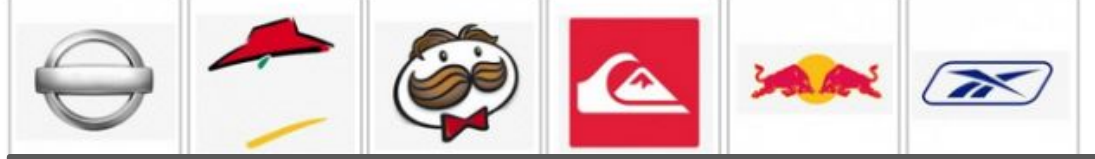


UNIT 2: COMPUTER SYSTEMS: WEEK05 LESSON01

**INTRODUCTION TO THE PURPOSE AND KEY
FEATURES OF AN OPERATING SYSTEM**

ENERGISER

Can you name all of these logos?



AIMS

- Today's lesson will move away from computer hardware and we will start to cover the content needed to complete P2 & M1 from your current assignment
- Today's lesson will be spent over viewing the origins of the computer operating system (OS) and Microsoft Windows Operating System including the numerous editions within each version

OBJECTIVES

- Define the role & purpose of an operating system
- Identify & list different Microsoft Operating Systems (OS) including versions & editions
- Classify the “purpose”
- Categorise features of the Windows OS
- Describe functions within the Windows OS
- Create a list of features that can be performed in Windows

OPERATING SYSTEM SOFTWARE (ROLE)

- At the very heart of any computer system is the operating system software
- But what do you think the job of an operating system actually is?
- Why do we need an operating system?
- What does an operating system do?
- Do all operating systems perform the same roles?

INTRO

- A computer is made up of many parts. You have the hardware e.g. monitor, keyboard and mouse and you have the software e.g. word processor, Spreadsheet and database.
- However, the software and the hardware can't work together without something to act as an 'in-between'.
- The task of co-ordinating all of the software and hardware is given to the Operating System.
- Read through the next few pages by using the menu on the left hand side

WHAT IS AN OS

- There are two main categories of software. There is 'application software' with examples such as Word processors, Spreadsheets and databases. The other main category is called 'system software' which includes the OS and utility programs
- Once your computer has begun booting up using the BIOS instructions in ROM, the operating system will be the first piece of software to be loaded up.
- The OS is needed to control everything happening in your computer. It controls the memory, the disks, the peripherals and the application software.

WHAT DOES AN OS DO?



SINGLE USER, SINGLE APP OS

- This type of OS only has to deal with one person at a time, running one user application at a time
- An example of this kind of OS would be the OS of a basic mobile phone or an MP3 player
- There can only be one user using the device and that person is only using one of its applications at a time.
- But it still has the same fundamental parts as all the other types of OS
- **What is the "Symbian OS"?**

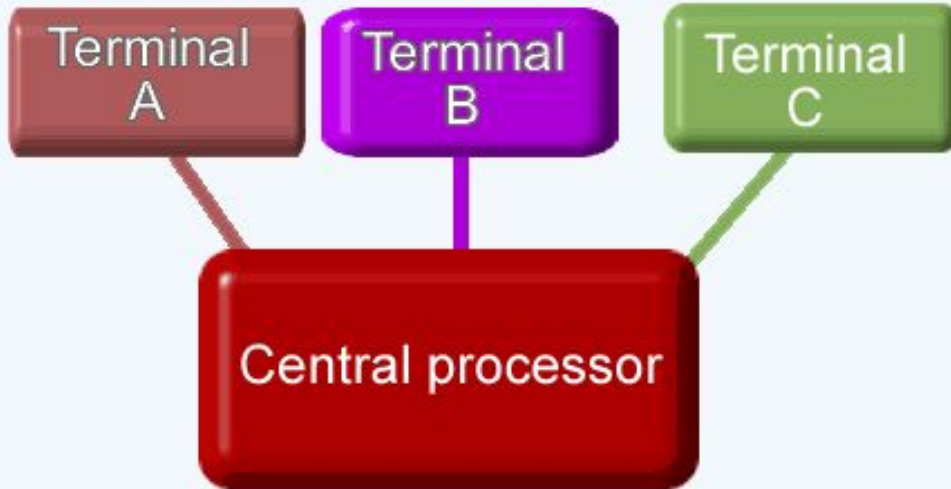
SINGLE USER OS

- Whilst you are using your computer it is likely that you don't need to share peripherals e.g. a printer and you probably don't need to share out your processing time with another person in the house
- Therefore, the operating system on your computer only has to deal with the tasks you are giving it. It doesn't need to worry about sharing out memory, hardware or processing time.
- This is called a single user operating system.
- Example – Windows XP, Mac OS

MULTI USER OS

- Large companies often use a mainframe computer system
- These are very expensive, powerful machines and it would make no sense at all for only one person to be able to use the computer
- A mainframe computer can only do one thing at a time - even if it does it very quickly
- To allow the mainframe to be able to deal with hundreds of people who all want to do something different, multi-user operating systems were developed
- They work by 'slicing' up the processing time of the CPU into tiny chunks
- Each chunk of time is given to a user to deal with their task

MULTI USER OS



The sharing of the CPU happens so quickly, (billionths of a second) that users don't realise that they are having to share the computer with others

Multuser operating system share Processor time



Time Slices

MULTI TASKING

When you have more than one application open on your desktop

You are able to do this because your operating system will switch the application modules in and out of RAM as you are using them and return them temporarily to the hard disk when they are open but not being accessed

Compare Operating Systems

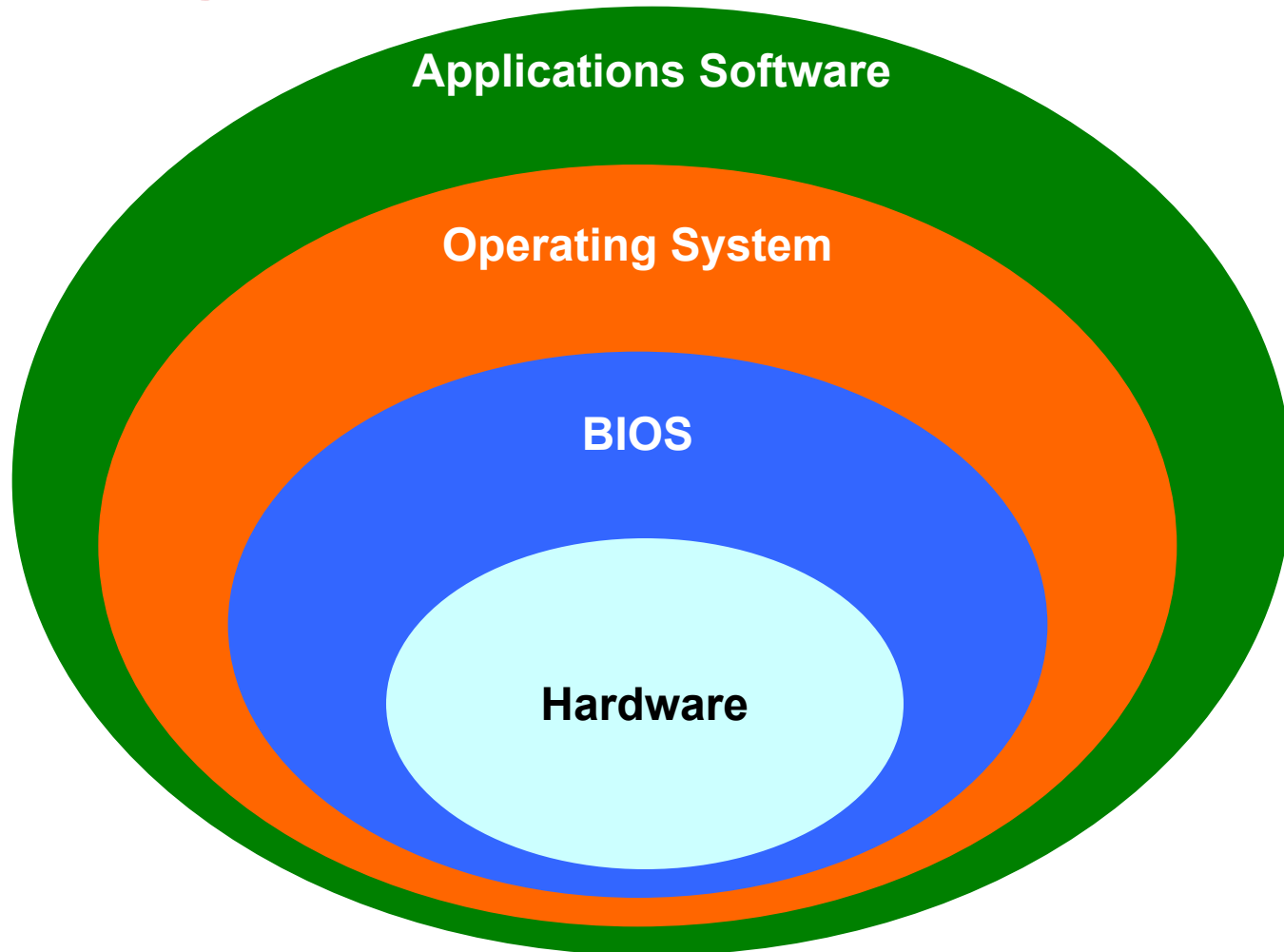
Desktop Operating System

- Supports a single user
- Runs single-user applications
- Shares files and folders
- Shares peripherals
- Used on a small network

Network Operating System

- Supports multiple users
- Runs multi-user applications
- Is robust and redundant
- Provides increased security
- Used on a network

COMPUTER SYSTEM LAYERS



THE KERNEL

- The kernel is the central component of most computer operating systems
- It is a bridge between applications and the actual data processing done at the hardware level
- The Kernel has the task of loading the applications into memory, making sure they do not interfere with one another and allowing them to share use of the CPU efficiently
- The kernel also handles file storage to and from secondary storage devices such as hard disks and optical drives.
- The kernel handles:
 - Loading / Unloading applications from memory
 - Scheduling tasks to run on the CPU
 - Memory management
 - File management
 - Data security

CORE INTERLOCKING COMPONENTS

- Resource Management
- User Interface
- Input / Output (peripheral control)
- Filing system
- Security
- Task Management

RESOURCE MANAGEMENT

What resources are found on a modern computer system?

- Physical Memory
- Virtual Memory
- Disk Cache
- CPU
- Bandwidth

USER INTERFACE

What is the interface responsible for?

- Accepting user commands
- Parsing user commands (working out what the command is actually requesting)
- Displaying error / warning messages
- Informing users of critical system events
- Confirming that a command has been successfully completed
- Visual aid for the user (user friendly)

COMMAND LINE AND GUI OPERATING SYSTEMS

- Prior to the introduction of the WIMP environment, early computers relied on command line interpreters
- The operating system responded to individual commands keyed in by the user
- When it had finished doing whatever was asked of it, the user was presented with the command line prompt (usually including a >symbol) and the computer then waited for the next instruction
- The user needed to have a high level of knowledge, particularly in how to give the commands in the DOS language

COMMAND LINE AND GUI OPERATING SYSTEMS CONT.

- Windows: a WIMP environment system developed by Microsoft Corporation and sold under licence; used on IBM-compatible PCs
- The first Windows operating system was simply an application – a user interface – that ran on top of the MS-DOS operating system
- When Windows-based operating systems were introduced, instead of entering a command, the user now indicated their selection or decision by clicking on an option in a menu, pressing a button or completing boxes on a form
- The interface became far more user-friendly and it opened up the use of computers to people who had not learnt how to program a computer

OPERATING SYSTEM EXAMPLES

MS DOS Promo Advert

DOS was the name of an operating system developed by IBM for business computers

The first personal computer version of DOS was developed for IBM by Bill Gates, who then set up Microsoft Corporation

It is a non-graphical line-oriented command or menu driven operating system

It has a simple interface but lacks the 'friendly' user interface of the WIMP environment

DOS for beginners

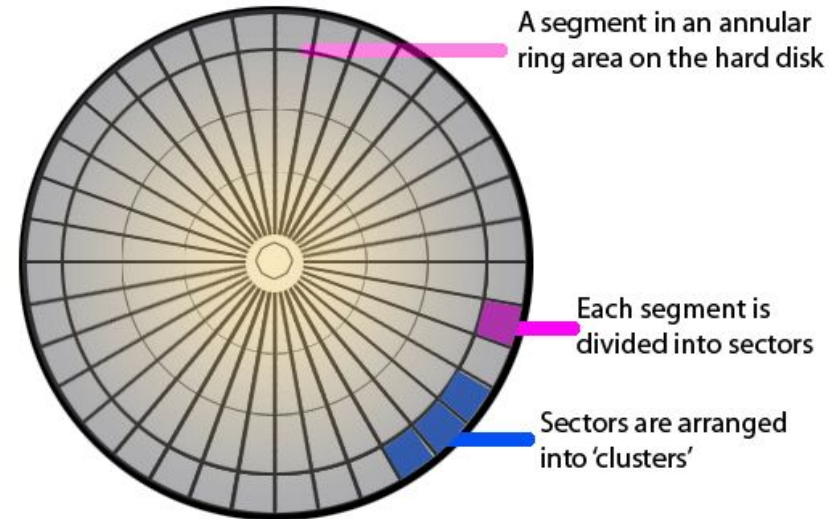
INPUT / OUTPUT (PERIPHERAL CONTROL)

- It is the computers job to control the amount of CPU attention that is paid to each device
- IRQ's (interrupt request) are used for this to prevent conflicts
- Controlling the flow of communication is called *interruption*
- Every CPU has a wire called the INT wire
- If voltage is applied to the wire, the CPU interrupts what it is doing and attends to the device
 - *For example, when a mouse button is pressed, the CPU attends to the interrupt request, invoking the necessary BIOS routine to query the mouse*

FILING SYSTEM

What does this mean?

Hard disk format



- A file system is the underlying structure a computer uses to organise data on a hard disk
- If you are installing a new hard disk, you need to partition and format it using a file system before you can begin storing data or programs
- In Windows, the three file system options you have to choose from are NTFS, FAT32, and the older and rarely-used FAT (also known as FAT16)
- [File System Comparison](#)

SECURITY

Where does Security fit into an OS?

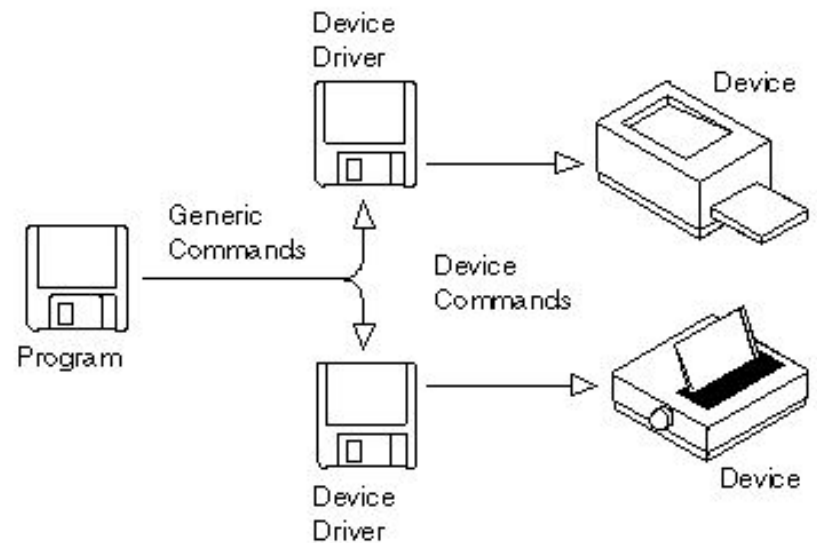
Your task is to find out!

TASK MANAGEMENT

- Where does Task Management come into this?
- The Process Manager handles the scheduling of activities within the CPU and the assignment to the CPU of individual tasks involved in an application or utility program
- In the typical situation in modern computers, more than one application program and/or utility program will be running at any given moment, a situation known as "multiple tasking" (which is often shortened to "multitasking").

DEVICE DRIVERS

- For each peripheral device, a device driver is needed to interface between the processor and the peripheral
- The driver acts as a decoder, so the data is interpreted correctly
- Installing device drivers is necessary when new hardware is installed



UPDATING & DEVICE DRIVERS

- Automatic Updates
- Driver Installs
- Driver Updates
- System Restore
- Last known good configuration

32-BIT VS. 64-BIT OS AND PROCESSOR

32-bit Windows Operating System and x86 Processor Architecture

- Capable of addressing 4 GB of RAM
- Each virtual machine receives 1 MB of memory and access to hardware
- x86 uses a Complex Instruction Set Computer (CISC)
- x86 processors use fewer registers than x64 processors

64-bit Windows Operating System and x64 Processor Architecture

- Capable of addressing 128 GB of RAM
- Enhanced performance for memory management
- Additional security features
- x64 architecture is backward compatible with x86
- Process much more complex instructions at a much higher rate

IDENTIFY MICROSOFT OPERATING SYSTEMS

Whiteboard Exercise

Identify Minimum Hardware Requirements

- Customer may need to upgrade or purchase additional hardware to support the required applications and OS.
- A cost analysis will indicate if purchasing new equipment is a better idea than upgrading.
- Common hardware upgrades:
 - RAM capacity
 - Hard drive size
 - Processor speed
 - Video card memory and speed

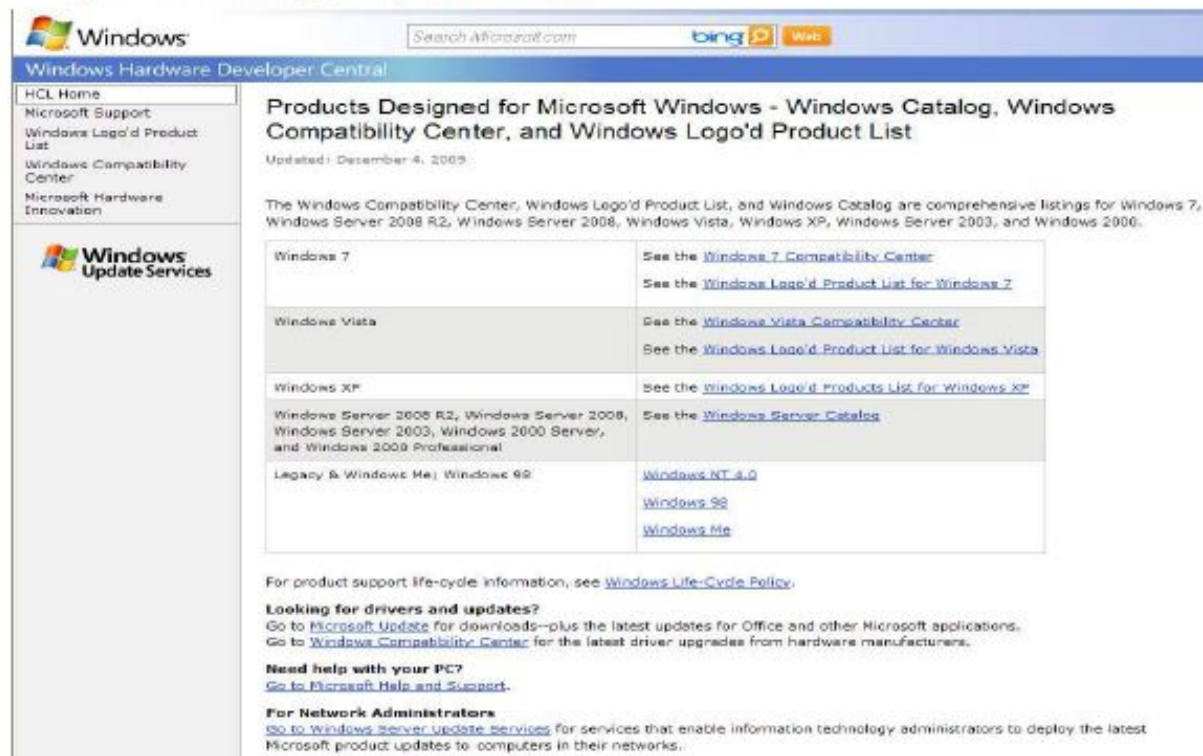


MINIMUM/RECOMMENDED REQUIREMENTS

- Microsoft Windows Seven Requirements

Hardware Compatibility List (HCL)

- Most operating systems have an HCL.
- HCLs can be found on the manufacturer's website.
- HCL includes list of hardware that is known to work with the operating system.



Windows Hardware Developer Central

HCL Home
Microsoft Support
Windows Logo'd Product List
Windows Compatibility Center
Microsoft Hardware Innovation

Windows Update Services

Products Designed for Microsoft Windows - Windows Catalog, Windows Compatibility Center, and Windows Logo'd Product List

Updated: December 4, 2009

The Windows Compatibility Center, Windows Logo'd Product List, and Windows Catalog are comprehensive listings for Windows 7, Windows Server 2008 R2, Windows Server 2008, Windows Vista, Windows XP, Windows Server 2003, and Windows 2000.

Windows 7	See the Windows 7 Compatibility Center See the Windows Logo'd Product List for Windows 7
Windows Vista	See the Windows Vista Compatibility Center See the Windows Logo'd Product List for Windows Vista
Windows XP	See the Windows Logo'd Products List for Windows XP
Windows Server 2008 R2, Windows Server 2008, Windows Server 2003, Windows 2000 Server, and Windows 2000 Professional	See the Windows Server Catalog
Legacy & Windows Me/ Windows 95	Windows NT 4.0 Windows 98 Windows Me

For product support life-cycle information, see [Windows Life-Cycle Policy](#).

Looking for drivers and updates?
Go to [Microsoft Update](#) for downloads—plus the latest updates for Office and other Microsoft applications.
Go to [Windows Compatibility Center](#) for the latest driver upgrades from hardware manufacturers.

Need help with your PC?
Go to [Microsoft Help and Support](#).

For Network Administrators
Go to [Windows Server Update Services](#) for services that enable information technology administrators to deploy the latest Microsoft product updates to computers in their networks.

The Boot Sequence for Windows XP

- Power On Self Test (POST)
- POST for each adapter card that has a BIOS
- BIOS reads the Master Boot Record (MBR)
- MBR takes over control of the boot process and starts NT Loader (NTLDR)
- NTLDR reads the BOOT.INI file to know which OS to load and where to find the OS on the boot partition
- NTLDR uses NTDETECT.COM to detect any installed hardware
- NTLDR loads the NTOSKRNL.EXE file and HAL.DLL
- NTLDR reads the registry files and loads device drivers
- NTOSKRNL.EXE starts the WINLOGON.EXE program and displays the Windows login screen

THE START MENU

- The Start menu is one of the primary connections between the user and the Windows desktop
- The Start menu provides access to the available programs, network places, connections, help and support files, recent documents, and more

THE TASK BAR

- The Task Bar is another of the primary connections between the user and the Windows desktop
- The taskbar displays files and programs that are currently open and running
- The taskbar also allows the user to switch easily between open files and applications, group items, and open the most-often-used programs quickly
- The notification area to the right of the taskbar displays the system clock and programs that are running in the background

THE CONTROL PANEL

- The Control Panel is a part of the Microsoft Windows graphical user interface which allows users to view and manipulate basic system settings and controls via applets
- These include adding hardware, adding and removing software, controlling user accounts, and changing accessibility options
- Additional applets can be provided by third party software

The Windows Registry Files

HKEY	DESCRIPTION
HKEY_CLASSES_ROOT	Information about which file extensions map to a particular application
HKEY_CURRENT_USER	Information, such as desktop settings and history, related to the current user of a PC
HKEY_USERS	Information about all users who have logged onto a system
HKEY_LOCAL_MACHINE	Information relating to the hardware and software
HKEY_CURRENT_CONFIG	Information relating to all active devices on a system

RESOURCE PAGE

- [OS resource 1](#)
- [OS resource 2](#)
- [OS resource 3](#)
- [OS resource 4](#)

A BREAKDOWN OF P2

Describe the features and functions of an operating system

Describe what an Operating System is used for e.g. Providing an interface between the hardware and the software and/or user.

P2 CRITERIA

Operating System Types

- Command line
- Graphic User Interface

Functions

- The Kernel - This is the heart of the Operating System?
- File System - What does the file system allow us to do?
- User Interface - Make sure you describe the two main types of interface (graphical and command line). Explanation of the acronym WIMP.
- Discuss the advantages and disadvantages of each type of user interface.

P2 CRITERIA CONT.

Services including...

- Machine and peripheral management
- Security: data security including encryption, usernames and passwords
- File management
- Device drivers

Features including...

- Ability to customize
- Support for connectivity of portable media
- Security
- Stability
- Reliability
- Ease of management
- Associated utilities
- Cost
- Support for the user

MERIT TASK (VIA ASSIGNMENT)

You must produce a report that explains the purpose of Operating Systems (OS) including the features and functions of each.

A decision must be made regarding what OS to install on his Colleges computer systems (including laptops). Currently he is considering two OS's; these are Microsoft Windows Seven Operating system and the Apple OS X. He can't fully decide which would be best and so would like you to investigate the benefits offered by each. You must compare and contrast any differences between these two operating systems summarising their respective strengths and weaknesses.

Think about this as a buying guide - *"I'm looking to buy a new computer and can't decide whether to stay with Windows or buy a Mac, can you explain the differences and advise me?"*

MERIT TASK CONT.

For this task I would expect you to research the differences between key aspects of the two operating systems such as:

- User interface
- Performance
- Security
- Availability of software
- Reliability

Look at what the industry press and bloggers are saying about the two operating systems but be careful not to get biased views

Always look at a number of sites before making your comment

There is no right or wrong answer for this task but I am looking for 'informed' answers