# 3

# SYSTEM DEVELOPMENT METHODOLOGIES

## 3.1 INTRODUCTION

Different types of system development methodologies are used in designing information system. Depending upon the actual requirement of the system, different approaches for data processing are adopted. However, some system groups recommend a centralized data processing system while others may go in for a distributed data processing system. In a centralized data processing, one or more centralized computers are used for processing and the retrieval of information is done from them. The distributed processing system involves a number of computers located remotely in the branches/ departments of the organization. The client/server technology is also gaining popularity these days.

## 3.2 OBJECTIVES

After going through this lesson you would be able to

- differentiate between the advantages and disadvantages of centralized/distributed data processing system

- distinguish between various approaches to the information system

- explain networking environment

- explain the meaning of client/server technology

## 3.3 DATA PROCESSING SYSTEM

Data processing techniques are very much dependent on the kind

of applications and the working environment. The activities involved in data processing are along departmental lines and application based such as Store Management, Production Planning & Control, Sales Accounting, Financial Accounting, Student Information System, etc. The basic input data are the real resource of data processing. With the progress in technology the concept of integrated data processing has also come into being. In integrated data processing the output data of one application can be used as the input of another application. Depending upon the application area, working environment and the needs of the management, there are basically two approaches to data processing:

● Centralized data processing

● Decentralized data processing

### 3.4 CENTRALISED DATA PROCESSING SYSTEM

With the increasing use of computer based data processing, there has been a growing tendency in the minds of management to centralize the data processing activities. A separate department EDP (Electronic Data Processing) department is established to carry out the data processing work of different departments in the organization. Many times the data processing is also done by hiring the services of the outside agencies and with the passage of time and experience in-house set is developed for data-processing.

The centralized data processing system provides the following benefits:

● The emergence of data takes place only at one place.

● The loss of data is minimized.

● The methods and machines can be standardized.

● Services of more competent and technical personnel can be taken.

● It is also very cost-effective particularly in the case of large operations.

● Duplication of work can be avoided.

The disadvantages, however, are:

● Lack of cooperation from managers, who do not like to be under control of centralized Data Processing department.

- Resistance from managers for mechanization of the data processing activities relating to their various functions.

- It is difficult to provide equitable services to various departments.

- The data security is also questioned.

## 3.5 DECENTRALISED DATA PROCESSING SYSTEM

In the decentralized data processing system, there is really a divisional breakdown of computing services. Each division, unit or department handles its own computer needs and does not like to interact with any other division, unit or department. It is well suited to a decentralized mangement scheme in which organizational autonomy is important. For example, research divisions of a large organization may adopt the decentralized data processing approach to provide data security of their work.

Arguments in support of decentralized data processing include the following:

- Familiarity with local problems

- Rapid response to local processing needs

- Profit-and-loss responsibility can be easily fixed

The drawbacks of the decentralized data processing system are:

- There is duplication of activities and redundancy in the maintenance of files.

- It is difficult to maintain uniformity in the procedures throughout the organization.

- The overall cost of the data processing for the organization is more.

## 3.6 INFORMATION SYSTEM

The information system aims at providing detailed information on a timely basis throughout the organization so that the top management can take proper and effective decisions. The information system cuts across departmental lines and help achieving overall optimization for the organization.

The organization is viewed as a network of inter-related sub-systems rather than as a hierarchy of manager-subordinate relationship. The information system can be of two types:

- Integrated information system

- Distributed information system

## (a) Integrated Information System

The integrated information system is based on the presumption that the data and information are used by more than one system in the organization. Accordingly, data and information are channeled into a reservoir or database. All the data processing and provision of information is derived and taken from this common database. The development of an integrated information system requires a long-term overall plan, commitment from management at all levels, highly technical personnel, availability of sufficient fund, and sophisticated technology. It also requires adequate standby facilities, without which the system is doomed to failure. Because of its integrated component, the modification to the system is quite difficult and the system development takes a fairly long time.

## (b) Distributed Information System

There are opinion that development of an integrated information system is embodied with several practical problems and therefore, not feasible. This view has been reinforced by the failure of integrated systems in various large organizations. The concept of a distributed information system has emerged as an alternative to the integrated information system. In the distributed information system, there are information sub-systems that form islands of information systems. The distributed information system aims at establishing relatively independent sub-systems, which are, however, connected through communication interfaces.

Following are the advantages of the distributed information system:

- The processing equipment as well as database are dispersed, bringing them closer to the users.

- It does not involve huge initial investment as is required in an integrated system.

- It is more flexible and changes can be easily taken care of as per user's requirements.

- The problem of data security and control can be handled more easily than in an integrated system.

- There is no need of standby facilities because equipment breakdown are not as severe as in an integrated system.

The drawbacks of the distributed system are:

● It does not eliminate duplication of activities and redundancy in maintaining files.

● Coordination of activities becomes a problem.

● It needs more channels of communications than in an integrated system.

It is possible to consider several alternative approaches, which fall between the two extremes – a completely integrated information system and a totally independent sub-system. It is to be studied carefully what degree of integration is required for developing an information system. It depends on how the  management wants to manage the organization, and the level of diversity within the organization.

## 3.7 MULTI-USER ENVIRONMENT

The necessity of sharing of data and information gave rise to multi-user environment. In a multi-user environment, there is a concept of file server and user nodes or user terminals connected to the file server. There are various ways of developing a multi-user environment depending upon the connectivity. There is local area network (LAN) where nodes are connected with the file server with cables through which the data and information are transferred from file server to the different nodes connected to the file server and vice-versa. In a Wide Area Network (WAN), the nodes are connected through MODEM or through  satellite.

## 3.8 NETWORKING/FILESERVER SYSTEM

In a Local Area Network, all the data and programme files are stored in a file server. A file server is the central node in the network. All the users connected to the file server through different nodes can access the data and information stored in the fileserver simultaneously. The file server in a LAN acts as a central hub for sharing peripherals like, printers, modems, etc. In a LAN an application running on a workstation reads and writes files on the file server. In many cases the entire files are pumped across the network on behalf of the operations taking place on LAN PCs. A file server is not involved in processing of an application. It simply stores files for applications that run on LAN PCs. For example, you might have a personal database manager and then information in a file on the file server. The file server sends all or part of the data file across the network to

your workstation. As you work with your personal database manager and the database on your workstation, the file server does not take part at all. When you save the file it goes back to the file server across the network.

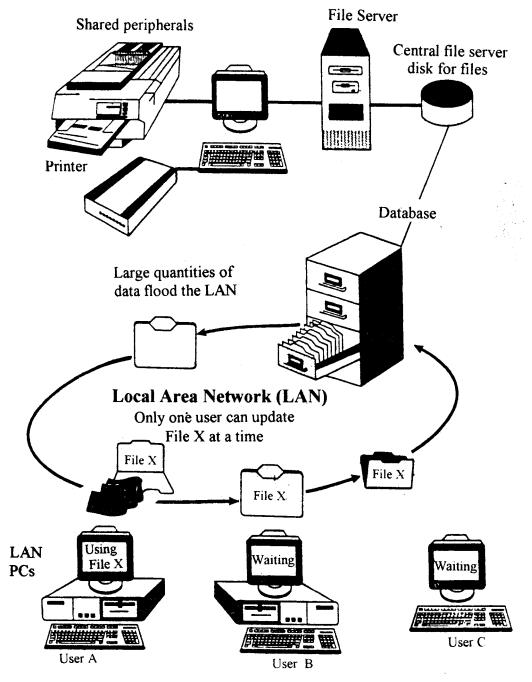The inherent design of the LAN/file server computing model is shown in Fig.3.1.

Shared peripherals

File Server

Central file server disk for files

Printer

Database

Large quantities of data flood the LAN

**Local Area Network (LAN)**

Only one user can update File X at a time

File X

File X

File X

LAN PCs

Using File X

Waiting

Waiting

User A

User B

User C

*Fig. 3.1: Network/File server system*

Two flaws limit a file server system for multi-user applications. First, the file server model does not deliver the data concurrency (simultaneous access to a single data set by more than one user), that is required frequently by multi-user applications. The reason behind it is that the file server operates in files, which are set of large number of data records and prevents a user from sharing a file when another user has locked it out. Second, if many workstations request and send many files in a LAN, the network can quickly become saturated with traffic, creating a bottleneck that degrades overall system performance.

## INTEXT QUESTIONS

1. Fill in the blanks.

   (a) There are basically two approaches of data processing centralized data processing and _____.

   (b) In _____ data processing the loss of data is minimized.

   (c) The _____ information system is based on the presumption that data and information are used by more than one system in the organization.

   (d) The drawback of distributed system is that, it does not eliminate_____ of activities and redundancy in maintaining files.

   (e) In a Local Area Network all the data and program files are stored in a _____.

## 3.9 CLIENT\SERVER SYSTEM

The limitations of the network\file server system have led to the development of the client\server system. It delivers the benefits of the network-computing model along with the stored data access. Any local area network could be considered as client\server system, since work-stations (clients) request services such as data, program file or printing from server.

A client\server has three distinct components, each focusing on a specific job: a data-base server, a client application and a network. Fig.3.2 represents an idea about the components of the client\server-computing model.
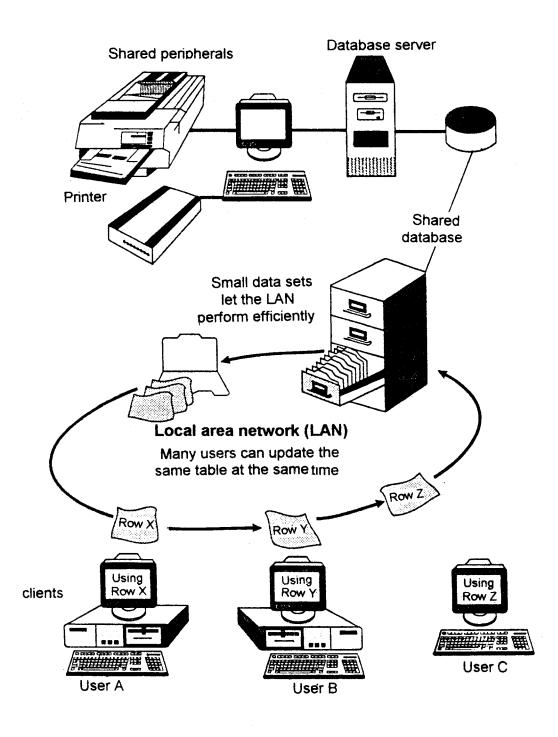
*Fig. 3.2: Components of client/ server computing module*

## 3.10 DATABASE SERVER

A server (or "back end") manages the resources such as database, efficiently and optimally among various clients that simultaneously request the server for the same resources. Database server mainly concertrates on the following tasks.

● Managing a single database of information among many concurrent users.

● Controlling database access and other security requirements.

● Protecting database of information with backup and recovery features.

● Centrally enforcing global data integrity rules across all client applications.

## 3.11 CLIENT APPLICATION

A client application (the "front end") is the part of the system that users apply to interact with data. The client application in a client/ server model focus on the following job:

● Presenting an interface between the user and the resource to complete the job

● Managing presentation logic

● Performing application logic

● Validating data entry

● Managing the request traffic of receiving and sending information from database server

## 3.12 NETWORK

The third component of client/server system is network. The communication software are the vehicles that transmit data between the clients and the server in client server system. Both the client and the server run communication software that allows them to talk across the network.

## INTEXT QUESTIONS

2. State whether the following statements are True and False.

    (a) Any Local Area Network could be considered as client/ server system.

(b) A server application is the part of the system that users interact with.

(c) A client/server has three distinct components: a data base server, a client application and a network.

(d) The third component of a client/server system is network.

(e) Database server mainly concentrates on validating data entry.

## 3.13 WHAT YOU HAVE LEARNT

In this lesson different data processing methodologies such as centralized and decentralized have been explained. The development methodologies of various information system are also explained. A brief description of network/file server and client/server technology has also been made.

## 3.14 TERMINAL QUESTIONS

1. Explain various data processing techniques.

2. What is the difference between integrated information system and distributed information system? Explain in brief.

3. Define client/server system. Explain the different components of a client/server system.

## 3.15 KEY TO INTEXT QUESTIONS

1  (a) decentralized data processing (b) centralize  (c) integrated (d) duplication(e) file server

2.  (a) True   (b) False  (c) True   (d) True   (e) False