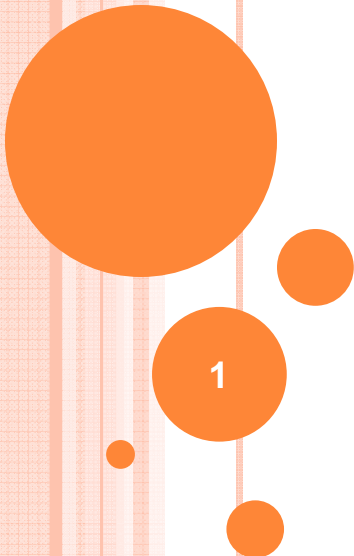


# Multimedia Technology (IT-204-F)

## Section A Introduction to multimedia

### LECTURE 2 FRAMEWORK OF MULTIMEDIA



# MULTIMEDIA: KEY POINTS

- Some of the **key points** regarding multimedia are:
  1. Multimedia projects often require a large amount of digital memory; hence they are often stored on CD-ROM or DVDs.
  2. Multimedia also includes web pages in HTML or DHTML(XML) on the www, and can include rich media created by various tools using plug-ins.
  3. Multimedia can contain structured linking; this is called Hypermedia.
  4. Multimedia developers produce multimedia titles using authoring tools.
  5. Multimedia projects, when published, are called multimedia titles.

# FRAMEWORK OF MULTIMEDIA SYSTEM

- A multimedia system is a system capable of processing multimedia data and applications. A multimedia system is characterized by the processing, storage, generation, manipulation of multimedia information.

- Characteristics of Multimedia System:

A multimedia system comprises of basically four basic characteristics:

1. Multimedia system must be computer controlled
2. Multimedia systems are integrated.
3. The information they handle must be represented digitally.
4. The interface to the final presentation of media is usually interactive.

# HYPertext & HYPERMEDIA

- a. Hypertext is text which is not constrained to be linear. Hypertext is text which contains links to other texts. The term was coined by [Ted Nelson](#) around 1965.
- b. Hypertext systems are particularly useful for organizing and browsing through large databases that consist of disparate types of information. There are several Hypertext systems available for Apple Macintosh computers and PCs that enable you to develop your own databases. Such systems are often called *authoring systems*. *HyperCard software from Apple Computer is the most famous.*
- o Text which does not form a single sequence and which may be read in various orders; specially text and graphics ... which are interconnected in such a way that a reader of the material (as displayed at a computer terminal, etc.) can discontinue reading one document at certain points in order to consult other related matter.
- o Theodore `Ted' Nelson, who first coined the terms hypertext and hypermedia, wrote in *Literary Machines* that `As popularly conceived, [hypertext] is a series of text chunks connected by links which offer the reader different pathways.' Neither hypertext nor hypermedia require the use of link.

- HYPERMEDIA is an extension to hypertext that supports linking graphics, sound, and video elements in addition to text elements. The World Wide Web is a partial hypermedia system since it supports graphical hyperlinks and links to sound and video files. New hypermedia systems under development will allow objects in computer videos to be hyperlinked.

# FRAMEWORK OF MULTIMEDIA TECHNOLOGY

- A multimedia system is a system capable of processing multimedia data and applications.

A multimedia system is characterized by the processing, storage, generation, manipulation and rendition of Multimedia information.

- **Characteristics of Multimedia System:**

A Multimedia system has four basic characteristics:

1. Multimedia system must be computer controlled.
2. Multimedia Systems are integrated.
3. The information they handle must be represented digitally.
4. The interface to the final presentation of media is usually interactive.

# CHALLENGES IN MULTIMEDIA SYSTEM

- **Challenges for Multimedia System**

Supporting multimedia applications over a computer network renders the application “Distributed”. This will involve many special computing techniques.

Multimedia systems may have to render a variety of media at the same instant—a distinction from normal applications. There is a temporal relationship between many forms of media (e.g. Video & Audio).

The two types of problems faced are:

1. Sequencing within the media-playing frames in correct order/ time frame in video.
2. Synchronization-inter-media scheduling (e.g. Video & Audio)

# MULTIMEDIA: KEY ISSUES

- **The key issues multimedia systems need to deal with are:-**
  1. How to represent and store temporal information.
  2. How to strictly maintain the temporal relationship on play back/ retrieval.
  3. The various processes which are involved in above.

In case of multimedia system, data has to be represented digitally so many initial source of data needs to be digitized-translated from analog source to digital representation. This will involve scanning (graphics, still images), sampling(audio/video) although digital cameras now exist for direct scene to digital capture of images and video.

As the data which generally a multimedia system handles is large, say in MBs or GBs-therefore storage, transfer (bandwidth) and processing overheads are high.

To save the memory, we generally go for various data compression techniques.



# MULTIMEDIA DEVICES

## ○ **Multimedia Devices**

1. CD-ROM-stands for compact disk-Read Only Memory. CD-ROMs have become ubiquitous (being present anywhere)in a very short span of time as the media of choice for various industries like audio, video etc.

### **Some important reasons to this rapid growth are:-**

1. Ease of use and Durability of the media.
2. Random access capabilities as compared to tapes.
3. Very high sound fidelity (accuracy in detail)
4. High storage volumes.

## ○ Specifications

1. It consists of Polycarbon Disk.
2. 120 mm in diameter
3. 1.2 mm in thickness
4. 15 mm spindle hole in centre
5. Polycarbonate substance contains lands and pits
6. Each pit is 100 nm in depth & 500 nm in width
7. Space between two adjacent pits is called land.
8. Pits represent binary zero and the transition from land to pits and pits to land is represented by binary one.

# CD ROM STANDARDS

1. **CD-DA(CD-Digital Audio) Red Book:** this standard specifies multiple tracks, typically with one song per track. One track contains one frame worth of data which is 2352 bytes. There are 75 frames in a second which gives us the bandwidth of 176 KB/sec.
2. **CD ROM Mode I Yellow book:** This standard was developed for the purpose of demand data. It provides both error detection codes and error correction codes, generally referred as EDCs and ECCs. The space dedicated for EDCs and ECCs is 288 bytes.

Synchronization	Header	Data	ECC/EDC
12 bytes	4 bytes	2048 bytes	288 bytes
0-11 bytes	13-15 bytes	16-2063 bytes	2064-2351 bytes

**3. CD-ROM Mode 2 Yellow Book:** This was developed for compressed audio and video applications where due to lossy compression, data integrity is not quite as important. This structure maintains the frame structure but it does not contain the EDCs/ECC bytes. Removing the ECC/EDC bytes allows a frame to contain an additional 288 bytes of data.

Synchronization	Header	Data
12-bytes	4-bytes	2336 bytes
0-11 bytes	13-15 bytes	16-2351 bytes

**4. CD-I (Interactive) Green Book:** This was designed originally with a Motorola 6800 processor utilizing the RTOS( Real Time Operating System) to manage resources such as audio o/p, video o/p and disk access. It generates an NTSC ( National Television System Committee) , o/p signal for home TV sets. CD-I allows interleaving audio & video for synchronized payback, a feature that neither Red Book nor Yellow Book standards support. CD-I also incorporates MPEG(Motion Picture Expert Group) compression/decompression standards for real video compression/decompression.

5. **CD-ROM(XA)-Extended Architecture:** This standard was created by extending the existing CD ROM format. It contains multiple tracks. Each content track is described by a mode.  
e.g. Mode 0-CD Audio, Mode 1-Computer Data, Mode 2-User Data.
6. **CD-Audio-**The compact disk was the first consumer format to use digital techniques to represent audio. A criteria required to store the audio on a CD is that the sampling rate must be high enough to ensure accurate reproduction of the original analogue wave form.
7. **DVD (Digital Versatile Disk)-**It is used to store the digital data. The DVDs have drastically increased the capacity of CDs from 650 MB to 4.5 GB to 20 GB. Along with this high capacity these can also store full motion video(MPEG) files with different audio tracks. DVDs also allows for better graphics and greater Resolution.

- Some of the features of DVDs are:
  1. High capacity up to 20GB.
  2. High quality storage data.
  3. Sampling rate of 48, 96, 122 KHz.
  4. High quality video compression.
  5. Up to 8 streams of data available.

- Some other devices to know about:
  1. RAM-Random Access Memory-Volatile
  2. ROM-Read Only Memory
    - Not Volatile
  1. Floppy and Hard Disk
  2. Optical Storage Devices
    - ( CDs, DVDs)

Input Devices	Output Devices
Keyboard Mouse Trackball Touch screens Scanners Optical Character Recognition System Digital Cameras Voice Recognition System Remotes	Speakers and Amplifiers Monitors Projectors Printers

# APPLICATIONS

- Image Processing
- Image Enhancement
- Medical Imaging

# SCOPE OF RESEARCH

- Multimedia on Internet
- You tube etc.
- Blue Ray DVDs.