Information Systems & Network Security

Chapter 1

An Introduction to Information Systems

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Why Learn About Information Systems?

- Information systems (ISs) can cut costs and increase profits

- Students in most fields need to know ISs
  - Management major might be hired to design a system to improve productivity
  - Biochemistry major might be hired to conduct drug research using computer techniques

Introduction

- **Information system (IS)**
  - Set of interrelated components: collect, manipulate, store, and disseminate data and information.
  - Provides feedback to meet an objective.
  - Examples: ATMs, airline reservation systems, course reservation systems, e-commerce, m-commerce.

Information Concepts: Data, Information, and Knowledge

- **Data:** raw facts
  - Alphanumeric, image, audio, and video
- **Information:** collection of facts organized in such a way that they have additional value beyond the value of the facts themselves.
- **Knowledge:** In an information system, Knowledge can be described as: "an awareness and understanding of a set of information and the ways that information can be used to support a specific task or reach a decision"

Data, Information, and Knowledge (continued)

Data	Represented by
Alphanumeric data	Numbers, letters, and other characters
Image data	Graphic images and pictures
Audio data	Sound, noise, or tones
Video data	Moving images or pictures

Table 1.1: Types of Data

Data, Information, and Knowledge (continued)

Figure 1.2: The Process of Transforming Data into Information

The Characteristics of Valuable Information

Characteristics	Definitions
Accessible	Information should be easily accessible by authorized users so they can obtain it in the right format and at the right time to meet their needs.
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process. (This is commonly called garbage in, garbage out [GIGO].)
Complete	Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.
Economical	Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory.

Table 1.2: Characteristics of Valuable Information

The Characteristics of Valuable Information (continued)

Relevant	Relevant information is important to the decision maker. Information showing that lumber prices might drop might not be relevant to a computer chip manufacturer.
Reliable	Reliable information can be depended on. In many cases, the reliability of the information depends on the reliability of the data-collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up might not be reliable.
Secure	Information should be secure from access by unauthorized users.
Simple	Information should be simple, not overly complex. Sophisticated and detailed information might not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.
Timely	Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.

Table 1.2: Characteristics of Valuable Information (continued)

The Value of Information

- Value of information is directly linked to how it helps decision makers achieve their organization's goals.

- For example, value of information might be measured in:
  - Time required to make a decision
  - Increased profits to the company
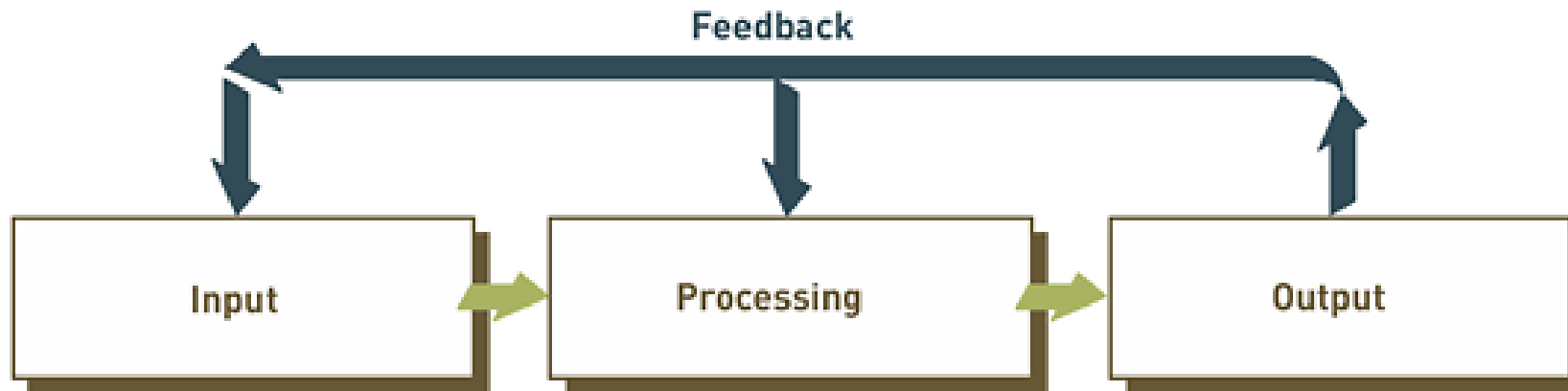
What Is an Information System?

Figure 1.3: The Components of an Information System

Input, Processing, Output, Feedback

- **Input:** the activity of gathering and capturing raw data

- **Processing:** converting or transforming data into useful outputs

- **Output:** production of useful information, usually in the form of documents and reports

- **Feedback:** output that is used to make changes to input or processing activities

Manual and Computerized Information Systems

- An information system can be:
  - Manual
    - Example: developing patterns and trends on graph paper for stock analysis
  - Computerized
    - Example: using program trading to track the market and trade large blocks of stocks when discrepancies occur

Computer-Based Information Systems

- **Computer-based information system (CBIS):** single set of hardware, software, databases, telecommunications, people, and procedures configured to collect, manipulate, store, and process data into information

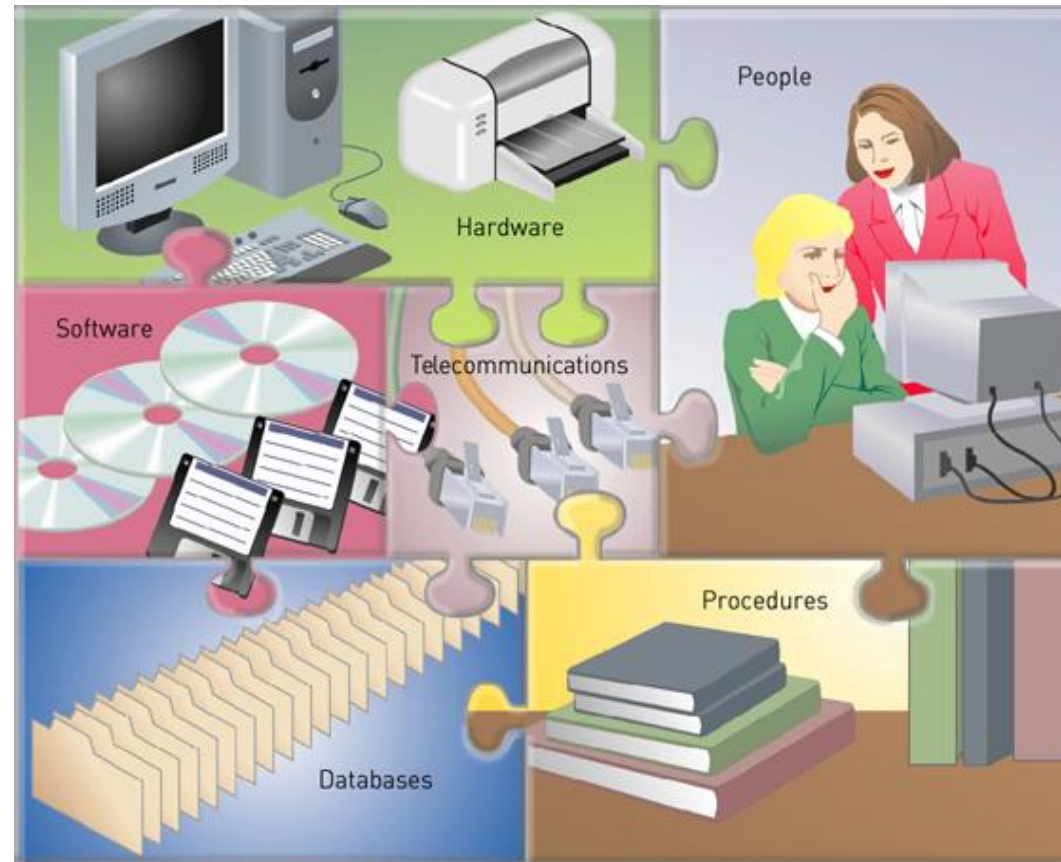# Computer-Based Information Systems (continued)

Figure 1.4: The Components of a Computer-Based Information System

Computer-Based Information Systems (continued)

- CBIS components
  - Hardware: computer equipment used to perform input, processing, and output activities
  - Software: computer programs that govern the operation of the computer
  - Database: organized collection of facts and information
  - Telecommunications: electronic transmission of signals for communications
  - Networks: connect computers and equipment in a building, around the country, and around the world

Computer-Based Information Systems (continued)

- CBIS components (continued)
  - Internet: world's largest computer network
  - People: manage, run, program, and maintain the system
  - Procedures: strategies, policies, methods, and rules for using a CBIS

Business Information Systems(BIS)

- Most common types of information systems used in business organizations
  - Electronic and mobile commerce systems
  - Transaction processing systems
  - Management information systems
  - Decision support systems
  - Specialized business information systems
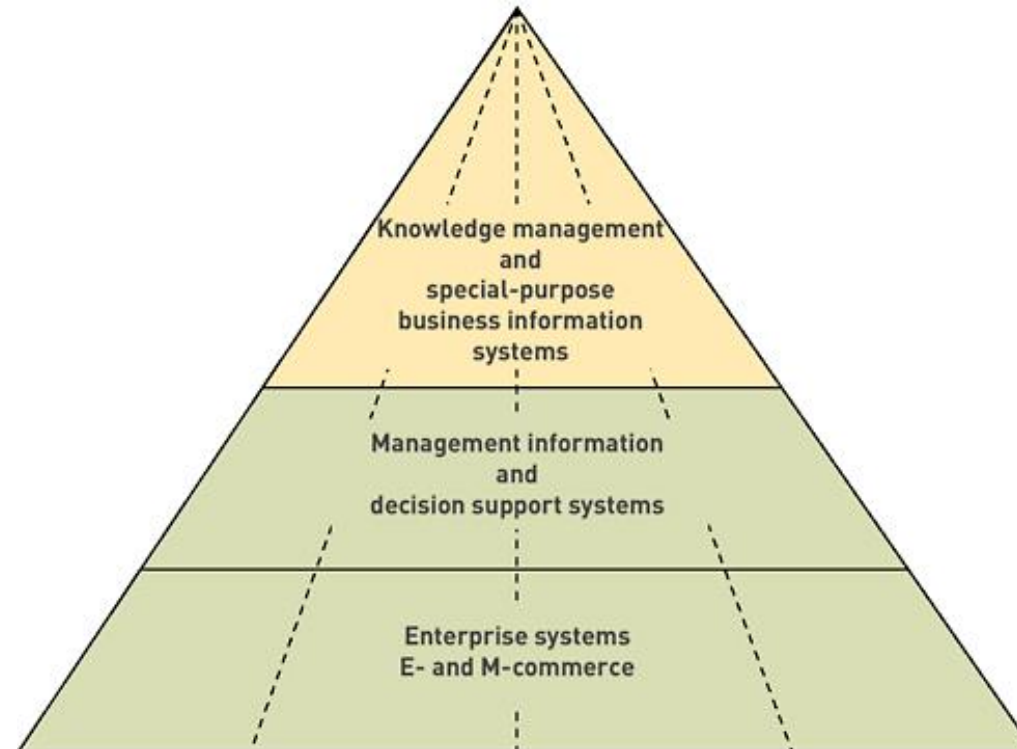
Business Information Systems (continued)

Figure 1.5: Business Information Systems

Electronic and Mobile Commerce

- **E-commerce:** any business transaction executed electronically between parties
  - Companies (B2B)
  - Companies and consumers (B2C)
  - Consumers and other consumers (C2C)
  - Companies and the public sector
  - Consumers and the public sector

Electronic and Mobile Commerce (continued)

Figure 1.8: Electronic Business

Enterprise Systems: Transaction Processing Systems and Enterprise Resource Planning

- **Transaction:** business-related exchange
    - Payments to employees
    - Sales to customers
    - Payments to suppliers

- **Transaction processing system (TPS):** organized collection of people, procedures, software, databases, and devices used to record completed business transactions.

- An effective TPS provides a number of benefits to a company

- A TPS can speed business activities and reduce clerical costs
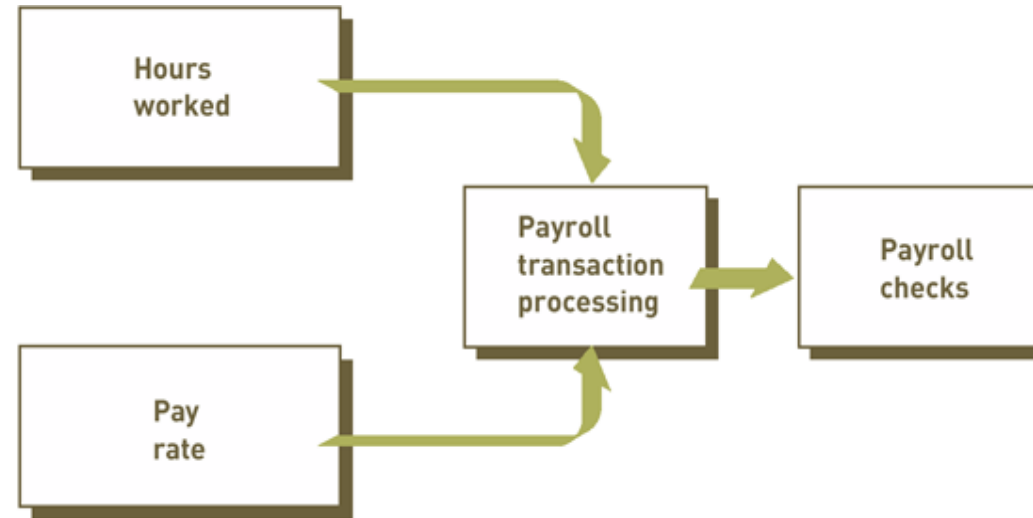
Transaction Processing Systems (continued)

Figure 1.9: A Payroll Transaction Processing System

Enterprise Resource Planning(ERP)

- Integrated programs capable of managing a company's vital business operations for an entire multisite organization

- Coordinate planning, inventory control, production, and ordering

Management Information Systems

- **Management information system (MIS)**
  - Organized collection of people, procedures, software, databases, and devices
  - Provides routine information to managers/decision makers
- Primary focus is operational efficiency
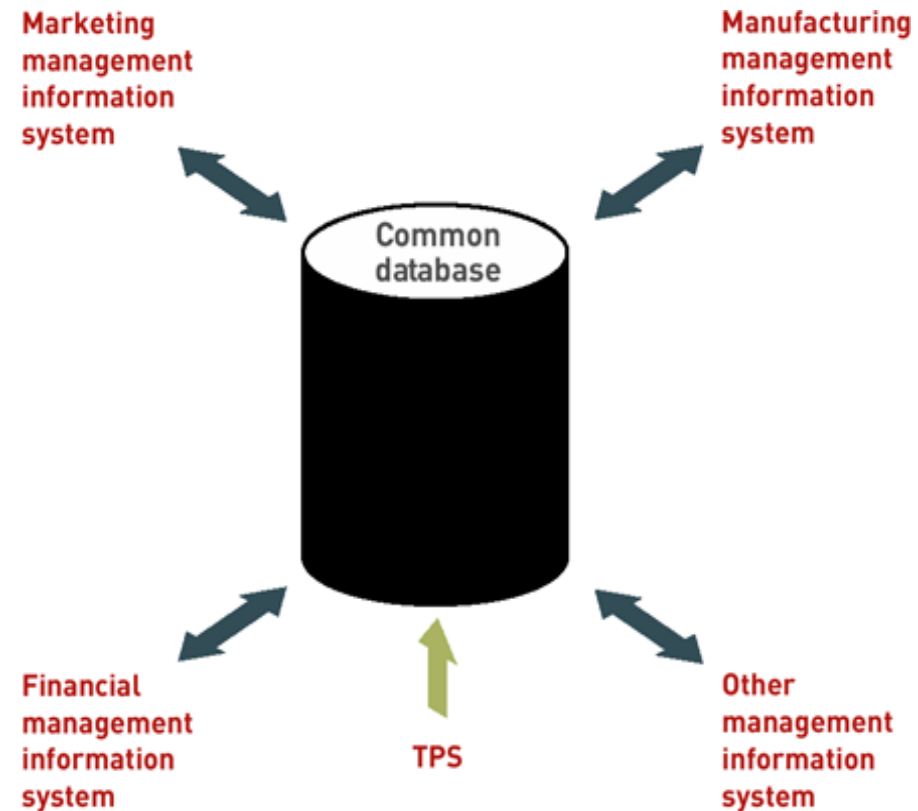
Management Information Systems (continued)

Figure 1.10: Management Information System

Decision Support Systems

- **Decision support system (DSS)**
    - Organized collection of people, procedures, software, databases, and devices
    - Supports problem-specific decision making

- Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

- Focus is on decision-making effectiveness

Specialized Business Information Systems: Knowledge Management, Artificial Intelligence, Expert Systems, and Virtual Reality

- **Knowledge management systems (KMSs):** an organized collection of people, procedures, software, databases, and devices to create, store, share, and use the organization's knowledge and experience

- **Artificial intelligence (AI):** field in which the computer system takes on the characteristics of human intelligence

Expert Systems

- Give the computer the ability to make suggestions and act like an expert in a particular field

- Allow organizations to capture and use the wisdom of experts and specialists

- The knowledge base contains the collection of data, rules, procedures, and relationships that must be followed to achieve value or the proper outcome

Virtual Reality

- Simulation of a real or imagined environment that can be experienced visually in three dimensions

- Can be a powerful medium for communication, entertainment, and learning

Summary

- **Information Systems** is study of systems with a specific reference to information and the complementary networks of hardware and software that people and organizations use to collect, filter, process, create and also distribute data.

- Input → Processing → Output

- Electronic and mobile commerce systems

- Transaction processing systems

- Management information systems

- Decision support systems

- https://www.youtube.com/watch?v=Qujsd4vkqFI