



Menofia University
Faculty of Computers and Information

Multimedia

2015-2016

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Lecture #2

General Rules





Chapter One

INTRODUCTION TO MULTIMEDIA

Definition of Multimedia



- **From etymology**

“Multi” = “numerous”

“media” = “medium” = “intermediary”

- **In information field**

Multimedia means “multiple means” by which information is stored, transmitted, presented and perceived.

Definition of Multimedia



What is Multimedia ?

“Multimedia” has no strict definition.

Multimedia can have a many definitions these include:

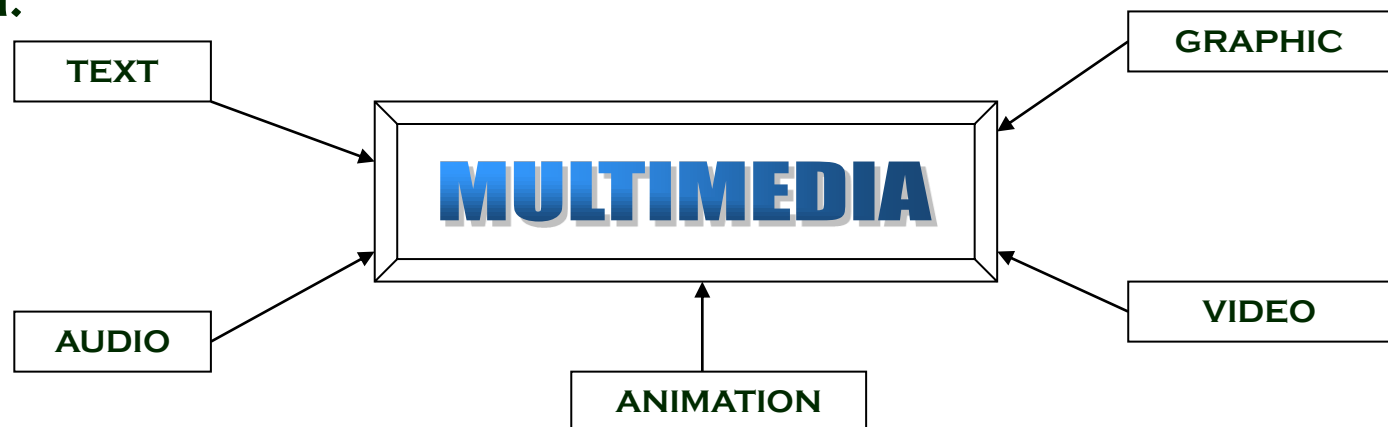
- ❖ **Computer professional:** uses computer to present and combine text, image, audio, video, and interactive features in several ways.
- ❖ **Consumer entertainment vendor:** interactive cable TV with hundreds of digital channels available, or a cable TV-like service delivered over a high-speed Internet connection.

What is Multimedia

- ❖ A **Multimedia Application** is an application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.

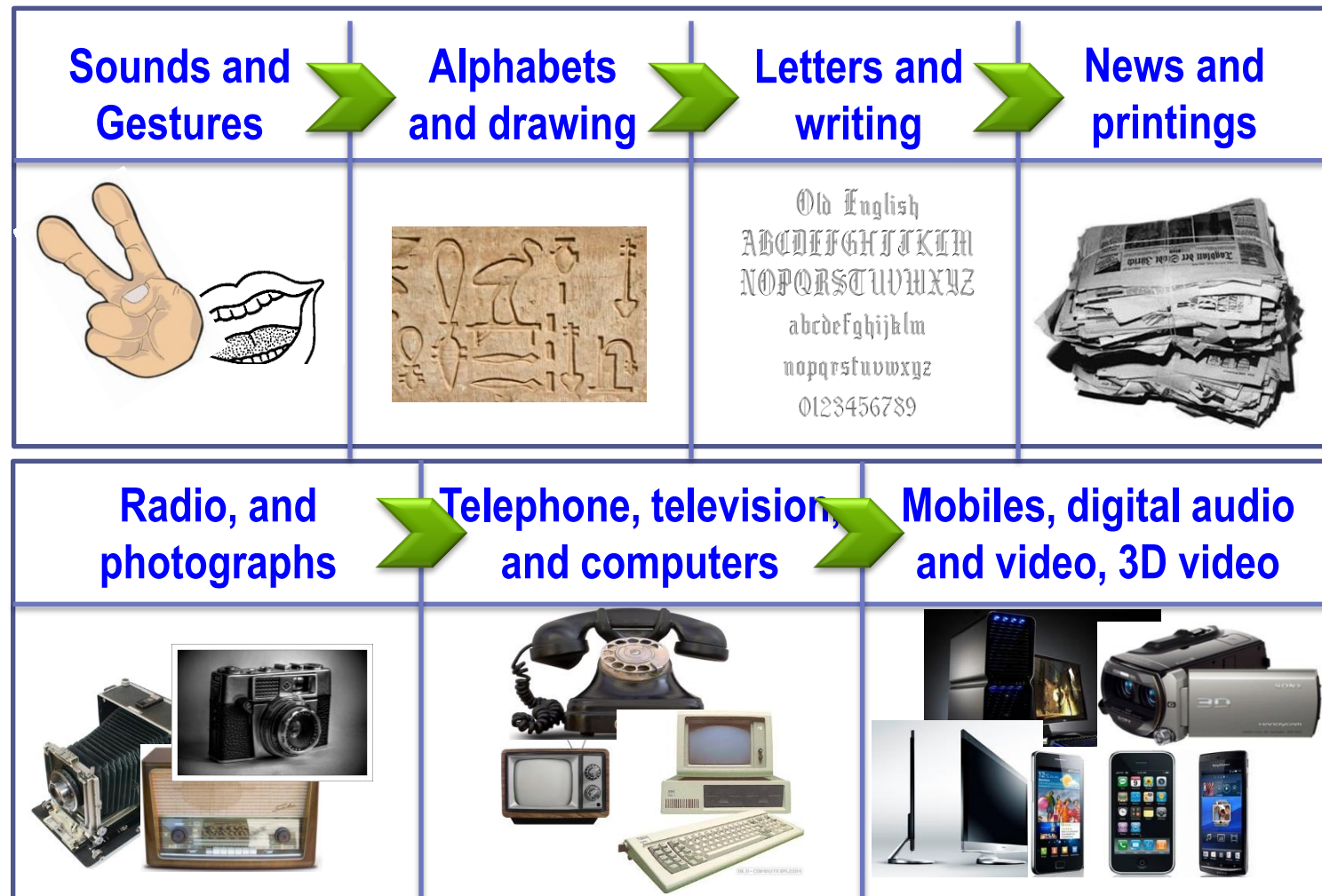
A good general working definition

- ❖ **Multimedia** consists of all applications that involve a combined use of different kinds of media such as text, graphics, audio, video and animation.



History of Multimedia

Multimedia differ from era to era



History of Multimedia

Age	Time and era	Type of Information	Storage medium	Mode of distribution
Prehistoric	15,000 BC	Sounds to communicate, gestures, painting	Rock surfaces, cave walls	—
Ancient	500 BC	Alphabets, drawing	Invention of paper	People delivering messages, horseback
Middle Ages	400–1000 AD	Letters, writing	Books	Beginning of a postal system
Renaissance	1300–1800 AD	News, paintings, magazine	Books, libraries	Printing press, steam engines, automobiles
Modern world	1900 AD	Morse code, radio, photographs, movies	Film, magnetic tapes, phonograph	Telegram service, wireless radio waves
Electronic	1950–1980	Telephone, television, fax, computers	Electronic memory, cassette tapes, LP records	Radio and TV broadcasting, satellite communication
Digital	1980 to present day	Computers, digital video, surround sound	Hard disks, CD-ROMs, DVDs	Ethernet, wireless networks, optical networks

Multimedia information / System



- ❖ **Multimedia information** can be defined as information that consists of one or more different media types.
- ❖ Today, multimedia information consists of text, audio, video, 2D graphics, and 3D graphics, animation.
- ❖ **Multimedia System** is a system capable of processing multimedia data and applications.
- ❖ **Multimedia System** is characterized by the processing, storage, generation, manipulation and rendition of Multimedia information.

Characteristics of Multimedia Systems

A Multimedia system has four basic characteristics:

- ❖ Multimedia systems must be **computer controlled**.
- ❖ Multimedia systems are **integrated**.
- ❖ The information they handle must be represented **digitally**.
- ❖ The interface to the final presentation of media is usually **interactive**.

Key Issues for Multimedia Systems

Three main processes inherent to multimedia systems:

- ❖ **Content creation or authoring.**

Capturing, digitization, rendering, and filtering.

- ❖ **Storage and compression.**

Available storage medium and the size of stored media.

- ❖ **Distribution.**

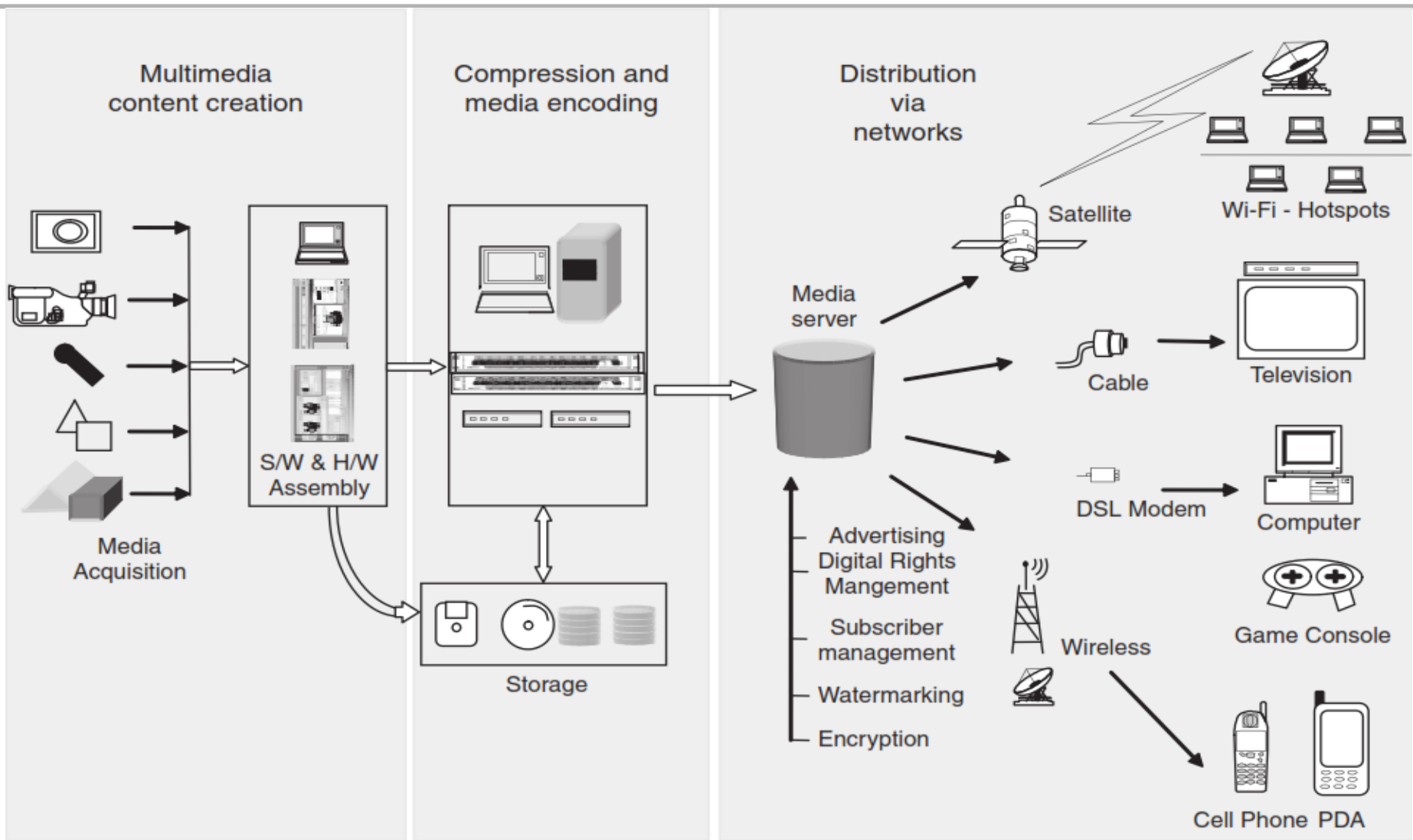
How multimedia content is distributed.

Components of a Multimedia System

The Components (Hardware and Software) required for a multimedia system:

- ❖ **Capture devices** — Camera, Microphone, Keyboards, graphics tablets, 3D input devices.
- ❖ **Storage Devices** — Hard disks, CD-ROMs, DVD-ROM, etc.
- ❖ **Communication Networks** — Local Networks, Internet, special high speed networks.
- ❖ **Computer Systems** — Multimedia Desktop machines, Workstations,
- ❖ **Display Devices** — CD-quality speakers, HDTV, SVGA, Hi-Res monitors, Color printers etc.

Components of a Multimedia System



Classification of Multimedia Systems

- ❖ **Static versus dynamic**
- ❖ **Real time versus orchestrated**
- ❖ **Linear versus nonlinear**
- ❖ **Person-to-machine versus person-to-person**
- ❖ **Single user, peer-to-peer, peer-multi-peer, and broadcast.**

Media Types Used Today



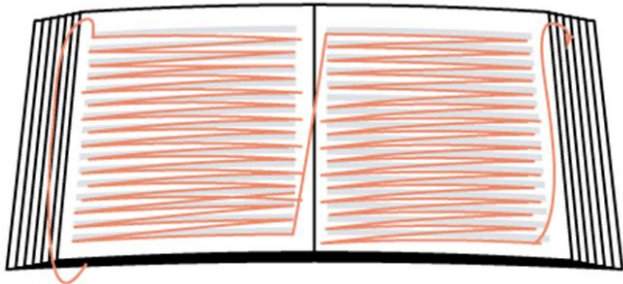
Two broad classes of media types:

- ❖ **Static, time-independent discrete media:** Text, graphics, images. Information in these media consist exclusively of a sequence of individual elements without a time component.
- ❖ **Dynamic, time-dependent continuous media:** Sound, video. Information is expressed as not only of its individual value, but also by the time of its occurrence.

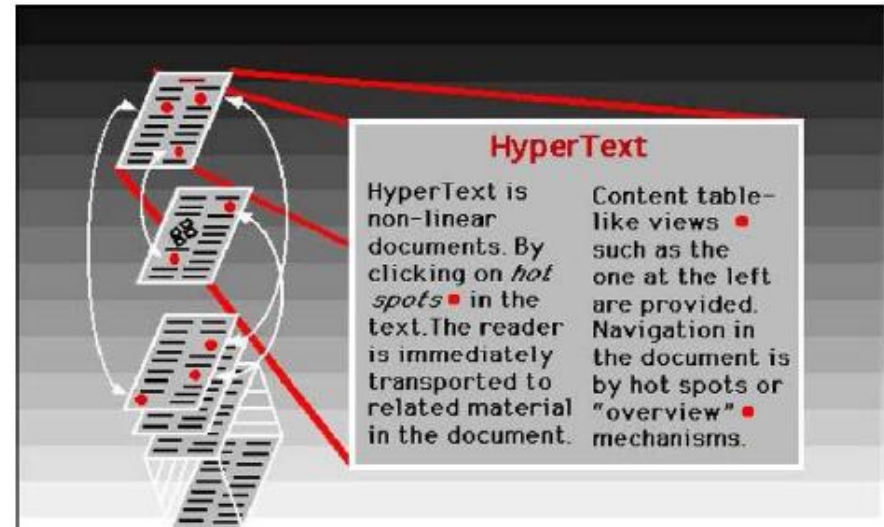
Text

- ❖ **Text** has been commonly used to express information not just today but from the early days.
- ❖ **Hypertext** is a text which contains links to other texts, allowing nonlinear access to information.

Sequential or linear arrangement

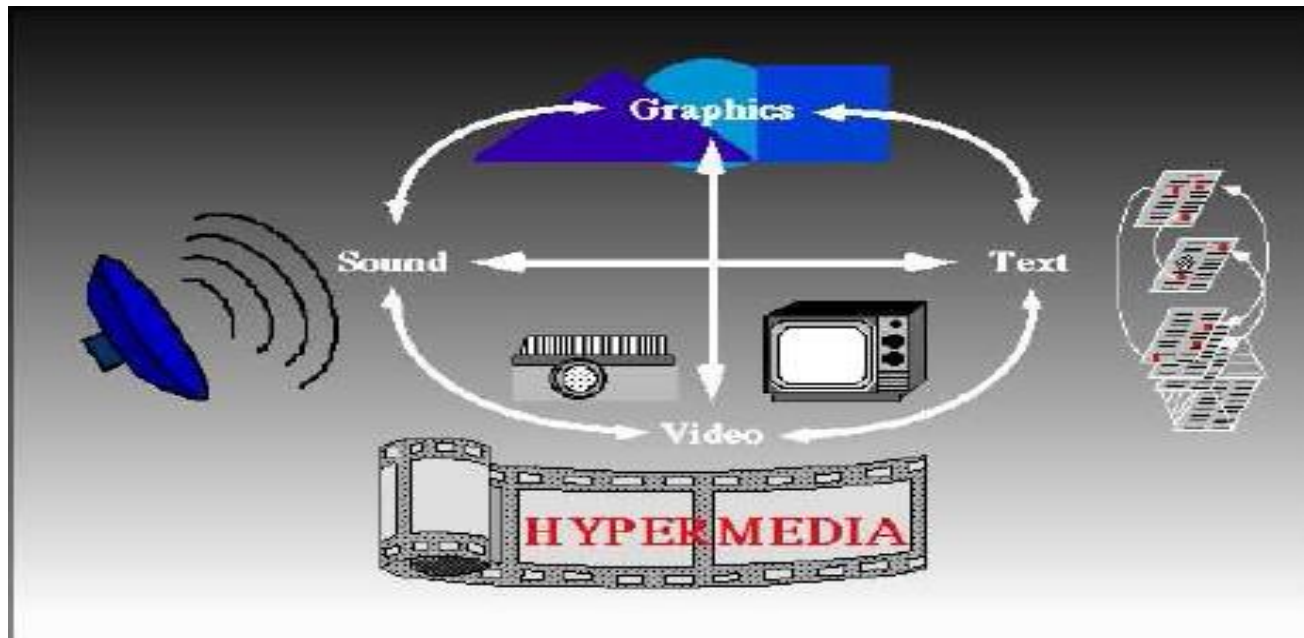


Hypermedia, non-linear structure



Hypermedia

- ❖ **HyperMedia** is not constrained to be text-based. It can include other media, e.g., graphics, images.
- ❖ The World Wide Web (WWW) is the best example of a hypermedia application.

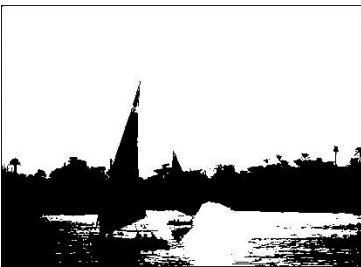


Images

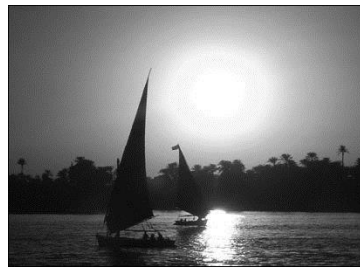
- ❖ Consists of a set of units called pixels organized in the form of a two dimensional array, Each pixel has a bit depth. (a grid of pixels).
- ❖ **Bit depth:** the number of bits assigned to each pixel.



Binary images (1bit/pixel)



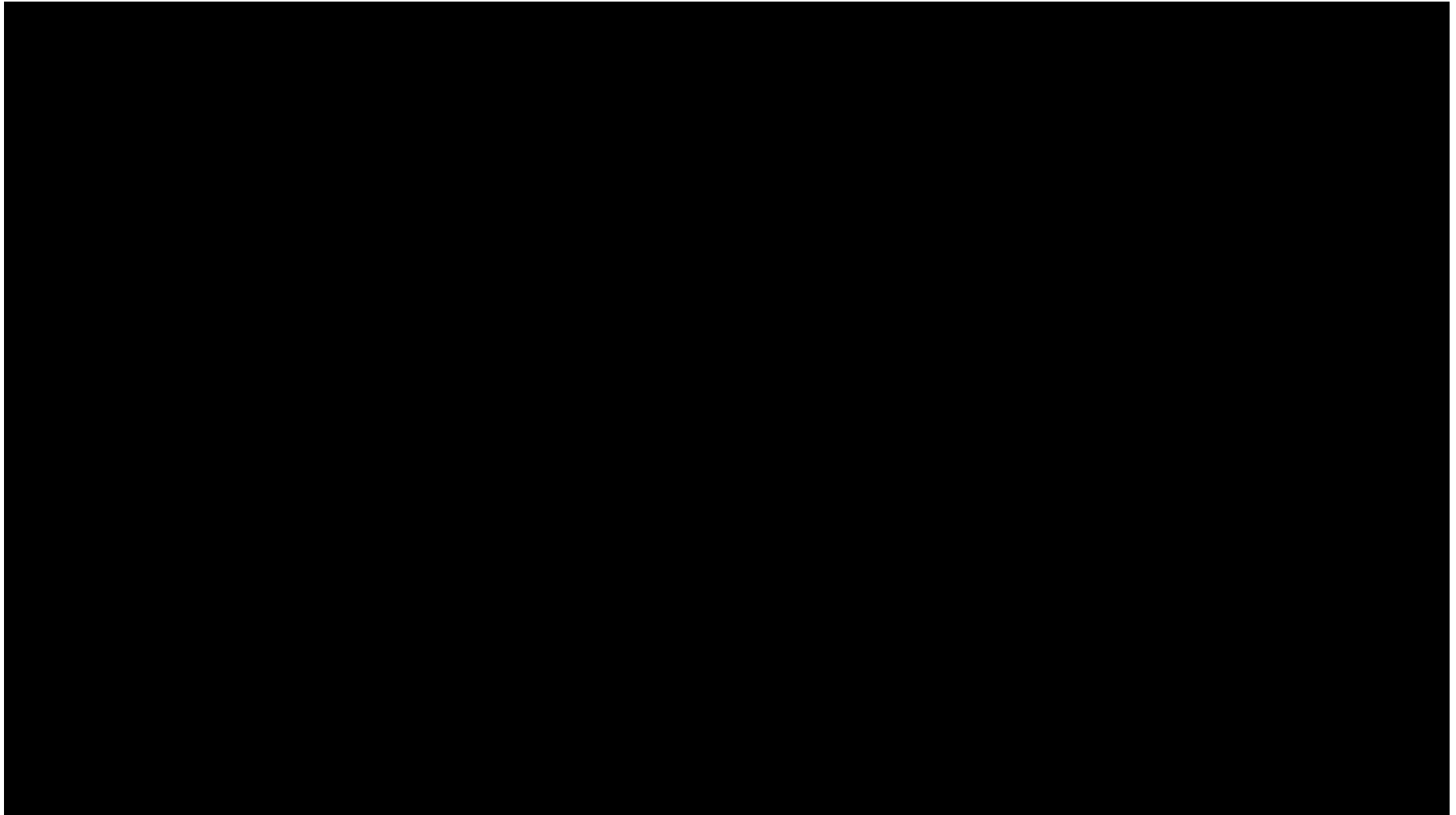
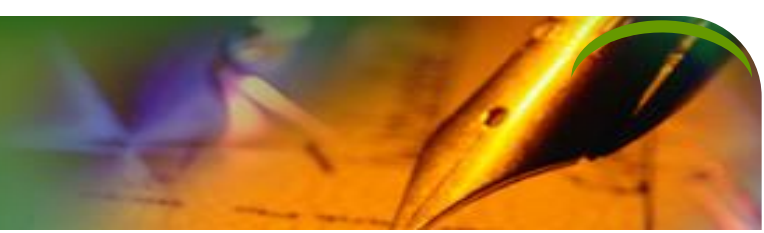
Gray images (8bit/pixel)



Color images (24bit/pixel)

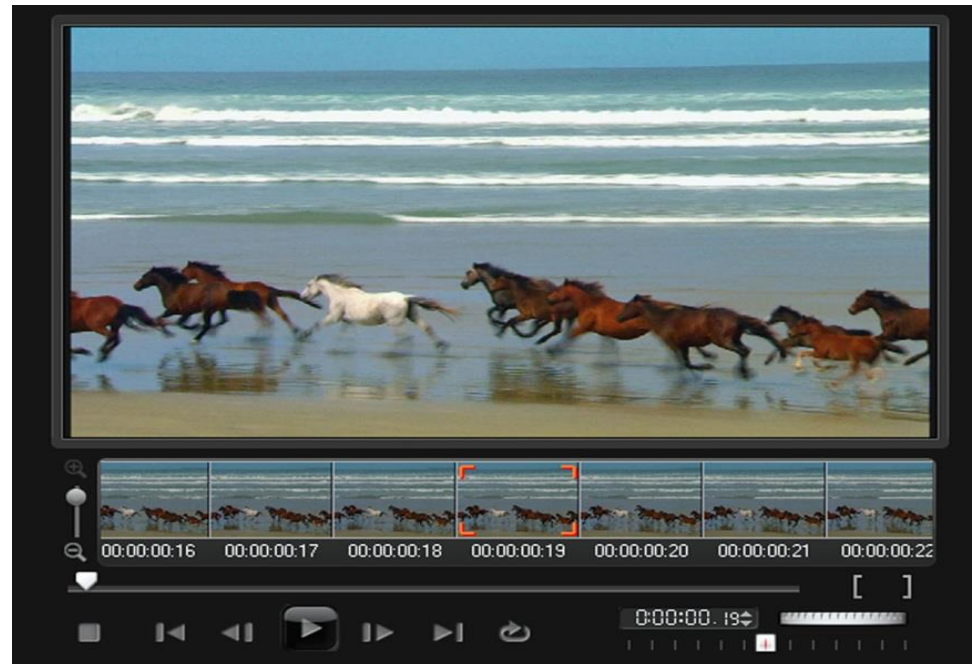


Video



Video

- ❖ A sequence of images (frames) having the same spatial parameters. Number of frames displayed per second is called the frame rate (fps).
- ❖ **Aspect ratio** : A common aspect ratio for video is 4:3, which defines the ratio of the width to height.
- ❖ **Scanning format**: Scanning helps convert the frames of video into a one dimensional signal for broadcast.

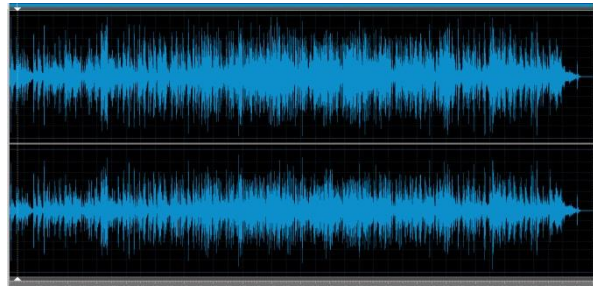


Audio

- ❖ **Digital audio** is characterized by a sampling rate in hertz, A sample can be defined as an individual unit of audio information.
- ❖ **Sampling rate:** how often the samples are taken (measured in kilohertz, or thousands of samples per second).
- ❖ **Sample size:** how many numbers are used to represent the value of each sample, 8-bits to 16-bits depending on the application.
- ❖ **Dimensionality:** the number of channels contained in the signal.



Mono (1 channel)

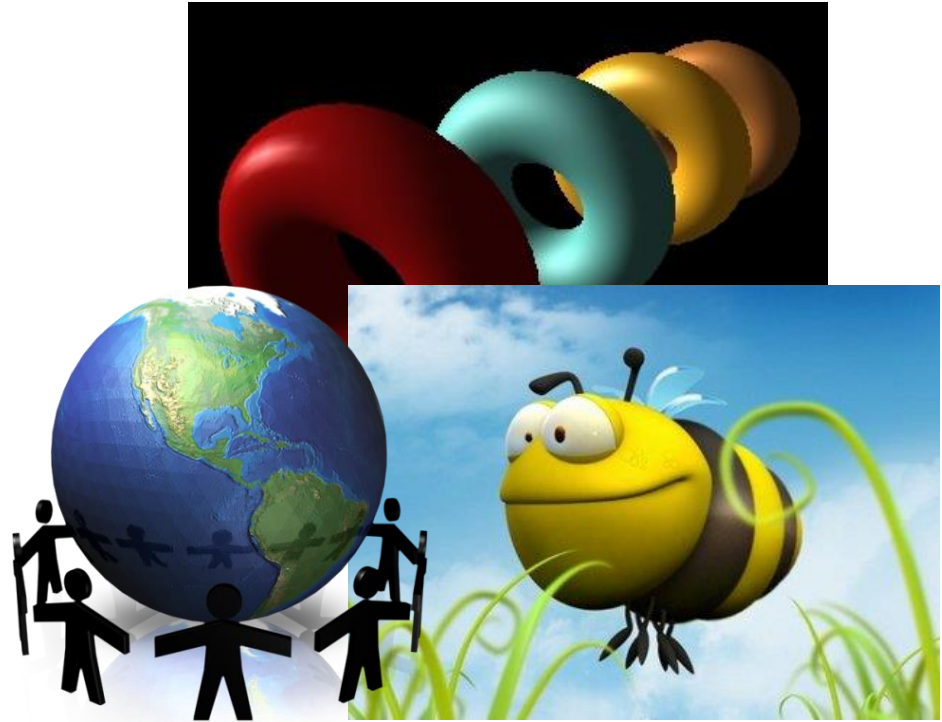
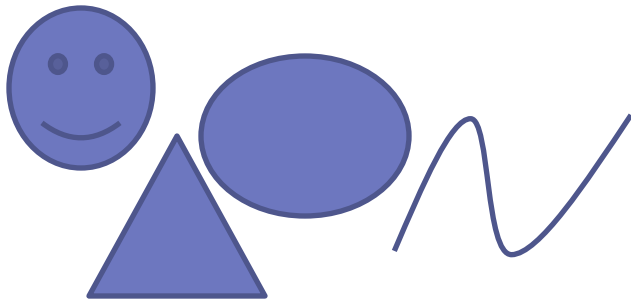


Stereo (2 channel)



Surround (more than 2 channel)

2D and 3D graphics



- ❖ 2D/ 3D graphic elements are represented by 2D/3D vector coordinates.
- ❖ Have properties such as a fill color, boundary thickness, and so on.

Inherent Qualities of Multimedia Data



- ❖ **Nature of media (analogue or digital).**

Our concern is the digital form.

- ❖ **Voluminous.**

Concerning with the size of data resulting from combining different types of media.

- ❖ **Interactive.**

Interacting with multimedia content.

- ❖ **Real time and synchronization**

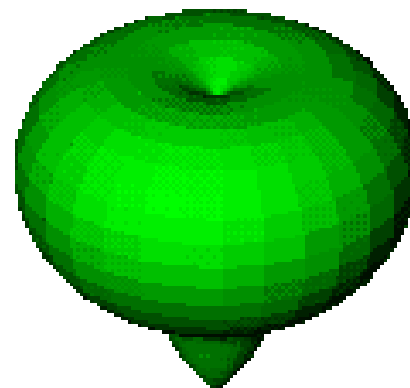
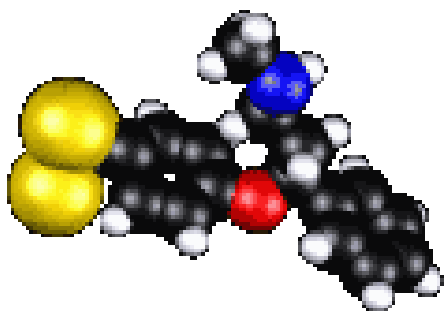
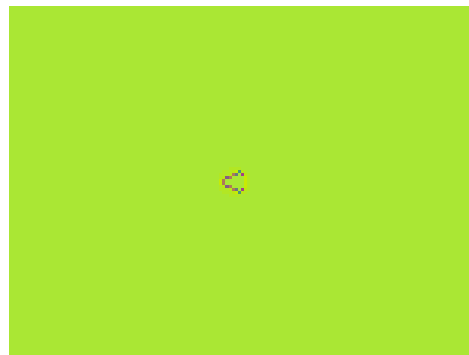
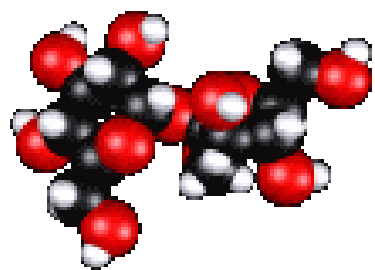
transmitting multimedia at a real time.

Multimedia Applications



- ❖ Hypermedia Courseware
- ❖ Video Conferencing
- ❖ Video-on-demand
- ❖ Interactive TV
- ❖ Groupware
- ❖ Home Shopping
- ❖ Games
- ❖ Virtual Reality
- ❖ Digital video editing and production systems

Application example



Multimedia Revolution



what is the main reasons of this revolution?

- ❖ Digitization of virtually any and every device.
- ❖ Digitization of libraries of information.
- ❖ Evolution of communication and data networks.
- ❖ New algorithms for compression.
- ❖ Better hardware performance.
- ❖ Smarter user interface paradigms to view/interact with multimedia information.
- ❖ Standardizations.



Thank You!