



Multimedia

Lecture: WHAT IS MULTIMEDIA

Department : Technology of Computer Engineering

***BY
HUSSEIN ALI RASOOL***

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AGENDA

1

What is Multimedia (MM)

2

Multimedia applications

3

Hypertext and its Application

4

Hypermedia and its Application

5

Components of a MM System

6

Multimedia System

WHAT IS MULTIMEDIA?



- media = text, graphics, still images, voice, sound
- multimedia = a combination of several media types or the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be *represented, stored, transmitted* and *processed* digitally.
- multimedia issues followed in this course:
 - storage of multimedia content – containers, codecs
 - transmission of multimedia content – multimedia streaming
 - presentation/delivery of multimedia content – players, codecs, continuous delivery

Multimedia Application Definition

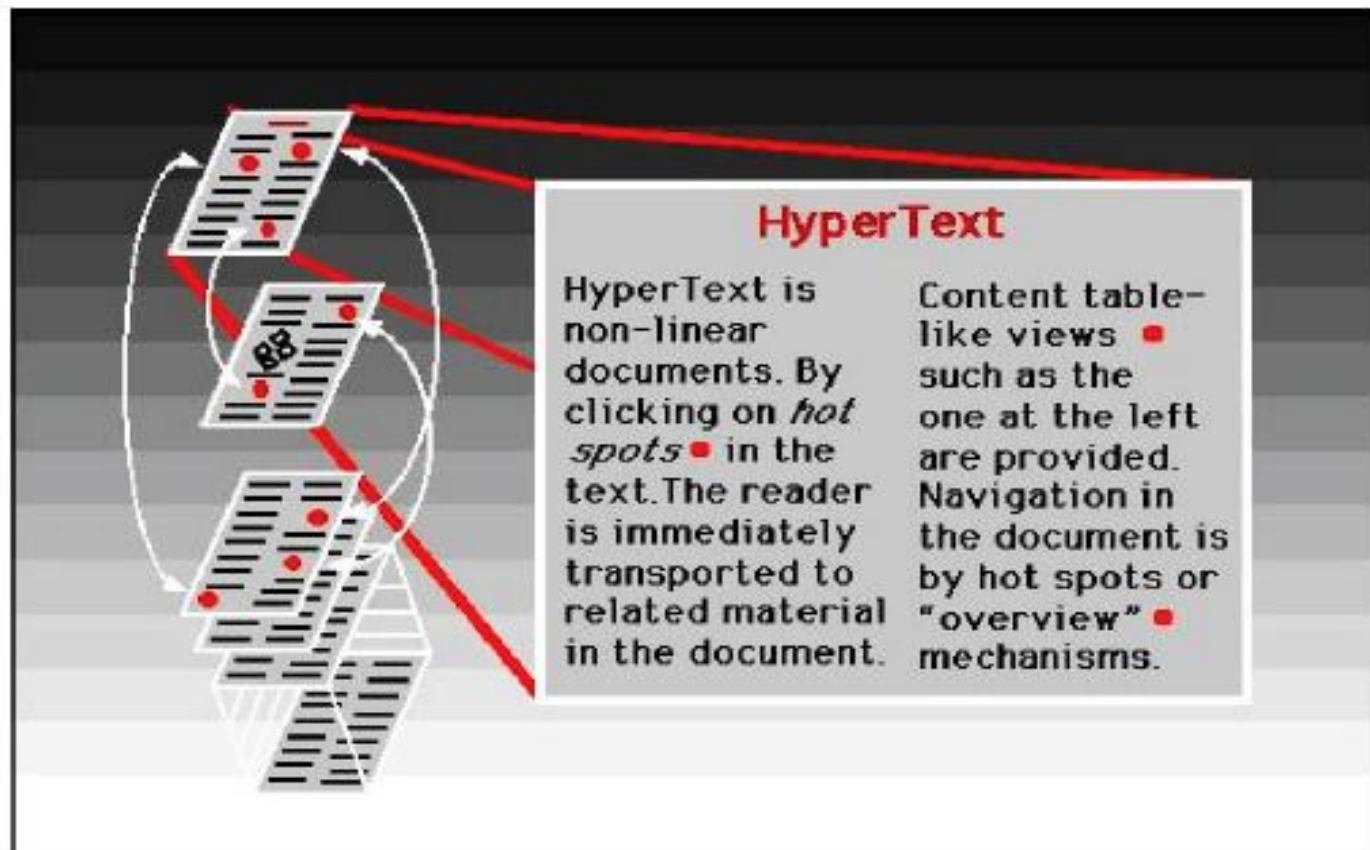
A **Multimedia Application** is an application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.

MULTIMEDIA APPLICATIONS

- Text, graphics, images ...
- Video on demand
- Video broadcasting
- Live broadcasting
- Video conferencing
- Multimedia presentations on the web
- Multimedia databases
- Peer-2-Peer video streaming
- Internet Television
- ...etc.

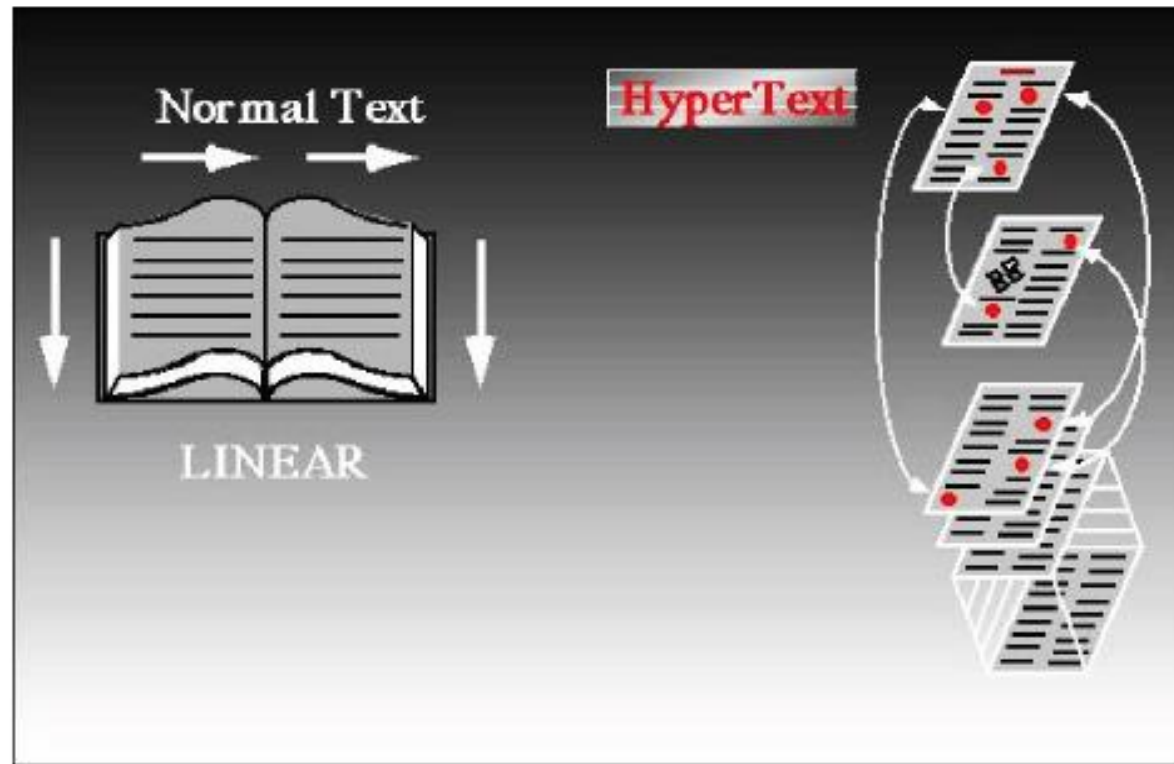
What is HyperText and HyperMedia?

Hypertext is a text which contains links to other texts.
The term was invented by Ted Nelson around 1965.



HyperText Navigation

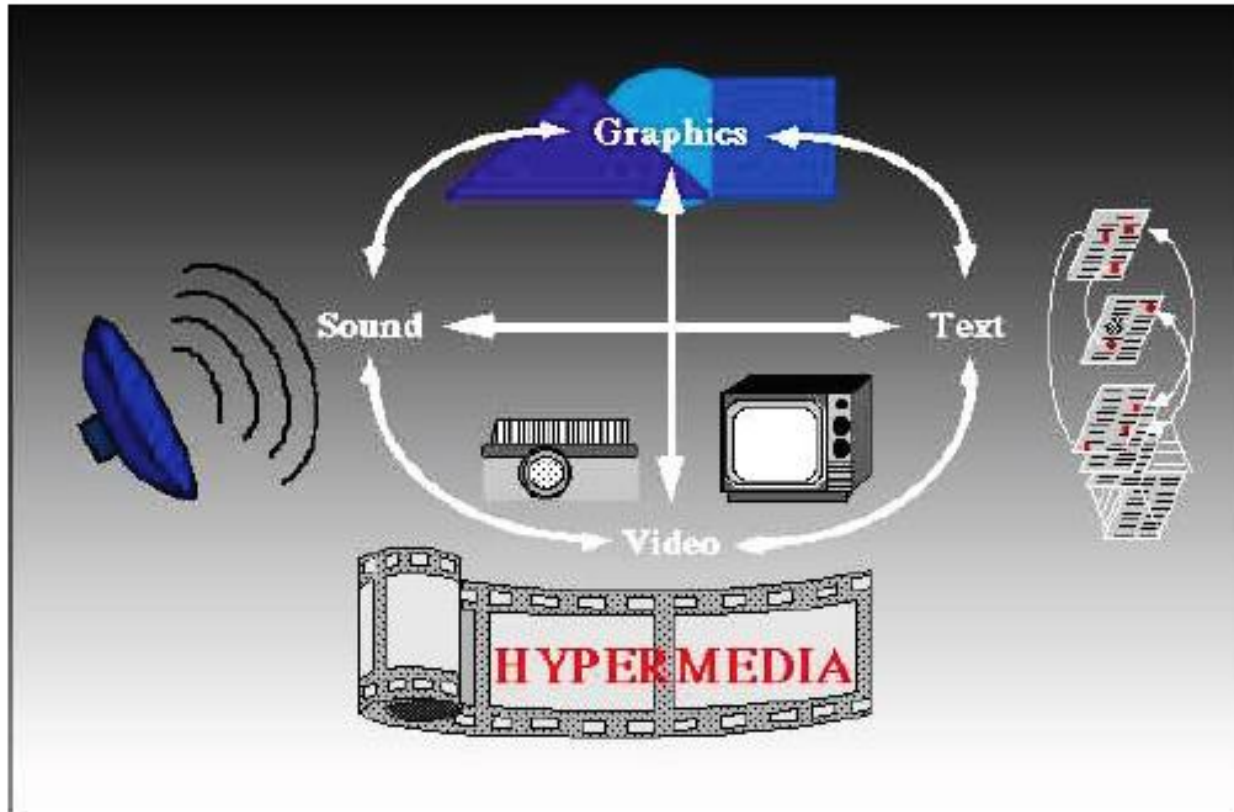
Traversal through pages of hypertext is therefore usually non-linear (as indicated below).



This has implications in layout and organisation of material — and depends a lot on the application at hand.

Hypermedia

HyperMedia is not constrained to be text-based. It can include other media, e.g., graphics, images, and especially the continuous media – sound and video.



Example Hypermedia Applications?

- The World Wide Web (WWW) is the best example of a hypermedia application.
- Powerpoint
- Adobe Acrobat (or other PDF software)
- Adobe Flash
- Many Others?

COMPONENTS OF A MULTIMEDIA SYSTEM



The multimedia system required Components (Hardware and Software) are:

Capture devices

- Video Camera, Video Recorder, Audio Microphone, Keyboards, mice, graphics tablets, 3D input devices, tactile sensors, VR devices. Digitizing/Sampling Hardware

Storage Devices

- Hard disks, CD-ROMs, Jaz/Zip drives, DVD, etc

Communication Networks

- Ethernet, Token Ring, FDDI, ATM, Intranets, Internets.

Computer Systems

- Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware

Display Devices

- CD-quality speakers, HDTV, SVGA, Hi-Res monitors, Colour printers ...etc.



Characteristics of a Multimedia System

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**.

Challenges for Multimedia Systems

- Distributed Networks
- Temporal relationship between data
 - Render different data at same time — continuously.
 - Sequencing within the media
playing frames in correct order/time frame in video
 - **Synchronisation** — inter-media scheduling

E.g. Video and Audio — Lip synchronisation is clearly important for humans to watch playback of video and audio and even animation and audio.

Ever tried watching an out of (lip) sync film for a long time?

Key Issues for Multimedia Systems

The key issues multimedia systems need to deal with here are:

- How to represent and store temporal information.
- How to strictly maintain the temporal relationships on play back/retrieval
- What process are involved in the above.
- Data has to be represented **digitally** — Analog–Digital Conversion, Sampling *etc.*
- Large Data Requirements — bandwidth, storage,

Data compression is usually mandatory

Desirable Features for a Multimedia System

Given the above challenges the following feature a desirable (if not a prerequisite) for a Multimedia System:

Very High Processing Power — needed to deal with large data processing and real time delivery of media.
Special hardware commonplace.

Multimedia Capable File System — needed to deliver real-time media — *e.g.* Video/Audio Streaming.

Special Hardware/Software needed – *e.g.* RAID technology.

Data Representations — File Formats that support multimedia should be easy to handle yet allow for **compression/decompression** in **real-time**.

Efficient and High I/O — input and output to the file subsystem needs to be efficient and fast. Needs to allow for real-time recording as well as playback of data.
e.g. Direct to Disk recording systems.

Special Operating System — to allow access to file system and process data efficiently and quickly. Needs to support direct transfers to disk, real-time scheduling, fast interrupt processing, I/O streaming *etc.*

Storage and Memory — large storage units (of the order of hundreds of Tb if not more) and large memory (several Gb or more). Large Caches also required and high speed buses for efficient management.

Network Support — Client-server systems common as distributed systems common.

Software Tools — user friendly tools needed to handle media, design and develop applications, deliver media.