CPSC 359 – Digital Logic Tutorial #2

Multiplexing

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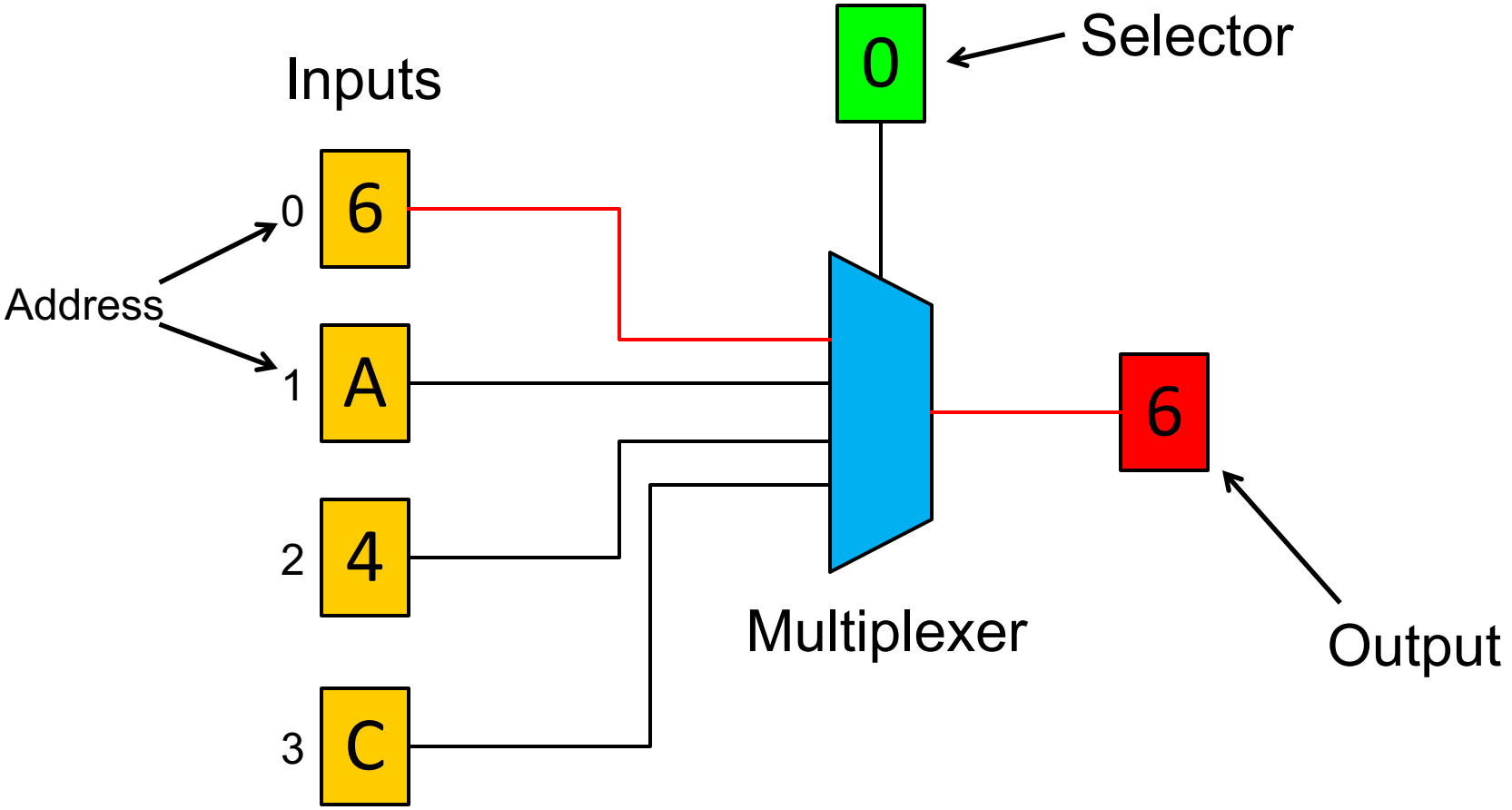
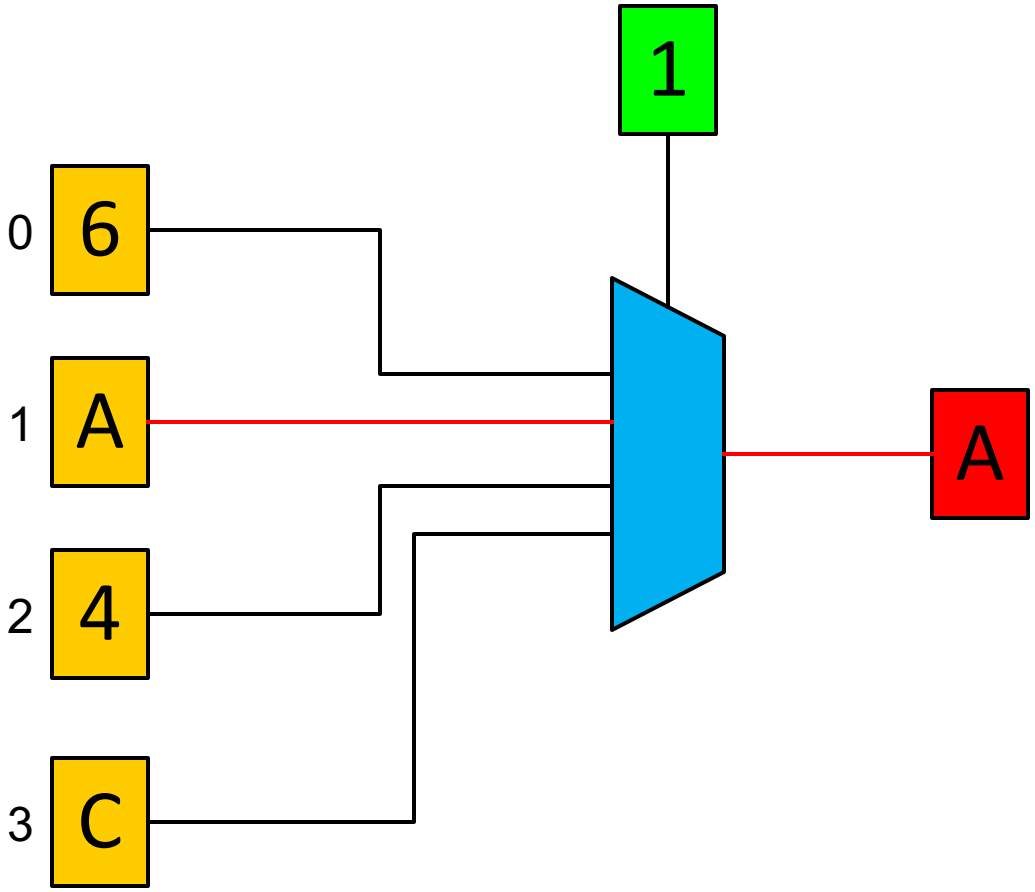
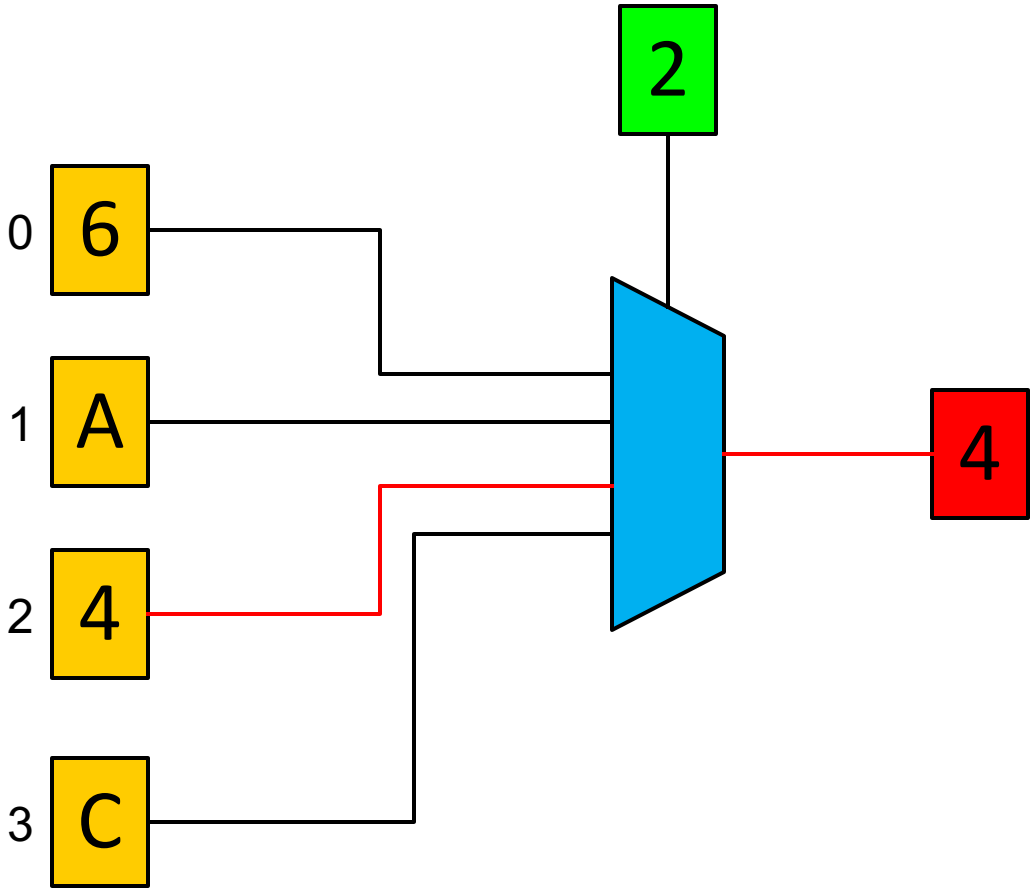
Multiplexers



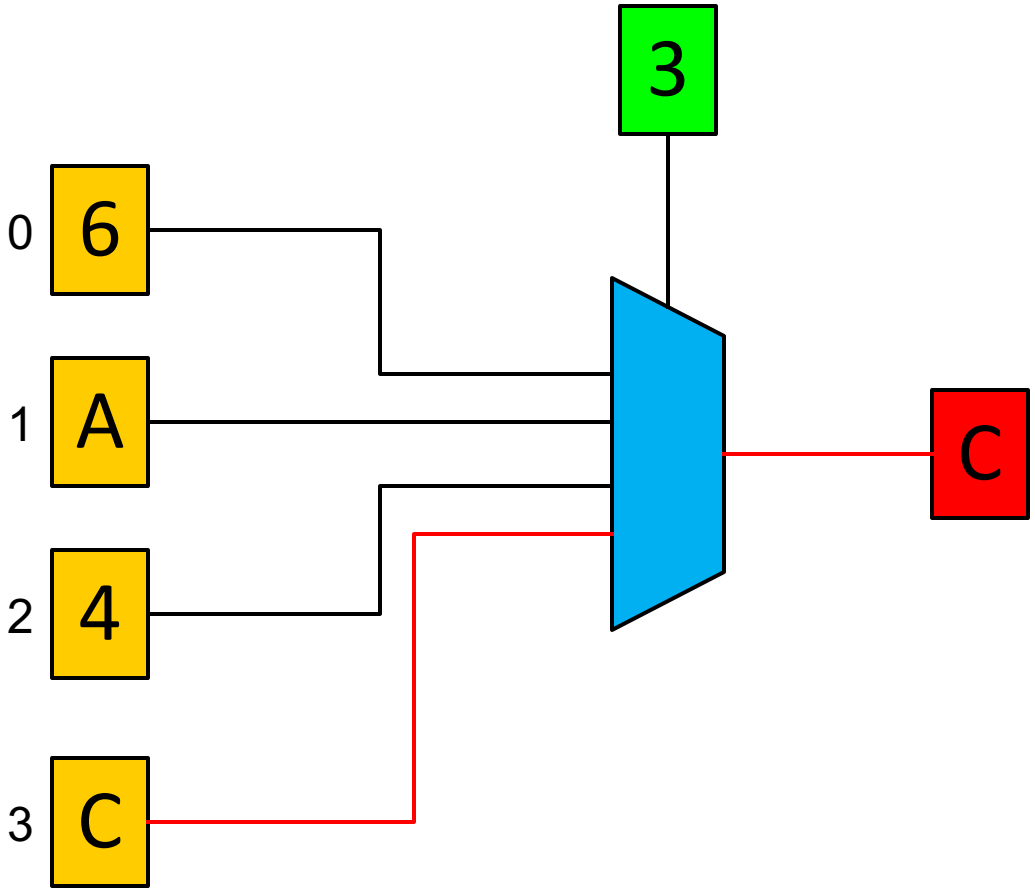
Multiplexers



Multiplexers

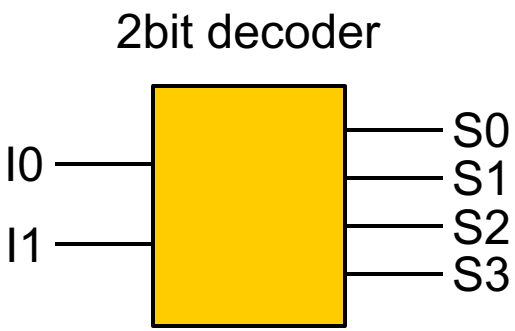


Multiplexers



Decode the Address

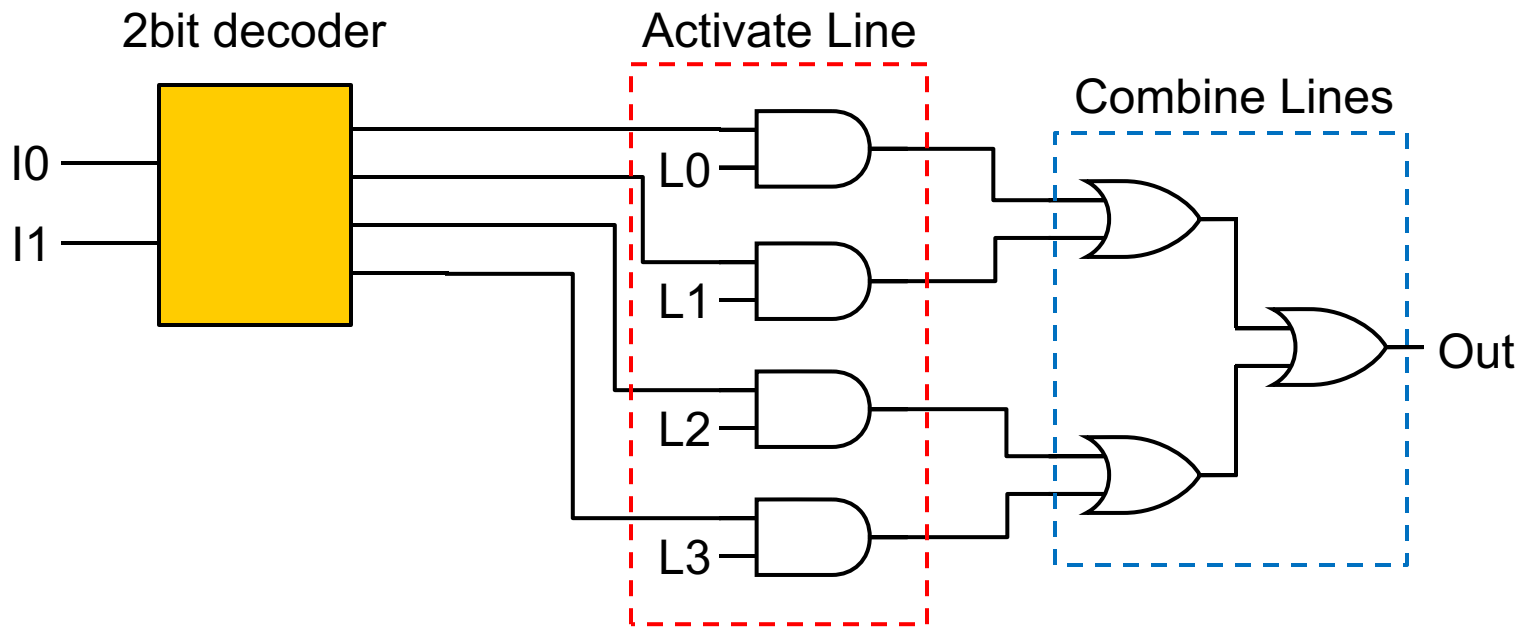
- First, we need to decode the address to select the line
  - Input: *n* bit address
  - Output: 2^n selector lines



I1	I0	S0	S1	S2	S3
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

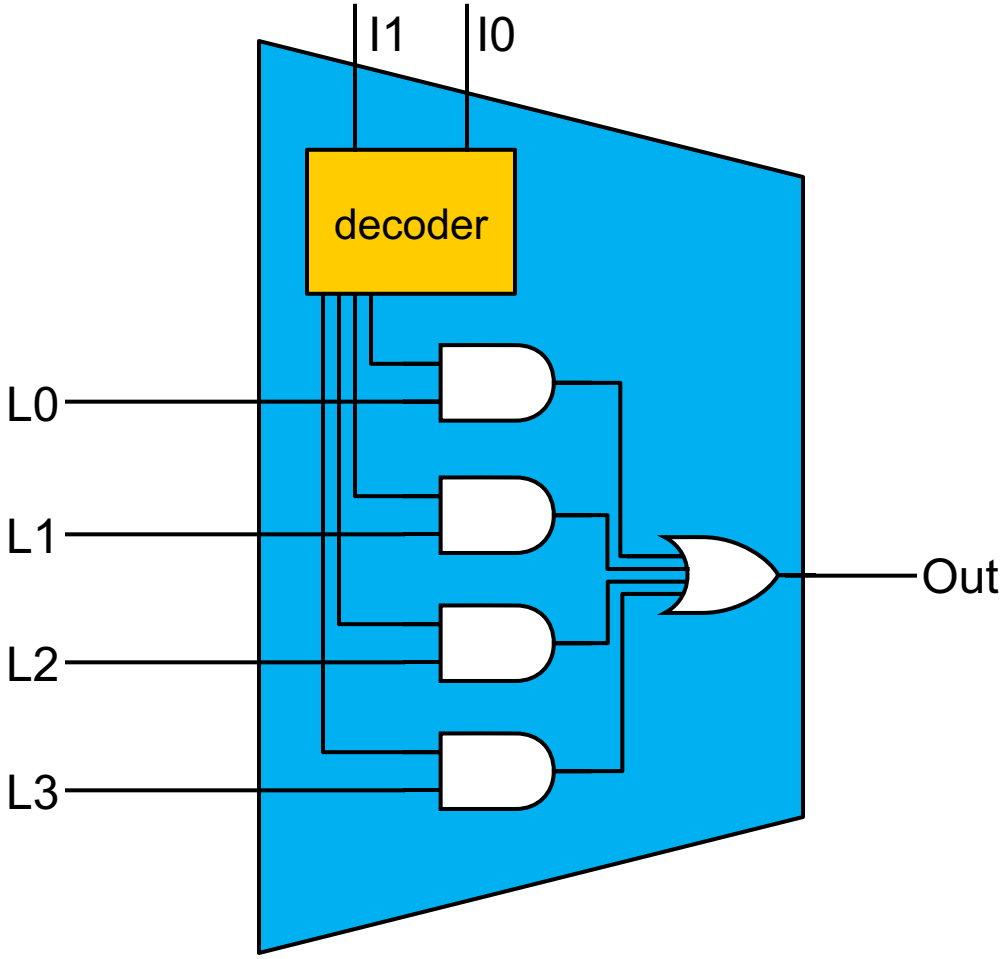
Activate the Line

- Use the output of the decoder to activate the correct line

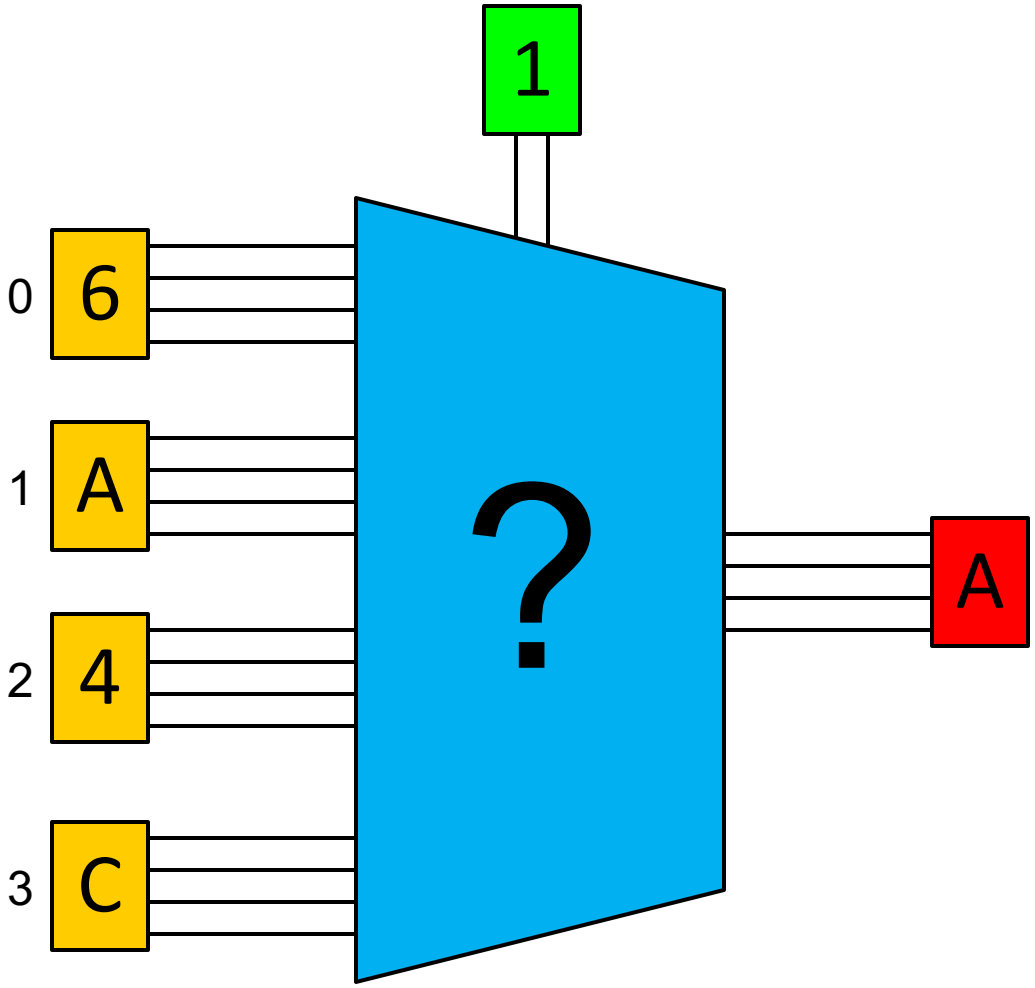


Activate the Line

- 4 to 1 multiplexer
  - 2bit address space
- What we have:
  - Four 1bit inputs
  - One 1bit output
- What we want:
  - Four 4bit inputs
  - One 4bit output



Exercise



Challenge Exercises

1. Combine the Multiplexer with the 4bit Full Adder
   - Use 4bit Full Adder circuit from lecture
   - Two 4bit 4-to-1 multiplexers to select each input to the adder

2. Create a 4bit 1-to-4 Demultiplexer
   - It's like a multiplexer, just in reverse!
   - One 2bit selector and one 4bit value input
   - Four 4bit value outputs