Introduction

Multimedia Systems (Module 0 Lesson 2)

Summary:

- Multimedia
  - Definition
  - Components
  - Communications viewpoint
- History and Evolution of Multimedia
- Scope and Applications

Multimedia

Multi + Media

- *Multi* : many; much; multiple
- *Medium* : An intervening substance through which something is transmitted or carried on; A means of mass communication such as a newspaper, magazine or TV

- Franklin Kuo:
  - "Multimedia concerns the representation of mixed modes of information – text, data, image, audio and video – as digital signals"
  - "Multimedia Communications concerns the technology required to manipulate, transmit, and control these audiovisual signals across a communications channel"
- Guojun Lu:
  - "A system capable of handling at least one type of *continuous media* in digital form as well as *static media*."

Media Types

Two broad classes:

- **Static, time-independent discrete media**: Text, graphics, images. Information in these media consist exclusively of a sequence of individual elements without a time component.
- **Dynamic, time-dependent continuous media:** Sound, video. Information is expressed as not only of its individual value, but also by the time of its occurrence.

A note: These notions of time-dependent, discrete and continuous media do not have any connection to the internal representation. They only relate to the impression of the viewer of listener.

Communications Viewpoint

Traditional view of Multimedia Systems involve a local computer-based point of view. However, increasingly, the real issues seem to arise from the communications aspect of Multimedia

Terminology:

- A sequence of individual packets (that constitute the media) transmitted in a time-dependent fashion is called a *data stream*.
- The packets can carry information of either continuous or discrete media. Examples:
  - Continuous media stream: transmission of speech in telephony
  - Discrete media stream: retrieval of a document from a database.

Data Stream Characteristics of Continuous Media

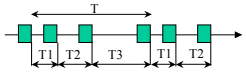
Data Streams

- Asynchronous
  - No delay guarantee
- Synchronous
  - Bounded end-to-end delay
- Isochronous
  - Bounded Delay Jitter (minimum and maximum); The interval between consecutive packets that constitute the media is bounded.

Continuous Media

- Inter-Pkt interval
  - Strongly Periodic (e.g., PCM coded speech)

  - Weakly Periodic



  - Aperiodic (e.g., mouse events in Groupware)

Data Stream Characteristics (Contd.)

- Packet size variation
  - Strongly regular (eg., live feed from a camera, audio CD)
  - Weakly regular over time (e.g., MPEG I:B:P)
  - Irregular (e.g., Differentially coded)
- Contiguous Pkts
  - Connected stream. All pkts are transmitted successively without a gap resulting in 100% utilization (e.g., B-Channel ISDN transmitting 64 Kbps audio data).
  - Unconnected stream. The stream feed is slower. For example, the transmission of a data stream coded with the JPEG method with 1.2 Mbps throughput on average will lead to gaps among individual pkts on an FDDI network.

Example summarizing Data Stream Characteristics

- An NTSC video signal is captured from a video camera and digitized in a computer, yet no compression is done. The created data stream is *strongly periodic, strongly regular* and *connected.* There are no gaps among the pkts.
- If, during the digitizing process, a compression method is used, the resulting data stream (considered over a long period) is *weakly periodic, weakly regular,* and, through transmission over a 16 Mbps Token Ring, *unconnected*

Evolution of Multimedia

- 1945 - Vannevar Bush (1890-1974) wrote about Memex
- 1960s - Ted Nelson started Xanadu project
- 1967 - Nicholas Negroponte formed the Architecture Machine Group at MIT
- 1968 - Douglas Engelbart demonstrated NLS system at SRI
- 1969 - Nelson & Van Dam hypertext editor at Brown
- 1976 - Architecture Machine Group proposal to DARPA: Multiple Media
- 1985 - Negroponte, Wiesner: opened MIT Media Lab
- 1989 - Tim Berners-Lee proposed the World Wide Web to CERN
- 1990 - K. Hooper Woolsey, Apple Multimedia Lab
- 1992 - The first M-Bone audio multicast on the Net
- 1993 - U. Illinois National Center for Supercomputing Applications: NCSA Mosaic
- 1994 - Jim Clark and Marc Andreesen: Netscape
- 1995 - JAVA for platform-independent application development.

Multimedia Applications

- Hypermedia Courseware
- Video Conferencing
- Video-on-demand
- Interactive TV
- Groupware
- Home Shopping
- Games
- Virtual Reality
- Digital video editing and production systems