

CSE 390B, Autumn 2022

Building Academic Success Through Bottom-Up Computing

Finals Preparation & Computer Networks

Gearing up for Finals Week, E-Portfolio Workshop,
Overview of Computer Networks

Lecture Outline

- ❖ **Gearing up for Finals Week**
 - **Study Plan Outline and Tips for Success**

- ❖ **E-Portfolio Workshop**
 - **Reflection Work Session and Feedback**

- ❖ **Overview of Computer Networks**
 - **How Computers Connect to The Internet**

Gearing up for Finals Week

- ❖ Revisit and reassess your goals each day
 - Break-up into different levels—minimal, solid, reach
- ❖ Have an accountability buddy
 - Study groups or working sessions—having someone who can help you stay motivated, accountable, and avoid procrastination
- ❖ Recall Bloom's Taxonomy
 - How is your preparation involving higher level thinking skills?
- ❖ Stick to a routine
 - Provides normalcy & structure for maintaining sleep and wellness

Planning for Success on Finals Week

In groups, discuss the following for 4-6 minutes:

- ❖ What are some metacognitive strategies that you plan on using to succeed in finals week?
 - How can you stay disciplined or keep yourself accountable in applying these metacognitive skills?

- ❖ In terms of academic and metacognitive subjects, what are your strengths and weaknesses going into finals?
 - How can you cultivate your strengths and improve the areas you are weaker in?

Developing a Plan for Finals Week

- ❖ First, list the commitments that you have for finals week (final exams, final projects, presentations, etc.)
- ❖ Then, outline the steps that you'll need to follow to complete those tasks
 - Be specific with these steps — instead of “review derivatives,” add detail about the **how**: “Review lecture slides and examples on derivatives and redo five derivative problems on WebAssign”
- ❖ Lastly, add dates to when you will work on and complete each of the steps (be realistic here!)
 - Add these to your calendar

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E-Portfolio Workshop

- ❖ Individually, spend 15-20 minutes completing the following steps:
 - Aim to finalize the two metacognitive skills, two examples of you applying them, and one technical skill you plan on reflecting on
 - Begin drafting your reflection on a document (should be in paragraph form in final e-portfolio, but bullet points ok for now)

- ❖ Then, get into groups of 3-4 and complete the following:
 - One group member presents on their reflection so far
 - Each group member listening should provide one question, comment, constructive feedback, or complement to the presenter
 - Repeat until everyone has had a chance to present

Five-minute Break!

- ❖ Feel free to stand up, stretch, use the restroom, drink some water, review your notes, or ask questions
- ❖ We'll be back at:



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- ❖ **Overview of Computer Networks**
 - **How Computers Connect to The Internet**

Overview of Computer Networks

- ❖ We will go over an overview of networks
 - Take CSE 333 (Systems Programming), CSE 461 (Computer Networks), and CSE 452 (Distributed Systems) to learn more

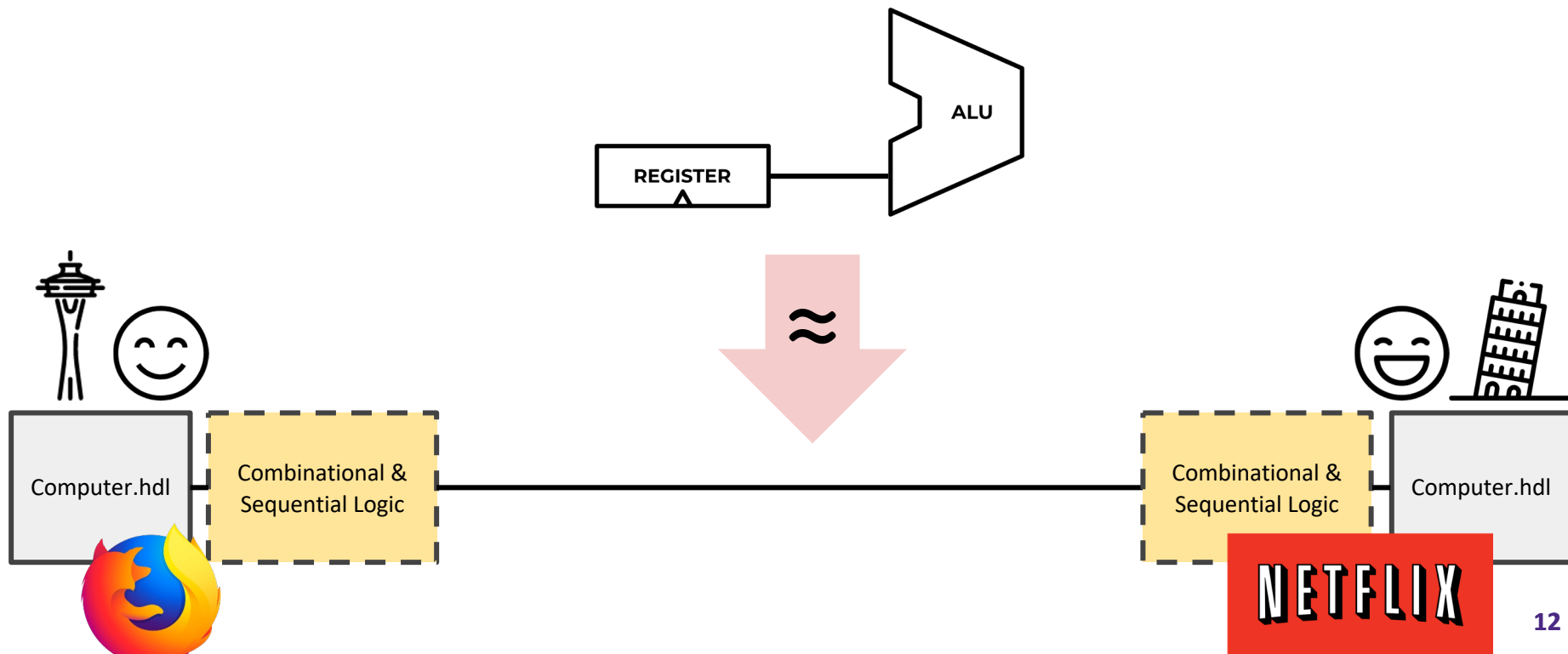
- ❖ Our focus:
 - Brief intro to what connecting to the internet looks like under the hood
 - What that connection might look like implemented in our computer

How Do Computer Networks Work?

- ❖ How do you think we connect computers in different physical locations?
- ❖ What modes of communication do you think computers use to network with one another?

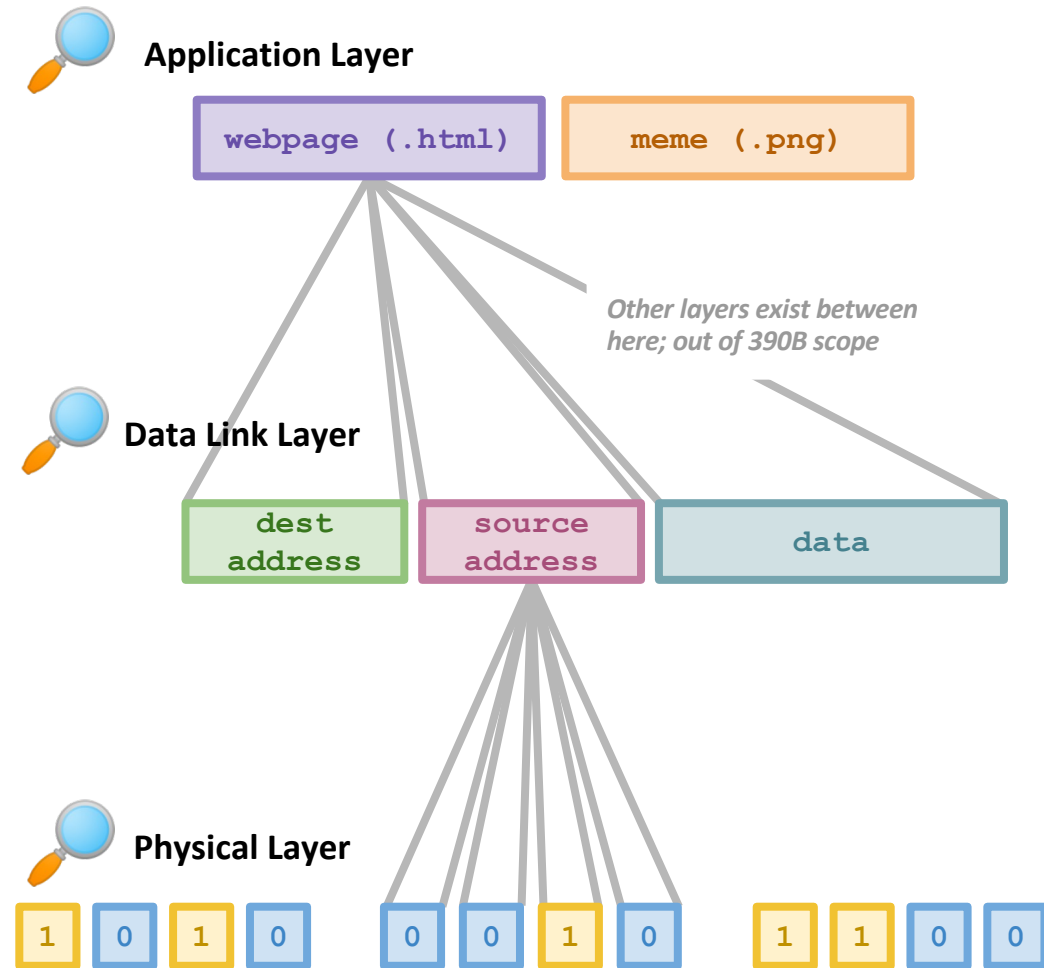
Networks = Really, Really Long Wires

- ❖ At a fundamental level, there's nothing magic about the Internet—it's the same concepts we used to build our CPU, just with longer wires
 - Still 1s and 0s, still just combinational + sequential logic



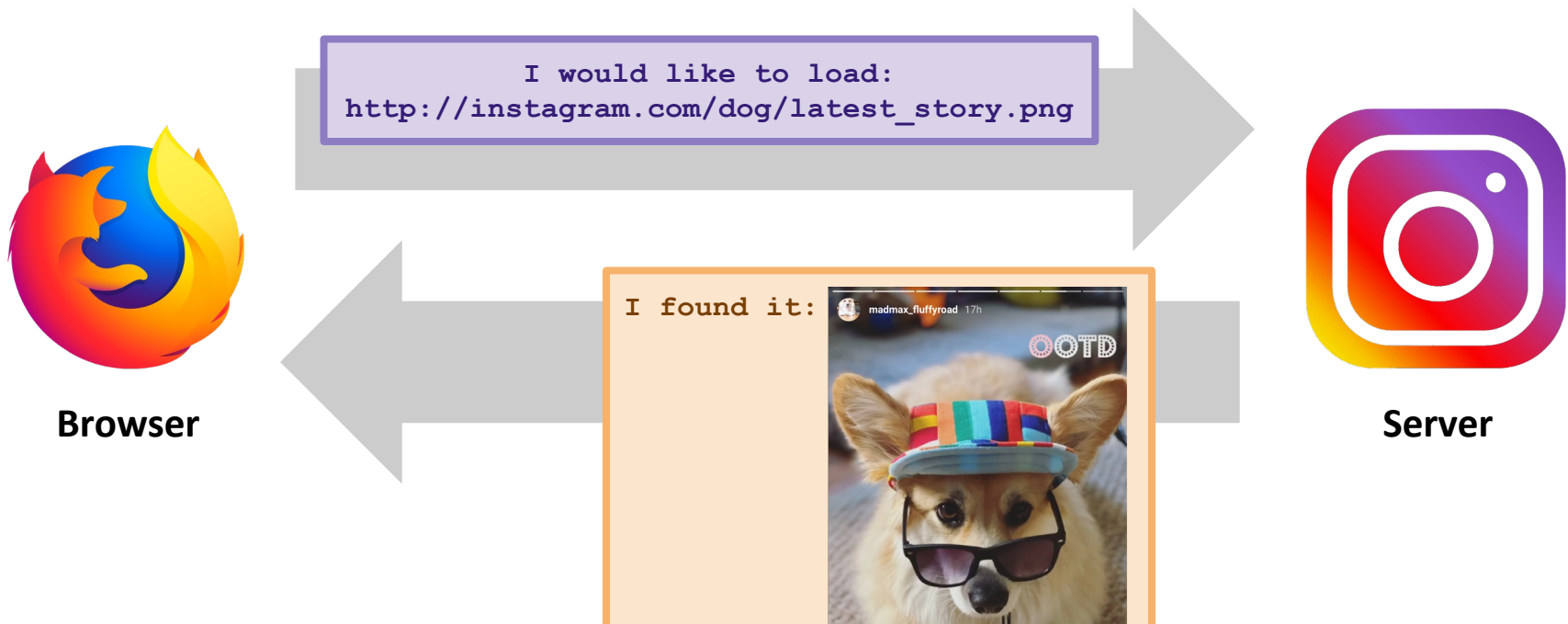
Thinking about the Network: Layers

- ❖ To manage the complexity, we think about the network in layers
- ❖ It's all 0s and 1s, but each layer is a different way of “framing” or thinking about those 0s and 1s
 - Each layer zooms out a little more



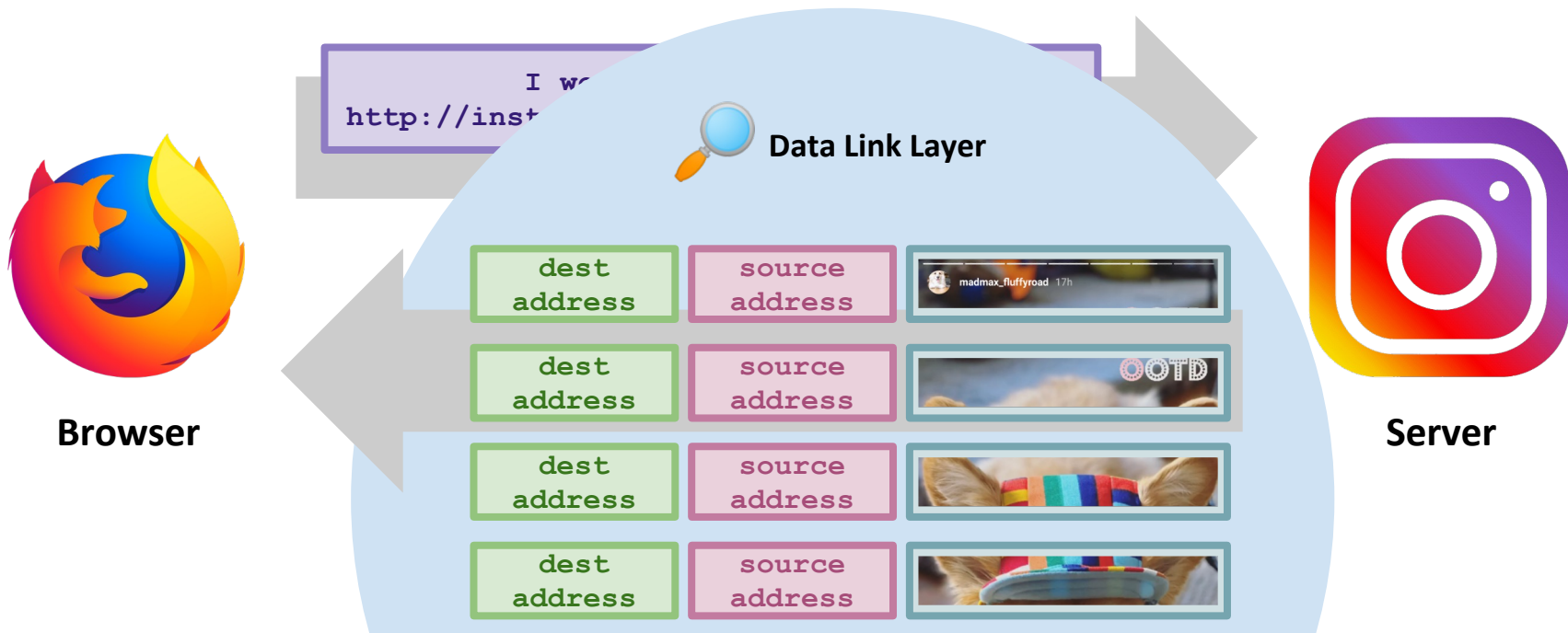
Application Layer

- ❖ Conceptually the “top” layer: looking at internet traffic as direct communication between applications
- ❖ Common use: HTTP (HyperText Transfer Protocol)
 - Your browser sends an HTTP request to a server
 - The server sends back an HTTP response with data attached



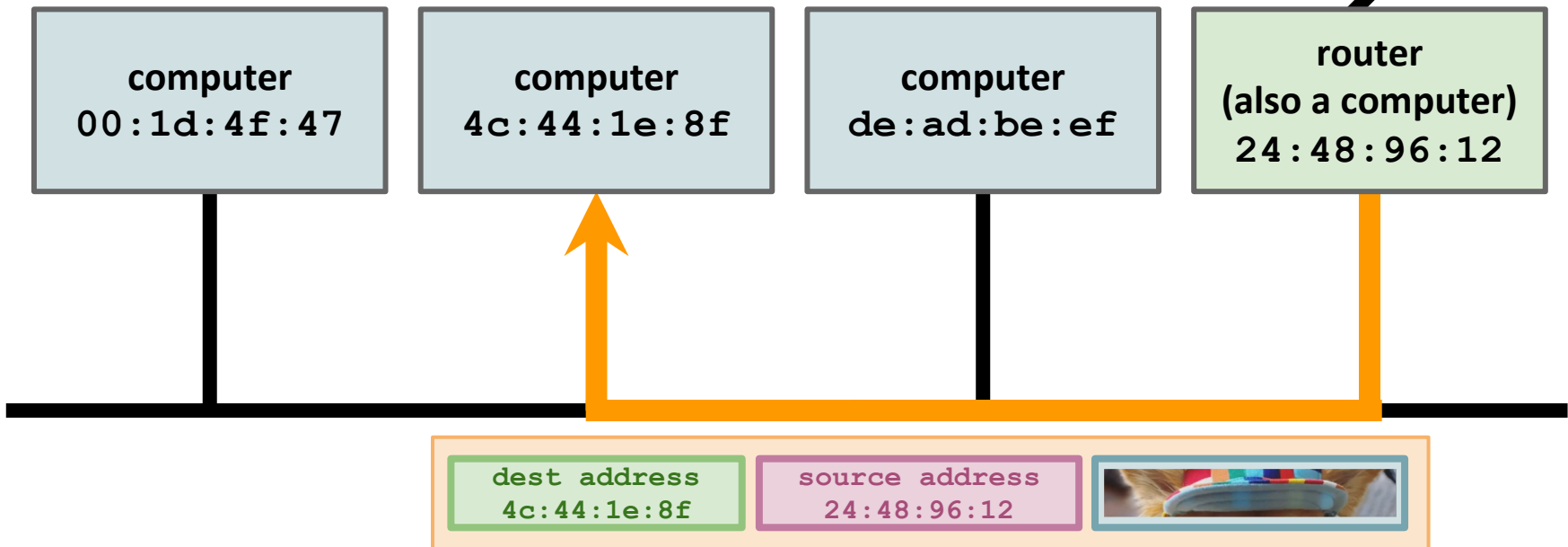
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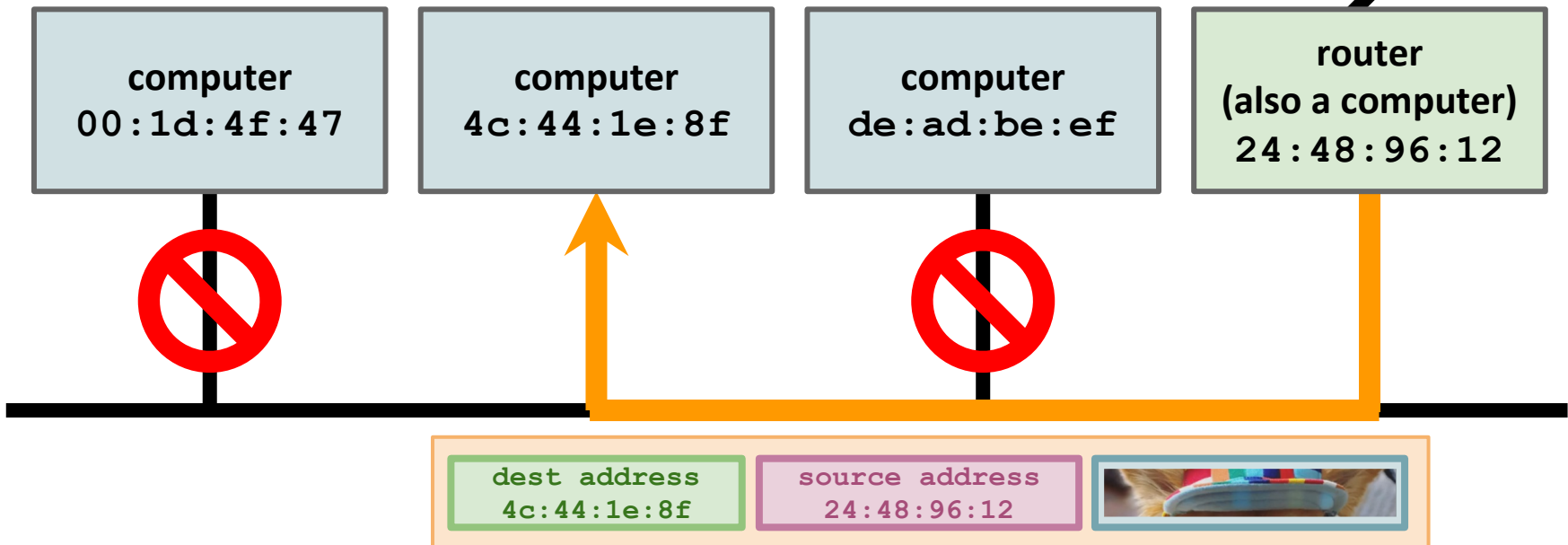
Data Link Layer

- ❖ A computer network is simply multiple computers connected by a single wire
- ❖ Why is it better to send smaller chunks of data?



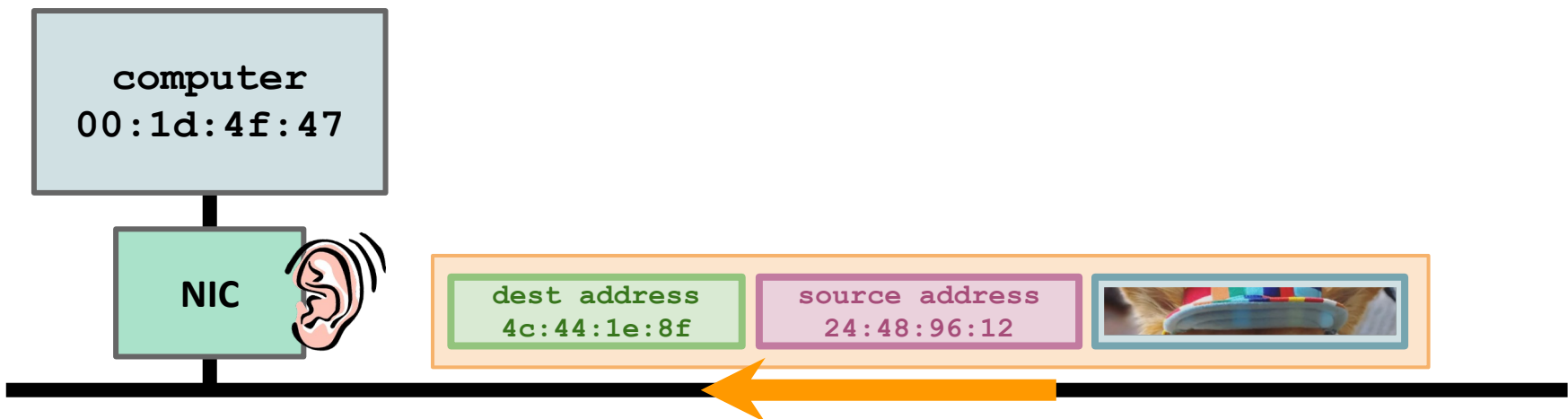
Data Link Layer

- ❖ Every computer will “hear” the message
- ❖ How do the other computers know to ignore an incoming packet of data?



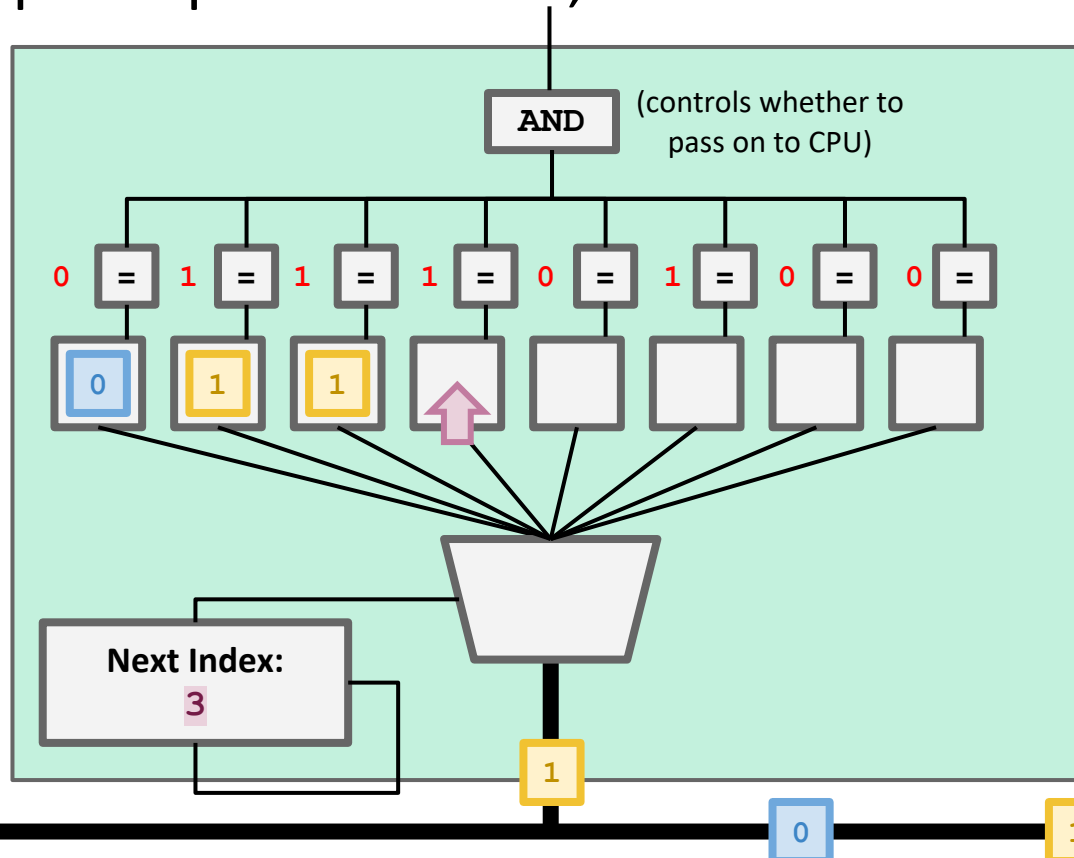
NIC (Network Interface Card)

- ❖ We don't want the CPU to waste time always listening to the network wire, especially when it's not even the destination computer
- ❖ Solution: **the NIC**—a new piece of the computer dedicated to dealing with the network wire
 - Listens to the network wire until it hears a destination address, checks if it matches this computer, and only sends to CPU if so



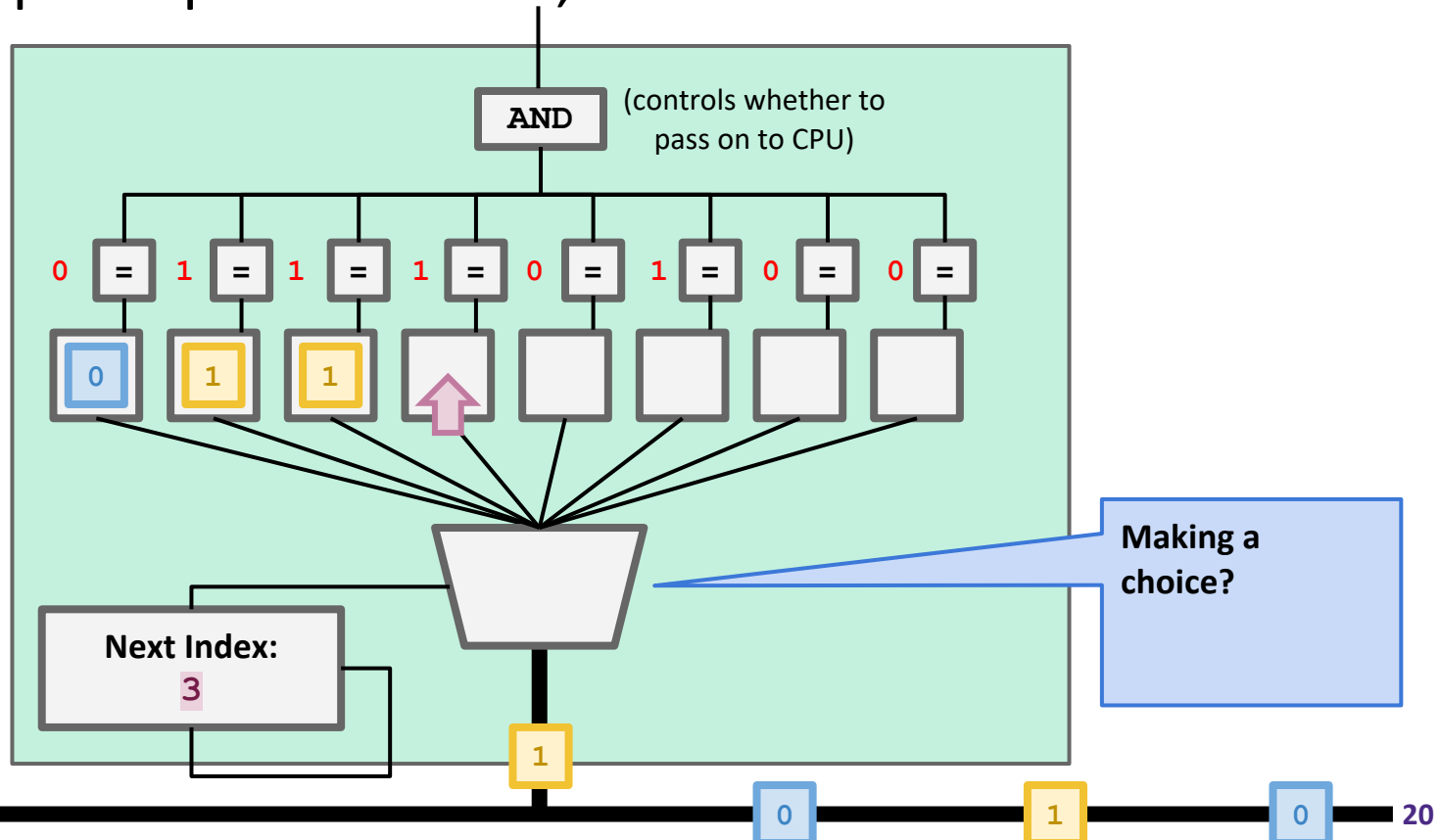
NIC Implementation in Your Computer

- ❖ Before, we would have to accept NIC as “magic”
- ❖ Now, we can imagine exactly how to build this chip, and for a simple implementation, turns out it's doable!



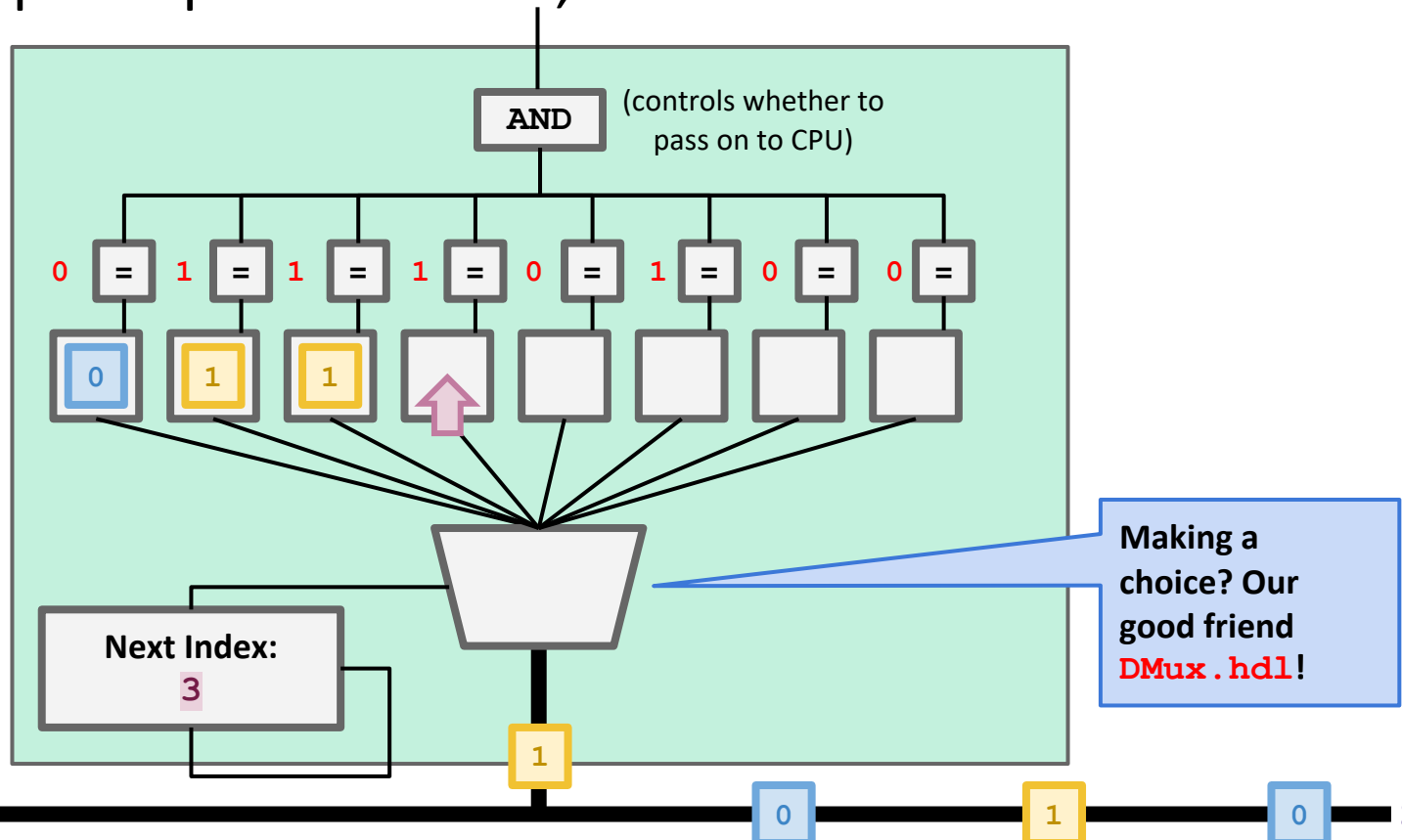
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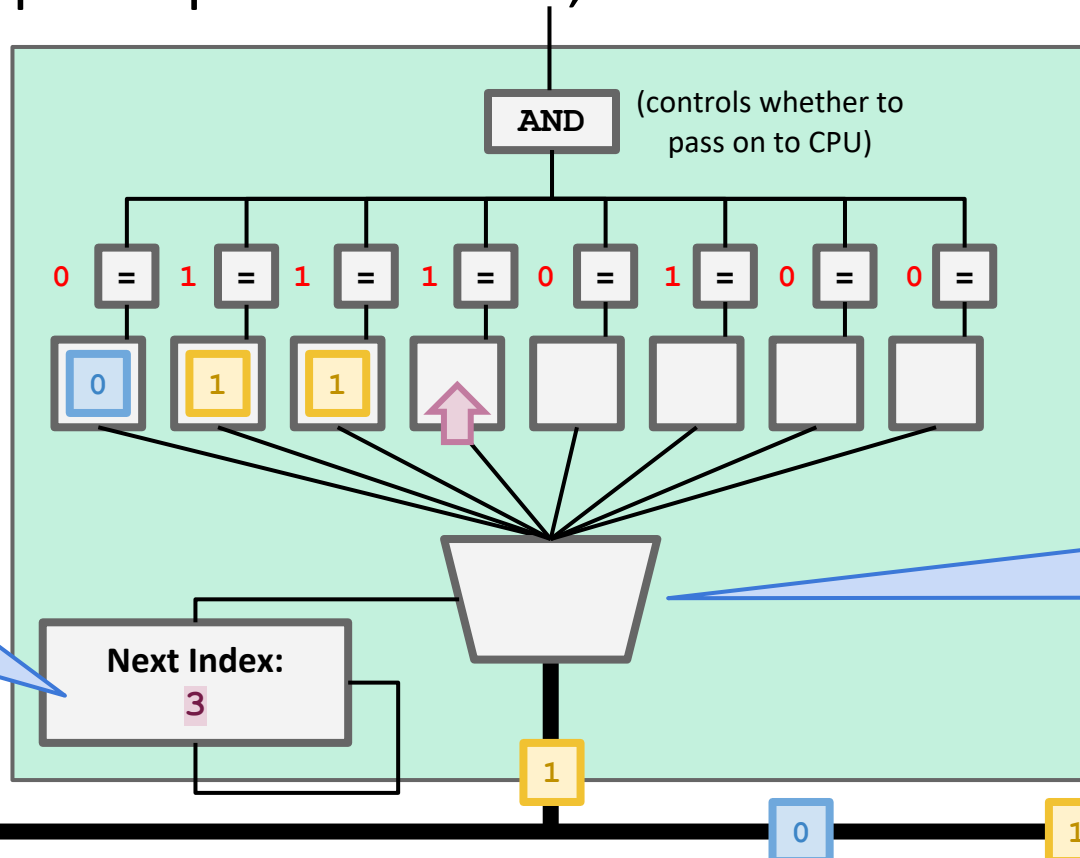
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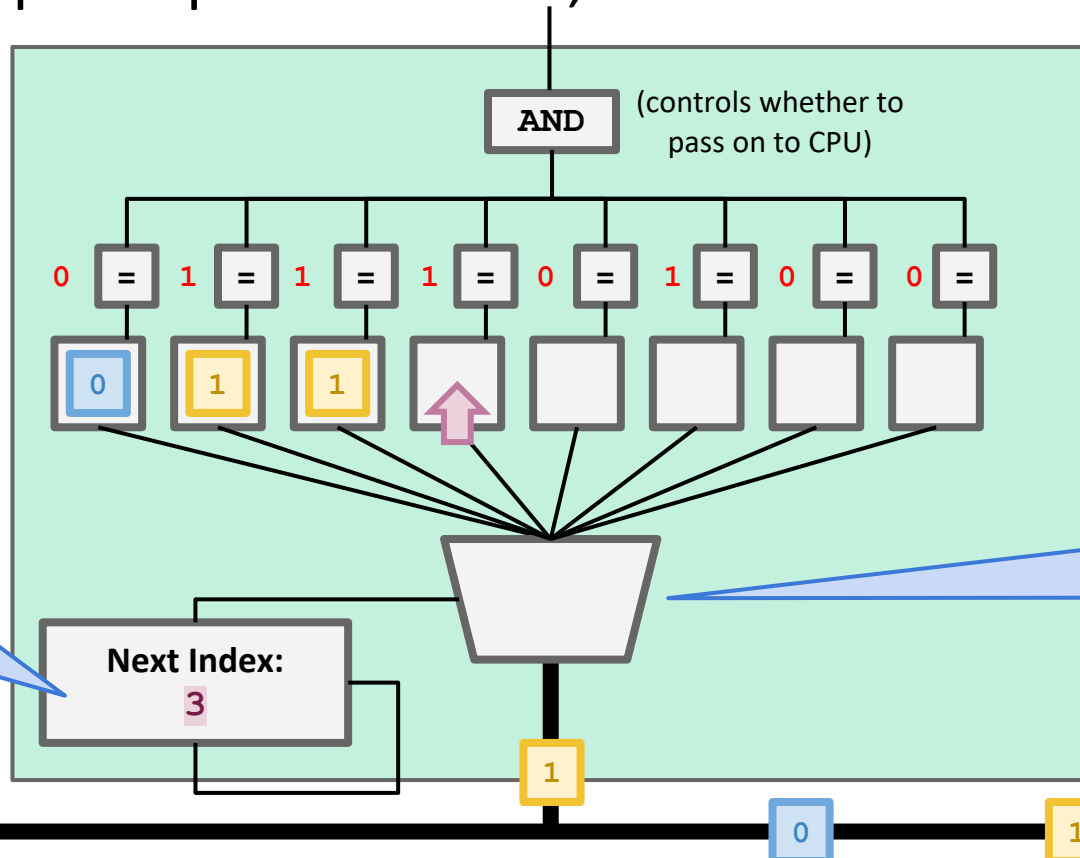
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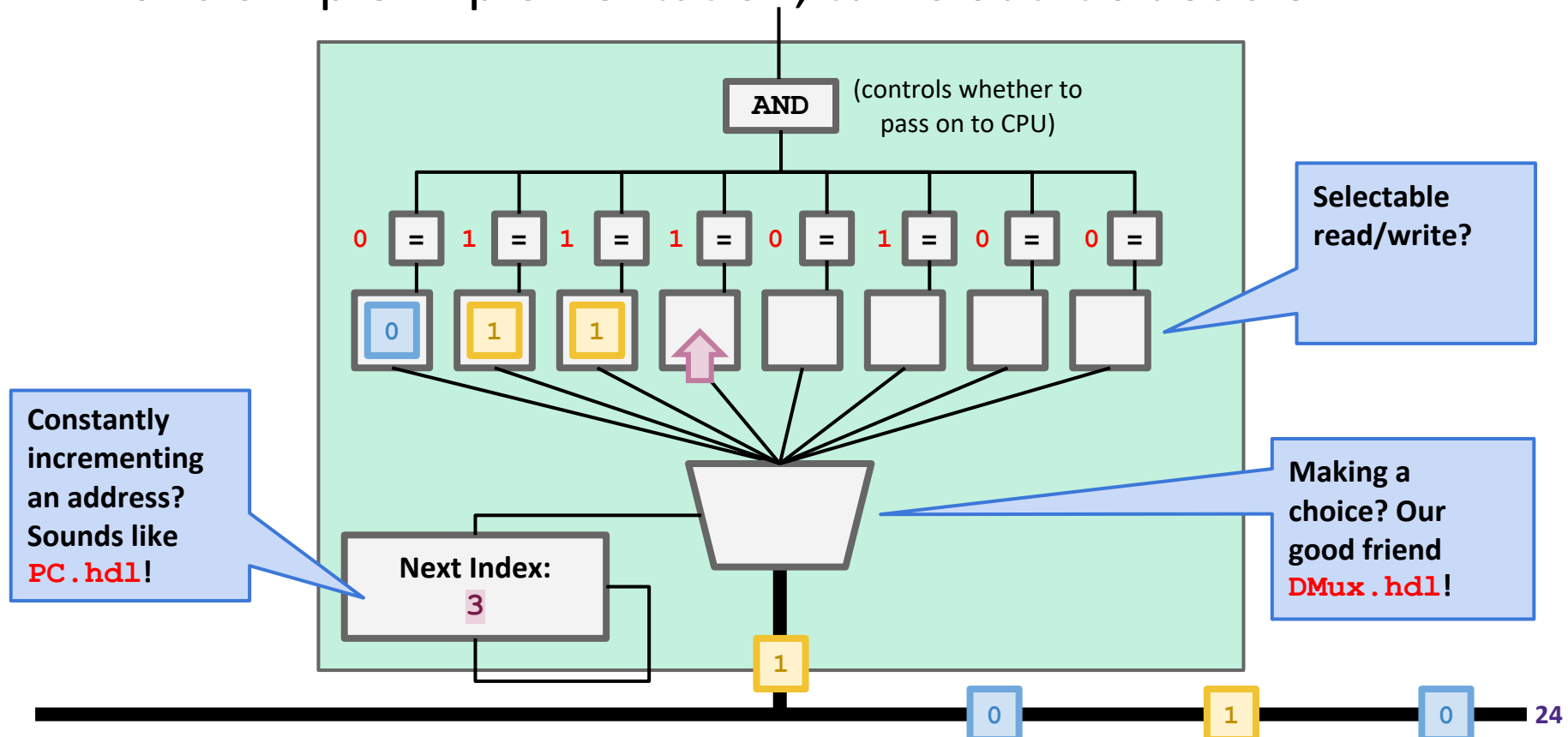
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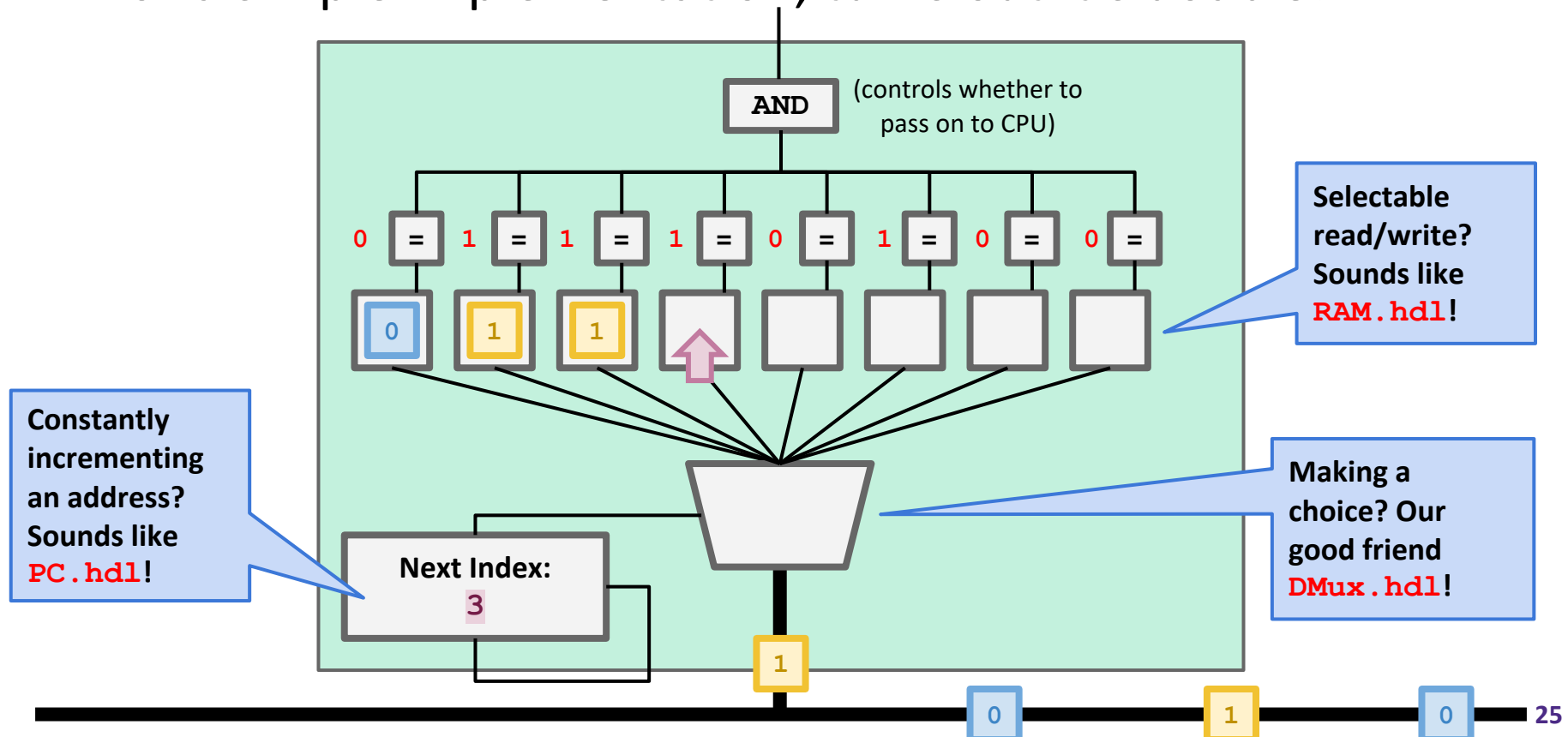
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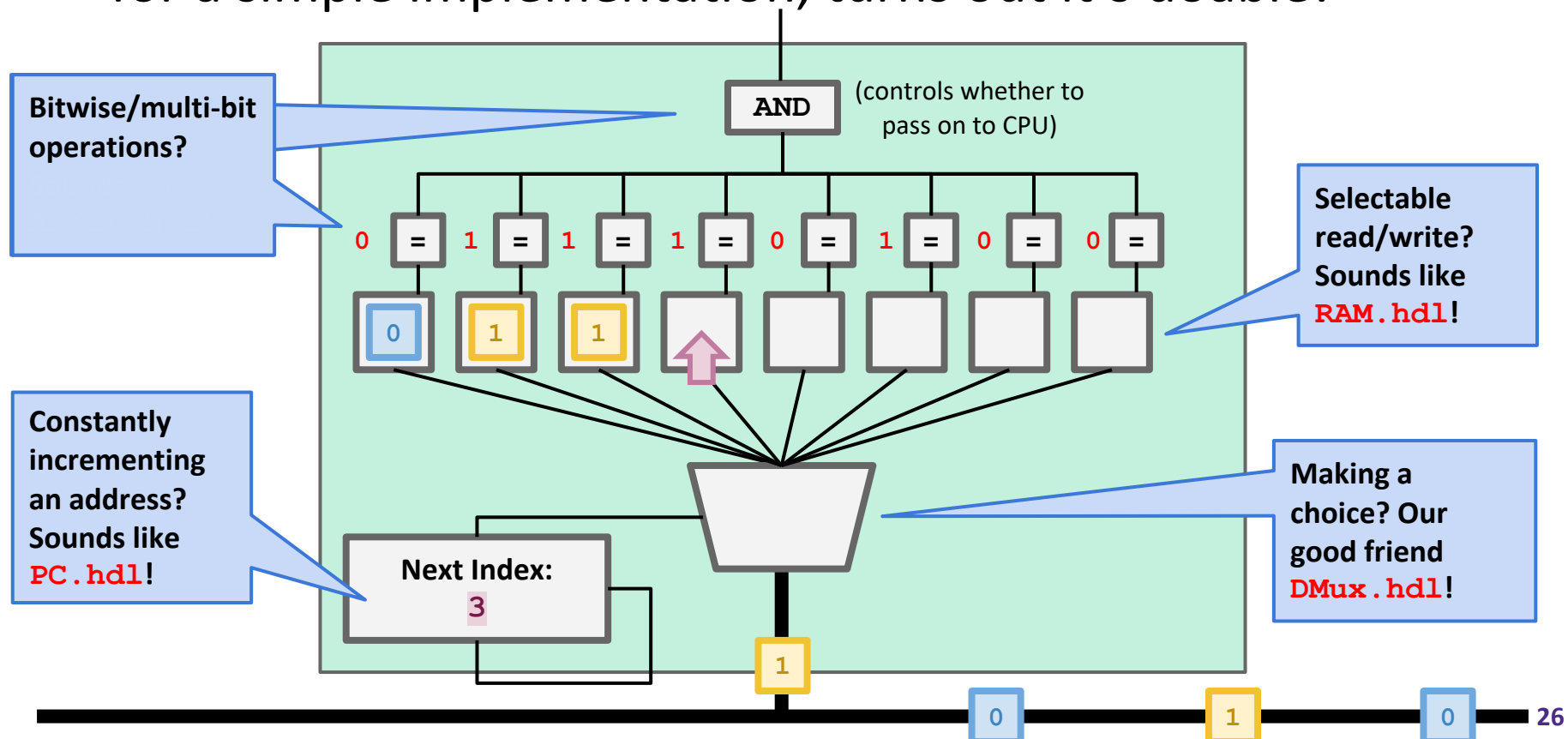
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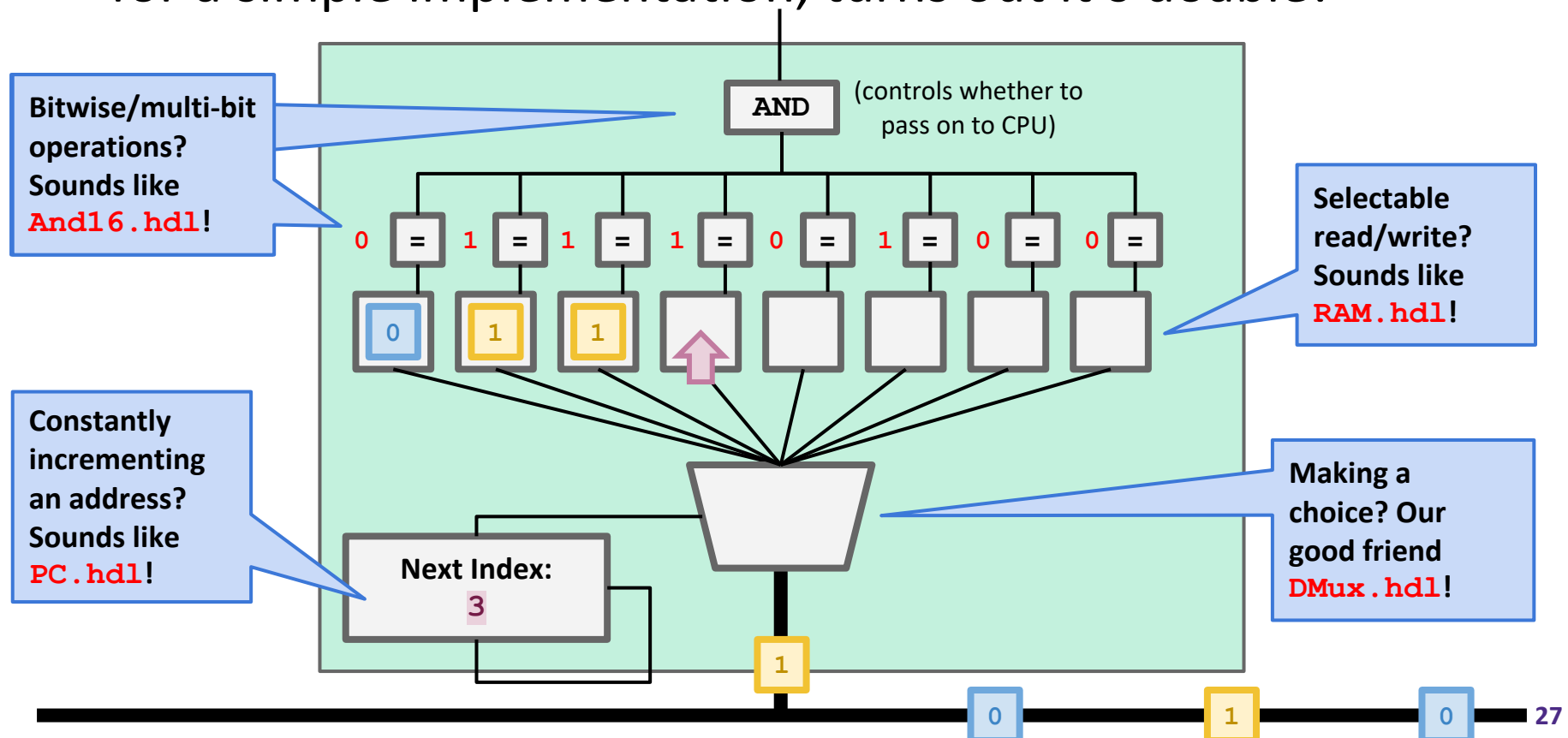
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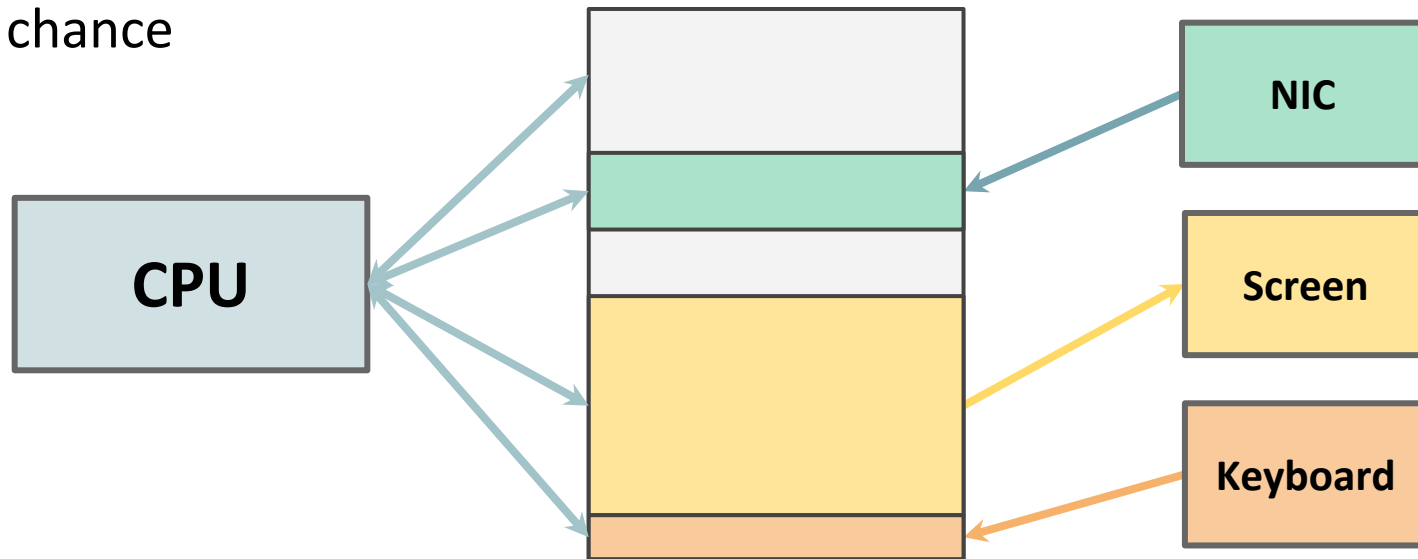
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Connecting NIC to Memory

- ❖ The keyboard and screen communicated with the CPU via memory maps—agreed-upon regions of RAM that can be read/written by the hardware of the devices themselves
- ❖ The NIC could be implemented in the same way
 - Every time the right address is detected, copy the following data into part of RAM where the CPU can retrieve it once it gets a chance



Takeaways: Computer Networks

- ❖ The network is fundamentally the same hardware we've been looking at
- ❖ Its incredible power comes from scale: how much data and how many computers it connects
 - To manage this complexity, we think of it in layers
- ❖ Interfacing with the network can be done with specialized hardware
 - This frees the CPU from monitoring constantly
 - Access data only when needed

Lecture 18 Reminders

- ❖ Next week: CSE 390B Victory Lap, TA-led Activities

- ❖ Project Reminders
 - **Project 7, Part II (Professor Meeting Report) due tonight (12/1) at 11:59pm**
 - Project 8 (Debugging & Implementing a Compiler) due next Tuesday (12/6) at 11:59pm
 - Final Project, Part I (E-Portfolio Outline) due next Thursday (12/8) at 11:59pm

- ❖ Course Staff Support
 - Eric has office hours in CSE2 153 today after lecture
 - Feel free to post your questions on the Ed board as well