Software

A **computer system** has both hardware and software.

Hardware is the physical components that make up a device or computer system. These include both the internal components (eg motherboard, CPU, RAM) and also peripheral and networking devices such as printers and routers.

Software is the computer code, programs and algorithms that give instructions to the hardware to make it perform the desired task. Without the software the hardware will not get any instructions and it will not do anything.

Hierarchy of software
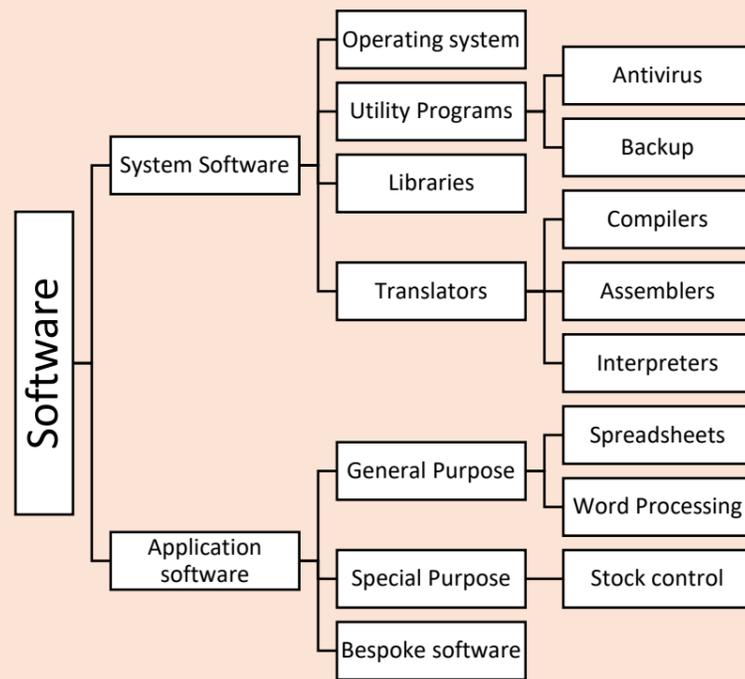
Application software

General purpose software - Software that is designed to be widely used in many ways for both business and personal use (eg applications such as word processing, presentation software, spreadsheet, and web browser).

Specialist Software – Software that is developed for a specific use or for a specific business, scientific, or educational area. For instance, air traffic control systems and stock control systems would fall under this category.

Bespoke software – The is tailor made software that is developed for a specific organisation or client. Bespoke software is expensive but meets the specific needs of an organisation.

System software

System software is concerned with the running of the computer. Its purpose is the control the computer hardware and manage the application software.

Program translators allow programs to be translated into machine code so that code can be run on a computer. Translators include interpreter, compiler and assembler.

Libraries are collections of prewritten code that can be used in software projects. Thee libraries significantly speed up the development process. Libraries can be reused across multiple applications.

Utility programs are applications that help with the running of the machine. Common utility programs include:

Auto backup and restore - Incremental backup is useful because only files that have changed or been added since the last full backup needed to be backed up.

Anti-virus - Scans the computer to identify malicious code
Firewall Scans input and output packets and prevents malicious packets accessing the computer.

Disk defragmentation Organises files on a disk to be located contiguously. Often after defragmentation performance is improved because a file can be accessed from one location on a disk. Files can become fragmented when the original file increases in size and no longer fits into a contiguous location and has to be split over multiple locations.

Before defragmentation
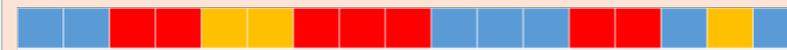
After defragmentation
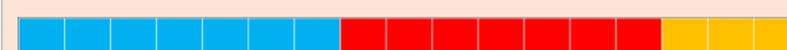
The role of the Operating System
- The most important piece of system software is the operating system.
- The operating system is system software with the role of managing the hardware and software resources.
- The OS handles management of the processor, memory, input/output devices, applications and security.
- The OS hides the complexity of the hardware from the user and provides a user interface.

Application management - Application software does not need to concern itself with interaction and complexities of managing the hardware because this is dealt with by the operating system. Application software needs to run on top of operating system which takes care of interaction with the hardware resources.

Processor resources – Allows multiple applications to be run simultaneously by manages the processing time between applications and cores and switching processing between applications very quickly. Multiple applications will access the processor resources via a schedule that alternates processing between applications. High priority applications will have more CPU time, but it means that lower priority applications will take longer to run.

Memory management – The OS distributes memory resources between programs and manages transfer of data and instruction code in and out of memory. Ensures that each application does not use excessive memory.

Input / Output devices – The OS controls interaction with input (eg keyboard) outputs (eg. Monitor) and storage (eg hard disk) using hardware drivers. Allows users to save files to the hard disk for instance.

Relation between application software, system software and computer hardware