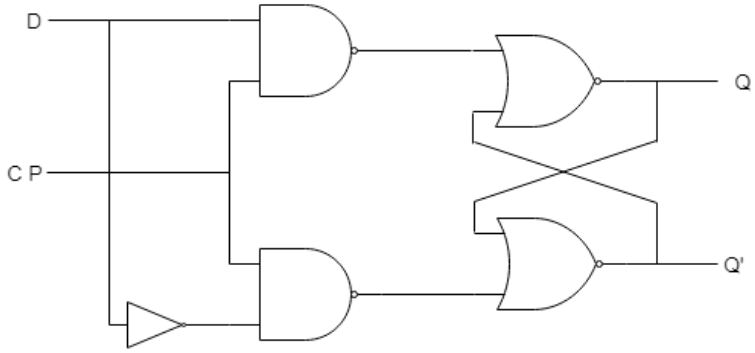
D FILP FLOP

A flip flop can store one bit of data. Hence, it is known as a memory cell. Flip-flops are synchronous circuits since they use a clock signal. Using flip flops, we build complex circuits such as RAMs, Shift Registers, etc.

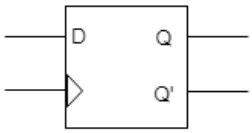
A D flip-flop stands for data or delay flip-flop. The outputs of this flip-flop are equal to the inputs.



(a) Logic diagram with Nand gates

Q D	Q (t + 1)
0 0	0
0 1	1
1 0	0
1 1	1

(c) Transition table



(b) Graphic Symbol

fig. Clocked D flip flop

RTL CODE:

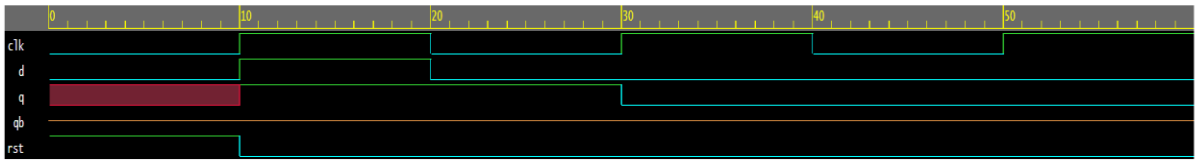
```
module tls(input clk,rst,d,output reg q,output reg qb);
  always @(posedge clk)
    begin
      if(rst==1)begin
        q<=0;
        qb<=1;
      end
      else
```

```
        begin
          q<=d;
          qb=!d;
        end
    end
endmodule
```

TEST BENCH:

```
module test;
  reg clk,rst,d;
  wire q,qb;
  tls a(clk,rst,d,q);
  initial begin
    $dumpfile("dump.vcd");
    $dumpvars(1);
  end
  initial begin
    clk=0;
    forever #10 clk=~clk;
  end
  initial begin
    rst=1;d=0;
    #10 rst=0;d=1;
    #10 d=0;
  end
  initial begin
    #60 $finish();
  end
```

endmodule



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