

Desktops: The Internals of an Artificial Organism



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Introduction

Since the invention of the first computer, the Analytical Engine, from 1871 to the present day the computer has undergone many advancements, modifications, and revolutionary technology to make it what we see now.^[1] Much has changed from the beginning, starting from giant metal cubes that took up almost an entire room or even more, to a lightweight box that sits on your desk or near your feet. The internals and wiring is small yet powerful in comparison to previous versions, suitable for an immense amount of tasks. Factories are not the only ones that can build computers, everyone can gain knowledge on how to build a working computer at a fraction of what it could have cost if it were built by a corporation. The technology used inside the great machines is exotic in the sense that doing something that seems truly simple takes extensive lines of code and programming for the computer to compose, all happening within just a couple minutes or even seconds of your fingers on the keyboard.

Components of a Desktop

Before starting to understand how the wondrous mind of the computer works, being acquainted with what the actual brain is and how it connects with its counterparts is important to know. The motherboard, power supply, processor, Random Access Memory, or RAM, and all other components play a

role in the completion of your goal. Below is a list of all parts necessary to build a working computer:

❑ **Motherboard**

- ❑ The beating heart of your computer, connecting all other parts, sending and receiving data from one place to another. The motherboard is a must-have for any computer because it is the central link to all parts of the computer, like the heart of a human.^[2]



Motherboards differ in a couple different cases, that some only take processing chips from one company, RAM types, and accessories. For example, take motherboards that support Intel and AMD, their slots are slightly different, making you have to choose specific kinds for your needs. This is slightly the same for the RAM, you have to get different kinds of ram depending on what Double Data Rate (DDR) your motherboard supports, ranging from SDRAM (Synchronous Dynamic RAM) and types DDR1-5. Accessories of your motherboard are what

kind of audio inputs, outputs, and USB ports, and video outputs it includes.

❑ Power Supply Unit (PSU)

- ❑ This unit is just what the name says. It powers your computer to actually boot up and run electricity to all components of the desktop. The main function is to convert the high-voltage AC current to the low-voltage DC current so your parts won't overheat and detonate a couple hundred dollars worth of parts into a hundred pieces.^[3] (Picture below)



The PSU is important because you have to get one with as much power as you need. If you purchase or receive one with insufficient power, there are a couple variations of events that your computer might do. Your worst case scenario is that your computer will surge and go up in flames, however that case is rare, most of

the time you will get into a reboot loop into the BIO's and eventually shut itself off after a certain number of tries, or it will just stay off as a whole. If you happen to get one with too much power, do not fret. On the contrary, this is beneficial if you are looking to add more parts or upgrade your parts in the future, because you will have more power to fuel your computer with what it needs.^[14]

❑ Central Processing Unit (CPU)

- ❑ The processor is the brain of your computer. It responds to logic and instructions to lead a computer to do tasks. The four basic tasks every processor does is fetch, decode, execute, and writeback.^[4]



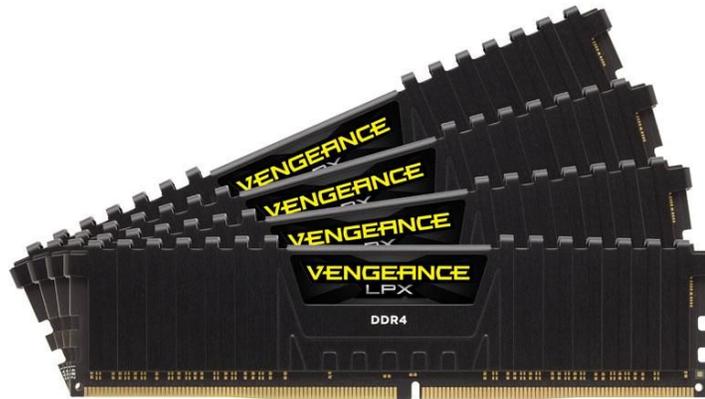
Many factors within the technology of a processor are what make it as powerful as it is. The clock frequency is usually measured in

gigahertz/second and explains how many bits per second it can analyze and compute. For example if a processor had a clock-rate of 3.5GHz, then the processor would be able to compute an average of 3.5 million bits of data per second. You may be able to increase a clock-rate, hence the term “overclocking”, but the gigahertz measure the signals pushed through the processor per second, nothing more. Current processors are equipped with multiple “cores” which can compute different things simultaneously. This simply means that how many cores you have will be the amount of operations your processor will be able to handle at a time. If you have four cores within a processor, then your processor will be able to dedicate how many gigahertz of clock frequencies to four different tasks onto your computer. Last but not least, stage pipelines, these calculate how efficient your computer is handling tasks, and the fewer you have, the faster your processor is able to carry out.^[15]

❑ Random Access Memory (RAM)

- ❑ These components handle the short-term memory of your computer and how many tasks it can handle. If you are going to just be using a desktop for typing papers and sending emails, you need a very small amount of RAM. However, if you are trying to create videos, run industrial-grade CAD software, or play modern

video games, you would need a high amount of RAM to run the processes.^[5]



RAM is similar to a microprocessor in the sense that its main parts are transistors and capacitors. Each pair of a transistor and a capacitor is able to represent one bit of data. Current random access memory is usually measured in gigabytes. So, let's say, in total, your computer has sixteen gigabytes of ram, that means that you have exactly 16,000,000,000 transistors and the same amount of capacitors in your ram sticks.

❑ Hard Disk Drive (HDD)

- ❑ This is the segment where all of your long-term memory of the computer is stored. All of your documents, executable files, pictures, music, videos and more all take their place in the hard drive of your computer.^[7]



The only difference between hard drives is the space they reserve. Alternatively, you could use a Solid State Drive (SSD) which is faster than a usual hard drive. An SSD stores data even if no power is directed towards it, making it faster to use than an HDD.^[7]

The parts above are what you need in order for a desktop to function and do basic processes. Of course, to use one you would still need to buy essentials like a keyboard, mouse, a tower and a monitor. However, there are other internals you need if you were to run very high quality programs. These parts are not necessary but highly recommended if you plan to do “more” with your computer.

❑ Optical Drive

- ❑ This is a device used to read CD's or DVD's. Sometimes, a computer may have two, one for copying data and one for installing.



❑ Graphics Processing Unit (GPU)

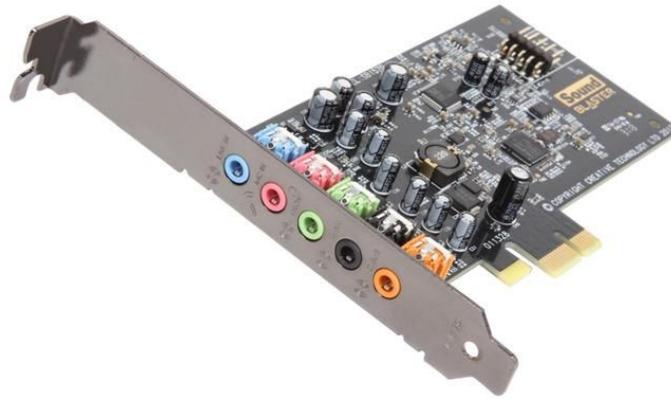
- ❑ The GPU converts video data and turns it into electronic signals and sends them to your monitor. The monitor converts these signals to give you a colorful image you see on the monitor. Most motherboards have a built-in, moderate quality graphics card meant for basic use. However, high quality programs require more video processing, and therefore, a higher-quality graphics card.



A GPU is much like a motherboard, which houses a mini processor and an amount of ram, however, it is not alike because of its function. The part is designed solely to perform equations and give a better image of what you see on your monitor. It is also equipped with specialized programming to improve the quality like full scene anti aliasing, which smooths the edges of 3-D objects, and anisotropic filtering, which makes the image look more “crisp”.

❑ Sound Card

- ❑ This, much like the graphics card, is not a piece of hardware that you need, because it is another piece that is integrated into the motherboard. If you wish to edit music and hear specific sounds within the music, you would want an independent graphics card.



A sound card is used to produce greater quality sounds within games. It gives a “realistic feel” in the sense that it is programmed to emit sound from a certain location and give the listener a better perspective of where the sound is coming from.

Corresponding Parts

After familiarizing with parts of a desktop, it’s time to explain how all the connected parts are synchronized. Throughout the process of wiring, constructing, and organizing everything, it seems to harmonize in a way and act as one. Computers understand mathematics much like we do, however, they understand it written from a different perspective, binary. Computers ‘think’ in binary and bring up many types of mathematics it could understand, it’s time to see what these parts can do.

Automated Proving Theorem

This process is based around programs that were designed solely for their purpose to solve theorems, problems, and complications from other sets of data. The user must describe the situation precisely, describing what applies to the situation and what does not, and of course the actual situation, and can give a conjecture ranging from trivial to impossible.

Let's take the rubik's cube puzzle, for example. One could have randomly moved the cube, not remember the sequence, and be too frustrated to solve it, a program can be developed to solve the puzzle. Familiarize the computer with the sides of the unsolved cube, their color and coordinates. Let it know what kinds of moves are logical and which ones are impossible, without breaking it, of course. After you have given it the situation, it is able to give solutions to what rotations and how many you need to get to the solution.

```

alg. no: 19
alg. name: gap 11.e
alg. type: 11.e
alg. variants: 2
max. usings: 4
cubies preserved: f1, 11.c
cubies destroyed: m1.e
nr. moves: 8/6

```

```

formula 1: mF'R mF'R'mF R mF R'
obs: (UR) -> (FR)

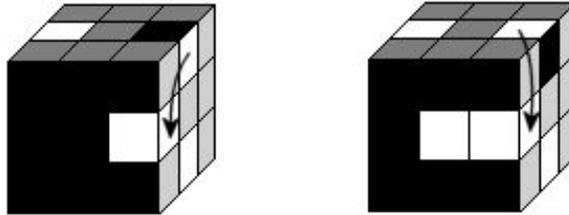
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formula 2: mF'R mF'R*mF'R
obs: (UR) -> (FR) and re-oriented

```

comments: all f1.e and 11.e can be positioned and oriented by intuition without destroying the cube corners, except one edge, called the gap edge. The algorithm is used for this gap.



Computational Science

Not to be confused with “Computer Science”, this field focuses on advanced computing capabilities to solve complex problems. Let’s take a vague example from chess, a pawn is about to take another pawn. However after that move, a knight will take the pawn, simple. We can use the term “CM” to identify the chess moves, “P₁” will be the first pawn to be taken, “P₂” will be the opposing player’s pawn, “K” will be the knight that takes

“ P_2 ”, and “-” will be shown in between the variables to indicate some piece being removed from the board.

$$CM = P_2 - P_1$$

As we see here, this is the first move of the set, P_1 takes P_2 . Now we have to show what happens after that movement is finished, the knight takes P_2 .

$$CM = K - P_2 (P_2 - P_1)$$

So, here we have the complete moves that we wanted to describe. The chess moves are: P_2 takes P_1 , after that, K takes P_2 . Ok, so, I’ve come up with a simple equation, but why is this important? Because there may be problems in the world that are illegal or impossible to test, we can use variables to feed into a computer, simulate the situation, and gather the data required without doing real-world testing. We are also able to modernize past events from which it was impossible to gather data, such as natural and human-caused disasters, earthquakes, wildfires, probabilities, and much more.

Conclusion

The computer is a group of parts and wires that is able to sometimes think faster and smarter than we do. It can be manipulated to your liking, being able to compute high amounts of data per second to handling documents and presentations. Automated Proving Theorem can be used within the mind of a computer to calculate many solutions to problems that would take too long or too much work for humans. Computational Science can be used to predict certain outcomes through given variables and equations through certain programs. What used to be a great machine is now something distributed for almost everyone to use, essentially, a second brain and a multi tool that has an endless amount of uses.

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