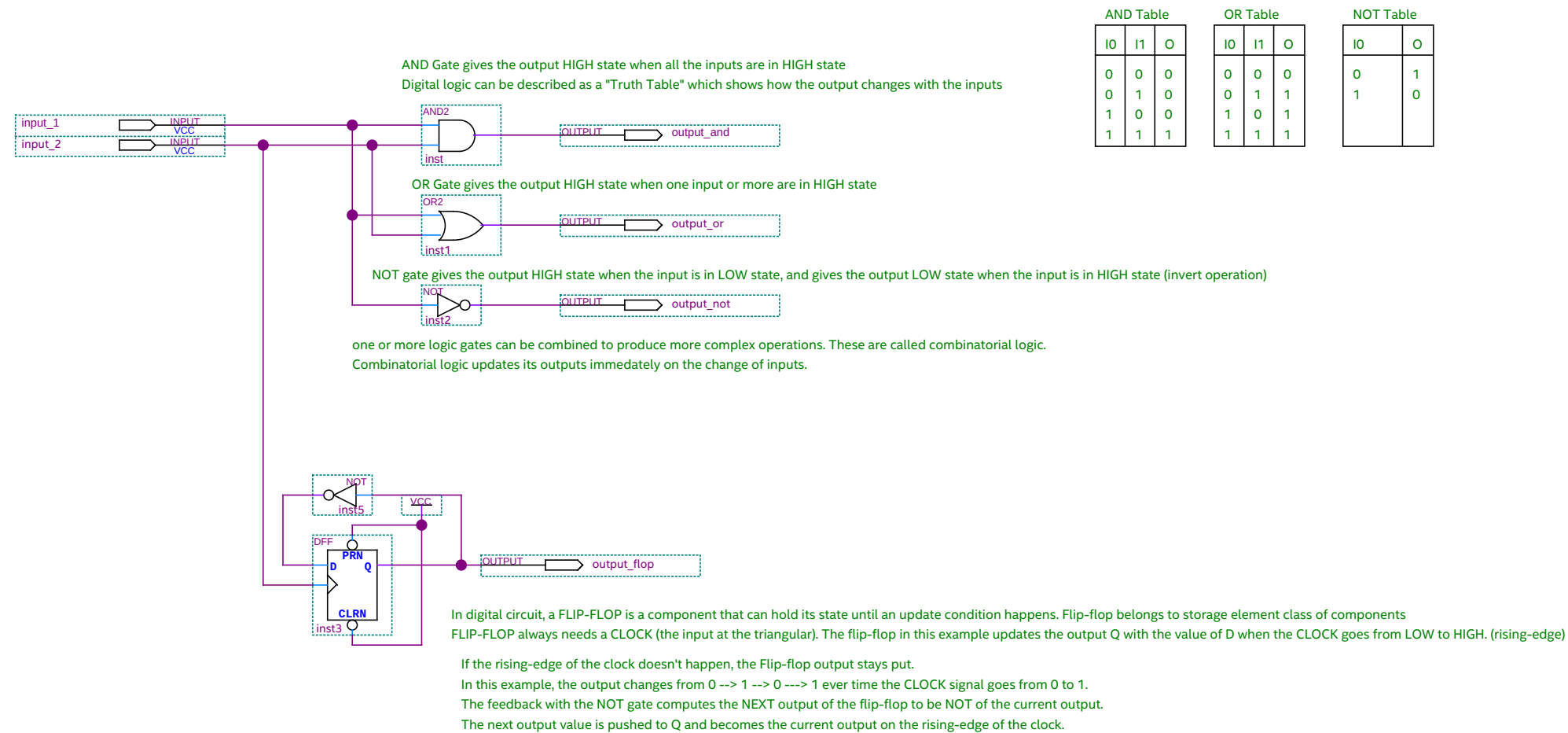


Digital signal holds one of the 2 states: TRUE/HIGH or FALSE/LOW.  
 Digital circuit manipulates digital inputs and produces digital outputs.  
 Basic building blocks of Digital Circuits are:  
 + Gates  
 + And Flip-flops



AND Table

I0	I1	O
0	0	0
0	1	0
1	0	0
1	1	1

OR Table

I0	I1	O
0	0	0
0	1	1
1	0	1
1	1	1

NOT Table

I0	O
0	1
1	0

- 1 In programmable devices, you have a fair bit of freedom of where you want to allocate your output pins  
 This type of allocation is called assignments or pin constraints  
 With quartus II, you can open the pin assignment by (Assignments --> Pin Planner)  
 In the pin planner you'll see the current assignments of CLOCK pins, and the outputs.  
 You'll need to make changes to suit how you plug in your LEDs (drag the signal and drop it to the pin map or type in the sheet)
- 2 After making changes to the pin assignments, you can run full compilation  
 Press Ctrl-L.  
 Full compilation completes with pof file in the output\_files folder. This is the binary file that you'll use to configure the CPLD
- 3 Open the programmer (Tools --> Programmer)  
 Select Hardware setup to detect your USB blaster  
 Then click "Auto Detect". You should see your device listed.  
 If your device is listed, then this is where you need to tell the tool what is your programming file. Use "Change file", don't use "Add file".  
 After change programming file from "none" to your output\_files/logic\_gates.pof. Tick the program/configure box, then click start. Your device will now be configured  
 After programming, then you can verify the operation of the Logic Gates with the buttons

Another interesting component is the MULTIPLEXER (or Mux). The multiplexer is built from the 3 basic components above.  
 You can "google" Multiplexer to see how it works and devise an experiment to understand its operation  
 Hint: If you look at the AND gate again, and look at one of the Inputs, you can see that it's really acting as a gate.  
 If it's a 0 --> The output is always 0. If it is a one, the output follow the OTHER input (Gating).  
 For A 2 to 1 multiplexer, when S = 0, I1 is gated, output follows I0. When S = 1, I0 is gated and output follows I1  
 Google Karnaugh map to see a systematic way of designing Digital Logic.