

COPPERBELT UNIVERSITY

SCHOOL OF INFORMATION AND COMMUNICATION TECHNOLOGY

CS 120 – Introduction to Computer Systems

Unit 1: Introduction

Nowadays, computers are an integral part of our lives. They are used for the reservation of tickets for airplanes and railways, payment of telephone and electricity bills, deposit and withdrawal of money from banks, processing of business data, forecasting of weather conditions, diagnosis of diseases, searching for information on the Internet, etc. Computers are also used extensively in schools, universities, organizations, music industry, movie industry, scientific research, law firms, fashion industry, etc. The term computer is derived from the word *compute*. The word *compute* means *to calculate*. A *computer* is an electronic machine that accepts data from the user, processes the data by performing calculations and operations on it, and generates the desired output results. Computer performs both simple and complex operations, with speed and accuracy.

Data and Information

The term *data* refers to individual or raw facts and statistics collected together for reference or analysis. Examples of data include lists of the raw materials that are combined into a finished product called a bill of materials, records of who owes the organization money called accounts receivable. There are also records of what was produced, how much was sold and to whom, who works for an organization, where the organization's branch locations are, the addresses of the organization's customers and so on.

When we combine data to gain additional insight, we are creating *information*. Therefore, information refers to processed facts; data with added meaning or interpretation. Information often consists of summarized data (such as total sales), or data compared across two or more entities (Lusaka versus Kitwe).

Alternatively, **Information** refers to data that have been shaped into a form that is meaningful and useful to human beings. **Data**, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

Qualitative and Quantitative Data/Information

Qualitative information deals with opinions, policies and narrative descriptions of activities or problems.

Quantitative information, on the other hand, deals with numbers, frequencies, or quantities.

Characteristics of Data and Information

There are several characteristics of data and information that affect their usefulness to the organization.

- Source:
The source is important because knowledge of the source affects the credibility of the information. Information from internal sources is often more highly regarded than information from external sources. External sources have different levels of credibility. When more than one source reports the same data, its credibility increases.
- Scope:
The scope of data is also important as it includes the range around which data or information is being collected or remains valid. The market trends of Lusaka province, Copperbelt province, are important if that is your entire market, but they are less important if your market is all of Zambia. As with source, it is important to report scope to those who are using the information.
- Accuracy:
Accuracy refers to the precision of the data – does it correspond to facts and is it free from error? Accuracy is relative, and perfect accuracy is often expensive to achieve, depending on the type of data. We expect almost perfect accuracy in our cash transactions, but we are willing to accept less than perfect accuracy in estimates of the time to complete a project. As data are processed to yield information, the accuracy of the information diminishes because the errors of the individual data are combined.
- Frequency:
The frequency of data collection and processing refers to how often it is collected or processed and should match the needs of the manager. Daily reports of the organization's raw material inventory level might be important to production line managers, but certainly not to the executive in charge of long-term planning. However, that person might want to know typical inventory levels for the past three years.
- Timeliness:
The timeliness of reporting is another attribute of information. The data or information must be presented within the time of validity. A daily report, received the morning after, is far less useful than one received at the end of the business day.
- Value:
Information has value. Sometimes the value is obvious. Sometimes the value is much less obvious. For example, the value one will get from purchasing the best performing students notes and past test papers will be higher than any other student's notes and/or test papers. As a result, notes and test papers from the best performing student might cost you more than any ordinary student.
- Cost
Every one of the characteristics just discussed carries a cost. For instance, to obtain greater accuracy we must survey a wider sample, or use more precise instruments, or check the data more carefully. More frequent reports cost more to produce. External data usually costs more than internal data.

Data Processing

This involves the carrying out of operations on data, especially by a computer, to retrieve, transform, or classify information. Data processing is all about recording and communicating data and information.

The Data Processing Model

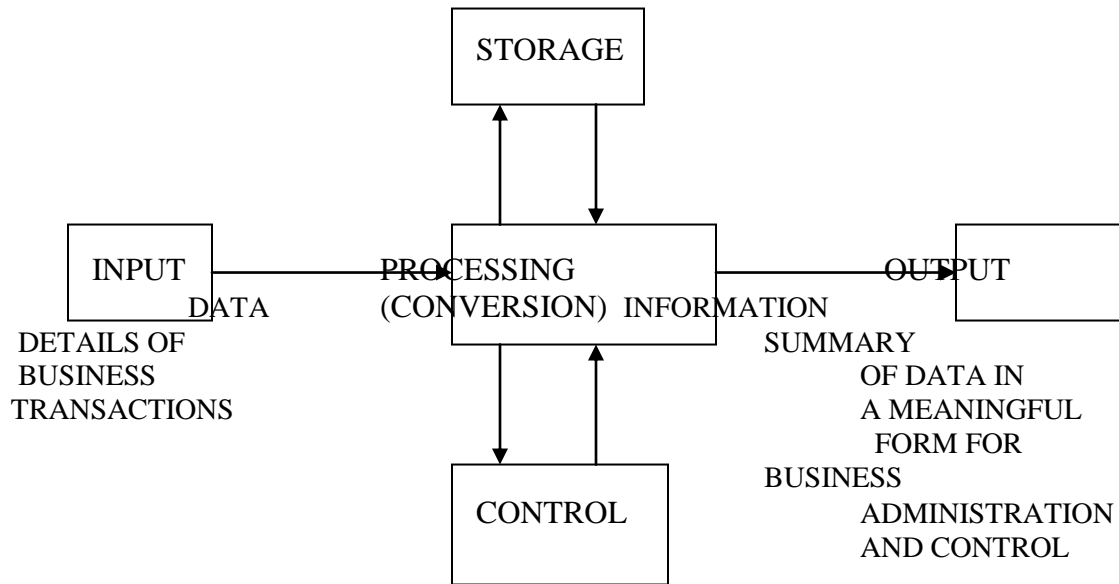
As earlier stated, data are the basic facts and figures which may be used as a historical record about, say, a company or an organization. These may be assembled together in the form of files, reports, graphs, payrolls, etc. If raw data is processed according to some rules or policy, the results obtained (if they are meaningful) are called information. The word meaningful here signifies that on which executives or management may take decisions. It may be noted that information obtained at a certain level may serve as raw data for further information at another level. That is probably the reason that the words data and information are used interchangeably. Strictly speaking, data consists of numbers, text, etc. that a computer processes according to certain procedures to produce information. The computer can be used to organize the raw data in some order so that it becomes information. Preparing charts, tables, reports, work sheets, etc. are examples of creating information from raw data.

A data processing system is a combination of machines, people, and processes that for a set of inputs produces a defined set of outputs. The inputs and outputs are interpreted as **data**, facts, information etc. depending on the interpreter's relation to the system.

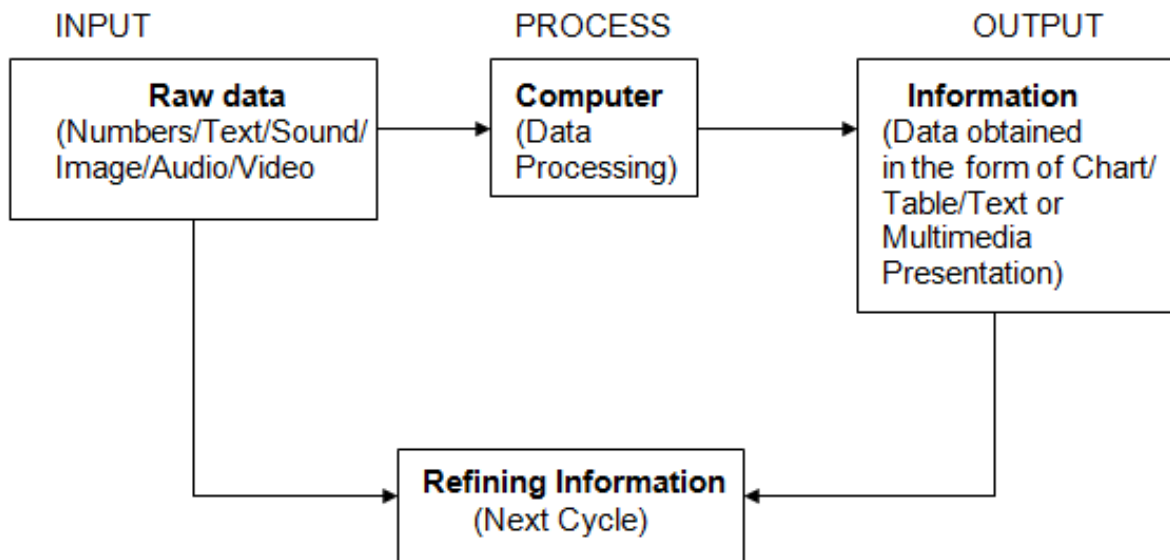
ELEMENTS OF A DATA PROCESSING SYSTEM

A data processing system in its simplest form consists of three primary elements, that is, *input*, *processing* and *output*. These elements apply whether the system is manual, mechanical or electronic. Data relating to business transactions such as items sold to customers, issues to production from the stores and hours worked by employees is input for processing. The data is subjected to processing operations in order to convert it into a more meaningful form prior to being output. The output, referred to as information, consists of documents such as invoices and payslips; schedules such as payrolls and sales summaries; and reports relating to customer credit standing and stock availability.

Two secondary, but nevertheless important, elements may be added to the primary elements of a data processing system. These are storage and control. Storage is concerned with filing documents and records relating to business transactions so that the state of affairs of specific business situations is readily available; for example, amounts owing to customers, amounts owed by suppliers and the quantity of items in stock. Control relates to the monitoring by a supervisor to ensure that activities are conducted in the prescribed manner (see the following figure).



We may therefore conclude that processing data is a cyclic process and at every cycle we receive more meaningful data as evident from the following model:



What is an Information System?

An *information system* can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, co-ordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. In short, an information system contains

information about an organization and its surrounding environment. Three basic activities – *input*, *processing*, and *output* – produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input.

Environmental actors such as customers, suppliers, competitors, stockholders, and regulatory agencies interact with the organization and its information systems.

NOTE

Information systems may be broadly categorized into two categories:

- Manual
- Computer Based

Basic Components of a Computer Based Information System

- Users:
These include the different group of persons who manage the system (computer operators) and those who retrieve the information from the system to take decisions, such as managers (users).
- Hardware/Communication Equipment:
These include networks (WANs-Wide Area networks, LANs-Local Area networks, and INTRANETS), all hardware and communication equipment.
- Software:
This is a collection of programs which do specific tasks. Different rules and methods and practices prevailing in a business organization are coded into the programs or software. The software is installed in computer systems and is used to manage the hardware, process the data and generate reports for different types of users.
- Database:
This is a structured collection of data. The software or programs fetch the data from the database and process them as per requirement.
- Set of Methods (or documented procedures):
The set of methods refers to the tradition and practices prevailing in the business house where the information system is used. Various traditions and practices which govern the business are laid down in the form of rules which are then coded into the programs.

Characteristics of Information Systems

- An information system keeps and manipulates data in a predictable way to provide information for its users.
- An information system exists in a context.
- An information system includes a data repository and processing functions.
- The data repository contains representations of objects from some “universe of discourse”.
- The data repository and the processing functions can be implemented manually, or they can be computerised.

