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**Concept of Data Processing Methods**

Processing methods are techniques used to process / sort different types of data. There are a number of processing methods depending upon the hardware / software capabilities of the computer and type of data need to be processed by the organization.

The data processing can be accomplished through following methods:

1. Manual Data Processing
2. Mechanical Data Processing
3. Electronic Data Processing

### **1. Manual Data Processing:**

In *manual data processing*, data is processed manually without using any machine or tool to get required results. In manual data processing, all the calculations and logical operations are performed manually on the data.

### **2. Mechanical Data Processing:**

In *mechanical data processing* method, data is processed by using different devices like typewriters, mechanical printers or other mechanical devices. This method of data processing is faster and more accurate than manual data processing

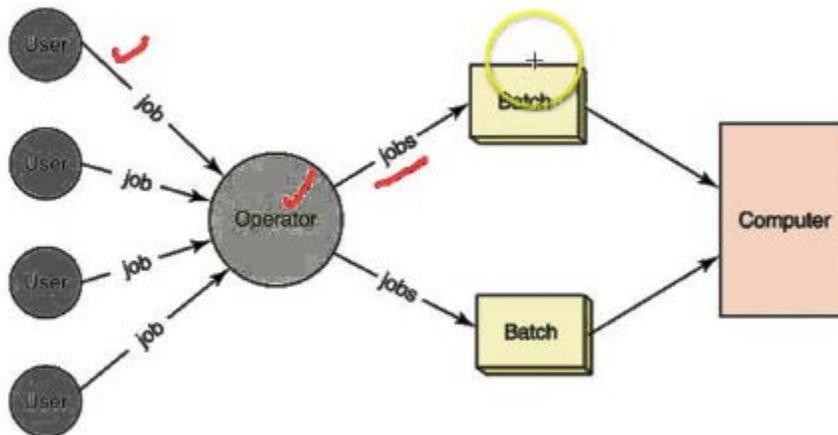
### **3. Electronic Data Processing:**

*Electronic data processing* is the modern technique to process data. The data is processed through computer; Data and set of instructions are given to the computer as input and the computer automatically processes the data according to the given set of instructions

## **1. Batch Processing**

Batch Processing is a method where the information to be organized is sorted into groups to allow for efficient and sequential processing. Batch Processing is also known as sequential, serial, offline or stacked/queued processing. In this processing method, different jobs of different users are stacked or queued in their receiving order (that is, in the sequence they are received one after another). Then finally, when a stack/ batch of jobs is completed, they are given for processing and the jobs will be processed in

the same order. Processing a large volume of data in batches over a period of time, results in lower processing costs per transaction or record than processing the transactions as they occur and hence it is an economical and convenient mode of processing data.



The transactions or data can be collected and stored offline, (on a tape or disk connected to a data entry device but not connected directly to the computer) or online (on secondary storage device connected directly to the computer) prior to the processing by the computer. In both offline and online processing there could be a delay of several minutes, hours or even days between the occurrence and processing of a transaction. Therefore batch processing is used by those applications where such a delay of time will not affect the usefulness of the results. In some cases, the data entry stations are located in remote areas and are connected through some communication media to the computer. This is known as remote batch processing.

**Advantages:** It is possible to perform repetitive tasks on a large number of pieces of data rapidly without needing the user to monitor it.

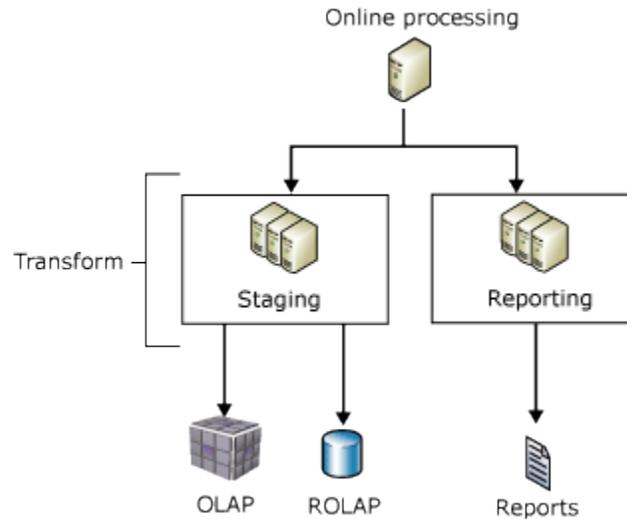
### **Disadvantages of Batch Processing Method:**

Time delay in obtaining results, control of priorities and keeping files up to date.

## **2. Online Processing:**

- Online Processing is also known as direct access or random access processing. In this processing method, a job is processed at the same time when it is received. Thus, online processing system feature random and rapid input of transactions and immediate and direct access to record contents as and when need. This is a method that utilizes Internet connections and equipment directly attached to a computer. This allows for the data stored in one place and being used at altogether different place. Cloud computing can be considered as a example which uses this type of processing. It is used mainly for information recording and research.
- Data is processed immediately while it is entered, the user usually only has to wait a short time for a response. (ex. games, word processing, booking systems). Interactive or online processing requires a user to supply an input.

- Online processing is an automated way to enter and process data or reports continuously as use as the source documents are available. A good example of online processing is bar code scanning. When you buy a shirt at Target, the bar code gets scanned at the register. This shirt (source document) is immediately updated in Target's inventory system as being sold. It is also updated in cost and sales reports. The online processing system continuously updates the entire accounting system.

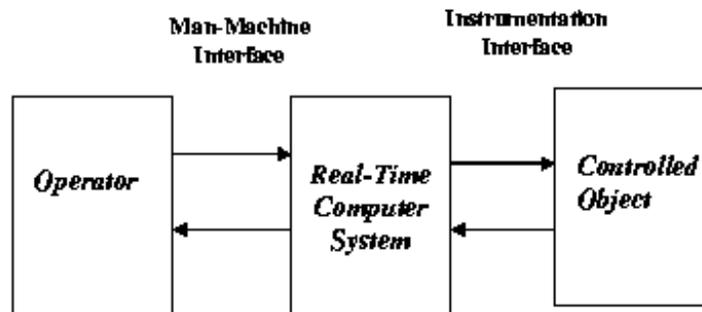


**Advantages:** Interactive or online processing enables the user to input data and get the results of the processing of that data immediately.

### 3. Real-Time Processing

This technique has the ability to respond almost immediately to various signals in order to acquire and process information. These involve high maintenance and upfront cost attributed to very advanced technology and computing power. Time saved is maximum in this case as the output is seen in real time. For example in banking transactions

This mode of processing designed to allow the computer to use data as they become available. To perform this function the equipment must have an online capability. Real time processing system works the same way like online processing system more quickly and efficiently. In this method, receiving and processing of transactions is performed simultaneously and there is no delay in processing of jobs. The real time processing system can use the features of an online processing system but online processing system not necessarily needs to use the features of real time processing system.



**Figure 1: Real-Time System**

Input is continuously, automatically acquired from sensors, for example, which is processed immediately in order to respond to the input in as little time as possible. After the system is finished responding it reads the next set of input data immediately to process that. This system doesn't need a user to control it, it works automatically.

**Advantages:** Whenever there is a rapid reaction required due to some sort of change, real time processing can take action without the need of a user or long processing time beforehand.

**Uses:**

There are many uses of real time processing, including the maintenance of customer accounts in banking institutions, or reservation system employed by hotels, airlines and car rental agencies.

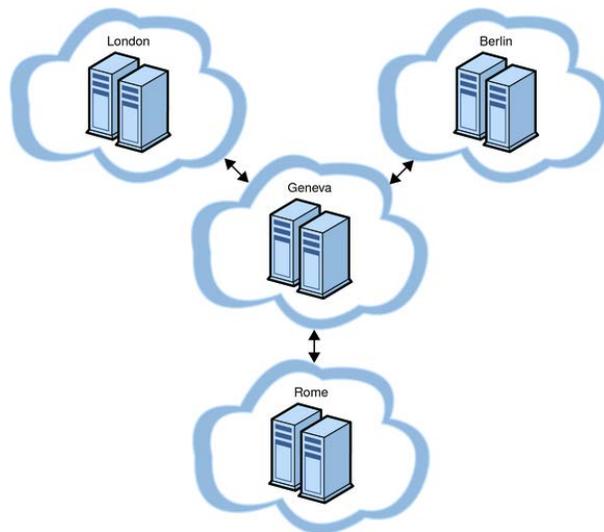
**Disadvantages:**

The principal disadvantage associated with a real time processing system is the expense. The cost of both the hardware and software exceeds as compared to that of batch processing.

## **4. Distributed Processing**

This method is commonly utilized by remote workstations connected to one big central workstation or server. ATMs are good examples of this data processing method. All the end machines run on a fixed software located at a particular place and makes use of exactly same information and sets of instruction. Distributed processing is a phrase used to refer to a variety of computer systems that use more than one computer (or processor) to run an application. This includes *parallel processing* in which a single

computer uses more than one *CPU* to execute programs. More often, however, distributed processing refers to *local-area networks (LANs)* designed so that a single program can run simultaneously at various sites. Most distributed processing systems contain sophisticated software that detects idle CPUs on the network and parcels out programs to utilize them. Another form of distributed processing involves *distributed databases*. This is databases in which the data is stored across two or more computer systems. The database system keeps track of where the data is so that the distributed nature of the database is not apparent to users.



### **Advantages:**

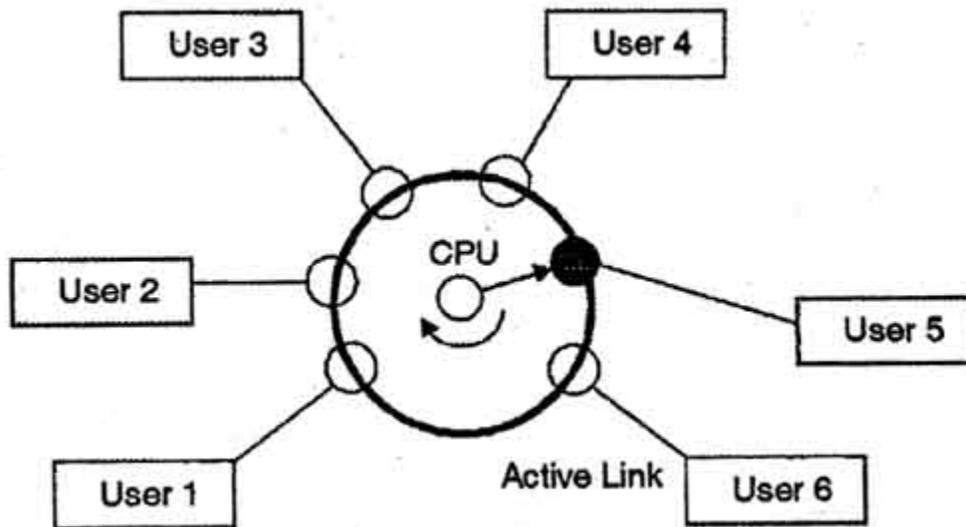
**Lower Cost:** Distributed data processing considerably lowers the cost of data sharing and networking across an organization by comprising several minicomputers that cost significantly less than mainframe machines.

**Reliable:** Distributed data processing is more reliable, since multiple control centers are spread across different machines. A glitch in any one machine does not impact the network, since another machine takes over its processing capability. Faulty machines are quickly isolated and repaired. This makes distributed data processing more reliable than single-server processing systems.

**Improved Performance and Reduced Processing Time:** Single computers are limited in their performance and efficiency. An easy way to increase performance is by adding another computer to a network. Adding yet another computer will further augment performance, and so on. Distributed data processing works on this principle and holds that a job gets done faster if multiple machines are handling it in parallel, or synchronously. **Flexible:** The system is flexible also in terms of increasing or decreasing processing power. For example, adding more nodes or computers to the network increases processing power and overall system capability, while reducing computers from the network decreases processing power.

## 6. Time Sharing:

This method of processing allows different users to use the same CPU resources simultaneously by dividing CPU time among all the users on the scheduled basis. There is only one CPU serving for more than one user. Therefore all the interested users are given a terminal for their link with the main CPU. The number of terminals can be more than 100. Now, all the terminals are allocated a small time slice. Therefore, this system is also called multi-access system. The most important characteristic of a multi-access system is that the computer is reacting to a number of devices connected to the machine. The devices may be terminals.



The main idea behind the time sharing processing is to give a chance to each user, from a large group of users, to share the CPU to solve their individual problem.

**Time-sharing** is the sharing of a computing resource among many users by means of [multiprogramming](#) and [multi-tasking](#) at the same time.<sup>[1]</sup>

By allowing a large number of users to interact [concurrently](#) with a single computer, time-sharing dramatically lowered the cost of providing computing capability, made it possible for individuals and organizations to use a computer without owning one,<sup>[2]</sup> and promoted the interactive use of computers and the development of new interactive [applications](#).

### Advantages of Timesharing –

- Provides the advantage of quick response.
- Avoids duplication of software.
- Reduces CPU idle time.

### Disadvantages of Time-sharing operating -

- Problem of reliability.

- Question of security and integrity of user programs and data.
- Problem of data communication.