CHAPTER 1 PERSONAL COMPUTERS

INFOCUS

Since the first serious business personal computer was released by IBM in August 1981 they have become a standard feature in work places, schools and homes.

The computer landscape has changed dramatically since those early days. Personal computers now come in many shapes, sizes and types, but they all have some aspects in common. For example, they all comprise hardware items and are operated using software.

This session explores personal computers and the technology behind them.

In this session you will:

- ✓ gain an understanding of some of the more basic concepts of computers
- ✓ gain an understanding of the differences between hardware and software
- ✓ gain an understanding of the history of personal computers
- ✓ gain an understanding of the different types of personal computers
- ✓ gain an overview of the main parts of a personal computer
- ✓ gain an understanding of a range of input devices
- ✓ learn how to identify output devices used on the computer
- ✓ gain an understanding of how external devices are connected
- ✓ gain an understanding of communications technology in the office.

WHAT IS A COMPUTER?

A *computer* is nothing more than a box of wires and electronic components. These components interact together so that by using special sets of instructions, known as *programs* or *software*, the computer allows you to type letters, draw pictures, communicate with other people, enhance photos, watch movies, listen to music and much, much more.

Understanding Computers

In simple terms a computer is an electronic device that allows you to *process* and *store* data.

Data is entered into a computer using a variety of *hardware* devices, known as *input devices*, such as a keyboard, mouse, touchpad, scanner, and digital camera.

Once the data has been entered into the computer it can be *processed* by the appropriate *software* to provide relevant, timely and quality information.

The processed data can be delivered to the user on a variety of hardware devices, known as *output devices*, such as a screen (monitor), printer and speakers.

In this sense a computer is similar to a hand-held calculator. With the calculator you enter numbers using the keyboard and perform a mathematical operation. The result of the operation is displayed on the calculator's screen.

A computer differs from a calculator, however, in that it can process other types of data as well as numbers. A computer also differs from a calculator because it allows you to *store* the raw data, the processed information, and even the processing instructions, for future use. As soon as you switch off a calculator, all of the data that you entered and the information that it has processed is lost. A computer allows you to *save* the data and the processes so that they can be used again later.
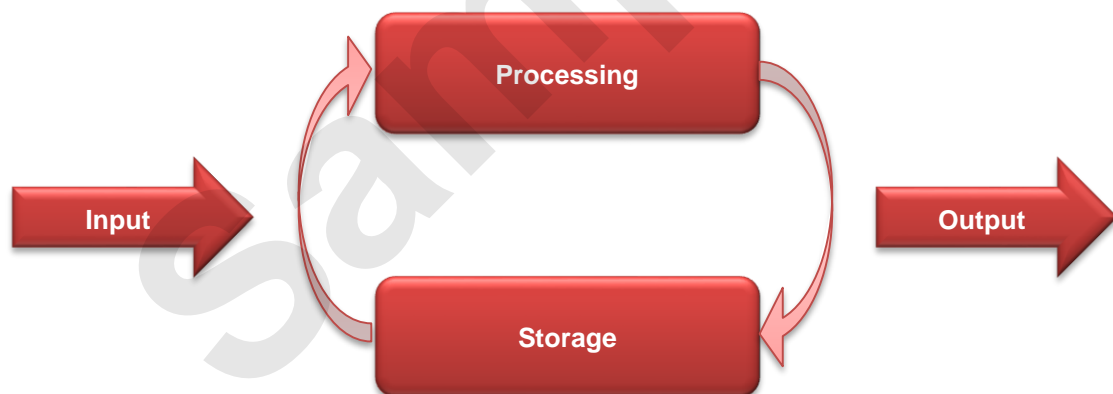
HARDWARE AND SOFTWARE

A computer is an electronic device. In very general terms, *hardware* refers to the physical components of the computer that you can see and touch, such as the case, mouse, keyboard and so on. *Software*, on the other hand, refers to the sets of instructions (or programs) that tell the computer what to do.

Hardware

The *hardware* refers to the physical components of the computer including the monitor (or screen), the computer cabinet, the various peripheral devices, and the printer 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 monitor displays work that you do with your computer on a screen

The systems unit is the main component of hardware and contains most of the electronics

The keyboard allows you to type into your computer and to interact with it

The mouse allows you to select tools and commands from menus of options and to interact with items on the screen

Software

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

Software is categorised as either an *operating system* or an *application*.

Operating system software is what makes the computer start up and is what you see when you first start your computer. It handles the boring jobs such as allowing you to connect devices, print data, and the like.

Application software gets the job done for you if you want to write a letter, create an email, modify digital photos, and so on.
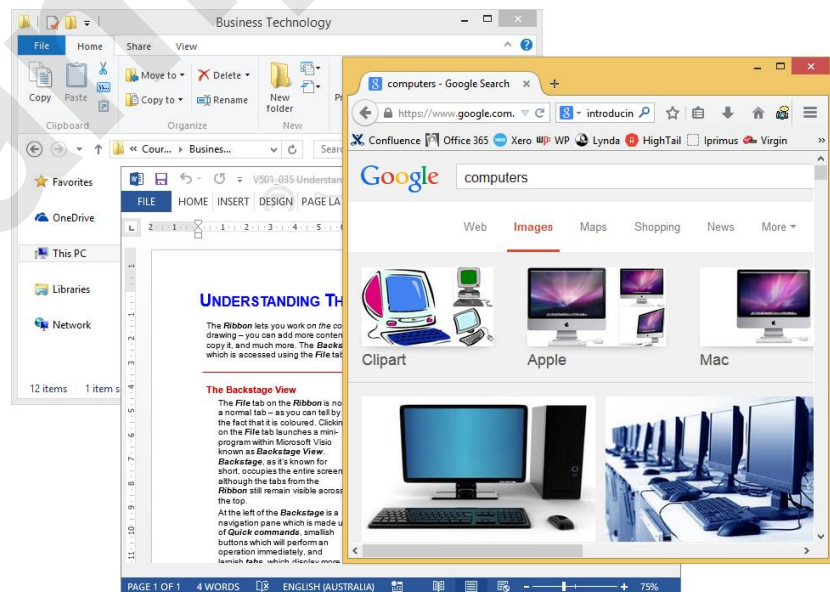
PERSONAL COMPUTERS

Personal computers took off in the business world in the early 1980s when IBM released the first IBM PC (*PC* is an acronym for *personal computer*). Personal computers became popular largely as a reaction to the high costs associated with mainframe and midrange (or mini) computers. Personal computers have permeated virtually all aspects of business, education and the home.

The Development Of The Personal Computer

In the late1970s the interest in computing by the general business community started to increase. In those days computers were large, specialised items of equipment known as mainframe or mini-computers. But while the computers themselves remained the domain of the engineers and technicians, the software used on those computers became easier for non-computing people to use. This was especially the case in finance and engineering.

As a consequence these mainframes and mini-computers started to become overloaded and overworked. The only alternative lay in developing smaller, more personal computers that users could have on their desk and that would alleviate the pressures being placed on the bigger computers.

In 1981 IBM released the **IBM Personal Computer** (**PC**), the first of a new breed of specialised computers developed originally for the business community. The IBM PC differed from mainframe and mini-computers in the fact that it had its own **central processing unit**. Unlike mainframe and mini-computers, where dumb terminals (screens) are connected to a remote central processing unit, with a personal computer the terminal and the central processing unit are combined in the one installation – hence the name, *personal* computer. Instead of having many users at screens trying to access one (albeit very large) central processing unit, each personal computer has its own central processing unit handling data requests from just the one user.

The IBM PC was so successful that it spawned an entirely new computer industry. Today personal computers are in every workplace. In an office they are used for budgeting, accounting, letter writing, developing marketing materials, keeping contact with customers and suppliers, doing small-scale inventories, and much more.

The pace of change with personal computers is frenetic. Computers (note that the word *personal* has largely been dropped from their name) don't really deteriorate or wear out – they usually become out-dated as our expectations of what we want out of a computer change.

TYPES OF PERSONAL COMPUTERS

There are many different types of personal computers on the market today, but they generally fall into one of two categories: *fixed* devices, such as desktop computers and game consoles, and *mobile computers*, such as laptops and netbook computers, tablets, smartphones, and programmable calculators.

Desktop Computers

As the name suggests a ***desktop computer*** is designed to sit on a desk. The desktop computer comprises several components.

The ***system unit*** (the rectangular box which houses the processing and storage components of the computer) can sit either on top of the desk or be turned on its end and placed on the floor butting up to the inside of a desk.

Other components, such as the ***monitor*** (screen), ***mouse*** and ***keyboard***, connect to the system unit.

Desktop computers are still popular because it is easy to customise them, replace parts and fix them with much more ease than you can a laptop. It is also more convenient to be able to connect peripherals like screens and keyboard and computer mice that fit your needs.

Laptop Computers

Laptop computers are portable computers.

With laptops, 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, on a plane, at home, and even in coffee shops and restaurants.

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

Tablet Computers

Tablet computers are a relatively new innovation made very popular by the introduction of the Apple iPad. Tablets are a hand-held device roughly the size of a small magazine. Like laptops, they contain all components in the one case; however, unlike laptops, tablets have a touch screen which replaces the physical keyboard.

Smartphones

Smartphones are mobile phones with an operating system. In other words, they are small portable computers. Along with a touchscreen, smartphones include common computer applications such as an internet browser, databases, multimedia, calendar, navigation programs and so on. As the popularity of larger mobile phones increases, users are relying on their phones for consuming media rather than simply making phone calls.

THE MAIN PARTS OF A PERSONAL COMPUTER

A personal computer is normally made up of three main components: the **monitor**, the **keyboard** and the **system unit**. The keyboard is used to input data (it is known as an **input** device). The monitor is used to display information that has been processed (it is known as an **output** device). Most computers also have another input device known as a **mouse**.

Monitor

Keyboard

Systems Unit

Mouse

The System Unit

The **system unit** is the *brain* of the computer. Here data and instructions received from input devices are processed and then sent to output devices for display. The system unit has a number of core and critical components under the hood as described in the following table.

Component	Category	Function
CPU	Processing	The **Central Processing Unit** (CPU) is an integrated circuit that is plugged into the main electronic board inside the system unit. Its job is to direct all of the activities within the computer and is where the processing of data takes place. The CPU acts as the 'brain' of your computer. Personal computers are often classified according to the type and speed of the processor they have fitted.
Hard disk	Storage	The hard disk is used to store data and information so that it can be used again at a later time.
RAM	Storage	**Random Access Memory** (RAM) is a temporary storage area for data awaiting processing by the CPU while the computer is switched on. The data stored in the RAM is erased when the computer is turned off.
DVD drive	Storage	The **DVD drive** on the computer is much the same as the DVD you use at home for playing movies. Large programs (especially games) are available on DVD and the DVD drive is normally used to load those programs onto the computer. The DVD drive can also be used to play your audio CDs on the computer and to play movies – providing you have the right software and sound card. Most of the DVD drives can also create (or *write* as it is known) DVD disks – this is known as *burning* a disk.
USB port	Storage or device connection	Another important part of a computer are the **USB** (Universal Serial Bus) **ports**. In computer jargon a port means a connecting socket. Most computers will have several of these ports because they can be used to do a number of different jobs, sometimes simultaneously. USB ports, for example, can be used to connect a mouse to your computer. They can also be used to connect a temporary storage device known as a *USB Stick* or *Memory Stick* to the computer so that you can copy data from the computer to it for safe keeping.

Peripheral Devices

There are a number of other devices that can be attached to a personal computer. These include devices such as printers, scanners for scanning in pictures, digital cameras, joysticks for playing games, and more. These devices are normally attached to special plugs at the back of the computer. Since they are peripheral to the main operation of the computer, they are sometimes known as **peripheral** devices.

INPUT DEVICES

An ***input device*** is a peripheral device that allows you to input data into a computer. To do this, an input device converts the incoming data and instructions into a pattern of electrical signals in code that are comprehensible to a digital computer. While the keyboard was originally the main means by which we would ***input data***, today there are a number of devices that can be used.

Keyboard

The most traditional and probably the most widely used input device is the ***keyboard***. Virtually every computer will have a keyboard. To enter data via a keyboard, you press a button on the keyboard. Keyboard buttons (*keys*) correspond with letters of the alphabet, numbers and various other specific functions.

Mouse

A ***mouse*** is used to point at something on the screen and then click with the mouse button to select it – hence, this is often referred to as a *point and click* device.

Touchscreen

A ***touchscreen*** is an electronic visual display that you can control by the use of simple or multi-touch gestures. You can touch the screen using a special stylus (pen) or with one or more fingers, as shown to the left. You can use the touchscreen to react directly with what is displayed, rather than using a mouse or touchpad.

Scanner

An ***image scanner*** is a device that optically scans images, printed text and handwritten text and converts it to a digital image.

There is more than one type of scanner. For example, a ***barcode scanner*** is an electronic device that reads printed barcodes, such as the ones seen on products that are scanned when you purchase them at a supermarket.

Digital Camera

A ***digital camera*** is a camera that digitises images and videos and stores them for later reproduction. You can use the digital camera to input photos and videos directly onto a computer for viewing, editing and sharing.

Microphone

Microphones are used to input voice and sounds that can be stored in the computer and played back as required. Increasingly they can also be used to issue voice instructions to a computer instead of typing at a keyboard. Microphones are also important when communicating to other people over the internet. These days many computers have microphones built into them.

OUTPUT DEVICES

Output devices are used by the computer to display information that has been processed by the CPU. To do this, they translate digitised signals into a form that is intelligible to users.

Output devices vary enormously, perhaps even more so than input devices. The most common output devices are the *screen* (known as the *monitor*) and the *printer*.

Monitors

Monitors (also known as *visual display units*) allow you to see the information that you have entered into your computer. Computer screens display images and text using dots (referred to as pixels). The number of dots that can be displayed is the screen resolution – the more dots, the better the resolution. The processing of the dots can also be boosted through additional chips placed on special graphics cards which are installed in the computer. In addition, the sophistication of computer monitors has progressed to the point where very high resolution is available. But like everything, the better the resolution the more you should expect to pay.

Virtually all computers have a monitor of some sort. Some monitors are separate items of hardware, while others are built into the computer (as is the case with laptop and hand-held computers). Monitors allow data and information to be presented immediately to the user.

Monitors come in many sizes and varieties and the one you choose will depend on what you are planning on doing with it. If you write papers or create presentations, a standard *LCD* (Liquid Crystal Display) or *LED* (Light Emitting Diode) monitor would be perfect. If you play games with intensive graphics, make videos or work with digital photographs or art, you will require a high-definition monitor. If you want to use a computer as your home entertainment system as well, you can get a monitor that is TV-ready. The final type of monitor you can choose from is a touchscreen.

Printers

Printers are used to create a tangible product to look at away from a monitor. For consumer use there are two kinds to choose from: the *inkjet* and the *laser printer*.

Inkjet printers are commonly used with home computers because they are relatively cheap to purchase – they are also great for photo printing. They actually squirt ink onto the paper through tiny nozzles in the print head. They are extremely quiet and reasonably fast. There is also a misconception that these printers are the cheapest of all – because of their purchase price. While they are relatively cheap units to purchase, the need to constantly replace the print cartridges means that they can be expensive to operate. Inkjets are best used as local, single user printers in a small business or at home. They are too expensive for heavy use.

Laser printers are the real workhorses of computer printing. They are fast, extremely quiet and relatively affordable to operate. However, laser printers can be the most expensive to purchase. Often they are heavy units and will also emit heat, gases and fumes when used extensively.

Both inkjet and laser printers are available as *multifunction printers*. These printers typically allow you to print, photocopy and scan documents into the computer (some also allow you to fax documents as well). If you have a small office where all of these features are required, then this type of printer will be ideal.

Speakers

Most computers include basic built-in speakers which typically produce low-quality sound. If you want to hear music or movies with a higher quality sound, you can attach *computer speakers* or *multimedia speakers* to your computer which will disable the computer's built-in speaker.

You can also connect your computer to an existing stereo system or surround-sound system to yield better results than small low-cost computer speakers.

DEVICE CONNECTIONS

The devices used by your computer all have connections that must be functioning for the devices to work. Connectivity is made either through cables (a **physical** connection) or **wirelessly**. With physical connections where cables are involved, you can easily check to ensure that the device is properly connected by examining the cable and the plug at either end.

Understanding Cable Connections

In the past, connecting peripheral devices such as keyboards, printers, monitors and the like could sometimes become a bit of a nightmare. Each device, and sometimes each manufacturer, had their own special type of plug which required a compatible socket somewhere on the computer. Not only that, but each device had to have special software (known as a **device driver**) installed on the computer to make sure that the computer would communicate properly with the device.

These days, most external devices use a **Universal Serial Bus** (*USB*) style of plug for connecting to the computer. Printers, mice and keyboards, digital cameras, external hard disk drives, and so on, all now basically use a standard *USB* cable with a *USB* plug for connecting to a computer. Indeed, so prolific is this style of connection that most modern computers have several *USB* sockets allowing you to connect many different devices at the same time. You can even purchase special **hubs** which add extra *USB* sockets to your computer.

All of these devices still require software to be installed for the device to work properly. However, USB sockets in a computer are '*hot wired'* meaning that the computer will automatically detect when you have plugged in a new device and will attempt to find and install the appropriate software without any assistance from you – all you need to do is to be a little patient while this is going on.

USB ports: USB 2.0 to the left and USB 3.0 to the right (notice the slightly different logos above each). The major difference between the two USB ports is that USB 3.0 provides better speed and more efficient power management than the USB 2.0 port.
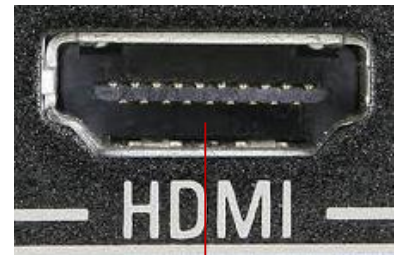
HDMI port

Other common devices that defy this rule are external monitors (which typically use an **HDMI** cable/port) and headphones and speakers (which both typically use 3.5 mm sockets).

Troubleshooting Cabled Connections

If your external device is not working check first to see whether the cable is properly inserted into the correct socket on the computer. When you pull the plug out of the computer, the computer (if it is currently switched on) will make a sound – conversely a sound will also be made when the plug is inserted into the computer. To check whether a device is properly inserted simply pull the plug out, wait a few moments, and then re-insert it.

Wireless Devices

Wireless devices, such as many printers and routers, are a little trickier to set up and therefore also to troubleshoot. There is no cable as such and a bit of fiddly work is involved to get these devices set up in the first place. If you have a wireless device that is not working properly, it may be wise to contact your IT department at work, ask a friend or search the internet.

OFFICE TECHNOLOGY COMMUNICATIONS

The effective use of our computers is inextricably tied to being able to communicate with others using them. The *internet*, email and the ability to move files between different personal computers within a building or country are all examples of how we employ communications technology in ways that make our computers more useful and our communications easier and more effective.

Computer Network

A *computer network* is simply several computers that are joined together so that communication in the form of emails, data transfers, and even text messaging can be performed between them.

A network can be simply a group of computers within an office or a building. However, networks can also be connected to other networks forming what has become known as the *World Wide Web*.

Router

A *router* is the device that connects computers on a network. The job of the router is to intercept data from the sender computer and then route it to the computer that it is addressed for. It's a bit like a post office – data comes in and is then sent to the correct destination.

In the past a router was wired into a computer network, but nowadays there are more wireless routers available where no cabling is required.

Modem

A Modem is the break-out device that allows one computer to connect to another, or one network to connect to another using telephone or other communications lines. The telephone line at the present time is the easiest form of cabling to use simply because it is there. However, many governments in many countries are setting up more high-tech cabling and infrastructure to make this interconnectivity much faster and more reliable.

Modems translate your computer data into a format so that it can be transmitted via the communications network. Modems are a necessary piece of equipment if you wish to connect to the *internet*.

Modems are also used at home where several computers may be connected via a router to form a network. In this scenario the modem is plugged into the router so that any computer on the network can have access to the Internet from the one place.

Connecting To The Internet

Everybody wants to be connected to the internet because the internet is simply the most radical and prolific tool available today for communicating with other people – you can visit their websites, send them emails, argue, associate or otherwise engage with them in forums, and see what they are doing on social networking sites such as *Facebook* and *Twitter*.

In the early days of computing the only way to connect to the internet was by using existing telephone lines in a process known as dial-up. Dial-up is still available today but only for emergency use and where no alternative is available. Dial-up is very slow and costly.

These days, most people access the internet using a broadband internet connection, which is a high-speed internet connection. Broadband internet is available in Australia using ADSL(*Asymmetric digital subscriber line*), cable, fibre, satellite and wireless technology, where the most common form of residential broadband is ADSL which uses existing copper telephone lines.

STARTING OFF WITH WINDOWS 8.1

An ***operating system*** provides a range of tools, programs and resources that help you and your computer to work together. It provides the ***interface*** between what your computer can do and your data.

Betting heavily on a huge increase in the use of touch devices, Microsoft released ***Windows 8*** in October 2012. This introduced a brand new approach to Windows which brought touch to the forefront, rather than the more traditional mouse/keyboard combination.

However, responding to vastly negative customer feedback, Microsoft released ***Windows 8.1*** less than a year later which enables users to easily navigate and use the interface regardless of whether they're using a touch or mouse device.

In this session you will:

- ✓ gain an understanding of the some of the new features in ***Windows 8***.1
- ✓ learn how to turn on the computer
- ✓ learn how to sign in to ***Windows***
- ✓ gain an understanding of the desktop in ***Windows***
- ✓ gain an understanding of the ***Start Screen***
- ✓ gain an understanding of the ***Apps View***
- ✓ gain an understanding of the taskbar
- ✓ gain an understanding of the ***App Switcher***
- ✓ gain an understanding of ***App Bars***
- ✓ gain an understanding of the ***Charms Bar***
- ✓ learn how to display key user interface elements
- ✓ learn how to put your computer to sleep
- ✓ learn how to shut down your computer.

WHAT IS WINDOWS?

Windows is an ***operating system*** that provides an intuitive, secure interface for you and your computer. If you purchase a new PC, it will have Windows 8.1 installed. Compared to earlier versions, Windows 8.1 provides not only new tools to help you easily manage your files, devices and information sharing, but it also comes complete with a new touch-friendly Start screen and apps.

User Interfaces: Start screen and the Desktop

For those of you who have been using computers for a while, the new brightly coloured Windows 8.1 user interface, known as the ***Start*** screen (as shown below to the left), may come as a bit of a shock. Microsoft took a different approach when it designed Windows 8 (and now 8.1) compared to its previous operating systems. Instead of designing it for a desktop or laptop – which are predominantly controlled by a mouse – Windows 8 was designed primarily for a touchscreen, resulting in the big 'tappable' tiles seen on the ***Start*** screen. These tiles are used to access programs (like Microsoft Word) and Windows 8 apps.

One of the default tiles on the ***Start*** screen provides access to the traditional ***Desktop*** user interface (as shown below to the right) which users of previous versions of Windows will recognise. Here you can create shortcuts to and access desktop programs.

You can determine user interface will display when you start your computer. However, by default, touch devices, such as a tablet, will boot up to the ***Start*** screen, while desktop computers or laptops that are designed for mouse and keyboard use will boot up to the ***Desktop*** user interface.
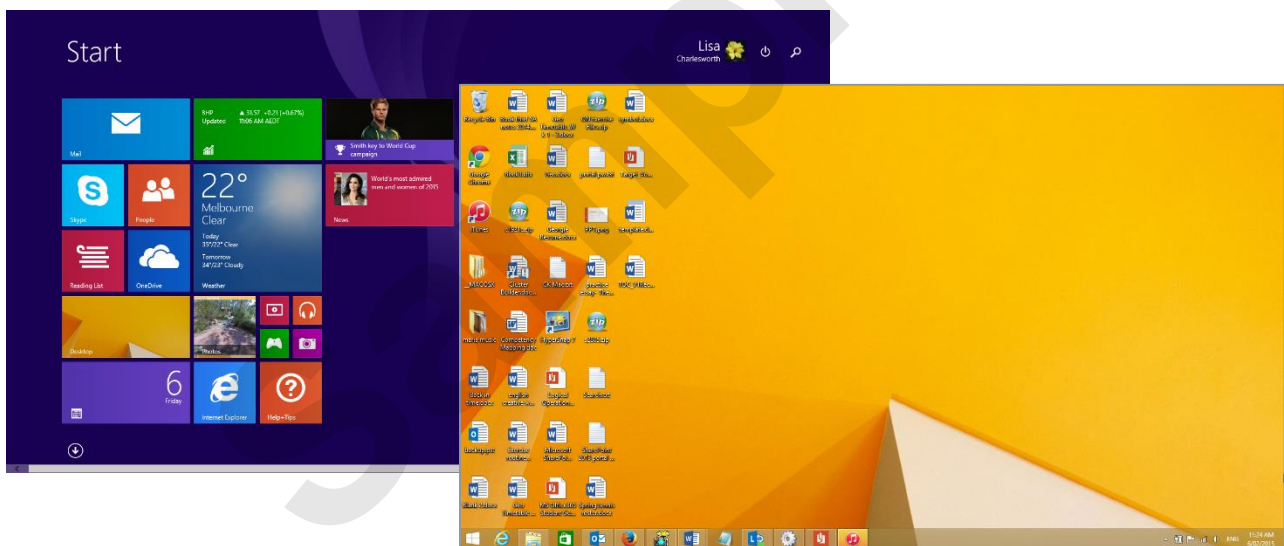
Better backup and restore facilities

The new ***File History*** enables you to automatically back up versions of your personal, desktop and offline OneDrive files, creating a complete history of your files over time. You can also easily restore an older version of a file (even if it wasn't deleted or corrupted) from the ***File History*** drive.

Search facilities

Searching has never been easier. Fast, universal search is available on the ***Start*** screen. Simply press the ***Windows*** key from any screen and begin typing. Search will automatically find local files, OneDrive files, apps, programs, settings and relevant internet search results.

Security

Windows 8.1 has improved data security by enabling ***BitLocker*** drive encryption by default. BitLocker is a program that can help protect your files and folders from unauthorised access by encrypting your drives. To turn on BitLocker, display the ***Control panel***, search on ***BitLocker***, then click on ***manage BitLocker***.

Windows 8.1 also includes ***Secure Boot***. ***Secure Boot*** is a security standard designed to ensure that your PC boots using only software that is trusted by the PC manufacturer, rather than rogue malware.

Internet Explorer 11

Windows 8.1 provides ***Internet Explorer 11*** to help you surf the web more easily and securely.