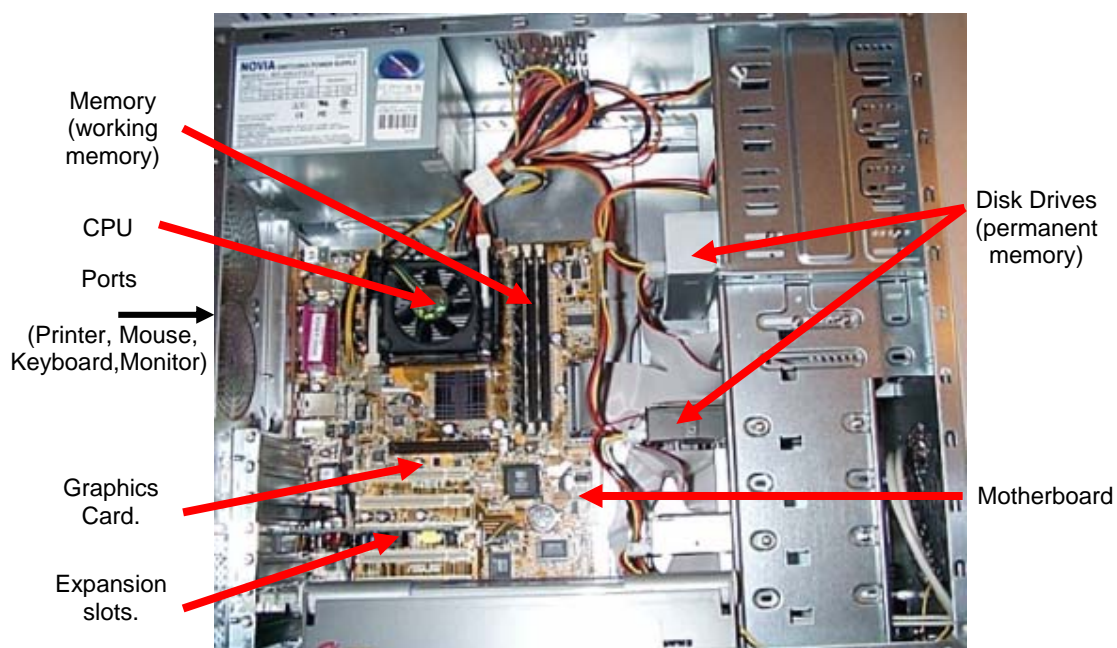

2.0 Computer Hardware

Theories of computing can be traced back some 300 years ago. Mathematicians and philosophers like Pascal, Leibnitz, Babbage and Boole founded some of the theoretical principles behind computing techniques. It was in the second half of this century that science and technology sufficiently developed to allow practical use and development of the earlier theories.

The modern PC uses the Von Neumann model, rooted back to the USA in the 1940s. John von Neumann (1903-57) was a mathematician, born in Hungary. His basic principles are still used in computer design today. The Von Neumann model describes computer hardware in five primary elements: CPU, input, output, working memory and permanent memory.



Inside a computer case (base unit).

PC's are customisable as they use components that connect together to form the whole 'system'. You can add components for specific tasks (such as playing sound) and choose more powerful and expensive parts to make a high-end (advanced specification) PC. You can also specify less powerful and cheaper components for a general style office PC.

- **Base unit styles of a personal computer (PC).**

Tower case: A tower-style base unit (case) is slightly larger than a desktop PC. The tower case usually stands on a desk or floor. Network servers are usually tower PCs as they provide more room internally for extra devices.



Desktop case: A desktop-style base unit (case) is one that usually sits flat on a desk. This style of base unit does not have quite as much room as the tower-style for expansion (i.e. adding more internal devices).



2.1 Motherboard and CPU.

Motherboard: A motherboard is a large printed circuit board with connections for other components in a PC. The motherboard allows the components to exchange data.



The type of motherboard determines the types of **CPU**, **memory** and **hard disk** that can be installed in a PC. The motherboard contains several slots to plug **expansion cards** into. These slots are referred to as:

- **ISA:** (**I**ndustry **S**tandard **A**rchitecture) – Expansion cards used on older PC's. Not commonly found on newer PC's, except to support "legacy" cards when upgrading.
- **PCI:** (**P**eripheral **C**omponent **I**nterconnect) – Standard expansions cards used in new PC's.
- **AGP:** (**A**ccelerated **G**raphics **P**ort) - High performance graphics cards.



ISA Card



PCI Card



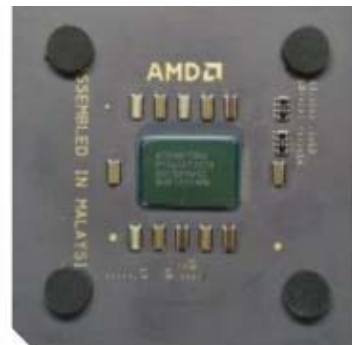
AGP Card

CPU: The CPU, or **Central Processing Unit**, is the brains of the computer. All the "thinking", calculating and processing is done by the CPU. The CPU is an advanced microprocessor that performs calculations and determines what to do with the results.

The CPU is sent instructions by the computer's software and can process many millions of instructions per second. The results are passed to other components. The speed at which the CPU operates can be the main factor influencing the overall system performance. The CPU's activities are co-ordinated by a **clock** that is used to synchronise all internal processes. Each unit of time is called a **cycle** and speeds are generally measured in **megahertz (MHz)** or **gigahertz (GHz)**.

1 megahertz = 1 million cycles per second.

1 gigahertz = 1000 megahertz.



The CPU also incorporates an **Arithmetic Logic Unit** (which performs the calculations and logical operations within the computer) and a **Control Unit** (which fetches, decodes and executes data from the memory).

There are three main manufacturers of CPU's – **Intel** (Pentium and Celeron CPU's), **AMD** (K6, Athlon and Duron CPU's) and **Motorola** (Apple Mac CPU's). Each manufacturer releases faster and improved CPU's fairly often. At the time of writing this document, entry-level CPU's range from 1 GHz to 3.5 GHz.

Because a CPU runs more quickly than other components, **immediate access memory (cache)** is usually incorporated as a buffer to maintain a consistent flow of the data to and from the CPU. The CPU also requires a fan to keep it cool while the computer is on (as CPU's often generate quite a lot of heat).

