PLAZA, ELMO L. BSCPE 3A

end Behavioral;

VHDL CODE FOR T FLIP FLOP:

```
library IEEE;
                                                             Clear
                                                                        Т
                                                                             Clock
use IEEE.STD_LOGIC_1164.ALL;
use IEEE.STD_LOGIC_ARITH.ALL;
                                                                1
                                                                        0
                                                                               0
use IEEE.STD_LOGIC_UNSIGNED.ALL;
                                                                        1
                                                                0
                                                                              л
entity T_flipflop is
  Port (t:in STD LOGIC; -- Tinput
     clk: in STD LOGIC; -- Clock input
     rst: in STD_LOGIC; -- Active-low reset
      q : buffer STD_LOGIC -- Output (buffer allows reading and writing)
 );
end T_flipflop;
architecture Behavioral of T flipflop is
  signal div : std logic vector(22 downto 0) := (others => '0'); -- Clock divider counter
  signal clkd: std_logic; -- Divided clock
begin
  -- Clock divider: Slow down the clock
  process(clk)
  begin
    if rising_edge(clk) then
      div \le div + 1;
    end if;
  end process;
  -- Select the slower clock signal
  clkd <= div(20); -- You can adjust this value for more or less division
  -- T flip-flop behavior
  process(clkd, rst)
  begin
    if rst = '0' then
                    -- Active-low reset
      q <= '0';
                  -- Reset output to '0'
    elsif rising_edge(clkd) then
      if t = '1' then -- Toggle on T=1
        q <= not q; -- Toggle the output
      end if;
    end if;
  end process;
```

Qn+1

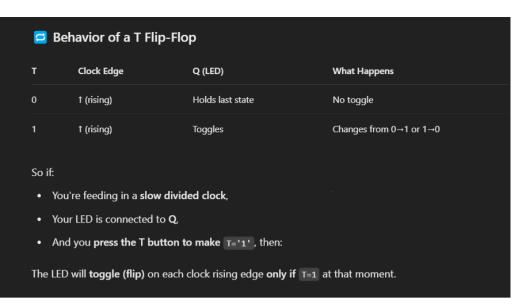
Qn

Qn

Qn+1

0

Qn



- The LED is toggling **only when you press T**, and depending on **when** you press it (relative to the clock edge), the LED either turns **on or off**.
- This is normal and expected behavior for a T flip-flop.

o Why It Feels Random:

Because of the clock speed and your human reaction time, sometimes:

- You press T just before a rising clock edge → it toggles.
- You press T just after a rising clock edge → no effect (waits for next one).

This causes the LED to sometimes turn on, sometimes off, depending on the timing.

