Areas of Computer Applications

Commercial data processing

Large companies like banks, insurance companies, phone, gas and electricity suppliers and mail order companies, often have over a million customers. Each customer generates paperwork every time a transaction is made. This is maybe an order, usually a bill or invoice and maybe a statement. If each customer has even four transactions a year each (four gas, electricity or phone bills for example) then the company is likely to deal with over 4,000 transactions each working day. It is much easier to deal with customer accounts with a computer rather than doing it manually and computers can deal with the vast amounts of paper required in each system. The following are two examples of how computers can help in commercial data processing:

Stock Control

A stock control system is one that is used to keep track of the movement of goods going in and out of a warehouse or shop. A stock control system is basically a specific DBMS application. The stock master file has a record for each item in stock. Some useful fields in the file would be: item code, item description, supplier code, quantity in stock, minimum stock level, price. When the value in quantity in stock field falls below the value in minimum stock level field, then that particular item requires re-ordering. Automatic stock control is very useful as it helps the management to re-order items in time as it automatically updates the stock levels.

Reservations

Computers are ideal for storing large quantities of information in databases and retrieving it quickly when required. Information storage and retrieval systems are interactive, displaying and printing the information when required.

An airline reservation (booking) system is one such example of an information storage and retrieval system. It is one of the largest and complex real-time network systems in operation. An airline has its own large computer system that connects to all its offices and travel agents. The computer system stores information on all its flights in a database. The databases of all airlines are networked, forming an international network system. The booking system enables reservations to be made for any flight from anywhere in the world.

Technical, Mathematical and Scientific uses

Medical diagnosis

Medicine is one area where expert systems are used. This is where the knowledge of experts is inserted into a computer. A doctor can then enter the symptoms of a patient into the computer and the computer will then give all the possible illness that the person may be suffering from.

Computer Aided Design (CAD)

Computer Aided Design (CAD) refers to the use of a computer to design the structure or appearance of an item on screen. Designers may use a graphics tablet as an input device and a plotter for high quality output. Using CAD software reduces the amount of work of a designer. It is very easy to make changes and view the design from different angles.

Car Design	Motor industry uses CAD to design attractive but economical, streamlined cars.
Kitchen Units	DIY stores use the computer to design a kitchen given the dimensions of the room.
Road Design	Road engineers use CAD to plan the route. Mistakes can be corrected before money is spent on building a road.
Housing	One planner can design a whole housing estate on one computer. It gives customers a chance to "see" the finished estate.

Computer Simulation

A Computer Simulation is a method of predicting the likely behaviour of a real-life system. A model of a system or situation is constructed on a computer. The model is then allowed to run under various conditions and its behaviour under these conditions are studied and tested. Computer simulations operate in real-time, that is, the effect of the varying conditions will immediately affect the model.

Some areas where computer simulations are very useful:

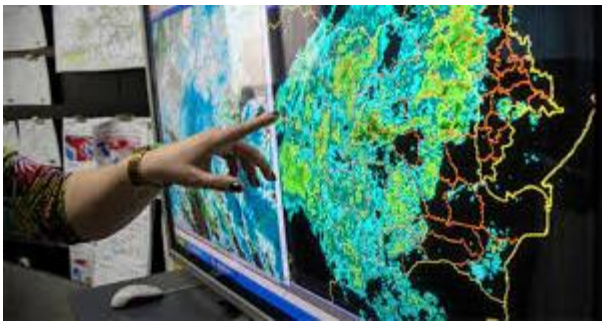
Flight simulation - used for the initial training of airline pilots.
Bridge Design - engineers use simulations to study the effects of various loading conditions and of transverse winds.
Simulation of crashing cars - to determine the safety of the passengers.
Dangerous scientific experiments - performing a simulation of the experiment is safe.

Testing through computer simulation offers various advantages. These include:

- No need to build a physical model
- Saving on expenses and on time
- Dangerous situations can be safely simulated.

Weather forecasting

These are very complex programs that use mathematical formulas to describe how the atmosphere works. Millions of readings of wind direction and speed, temperature, pressure, humidity, light, cloud cover and other variables at different altitudes are collected around the world and continually fed into the computers. With a series of such reports, the formulas can calculate what the weather is doing at a particular moment, assess how it's changing, and forecast that change.



Computer weather forecasting leads to better and earlier storm predictions. That could, for instance, give Atlantic coast residents earlier and more accurate warnings of when and where a hurricane will hit. Storm predictions are also useful to fishermen, sailors and people who need to plan their holidays.

Industry - Computer process control

Robotics

Robots can carry out processes faster than humans and perform tasks, which are often boring or repetitious. They can be used in harmful or dangerous environments, such as spray painting, welding and in the nuclear industry. They are more efficient than humans and can work without a break. They are also very flexible and can be programmed to do different tasks. Generally speaking they are more accurate than people are and they don't get tired or make mistakes.

One of the best examples of automated systems in industry is car manufacture on an assembly line. Robots with jointed arms can spray paint parts. A control program ensures correct parts sent from the factory to the assembly line. Robots can weld, assemble nuts and bolts and use a screwdriver among other functions.

Robots are also used in situations where it is too dirty or dangerous for humans to work in safety or comfort. Some examples of these are:

- detecting and defusing bombs
- spray painting body parts for cars and panels for domestic goods such as fridges and washing machines
- in the nuclear industry to change fuel rods in the reactor core

CAD-CAM

Computer Aided Manufacture (CAM) is using a computer to control the production process. Examples are making a car or cutting cloth. The product details can be stored and changed later if necessary. Using CAM means products can be consistently made very accurately.

A modern flexible manufacturing system uses Computer Integrated Manufacture (CIM). In CIM, CAD and CAM are combined to design and manufacture a product. CAD and CAM become CIM when the CAD drawing is transformed into the finished product. There is usually little or no human intervention.

The advantages of using CIM are in increased productivity and competitiveness in manufacturing. Computer controlled methods are faster and more accurate than older methods, waste can be minimized and a single operator can see the whole job through. The computer-controlled systems are simpler to operate and need less skill from the operator.

Educational uses:

Computer Assisted Learning (CAL) is the production of computer based interactive materials for individuals or groups who wish to learn by making use of the computer. Full multimedia facilities make this an interesting way to learn. CAL software provide instructional information to a student/group, pose questions and then reacts to the student's/group's response.

Finances

Shops - EPOS

Nowadays, bills in any kind of shops are produced using Electronic Point of Sales. Barcodes are input into a computer system together with the item details such as name and price of item. When the user is about to pay for the items, the teller will scan the barcode and the system automatically lists the items on the bill and calculates the balance due. This makes the issuing of bills much quicker. Bills are itemized and fewer mistakes are made. More over the management of such shops have more control on stock and bills.

EFT

Electronic Fund Transfer is the process of paying for goods with “plastic” money, that is debit or credit cards. The money leaves your bank account or is added to your credit card bill within seconds of your card being swiped at the till. This is convenient for the shop as they don’t have to carry so much cash and risk theft, and the payments are secure in their bank account. Shoppers prefer this system as they don’t have to carry cash and can buy goods more easily through mail order or e-commerce. Shops have to pay a charge to the bank for every transaction carried out using “plastic” money.

Banks

Banks were one of the first institutions to make use of computers. Computers are used for various reasons. Apart from their use by staff to display and record your details, other uses banks make of computers might be:

Processing Cheques

We often pay for things using cheques. When someone is given a cheque, for example a shop keeper, they must first take it to their bank. If there is enough money in the account of the person who wrote the cheque, then the money will be taken out of that account and put into the person presenting the cheque. This sound very simple, but without computers, it would be difficult and take a long time. Computers allow us to speed this up particularly through the use of Magnetic Ink Character Recognition system used by banks to process cheques.

Automatic Teller Machines

Automatic Teller Machines are the machines both in and outside banks where people can get cash, find out how much money they have in their account, order bank statements, order a new cheque book and so on. These are much faster then the old method when these things were done by people.

If a person wishes to use them, they enter their bank card into the machine and enter their Personal Identification (PIN) Number. This, along with details held in the magnetic strip on the back of the card allows the person to access the details of their account. This means they can see how much money is in their account at that time. Unlike the banks, these machines are open 24 hours a day and can now be found in many places as well as banks such as supermarkets.

Internet Banking

Instead of going physically to a bank, customers can manage their accounts and pay their bills through the internet. Using a secure way of accessing their accounts from home, customers avoid waiting in long queues at the bank. They can transfer money from one account to another, pay bills, open new accounts, order cheque books and re-order pin numbers, and customers can do all this any time of the day from the comfort of their home.

E-commerce

An almost infinite variety of goods and services is available on the Internet. You can bid for a work of art, swap a DVD, book you holiday, car hire, theatre tickets and restaurant meal, by anything from groceries to a car. You can buy or sell stocks and share on-line, do your banking and apply for a job. All this is e-commerce – buying and selling of goods and service over the internet.

In the community

Health

A hospital's administration system can also be on computer. This will allow administrators to keep accurate records of what equipment they have, maintain records of where patients are in the hospital at any time, how many beds they have free and so on. It will also allow them to allocate their staff more efficiently.

Libraries

The book lending library system is an example of information storage and retrieval system. The aim of the system is to give a quick, easy-to-use and accurate service to borrowers. A database stores the books details, the borrowers details and the loans details.

The book file contains one record for each book available in the library. Some important fields are: the book ISBN number, title of book, author, whether book is on loan or not, location in library etc.

The borrower (member) file has a record for each member of the library. Some important field are borrower number, name, address, address and telephone number.

The loans file has a record for each book taken on loan. Some important fields are: borrower number, book ISBN number, date of issue and date of return.

When a book is to be issued, the system prepares an empty record in the loans file. The borrower hands the book to the librarian who scans its ISBN bar code. The ISBN number is automatically inserted in the loans record. The system will then automatically insert the 'date of issue' and the 'date of return'.

When book is returned, the librarian reads the borrower number from card. The record is fetched from the file and deleted.