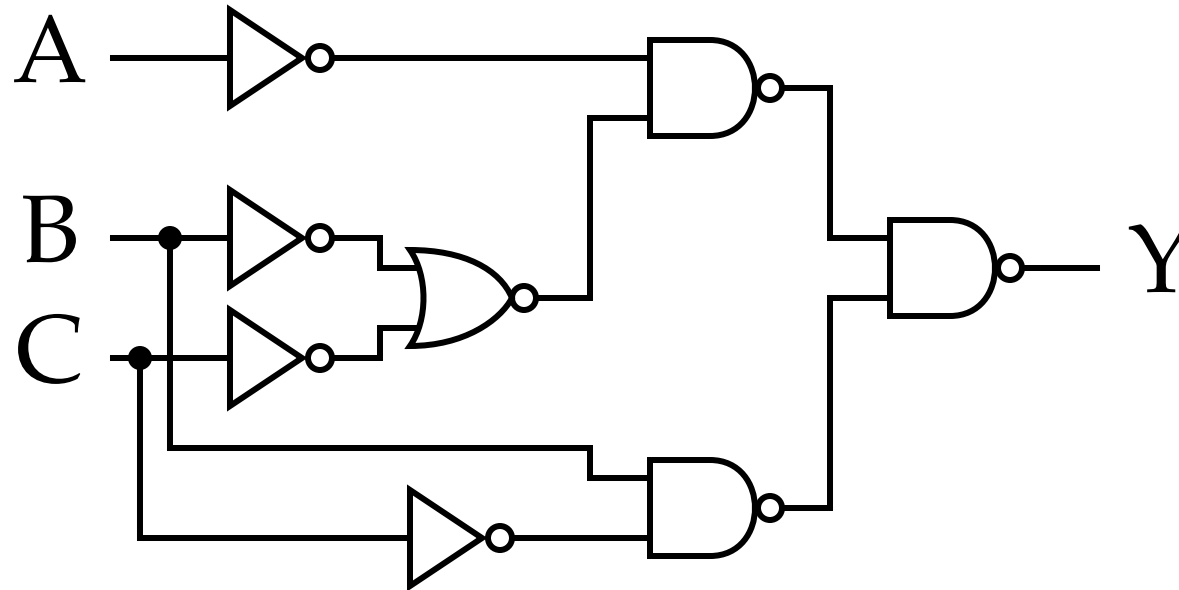


Warmup

Write a boolean equation for this circuit:

Use ! for NOT, e.g., $!(AB)$ or $!A + !B$



Respond at pollev.com/stevenbell699

Warmup #2

Implement this equation using only inverting logic:

$$(\bar{A} + \bar{B})(\bar{B} + \bar{C})(\bar{A} + \bar{C})$$

ES 4: Karnaugh maps

Steven Bell

30 January 2019

By the end of class today, you should be able to:

- Draw a k-map for a 3 or 4-input truth table, and use it to create a minimal boolean equation for the truth table.
- Find a minimal boolean equation for a truth table with "don't cares"

What's the point of High-Z?

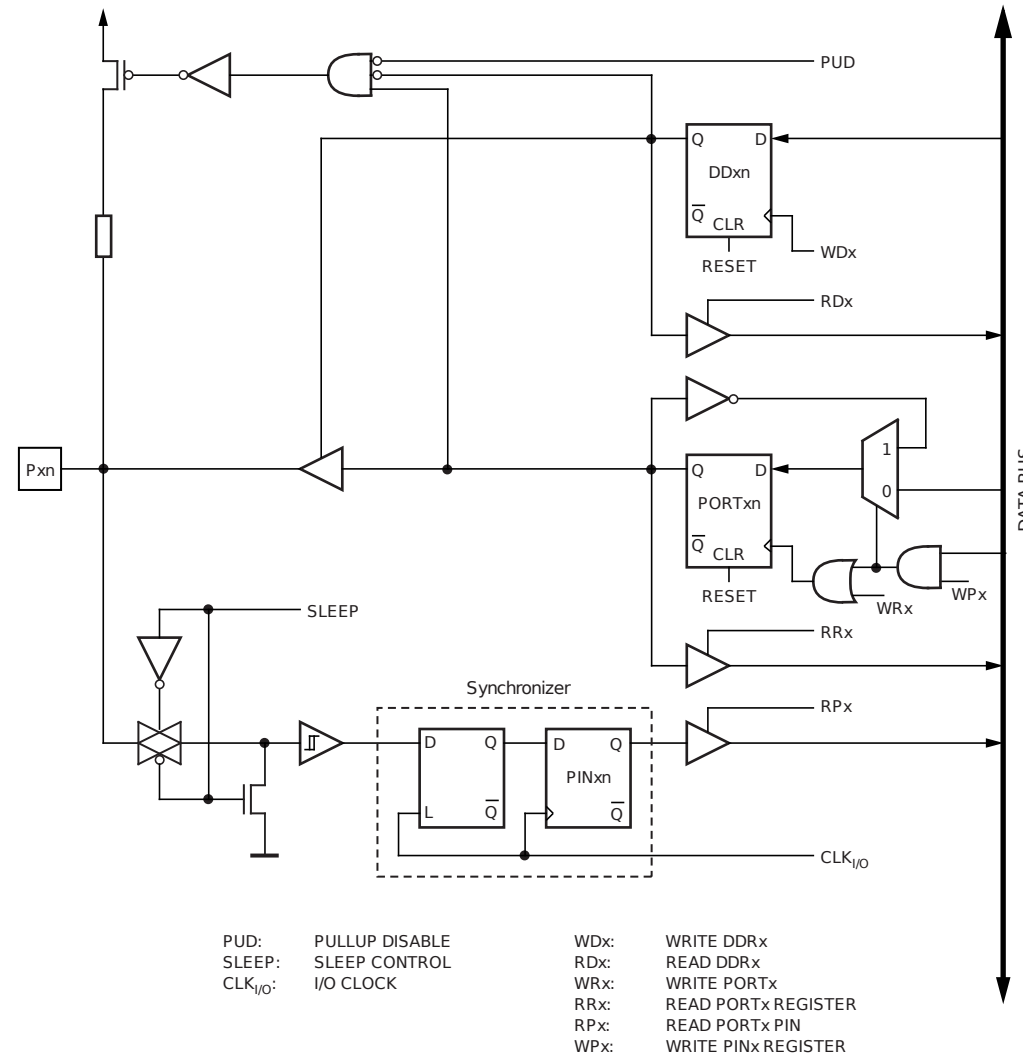
Multiple modules need to communicate on a shared bus

But this means we could have contention!

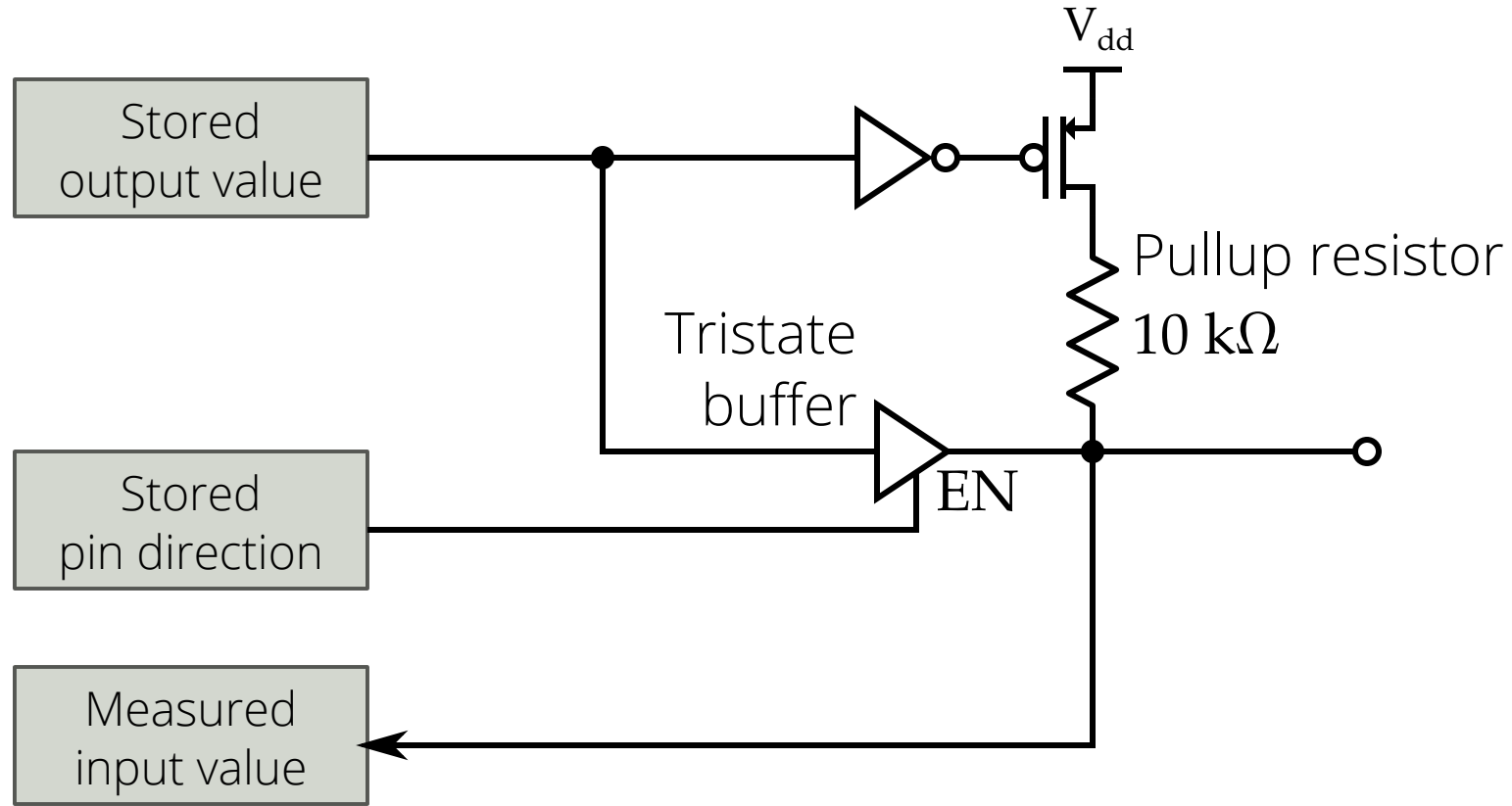
We solve this by turning off a gate completely (neither high nor low)

High-Z in practice: inside an Arduino pin

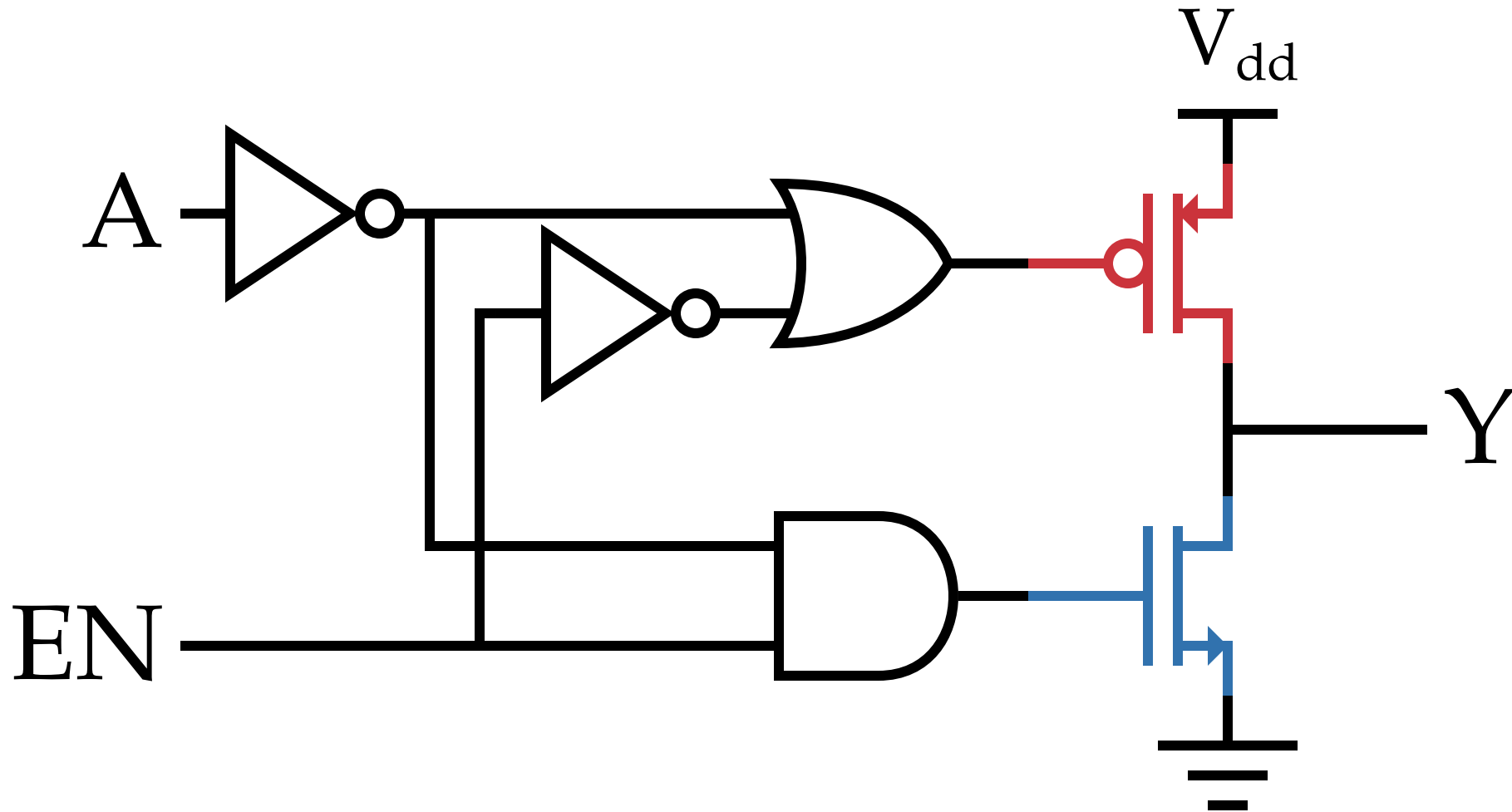
Figure 13-2. General Digital I/O⁽¹⁾



A gross simplification



A hypothetical tri-state buffer



Bonus material

Key representations

Boolean equation

$$\overline{AB} + C$$

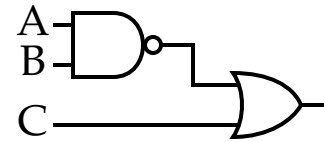
Boolean algebra

Truth table

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1

Karnaugh maps

Logic diagram

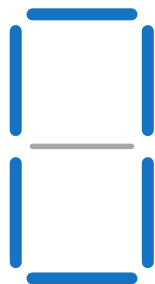


Bubble pushing

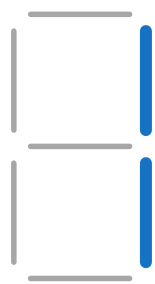
Karnaugh maps

Are just a clever way of looking at the truth table

Don't cares



0



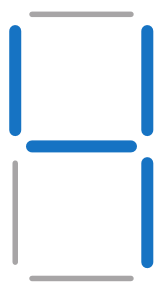
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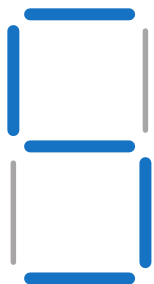
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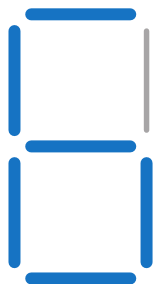
3



4



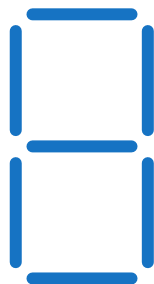
5



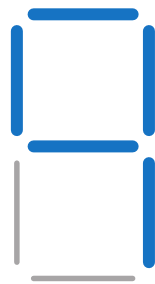
6



7



8



9

For Monday

1. Read the book (2.8) and complete the pre-class quiz

www.ece.tufts.edu/es/4/

Quiz is due at **9AM** the day of class, so I can review it

```
cp /es/4/public_html/quizzes/quiz_04.txt ./
```

```
provide es4 q4 quiz_04.txt
```

2. Complete **homework 1** (due Monday 2/4)
3. Finish lab and write **lab report** (due Wednesday 2/6)