

2023 Digital IC Design Homework 2

NAME	尤蓀琇		
Student ID	F74092308		
Functional Simulation Result			
Score		100	
<pre># # ----- # ---- Simulation finish, ALL PASS, Score = 100 ---- # ----- # ** Note: \$finish      : C:/modeltech64_10.1c/examples/IC_hw2/tb.v(13!</pre>			
Description of your design			
一共有 6 個狀態(如下圖)			
			
當 reset 結束後會從 INIT 到 READ_NUM 並開始讀火車數，之後切到 READ_OUT 讀取順序，接著 CHECK_RAIL 開始依序判斷(如下圖)			

```

begin
  if(buffer_rail[head] > buffer_input[ptr_input]) // result = 0
  begin
    check_over <= 1;
    exist_situation <= 0;
  end
  else if(ptr_input == rail_num) //result = 1
  begin
    check_over <= 1;
    exist_situation <= 1;
  end
  else if(buffer_rail[head] == 0 && head == 0) //if stack is empty
  begin
    buffer_rail[head] <= in_station;
    in_station <= in_station + 1;
  end
  else if(buffer_rail[head] !=buffer_input[ptr_input]) //if the outside train is not the next move one
  begin
    buffer_rail[head+1] <= in_station;
    in_station <= in_station + 1;
    head <= head +1;
  end
  else if(head >0) // if the outside train is the next move one
  begin
    buffer_rail[head] <= 0;
    head <= head -1;
    ptr_input <= ptr_input +1;
  end
  else // head ==0, if the outside train is the next move one and the stack become empty
  begin
    buffer_rail[head] <= 0;
  end
end

```

首先判斷結束時的結果，stack 最上層的數字是否大於目前判斷到的順序數字，若是 代表此順序沒有結果；再者若判斷順序已到最後則代表有結果；接著判斷未結束時的狀況，若 stack 為空，則直接加入數字；反之判斷 stack 最上層數字是否是目前判斷到的順序數字，若不是就將數字加入 stack 內，若是則將 stack 移除最上層數字，並判斷 head(指向 stack 的最上層)是否為 0 做調整。

判斷結束後到 OUTPUT 開始輸出，輸出後要等第 2 個 cycle 再開始讀取，所以會先到 FINISH 再從 READ\_NUM 開始。