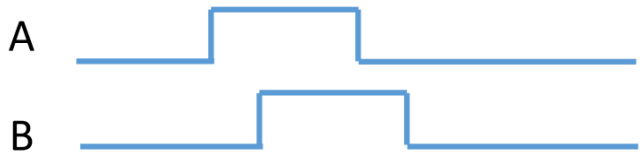
Project 3 (Due date: September 25, 2020)

This project is based on the state machine you generated in Project 2:

The basic goal of Project 2 is to design logic to design a state machine for a parking lot car counter. The lot has a gate through which only one car at a time may enter or leave. There are two detectors, A and B, mounted on the gate. Each detector produces a '1' output when a car passes by the detector. The detectors are arranged such that a car entering the lot must first pass by detector A and then B. In other words, when a car enters the lot, the front of the car triggers A and then triggers B as shown in the timing diagram below. When the car has advanced sufficiently, detector A will turn off, followed by B. The process is reversed when a car leaves the lot. Note that a car may partially enter or leave the lot and then reverse meaning that you may get A on and A off without B ever going on – or A on then B on, and then B going off before A going off. The sensors are close enough such that it is impossible for a car to be between the two sensors.



Now you should have an FSM design that has been validated by simulation. Your entity includes two sensor inputs and one counter output. In Project 3, each team need to implement your design on the DE2 board. Use **two switches** to represent the two sensors. The **7-segment LED** display should display the count of cars in the lot. On reset of the state machine, the counter should be initialized to 0. DE0-Nano with external 7-segment display is also acceptable.

Submit a report including group member names, the design diagram, VHDL code, and a screenshot of Quartus II compilation result (including all the errors and warnings if there is any). You can ignore any unimportant warning such as drive logic, load capacitance, or unused pins setting. One submission per group. There are three ways to show your project demo:

1. Take pictures and attach them in your report

2. Record your demo, upload the video to Google drive and send an email with the shared link

3. Use Zoom during the office hour (3:00 pm ~ 4:30 pm from Monday to Thursday)

Please select one method to complete your demo before the deadline.