Introduction to Multimedia

Multimedia Types/Applications

Topics

- Introduction
  - Media
  - Multimedia
- Multimedia Applications
- Multimedia Requirements
  - Broadcasting Multimedia
- Representing Multimedia
- Multimedia and the Internet

Media and Multimedia

- Definitions:
  - Data: is information that may be valuable for an end-user
  - Media: tools used to store and deliver information or data
  - Multimedia: communications that include multiple forms of information

Media Types

- Data may be presented as:
  - Audio: voice, music, natural sounds, sound effects, etc.
  - Image: photographs, paintings, drawings, etc.
  - Video: Visual information which involves object motions.
  - Animation: drawings that involve motion
  - Text: short messages, articles, books, ..

Multimedia Applications

- *Point of Sale*
- *Point of Information*
- *Training*
- *Learning*
- *Entertainment*

Point of Sale

- Using multimedia data, the user is presented the various models available from the vendor

- This can be a graphical demonstration of how the product actually works.

Point of Sale

2009 TOYOTA LANDCRUISER UZJ200R SAHARA (4X4)

Price:	$91,990
Kilometers:	34993
Body:	Wagon
Color:	Pearl White
Transmission:	Automatic
Engine Size:	4.7 Litres
No of Seats:	8
Fuel Type:	Petrol - Unlead

Extras/Features:

17 Inch Alloy Wheels Air Con + Climate Control Multi Zone Alarm System/Remote Anti Theft Anti-Lock Braking Brake Assist CD With 6 CD Stacker Central

Point of Information

- Interactive multimedia information systems are being used in museums, hotels, university campuses, companies, etc.
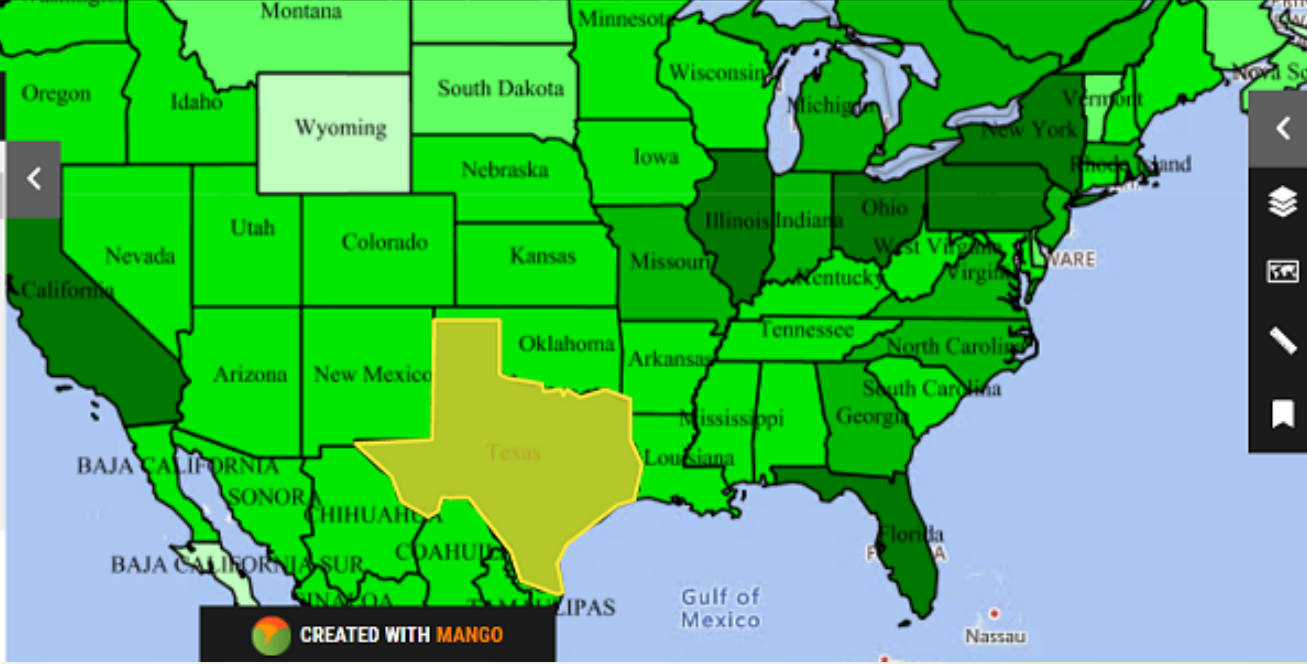
Training

- Visual training with the help of images, animation, video and other type of multimedia is proven to be more effective.

- Multiple choice exams after short video clips can lead the user through the training system.

Learning

- A successful learning system should have features for the user to explore the information.

Entertainment

- Entertainment is one of the important areas for multimedia applications.

- Computer games are becoming widespread by simulating the real game environments.

Entertainment

Multimedia Systems

A Multimedia System is a system capable of:

- Processing multimedia data,
- Storing multimedia data,
- Generating and manipulating multimedia data.

Characteristics of Multimedia Systems

- A Multimedia system has four basic features:
  - 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.

Multimedia Requirements

- The multimedia systems should:
  - Process large amount of data
  - They should be real time in many cases
  - They should be able to combine different media
  - It is desired that the media be accessible from a remote place

Multimedia Data Representation

- A sample video contains:
  - About 30 frames per second
  - About 600 x 800 rows and columns in each frame
  - Needs 3 bytes for each pixel

- The file size for a one hour video will be
  - 3600 * 30 * 600 * 800 * 3 = 155,520,000,000 Bytes which is about the size of 220 CDs

- Conclusion: Multimedia data should be stored in compressed form.

Challenges in Representing Multimedia Data

- Compression ratio should be high while the quality of the multimedia data is preserved.

- Compression/decompression should be fast (near to real-time)

- Processing multimedia data in compressed format is desired

Communicating Multimedia

- Multimedia data can be used as:
  - Streaming data
    - Data (audio, video, etc) is presented to the end-user only once (without being saved to a file).
  - Downloadable
   - Data is downloaded to a file and presented to the end-user repeatedly.

Streaming Multimedia Data

- Multimedia data can be sent as a stream over a private or a public network.

- Streaming may be broadcast or on-demand

Broadcasting over Dedicated Networks

- The networks resources are not shared with other applications

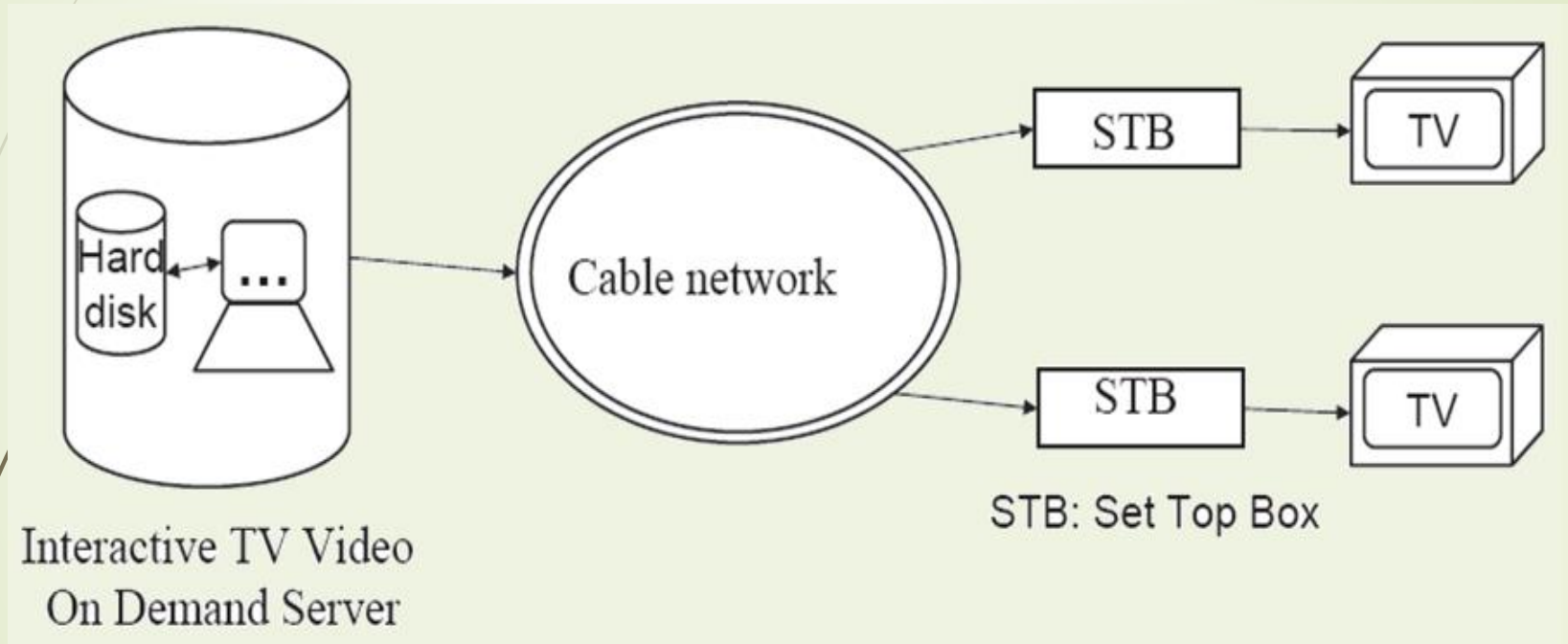- Multiple users share the same data stream, therefore, the entire network bandwidth is used for the multimedia data

Broadcasting over Dedicated Cables

Interactive TV Broadcasting Server

STB: Set Top Box
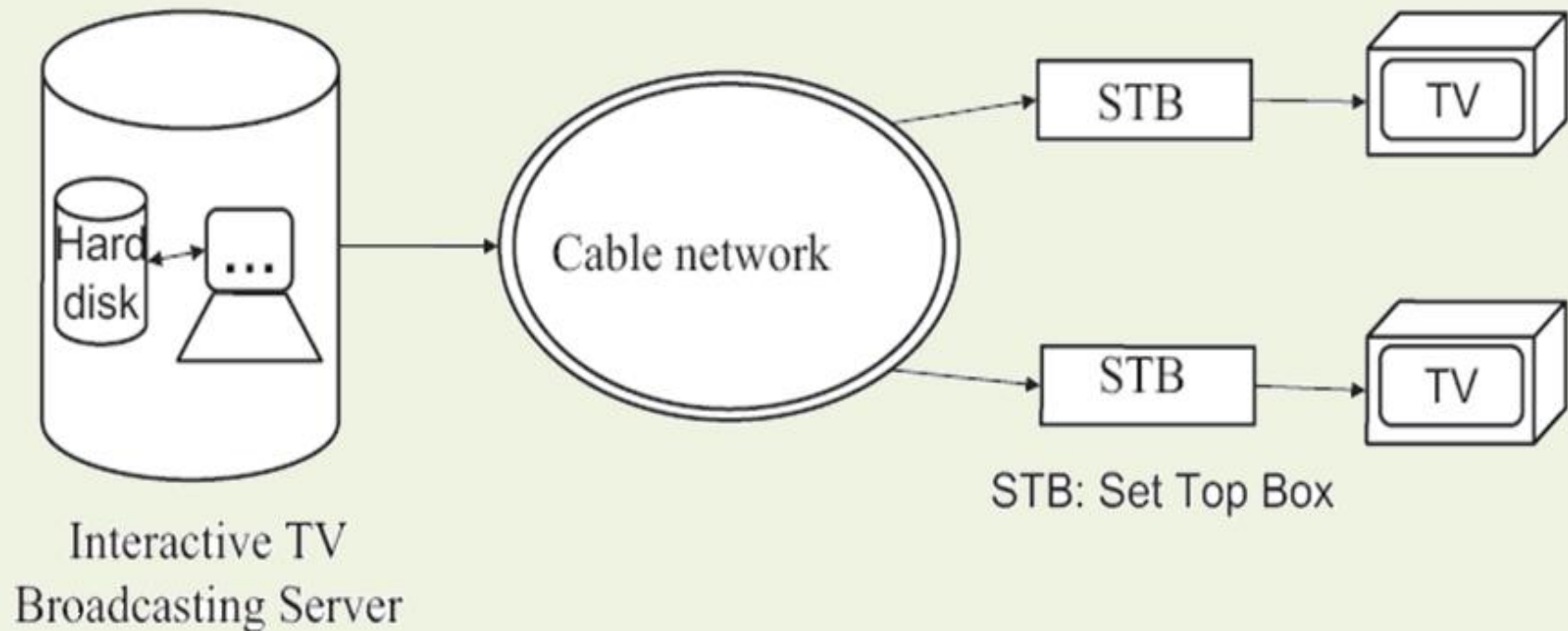
Video on Demand over Dedicated Networks

- The network resources are used for the multimedia data streaming.
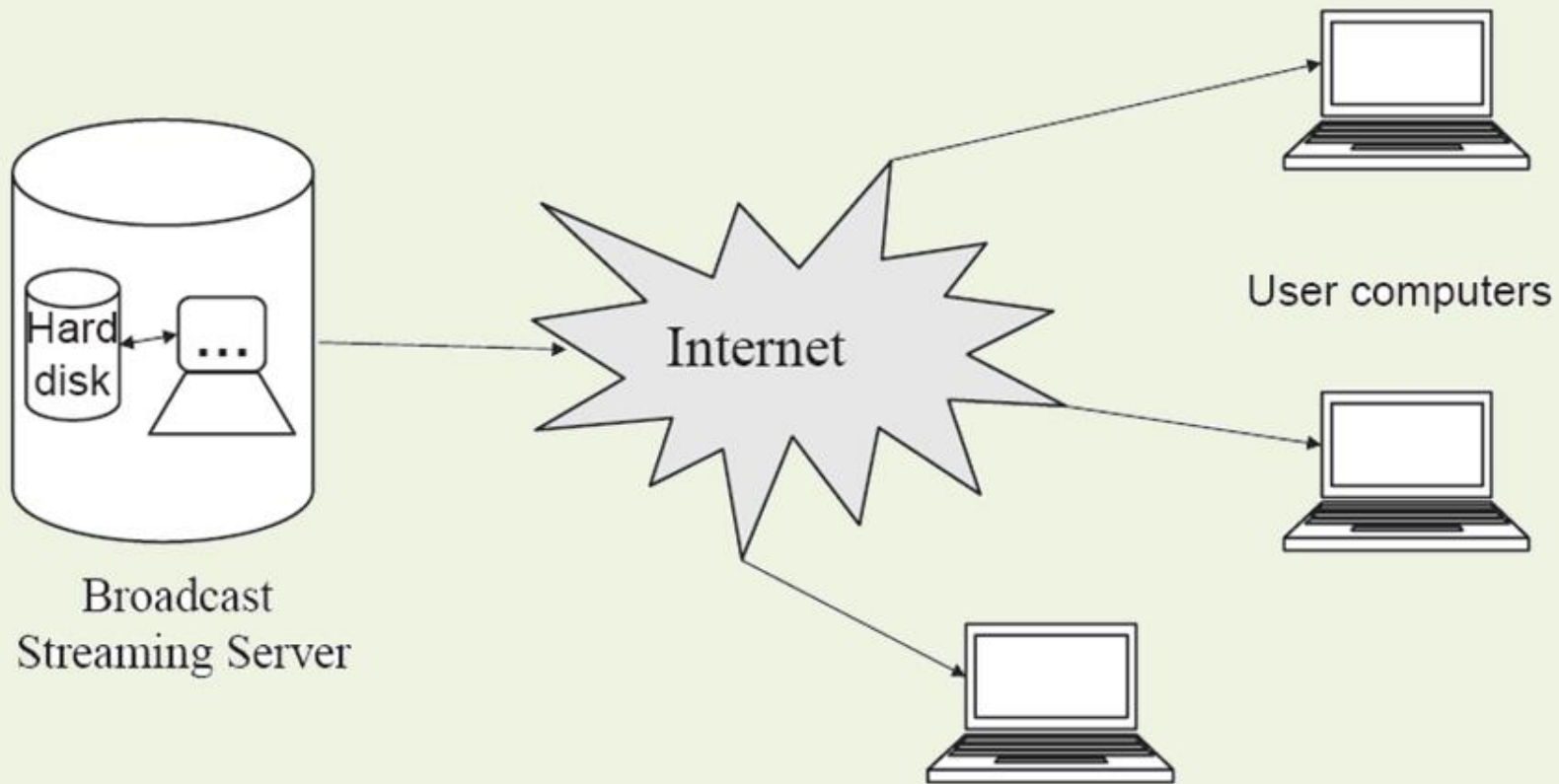
- Multiple streams used network resources

Video on Demand over Dedicated Cables

Interactive TV Video On Demand Server

STB: Set Top Box

Broadcasting over the Internet

- ➡ The multimedia data shares the network resources with other applications (web, databases, etc.)
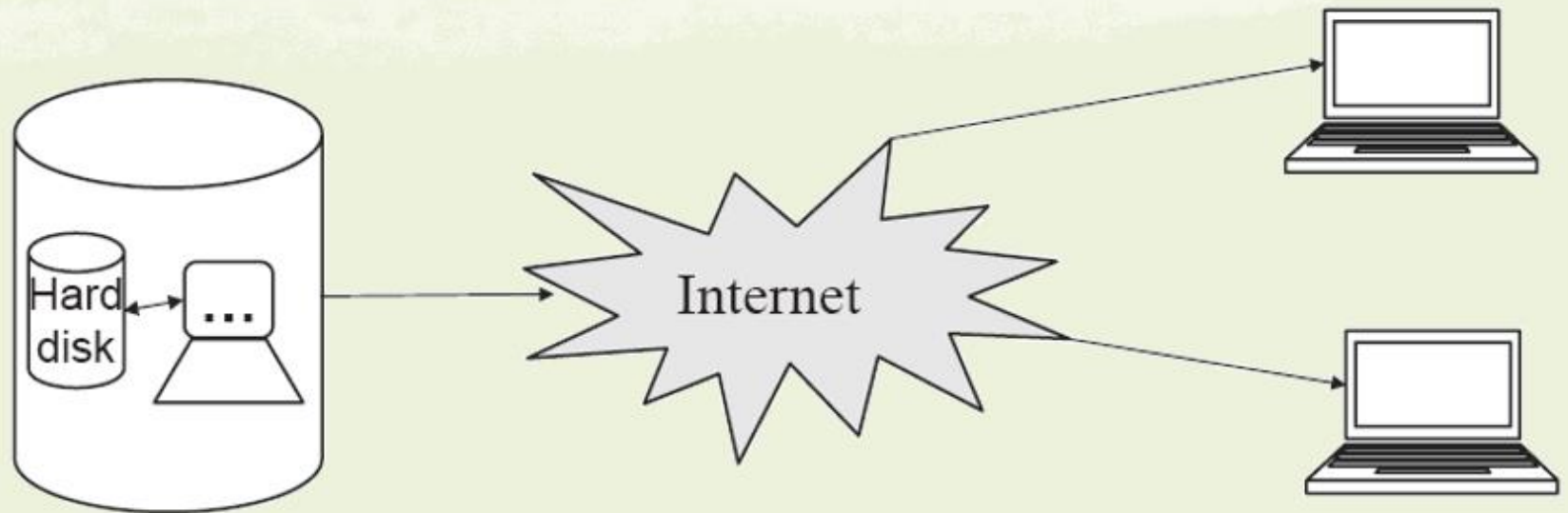- ➡ Multiple users share the multimedia stream

Broadcasting over the Internet

Video on Demand over the Internet

- The multimedia data shares the network resources with other applications (web, databases, etc.)

- Multiple multimedia streams use network resources

Video on Demand over the Internet

Video On Demand (VOD) streaming server

Multimedia over the Internet

- Multimedia data can be used from a distance using computer networks.

- The Internet is a public network that is used for multimedia transmission.

Computer Networks and the Internet

- The Internet is a large network interconnecting local networks.

- The Internet has a heterogeneous structure.

- The Internet is a best-effort network.

- The Internet does not guarantee a fixed data rate over a connection.

Multimedia and the Internet

- Internet is a best effort network
  - Multimedia data may get lost or corrupted
- Internet is a public network
  - The data rate may change with the traffic load created by other applications
  - Extra delay may be added to multimedia delivery

Multimedia over the Internet: Solutions

- Network resource reservation
  - Part of the network bandwidth, processing time, or memory space can be reserved for a multimedia stream
- Self-adapting multimedia
  - Multimedia data can adapt with changes in network parameters

Main Challenges in Multimedia Applications

- Representing multimedia data in high compression rates, with minimum redundancy

- Minimizing multimedia processing time (real-time processing)

- Interactive multimedia

- Self-adapting multimedia

- Content-aware multimedia

Summary

- Multimedia is a way of presenting information to the end-user in multiple formats (audio, visual, etc.)
- Multimedia provides possibility of transferring information from a distance (using computer networks)
- Large size of multimedia data requires high rate of compression.

Questions?