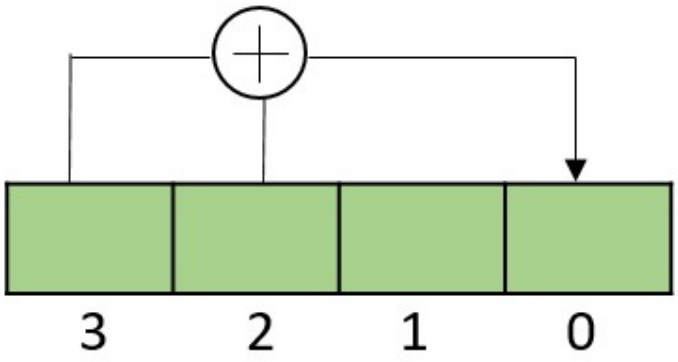
DAY #24

30 DAYS OF VERILOG

AIM – TO IMPLEMENT LINEAR FEEDBACK SHIFT REGISTER

A Linear-feedback shift register (LFSR) is another variation of shift register whose input bit is a linear function (typically XOR operation) of its previous state. It is generally used as a pseudo-random number generator, whitening sequence, pseudo-noise sequence, etc.

The bit positions that act as an input to a linear function to affect the next state are known as taps.



Linear-feedback shift register (LFSR)

At every step,

1. Q[3] xor Q[2]
2. Q = Q << 1
3. The result of the XOR operation is fed to the LSB (0th bit)

In the above pseudo-random sequence generator, taps are 4 and 3.

CODE –

```
module LFSR(input clk, rst, output reg [3:0] op);
  always@(posedge clk) begin
    if(rst) op <= 4'hf;
    else op = {op[2:0],(op[3]^op[2])};
  end
endmodule
```

WAVEFORM-

```
op=xxxx
op=1111
op=1110
op=1100
op=1000
op=0001
op=0010
op=0100
op=1001
op=0011
op=0110
op=1101
op=1010
op=0101
op=1011
```