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Multimedia

Introduction to Multimedia

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What is Multimedia

Many definitions

- Multimedia in [computer system perspective](#)

Multimedia means that computer information can be represented through audio, video, and animation in addition to traditional media (i.e., text, graphics/drawings, images).

What is Multimedia

- Multimedia in a more [general perspective](#)

Multimedia is 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

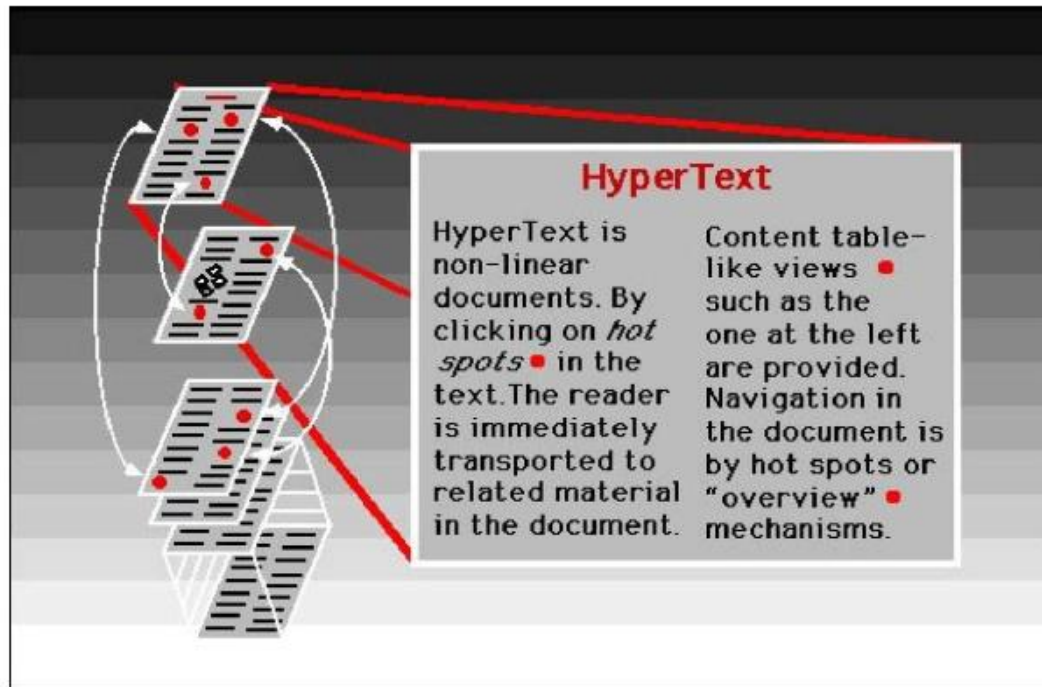
Multimedia Application

- 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.

Hyper Text

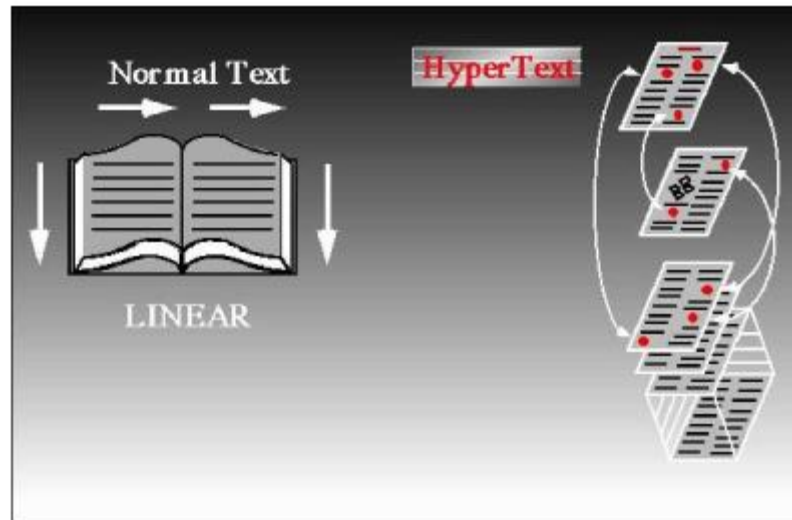
Hypertext is a text which contains links to other texts.

The term was invented by **Ted Nelson** around 1965



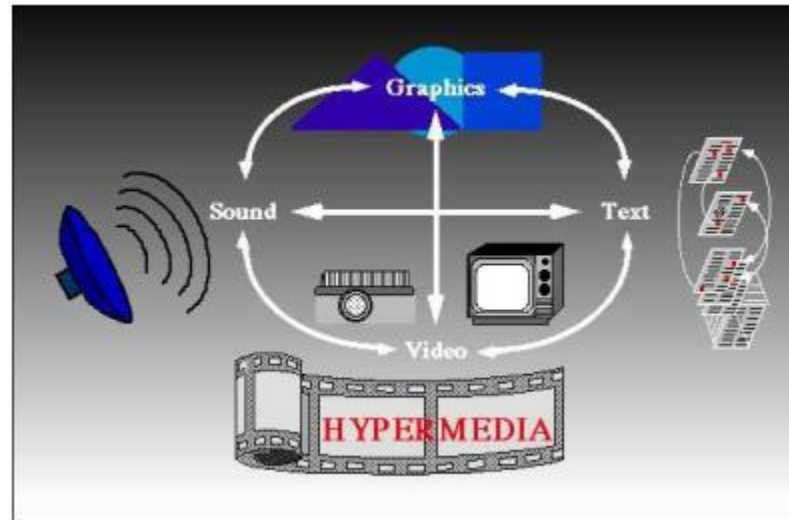
Hyper Text Navigation

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



- This has implications in layout and organization 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 continuous media - sound and video.

Hypermedia Applications Examples

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

Multimedia Applications

- World Wide Web
- Multimedia Authoring, e.g. Adobe/Macromedia Director
- Hypermedia courseware

- Video-on-demand
- Interactive TV

- Computer Games
- Virtual reality

- Digital video editing and production systems
- Multimedia Database systems

Multimedia Systems

- Definition: 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 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
 - Synchronization — inter-media scheduling
E.g. Video and Audio — Lip synchronization is clearly important for humans to watch playback of video and audio and even animation and audio.

Key Issues for Multimedia Systems

- 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 of a MM Systems

- 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.

Desirable Features of a MM System

- 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.

Desirable Features of a MM System

- Storage and Memory
 - large storage units and large memory.
 - 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.

Components of a MM System

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



3D Graphics Tablet



Spacemouse Pro



Tactile Sensor

- Storage Devices
 - Hard disks, CD-ROMs, DVD-ROM.

Components of a MM System

- Communication Networks
 - Local Networks, Intranets, Internet, Multimedia or other special high speed networks.
- Computer Systems
 - Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware
- Display Devices
 - CD-quality speakers, HDTV,SVGA, Hi-Res monitors, Colour printers

Multimedia S/W Tools

- Music Sequencing and Notation
 - Cakewalk, Cubase, Macromedia Soundedit
- Digital Audio
 - Cool Edit, Sound Forge, Pro Tools
- Graphics and Image Editing
 - Adobe Illustrator, Adobe Photoshop, Macromedia Fireworks, Macromedia Freehand
- Video Editing
 - Adobe Premiere, Adobe After Effects, Final Cut Pro
- Animation
 - Multimedia APIs: Java3D, DirectX, OpenGL
 - Rendering Tools: 3D Studio Max, Softimage XSI, Maya, RenderMan
- Multimedia Authoring
 - Macromedia Flash, Macromedia Director, Authorware, Quest

Multimedia Research Topics

- **Multimedia processing and coding:** multimedia content analysis, content-based multimedia retrieval, multimedia security, audio/image/video processing, compression, etc.
- **Multimedia system support and networking:** network protocols, Internet, operating systems, servers and clients, quality of service (QoS), and databases.
- **Multimedia tools, end-systems and applications:** hypermedia systems, user interfaces, authoring systems.
- **Multi-modal interaction and integration:** “ubiquity” — web-everywhere devices, multimedia education including Computer Supported Collaborative Learning, and design and applications of virtual environments.

Q&A

