

# ***Digital Design (DD)***

## ***Exercise 3***

7 segment Display – Single Digit

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# 7 Segment Display – Single Digit

Extended – Individual Task



# TASK DESCRIPTION

## Qualitatively

- If the CPU Reset button is pressed, all digits of the 7 segment display are switched OFF.
- If the switch SW(15) is switched ON, the first digit (which is the number 5 in the example video) shows the number  $digit_{number}$ 
  - For Each consecutive digit, the number is increased by 1.
  - When the number 9 is reached, the counting starts again with the number 1 (as in the video)
  - Remark: You can use a 20bit counter (with the 100MHz CLK) to switch the anodes and to update the digits by checking the 3 MSB bits of the counter

## Quantitatively:

The number  $digit_{number}$  is your individual assigned number

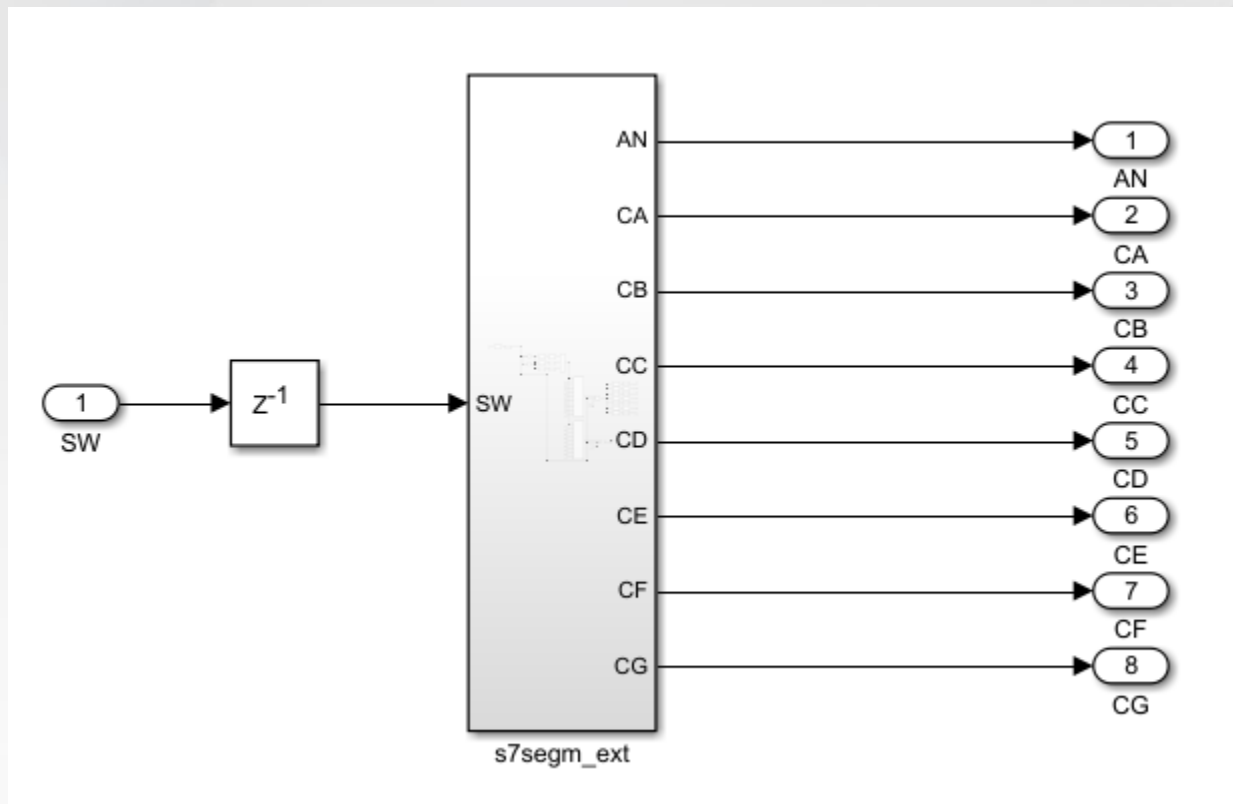


# ARCHITECTURE COMPONENTS

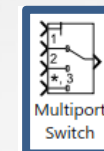
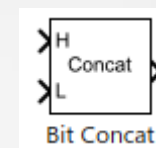
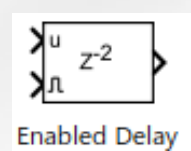
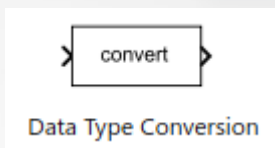
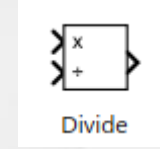
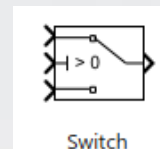
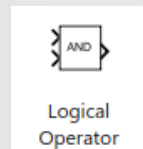
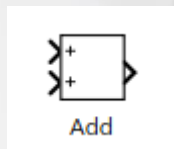
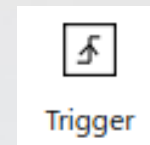
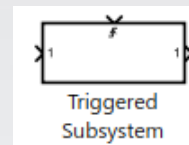
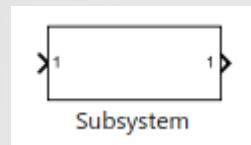
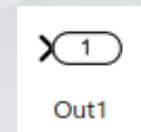
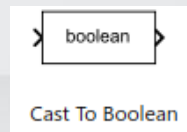
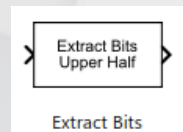
S7segm\_ext\_top → 7 segment top level

S7segm\_ext.vhd → Block that is used to generate the proper anode and cathode signals for the dedicated digits of the 7 segment display

<https://digilent.com/reference/programmable-logic/nexys-4-ddr/reference-manual>



# USEFUL BLOCKS



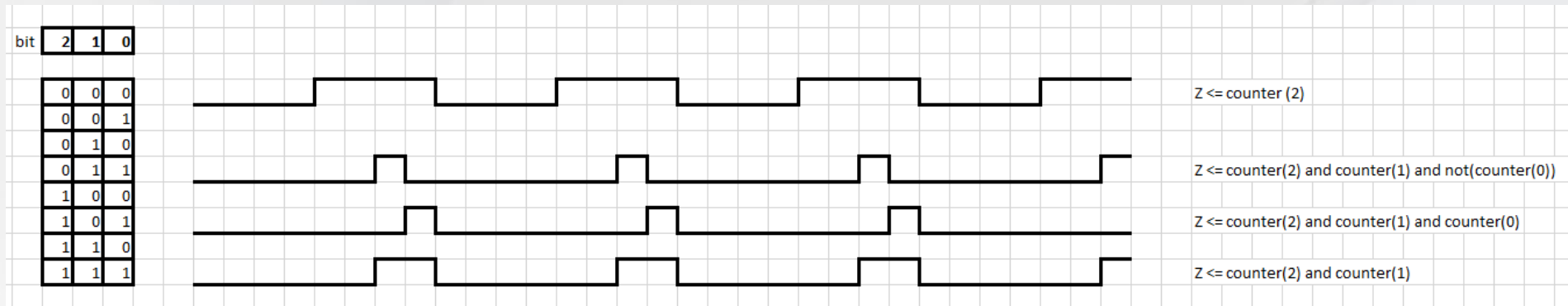
# ANODE CATHODE CONTD.



Figure 18. Common anode circuit node.

<https://digilent.com/reference/programmable-logic/nexys-4-ddr/reference-manual>

# 7 SEGMENT DISPLAY – SEQUENTIAL CONTROL



- The CLK divider frequency (update interval) depends on the counter width
- The pulse width depends on the number of bits
- Unique bit patterns result in unique pulse positions



- Send the **codable** Simulink graphic (\*.slx) in a zipped file in a “**graph**” folder
- Add a small video (mp4) „**7segm\_single\_dig\_ext\_video**” to the zip file in a „**video**” folder to demonstrate the right behavior
  - To compress a HQ video from your mobile phone, you could use a tool for video compression:
  - E.g.: <https://video-verkleinern.online-umwandeln.de/>

