CS 251 — Lecture 4

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Definition — Floating

In assignment 1, there is a term mentioned called "floating", this defines a circuit that is not connected to power or ground (i.e., the resistance on all transistors leading to power and ground is high).

Implementing Boolean functions with ROM

ROM, or read-only memory, contains a set of locations (i.e., in memory) that can be read. These readable locations are fixed when the ROM was manufactured and cannot be changed. We can think of ROM as a customizable table of 2^n m-bit words. Note that we can configure the values of n and m and they don't have to be fixed values.

Clocks and Sequential Circuits

Clocks are used change storage and alter data, and they're also used to allow the flow of communication between transistors to be orderly. For instance, imagine if three people were telling you some instructions at different rates, it would be hard to manage what each person is saying. If you had a clock that determined the speed at which information can be delivered, that would be much easier — and that it what a clock does.
There are two types of sequential circuits:

- Synchronous (has a clock): in this circuit, memory only change at discrete points in time (rather than whenever they want)
- Asynchronous (no clock): potentially faster and consumes less power, but it's harder to design an analyse

Flip-Flops and Latches

Flip-flops and latches are the simplest memory elements. Speaking with Prof. Mann, all he told me to remember about these is that they store only 1 bit of data.

D Latch and D Flip-Flops

The output of a D flip-flop changes on the falling clock edges. We say that
Q_I copies D when the clock is high.
Q_E copies D when the clock is low (and remains that way until the clock is low again)

Registers and Register Files

A **register** is simply an array of flip-flops (e.g., there are 32 flip-flops for a word register). A **register file** is a way of organizing registers.