

Multiplexer

Requirements for the exercise (issues and skills necessary to complete the task):

- representation of numbers in decimal, binary and hexadecimal systems;
- setting up a new project in Quartus Prime;
- creating a hardware module (symbol) in Quartus Prime based on a schematic file (*.bdf);
- creating a hardware module (symbol) in Quartus Prime based on a source code file (eg. *.vhd);
- ability to simplify a logical expressions using the Karnaugh Map method;
- ability to implement a scheme with logic gates based on an algebraic equation.

A Multiplexer is a device that allows one of several digital input signals which are to be selected and transmits the input signal that is selected into an output.

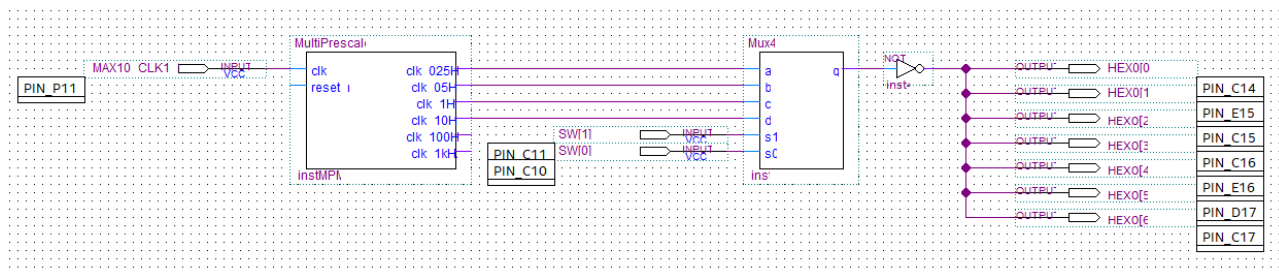
Implement a multiplexer with four signal inputs (a, b, c, d) and two control inputs (s1, s0), according to the table below. Design the system in the form of a schematic with logic gates.

State of control inputs (s1, s0)	Output q
00	a
01	b
10	c
11	d

Multiplexer circuit implement as hardware block (create symbol):

- correctly implemented multiplexer: **1.5 pts**;
- created the hardware block (symbol file): **+0.5 pts**.

In order to test the multiplexer use **MultiPrescaler** module. Connect implemented combinational circuit as in the picture below. The state of the multiplexer output can be displayed on the diodes forming one of the 7-segment displays (add a not gate next to the output pin).



Save the multiplexer for future classes!!!

Questions

- 1) What is the function of a multiplexer, and what is it used for?
- 2) What is the purpose of the control lines in a multiplexer?
- 3) Explain how a multiplexer works based on a diagram.
- 4) How many control inputs are there in an 8:1 / 16:1 / 32:1 multiplexer?