Digital Logic Synthesis Multiplexors

Last updated 10/29/24

Digital Logic Synthesis – Multiplexors

- Logic synthesis using multiplexor circuits is simple when starting from a truth table
  - Process
    1. Create a truth table from the logical expression
    2. Create a 2^n input multiplexor – where n is the number of logic inputs
    3. Connect the inputs to the Control signals for the multiplexor
       - Be sure to wire the lsb of the truth table to the all 0s input of the control signal
    4. Connect the inputs of the multiplexor to V_{DD}/Gnd as indicated in the truth table
       - Be sure to connect the 000.. output of the truth table to the 000… input of the multiplexor

Digital Logic Synthesis – Multiplexors

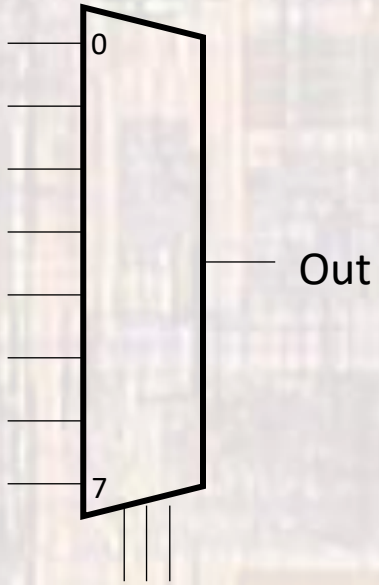
- Ex – step 1
  - Create Truth Table

C	B	A	OUT
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

Digital Logic Synthesis – Multiplexors

- Ex – step 2
  - Create N input multiplexor

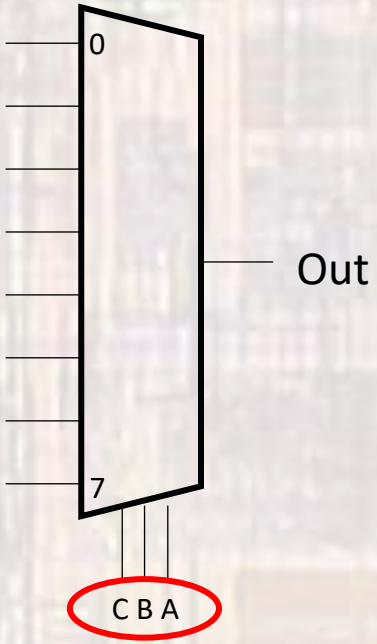
C	B	A	OUT
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0



Digital Logic Synthesis – Multiplexors

- Ex – step 3
  - Assign select inputs

C	B	A	OUT
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0



Digital Logic Synthesis – Multiplexors

- Ex – step 4
  - Wire inputs according to the truth table

C	B	A	OUT
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0