Hello everyone.

**Categorize, describe, and give examples of the major functions of operating systems.**

The major functions of operating systems, according to Silberschatz, Galvin, and Gagne, include a user interface, program execution, I/O operations, file system management, communication management, error detection, resource allocation, accounting, and protection and security (2014, 2.1).

The UI, or user interface, is exactly what the name implies. The UI is what the user sees and interacts with and comes in several forms. There is the command-line interface (CLI), where commands are typed by the user in a text-based environment, such as MS-DOS and (still frequently used with) Linux. There is a batch interface, where the commands are pre-loaded in a file and executed by running the file. In the days of MS-DOS, you would typically load a video game by running a batch file that would start the game, set up the sound card configuration, and set up the graphics display configuration, so the game would function properly. Finally, there is the GUI, or graphical user interface. GUIs provide visual interaction with a system and are considered by most as being the most user-friendly. Some examples of GUIs include Microsoft Windows, MAC-OS, and many Linux distros (distributions) such as Fedora or Ubuntu.

Program Execution is the next major function of the OS. A computer must be able to load, run, and terminate a program. The next function of an operating system is I/O, or input/output, operations. When a running program needs to access a file or other device, it communicates the request to the OS, which in turn provides the required access.

Now we come to file-system manipulation. The OS handles the organization of files, creating new files, deleting files, and searching files by a variety of different methods. Many OSs today also control who is able to access certain files, directories, and drives. The OS handles communications for programs and hardware, either on the same system or between systems that are networked together.

Error detection (and correction) is another vital function of the OS. The OS attempts to keep everything moving efficiently, but sometimes the only recourse it has is to halt the operation.

Computer systems have a finite number of resources available for use. The OS is responsible for allocating those resources based on priority and reallocating them when the current operation is completed.

Accounting, not in the financial sense, is also handled by the OS. It keeps track of all the resources, which users/devices access those resources, and provide statistics on the resources.

Lastly, the OS is responsible for security and protection. This is done in many ways, including the setting of permissions for users, authentication to ensure a user is valid (particularly if being remotely accessed), and encrypting data so it can only be accessed with the appropriate key.

**Illustrate the hierarchy of subsystems, components, or subcomponents of operating systems and explain how they interact with one another.**

The hierarchy of subsystems, components, and subcomponents goes from user, either a person or another system outside of the computer, user interface, system calls, OS services (functions), and hardware.

**References**

Silberschatz, A., Galvin, P. B., & Gagne, G. (2014). [Operating system concepts essentials](https://ashford.instructure.com/courses/66667/modules/items/3374055)(2nd ed.). Retrieved from https://redshelf.com/