**Mux:**

LIBRARY ieee;

USE ieee.std\_logic\_1164.all;

ENTITY mux IS

PORT ( w0, w1, w2, w3 : IN STD\_LOGIC ;

s : IN STD\_LOGIC\_VECTOR(1 DOWNTO 0) ;

f : OUT STD\_LOGIC ) ;

END mux ;

ARCHITECTURE Behavior OF mux IS

BEGIN

WITH s SELECT

f <= w0 WHEN "00",

w1 WHEN "01",

w2 WHEN "10",

w3 WHEN OTHERS ;

END Behavior ;

LIBRARY ieee ;

USE ieee.std\_logic\_1164.all ;

PACKAGE mux\_package IS

COMPONENT mux

PORT ( w0, w1, w2, w3 : IN STD\_LOGIC ;

s : IN STD\_LOGIC\_VECTOR(1 DOWNTO 0) ;

f : OUT STD\_LOGIC ) ;

END COMPONENT ;

END mux\_package ;

**Decode:**

LIBRARY ieee ;

USE ieee.std\_logic\_1164.all ;

ENTITY decode IS

PORT ( w : IN STD\_LOGIC\_VECTOR(1 DOWNTO 0) ;

En : IN STD\_LOGIC ;

y : OUT STD\_LOGIC\_VECTOR(0 TO 3) ) ;

END decode ;

ARCHITECTURE Behavior OF decode IS

SIGNAL Enw : STD\_LOGIC\_VECTOR(2 DOWNTO 0) ;

BEGIN

Enw <= En & w ;

WITH Enw SELECT

y <= "1000" WHEN "100",

"0100" WHEN "101",

"0010" WHEN "110",

"0001" WHEN "111",

"0000" WHEN OTHERS ;

END Behavior ;

**Encod:**

LIBRARY ieee ;

USE ieee.std\_logic\_1164.all ;

ENTITY encod IS

PORT ( w : IN STD\_LOGIC\_VECTOR(3 DOWNTO 0) ;

y : OUT STD\_LOGIC\_VECTOR(1 DOWNTO 0) ;

z : OUT STD\_LOGIC ) ;

END encod ;

ARCHITECTURE Behavior OF encod IS

BEGIN

PROCESS ( w )

BEGIN

y <= "00" ;

IF w(1) = '1' THEN y <= "01" ; END IF ;

IF w(2) = '1' THEN y <= "10" ; END IF ;

IF w(3) = '1' THEN y <= "11" ; END IF ;

z <= '1' ;

IF w = "0000" THEN z <= '0' ; END IF ;

END PROCESS ;

END Behavior ;

**Johns:**

LIBRARY ieee;

USE ieee.std\_logic\_1164.all;

ENTITY johns IS PORT(Clrn, E, Clkn

: IN STD\_LOGIC;

--clrn is your reset button STUDENT\_ID

: out std\_logic\_vector(3 downto 0);

Q

: OUT STD\_LOGIC\_VECTOR(0 TO 2));

END johns;

ARCHITECTURE Behavior OF johns IS

signal Qreg : STD\_LOGIC\_VECTOR (0 TO 2);

BEGIN

PROCESS (Clrn, Clkn)

BEGIN

IF Clrn = '0' THEN

Qreg <= "000";

ELSIF (Clkn'EVENT AND Clkn = '0') THEN

IF E = '1' THEN

Qreg(1) <= Qreg(0);

Qreg(2) <= Qreg(1);

Qreg(0) <= NOT Qreg(2);

ELSE

Qreg <= Qreg;

END IF;

END IF;

-- STUDENT\_ID variable represents the last 6 digits of your student ID

hence d4 is the fourth digit of your

--student ID in four bits, d5 is the fifth and so on. For example, for

Student ID 501 137659,

--d4 is 0100, d5 is 0011 and so on

CASE Qreg IS

WHEN "000" =>

STUDENT\_ID <= "0001"; --d1

WHEN "100" =>

STUDENT\_ID <= "0011"; --d2

WHEN "110" =>

STUDENT\_ID <= "0111";--d3

WHEN "111" =>

STUDENT\_ID <= "0110";--d4

WHEN "010" =>

STUDENT\_ID <= "0101";--d5

WHEN "011" =>

STUDENT\_ID <= "1001";--d6

WHEN OTHERS => STUDENT\_ID <= "----";--error

END CASE;

END PROCESS;

Q <= Qreg;

END Behavior;

Calendar

Description automatically generated