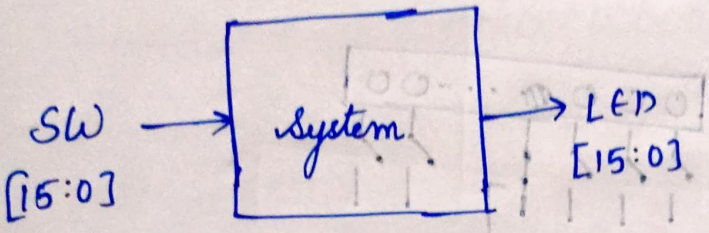
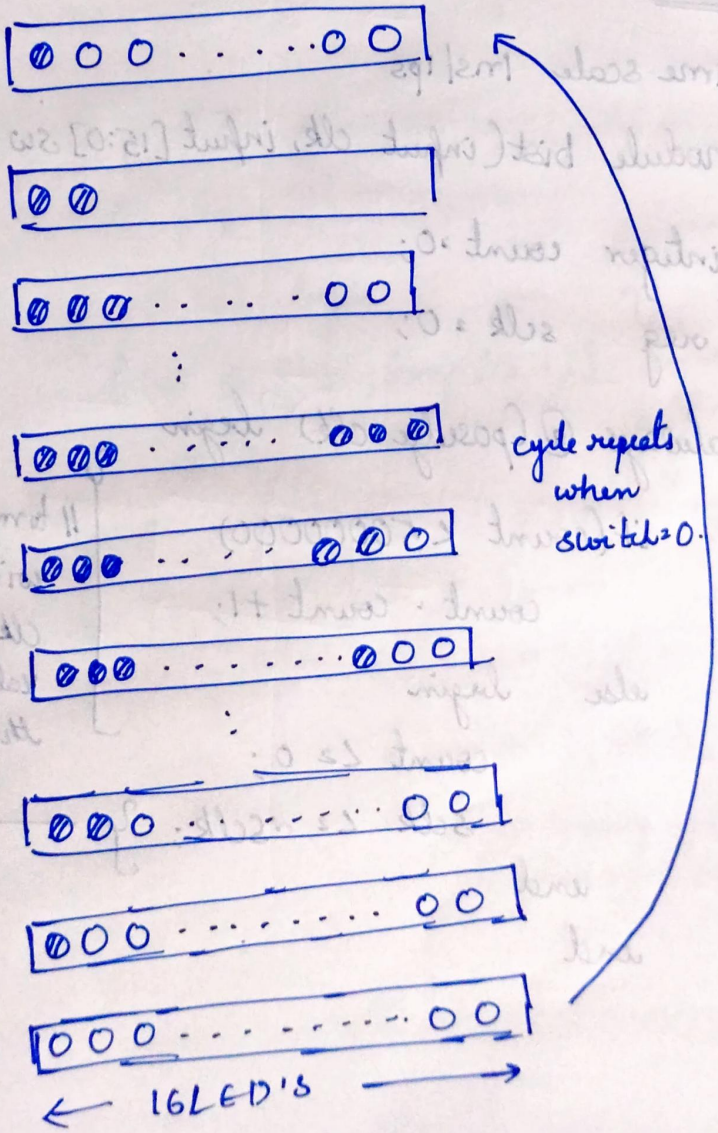
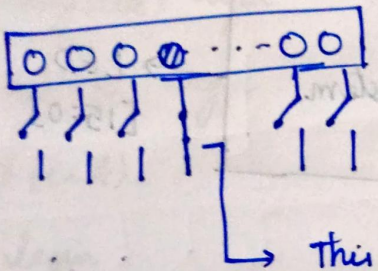
BIST for SW & LED on Basys 3 board



SW=0 (Test LED by sending random pattern).



SW-1 turning corresponding LED of the respective switch is not equal to 0.



This is how the corresponding LED turns on as per the respective switch operation (turns on).

Code:

```
`time scale 1ns/1ps
module bist(input clk, input [15:0] sw, output [15:0] led);
 integer count=0;
 reg     sclk=0;
always @(posedge clk) begin
   if(count <50000000)
        count = count+1;
   else  begin
        count <= 0;
        sclk <= ~sclk; }
   end
end
```

// to maintain slower clk with the given 100MHz clk we take a count value of 50107 to change the state of clk.

```
reg flag = 1'b0;
always @(posedge clk) begin
    if(sw == 16'b0000000000000000)
        flag <= 1'b0;
    else
        flag <= 1'b1;
end
```

// to maintain the state of switch of being in 0 or 1

```
integer i=0;
reg [15:0] temp = 0;

always @(posedge sclk) begin
  if (flag == 1'b0) begin
      if (i< 16) begin
        temp <= {1'b1, temp[15:1]};
        i <= i+1;
      end
      else if (i< 32) begin
        i <= i+1;
        temp <= { temp[14:0], 1'b0};
      end
      else begin
        i <= 0;
        temp <= 16'b0000000000000000;
      end
end
```

// Blinking on led's from left to right

// again turning off them from right to left

// this is to repeat cycle again from i=0.

```
else begin
    temp <= sw;
end
end
assign led = temp;
```

→ this is for the case when sw → 1 (flag → 1) where LED turns on w.r.t switch

→ This is to constantly assign led from the value temp to get the O/P with continous assignment.

```
end module.
```

∵ As the clock frequency of Basys 3 boards is 100MHz

clk freq → 10^8 Hz.

to maintain a slower clk of period 1 sec we maintain a count value to change the state

$$\frac{10^8}{2} = 5 \times 10^7 \rightarrow \text{count} < 5 \times 10^7$$

• slowerclk.