算輸

顯示分數和實際分數相同時進入決定誰發球狀態
PS)最小位元的再最邊邊

說明

顯示led的方塊給
除頻clk才看的到

```
counter :process (i_clk , i_rst)
begin
    if i_rst = '0' then
        count <= "00000000";--count初始直
    elsif led_clk' event and led_clk = '1' then
        case counter_move_state is
            when counter_is_counting_left =>
                count <= count(6 downto 0) & '0'; --左移
            when counter_is_counting_right =>
                count <= '0' & count(7 downto 1); --右移
            when right_win =>
                count <= (left_score(0)&left_score(1)&left_score(2)&left_score(3)) & right_score; --看分數
            when left_win =>
                count <= (left_score(0)&left_score(1)&left_score(2)&left_score(3)) & right_score;  --看分數
            when left_ready_serve =>
                count <= "10000000"; --左初始直
            when right_ready_serve =>
                count <= "00000001"; --右初始直
            when others =>
                null;
        end case;
    end if;
end process;
```

reset為0時預設led不亮

led左右移動一格

顯示分數

左右發球預備狀態

說明

```
count_score : process (i_clk, i_rst)
begin
    if i_rst = '0' then
        right_score <= "0000"; -- 初始化 score
        left_score  <= "0000"; -- 初始化 score
    elsif i_clk' event and i_clk = '1' then
        case counter_move_state is
            when counter_is_counting_left =>
                null;
            when counter_is_counting_right =>
                null;
            when right_win =>
                if prestate = counter_is_counting_left then
                    right_score <= right_score + '1'; --right_win
                else
                    right_score <= right_score;
                end if;
            when left_win =>
                if prestate = counter_is_counting_right then
                    left_score <= left_score + '1'; --left_win
                else
                    left_score <= left_score;
                end if;
            when left_ready_serve =>
                null;
            when right_ready_serve =>
                null;
            when others =>
                null;
        end case;
    end if;
end process;
```

管理分數

右贏右加 1分
左贏左加 1分

說明

```
fd:process(i_clk ,i_rst)
begin
if i_rst = '0' then
    divclk <= (others => '0');
elsif rising_edge(i_clk) then
    divclk <= divclk +1 ;
end if;
end process fd;
led_clk <= divclk(24);
```

除頻

說明

Thanks