TECHNISCHE UNIVERSITÄT WIEN

Institut für Computertechnik
Institute of Computer Technology

MELODI

Mass E-Learning of design, test, and prototyping DIgital hardware

LEVEL 1

Servo: Wave the Flag

To wave the flag of the MELODI platform, you have to control the servo correctly. There is a standard servo which needs a **PWM** with **50Hz**, the respective duty cycle determines the angle of the flag. *Table 1* below shows the details of the required state control of the servo.

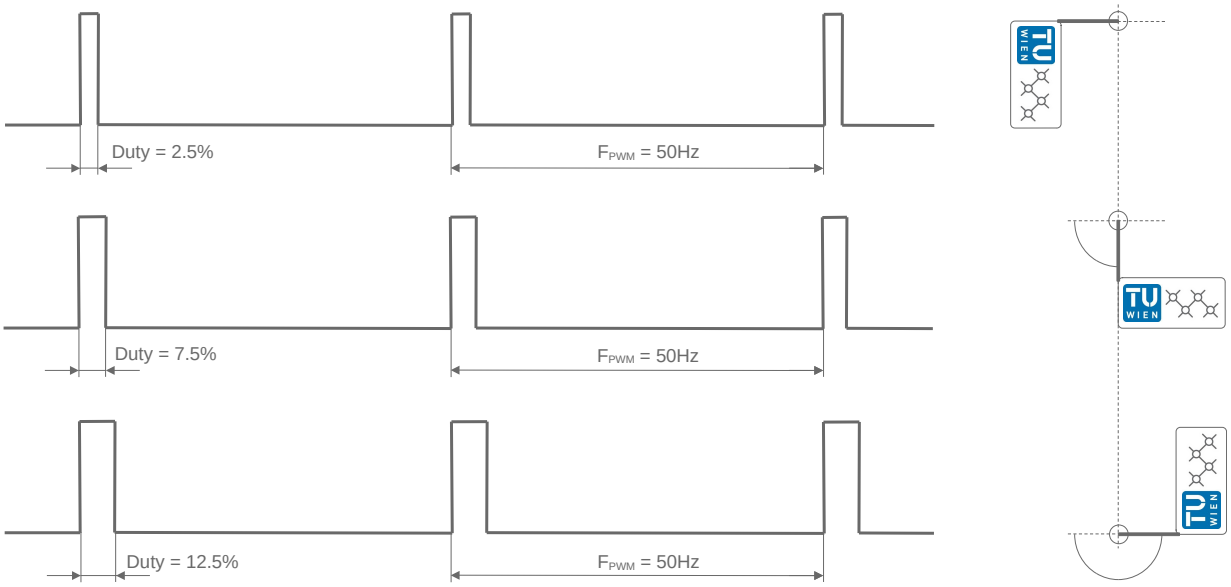


Figure 1: Details of the PWM timing.

The "servo-motor" entity shall generate a PWM (Pulse-Width Modulation) signal from a clock signal (input port CLK) with the following constraints:

- Input: CLK (100MHz) with type std_logic;
- Period F_{PWM} = 50Hz

States		
Button [0]	**Button [1]**	**Duty**
0	0	2.5%
1	0	7.5%
0	1	12.5%
1	1	2.5%

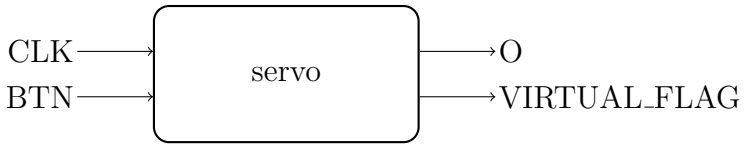
Table 1: System states.

- Duty cycle $\frac{T_{HIGH}}{T_{PWM}} = \text{DUTY}$
- The signal raising edge has to be held fixed, the falling edge has to be modulated.

Based on the *Table 1*, create a design that features four states of the flag. The entity is declared in the attached file "servo_motor.vhdl" and has the following properties:

Entity

- Input: CLK (100MHz) with type std_logic
- Input: BTN with type std_logic_vector of length 2
- Output: O with type std_logic
- Output: VIRTUAL_FLAG with type std_logic_vector of length 2



The behavior from *Table 1* has to be programmed in the attached file "servo_beh.vhdl". You can use the *VIRTUAL FLAGS* for debug purposes, e.g. to output arbitrary states.

Do not change the file "servo_motor.vhdl".

To turn in your solution write an email to vhdlabgabe+e384@tuwien.ac.at with subject "Result Task 1" and attach your behavior file(s):

- "servo_beh.vhdl"

Good Luck and May the Force be with you.