Introduction to Computing

History & Present

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The First Computers

Computers have been around for longer than many might think. Since the times of antiquity there have been devices which replaced the human brain with metal.

Analog Age

For example, the *Antikythera Mechanism*, discovered deep under the Mediterranean Sea aboard a sunken Ancient Greek ship, is believed to have been created to predict the movements of the solar system – only using brass cogs and gears.

This mechanism is an example of an **Analog Computer**, which is called such because it replicates, or is analogous, to the real world – thus allowing it to predict the movements of planets by finding representing ratios between their orbits using gears and other mechanical principles.

While these computers are very energy efficient – only needing someone to turn a crank to drive gears – their fatal flaw is that they are only as accurate as their construction. Additionally when used, their mechanisms ware, which further reduces their accuracy.

Dawn of Digital

Digital computers, as you may have heard, are what most people would consider a computer today. These computers are also made of metal – like their analog ancestors, however they use a completely different system to represent the world. Where analog computers try as best they can to mimic the real – digital computers take the real and place it into the prefect world of math and numbers, thus the name *digital*.

These **Digital Computers** operate on Binary, which is a number system, same as decimal (0-9), accept they only use two digits, 1 & 0. Using just these two digits, or states, computers can represent any number, or type of data, using a seemingly infinite series of 1 and 0 – on and off.

Using this different number system, computers also use a different kind of math – called *Boolean Logic* – which can do anything normal math can do, just using 1 and 0, True and False, On and Off.

One can explore these concepts in greater detail – but for the scope of this text – the important point to understand is that digital computers take all the errors out of doing something with analog computing. However, this is at the cost of immense and often unintuitive logic & complexity.

Our Modern Computers

Unfortunately – the computers we use today are far too complex to be understood simply through binary and Boolean Logic. The systems and operations that occur on the level of 1 and 0 are often not even understood by seasoned computer scientists.

Instead, it is more effective to think about our computers through the lens of *Information Theory* – which is a field of science focused on the flow of information. This science allows us to simplify complex systems (somewhat) in order for us to understand and visualize them in useful ways.

The Terminal

To begin our exploration into modern computing, we shall start – fittingly – with the first modern way to interact with a computer. This is what is known as the Terminal, Shell, or Command Line Interface (CLI).

Many have seen the terminal before, however in modern times it is only portrayed as a tool used by hackers, or other experiences computer-geeks. While this is certainly the case, the terminal is a tool that, can – and should – be used by even casual computer users (most everyone these days).

The reason why the terminal is so important to understand, is because it allows one to use their computer – as intended – in a programmatic way. This will allow someone to create and save files automatically where you would like, and also run programs created by themselves or others to do things that are difficult to do otherwise.

One interacts with the terminal by typing *commands*. Through this simple and somewhat standard input method, a user is able to do anything on a computer. However, The true power of the terminal is what is called *scripting*, which is the process of creating programs which can automate any task you could do in the terminal, and thus, on the computer.

The Graphical User Interface

Using a GUI, or Graphical User Interface, is what most people are familiar with when using a computer. This method of interaction was vital for the wider

adoption of computers, as it made computers intuitive and easy to begin using for those new to the technology. However, this ease of use comes with the drawback that it is nearly impossible to automate tasks.

Graphical User Interfaces are certainly vital for using a computer, as there are many things that one would not want to do in the command line as it would either be too tedious or inconvenient – however it is important to understand that, in the same way, there are many things in the terminal that can be done much more conveniently than in a GUI.

Further Reading

With this – admittedly brief – overview of the history of computing as well as computers in the modern day, I hope that you can start to look for more learning opportunities !

Some interesting topics to look into (which will be covered in later texts) are:

- Binary Numbers
- Boolean Logic
- Bash Scripting
- Command Line Tools
- Package Managers