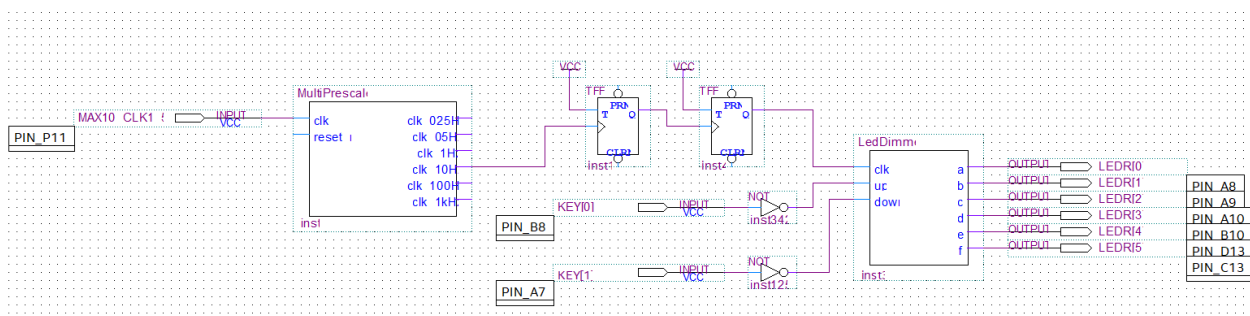


Task 1

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 1 brightness level (turned on 1 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

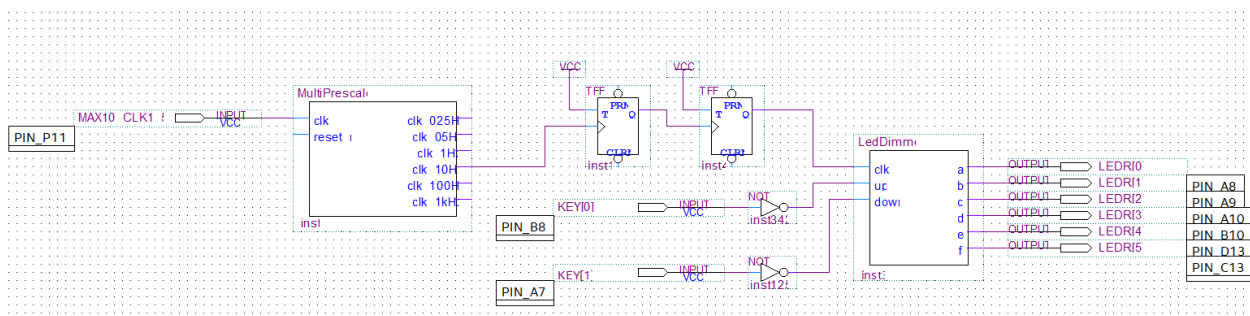


Task 2

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 2 brightness level (turned on 2 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

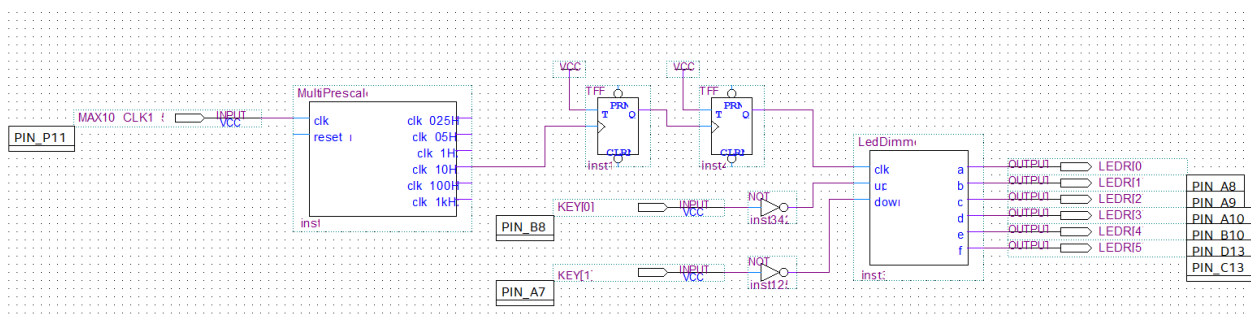


Task 3

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 3 brightness level (turned on 3 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

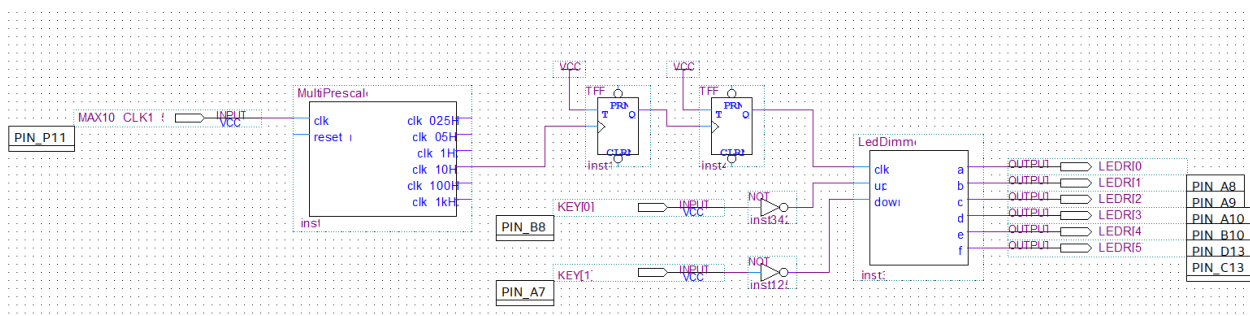


Task 4

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 4 brightness level (turned on 4 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

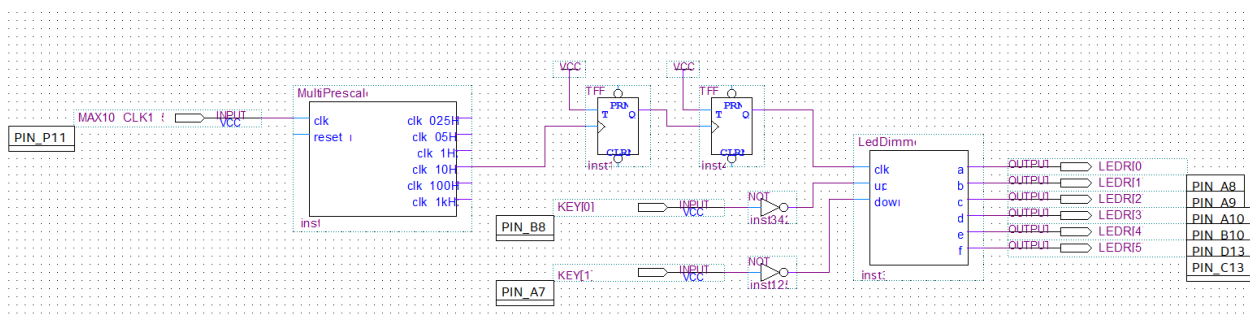


Task 5

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 5 brightness level (turned on 5 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

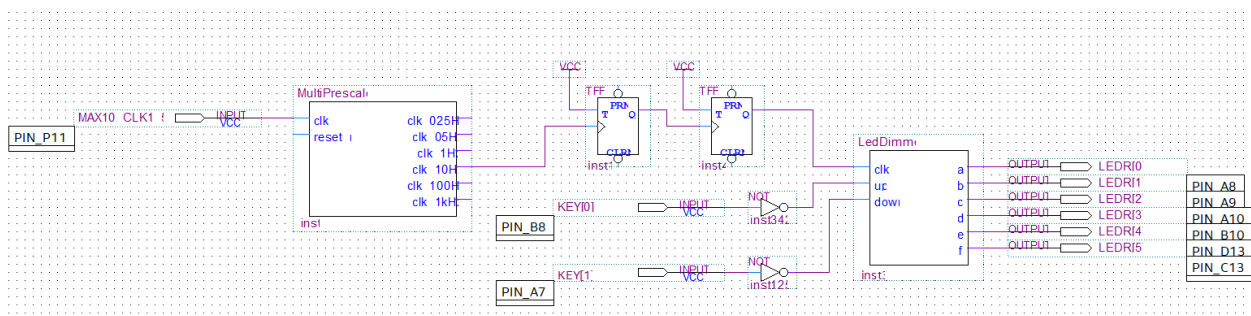


Task 6

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 6 brightness level (turned on 6 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

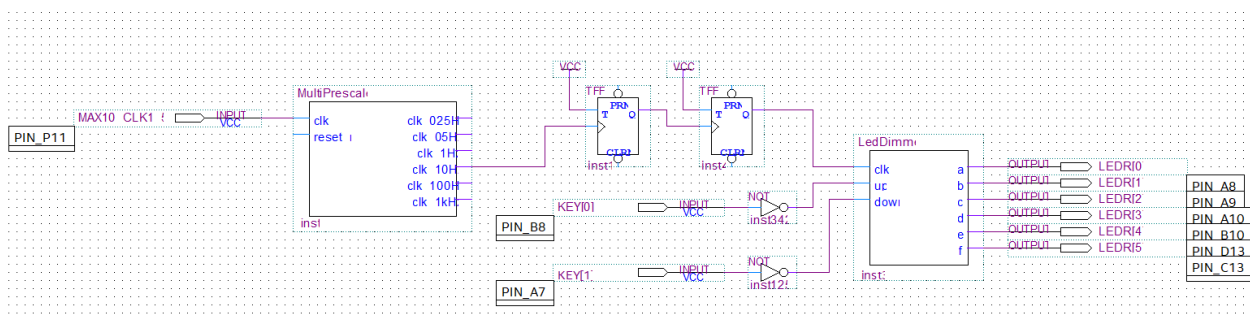


Task 7

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 2 brightness level (turned on 2 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.



Task 8

Design and implement a LED Lamp Dimmer in the form of a Moore machine. The LED Lamp consists of 6 diodes. The dimmer allows to adjust the brightness on a 6-point scale (by turned on from 1 to 6 diodes) and turn off the LED Lamp. The dimmer has two inputs (Up - brightening, Down - dimming). The LED Lamp can be turned off by simultaneously setting high signal (logic 1) on both inputs (Up and Down). The LED Lamp can be switched on by setting high signal (logic 1) on one of the inputs - just only one (Up or Down). **After switching on, the lamp should be adjust to the 3 brightness level (turned on 3 LEDs).** Draw the state diagram for Moore machine, select the coding for states, draw a transition table, output table, and equations describing the logic of the transitions and outputs. Implement the Moore machine in FPGA. Use at least two types of flip-flops (5 p).

- a) the Dimmer implementation on a FPGA device: 2 p;
- b) using of two or more types of flip-flops: +0.5 p;
- c) implementation in the form of hardware block (symbol file): +0.5 p.

In order to test the system connect modules as in the picture below.

