# Overview of a Computer System

Monday, June 12,

## Objectives

Students will receive an appreciation, and understanding of the differences and breadth in capabilities between various computer systems.

This module is not to be conclusive but to expand the knowledge students have of Computer Systems as well as begin to define for them the various systems available.

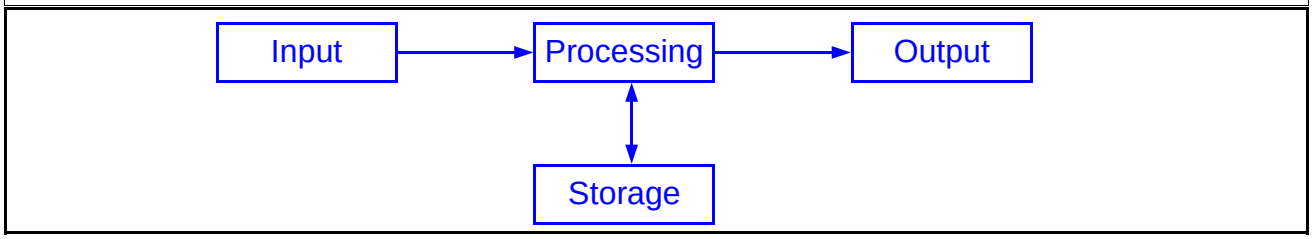
## What is a computer?

Computer System= Hardware + Software

A digital computer is a machine that can be programmed to accept data (input) and process it into information (output). Where necessary the computer may use storage devices to store information. A classical definition, supported by the below chart defines a computer as:

A computer is a device that accepts **input**, **processes** data, **stores** data and produces **output**.

*Diagram 4.1 - Classical Block Diagram of Data flow in a computer*




## Hardware

Compare to hardware at the shop.

Hardware refers to the physical parts/components of a computer. If you can touch it, it is hardware.

## Software

Software is the non-physical parts/components of a computer.

Software are a list of instructions that tell the hardware what to do. Another general category name for software is “programs”. Programs are designed to control the hardware’s behaviour and also it’s interaction, reaction to the computer user.

For the software instructions to work on the computer the computer must have space on it to store the instructions as it processes or goes through each instruction. Software instructions are usually stored on disks before they are needed and then loaded into the computers RAM during processing.

The purpose of a computer system is to turn unprocessed data into usable information. This requires four main areas of data handling—input, processing, output, and storage. The equipment associated with a computers system is called hardware. A set of instructions to tell the hardware what to do is called software. People, however, are the most important component of a computer system. **Capron “Computers. Tools for an Information Age.”**

An example of combining software and hardware for work the tape recorder, CD-player, phonograph. The physical hardware you can touch, the software is the music or instructions to the player recorded on the CD, tape. The player reads the instructions and using these instructions tells the sound-system, speakers the sounds to make for our listening enjoyment.

### *Which is more important, hardware or software?*

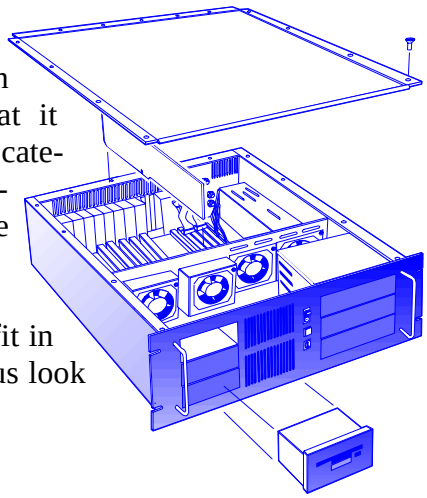
Each is equally important. There's no point having the world's greatest CD-player if you can't get the music you want to listen to. There's little pleasure in having the recorded music, if you can't play it to listen to.

For the software instructions to work on the computer, the computer must have space on it to store the instructions and the capabilities to process and follow through with the instructions.

### Review Assignment:

What are examples of Hardware and Software using the definition, discussion in the class?

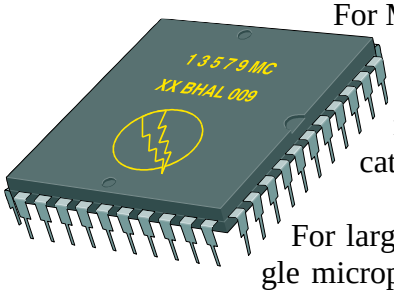
# Computer Hardware



We will review *Four major categories* of computer hardware, and go into more detail later in the course on the specific categories and what it means to us. I will give you an example for each category but there are more examples for these categories that we will discover together as the course continues.

These categories are not law, some devices will fit in more than one category. This section is to help us look at each section separately.

## *C.P.U. - Central Processing Unit.*




For Microcomputers, the CPU is not the box, but rather the microprocessor chip designed to act as the centre, control of all processing in the microcomputer that is housed/enclosed by the box. Activities to be carried out by the computer is routed or passed through the CPU for allocation to the specific hardware to perform the requested task.

For larger computer systems, such as Mainframes and Minicomputers, a single microprocessor chip cannot contain all the processing requirements for the calculations and a collection of microprocessor chips and other support chips work together as the "Central Processing Unit" so the complete collection, put together into a box, is called the CPU. As with microcomputers, supporting devices such as printers, screens, keyboards are all connected through to the CPU so the CPU still remains at the "centre" of action.

Draw images of hardware for the class to copy. This will get them used to the symbols used in Computer Studies for these components.

What does the "processor" process? The raw materials that a computer processes is electrical signals which is commonly attributed as "data". What ever information can be converted into electrical signals, input into a computer can be 'processed'. Such material can be letters, numbers, or facts etc.

**Examples of microprocessor CPUs used with microcomputer designs:**

| ***Complex Instruction Set (CISC)*** | ***Reduced Instruction Set (RISC)*** |
|---|---|
| Intel 8086, 80186, 80286, 80486, Pentium, Pentium MMX, Pentium Pro, Pen- | Intel |
| AMD K5, K6, K7 | ARM, Sun Sparc |
| Cyrix Media GX, 6x86, 6x86MX | MIPS R4000, R5000 |
| Motorola 68000, 68020, 68030, 68040 | Motorola PowerPC, IBM PowerPC |
| | Compaq Alpha |

Ask the class for examples of Data: *(class roll, football scores, etc.)*
What is the singular of Data? *(datum)*

Microprocessor CPUs serve as central processors for more than the computers used by people, in many cases they serve and manage components used within lar-

ger computer systems, or even to control devices such as the Microwave, digital watches, VCRs and Televisions.

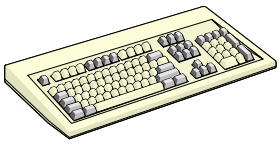
## *Input Devices*

e.g. Keyboard, mouse, scanner, digital camera, Audio Recorder, digital tablets

**Definition:** Generally speaking Input Devices are the devices that allow the user to give instructions to the hardware, software.

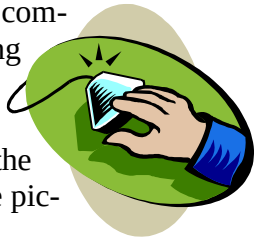
**Definition:** More precisely, an input device is anything that can "put in" or supply data to the central processing unit. The device can be automated external tools to feed instructions or data into the machine. (e.g. modem, network)

**Keyboard/Keypad:** Most people define input devices as devices used by people to put things into a computer. We know that a Keyboard is used to type things into a computer, and we even use a mouse to instruct the computer to do certain things.

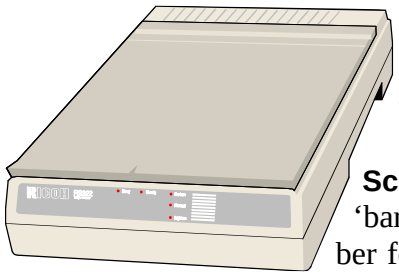


There are even keyboards specially designed for different requirements such as the keyboard used by fast-food restaurateurs like McDonalds where instead of the cashier typing in the price and the product, they just press the key which has the product label on it.

**Pointing Device:** The mouse is part of a category of Input Devices sometimes called "Pointing Devices" for their use to "point" to things on the computer screen. The mouse is the most commonly known of the pointing devices but other similar devices include the trackball, a mouse with the ball at the top where the user physically moves the ball. The digital tablet, works by providing a square input device that senses the area of the surface that is being touched and coordinates this with the pictures on the computer screen.



**Scanners:** Other examples of Input Devices used by people include Digital Scanners which allow people to copy pictures into a computer, and sometimes special software can be used to convert pictures of documents into word-processing documents. Some computers are sophisticated enough that they provide a screen that can be 'written' on and it can 'read' the handwriting.



**Scanners (specific application):** TCF and other supermarkets are using 'barcode scanners', to scan stripes of ink on packaging that provides a number for the computer database to check what the name and price of a product is.

**Motion Sensors:** Large manufacturing plants have sensor devices along their manufacturing process to inform the computer the location and state of items on the production line. Traffic Management authorities in cities with very busy traffic have sensors on the roads to keep the computer processing the traffic flow to maximise traffic movement through the use of traffic lights controlled by a computer.

**Chemical Sensors:** The Police use "breath-test" equipment to measure the alcohol blood content of a driver from input by a person 'blowing' into the computer sensor. The sensor determines the chemical contents of the breath and makes a very accurate estimate of the alcohol blood content.

## *Output Devices*

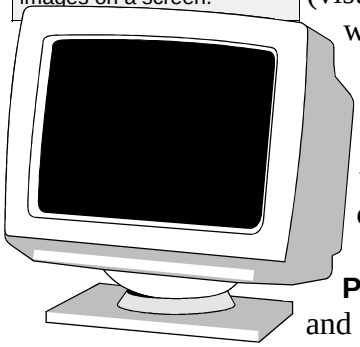
e.g. Screen, Printer, lights, sounds

**Definition:** Generally speaking output devices are the devices that indicate to you that the machine is doing something.

**Definition:** More specifically, output devices is anything that allows the CPU to "put out" information or instructions. Output can occur from the computer to an external device, without the need for the user to know that information, instructions are being transmitted.

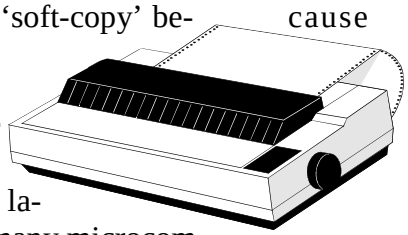
**Screen Displays:** Most people define output devices as devices used by people to receive things, view what is happening with a computer. The computer screen also known as the *Video Display Unit* (VDU) and the printer are the most commonly thought of output devices. VDU describes the function of a computer monitor (visually display) and another commonly used term is the *Cathode Ray Tube* (CRT) which describes the TV Tube used to display the information.

Cathode Ray Tube (CRT) is a technical description of the television 'tube' and the use of 'cathode ray's to draw images on a screen.



Advancements in technology have led to VDUs no longer requiring big television size boxes to connect to a computer. Laptops became possible with the advancement in LCDs (Liquid Crystal Displays) which are more commonly used on cheap electronic watches.

**Paper Copies:** Output on printers are termed 'hard-copy' because it is physical and is not lost when the computer turns off or goes to another activity. The output from computers onto a monitor is sometimes termed a 'soft-copy' because it is temporary.



Microcomputer monitors are connected to the computer through an interface card which translates the instructions from the computer to those that manipulates the lasers in the monitor to produce the desired images. For many microcomputers, the interface card is defined by its compatibility to the industry standard Video Graphics Adapter (VGA) and its enhancements.

Major Standards that have developed for Interface Cards for Microcomputer Monitors have been:
**MGA**. Monochrome Graphics Adapter.
**CGA**. Color Graphics Adapter (320x200 pixels)
**EGA**. Enhanced Graphics Adapter (640x350 pixels)
**VGA**. Video Graphics Adapter (640x480 pixels)
**Super VGA** (1280x1024 pixels)

Picture Elements (**pixels**) is a measure of how many dots can be displayed by a device.

**Machine Control:** Computers at automanufacturer's plants control the flow of the assembly line, and robot arms drilling cutting parts on the new car. Computers in a steel mill controls the movement of the iron ore through the processing line. An aeroplane's autopilot sends output to the wings and controls the engine and flight movement..

**Multimedia:** Many computers send output as a mix of sound and video, computers can generate different sounds through sound devices such as Sound Cards, and Music Keyboards.

Technically, not all output from computers require the intervention or control of the Central Processing Unit. The little diode lights indicating power on terminals and microcomputers are independent of the Central Processing just as the blinking lights indicating hard-disk activity works independent of the CPU.

## *Input / Output Devices*

Many devices perform both input and output services, even the devices listed up receive instructions (output) from the CPU to coordinate its communications (both input and output.) Some of the devices often listed as both input and output devices are the modem and network interface card.

**Modem:** A modem (Modulator, De-modulator) is used to communicate between two different computers over communications channels such as the telephone cables. The modem translates the digital communications from a computer into the analog communications medium such as the telephone line. *The process is called 'modulation'.* The computer on the other end of the communication translates back the analog signal into the computer digital communication, *this reverse process being called 'de-modulation'.*

**Network Interface Card (NIC):** The Network Interface Card translates the digital communications from the computer into digital signals to send across the network medium (cabling.)

## *Storage Devices*

The CPU uses external devices for storing and recording data. Storage devices have been grouped into two distinct categories, the Primary (or sometimes called main) Storage and the Secondary Storage.

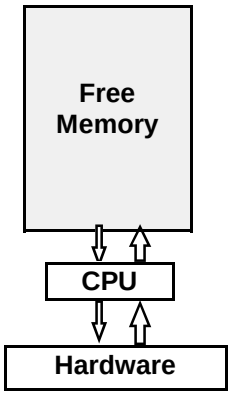
RAM - Random Access Memory

ROM - Read Only Memory

NVRAM - Non-volatile Random Access Memory

### Primary Storage

e.g. RAM, ROM, NVRAM




Primary Storage devices are the storage facilities which the CPU initially looks at when looking for further information or instructions. Physically, RAM is made up of electronic circuitry which maintains its 'information' while electrical current flows through the circuits. The use of electrical circuitry maximises the speed by which information can be placed into and removed from the storage.

A major shortcoming of RAM circuits is its inability to maintain the stored information when the electricity is turned off. Some of the Primary Storage facilities such as ROM and NVRAM can maintain information but due to their size and costs they are limited to what information can be put into the storage although retrieving information is still faster than secondary storage.

**Key Advantages:** Higher speed of access,
**Disadvantages:** Higher cost

### Secondary Storage

e.g. Hard Disk Drives, Floppy Disk Drives, Tape Drives, ZIP drives, CD-ROMs

A graphic of a hard disk with the covers taken off.

These devices are additional storage, separate from the CPU and memory that allow the user to store large information, programs for later use. The most common secondary storage device is the magnetic disk. The magnetic disk works much like the record player storing information on the plastic disk, and reading it back using the 'stylus', 'needle'.

The hard disk drive contains a non-removable disk that is built into your system. With a hard disk drive you can store a large amount of information in one convenient place. Although much slower than Primary Storage, the major advantage of

secondary storage is its ability to retain stored information when electricity is turned off, and its portability (the ability to move the information from one machine to another.)

The floppy disk drive holds a removable, floppy disk, which has less storage capacity than the hard disk drive. The portability of floppy diskettes (simplicity in moving it between machines) also give us the opportunity to use floppy diskettes as mass input device

**Key Advantages:** Lower cost per megabyte (amount of storage), Higher capacity, Can be modified, data is not lost with power failure.
**Disadvantages:** Slower than primary storage

## *Hardware Summary*

Different manufacturers, makers of equipment have released hardware into the market. With so many different makers trying to sell their own designs, we now have a number of machines, devices that do not work together.

If you want to use a printer from one machine, with another machine, you may need to check whether the printer will work with the computer.

The dominant, or most common computer on the market is the IBM PC design. This design and its many subsequent updates is about 90% of computers in the world.

## *Homework Review Questions*

*not assessable, use to allow students to review for themselves whether they are keeping in touch with the course.*

1. Name two CPU brand and models that can be bought at the shops
2. Name two input devices not already mentioned in class that can be bought at the shops.
3. Name two output devices not already mentioned in class that can be bought at the shops.

*One week is given for the assignment, and a representative from each group will read out the question, the place where they got their answer, and the answer for the class to know.*

*A copy of the answer is written on the board for the class to discuss.*

### The Keyboard

Draw a computer keyboard and note where the following key areas are:-

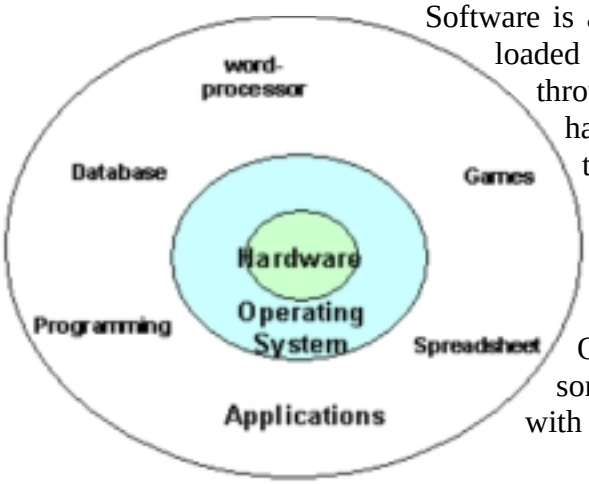
- Alpha-numeric keys
- Modifier keys (Shift, Ctrl, Alt)
- Function Keys (F1 – F12)
- Numeric Keypad
- Navigation Keys (Arrow Keys)
- Editing Keys (Insert, Home, Page Up, Page Down, Delete, End)

### The Mouse

Draw a mouse diagram that indicates the rollers used by the mouse to indicate x-y movement.
Describe what the following terms mean.

- Click
- Double Click
- Left Click
- Right Click
- Click and Drag

# Computer Software




Software is a general category of computer instructions generally loaded onto the computer through one of the input devices, or through one of the storage devices. Since the instructions have to be read and interpreted (actioned, executed) by the CPU the computer software is generally loaded (copied) by the CPU from the secondary storage into primary storage (RAM) for faster access to the instructions.

Our diagrams beside each software category gives some idea of how RAM is used and how software talks with the hardware to achieve their goals.

I will provide an example for each category and we will study some of these in more detail later in the course.

For the purposes of this introduction we will categorise software into four major categories as we have categorised hardware.

## *Operating Systems*

e.g. MS-DOS, Windows, OS/2, Apple's Macintosh System 7, Unix, MVS, VMS

These are very special programs that talk directly to the physical equipment. Since the operating system talks directly to the hardware, the programmer uses the operating system to talk to the hardware instead of writing his own instructions to the computer hardware. Operating systems are usually supplied with the machine, and some machines can have more than one operating system.

There are varying complexities of operating systems, the more complex allow the programmer to never concern themselves with the physical machine and to concentrate on their application. Others offer rudimentary services.

**Disk Operating System**

Some people have said that DOS is a "Disk" operating system because it comes on a disk, or more than one disk.

MS-DOS is a disk operating system because it holds the essential instructions for 'operating the disk.' It has often been argued that MS-DOS is not an operating system because it does a very poor job of managing the Disk let alone any of the other key operations an operating system is supposed to do.

Looking at our diagram, the Operating System talks directly with the hardware, giving instructions to the hardware of things for it to do. In response, some of the hardware send back to the Operating System information about what happens or some information the hardware has been programmed to send back to the Operating System.

**BIOS - Basic Input/Output System.**

The BIOS is a special feature of the IBM PC family of personal computer. This is a set of chips on the computer that is programmed with instructions on how to manipulate the hardware.

The O/S thus has less work to do, using the BIOS to get things done. On the Macintosh the same feature is called the Mac Toolbox.

For IBM PC Compatibles, a special part of the hardware sometimes used by the Operating System are the programs stored in a ROM chip termed the BIOS. The ROM BIOS was developed by IBM to provide basic instructions to the hardware of how to manipulate, do things. To maintain (make sure) compatibility between computers most manufacturers have developed ROM BIOS chips of their own that is configured into all PC Compatibles.

**Embedded Systems, Firmware**

A special, customised, class of operating systems, applications are the "embedded systems," sometimes called firmware, or "*chip-based*" operating systems.

Embedded Systems are services, or specific functions, whose instructions have been fixed into the hardware.

Laserprinters are an example of devices having embedded instructions burned into the chips. For a laserprinter, durability is critical. The operating instructions (programming code for creating the printed page) is less complicated and uses less space than a general purpose operating system such as MS-DOS or Windows 95. The use of embedded systems, for laser printers, by placing the instructions into a chip is more effective than supplying each printer with a hard-disk.

Nintendo, Sega, Playstation game machines have operating systems built into the chips for durability and speed. The game cartridges have the game program embedded onto the chips in the cartridge so the cartridge is more durable than floppy disks, CDs, and Hard-Disks used with PCs.

Some typewriter word-processors have the word-processing application built into the typewriter.

But even MS-DOS has been included in some equipment as embedded systems. In the early days of notebooks, the hard disk was a very prized (expensive) resource, so Toshiba released a few notebook models where MS-DOS was **not** on the hard disk placed in the computer ROM. A few experimental sewing machines in the early nineties built MS-DOS into the sewing machine ROM.

Today, complex operating systems running on PC Compatibles only use the ROM BIOS for the initial instructions on starting the computer and then replaces the BIOS instructions for controlling the hardware with software instructions loaded from the secondary storage (hard disk). Operating Systems with this independent style of thinking include NetWare 4.x, Unix, Linux, Windows NT, Windows 98, OS/2. Operating Systems that still depend of the BIOS instructions include MS-DOS, DR-DOS, Windows 3.x.

In the 1980's and early 1990's the most dominant operating system for microcomputers has been MS-DOS, written specifically for the most dominant microcomputer hardware design. Subsequently, the more dominant products in the other software categories all run on MS-DOS.

In 1995 Microsoft released an update to its Windows operating system, making it independent of MS-DOS and called it Microsoft Windows 95. By 1997 the majority of shipping software packages (operating system, applications, tools, etc.) have all been based on compatibility with the Microsoft Windows 95 operating system.

Mainframes and Mini computers generally run operating systems designed and sold by the manufacturer of the computer. Although there is a lot of money to be made selling applications to owners of Mainframe and Mini computers, because they generally are using it on a lot of data (and hopefully making a lot of money from the work) the high cost of owning and using a Mainframe and Mini has meant fewer applications and software is generally available for these computers than for the more popular (greater number of unit sales) of microcomputers.

MS-DOS. Microsoft Disk Operating System, written by the company called Microsoft Corporation.

Virtually all general purpose computers today depend on Operating Systems to keep hardware running efficiently and minimise the costs of developing software for the hardware platform.

## *Functions of an Operating System*

The operating system, is a system of programs that perform a variety of functions such as:

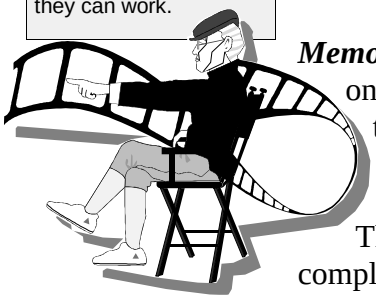
***Communicating with devices/peripherals.*** Some of the most complex tasks performed by a computer involve communicating with computer monitors, printers, disk drives, and other peripheral devices. A computer's operating system generally includes programs to handle these tasks for applications.

This is why in Windows 95/98 if we connect a new printer to the computer, or on the network, we have to configure the operating system to tell it what the new device is so it can install the software it requires to let applications print correctly to the printer.

Programs used as part of an operating system to communicate with a control device is often referred to as a 'device driver' or 'driver'. In the context of the Windows operating system, device drivers for printers are often referred to as Printer Drivers, while device drivers for Display Cards are often referred to as Display Drivers.

***File System.*** Storage devices are an important part of the continuing operation and recordings of an operating system. A key component of general purpose operating systems is the management of secondary storage devices, and the allocation of storage units (commonly referred to as files.)

Like the film-director who picks which scenes go where and who gets to act, the Operating System decides for programs what memory they can have and when they can work.



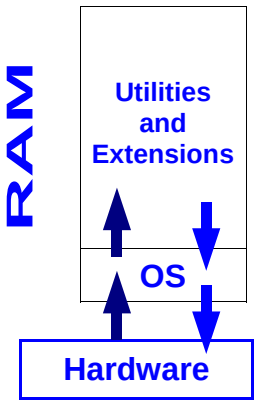
***Process Management.*** A key attribute, function, of operating systems is to organise the use of CPU time by other programs. This function includes loading the program into memory, allocating it time and then executing the instructions in the program by passing it to the CPU.

***Memory Management.*** When several software instructions are being processed, one of the tasks for the operating system is to keep track of the free space in the computer's memory and to make sure that no application task corrupts another application's memory area.

The more capable hardware and operating systems include a number of more complex tasks for the operating system to perform to maximise use of the hardware features and to increase the usefulness of the operating system for applications developers.

## *Utilities and Application Extensions (Add-ons)*

eg. PC Tools, Norton Utilities, Symantec, Acrobat Reader,
These programs are designed for users who want to maintain and enhance the functionality of their computer and other applications. Maintenance tools usually work with the operating system, and where necessary talk directly with the hardware to correct hardware problems controllable through software. Application enhancement programs (sometimes termed "add-ons") provide additional features to an application not originally included with the application or which has been "added" to the program due to computer user requests.

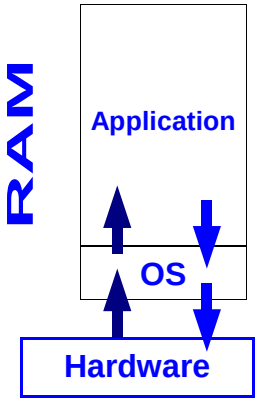



The need for tools and utilities exists because no operating system nor application can fulfil all the requirements of all users. For operating systems, the tools and utilities generally serve as tools for system maintenance and repairs not automatically handled by the operating system. For applications, the tools and utilities serve as additional features, refinements to increase productivity or enjoyment.

For example, Disk Utilities allow computer users to attempt recovery of data from diskettes that the operating system no longer reads. Disk utilities generally work by overriding the operating system's control of the Disk Drive and directly manipulating the Disk Drive to attempt to look at physical the Disk Media (floppy diskette or hard disk) to try and recreate something the operating system can read.

Applications enhancement tools, sometimes called add-ons, such as Adobe Acrobat Reader allow Internet Explorer, an application written for "browsing" or looking at World Wide Web pages, to also open files created specifically for Adobe Acrobat. In this enhancement Microsoft (the creators of Internet Explorer) are not forced to write their own software to read Acrobat files, because the Acrobat Reader works together with Internet Explorer so the computer user can read the Acrobat files while using Internet Explorer. Acrobat Reader is a functionality improvement for Internet Explorer.

### *Application Programs*




eg. Word Processing, Spreadsheets, Databases, Desktop Publishing
These programs are designed to serve a specific user function and requirement. For example, a word processor is an application program that is designed to work like an electronic paper that you can type and manipulate/move words in.

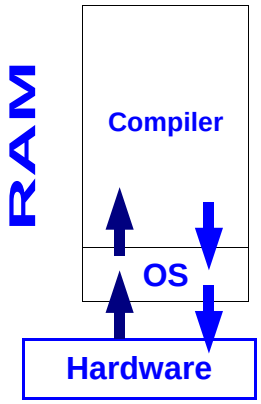
The application programs concentrate on what the computer wants to do, and use the operating system change the hardware's behaviour to get the work done. The most common application of a microcomputer is for typing, word processing.

The better application programs are those that can solve the users specific problems, and in a way that is easier for the user to use and learn.

Applications for Mainframes and Minis include Bank Account transaction programs, or Airline Reservation Systems, programs for making sure the traffic lights work in the sequence to ensure traffic flows well, minimising traffic movement delays.

### *Compilers, Programming Tools*

eg. BASIC, Turbo Pascal, Macintosh Programmer's Workshop, QBasic, C, Java




These software tools allow people to create their own programs. This may be necessary if the problem cannot be resolved by buying one of the programs already available from stores.

Today, sophisticated application programs allow users to customise and modify "program" the application to better suit unique requirements of the user. Unique requirements may include using different date formats (eg. USA date formatting is month/day/year where Tonga uses day/month/year) to changing the way the program looks to the users (eg. changing the Mario Bros character to wearing pink trousers).

The major advantage of learning how to program is not the ability to create the programs with your desired features, but to learn how to apply logic to the breakdown of problems and into clarifying instructions that even a machine can follow.

In the late 1940's, John von Neumann considered the idea of storing computer instructions and data in memory, which was accessed by a central processing unit, or CPU. The CPU would control all the functions of the computer electronically so that it would not be necessary to flip switches or pull wires to change the instruc-

tions. Now it would be possible to solve many different problems by simply typing in new instructions at the keyboard.

Programming early computers required setting different electrical switches to their On or Off positions. The first programming languages were very similar, being strings of 1's and 0's representing the status of the switches they were replacing (1 for On and 0 for Off). These languages were called Low-level languages because they made little differentiation between what the user wanted and what the computer understood.

High-level languages were created to allow people to use more human language words to describe instructions the human wanted the computer to do. FORTRAN (FORmula TRANslator) was one of the early popular computer languages to begin using English-like instructions such as READ to instruct the computer to READ information from primary or secondary storage and WRITE to instruct the computer to WRITE information out to the terminal or printer.

Popular in the 70's and 80's was COBOL (COmmon Business Oriented Language) developed by the US Department of Defence in 1959 to provide a common language for use on all computers. The principal designer of COBOL was Grace Murray Hopper, a Commodore in the US Navy at the time. Commodore Hopper was the first person to apply the term "debug" to the computer. While working on the Mark II computer in 1945, a moth flew into the circuitry, causing an electrical short which halted the computer. While removing the dead moth, she said that the program would be running again after the computer had been "debugged." Today, the process of removing errors from programs is still called debugging.

**BASIC** - Beginner's All-purpose Symbolic Instruction Code developed by John Kemeny and Tom Kurtz at Dartmouth College.

A number of new high-level languages have been developed since that time including BASIC, Ada, C, Java.

## Software Summary

Just like the hardware platform, many makers (programmers) have released all sorts of operating systems, applications, tools etc. over the years. This means that many software programs cannot talk to each other, this can cause problems for the user.

## Software Licensing Methods

There are many different methods used for distributing (selling, moving) software products (programs) from the creator to the public and licensing the program. Software programs are usually made available through retail stores on made available on online networks for users to 'grab.' Below is the description of licensing methods used to clarify the rights between the software writer and software user.

- Commercial
- Freeware
- GNU License
- Public Domain
- Shareware

Note: These definitions are generalisations, some software package licenses may have additional restrictions not described below.

### Commercial

Commercial Software licenses allow the user restricted rights to the use of the software. Users are generally given the right to use the software on as many machines as the user has paid the right for. Users are not allowed to copy or sell the software product without express permission from the software supplier.

For example, *Microsoft Office* requires the user to pay money for each different machine that will be using the software. If you install and use Microsoft Office on 10 machines, you are generally required to pay for the license to use 10 copies of Microsoft Office. The user is not allowed to copy the software for friends.

The purpose of this license is to protect the software developer's rights for compensation for the use of the software.

### GNU License

The GNU License allows the user to make changes to the software so long as these changes are also made available to others requesting the source code. Users of the software are allowed to make copies and give it away to friends. Sale of the software is restricted to fair cost of the manufacture and distribution of the medium where the software is stored.

For example, '*emacs*' is a text editor in the GNU license. People using different operating systems (Unix, Microsoft Windows, MS-DOS) have used the source code to develop different versions of emacs to work on the different operating systems and for different national languages. Emacs is usually copied from servers on the internet where the copy of the full source code for emacs is also available.

The purpose of this license is to protect the free use, modification of the software and to encourage enhancements to the software through programmers around the world having access to the source code. Other, similar, licensing methods are the GPL and CopyLeft licensing.

### Public Domain

Public Domain software are generally supplied with no restrictions on the use or copying of the program.

The purpose of Public Domain software was to supply free programs for general use, and in some cases provide examples of programming algorithms. Public Domain software has given way to GNU license style programs.

### Shareware

Shareware programs are supplied in two manners. The registered and unregistered copy of the software. The registered copy of the program is the complete program while the unregistered program will generally provide most of the features of the registered program for limited trial use by the user.

For example, Quake, is a first-person shoot-em up game available as shareware. Users can get a trial copy of Quake which does not have as many features as the 'registered' version of Quake. The trial version of Quake has fewer weapons, fewer levels, and no access to online Quake worlds. The full 'registered' version of quake allows the game player to participate in Internet Quake wars, use Quake worlds created by other programmers, has more weapons, has many more levels fo

playing games.

### *Software Distribution*

Software programs are made available on physical media, and through electronic online services.

Microcomputer software packages were initially available on floppy-diskettes but as the size of programs have grown they are now increasingly made available on CD-ROMs and even DVD. Electronic copies of many software packages can be found on the public internet and private networks.

### *Homework Review Questions*

*not assessable, use to allow students to review for themselves whether they are keeping in touch with the course.*

1 Name two Operating Systems that can be bought at the shops
2 Name two Word Processors that can be bought at the shops, and what operating system do they run on.
3 Name two Tools/Utilities that can be bought at the shops, and what task do they specialise in doing.

*Recommendation*: The topic is still very new to the class. It will be appropriate to complete the first two assignments as group assignments.

Assign one question to each group.

Divide the groups into using:
PATCO - Robert Bolouri
Moore Electronics - Lisiate
Office Equipment - Tapu Panuve

# Review Questions

1. An example of a peripheral device is
a) magnetic tape
b) the ALU
c) the control unit
d) all of the above
e) none of the above

2. Which of the following is TRUE
a) Computers need instructions in order to solve problems
b) Computers have brains
c) Computers are smarter than humans
d) all of the above
e) none of the above

3. Writing and revising a letter to your pen pal can be best done with
a) a data-base management program
b) an electronic spreadsheet
c) a word processing program
d) software
e) all of the above
f) none of the above

4. I/O devices are very "**USEFUL**" to computers. Give a reason I/O devices are useful

5. Give 2 examples of input and 4 examples of output devices

a) Input:
b) Output:

6. Give 2 examples of devices that can act as both input and output devices

7. Give two examples each of devices that can be connected to a computer via serial or parallel port. DO NOT use the same device twice.

a) Serial:
b) Parallel:

8. Some devices can also be connected to either one of these ports. Identify an example of such device.

9. Describe how MODEM are utilised in WANs

10. How are printers classified ?

11. There are two main types of printers, Impact and Non-impact. Identify one thing that they are similar in

12. Identify one difference between the two types of printers

13. Give two examples for each type of printer

a) Impact:
b) Non-Impact:

14. Each printer type has its advantages and disadvantages. Give one for each type

a) Impact:
b) Non-impact:

15. Which printer would you recommend to be used by the Tonga Chronicle and why ?

16. The computer keyboard is another peripheral that can be used by a user to communicate with the computer. The keys are grouped together based on the functions of each. For key types shown below, describe its main function:

a) Cursor control
b) Numeric key pad

17. With the help of an example, differentiate between hardware and software ?

18. What is the relationship between the system software and application software ?

19. For each of the following general purpose programs, describe their purposes.
a) Word processing
b) Desktop publishing

20. Define what an operating system is

21. Give a reason why an operating system is sometimes called the “FOUNDATION SOFT-WARE

22. Give 4 examples of operating systems used for personal computers

23. Give 4 differences between a single-user operating system and a multi-user operating system.

24. Turning a computer “ON” is referred to as “**BOOTING**”. Define what booting is ?

25. There are two methods of starting up a computer. Name and describe each of them.

a) Method:
b) Desc:

c) Method:
d) Desc:

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http://www.tongatapu.net.to/compstud/ - Computer Studies Course Notes
http://www.tongatapu.net.to - **Tonga** on the **'NET**

**Tonga** on the **'NET** is available on all networked computers at Queen Salote College and participating schools.