

Dan's Desk

Computer Fundamentals #2

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Here is part 2 of my series on "Computer Fundamentals" - a series of articles to explain the fundamentals of computers, programming and their usage that will hopefully deepen your understanding of how it all works and why things are the way they are.

This time we will examine two core parts that make any computer more than an assortment of electronic components:

- the operating system (OS)
- a program (app or application)

Both are software, that is many lines of programming code that performs a set of functions that must be loaded onto a hardware platform to operate. Hardware is the real set of electronic components that make up a computing device. A typical hardware desktop has the following core parts:

- a motherboard
- a central processing unit or CPU
- one or more memory chips
- storage devices (DVD/CD/hard drive, etc.)
- a video display
- input devices – keyboard, mouse, touchscreen, etc.

The OS is the programming code that allows the hardware to do something. Without an OS you get a blinking cursor and nothing else. It is often called the system software to differentiate it from application software. The OS allows the hardware to process application programs written in any number of languages to operate on a given hardware platform. In essence, the OS translates certain instructions from the app to perform specific tasks using the hardware. The OS controls hardware devices using 'drivers' which translate instructions into commands that a specific piece of hardware can perform. The OS also controls the allocation of the system memory, usually called Random Access Memory or RAM. RAM is the memory sticks or chips that every computing device contains that is required to load instructions into to trigger some activity. Typically, a desktop or laptop computer contains around 4GB today. All the most popular operating systems can also allocate a file on a disk drive to serve as 'virtual memory' which effectively doubles the amount of memory available for the OS to assign to program tasks.

An app is the piece of software that works in conjunction with the OS to allow a user to process some input, do something with it and produce some output. Each app on your

smartphone is a specialized piece of software designed to do something such as look up the cheapest gas stations to my location or tell me what the movie times are at the local cinema. The user interface on a PC typically uses icons (those shortcuts on your desktop) for the user to click on, using a mouse or a keyboard or to touch on a touchscreen, to start a specific program. The OS intercepts the start action and loads the program into the correct amount of memory for it to execute. The program will ask for certain files to be opened or created and the OS uses device drivers to access the storage media or the network to create or access the file information. The program will then take some action using that data, such as displaying some information, calculating something using the data, or printing a map. Perhaps you will choose to print the results of the data being processed in which case the OS will use a device driver to pass the desired report to the printer in a format that that specific printer can understand and handle as a printed report. As a final step you may instruct the program to save any updates that you made at which point the OS will again access the storage media and tell it to write the data in a file.

In the next part we'll look at the evolution of operating systems and basic file systems.

