

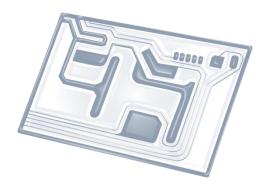
# Computer Organisation IB Computer Science

Content developed by **Dartford Grammar School** Computer Science Department





## HL Topics 1-7, D1-4





1: System design



2: Computer Organisation



3: Networks



4: Computational thinking



5: Abstract data structures



6: Resource management



7: Control



D: OOP





#### 1: System design

### HL & SL 2 Overview

#### **Computer architecture**

2.1.1 Outline the architecture of the central processing unit (CPU) and the functions of the arithmetic logic unit (ALU) and the control unit (CU) and the registers within the CPU

2.1.2 Describe primary memory. 2 Distinguish between random access memory (RAM) and readonly memory (ROM), and their use in primary memory

- 2.1.3 Explain the use of cache memory
- 2.1.4 Explain the machine instruction cycle

#### **Secondary memory**

- 2.1.5 Identify the need for persistent storage
- Operating systems and application systems
- 2.1.6 Describe the main functions of an operating system
- 2.1.7 Outline the use of a range of application software
- 2.1.8 Identify common features of applications

#### **Binary representation**

- 2.1.9 Define the terms: bit, byte, binary, denary/decimal, hexadecimal
- 2.1.10 Outline the way in which data is represented in the computer

#### Simple logic gates

- 2.1.11 Define the Boolean operators: AND, OR, NOT, NAND, NOR and XOR
- 2.1.12 Construct truth tables using the above operators
- 2.1.13 Construct a logic diagram using AND, OR, NOT, NAND, NOR and XOR gates

















6: Resource management

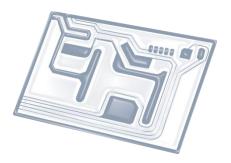






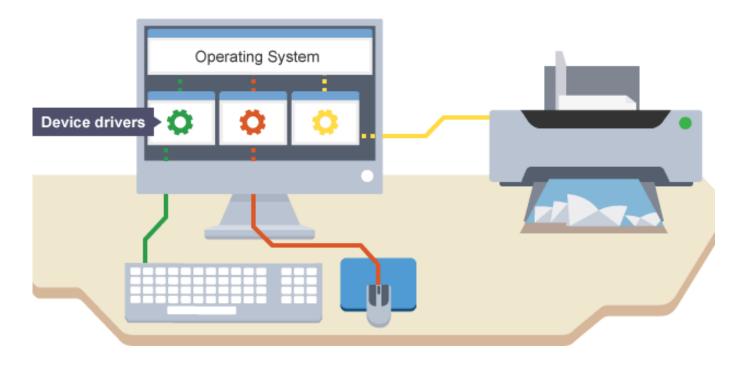






### **Topic 2.1.6**

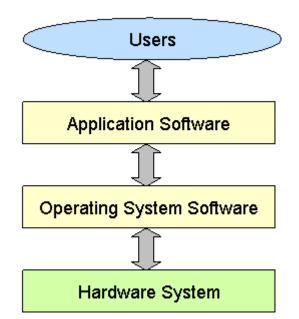
# Describe the main functions of an operating system

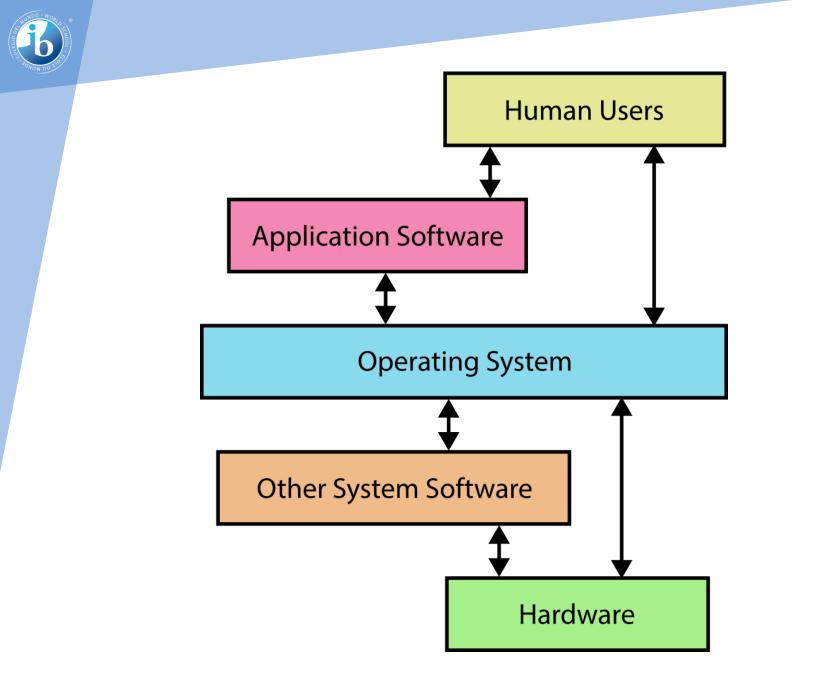






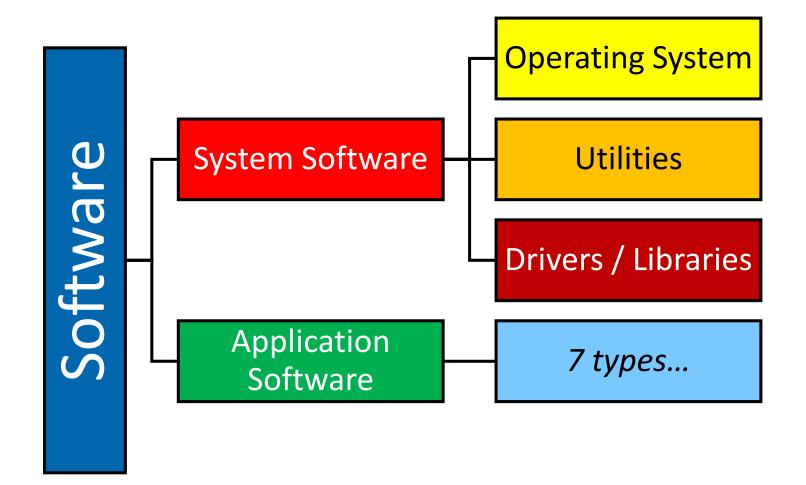
*HL students*: This curriculum point is repeated in much greater detail in **Topic 6: Resource Management**. For reference, see **Curriculum Points 6.1.5-6.1.9** 







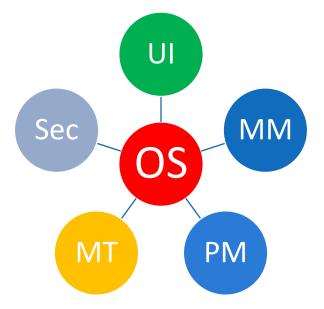
#### **Hierarchy of software**





### Functions of an operating system

- A. Provides a user interface
- B. Does memory management
- C. Does peripheral management
- D. Allows multi-tasking
- E. Provides security





#### **A. User interface**

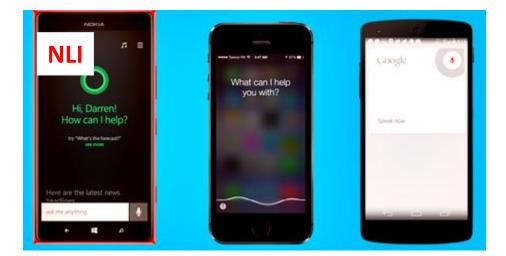
- OS has to provide a link between the user and the computer hardware.
- Types of user interfaces:
  - Graphical User Interfaces (GUIs) that have menus and icons,
  - **Command Line Interfaces** (CLIs) where the user types in codes,
  - Natural Language Interface (NLIs) where the user speaks to the interface
  - Menu Based Interface (MBIs) which gives the user a selection of options.

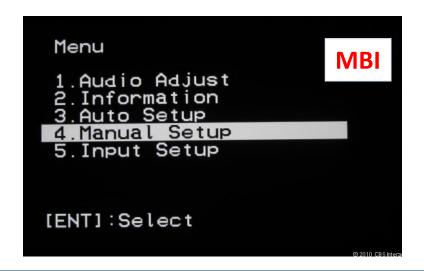


#### **Example of user interfaces**

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Hostname : LLB-DEMO			
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Date/Time/Zone : 2006-04-29 01:41:17 UN	C +00:00		
Logging : 10.54.10.96			
Default Gateway : 10.0.60.1			
Management IP : 10.0.60.2			
Management Netmask : 255.255.255.0			
Management Broadcast : 10.0.60.255			
LLB-DEMO-enable:system [single] #sh ver			
Version : 3			
Revision : 1			
Build : 48			
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#### **B.** Memory management

- Memory management is done by keeping track of storage devices (like HDD) and controlling which application has access to which area of memory (RAM).
- Each location in memory can be read, modified, and written to by the OS. When the memory location is full the OS sends a confirmation message.
- Similarly, the OS provides file management services by sorting out where data is stored on the disk drives and memory.
- The OS allows users to **organise files** in **folders** as well as to copy and delete files.

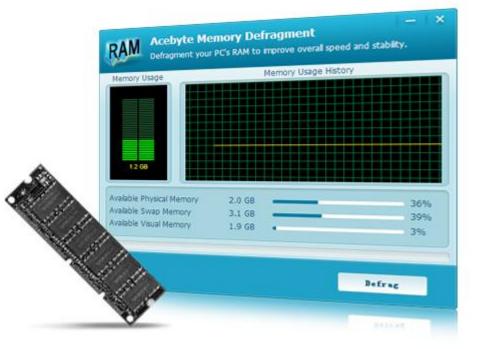


#### **Example of memory management**



File manager for managing files on HDD

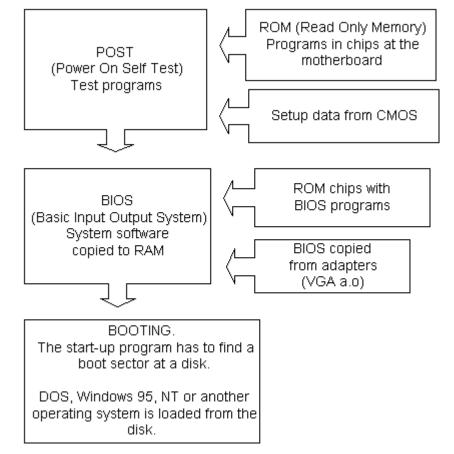
Memory manager for RAM to make sure programs don't use same memory space





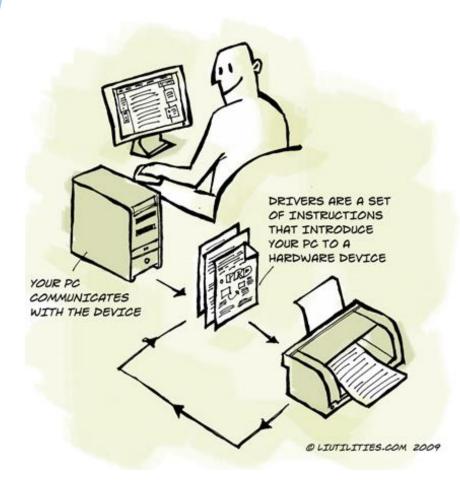
### **C.** Peripheral management

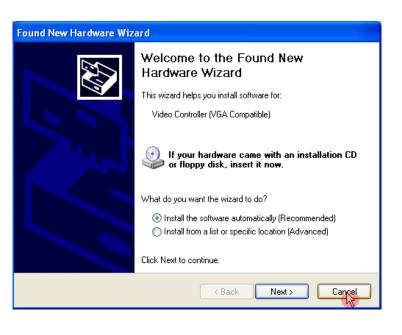
- Keyboard, mouse, monitor and printers are controlled through device drivers.
- A device driver is a software program which allows hardware devices to be used by the OS. They act as translators between the devices and the computer system.





#### Peripheral management example









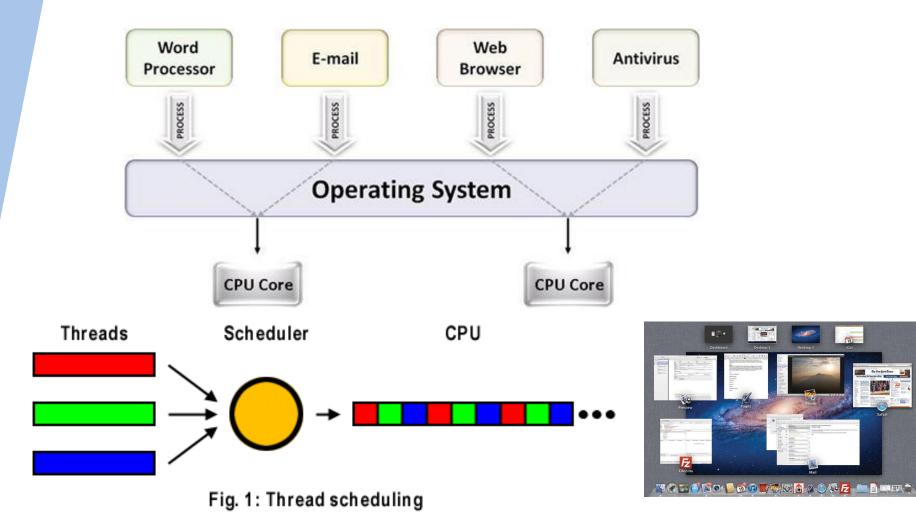
### **D.** Multitasking

- The OS **coordinates** the working of different programs by allocating the CPU time between different programs based on **time** and **priority** of the software application.
- Each task running is given a **slice of time**, or a turn on the CPU.
- Each task has to wait its turn unless it is given a higher priority by the OS in which case it gets more or longer time slices.





### **Multitasking example**



1.84



### **E. Security**

- OS prevents unauthorised access.
- It ensures security of the system through usernames and passwords.
- The OS protects files from other users reading or writing files.





### **Security examples**

Title	JimD-C (C:) Properties
Enter username and password:	General Tools Hardware Sharing Security Quota
User Name: user	Group or user names:
Password:	Administrators (JIM \Administrators)
	CREATOR OWNER
Save	Everyone
OK Cancel	SYSTEM
	🕵 Users (JIM\Users)
	Add Remove
Open File - Security Warning	
	Permissions for Administrators Allow Deny
The publisher could not be verified. Are you sure you want to run this software?	Full Control 🗹 🗋
Name: Ext32.exe	Modify 🔽 🗌
Publisher: Unknown Publisher	Read & Execute
Type: Application	List Folder Contents
From: \\Dm14\mt_new\Apps	Read 🗹 💭 💻
	Write 🔽 🔽 🗸
Run Cancel	For special permissions or for advanced settings, Advanced
Run Cancel   It is file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust.	For special permissions or for advanced settings,



#### **Recap: Functions of an operating system**

- A. Provides a user interface
- B. Does memory management
- C. Does peripheral management
- D. Allows multi-tasking
- E. Provides security

