Here is part 3 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 the evolution of Operating Systems and what files are.

Prior to the mid-seventies, the term Computer typically referred to one of two types of computing devices. The oldest was the early types of accounting or tabulating machines. These machines were the foundation of the IBM computing business for many years ranging from the 1940's to as late as 1976. They were relatively simple machines that could read numbers from punch cards, manipulate the numbers and print the results. Some of the 'programming' consisted of boards that had patterns of electrical circuits that were selected to perform predetermined functions (add, subtract, etc.) by connecting them by placing jumper wires between functions. The operating system on these machines was essentially fixed in place for a single purpose – to perform accounting functions.

The series of computers during the 1960's contained what we would consider today to be a proper operating system that required the more advanced capabilities of the post vacuum tube generation of computers. The IBM 360 series of computers started with a DOS/360 OS, which just like a PC DOS system, could only perform one task or program at a time. All the memory installed on the computer was essentially used by the executing program. IBM soon evolved the DOS/360 OS to OS/360 which became the most popular multi-programming system. There were two main variations of this:

- Multiple Fixed Task (MVT)
- Multiple Variable Task (MVT)

MFT allocated the physical memory into fixed regions or partitions. This allowed two or more programs to run simultaneously – true multi-tasking! The computer operator had to make sure that each program had its memory requirements known prior to trying to run it or it would not be able to load properly. It was also possible through operator commands to reallocate the memory as needed to create one large partition for the really large programs. MVT was used on the larger mainframes where memory could be allocated as needed by the program dynamically and each program ran in its own memory space. This OS has evolved many times since the 1970's but the essentials are the same.

A technique of using virtual memory reached the mainstream OS during this period. Virtual memory used external storage space, such as a disc file, to extend the physical memory space to typically double the memory available. Each program uses only a small portion of program code at any point in time, so virtual memory allocates the required memory into virtual pages that can be written to the disc file when not needed and then swapped back into real memory when required. Your PC or Mac uses this same process today.

File creation really matured with the release of OS/360 which allowed an organization to name the files into directory layers like a project.user.filename structure. A computer file is a method for recording data in a computer storage device. Just like words can be stored on a page, information be written to a computer file. Here's how Wikipedia describes computer files: "There are different types of computer files, designed for different purposes. A file may be designed to store a picture, a written message, a video, a computer program, or a wide variety of other kinds of data. Some types of files can store several types of information at once.

By using computer programs, a person can open, read, change, and close a computer file. Computer files may be reopened, modified, and copied an arbitrary number of times.

Typically, files are organized in a file system, which keeps track of where the files are located on disk and enables user access."

In a Windows OS, the file name is usually of the form name.type. The name can be used to easily identify what the contents of the file may be about, and type is used to determine the correct program to be used to access that file. A file called 'my best song.mp3' tells the Windows OS to open this file with the default program used to play .mp3 file types, such as with iTunes or the Windows media player program.

There is a lot more to files, such as what are databases and the various methods of accessing and storage of files (formatting, NTFS, FAT, FAT32, etc.) but that's a topic for the more technically inclined audience. I

n the next part we'll look at the common program languages that programmers have used to accomplish work on a computer.