

PE 231 Education Media AND Technology

1

Types of Data

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

4

Assessment

- CA: 40%
 - THEORY TEST - 30%
 - PRACTICAL TEST – 10 %
- EXAM: 60%
- Notes: Visit:
www.lechaamwe.weebly.com
- Goto: Lecture Notes
- Then to Undergraduate
- Then Click on PE 231

2

Information

- **Information:** collection of facts organized in such a way that they have additional value beyond the value of the facts themselves

5

Information Concepts: Data, Information, and Knowledge

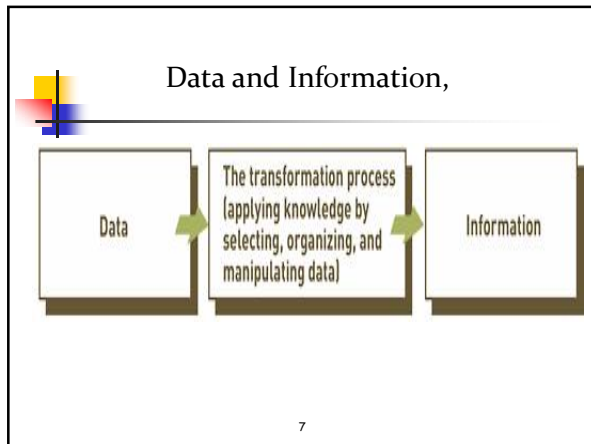
- **Data:** Collection of raw facts and or figures
 - Alphanumeric, image, audio, and video

3

Information Concepts

- **Value of Information** is directly linked to how it helps decision makers achieve their organization's goals and can be measured
 - in time required to make a decision
 - Increased profits to the company

6



The Characteristics of Valuable Information

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.

Examples

- Data – thermometer readings of temperature taken every hour:
16.0, 17.0, 16.0, 18.5, 17.0, 15.5....

↓ Transformation

- Information – today's high: 18.5
today's low: 15.5

8

Example: Health Information

- You want the information about you in a health information system to be:
 - As accurate as possible (e.g. your age, sex)
 - As complete as possible
 - Relevant
 - To be reliable
 - Should be available in a timely manner (e.g. information about your drug allergies are available before your operation!)

11

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.

Information Concepts

- Process
 - A set of logically related tasks performed to achieve a defined outcome
- Process
 - (n) An executing program. The term is used loosely as a synonym of task.
 - (v) To perform some useful operations on data.

12

Information Concepts

- Knowledge
 - An awareness and understanding of a set of information and how that information can be made useful to support a specific task
- Knowledge base
 - The collection of data, rules, procedures, and relationships that must be followed to achieve value or the proper outcome

13

Introduction to Computers

16

Information Concepts

- Wisdom
 - Acquired Knowledge used for the betterment of Mankind
 - The fear of the Lord is the beginning of Wisdom:

14

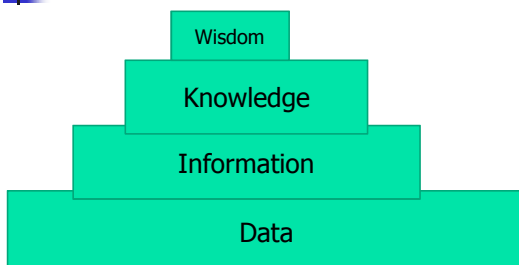
What Is A Computer?

A computer is an electronic device, operating under the control of instructions (software) stored in its own memory unit,

- that can accept data (input),
- manipulate data (process), and
- produce information (output) from the processing.
- Generally, the term is used to describe a collection of devices that function together as a system.

17

Data – Wisdom Hierarchy



15

What Does A Computer Do?

Computers can perform four general operations, which comprise the information processing cycle.

- Input
- Process
- Output
- Storage

18

Why Is A Computer So Powerful?

- The ability to perform the information processing cycle with **amazing speed**.
- **Reliability** (low failure rate).
- **Accuracy**.
- Ability to **store** huge amounts of data and information.
- Ability to **communicate** with other computers.

19

Computer System

- **Computer system:** Interrelated components including hardware and software that work together with the aim of converting data into information.

22

How Does a Computer Know what to do?

- It must be given a detailed list of instructions, called a **compute program** or **software**, that tells it exactly what to do.
- Before processing a specific job, the computer program corresponding to that job must be stored in memory.
- Once the program is stored in memory the compute can start the operation by executing the program instructions one after the other.

20

A personal computer with the typical components

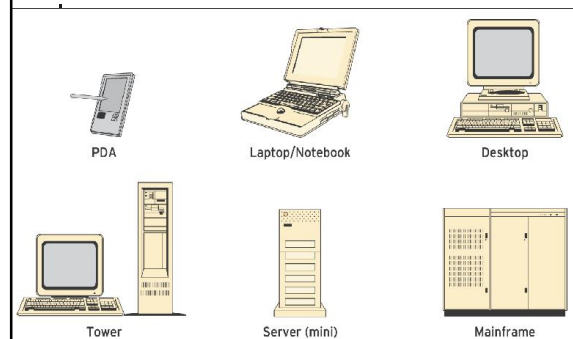


23

Computer System

21

Different forms of computer system



24

PDA's, Media Players & Smart Phones



Supercomputers & Mainframes



Tablets, Laptops & Desktops



Computer Hardware

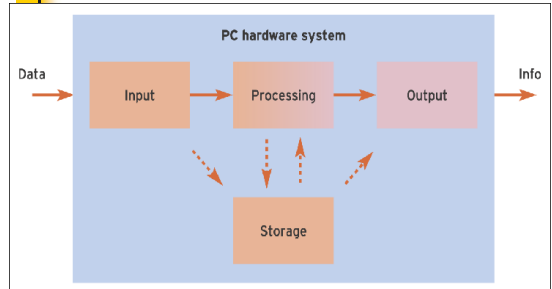
- **Hardware:** The physical components of a computer system: input devices, memory, central processing unit, output devices and storage devices.

29

Servers



Basic hardware components of a computer system



30

Hardware components

- **Input device:** Hardware used to enter data, information or instructions into a computer-based information system.
- **Central processing unit (CPU):** The processor found in a computer system that controls all of the computer's main functions and enables users to execute programs or process data.

31

Input devices

- **Lightpen:** A pointing device used to control applications by pointing to items on the screen.
- **Trackball:** A trackball is a pointing device that is controlled by rotating a small ball with the fingers or palm of the hand.
- **Optical scanner:** An input device used to capture graphics and text from printed documents.

34

Hardware components

- **Memory:** A temporary means of storing data awaiting processing, instructions used to process data or control the computer system, and data or information that has been processed.
- **Storage devices:** A permanent means of storing data and programs until they are required.
- **Output devices:** Translate the results of processing – output – into a human readable form.

32

Input devices

- **Optical character recognition (OCR):** Software that attempts to recognise individual characters.
- **Optical mark recognition (OMR):** Detection and recognition of simple marks made on a document.
- **Bar code:** A means of displaying a unique identification number as a series of thick and thin lines.

35

Input devices

- **Natural keyboard:** Keys are arranged so that users can locate them more quickly and easily in a way that makes prolonged use more comfortable.
- **Mouse:** A pointing device found on most modern personal computers.
- **Pointing device:** An input device that allows the user to control the movement of a small pointer displayed on the screen that is used to select options.

33

Input devices

- **Universal product code:** A standard for defining bar codes used frequently in retailing.
- **Bar code reader:** Measures the intensity of a light beam reflected from a printed bar code to identify the digits making up a unique identification number.

36

Input devices

- **Touch screen:** A transparent, pressure-sensitive covering that is attached to the screen of the monitor.
- Users make selections and control programs by pressing onto the screen.

37

Input devices

- **Voice recognition:** The facility to control a computer program or carry out data entry through spoken commands via a microphone connected to a sound card.

40

Input devices

- **Interactive kiosk:** A typical application for touch screen systems, an interactive kiosk allows a user to purchase items or browse through a list of products by pressing buttons or other controls shown on the screen.
- **Graphics tablet:** Used in the same way as a writing pad; a stylus is used to draw images on a rigid pad located near to the computer.



38

Selecting input devices – key issues

- Volume
- Speed
- Accuracy
- Cost
- Data complexity
- Frequency of data entry

41

Input devices

- **Video capture card:** The video capture card records and stores video sequences (motion video).
- **Sound card:** A sound card allows a personal computer to play speech, music and other sounds. A sound card can also be used to capture sound, music and speech from a variety of sources.

39

Which input device to use & when

Volume of data	Speed	Nature of System	Ease of use	Technological development	Cost
•Large – automatic equipment is best	•Barcode scanner useful if high speeds necessary	•MICR/Magnetic Ink Character Recognition [MICR] – needed for specialist input methods such as banking cheques	Conditions may influence choice	Methods constantly updated as new methods introduced	Major factor – could relate to staffing or hardware

42

Output devices 1

- **Visual display unit (VDU):** A monitor connected to a computer system, traditionally used to describe character-based terminals.
- **Resolution:** The 'fineness' of the image that can be displayed, expressed as number of pixels (picture elements) – the individual dots that make up an image on the screen.

43

Selecting output devices – key issues

- Appropriateness
- Permanence
- Response time
- Speed
- Cost
- Data complexity
- Frequency of data entry

46

Output devices

- **Video projector:** A computer system can be connected directly to a projector so that the output is directed to a projection screen.
- **Plotter:** A plotter uses a number of different coloured pens to draw lines upon the paper as it moves through the machine.

44

- **Response time:** The time it takes to respond to an action. For instance, the delay between pressing a key on the keyboard and a letter appearing on the screen.

47

Output devices

- **Computer output to microfilm (COM):** Information is processed via a computer and sent directly to a device that produces microfilm negatives.

45

Printers

- **Laser printer:** A laser is used to charge sections of a rotating drum which is then used to print using toner powder, achieving a combination of speed with high print quality.
- **Inkjet printer:** An inkjet printer uses a print-head containing 50 or more small nozzles that squirt ink onto the paper by varying electrostatic charges produced by the printer.

48

Printers

- **Dot-matrix printer:** A character is transferred to the paper by striking pins against an ink ribbon.

49

Storage devices

- **Primary storage:** Data and instructions are loaded into memory such as random access memory. Such storage is temporary.
- **Secondary storage:** Floppy disks and hard disks are examples of secondary storage and the storage is permanent.

52



50

Measuring storage capacity

- **Bit:** A single binary digit representing a (0) zero or a 1.
- **Byte:** Made up of eight bits and represents the amount of space required to hold a single character.
- **Kilobyte (kb):** Exactly 1024 bytes, or the equivalent of (2^{10}) characters.

53

Selecting printers – key issues

- Purchase cost
- Printing cost
- Print quality
- Paper handling
- Volume
- Speed

51

Measuring storage capacity

- **Megabyte (Mb):** Exactly 1024 kb, or the equivalent of (2^{20}) characters.
- **Gigabyte (Gb):** Approximately 1024 Mb, or the equivalent of (2^{30}) characters.

54

Secondary storage

- **Floppy disk:** Consists of a plastic disk, coated with a magnetic covering and enclosed within a rigid plastic case.
- **Hard disk:** A magnetic medium that stores data upon a number of rigid platters that are rotated at very high speeds.

55

Optical secondary storage

- **CD-ROM:** A computer storage device offering a relatively high capacity.
- The acronym CD-ROM stands for compact disc – read only memory, denoting the fact that CD-ROM discs are read-only devices.
- **Compact disc (CD):** The media used by CD-ROM players. The data on a compact disc is encoded as a series of dips and raised areas.

58

Secondary storage

- **Flash drive:** A flash drive is a portable storage device that connects to a computer via a standard USB port.
- Flash drives have no moving parts, so are reliable and robust.

56

Optical secondary storage

- **CD-R (CD-recordable):** Can both read conventional compact discs and also write data to special 'gold' discs.
- **CDRW:** In addition to providing the functionality of the CDR drive, the CDRW drive also allows the use of special compact disc media that can be written and erased many times.

59

Secondary storage

- **Memory Cards:** An extension of flash drives but more portable.
- Used to store data in small and portable devices such as digital cameras and smart phones.

57

Optical secondary storage

- **Digital versatile disc (DVD):** Similar to CD-ROM but with higher storage capacities, typically between 4 Gb and 7 Gb and which is accessed at higher speeds.

60

Optical secondary storage

- **Blue Ray Disc (BD-Disc):** is an optical disc storage medium designed to supersede the standard DVD format.
- Its main uses are for storing high-definition video, PlayStation 3 video games, and other data, with up to 25 GB per single-layered, and 50 GB per dual-layered disc.

61

Primary storage – memory

- **Cache memory:** Used to improve performance by anticipating the data and instructions needed by the processor.
- The required data is retrieved and held in the cache, ready to be transferred directly to the processor when required.

64

Primary storage – memory

- **Volatile memory:** Anything held in memory is lost once the power to the computer system is switched off.
- **Non-volatile memory:** Non-volatile memory retains its contents until altered or erased.
- **Random access memory (RAM):** RAM is used as volatile, working storage by a computer, holding instructions and data that are waiting to be processed.

62

Storage-type summary of selection criteria

Storage medium	Speed	Cost	Capacity	Permanent
Magnetic tape	Very slow	Very low	Very high	No
Floppy disk	Slow	Low	Very low	No
Hard disk drive	Fast	Low	Very high	No
CD-ROM	Slow	Low	Very high	Yes
Memory	Very fast	High	Low	No/yes

Comparison between storage media and devices

65

Primary storage – memory

- **Read-only memory (ROM):** The contents of ROM are fixed and cannot be altered. ROM is non-volatile.
- **EPROM (erasable programmable read-only memory):** This is a form of ROM memory that retains its contents until changed using a special device known as a 'burner'.

63

Processors

- **Processor:** Uses instructions from software to control the different components of a PC.
- **Clock speed:** Measured in MHz (megahertz or millions of pulses per second).
- The clock speed is governed by a quartz-crystal circuit.

66



Processors

- **Bus width:** Describes how many pieces of data can be transmitted or received at one time by the bus connecting the processor to other components of the PC.
- **VGA (video graphics array):** A common standard for graphics cards. All graphics cards support the VGA standard which specifies a maximum image size of 640 by 320 pixels, displayed in 16 colours.

67



Virtual computing

- Virtual computing involves simulating a complete computer system in software. The **virtual machine** (VM) behaves exactly the same as a physical computer system and can be used in the same way.

68