

CHAPTER 1

In

Focus

WPL_GC01

HEALTHY COMPUTING

Working with computers involves more than just using software and hardware. This chapter focuses on aspects that must be considered to ensure that employees' working conditions are both safe and healthy.

In this session you will:

- ✓ gain an understanding of **Work Health and Safety in Australia**
- ✓ gain an understanding of performing a computer risk assessment
- ✓ gain an understanding of what constitutes good posture
- ✓ gain an understanding of what constitutes a good computing work environment
- ✓ gain an understanding of appropriate rests and exercises
- ✓ gain an understanding of the standards and specifications associated with ergonomics
- ✓ gain an understanding of stopping and controlling influenza in the workplace.

WORK HEALTH AND SAFETY

A safe and healthy workplace is essential for successfully running any size business. Business owners have rights and responsibilities regarding the health and safety of their employees, their

customers and also the general public. In Australia the states and territories have each enacted their own **Work Health & Safety** (WHS) laws.

1 Employer Obligations

Even though each state and territory in Australia has its own WHS legislation, the laws are similar enough to ensure that all employers are obliged to provide:

- Safe premises
- Safe machinery and substances
- Safe systems of work
- Information, instruction, training and supervision
- A suitable working environment and facilities

It doesn't matter whether you sit on a chair in front of a computer in an office or descend two kilometres underground to dig coal, as an employee your health and safety is covered by WHS legislation, and heavy penalties exist for employers who fail to meet their obligations.

2 Acts, Regulations and Codes of Practice

Each state and territory in Australia has its own **WHS Act** which sets out the requirements for ensuring safe and healthy workplaces. These acts are general in nature and explain the responsibilities and duties of various people who play a role in workplace health and safety.

Some hazards in the workplace require more specific regulations or codes of practice. The various states and territories have created their own codes of practice to regulate these hazards. For example in New South Wales there is a code of practice dealing with *Cash in Transit*, another for *Collection of Domestic Waste*, and yet another for *Low Voltage Electrical Work*. These codes spell out more detailed regulations, procedures and responsibilities for dealing with specific hazards to employees, customers and the general public.

3 WHS Authorities

Each state and territory has its own authority that is responsible for enforcing the WHS laws, codes and regulations. These authorities also work with a national **Safe Work Australia** authority. Each of these authorities has its own website where you can obtain WHS information specific to the state in which you work. The authorities are listed below.

State/Territory	Authority	Website
ACT	WorkSafe ACT	www.worksafe.act.gov.au
New South Wales	WorkCover NSW	www.workcover.nsw.gov.au
Northern Territory	NT WorkSafe	www.worksafe.nt.gov.au
Queensland	WorkCover Queensland	www.workcoverqld.com.au
South Australia	SafeWork SA	www.safework.sa.gov.au
Tasmania	WorkCover Tasmania	www.workcover.tas.gov.au
Victoria	WorkSafe Victoria	www.worksafe.vic.gov.au
Western Australia	WorkSafe	www.worksafe.wa.gov.au

These authority names and website addresses were correct at the time of writing but may vary and change over time. You can use an internet search engine (such as **Google**) to find the relevant WHS authority for the state in which you work.

PERFORMING A COMPUTER RISK ASSESSMENT

To ensure that you are working safely and healthily with your computer and at your workstation you can perform a **risk assessment** to ascertain where any potential problems lie. A

risk assessment tool can simply be a checklist with questions like the ones shown below. This checklist can then be used to rectify potential problems.

1	Workstation		
	Is the desk between 68cm and 72cm high and have a top dimension larger than 115cm x 90cm?	Yes	No
	Is the workstation designed to prevent undue twisting of the neck or trunk?	Yes	No
	Can all frequently used items such as telephones and documents be placed within easy reach?	Yes	No
	Does the chair have height adjustment, backrest adjustment, lumbar support, and a 5 star castor base?	Yes	No
	Are the thighs fully supported with 2-3 finger space behind the knees when seated and with the back fully supported by the chair?	Yes	No
	Is a footstool required?	Yes	No
	Can the keyboard be placed at a height where your forearms are parallel with the floor?	Yes	No
	Can the mouse be positioned next to and at the same height as the keyboard?	Yes	No
	When sitting tall and looking straight ahead can you look at the top edge of the screen?	Yes	No
	Is a document holder available?	Yes	No
	Is the screen at approximately one arm's length away and at a comfortable reading distance?	Yes	No
	Is the image on the screen steady and free from flicker?	Yes	No
Is the screen free from glare and reflection?	Yes	No	
2	Work Environment		
	Can the level of lighting be adjustment, perhaps through the use of window blinds?	Yes	No
	Is access and egress to the workstation and work area free from obstacles?	Yes	No
	Is the area free of tripping and slipping hazards?	Yes	No
	Are adequate storage facilities available?	Yes	No
	Is ventilation, heating and cooling adequate?	Yes	No
Is the level of noise conducive to concentration?	Yes	No	
3	Work Practices		
	Can your posture be changed at least every hour, perhaps by changing the variety of tasks?	Yes	No
	Do you have control over your workload and the ability to take breaks?	Yes	No
4	Safety Equipment		
	Is a first aid kit available?	Yes	No
	Are electrical cords and connections safe (undamaged and not caught around or under equipment)?	Yes	No
	Have appropriate circuit breakers been installed in electrical circuits?	Yes	No



There are many checklists available on the internet that can be used as a source of inspiration for your own. Some of the questions on the checklist above have been adapted from a checklist published on the internet by the *University of Western Australia* and other organisations.

GOOD POSTURE AT THE WORKSTATION

The way you sit at your computer desk and work with the computer, that is your **posture**, is critical to maintaining your health and safety. Good posture is knowing how to sit properly and in

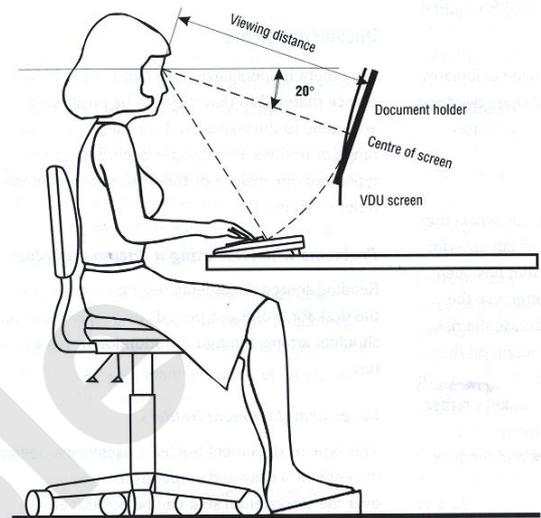
many ways is reliant upon having the correct chair, desktop and other accessories while working with the computer.

1 The Height of Your Working Surface

The height of your workstation surface and/or the height of your chair should be such that your elbows while working at the keyboard are bent at 90 degrees, with forearms parallel to the floor, your wrist straight, and your shoulders relaxed. Ideally you should have either an adjustable desk where the height can be raised or lowered or a separate and adjustable keyboard shelf.

2 Your Chair

You should adjust the tilt of your seat so that you are comfortable while working at the computer. This may be close to horizontal or titled slightly forwards. The backrest should be adjusted so that it supports your lower back when you are sitting upright. Your knees should be bent at a comfortable angle and greater than 90 degrees flexion. If this is uncomfortable or makes it difficult to reach the floor you should use an adjustable footrest.



3 Your Keyboard and Mouse

Your keyboard and mouse should be within a comfortable reach so that your upper body and spine are in a neutral working posture. Place the keyboard and the mouse far enough into the work surface to allow for forearm support, while maintaining a comfortable 90 degree bend at the elbow.

While there is some debate about the benefit or otherwise of a wrist support, a gel wrist rest can provide support of the forearm, help to produce a neutral wrist position, and can reduce contact stress with the hard surface of the desk. If you are unconvinced of the benefits of a gel wrist rest, you can at least use it as a rest when not typing.

At all costs you should try to keep the keyboard as flat as possible. Do not use the keyboard supports at the back of the keyboard to tilt it forward. A keyboard that is tilted forward puts too much strain on the wrists.

The humble mouse is actually the source of many wrist upper limb injuries. A well designed mouse should not cause undue pressure on the wrist and forearm muscles. Avoid a large and bulky mouse which can keep your wrist bent at an unnatural angle. Use a slim-line, low-profile mouse and release it regularly.

4 Your Computer Screen

You should place your screen at a distance that permits you to most easily focus on the screen. For most people this will be at about an arm's length. Recent recommendations suggest the screen should be placed between 15-50 degrees below the horizontal line of sight, and that a lower monitor height and low gaze angle helps reduce headaches and eyestrain. Generally, the screen should be at a height that allows your head and neck to be within 20 degrees of the upright position. The monitor should be tilted back so that the top is slightly farther away from the eyes than the bottom.



While the specifications above are based on standards and recommendations current at the time of writing, they are constantly under investigation and subject to change. Use the internet to research the latest recommendations and guidelines, or if possible and viable, consult with ergonomic professionals to obtain the best settings for you and your computer.

A GOOD WORKING ENVIRONMENT

In addition to setting up for good posture at your computer workstation it is important that the environment and the ambience surrounding the workstation are conducive to healthy and safe

computing. Environmental factors include such things as lighting, noise, ventilation, space and storage, equipment safety, and the like.

1 Lighting and Glare

To avoid excessive reflections and glare a computer user should not be facing an uncovered window. If a window is uncovered the workstation should be positioned at right angles to the window.

With regard to lights, a computer monitor should be positioned to the side of a light source and not underneath it. If the monitor is well away from windows and there are no other sources of bright light you should use a low level of service light of 300 lux. If the room has strongly contrasting light levels then a moderate level of lighting of 400 – 500 lux may be desirable.

2 Noise

Excess noise can be distracting to a computer user. Excessive noise around a workstation can be filtered out using portable panels and partitions, double glazing on windows, noise cancelling headphones, and the like. You can also download specialist software (such as **ChatterBlocker**) which purports to cancel out peripheral noises by placing sounds similar to the older **Muzac** played in elevators and department stores.

3 Ventilation, Heating and Cooling

A comfortable working environment leads to better concentration and therefore productivity. Computers and their peripheral devices such as printers can produce fumes and heat. It is important therefore that the workplace has adequate ventilation to prevent these fumes from causing health problems.

A comfortable level of heating and cooling, depending upon the location and season, are also important.

4 Space and Storage

Your workstation should be able to accommodate all of the items and equipment that you need to do your work. Your desk should have enough space for items such as a keyboard, mouse, document holder, telephone, pens, and other items that you would use during the normal course of your work. If you work from books or document the desk should be large enough for you to work from these without too much clutter. If your desk is not large enough to do this then you could consider having a side table for items that are not used or accessed that frequently.

5 Keyboarding from Documents

When keyboarding from documents a good document holder should be used. Touch typists should use an A4 document holder placed level with and close to one side of the screen. Non touch typists should use an A3 document holder above the keyboard and in front of the screen.

6 Computer Radiation

All computer monitors emit low levels of radiation that may affect your health. You should avoid sitting to the side or back of monitors and keep at least 1 metre away. Where possible use liquid crystal display (LCD) monitors as these emit less radiation than older style CRT monitors. If you use an older style CRT monitor use a radiation filter screen over the front of the monitor to reduce the rays emitted. Monitors should be turned off when not in use.

7 Equipment Safety

Computers are electrical devices and therefore have cabling associated with them. Cabling can present both a tripping and an electrical hazard at the workplace. All electrical devices, including computers, should be electrically tested periodically to ensure that they are safe and working correctly. Cables should not be placed where they present a tripping hazard – a good electrician will always find a way of re-routing dangerous and exposed cables.

Older style double adaptors should be avoided, as should overloading a powerboard with too many appliances. These pose significant office fire risks.

RESTS AND EXERCISE

Prevention is definitely better than cure when it comes to any form of illness or injury. Here are a number of suggestions for rest breaks and stretching exercises for you to try while working

at the computer. Make sure that you relax and perform the exercises gently. You should stop immediately if you feel any discomfort.

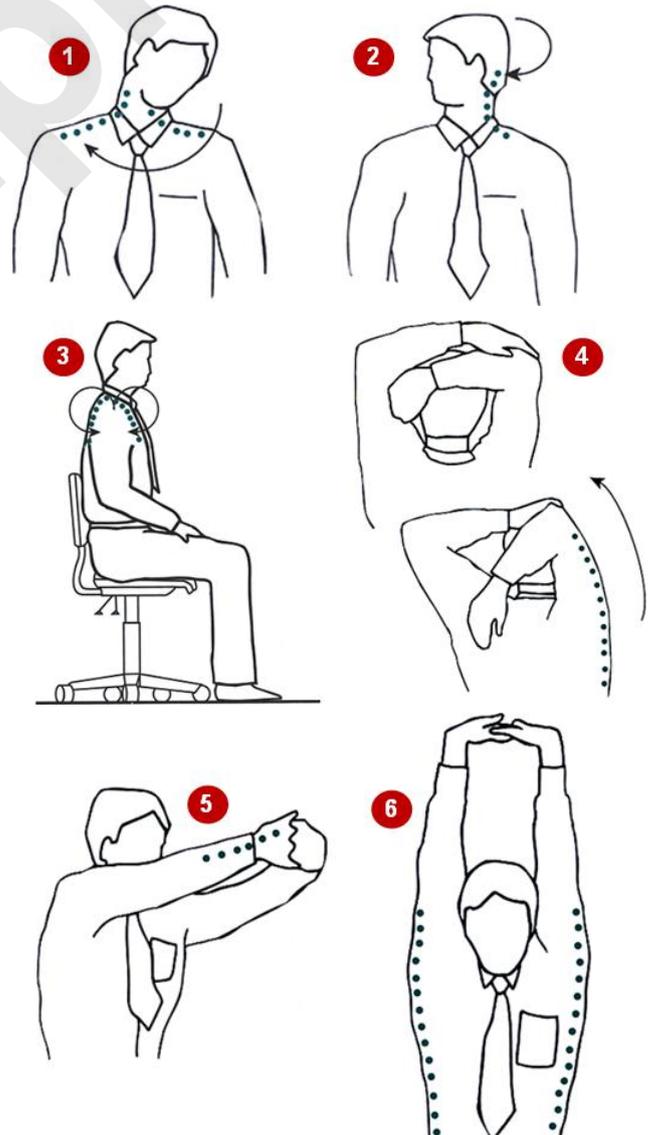
Rests and Breaks

- Take a rest break away from the computer for 5 to 10 minutes every hour.
- Active rest during a break with some other type of activity, such as walking or stretching, is more beneficial than passive rest – get up off your chair and walk to the printer to collect those print jobs!
- Vary activities where possible interspersing computer activities and tasks with non-computer activities and tasks.
- Try to limit computer time to 5 hours per day – break this time up into segments.

Some Suggested Exercises

Exercises provide a way of using those parts of your body that may become stiff or unused with prolonged computer work. These suggested exercises have been compiled from several internet sources. Exercise suggestions change regularly and you are encouraged to search the internet for the latest offerings of these. Note also that you should stop immediately if these or any other exercises cause you pain or discomfort – they are here as a suggestion only.

1.	Head Rolls	Gently lower ear to shoulder and hold for 10 seconds. Slowly roll chin to chest and up to other shoulder and hold chin for 10 seconds. Repeat several times and be careful not to extend your neck back too far.
2.	Head Turns	Turn head to look over left shoulder and hold for 10 seconds. Turn head the other way and hold for 10 seconds. Repeat several times.
3.	Shoulder Rolls	Circle shoulders forward several times, then backwards. Repeat 3 to 5 times.
4.	Shoulder Stretch	Stretch arm above head, cradle elbow with hand and gently pull elbow behind head. Hold for 10 seconds and repeat several times.
5.	Wrist Stretch	Interlace fingers, palms outwards, and straighten arms in front. Hold for 10 seconds and repeat several times.
6.	Upper and Lower Back Stretch	Interlace fingers and turn palms upward above head, straighten arms then slowly lean slightly from side to side. Repeat movement several times.



SPECIFICATIONS AND STANDARDS

WHS is a huge subject and is constantly evolving. There are many WHS sources of information related to computing especially in regard to ergonomics. Most countries around the

world recognise the importance of WHS and there are now a number of national and international standards that can help you determine how to correctly setup a workstation.

Common Specifications and Dimensions

Height of work surface (from floor)	Viewing distance to work
Fixed desk: 680mm to 720 mm	350 mm to minimum
Adjustable: 580 mm to 730 mm	750 mm to maximum
Work surface area	Height of display
Width: 1,500mm minimum	30 mm to 40 mm below eye level
Depth: 900 mm minimum	
Leg space volume	Seat pan height
Width: 800 mm minimum	Surface of seat to floor: 380 – 510 mm
Depth: 550 mm minimum	Seat pan depth: 330 – 430 mm
Height: 580 mm minimum	Footrest area: 300 – 375 mm

National Standards Pertaining to Computer Ergonomics

AS3590.1-1990 Screen-based Workstations – Visual Display Units
AS3590.2-1990 Screen-based Workstations – Workstation Furniture
AS3590.3-1990 Screen-based Workstations – Input Devices

National/International Standards Pertaining to Computer Ergonomics

AS/NZS 4438:1997 Height Adjustable Swivel Chairs
AS/NZS 4442:1997 Office desks
AS/NZS 4443:1997 Office panel systems

International Standards Pertaining to Computer Ergonomics

ISO 9241-1:1997(E) Ergonomic requirements for office work with visual display terminals
Part 1: General introduction
Part 3: Visual display requirements
Part 4: Keyboard requirements
Part 5: Workstation layout and postural requirements
Part 6: Environmental requirements
Part 7: Requirements for display with reflection

These standards are all very comprehensive and are supplied in quite large books. If you perform a search on the internet (using Google or something similar) you will easily be able to locate retailers who can provide these standards to you should you require them.

INFLUENZA IN THE WORKPLACE

Influenza, or **flu**, contributes significantly to workplace illnesses and absence. While flu is not new, recent strains of influenza, such as SARS, H5N1 (avian flu) and H1N1 (swine flu) have

caused widespread concern in the community and has prompted the government to recommend that WHS risk control measures be incorporated by businesses to cope with pandemic outbreaks.

1 Background

New strains of influenza emerge, usually in the cooler months, almost every year and effect literally tens of thousands of employees in the workplace. Some strains, however, are more severe than others and may reach pandemic stage. A pandemic occurs when a new subtype of influenza emerges that can spread easily between humans and is capable of causing severe disease. According to **Comcare**:

"It is anticipated that up to 25% of the population could become infected and ill during the course of a pandemic. Some people will die and it is estimated that with an infection rate of 25% there could be between 13,000 to 44,000 deaths in Australia."¹

It is important in periods of heightened risk that preventative measures designed to reduce the spread of influenza be undertaken in the workplace.

2 Responsibility of Employers and Employees

Under the *WHS Act* employers must take all reasonably practical steps to protect the health and safety of their employees during an influenza pandemic which is relatively foreseeable. Employees must co-operate with their employer in implementing the appropriate control measures.

3 How Infections Are Transmitted

Infections general occur through:

- **Contact** – including direct person to person contact (handshaking, touching, kissing, etc), touching contaminated surfaces, or from handling infected materials. Generally a virus will survive several hours on common surfaces.
- **Airborne droplets** – generally transmitted through the air by coughing and sneezing.
- **Aerosol transmission** – through air-conditioning concentrations of the virus suspended in moisture or dust particles.

4 Managing the Direct Risks of Infection

Comcare recommends a number of ways of managing the direct risk of infection, including:

Social distancing	Allowing only essential staff to attend work; using alternative work options such as working from home; prohibiting handshaking, kissing, and touching in the workplace; replacing meetings with electronic communications such as video conferencing; closing or reducing service counters
Hygiene	Undertaking additional cleaning of the workplace and especially equipment handled by a number of people; encouraging personal hygiene such as regular and thorough hand washing, covering of the face when coughing and sneezing, disposal of tissues; wearing of surgical masks by employees who develop symptoms
Controlled entry	Imposing an exclusion period and restricting the entry to the workplace by persons who may have influenza or who may be at risk of contracting it
Managing illness	Isolating staff who become ill at work and ensuring that they can safely be sent or taken home (avoiding public transport); cleaning of the employees work area once they have left.

1. *OHS Preparedness for an Influenza Pandemic: A Guide for Employers* (published September 2006); Australian Government, Comcare

CHAPTER 2

In

Focus

WPL_GC20

COMPUTERS

Computers come in all sorts of shapes and sizes and with vastly dissimilar price tags and performance abilities. And as a result, different types of computers have different uses.

In this session you will:

- ✓ gain an overview of information technology
- ✓ gain an understanding of the different types of computers
- ✓ gain an understanding of the two main types of personal computers
- ✓ gain an overview of how the different types of computers are used
- ✓ gain an overview of computer performance.

INFORMATION TECHNOLOGY AND COMPUTERS

Information technology basically involves the use of equipment and techniques to handle and process information. The term is used more specifically to refer to electronic communications

and the use of computing which have really allowed the easy dissemination of information to enter virtually every aspect of daily life.

Information Technology

Since information technology is primarily concerned with communications, the earliest forms of information technology included the use of ochres and dyes to create cave paintings, the use of an abacus to perform calculations, and later, a printing press to disseminate information.

It is believed the term **information technology** itself was first coined in the 1970s to refer to the advances in electronic technology that burgeoned at the time. Today, it incorporates a wide spectrum of technology including communications, broadcasting, consumer electronics and computing.

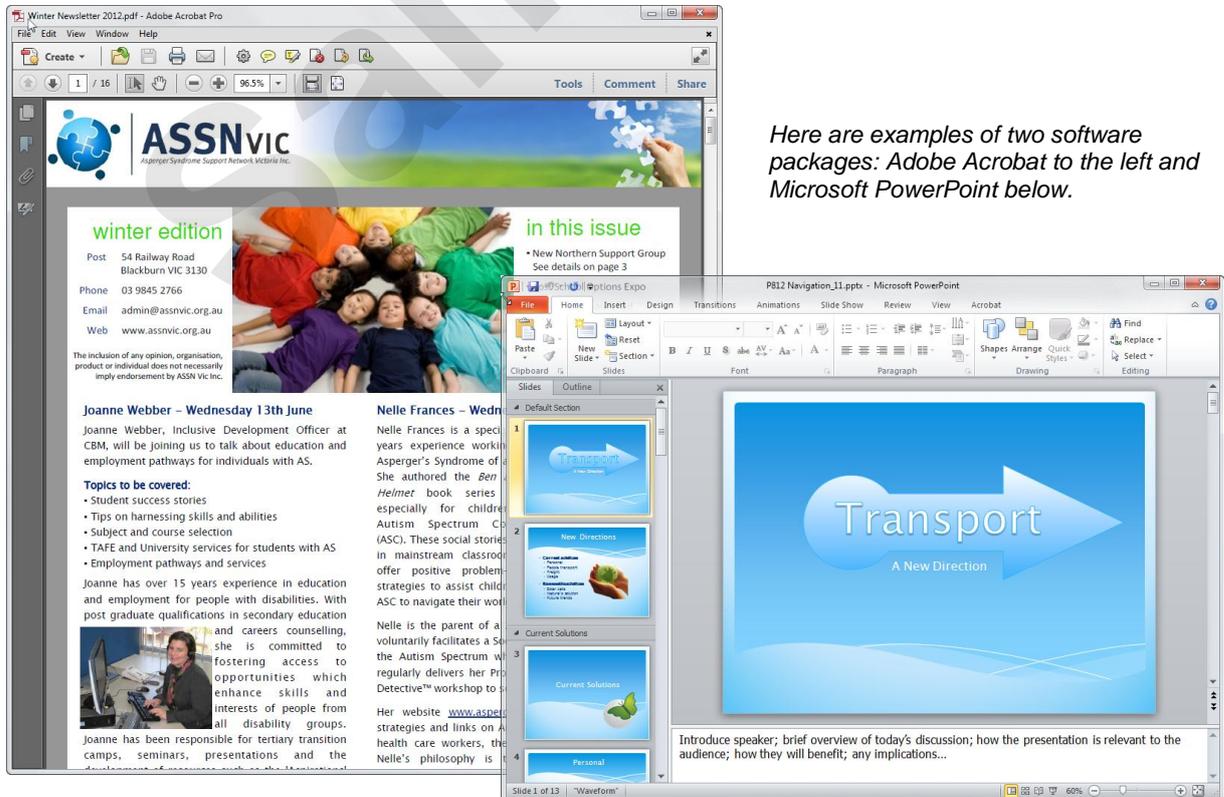
At the heart of the **information technology revolution**, as it has been called, are computers.

Hardware and Software

A computer is made up of two components: the **hardware** and the **software**.

The hardware refers to the physical components of the computer including the monitor (the screen), the computer cabinet, the various peripheral devices such as the keyboard and mouse, and even the printer that is used to print information. In general terms, hardware means all of the electrical and electronic components of the computer together with the cabinets, boxes, or shells, in which they are housed.

The software refers to the instructions (also known as programs) that make the computer work. Basically, it is the software that tells the computer what to do and how to do it.



Here are examples of two software packages: Adobe Acrobat to the left and Microsoft PowerPoint below.

In very general terms, **hardware** refers to the tangible aspects of the computer (the case, the mouse, the keyboard, and so on), while **software** refers to the intangible elements of the computer such as the processing instructions.

TYPES OF COMPUTERS

Modern, electronic computers have been in commercial use since the mid-1960s. There are many different types of computer ranging from very large and powerful mainframe computers

through to very small and personal hand held computers, such as smartphones which are built on a mobile computing platform. The more common types of computers are detailed below.

Mainframe Computers

Mainframe computers are high performance computers used for large scale computing purposes that require greater availability and security than smaller scale computers can offer. They are normally used by large organisations for processing enormous amounts of information and data.

Mainframe computers consist of a central processing unit, which is usually housed in a highly secure part of a building, and a number of dumb terminals sprinkled around the organisation. A dumb terminal consists of a keyboard to input data and a screen to see the information. Dumb terminals, however, do not have any processing capabilities and all of the input is sent via cables to the central processing unit. A typical example is seen at the check-in counters at an airport – there may be dozens of dumb terminals all connected to the mainframe computer that handles the processing of tickets and flight information.

A mainframe computer may have thousands of dumb terminals connected to it.

Personal Computers

Personal computers are the complete opposite of mainframe computers. They were developed in the late 1970s to help alleviate the pressure that users were placing on mainframe computers.

Personal computers are used by an individual (hence the name personal) and differ from mainframe computers in that they have their own central processing unit. Unlike mainframe computers, where dumb terminals are connected to a remote central processing unit, with a personal computer the terminal and central processing unit are combined into the one installation. Instead of having many users at dumb terminals trying to access one (albeit very large) central processing unit, each personal computer has its own central processing unit handling data requests from only one user.

Network Computers

Network computers are usually personal computers that are connected to other computers. While personal computers offer personal freedom and independence from large mainframe computers, it is often important for users of personal computers to share data and information with other people. To allow this to happen, personal computers can be networked or joined together. This is normally done using either cables running between the computers or with wireless technology where no cables are necessary.

Laptop Computers

Laptop computers are personal computers that are portable and can be moved to and operated in many different locations. Laptop computers can be seen everywhere, from desks, to airport lounges, to cars and buses. Laptop computers usually integrate the main components of a computer (the central processing unit, screen and keyboard) into a single fold-up case. They are powered by a battery that can be connected to a charger when mains electricity is available. When the charger is connected the laptop actually uses mains power while the battery is being charged.

Laptop computers are paradoxically getting smaller, yet becoming more powerful as time progresses. Today's laptops are often much more powerful than the mainframe computers of the 1960s, yet they will fit into a briefcase and can be taken to virtually any destination on earth.

Like personal computers, laptops can be connected or **networked** to other computers.

Tablet Computers

A tablet computer (also known simply as a tablet) is a mobile computer that comprises a flat touch screen. The screen allows users to navigate easily and intuitively by touching the screen, and to type using the virtual keyboard on the screen rather than having to use a physical keyboard.

TYPES OF PERSONAL COMPUTERS

The main difference between a personal computer and a mainframe computer is that the personal computer is self-contained and includes its own keyboard, monitor and systems unit.

There are many different types of personal computers on the market today, but they generally fall into two categories: **notebook** and **desktop**.

Desktop Computers

As the name suggests a **desktop personal computer** is designed to sit on a desk in an office. The desktop computer normally has three physical components: a screen (also known as a monitor), a keyboard and the systems unit (a squarish box that houses the processing and storage components of the computer).

The standard desktop computer normally has the monitor sitting on the desk. It may sit on top of the systems unit or the systems unit may be turned on its end and placed on the floor butting up to the inside of a desk.



Notebook Computers

Notebook personal computers, or **laptop** computers, are a form of portable personal computers.

With notebook computers the systems unit, monitor, keyboard and mouse are combined into one unit for compactness and ease of transport. They are preferred by people who need to do their computing work in a number of places: at an office, in a car or caravan, on the plane, at home, and even in coffee shops and restaurants.

Notebook computers are battery powered so that they can be run away from a power point source for several hours depending upon the type of work they are doing.



Which Should You Buy?

The answer to this lies in how much you've got to spend, what you intend to use the computer for, and where you intend to use it.

If you want to use your computer in a number of different locations then you will most likely need to purchase a notebook computer because it is fiddly to constantly dismantle then reassemble a desktop computer.

However, notebook computers are more expensive both in the initial purchase and if you have to have it repaired at a later time.

Many desktop components are interchangeable with most manufacturers sharing common components. So if one part fails or perhaps needs to be updated to a larger capacity, then parts are more readily obtainable and cheaper.