The Process Behind a Computer Booting Up

Overview
Several people have access to computers and use them every day to complete day-to-day activities whether it is a requirement for a specific job, solely meant for the purpose of checking emails, posting on social media, or something different. The current trend shows that the number of people who have full access to computers is dramatically increasing over time from 1984 to 2015 and the projections are only getting larger. In 1984, 8% of households had access to a computer and this percentage increased to 51% in 2000 and 79% in 2015. Some people even believe that computers are becoming more of a necessity to our daily lives since it stores a lot of sensitive information and data that they cannot imagine living without. It appears that the majority of us value this type of technological device a lot so it would be crucial that all of its components are working properly without any issues from taking place. Have you ever wondered how a computer works internally that would allow users to be able to access the websites and applications that they are looking to use?

The primary purpose of this document is to inform readers, specifically those who are majoring in a technology field or interested in technology, to have a clear understanding of how a computer powers up internally. Although every person is most likely to come from different educational backgrounds and certain individuals are further along in their field of study than others, the information that is about to be presented would be good to know especially for people who plan on applying for an information technology position in the future. More often than not, this type of job offers a considerable amount of access to computers and this document could potentially be used as a good reference tool when working on the first job assignment. The document explains how a computer powers up internally through six different steps of what is known as the boot process.

Operating System Functions

How does a personal computer boot up?

Step 1: Power supply sends signal to components in system unit
Step 2: Processor accesses BIOS to start computer
Step 3: BIOS runs test, called the POST, to check components such as mouse, keyboard, and adapter cards
Step 4: Results of POST are compared with data in CMOS chip
Step 5: BIOS looks for system files in floppy disk drive or CD/DVD drive, and then hard disk
Step 6: Kernel (core) of operating system loads into RAM
Step 7: Operating system loads configuration information and displays desktop on screen
Initiating the Boot Process
When a computer/PC is booted up or turned on, power is being generated to the system that flows to several internal components and then they respond to a set of instructions or commands. The boot process focuses on successfully running both hardware (physical parts of the computer) and software (programs being used on the computer). This is controlled by BIOS or software stored on a flash memory chip found in the motherboard that enables information to be processed through the computer’s input and output system. When a computer is powered on, the only thing it can do is read ROM (read-only memory) or non-volatile memory that is used for permanent storage making the computer function slower.

POST (Power-On Self-Test)
After the power supply is activated, the PC moves on to the next stage known as POST which is a small computer program within BIOS used to evaluate hardware and ensure that these physical parts are not experiencing any setbacks. POST can easily detect problems from all of the hardware components including the processor or central processing unit, monitor, power supply, hard drive, motherboard, RAM memory modules, video card, system fan, and more. Some instances of hardware failures could be as simple as a cord not being properly plugged into one of the ports and the PC missing a hard drive. If a single beep is sounded from the PC, then there are no hardware issues present in the system. However, an alternative beep sequence indicates that the PC has detected a hardware issue that needs to be resolved before moving on to the next stages of the process.

Visual Display of Boot Process
If no errors have been detected in the computer thus far, it will show specific details pertaining to the boot process on the monitor. The information consists of the manufacturer and revision of the BIOS software, professor specs, the drives detected, and the amount of RAM (random-access memory) or volatile memory used for temporary storage that reads and writes data making the computer act faster. As long as there are a set of words and numbers displayed on the screen that reveal necessary information about the computer itself, all of its components are continuing to work well without any issues.

Regulating a Boot Device
The BIOS software is virtually used throughout the entire process and has continued to cause the PC to respond in a particular way. The following software is important because it regulates how communication is processed between multiple hardware components. It attempts to access the first available storage address in the first sector of the boot disk or hard disk that runs the operating system. The storage addresses are typically ordered chronologically and they are accessed in the particular sequence that is used.

Boot Loader
After the BIOS software identifies a particular storage address in the boot disk, it will apply the boot loader. The boot loader or boot manager is generally a small program that places the operating system of a computer into memory or RAM. It focuses on loading and starting the boot time tasks and processes found within the operating system.
Transferring Control
Once the boot loader has successfully placed the PC into memory, the operating system seizes control from the boot process. The operating system will then finalize any remaining tasks left such as executing pre-configured startup routines. The moment that there are no more tasks left to be completed, a visual with content will be displayed on the monitor.

Summary
Computers are essential devices that most people use on a daily basis and understanding how they work internally would help many greatly succeed in the long-run. The purpose of the document is to provide general knowledge to users of how a computer boots up internally. It is especially meant to accommodate the needs for those who have shown a greater interest in technology. To reiterate the primary points of the boot process, it involves six major steps that describes how power is transmitted throughout the PC. They include initiating the boot process, POST (Power-On Self-Test), visually displaying the boot process, regulating a boot device, the role of the boot loader, and transferring control.