Introduction to Multimedia Systems

What is Multimedia?

What is Multimedia?

Multimedia can have a many definitions these include:

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

General Definition

A good general working definition for this module is:

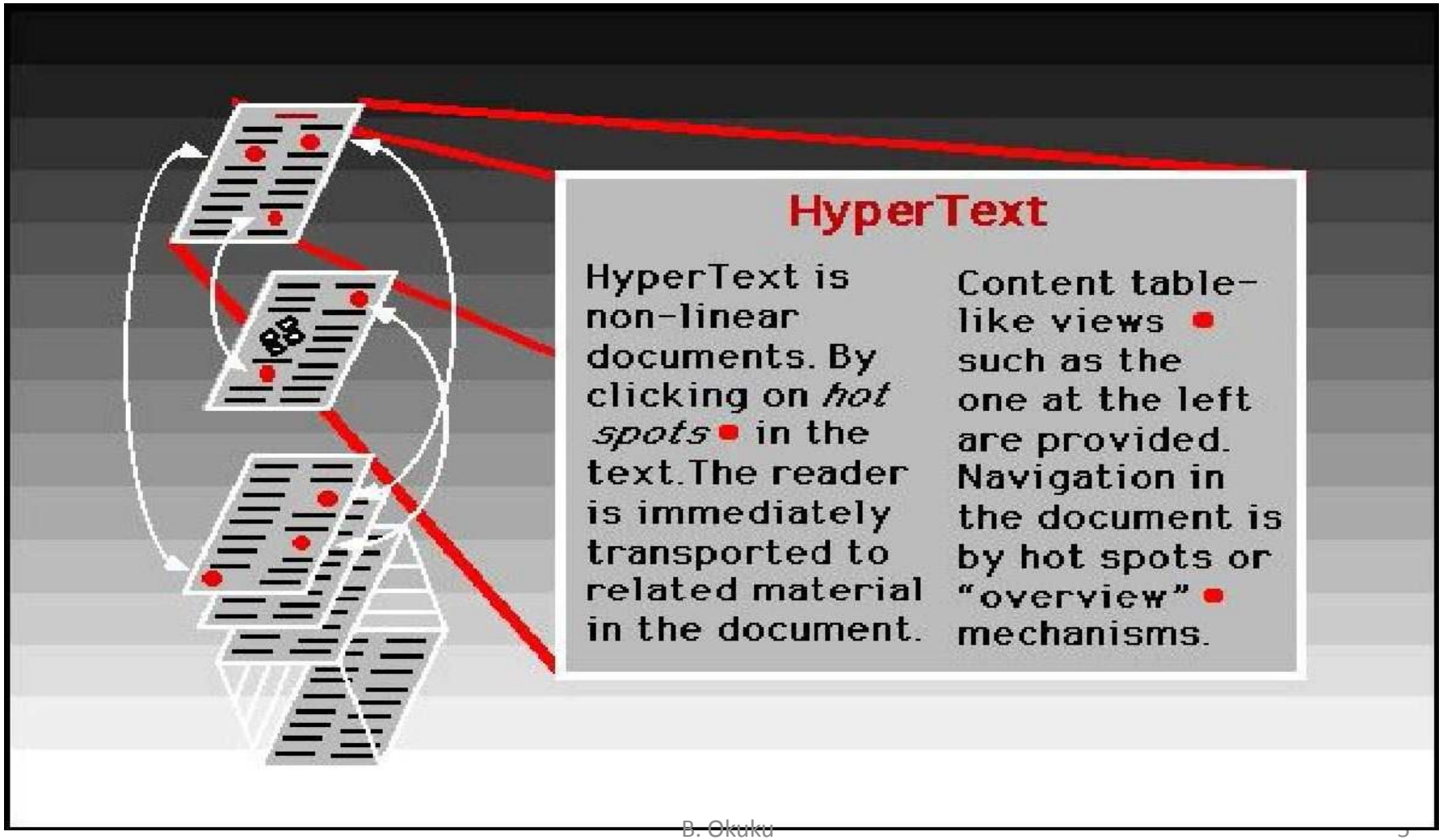
Multimedia is the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

Multimedia Application 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.

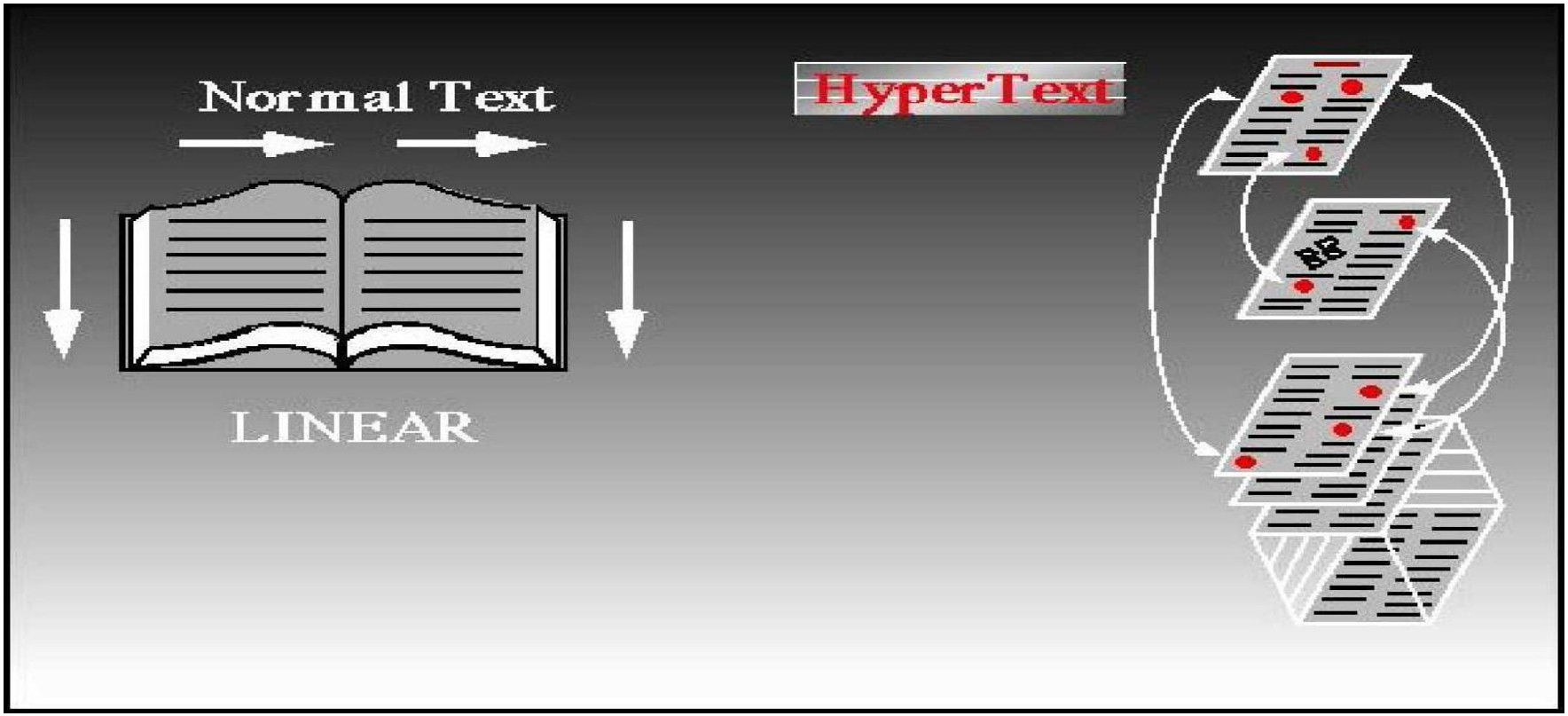
What is HyperText and HyperMedia?

Hypertext is a text which contains links to other texts.



HyperText Navigation

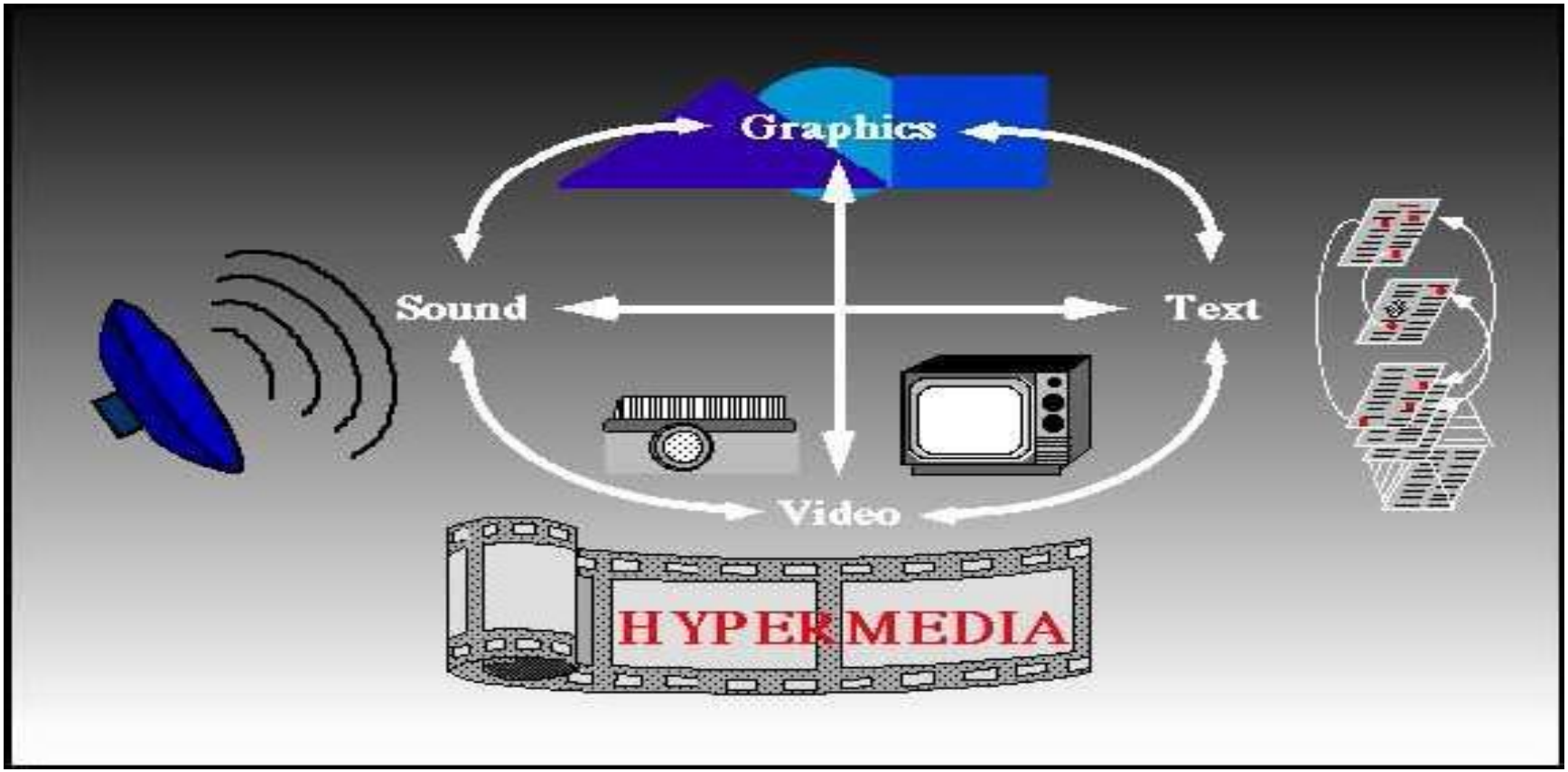
Traversal through pages of hypertext is therefore usually non-linear (as indicated below).



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

• Many Others?

Multimedia Applications

Examples of Multimedia Applications include:

- 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

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

A Multimedia System is characterised 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

– 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 info.
- How to strictly maintain the temporal relationships on play back/retrieval
- What process are involved in the above.
- Data has to 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.

Components of a Multimedia System

Now let us consider the Components (Hardware and Software) required for a multimedia system:

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

•Storage Devices — Hard disks, CD-ROMs, DVD-ROM, etc

•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 etc.

Applications

Examples of Multimedia Applications include:

- World Wide Web
- Hypermedia courseware
- Video conferencing
- Video-on-demand
- Interactive TV
- Groupware
- Home shopping
- Games
- Virtual reality
- Digital video editing and production systems