



# The SAS Introduction to IT Programme

## **Part One of Three**

**Print It Out and Take It Away**

**An Extract Only**

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# The SAS Introduction to IT Programme

## Part 1

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## The SAS Introduction to IT Programme

### Preface - The Purpose of This Introductory Course

IT is a vast and rapidly growing area knowledge and affects all facets of the modern world. Thousands are attracted to IT and would like to know more about it. However, for many it can be an extremely expensive subject to study.

Also, what many do not realize is that there are different areas of IT requiring different skills and talents e.g. programming or application. A person could spend a lot of money only to find that he or she has wasted one or two years studying an area of IT that they are not really suited to.

This introduction to IT course will enable a person to consider which area of IT would best suit his/her abilities and temperament, without first committing vast resources to a study programme.

## The SAS Introduction to IT Programme

### How To Work Your Way Through Part 1

- a/ Before attempting to answer any of the questions read through the whole material.
- b/ Then answer each question as directed on the answer sheet. (Copy more answer sheets as required).

# An Introduction to IT – Part 1

# Introduction to IT - Part 1

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## Part 1: Introduction to Computing

# Introduction

Welcome to the **Introduction to IT** course. This course is intended for those who are keenly interested in entering into the now vast world of computing but have not previously had the chance to become familiar with some of the fundamentals. The main objective of this course is to introduce you to various aspects of the world of computing in order for you to get a feel for which aspect of computing appeals to you so that you can spend time further pursuing that field assured that this is the path that you wish to take.

When I first became involved in computing some time ago I found that I had already spent a large amount of time pursuing a career in systems administration before I really spent any time even looking into application development. By the end of this course you will not have to worry that you have found yourself in the same situation. In this course we will look at a wide variety of fields within the world of computing and giving you a feel for each. **Please note that this course does not intend to teach you how to be proficient in all of these aspects. This course will cover the basic concepts of these fields only.** If you are interested in pursuing any of the topics covered in this course I strongly suggest referring to more detailed texts and web sites (some of which are referenced in this course material) or attending official training courses that are often run by large computing corporations such as IBM and Microsoft.

Some of the subjects being covered in this course include the following:-

- **Introduction to the Stand Alone Computer** – This section will focus on various aspects of the stand alone computer such as the CPU, RAM and disk drives.
- **Introduction to Computer Networks** – This section will cover why and how computers are connected together to share information and resources.
- **Intranets, Extranets and the Internet** – This section will describe how computer networks and web technologies can be associated together to offer a wider range of services.
- **Introduction to Computer Operating Systems** – This section will introduce the concept of what an operating system is and how it can make using a computer a much more productive experience.
- **Introduction to Microsoft Windows** – This section will introduce you to the concepts of one of the worlds most widely used graphical operating systems.
- **Introduction to UNIX** – This section will introduce you to concepts of one of the most scalable Operating Systems in the world.
- **Introduction to Computer Programming Concepts** – This section will describe why you may want to program an application and tools available for doing so. This section will also describe a number of different types of programming languages.
- **Introduction to HTML Programming Concepts** – This section will cover concepts of the Hyper Text Mark up Language (HTML) which is used in authoring (writing) web pages.
- **Introduction to JavaScript Programming Concepts** – This section will cover concepts of the JavaScript language which is used to add logic to web pages.

Again I wish to stress that these topics are not going to be covered in detail but will describe the basic concepts that can be associated with each so as to give you a feel for which you would prefer to pursue further.

# A Brief History of Computing

Computers are considered by most to be a very modern development. When thinking of the history of mankind they are, but they have been in existence for much longer than people tend to think. You could say that simple counting devices such as the abacus were the first instance of computers and you would be right. An abacus is a tool that can be used to solve logical problems which is basically what even the super computers of today are still doing albeit a lot more complex problems in a lot less time. But computers, as we tend to think of them today, with their silicon chips and integrated circuits have been around since the 1950's in varying forms.

During the 1960s some major developments were really starting to come to the fore around the San Francisco area in California U.S.A.. Around this time experiments with getting different computers talking to each other were starting to yield some interesting results that would later change the way of modern life. In an effort to get computers to talk to each other and therefore be able to share and use information more widely and wisely operating systems such as UNIX were starting to be developed. UNIX has since become a major part of computing and networking today and is used by thousands of corporations around the globe. Some of the base technologies that were developed to connect these computers together, or networking them, can still be applied to the most complex of all computer networks in existence today, the Internet.

The 1970s saw these developments come further and the computer entering into the global consciousness. Larger corporations were starting to apply this technology to their business at an ever increasing rate. The world was starting to shrink as the larger companies were being able to transfer information from one office to another at a much faster rate that was considered possible just a few years previous.

It was the 1980s that saw the Personal Computer leap onto the market place and the general public pick up on the trend. Soon many households were the proud owner of a computer that many were too scared to use in case they broke it or it outsmarted them. It wasn't long before many found that computers are only as smart as the person using them and that there is usually a way to fix a problem you create. This is a good mindset to keep while going through this course and when learning more detailed aspects of computing. Don't be scared of the computer, it is simply a tool you use to get a job done much like you would use a toaster to toast your bread in the morning; and I'm sure you're not scared of the toaster.

The greatest change to effect the computing public, in fact the public in general, came in the early 1990s with the introduction of the Internet. The Internet had been alive for some years at government levels but it was its commercialisation in the early 1990s that saw its explosive growth into what we know it as today. Now you can do just about anything without leaving your house by using the Internet such as buying your groceries, doing your banking, booking a holiday and even watching a film.

Where the future of the Internet will take us is anyone's guess. The great thing about getting involved in this wonderful technology now is that you are getting involved in its early stages which means that the opportunities for you to develop an exciting career in this field are great, you could compare getting involved in a computing career today to getting involved in an automotive engineering career in the days of Henry Ford.

## Course Structure

So without any further delay let's move on into the subjects that were outlined above and have you on the way to a broader understanding of the world of Information Technology (IT).

The course is broken up into three Parts as follows:-

- **Part 1 – Introduction to Computing** – This section will cover the Stand Alone Computer, Computer Networking and Intranets, Extranets and the Internet.

- **Part 2 – Computer Operating Systems** – This section will cover the concept of Operating Systems and look at the Microsoft Windows and UNIX Operating Systems.
- **Part 3 – Introduction to Computer Programming Concepts** – This section will focus on the concept of computer programming and will look at the HTML and JavaScript languages.

At the end of each of these Parts there will be a series of questions that will relate to the material that you have just considered. These questions are designed to test whether you have comprehended the information and also to see if you can apply the information to a given situation.

Most of all I would suggest that you take the time to enjoy this course. For the most part I have tried to keep a relaxed tone throughout to help make the course enjoyable although at times I have been forced to talk in “techie” speak to fully explain a concept. Hopefully, by the end of the course, you will be able to speak in “techie” terms as well. Welcome to the world of computing and Information Technology.

## The Stand Alone Personal Computer

Before being able to grasp concepts such as computer networking, the internet and computer programming it is imperative to have an understanding of how the personal computer (PC) operates without being connected to anything else such as a network or the internet, this is referred to as the stand alone computer. The second Part in this course will go into detail about how computer operating systems, such as Microsoft Windows and UNIX, work. This first Part will focus more on the hardware side of the matter.

The PC can be broken up into many different parts, while it is not necessary to know what every component of the PC does there are a number that you need to know to grasp the basic concepts of what your computer is doing and also to aid you in purchasing the PC that is best suited to your needs when you come to make that purchase. The components of the PC that we will consider are the following:-

- **Central Processing Unit (CPU)**
- **Random Access Memory (RAM)**
- **Floppy Disk Drive**
- **Hard Disk Drive**
- **CD ROM**
- **Monitor**
- **Printer**
- **Modem**

## Central Processing Unit (CPU)

The Central Processing Unit, often referred to as the CPU, is essentially a silicon chip that acts as the brain of the computer. Given that this processing unit controls the processing of any information on the computer people tend to want to have them set to run as fast as possible so that they are not left waiting for their computer to catch up with them.

You may hear people referring to a **Pentium III 500** computer. When using this term they are actually describing the CPU and not the computer as a whole. In this example the **Pentium III** is the name of the chip and **500** is the speed that this chip runs at measured in megahertz (MHz).

There are various different types of CPU chips on the market such as Celeron, Athlon, SPARC and Pentium. The Pentium chip, produced by the Intel company, has for some time dominated the market considerably and at the time of writing this doesn't look much like changing.

You will notice in the above example I quoted a Pentium III as opposed to simply Pentium. This is due to the fact that with developments in technology the chip manufacturers have been able to change the way the Pentium chip has been made to enable it to run at much faster speeds. So, with that in mind, it stands to reason that the later the release of the chip the faster it is going to run. At the time of writing this course the fastest Pentium chip available on the market was the Pentium IV running at 2 Gigahertz (2GHz) which equates to 2000 MHz.

These numbers most likely seem pretty abstract at this point. To give you a feel for what speed you would want your processor running at, keep in mind that you will not likely be able to run the latest versions of Windows on a machine with a processor slower than 200 MHz. Of course, given the speed at which new technology is available and the resulting demands made by software, you would always try and aim to purchase the fastest CPU that you can when purchasing a computer so that you are able to use new software that is released for some time to come.

So to recap, the Central Processing Unit, or CPU, is a silicon chip in the computer that is in charge of controlling all the processing that goes on within the computer. The CPU is responsible for making all of the elements of the computer, both hardware and software, act together in a harmonious way to produce the results you require.

## Random Access Memory (RAM)

Imagine that you are trying to add up a series of numbers in your head. To add the first two together you use your brain to make the addition and then store the resulting amount of that first addition in your memory so that you can quickly add on the next number and so forth. How many numbers do you think you can keep in the front of your mind to access at any given time? Obviously, the more numbers or names of people or places that you can keep in your memory to access at any point in time are going to help your brain to process information.

Much like your brain uses your memory to store pieces of information to recall in any random pattern it may require, the CPU of your computer uses Random Access Memory (RAM) to store information that it is going to need to use. Unfortunately, your computer cannot possess a memory anywhere near the size of the human mind. Due to this limitation the computer only keeps in its RAM the information that it is going to need to do the jobs at hand and then releases information that it does not need once it has completed using that information. If it needs that information again it will need to recall it from a data storage place such as a hard disk drive before it can use it again. With this logic in mind you can see that the more RAM that your computer has the more it will be able to do at any given time. In fact, some processing may be so intense that your computer may need more RAM to run it at all let alone at any kind of speed.

RAM is measured in **bytes**. Every byte is made up of 8 **bits**. A thousand bytes is referred to as a **Kilobyte (Kb)**, a thousand kilobytes is referred to as a **Megabyte (Mb)** and a thousand megabytes is referred to as a **Gigabyte (Gb)**. At the time of writing this course RAM is generally referred to in terms of Megabytes, with the average home computer having a RAM of 128Mb to 256Mb.

## Floppy Disk Drive

Most PCs come with a floppy disk drive to allow you to insert a floppy disk into the computer so that information stored on the floppy disk can be read into the computer's memory and processed by the CPU.

The floppy disk is a form of magnetic media, meaning that it stores the information on the disk using a series of magnetic signals. Using your computer's floppy disk drive you can both read these magnetic signals from the floppy disk and write them to the floppy disk.

Today the standard size of a floppy disk is 3-1/2". The capacity of a 3-1/2" high density floppy disk is 1.44Mb. There is also a 3-1/2" extended density floppy disk that has a capacity of 2.8Mb although the high density is the more commonly used and what people would be referring to when they speak of 3-1/2" floppy disks.

This disk can be inserted and removed as needed so that you are able to write information to the floppy disk at one computer, take it out of that computer and place it in another's floppy disk drive and read the information that was written from the previous computer. Obviously this process would raise some risks in the current climate of the computer virus.

## Hard Disk Drive

The Hard Disk drive is the disk that is permanently mounted inside of your computer. Unlike the floppy disk drive, the hard disk drive cannot be readily removed from the computer and taken to another. The hard disk drive usually stores information that your computer is going to need to use every time it starts up such as the computers operating system, which will be discussed in further detail in the next Part of the course, and any other files that your wish to save.

The big advantages of the hard disk drive over the floppy disk drive are speed and capacity. Even the slowest of hard disk drives will run much faster than a floppy disk drive allowing the computer to be able to read the information into memory much faster. Hard disk drives could also be broken up into the groups IDE and SCSI. IDE drives are slower than SCSI drives but are still probably the most widely used in the home PC market due to the fact that they are also considerably cheaper than SCSI hard disk drives. But the main reason that the hard disk drive is of such great importance is its size. While a high density 3-1/2" floppy disk can hold less than 2Mb, with its 1.44Mb limitation, a 20Gb hard disk drive would be considered relatively small in today's market. At the time of writing you could purchase a computer for home use with a hard disk drive of 100Gb installed.

## CD ROM

Nowadays most computers come with a CD ROM drive installed. The Compact Disc (CD) that you use in your computer is exactly the same thing as you would use to play music from. The big advantage to CDs over floppy discs is that they can store between 640Mb and 800Mb and can be inserted and removed from your computer in the same manner that a floppy disk can be.

The reason that a CD can hold so much more information than a floppy disk is because a CD stores its information in an optical format rather than in magnetic. Optical media is far more precise than magnetic and can therefore fit more data into any given space allowing the CD to hold so much information.

The expression CD ROM comes from the fact that traditionally CDs could only be read from and not written to. ROM stands for Read Only Memory. ROM differs from RAM in that it remains constant and cannot be changed whereas RAM can, as the name suggests, be randomly accessed to store data that is required and any given time therefore its contents are changeable.

With the every changing technologies of the computer world however CDs can now be written to if you have a CD-R which will allow you to record information to a CD. A CD-RW goes one step further and will allow you to re-write information to a CD, in other words it will allow you to record over the top of information that is already on a CD if that is what you want to do

## Monitor

To be stating the obvious, the monitor is the tool that you see all the results of your hard work on. Much like a

television, a monitor displays information to its viewer in a graphical manner. However, the computer CPU does not speak in terms of graphics. Therefore there has to be a tool between the CPU and the monitor that translates the language of the CPU into graphical terms for the monitor to display to you. This tool is referred to as a **graphics card**.

This graphics card is a card that has a number of silicon chips on it that plugs into the computer's internal motherboard which is the panel that the CPU is mounted on. In turn, the monitor is plugged into the graphics card at the back of your computer. That's right, that port at the back of your computer is, in fact, the back of your graphics card. If you were to open up your computer you would see that this port is attached to the graphics card. When the CPU sends a message to the graphics card it is converted into a graphical term that the monitor can understand and then sent up the cable to the monitor to be displayed for you to see.

As you are probably coming to expect there are a wide array of graphics cards available on the market. Those of you who are avid computer gamers are probably already aware of graphics cards that are specifically designed to work with three dimensional graphics. These graphics cards often have a measure of RAM, usually between 16Mb and 64Mb, that is dedicated to processing more complex graphics at high speeds as the computer games of today are coming to demand. If you are not one to play computer games, or use Imaging applications, such as Photoshop, Paintshop and Paintshop Pro, it is highly unlikely that you will need to pay too much attention to graphics cards so long as you have one sufficient enough to run whatever tools you wish to use, the standard installed card usually being more than enough.

You will also note that speakers attached to your computer will make use of another card within your computer, a sound card, that has much the same relationship to the speakers as graphics cards do to monitors.

## Printer

You will often find yourself wanting to print out a paper copy of something you have been working with on your computer. You will hear people refer to paper copies of files as **hard copies** and the copies stored on their computer or received by e-mail as **soft copies**. To create a hard copy of a file from your computer you will need to tell your computer to send this file to the computer's printer.

For your CPU to be able to send files to the printer to print you will need to have the CPU identify the printer. This used to involve installing a file called a **driver** that was specific to that printer. A driver is basically a file that is used by the computer to describe how to interact with a given piece of hardware, for example a printer or a scanner. Now, thanks to the development of more complex operating systems, the computer can often identify the printer, or any other newly attached hardware, automatically using a technology known as **plug and play**.

While we are talking about the stand alone computer here it is worth noting for future reference that if you are using a computer on a network you may not necessarily have a printer that is attached directly to your computer but rather a printer that is connected to the network you are also connected to. To use this printer you have to identify it using your operating system. Once this printer has been identified and selected whatever you print will be sent to this printer on your network which may also be shared by other people in your office.

## Modem

Sooner or later you are not going to be able to fight the urge to get on to the internet or send e-mail to a friend. In order to do this you will need to connect to an Internet Service Provider (ISP). An ISP is a company that allows you to connect to them and then makes the whole world wide web (WWW) available to you through them. To be able to talk to another computer, i.e. the one at your ISP, you will need to be able to call them up just like you would call a friend up using your telephone.

Obviously computer data such as text files, sound files, and graphics, are not stored in a format that can be transmitted over a telephone line, that is where the modem comes into play. A modem acts much like a video or

sound card in concept, it converts files from one format into another so that it can be transmitted. In the case of a modem, the data is translated from the format that is used by the computer into sounds that can be carried over a telephone line to the recipient of your call. Obviously the person receiving your data will need to be able to convert this data back into a form that their computer can use, for this reason a modem is also needed at their end else the data cannot be used.

## Summary

In this first section we have briefly looked at the evolution of the computer of the last fifty years and seen that there have been milestones achieved throughout the 60s, 70s, 80s and 90s that have brought computers to the forefront of the public consciousness.

We have also spent time looking at the major components of the stand alone computer. These major components have included the following:-

- **Central Processing Unit (CPU)**
- **Random Access Memory (RAM)**
- **Floppy Disk Drive**
- **Hard Disk Drive**
- **CD ROM**
- **Monitor**
- **Printer**
- **Modem**

One of the most important things to remember from this section of the course is that most elements of computing such as RAM and Disk Space can be measured using the unit **byte**. Every byte is made up of 8 **bits**. A thousand bytes is referred to as a **Kilobyte (Kb)**, a thousand kilobytes is referred to as a **Megabyte (Mb)** and a thousand megabytes is referred to as a **Gigabyte (Gb)**.

## Computer Networks

As mentioned in the preceding section the advent of the computer network greatly enhanced what we were able to achieve using the computer. In the most simple of terms you could describe a computer network as two computers connected together by a cable so that they are able to exchange information. Although this is a very crude example of a computer network it does highlight one of the key reasons for using a computer network as opposed to using a series of stand alone computers. The key thought that is highlighted here is that the computers are able to transfer information. If the computers were not connected by a network they would not be able to share information. Naturally most computer networks consist of a far more complex infrastructure than simply two computers connected together by a cable but the principle remains the same, we network computers together to enable information to be shared in an efficient way. Given that the existence of many businesses of varying sizes today depends on being able to provide and access the right information at the right time computer networking has become a very important issue on the world scene today. You will see whole departments of companies dedicated to ensuring that the companies computer networks run efficiently and constantly and you will also see a myriad of magazines on the topic of computer networks at newsstands today.

Another key reason for using computer networks today is that they can also save a company a considerable amount of money. Consider this point, if the computers in a large office block were not networked only those persons with a printer directly attached to their computer would be able to print documents. There would only be two ways to work around this problem so that everyone could print in the office. One would be to purchase a printer for every person in the office. This option could run into hundreds of thousands of dollars of which many may be largely wasted given that some workers may only need to print occasionally. The second method could be for any person in the office to save their document to a floppy disk and take it to a person that has a printer

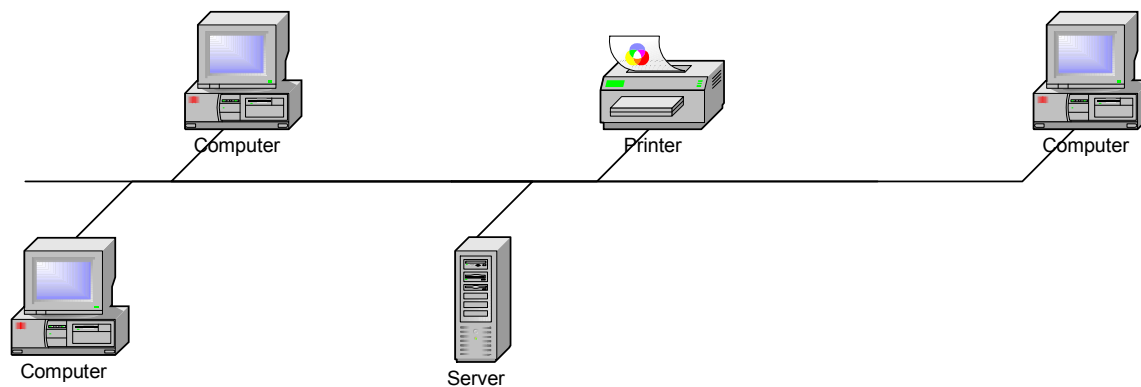
attached to their computer and ask for them to print it out. This is not a very efficient method of overcoming the problem either due to the fact that the person with the printer attached to their computer would never get any work done because they would always be stopping what they were doing to print out others work and can you imagine the queues of people with floppy disks in their hand at these persons desks. However by having a computer network in place this problem is overcome in an efficient and cost effective manner by placing a printer on the network that everybody can access as if it were connected directly to their own computer.

Some other advantages of using networks include being able to centrally store and share information to a large number of people and being able to preserve and protect that information.

Information such as financials and sales information would often be centrally stored so that there is only one copy of that information available meaning that when one person edits that information that change is reflected to all people who access it so that all people have the most up to date information at all times. By centrally storing information the systems administrator is also able to protect that information by controlling who has access to this information so that it does not fall into the wrong hands, we will look into how this is done in a little more detail in the second Part of the course.

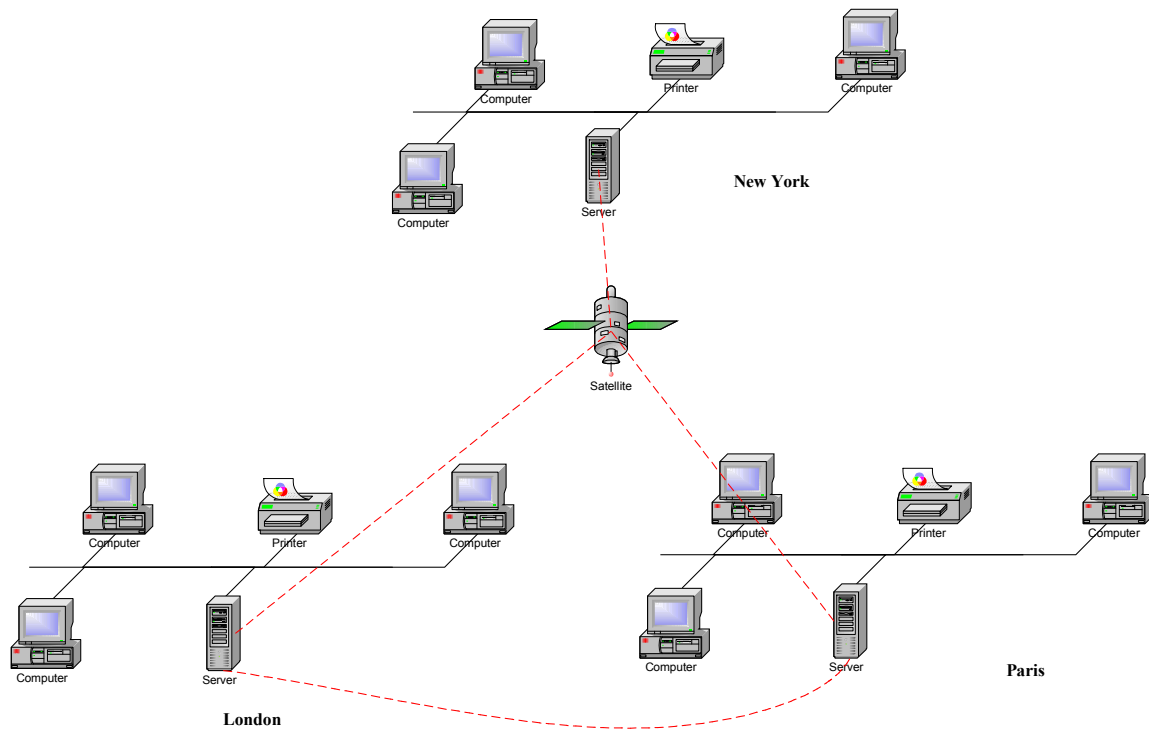
By having information centrally stored the information is also able to be backed-up so that, in the event of a loss of information or data, it can be restored in an efficient manner.

Given that computer networks can vary in size we tend to break them up into groups to better identify them. A group of computers all networked together in one location is referred to as a **Local Area Network (LAN)**. The below diagram shows us an example of a simple LAN.



## Local Area Network (LAN)

However many larger companies often have offices located throughout various regions or cities that need to be able to exchange information. A LAN is not suitable for transferring information over these kind of distances. If remote sites need to be connected together where a LAN is unable to do so due to distances a **Wide Area Network (WAN)** is used instead. A WAN, in simple terms, connects a number of LANs together as shown in the below diagram:-



## Wide Area Network (WAN)

Technologies such as dedicated leased high speed telephone cables, microwave transceivers and satellites are generally used when implementing WANs which usually restricts their use to larger corporations due to the high costs involved in using such technologies.

## Network Topologies

Now that we have spent some time considering the advantages of using computer networks we will consider in further detail how different types of networks can be connected together using various topologies.

A network topology is a way of grouping various computers together in a LAN so that they can effectively and efficiently share information and resources. The computers that make up this LAN can be broken up into three groups as defined below:-

- **Client** – A computer that a person uses to access and use network resources but does not provide any network resources.
- **Peer** – A computer that both uses and provides network resources.
- **Server** – A computer that provides network resources.

A **server-based network** is one that has servers dedicated to providing certain services on the network. In this type of network you may have servers dedicated to providing e-mail services, others dedicated to handling printing requests, and still others that are dedicated to file storage. The advantages of a server based network are many which is why you will find this type of network used so widely in larger corporations that depend on having their data available continuously. The advantages of a server-based network could include, but not be limited to, the following:-

- Central file storage and security.