**INTRODUCTION TO INFORMATION PROCESSING**

**Input-Process-Output Cycle (Ch. 1.1)**

- The process of a computer task can be divided into three stages:

  ![Input Process Output Cycle](chart)

- Examples:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buying Drinks from a Vending machine</td>
<td>Inserting Coins, Pressing a button</td>
<td>Select a drink according the button pressed</td>
<td>Drink, Coins changed</td>
</tr>
<tr>
<td>Using Computer</td>
<td>Data and commands via input devices.</td>
<td>The CPU works on the data according to the input commands</td>
<td>The processed result on the output devices</td>
</tr>
</tbody>
</table>

**Stored Program (Ch. 1.2)**

- Computers themselves will not function if no command is given.

- A program:
  i. is a sequence of commands.
  ii. should be provided to the computer in order to instruct the computer to complete a specific task.
  iii. will be fetched by the computer and the commands will be executed one by one.

- Stored programs
  i. enable computers to do tasks automatically, repeatedly and accurately.
  ii. is saved in the read-only memory (ROM) of many home appliances and machines.
  iii. is executed by the microprocessor to control the operations of the machines.

- Found in many home appliance such as washing machine, rice cooker.

**Data and Information (Ch. 1.3 – 1.4)**

- **Data.** Basic facts or raw figures, may be in the form of text numbers, sound or images.

- **Information.** A set of organised data.

- The distinction between data and information is _usefulness_.

- The problem with data is that they are very large and they have no _meaning_ by itself. So, they have to be organised in a meaningful way so that it is _useful_.

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INTRO. TO INFORMATION PROCESSING
**Definition** for data processing

Examples of DP:

<table>
<thead>
<tr>
<th>DATA</th>
<th>DATA PROCESSING</th>
<th>INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>In school</td>
<td>Marks</td>
<td>Sorting / Computation</td>
</tr>
<tr>
<td>In Scientific Research</td>
<td>Experimental Data</td>
<td>Calculation / Analysis</td>
</tr>
<tr>
<td>In Business</td>
<td>Sales Figures</td>
<td>Calculation / Analysis</td>
</tr>
<tr>
<td>In Government</td>
<td>Data on Traffic Accidents</td>
<td>Statistical Analysis</td>
</tr>
</tbody>
</table>

**Type of data:** Text, Images, Audio, Video

**Components of an Information System** (Ch. 1.5)

- In information system consists of five interrelated components:
  
i. **Purposes.** The most common reasons for implementing an information system:
   a. Automating an existing manual process
   b. Improving an existing system
   c. Fixing system problems

  ii. **Data.**
   a. After the data are collected, they will be stored in a main database
   b. A database is a structured collection of records or data. They can be then retrieved by query language (SQL).

  iii. **Processes**
   a. An information system must contain a number of processes the work with data inside the main database to achieve its purposes.

  iv. **Technologies**
   a. Hardware. Physical components
   b. Software. A sequence of instructions which instructs the information system to perform specific tasks.
   c. Network. Some information system may not only be used in a single computer.
v. **Personnel**

a. **End-users.** Use the system and its products.

b. Information System Specialists:
   - **System analyst.** Do the research, plan and implement the system according to the requirement defined by the users.
   - **Programmer.** Convert the system design developed by the systems analyst.
   - **Technician.** Manage the system such performing the backup.
   - **Network manager.** Monitor the performance of the network.
   - **Data entry operator.** Enter data into the system.

**Information Life Cycle** (Ch. 1.6)

♦ **Data collection.**

i. The activity of collecting raw data from the outside world so that it can be put into an information system.

ii. Methods:
   a. Direct observation
   b. Personal interviews
   c. Telephone interviews
   d. Questionnaires
   e. Experiments
   f. The Internet

iii. These methods can be used separately or combined together.

♦ **Organization.**

i. Collected data must be organized into certain formats so that it can be further processed.

ii. The data can be represented in: Text, Images, Audio and Videos

iii. Ways to organize data:
   a. Putting data into paper-based forms or electronic forms by its category
   b. Inserting data into related database tables or spreadsheets
   c. Grouping images to create an animation

♦ **Storage.**

i. Organized data must be stored in storage media so that they can be retrieved for processing later.

ii. Two kinds of storage media:
   a. Non-digital media, e.g. Paper and Files
   b. Digital media
   - Optical disks: CD-ROMs, DVDs
- Flash memories: used with USB flash drive or in the form of memory cards
- Magnetic disks: Hard disks, Floppy disks
- Magnetic tapes

iii. Most of the information systems use database software to store data. Database software uses direct access devices such as hard disks as storage media.

♦ **Processing**

i. Different kinds of processing:
   a. Data processing, including **Sorting, Searching, Merging, Calculating**
   b. Word processing
   c. Image processing
   d. Video processing
   e. Audio processing

ii. An example of information processing in a human resource management system:
   a. Photos given by employees may be in a different format or size other than the system requires.
   b. The photos may need to be processed by image editing software.
   c. Sorting (data processing) on employee names may be necessary to speed up data search.

♦ **Analysis**

i. Analysis is performed on the processed data to extract useful information.

ii. An analysis method: e.g. using spreadsheets to create models to produce statistics or trend analysis

iii. Analyzed information can be presented in graphs or charts.

iv. For the food ordering system of a restaurant:
   a. The database is analyzed to find most popular foods.
   b. The staff is then informed to purchase more of these foods.

♦ **Transmission**

i. The process of sending information from one computer system to another

ii. A common **protocol** must be used to communicate between different systems.

iii. The Internet:
   a. It uses TCP/IP for data communication.
   b. Data in different systems may be in different formats.
   c. Extensible Markup Language (XML) provides a common data format for different information systems

♦ **Presentation**

i. There are numerous ways to represent information such as **lists, tables and charts**.

ii. Information can also be presented through different media, such as audio, video screen displays and printout output.
**What is the Information Age?**

- Refers to a period beginning in the last quarter of the 20th century
- With the advancement of distribution of information by telecommunication networks and especially the Internet, information spreads widely and rapidly.
- People can access all kinds of up-to-date information easily anywhere and anytime at a very low cost.

**IT and communication**

- Ways: Internet services (e-mail, instant message), Cabled or Mobile phones, Fax, etc.
- Effects: Globalisation, Open market, e.g. eBay

**IT and Education**

- Range: Drill and practice to cooperative constructive learning.
- Useful web sites: www.hkedcity.net,

**IT and Entertainment**

- Tools: Video games, On-line and off-line computer games, on-line multi-media resources on computers, mobile players or mobile phones.
- Characteristics: Up-to-date, globalized IT and Shopping, e.g. moov.hk, youtube.com

**On-line shopping**

- E.g. www.cp1897.com, www.amazon.com,
- Anytime, Anywhere,
- Major concern: security

**IT and Banking**

- On-line banking www.hsbc.com.hk
- Anytime, Anywhere
- Major concern: security

**IT and Work**

- Up-dated qualification: microsoft, cisco, oracle

**Examples for Information System**

- **Stock Control System.**
  
  i. Shop worker counts the amount of each item remaining on the shelves. These data is then transferred into the computer by *manual typing* or automatically transferring if there is a *stock-taking machine*.
  
  ii. After each *transaction*, the stock record in the computer is updated.
iii. If the number of an item is lower than a predefined level in quantity, the system will signal for new order on that item. The system will then instruct printer to print out the new order for the suppliers.

iv. After receiving the purchased items, the stock record will then be updated.

♦ **Point-of-Sale System.**
  i. It is usually found at the check-out counter of a shop.
  ii. When the customer takes the bar-coded products to the counter (the point-of-sale terminal), the bar-codes on the product are passed over the scanner.
  iii. Computer checks the price and identity of the product. (from a database)
  iv. The name and price of the product are displayed on the screen. The accumulated amount to pay are also calculated and displayed on the screen.
  v. After the customer pays and the change is made, a receipt is printed.
  vi. The system also updates the stock record in the computer.

♦ **Easy Pay System (EPS – an electronic fund transfer system)**
  i. The shopkeeper keys in the amount of the purchase.
  ii. The customer passes his card for Automatic Teller Machine (ATM) through a card-reading machine.
  iii. The customer keys in his Personal Identification Number (PIN).
  iv. Bank computer checks PIN and bank balance of the customer.
  v. After checking, computer gives the authorisation for the purchase. The purchased details are then recorded and the funds are then transferred from the customer’s account to the shop’s account.

An information literate should be able to:
  • determine the nature and extent of the information needed
  • access information effectively and efficiently
  • question the information source
  • use information effectively to accomplish a specific task
  • convert information from one form to another desirable form using information technologies
  • create new knowledge from collected information through analytical processes with IT software
  • use information ethically and legally