What is an FPGA?
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Main Idea:

A Field Programmable Gate Arrays is a programmable device or chip. This is the closest thing you can get to designing your own chip completely from scratch. You can design and implement virtually any digital function all within the one universal chip. Different than any other chip that you can buy, the FPGA does not have any intended function built into it**.** The FPGA can handle things in the digital domain, and can be used for virtually anything. They are incredibly flexible. They contain thousands of configurable logic blocks or elements(CLB). The CLB can be configured to perform any complex or simple digital logic function. An FPGA has a basic look up table and then one or more flip-flops which take a clock and reset as the inputs. FPGAs contain an array of programmable logic blocks, and have reconfigurable interconnections that can be wired together. The logic blocks can be configured to perform complex functions or simple AND and XOR gates. The FPGA has external configured flash memory which is a regular four or eight M/bit flash serial memory device, it contains all of the information for all of the fuses inside the FPGA. When you initially power on an FPGA it does not know exactly what to do, but the configuration logic automatically knows that the data from the external flash memory needs to be loaded and programs all the fuses which can take a couple seconds. This means an FPGA is not instant when they are powered on. You can purchase specific FPGAs to accomplish almost any task, they are incredibly complex devices.

What did I take away from the video:

 What I took away from the video was just what exactly the FPGA is. I was not familiar at all with this concept so it was interesting to learn its functionality and what exactly this gate array can do. It is pretty awesome that you can basically use this gate array to program anything you desire. I think it is crazy that something so small like a FPGA can accomplish so many tasks, it was really interesting getting to learn about something I have never seen before but have used in different technology. Something interesting that I learned was that a lot of big companies like Bing use FPGAs to accelerate their performance on their systems. So even big companies use these gate arrays to make their products run quicker.

Relating to what we learn in class:

This is different from a microcontroller which we use in class, which is a computer built with the logic already hardwired in and can do useful tasks all it needs is a program. The CLBs use NAND gates, which if we have enough NAND gates you can create anything ranging from a microcontroller or any function possible. The FPGAs can run all the logic gates that we made during our projects for Hack Computer.
SOURCE VIDEO: https://www.youtube.com/watch?v=gUsHwi4M4xE