Multiplexers & Demultiplexers

Convenience in circuit design

Akilesh Praveen & Ashwath Krishnan

UMD

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Agenda

1. Announcements
   - Project 3
2. Multiplexers & Demultiplexers
   - Introduction
   - What are Muxes and Demuxes?

Announcements

Project 4

- Project 4's been released, and the name of the game is multipliers.
- You'll find everything you need under the 'week 5' section on the course website
- Today's lecture will give you background knowledge that will help you implement multiplexers and demultiplexers.
- More info to come at the end of lecture

Multiplexers & Demultiplexers

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- A **Demultiplexer** is often called a 'demux'.

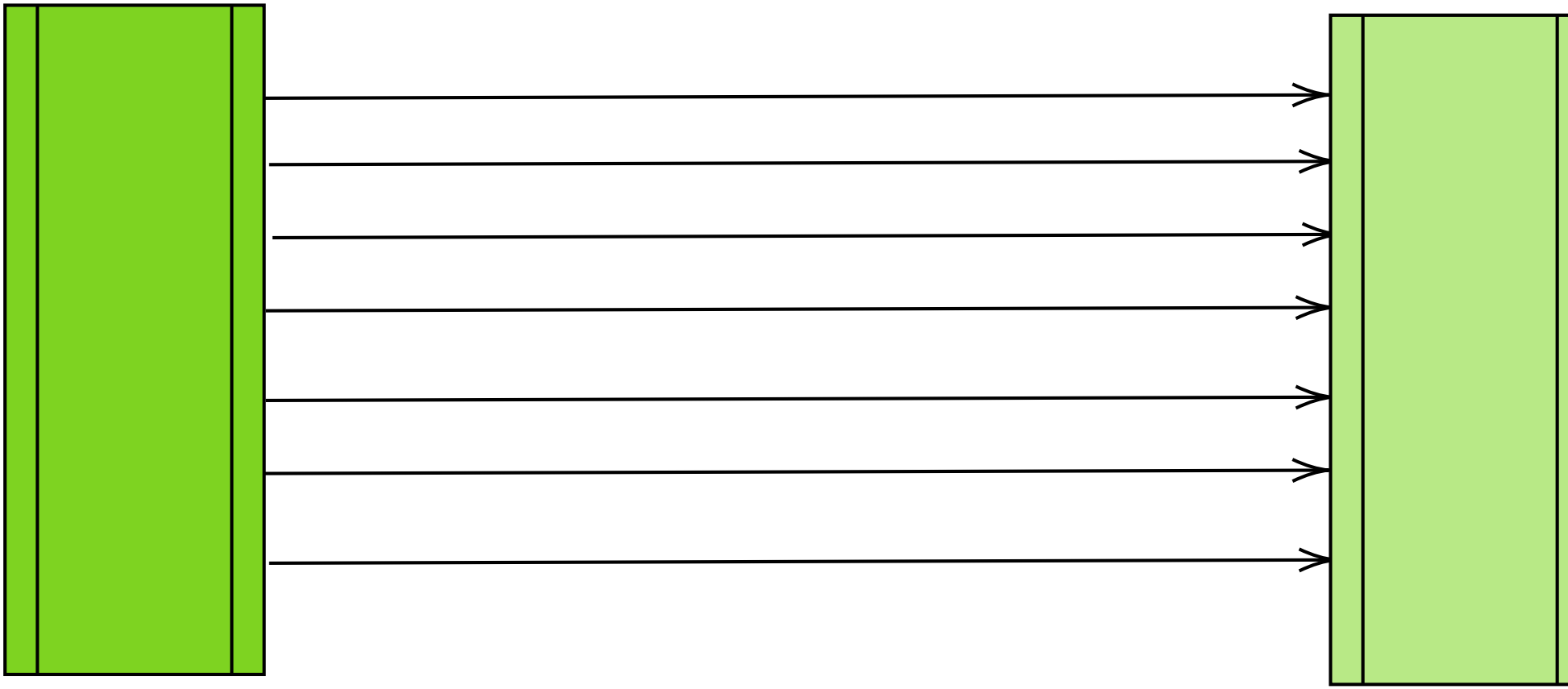
Multiplexers & Demultiplexers

- A **Multiplexer** is often called a 'mux'.
- A **Demultiplexer** is often called a 'demux'.
- The question is- what are they?

Need necessitates solution

- The need for **Multiplexers** arose due to the presence of a certain problem in digital circuit design.
- Remember our buses + encoders and decoders?
- It turns out, there are a lot of different circuits that would require us to have a fair amount of parallel wires.

An example



- We've started creating circuits that have a sizable amount of wires associated with them
- It turns out, extending **all** of these wires is pretty expensive and space-consuming, given just how many wires we have to build

Parallel Signals

- This phenomenon is known as having many **parallel signals**.
- They use a ton of wires!
- I'm sure everyone is well aware of how much more effort it is to place one extra line of wires in Minecraft, which makes you wonder how much harder it is to do in real life
- If we're going to be extending these wires over long distances, are there more efficent ways to handle that many signals?

Parallel Signals

- Yes!!!
- Your answer can be found in **Multiplexers** and **Demultiplexers**.

What are they?

- A **Multiplexer**, or **Mux**, takes a bunch of parallel wires and condenses all of them down to a singular `OUT` wire and a few `SELECT` wires.
- A **Demultiplexer**, or **Demux**, takes a singular `IN` wire and a few `SELECT` wires, and sends the `IN` signal down the appropriate output wire.

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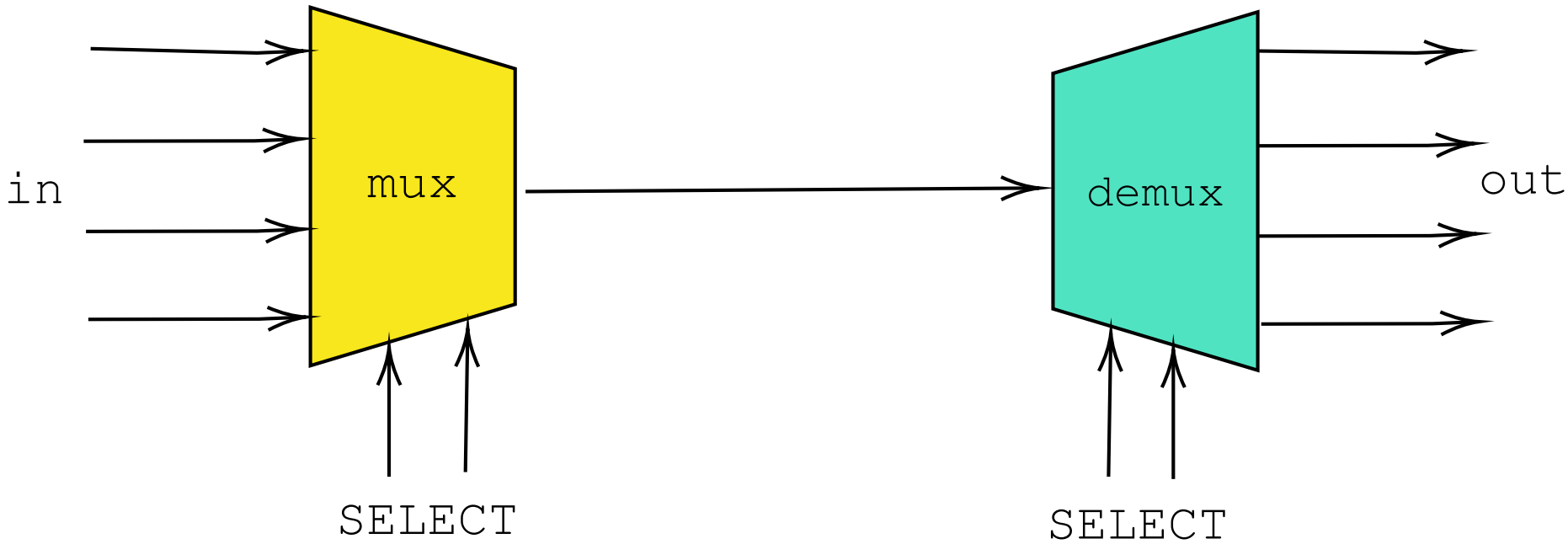

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- Although it may seem unnecessary at first, I invite you to think on a larger scale (as we will later in this lecture)