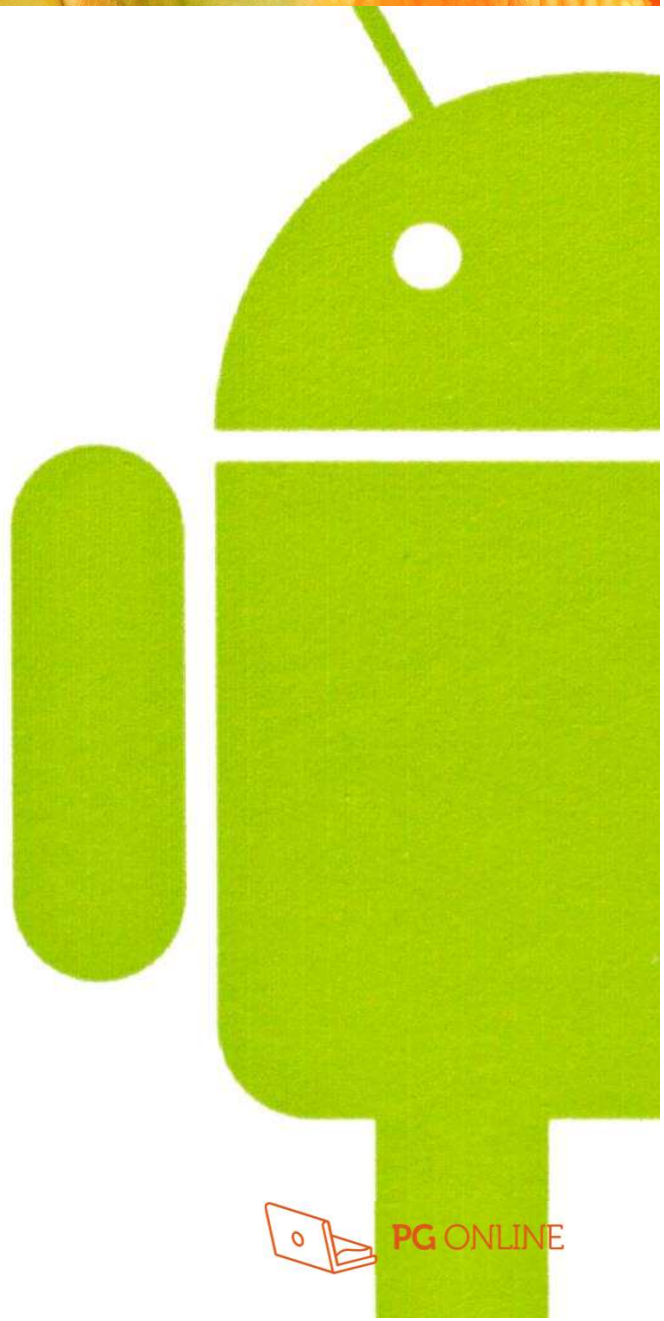

GCSE
OCR
Computer Science
J277
3
Operating systems software
Unit 4 Network security and systems software
PG ONLINE

Objectives

- Explain the need for the following functions of an operating system:
  - User interface
  - Memory management and multitasking
  - Peripheral management and drivers
  - User management
  - File management

Starter

- Microsoft Windows is one example of an operating system
  - Name as many different operating systems as you can



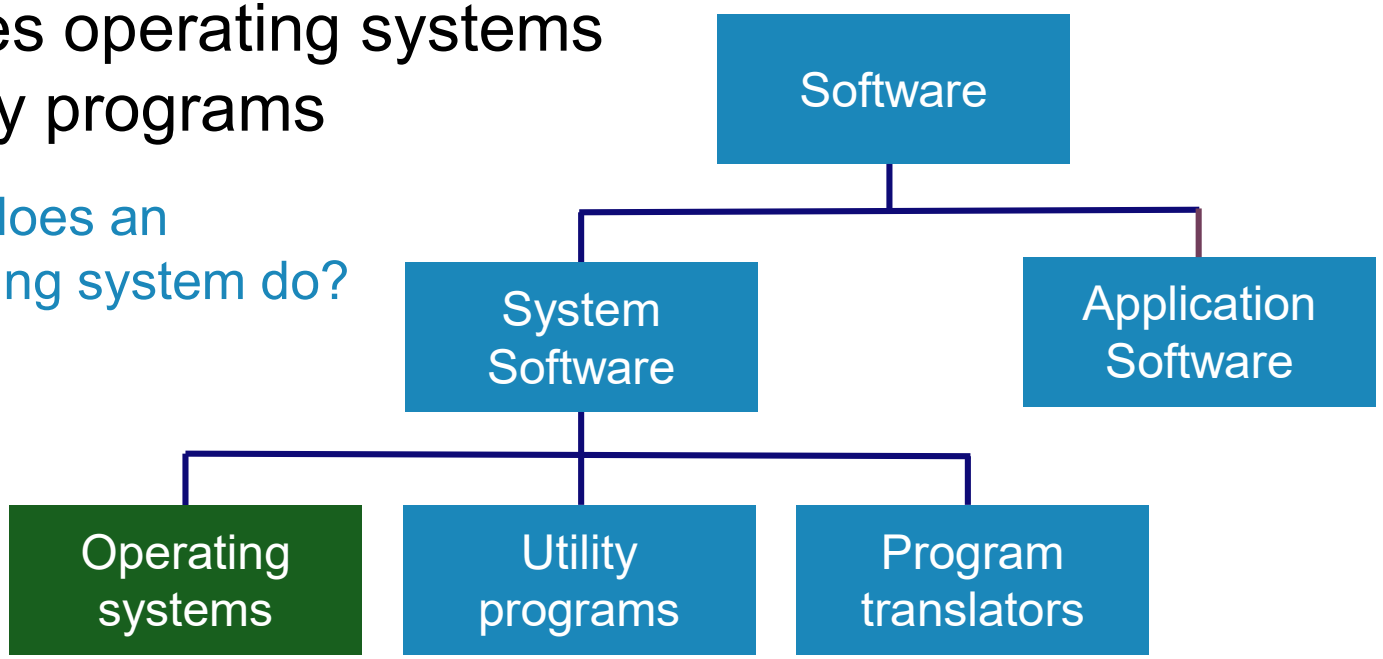
Some operating systems

Answers

- Microsoft
  - MS-DOS (1981-2000)
  - Windows (1985-present)
- Google
  - Android (2008-present)
  - Chrome OS (2011-present)
- Apple
  - macOS (2001-present)
- Linus Torvalds and other contributors
  - Linux (1991-present)

Types of system software

- System software is the software that provides a platform for other software to work
- It includes operating systems and utility programs
  - What does an operating system do?



Operating Systems

Answers

- Operating systems manage computer hardware, users and the resources used by software
- They are responsible for managing:
  - The user interface
  - Memory management
  - Multitasking
  - Peripheral management and drivers
  - User management
  - File management

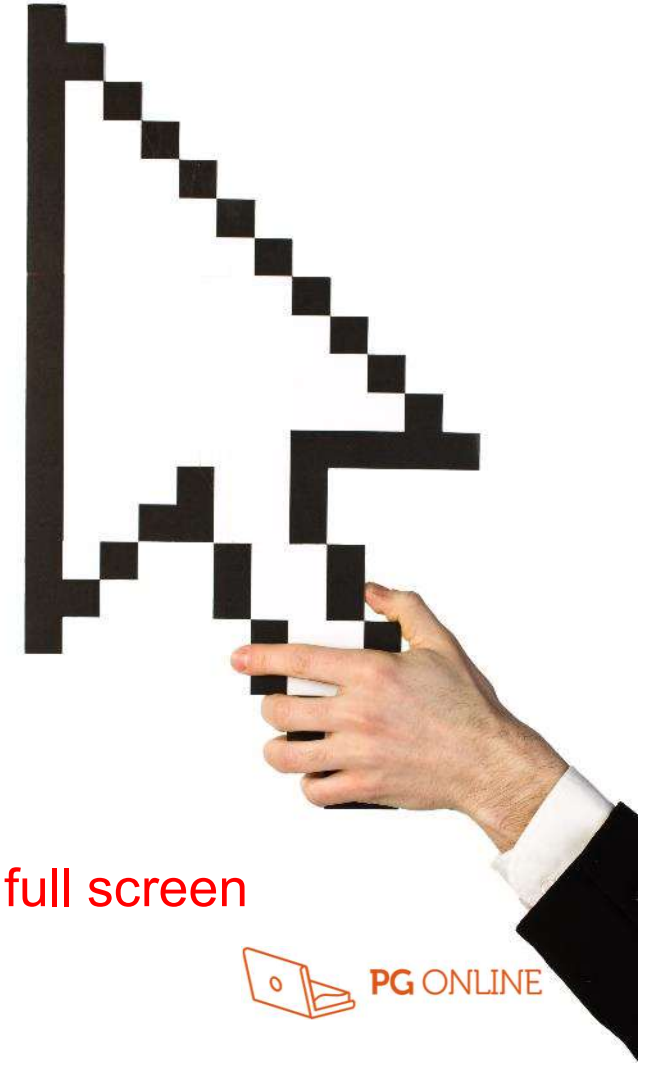
User interfaces

- User interfaces provide a method for users to interact with a computer
- One type of interface is the graphical user interface (GUI)
  - What features do GUIs have?
  - How do the features differ between desktop computers, tablets and smartphones?

Graphical user interfaces

Answers

- Desktop interfaces
  - Pointers
  - Windows
  - Menus
  - Icons
  - Drag and drop
- Smartphone and touch interfaces
  - No pointers in general as they cannot be seen under a finger
  - Windows (for apps) generally take up the full screen

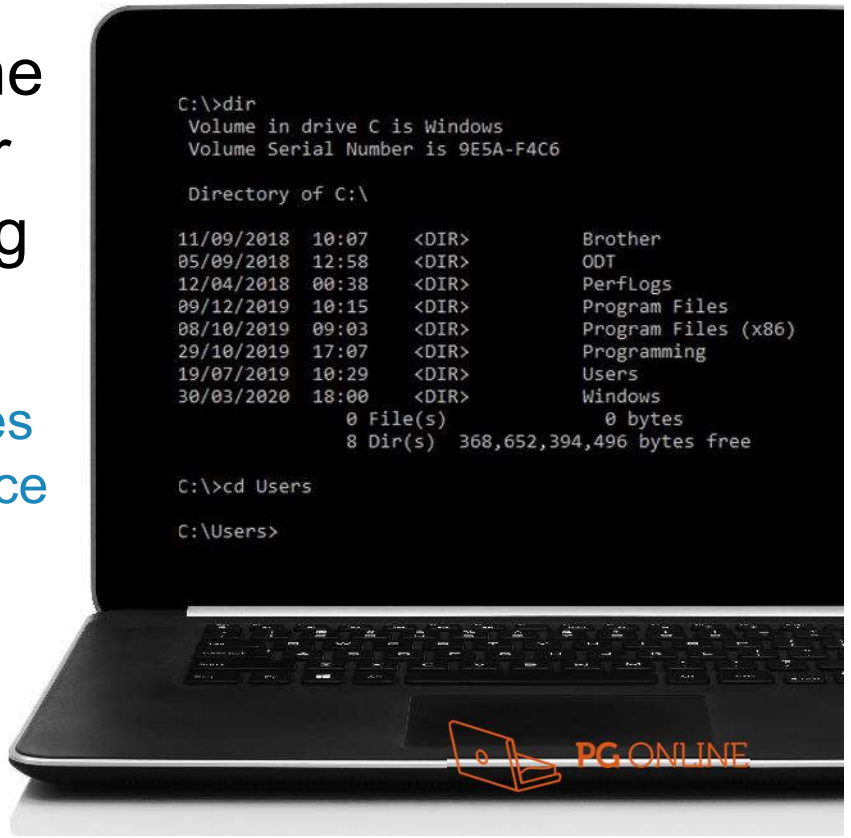


Types of User Interface

- GUI: Graphical User Interface
  - WIMP is a commonly used acronym in traditional GUIs: **W**indows, **I**cons, **M**enus and **P**ointers
- Menu-driven interface
- CLI: Command Line Interface
  - Text commands are entered into the interface
- Voice activated
- Real-time
  - sensors detect inputs

Command Line Interfaces

- Text commands are entered into the computer
  - This requires very little processing and can save on the need for an expensive graphics card
- For expert users who know the commands it can be far faster to enter commands than using a mouse
  - A command line interface requires much less hard disk storage space
  - It also will require less RAM



Menu-driven interfaces

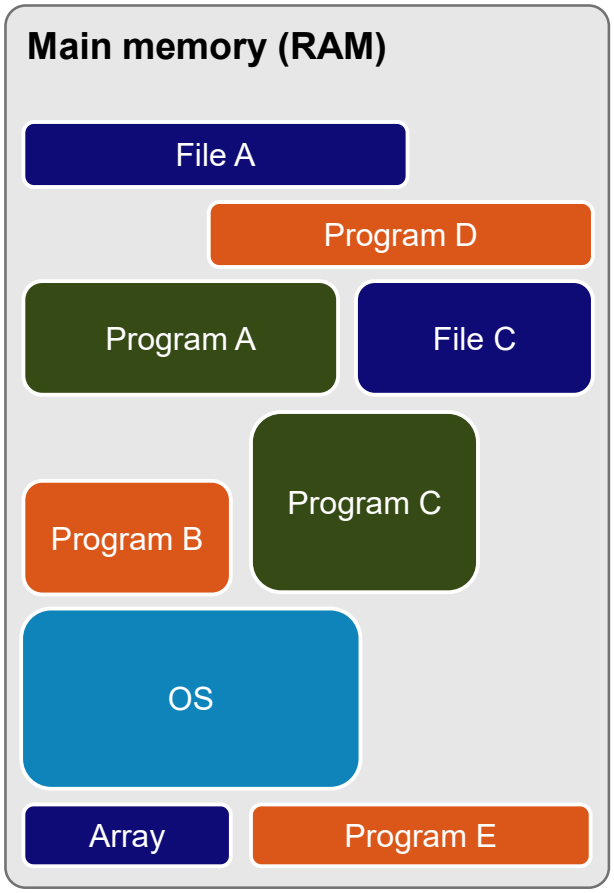
- Menu driven interfaces are often used by devices that have a dedicated function including
  - MP3 players
  - ATM machines
  - Self service checkouts

Worksheet 3

- Now complete **Task 1** and **Task 2** on **Worksheet 3**

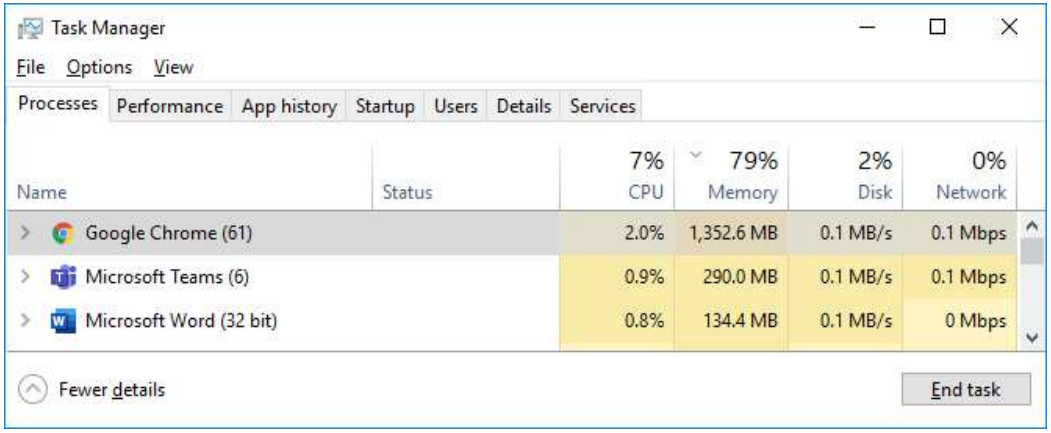
Memory management

- To run a program, the computer must copy the program from storage into main memory – **Why?**
  - Data used by the program is copied into main memory
  - The operating system keeps a record of where each program and its data are located
  - The operating system will make sure not to overwrite existing programs and data



Multi-tasking

- Multi-tasking is where an operating system manages many tasks happening at the same time
  - This may be having a web browser open whilst playing music and messaging friends
  - Many other background processes also are running
  - The operating system decides which process will next run on the CPU and for how long



Interrupts

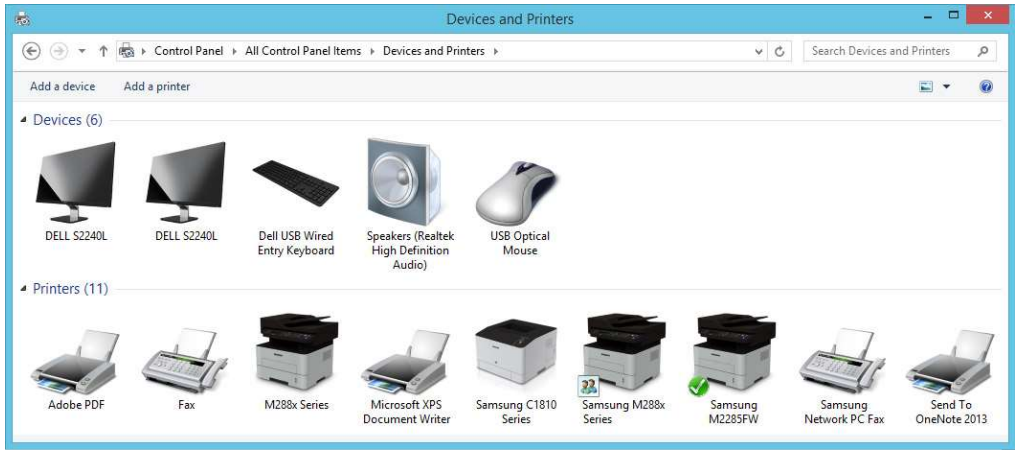
- **Interrupts** are signals sent to the CPU by external devices to indicate an event that needs immediate attention
  - They tell the CPU to suspend its current activities and execute appropriate instructions
- **Hardware interrupts** are generated by hardware devices – for example, **printer out of paper**
- **Software interrupts** are generated by programs – for example, a **divide-by-zero error** will cause an error message to be displayed

Peripheral management

- The operating system must manage:
  - Getting inputs from and sending outputs to peripheral devices
- Peripherals include mice, keyboard, printers, displays, digital cameras and graphics tablets
  - What item of software needs to be installed for each peripheral to work?

Device drivers

- A device driver is a program that controls peripheral devices such as printers, mice and displays
  - Each device communicates with the OS via its own driver
  - Many device drivers come with an operating system but if you buy a brand new type of device, it will be supplied with a driver, which you will need to install



Sending data to a printer

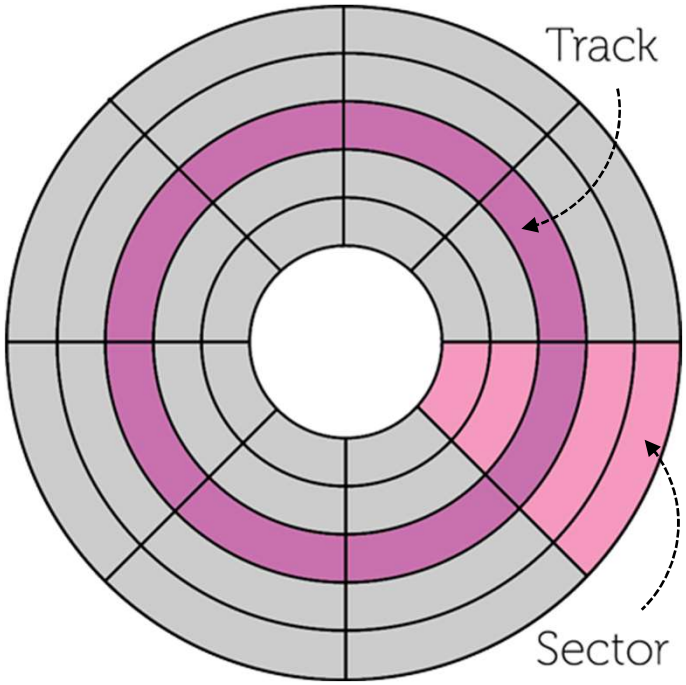
- The computer can send data to a printer much faster than it can be printed
- The data will be sent to a print queue or buffer which is a special area of memory in a computer print server or the printer itself
  - Any data in the print queue is transmitted to the printer, typically a page at a time
  - The printer will send its status back to the operating system which reports any errors to the user. For example, the operating system may display an “out of paper” error message

The print queue

- The screenshot shows a print queue in action
- It shows the status of each job in the queue, and whether it is printing or waiting its turn

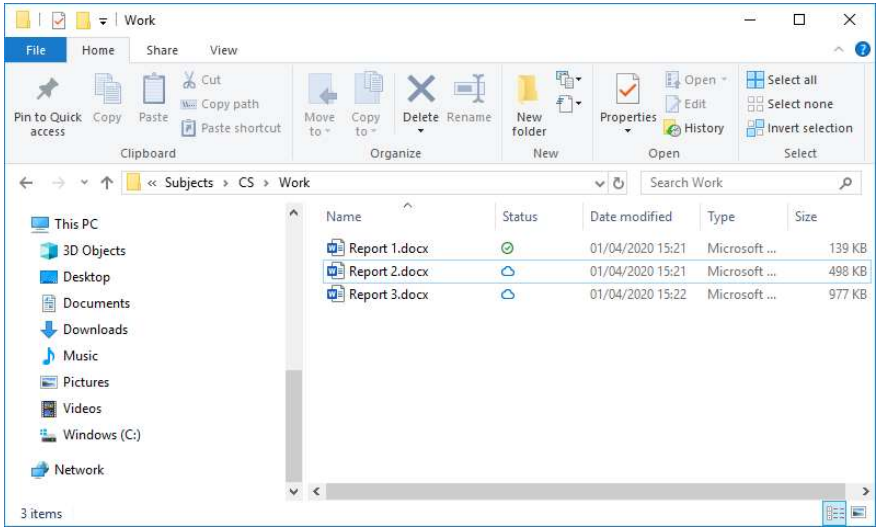
Disk and file management

- The hard disk in a computer is a storage peripheral
- The operating system:
  - manages where on the disk files are written
  - keeps track of where they are so they can be retrieved
  - makes sure no file overwrites another file



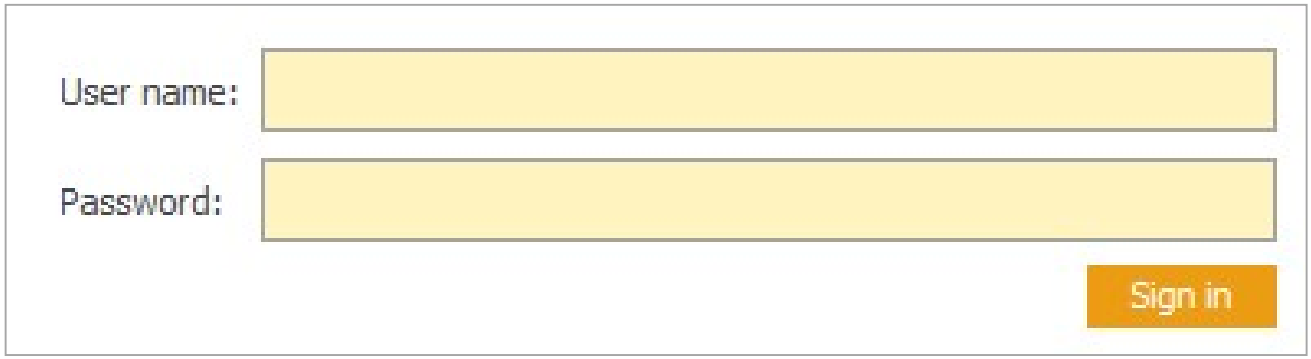
File management

- File management is carried out by the operating system
- The following features are available:
  - Naming files
  - Allocating files to folders
  - Moving files
  - Saving files
  - Copying files
  - Deleting files



User management

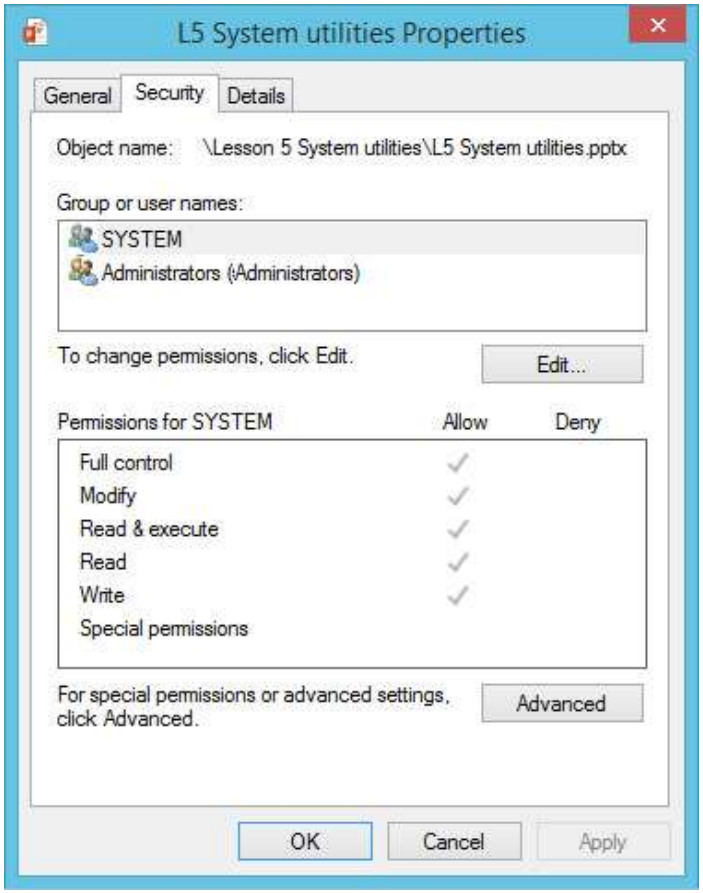
- The operating system is responsible for user logins and passwords



- It will store all users and their passwords in a file or database

Access rights

- Access rights:
  - If a computer is used by more than one person, each user should be able to see only their own files
  - Users and system administrators have different levels of access rights
  - Some users may be allowed to read files but not edit them



Worksheet 3

- Now complete **Task 3** on **Worksheet 3**

Plenary

- Explain to a partner each of the following functions of an operating system
  - User interface
  - Memory management
  - Multitasking
  - Peripheral management and drivers
  - User management
  - File management

Plenary

Answers

- Operating system functions:
  - User interface – a method of the user interacting with the computer – windows, icons, menus, pointers, drag/drop – can be GUI, menu interface or command line interface
  - Memory management – manages programs and data stored in RAM, frees up memory when a program is closed
  - Multitasking – running two or more programs at once
  - Peripheral management and drivers – the management of devices such as mice and printers
  - User management – management of usernames and passwords along with what they have permission to access
  - File management – the organisation of files on storage drives

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