University of M’sila, Algeria
Faculty of Mathematics and Computer Science
Computer science Department

Level: 1st Master RTIC

Multimedia Systems

Lesson 1: Multimedia definition

Level: 1st Master RTIC

Academic Year :2020-2021

- Summary:
- Multimedia o Definition
- Components
- Communications viewpoint
- Multimedia Systems
- History and Evolution of Multimedia
- Scope and Applications

- Multi-Media definition
- **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:

A)Static, time-independent discrete media: Text, graphics, images. Information in these media consist exclusively of a sequence of individual elements without a time component.

B)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.

- Remark: 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.

Multimedia Systems

- Combination of media
    - **continuous and discrete.**
  - Levels of media-independence
    - some media types (audio/video) tightly coupled, others not.
  - Computer supported integration
    - **timing, spatial and semantic synchronization**
- Distributed multimedia communication systems
    - data of discrete and continuous media are broken into **individual units (packets)** and transmitted.
- Data Stream
    - sequence of individual packets that are transmitted in a time-dependant fashion.
    - Transmission of information carrying different media leads to data streams with varying features
        - **Asynchronous**
        - **Synchronous**
        - **Isochronous**

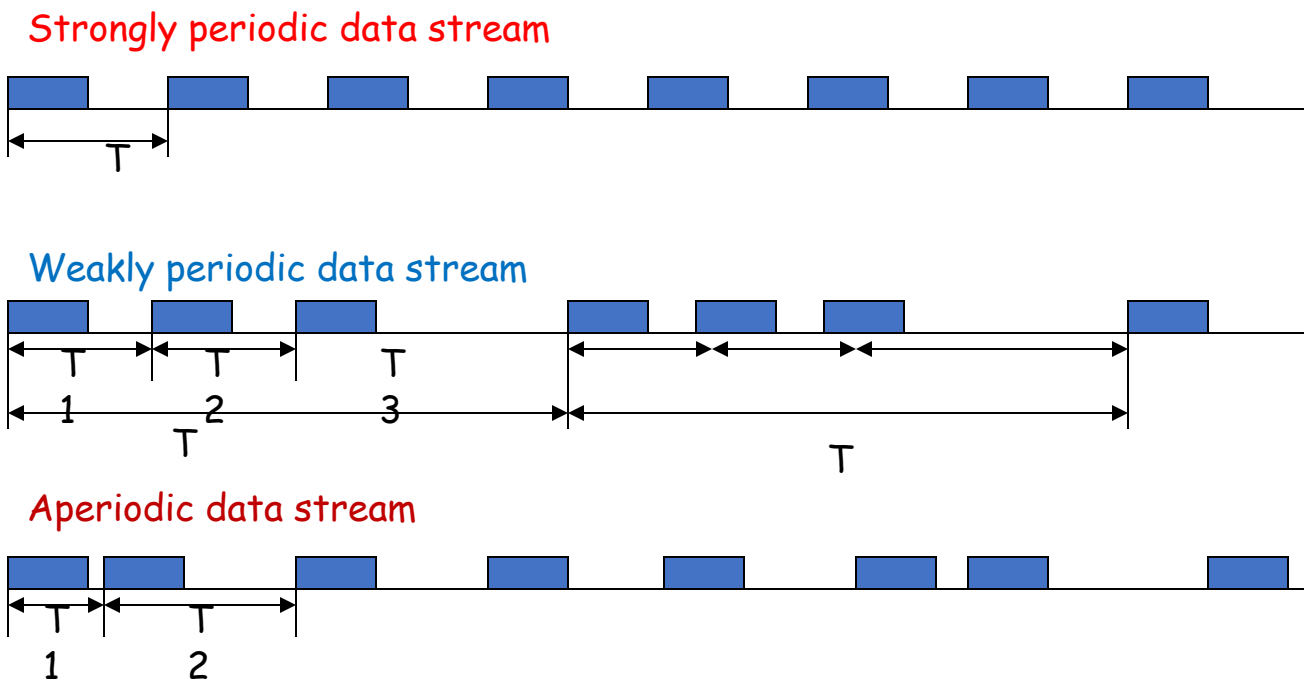
Data Stream Characteristics

- Asynchronous transmission mode
  - provides for communication with no time restriction
  - Packets reach receiver as quickly as possible, e.g. protocols for email transmission
- Synchronous transmission mode
  - defines a maximum end-to-end delay for each packet of a data stream.
  - May require intermediate storage
  - E.g. audio connection established over a network.
- Isochronous transmission mode
  - defines a maximum and a minimum end-to-end delay for each packet of a data stream. Delay jitter of individual packets is bounded.
  - E.g. transmission of video over a network.
  - Intermediate storage requirements reduced.

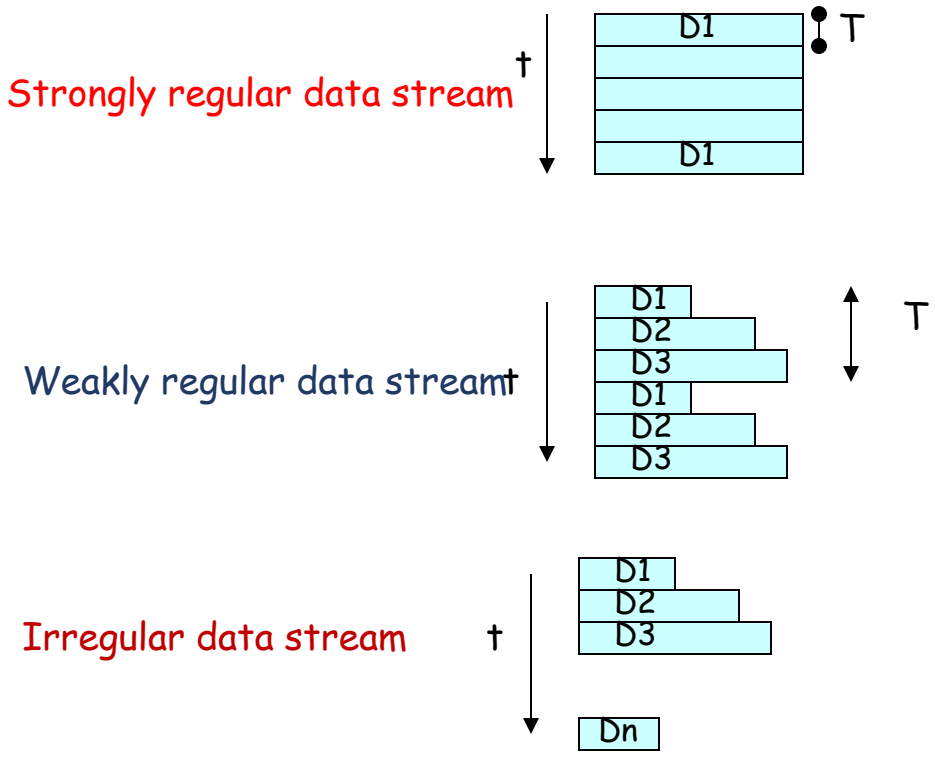
Data Stream Characteristics

- Data Stream characteristics for continuous media can be based on
  - **Time intervals** between complete transmission of consecutive packets
    - Strongly periodic data streams - constant time interval
    - Weakly periodic data streams - periodic function with finite period.
    - Aperiodic data streams
  - Data size - amount of consecutive packets
    - Strongly regular data streams - constant amount of data
    - Weakly regular data streams - varies periodically with time
    - Irregular data streams
  - Continuity
    - Continuous data streams
    - Discrete data streams

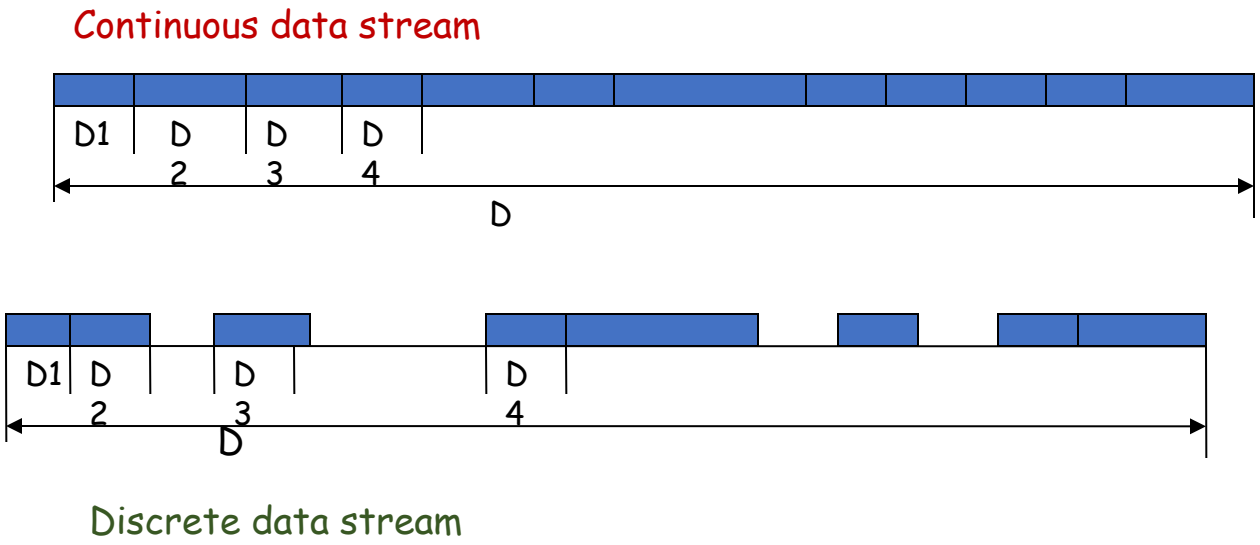
Classification based on time intervals



Classification based on packet size



Classification based on continuity



Evolution of Multimedia

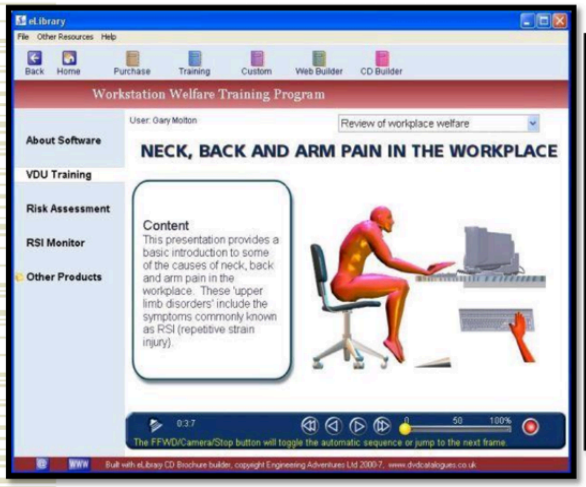
- 1945 - Vannevar Bush (1890-1974) wrote about Memex
-1960s - Ted Nelson started Xanadu project
-1967 - Nicholas Negroponte formed the Architecture Machine Group at MIT
-1968 - Douglas Engelbart demonstrated NLS system at SRI
-1969 - Nelson & Van Dam hypertext editor at Brown
-1976 - Architecture Machine Group proposal to DARPA: Multiple Media
-1985 - Negroponte, Wiesner: opened MIT Media Lab
-1989 - Tim Berners-Lee proposed the World Wide Web to CERN q 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

Multimedia Applications

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

Computer-Based Training

Teaching Aid



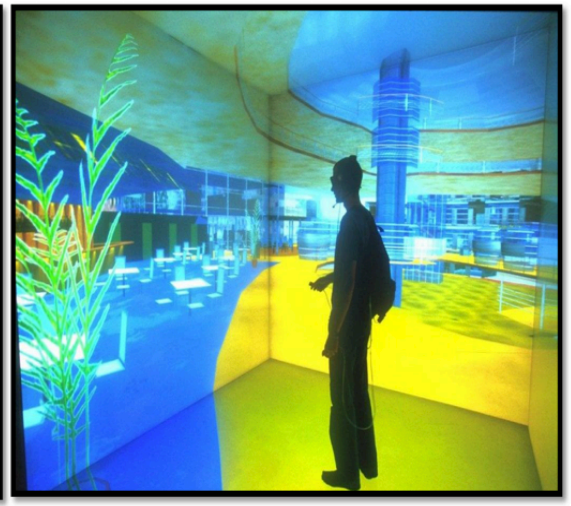
References

Entertainment

Virtual Surgery

Information Kiosk

Simulation



Virtual Reality