# Foundation Of Information Systems
## (IS 201)

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# Learning Objectives:

- **Defining Information Systems.**
  - 1.1 Defining Data and Information
  - 1.2 Defining Systems
  - 1.3 Defining Information Systems
  - 1.4 Business Information Systems
  - 1.5 Types of business information system

# Learning Objectives (cont'd):

- **Hardware**
  - 2.1 Input devices
  - 2.2 Central Processing Unit (CPU)
  - 2.3 Internal and External Memory
  - 2.4 Output devices
  - 2.5 Major categories of computers

# What Is An Information System?

- **<u>Data</u>** is a raw fact and can take the form of a number or statement such as a date or a measurement.

- It is necessary for businesses to put in place procedures to ensure data are recorded.

- **<u>Information</u>** is data that have been processed so that they are meaningful.

- The differences between 'good' and 'bad' information can be identified by considering whether or not it has some or all of the attributes of information quality. Attributes can be related to the timing, content , . . . etc.

# What Is An Information System? (cont'd)

- A <u>system</u> can be defined as a collection of components that work together towards a common goal.

- The objective of a system is to receive inputs and transform these into outputs.

- The role of the <u>Information systems</u> to provide information to management which will enable them to make decisions which ensure that the organization is controlled.

# What Is An Information System? (cont'd)

- People rely on modern information systems to communicate using a variable:

  - physical devices (hardware).

  - information processing instruction and procedures (software).

  - communications channels (network).
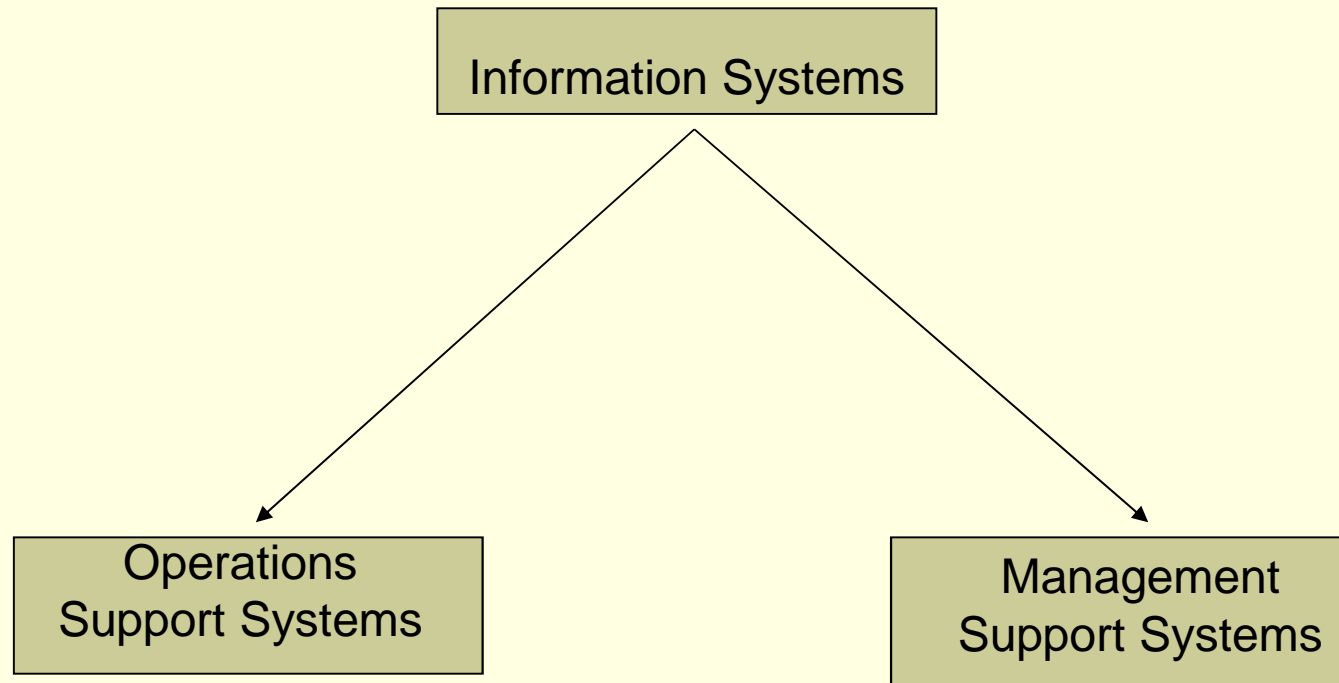
  - stored data (data resources).

# Business Information System (BIS)

- <u>Business Information System</u> is a group of interrelated components that work collectively to carry out input, processing, output, storage and control actions in order to convert data into information products that can be used to support forecasting, planning, control, coordination, decision making and operational activities in an organization (Laudon and Laudon, 2007).
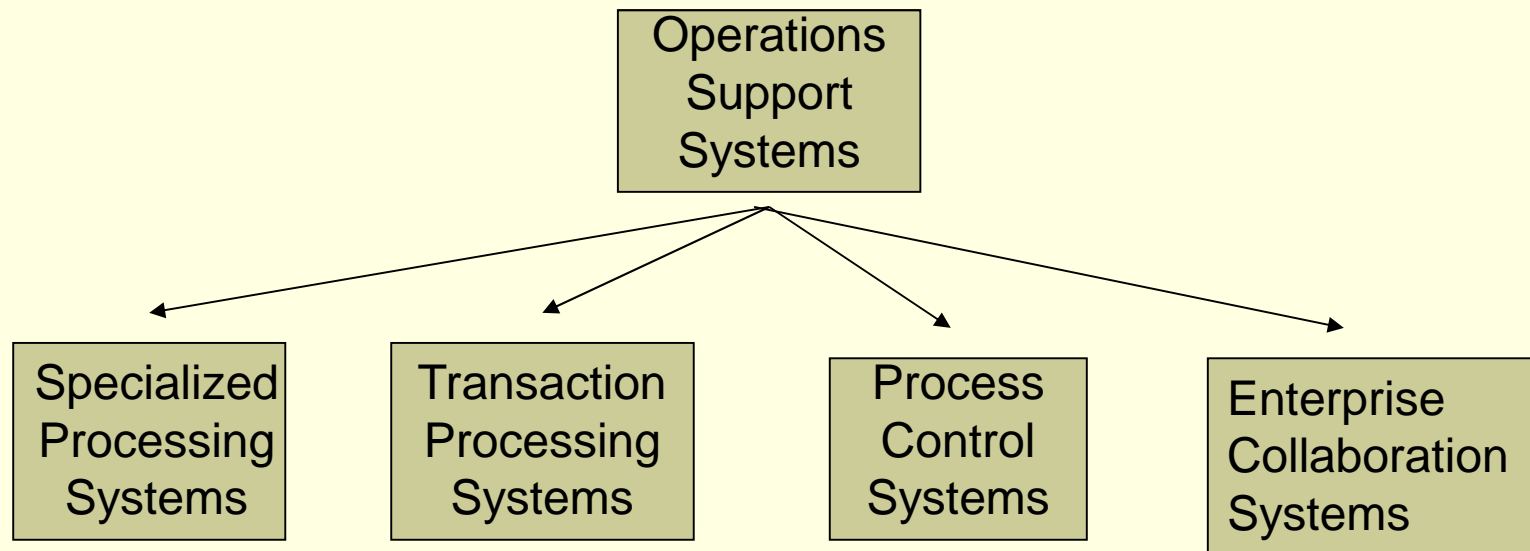
# Types of BIS :

- Operations Information Systems (OIS):

 are generally concerned with process control, transaction processing and communications.

- Management Information Systems (MIS):

are concerned with providing support to managerial decision making.

# Types Of Information Systems

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                    ┌─────────────────────┐
                    │ Information Systems  │
                    └─────────────────────┘
                       ╱               ╲
                      ╱                 ╲
                     ╱                   ╲
        ┌──────────────────┐    ┌──────────────────┐
        │    Operations    │    │    Management    │
        │ Support Systems  │    │ Support Systems  │
        └──────────────────┘    └──────────────────┘
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# Types Of Information Systems (continued)

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                    ┌─────────────┐
                    │ Operations  │
                    │  Support    │
                    │  Systems    │
                    └─────────────┘
            ┌───────────┼───────────┬───────────┐
            ▼           ▼           ▼           ▼
   ┌──────────────┐ ┌──────────────┐ ┌──────────┐ ┌───────────────┐
   │ Specialized  │ │ Transaction  │ │ Process  │ │ Enterprise    │
   │ Processing   │ │ Processing   │ │ Control  │ │ Collaboration │
   │ Systems      │ │ Systems      │ │ Systems  │ │ Systems       │
   └──────────────┘ └──────────────┘ └──────────┘ └───────────────┘
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# Types Of Information Systems (continued)

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                    ┌──────────────┐
                    │  Management  │
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┌──────────────┐ ┌──────────┐ ┌───────────┐ ┌──────────────┐
│  Management  │ │ Decision │ │ Executive │ │  Specialized │
│  Information │ │ Support  │ │Information│ │  Processing  │
│   Systems    │ │ Systems  │ │  Systems  │ │   Systems    │
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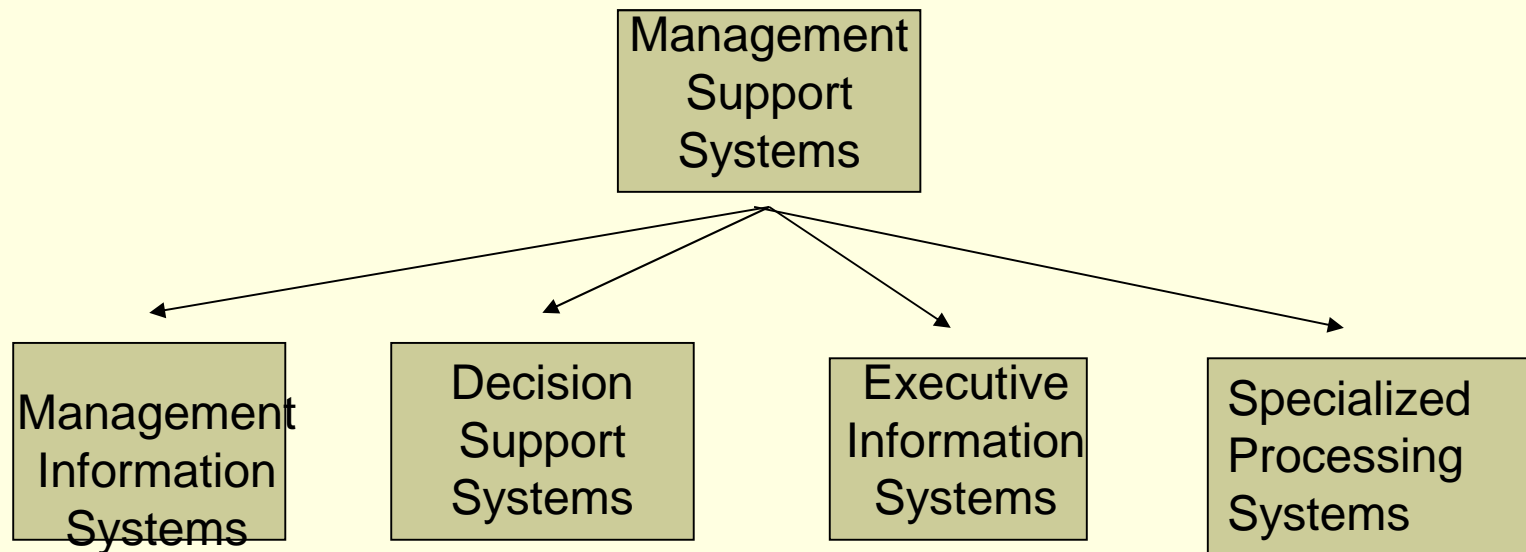
# Types Of Information Systems (continued)

- ■ Operations support systems:
  - Transaction processing systems
    - -- process data resulting from business transactions, update operational databases, and produce business documents.
    - Examples: Sales and inventory, processing and accounting systems.

# Types Of Information Systems (continued)

■ **Operations support systems (continued):**

- Process control systems.

-- minor and control industrial process.

Examples: Petroleum refining, power

generation, steel producing

systems.

# Types Of Information Systems (continued)

■ **Operations support systems (continued):**

   - Enterprise collaboration systems.

     -- support team, workgroup, and enterprise

      communications and collaboration.

      Examples: email, chat, video

              conferencing groupware

              systems.

# Types Of Information Systems (continued)

■ Management support systems:

- Management information systems

-- provide information in the form of pre

specified reports and displays to support

business decision making.

Examples: Sales analysis,

production performance,

cost trend reporting systems.

# Types Of Information Systems (continued)

- Management support systems (continued):

  - Decision support systems

    -- provide interactive ad hoc support for the decision making processes of managers and other business professionals. Examples: product pricing, profitability forecasting, risk analysis.

# Hardware

- **<u>Hardware</u>** describes the physical components of a computer system which can be categorized as:
  - Input devices,
  - Central Processing Unit,
  - Internal and external memory,
  - and output devices.

# Hardware (Cont'd)

■ **Input devices:**

Input devices are used to enter data or instructions from outside the computer into the computer. A mouse and keyboard are examples of input devices. The choice of an input device will often depend upon the quantity of data to be entered.

■ Even a typical personal computer will often feature several different methods for data entry, such as keyboard, mouse, joystick and sound card.

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# Hardware (Cont'd)

- **Central Processing Unit (CPU)**

  - Processor accepts instructions and data and executes them storing the results in memory. The increased speed of computers is primarily a result of increasing CPU speeds.

  - The speed of a processor will depend upon a number of different factors. such as the clock speed and bus width.

  - The clock speed determines how many instructions per second the processor can execute.

  - The bus width describes how many pieces of data can be transmitted at one time.

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# Hardware (Cont'd)

- **Internal and External Memory**
  - Computer memory is categorized as internal memory (also called main memory or primary memory) which is data held on the computer and external memory (also called external storage) which is data stored on a separate device where the information will be retained even if the machine is switched off.

  - Computer memory is used to store data awaiting processing, instructions loaded from software which are used to process data or control the computer system and data or information that has been processed. Floppy and hard disks are examples of external memory.

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# Hardware (Cont'd)

- ## Output devices

  - Output devices display the results of computer processing.

  - A computer-based information system will make use of a number of output devices as a monitor, printer and sound card.

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# Major categories of computers

- **Mainframe**
  - large, powerful machines designed for large-scale data processing activities.

- **Minicomputers**
  - The minicomputer combines some of the characteristics of the mainframe computer and the microcomputer. Today, they are often referred to as servers by companies
  - Different types of server may have different functions, such as managing a network or hosting a database.

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# Major categories of computers (Cont'd)

- **Microcomputers**
  - It makes use of more modern technology to provide relatively powerful computing facilities at low cost. It referred to as the 'client' machine which receives services and data from a 'server' machine.

  - Some of the major characteristics of the microcomputer are that they are small, relatively inexpensive and can be used for a variety of purposes.

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# Software

- **Software** can be defined as a series of detailed instructions that control the operation of a computer system and exists as programs which are developed by computer programmers.

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# Types of Software

- **Systems software**
  - Systems software manages and controls the operation of the computer system as it performs tasks on behalf of the user.

  - It consists of three basic categories:
    - Operating Systems (OS). (Ex. Windows, Linux)
    - Software Development programs. (Ex. C, C++)
    - Utility programs. (Ex. Antivirus)

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# Types of Software ( Cont'd)

- **Application software**
  - Application software can be defined as a set of programs that enable users to perform specific information-processing activities.

  - Application software can be divided into two broad categories:
    - General-purpose applications. (Ex. MS Word)
    - Application-specific software. (Ex. Payroll SW)

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# Computer Based Information System & Information Technologies:

1. Computer hardware technologies.
2. Computer software technologies.
3. Telecommunications network technologies.
4. Data resource management technologies.

# The Major Areas Of Information Systems Knowledge Needed By Business Professionals

1. **Foundation concepts.**

    concept about the components and roles of information systems.

2. **Information technologies.**

    hardware, software, networks, data management, many internet based technologies.

# The Major Areas Of Information Systems Knowledge Needed By Business Professionals (continued)

3. **Business applications.**

   operations, management, competitive advantage of a business.

4. **Development processes.**

   plan, develop, and implement information systems to meet business opportunities.

5. **Management challenges.**

   the challenges of effectively and ethically managing information technology at end user, enterprise, and global levels of a business.

# The Fundamental Roles Of Information System In Business

There are three fundamental reasons:

1. Support of its business processes and operations.

2. Support of decision making by its employees and managers.

3. Support of its strategies for competitive advantage.

# Database Systems

- An electronic database provides facilities for users to <u>add</u>, <u>update</u> or <u>delete</u> records as required.

- Indexing features mean that the <span style="color:red">same</span> basic information can be stored under a number of different categories. This provides great flexibility and allows users to locate, retrieve and organize information as needed.

- Databases used throughout a company are usually accessed by many different users across a network system.

# Organising data in a database

- The data in an electronic database is organised by <u>fields</u> and <u>records</u>.

- A field is a single item of information, such as a name or a quantity.

- A record is a collection of related fields and a table is a collection of related records.

# Organising data in a database (Cont'd)

- In order to identify a specific item of information within a database, all records must contain a unique identifier, normally called the key field or primary key.

- The key field usually takes the form of a number or code and will be different for each record in the database.

# Database Software

- The majority of database programs support the creation of relational databases containing several linked tables.

- Many programs, such as Microsoft Access, provide the ability to link tables together automatically to create any required relationships.

# Retrieving Data from a Database

- When using database software data is retrieved from a database using what is called a query.

- A query enables a user to locate, sort, update or extract records from the database.

- Users design a query by specifying the conditions that must be met in order for a record to be selected.

# Retrieving Data from a Database (Cont'd)

■ There are two types of query called selection queries and update queries:

   ■ A selection query can be used to locate and display any records meeting a set of specified conditions. None of the data held in the database are altered and any records not meeting the conditions set are simply hidden from view temporarily.

# Retrieving Data from a Database
(Cont'd)

- <u>An update query</u> can be used to modify records in a variety of ways such as according to a set of conditions specified by the user. Such as:

    - updating values held in fields,

    - deleting any records no longer required,

    - appending new records to the database,

    - and generating new tables containing selected records or summary information.

- The majority of database programs make use of a special Structured Query Language (SQL) in order to create queries, It provides a standardized method for retrieving information from databases.

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# Business Intelligence

- Business Intelligence (BI) systems are needed due to the vast amounts of data now held in organizational information systems and the need to extract useful information from this in the form of patterns, trends and present this in a understandable way to decision makers.

- BI systems generally focus on providing <u>timely</u> information at a strategic level in large organizations with large data sets.

# Business Intelligence (cont'd)

- A BI system has four major components of a data warehouse, business analytics, business performance management (BPM) and user interface.

  - Data is gathered from various sources and then held in a special database repository termed a <u>data warehouse</u> in order to support decision-making in the organization. Repositories of data focused on departmental or subject areas are termed data marts.

# Business Intelligence (cont'd)

- **Data mining** is a type of analysis that aims to identify patterns in the data that can be used to predict future behavior.

- **Business Analytics** are used to conduct analysis of the data held in the data warehouse using reporting and querying tools.

- **Business performance management** covers the methodologies used to measure and manage business performance.

- **The user interface** integrates and displays information from multiple business areas.

# The IS (Information System) Functions (continued):

- An important contributor to:

  - operational efficiency,

  - employee productivity,

  - customer service and satisfaction.

- A major source of information and support needed to promote effective decision making by managers and business professionals.

# The IS (Information System) Functions (continued):

- A vital ingredient in developing competitive products and services that give an organization a strategic advantage in the global market place.

# Foundation Concepts: The Components Of Information Systems:

- **Technology:**

  the computer network are systems of information processing component that use a variety of: hardware,

  software,

  data management,

  and telecommunication network technologies.

- **Applications:**

  the electronic business and commerce applications involve interconnected business information systems.

# Foundation Concepts: The Components Of Information Systems (continued):

- **Development:**

   that developing ways to use information technology in business includes designing the basic components of information system.

- **Management:**

   the managing information technology emphasizes the quality, strategic business value, security.

# The Internet and World-Wide Web

**Internet:**

The Internet is a vast network of computers connected across the globe that can share both information and processing.

- If information is limited to those inside an organization the network is termed an **Intranet**. If access is extended to some others, but not everyone beyond the organization, the network is termed an **Extranet**

# The Internet and World-Wide Web

**WWW:**

The World Wide Web provides a standard method for exchanging and publishing information on the Internet.

The medium is based on standard document formats such as <span style="color:red">HTML</span> (hypertext markup language) which has been widely used

because it supports a wide range of formatting facilities making documents easy to read on different access devices.

# The Internet and World-Wide Web

**Web browsers and servers:**

- Web browsers are software applications that are used to access the information on the world wide web that is stored on web servers.

- Web servers are used to store, manage and supply the information on the world wide web.

# The Internet and World-Wide Web

- Web browsers communicate with web servers in the following way:
  - A request from a PC is executed when the user types in a web address, clicks on a hyperlink or fills in an online form such as a search.
  - This request is then sent to the ISP and routed across the Internet to the destination server.

# The Internet and World-Wide Web

- The server then returns the requested web page if it is a static (fixed) page, or if it requires reference to a database.

- Information on all page requests is stored in a transaction log file which records the page requested, the time it was made and the source of the enquiry.

# The Internet and World-Wide Web

## E-business:

- E-business involves several key activities including <u>improving</u> business processes, <u>enhancing</u> communications and <u>providing</u> the means to carry out business transactions securely.

- E-business is part of a broader Internet <span style="color:red">economy</span> which encompasses all of the activities involved in using the Internet for commerce.

# The Internet and World-Wide Web

- The Internet economy is made up of the following layers:

  - Internet Infrastructure. Companies that provide the hardware, software and other equipment for the Internet. Examples: ISPs, networking companies and manufacturers of PCs and servers.

# The Internet and World-Wide Web

- Internet Applications Infrastructure. Companies that provide software facilitating Internet transactions. Also, companies that provide web development, design and consulting services. Examples: producers of web development software, web-enabled databases and search engines.

# The Internet and World-Wide Web

- Internet Intermediaries. Companies that link buyers and sellers, for example by providing content or by creating marketplaces where business can be transacted. Examples: travel agents, content providers and

- Internet Commerce. Companies that sell products and services to consumers or other companies. Examples: online retailers, subscription or fee-based services and manufacturers selling directly to the public.

# The Internet and World-Wide Web

- The benefits of e-business include:
  - Reduce costs,
  - Improve efficiency,
  - and access to larger markets.
  - enhance three main areas of business:
    - production processes,
    - customer-focused processes,
    - and internal management processes.

# The Internet and World-Wide Web

**E-commerce:**

- It can be described as using technology to conduct business transactions, such as buying and selling goods and services.

- E-commerce activities can be broken down into five basic types:

  - Business-to-business (B2B):

  Transactions take place between companies. Approximately 80 per cent of all e-commerce is of this type.

# The Internet and World-Wide Web

■ Business-to-consumer (B2C):

Companies sell products directly to consumers. B2C can involve activities such as product research (where consumers gather information and compare prices) and electronic delivery

(where information products are delivered to consumers via e-mail or other means).

■ Business-to-government (B2G):

 Transactions take place between companies and public sector organizations.

# The Internet and World-Wide Web

- Consumer-to-consumer (C2C):

  Transactions take place between private individuals.

- Mobile commerce (M-commerce):

  M-Commerce is a relatively new development and involves selling goods or services via wireless technology, especially mobile phones.

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# Acquiring Information Systems

**Bespoke development:**

■ It refers to when an information system is developed by an information systems <u>professional</u> to match the business requirements of the application.

■ The information systems professionals will either work for the business which is termed '<u>in-house</u>' bespoke development or for a third party such as a software house which is termed '<u>outsourced</u>' software development.

# Acquiring Information Systems (Cont'd)

**Bespoke development:**

- Advantage: producing software tailored to the precise requirements of the business.

- Disadvantages include:
  - High cost.
  - More Time.
  - Low Quality.

# Acquiring Information Systems (Cont'd)

**Off-the-shelf software:**

- It is an acquisition method that involves direct <u>purchase</u> of a pre-written application used by more than one company.

- This type of software is pre-written and is available for a whole <u>variety</u> of hardware platforms from PCs to mainframes.

- Off-the-shelf software is written to offer a broad <u>functionality</u> that will suit a wide range of different businesses.

# Acquiring Information Systems (Cont'd)

## Off-the-shelf software:

- Disadvantages:
    - User may feel that it is paying for things it will not use.
    - it may require businesses to process information in a particular way that is different with the way they normally do business.
- Advantages include:
    - Low cost.
    - High Quality.

# Acquiring Information Systems (Cont'd)

**End-user-developed software:**

- It is software written by non-IS professionals, i.e. the business users.

- They are more limited in scope. Applications may be departmental or personal in nature and are usually output- or report-oriented rather than input-driven.

# Acquiring Information Systems (Cont'd)

**End-user-developed software:**

- Disadvantages:
  - In some cases inappropriate software development tools might be used such as complicated spreadsheets instead of the construction of a database.
  - Low Quality.
- Advantages include:
  - It is easy because it is normally used by those who develop it.

# Factors affecting software acquisition

- There are a number of factors that will influence the choice of acquisition method. Three critical ones are time, cost and quality considerations, Other factors affecting software acquisition include the following:
    - Organization size.
    - In-house IS/IT expertise.
    - Complexity of the required information system.
    - Uniqueness of the business or business area to be supported.
    - Linkages with existing applications software.