Multimedia Technology

A Graduate Course

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Recommended Reading (1)

(ordered by relevance for this course)

1. R. Steinmetz: Multimedia-Technologie – Grundlagen, Komponenten und Systeme. 3. Auflage, Springer Verlag, Heidelberg, Berlin, New York, 2000 (English version to appear soon)
2. F. Kuo, W. Effelsberg, J.J. Garcia-Luna-Aceves: Multimedia Communications – Protocols and Applications. Prentice Hall, Upper Saddle River, 1998
3. W. Effelsberg, R. Steinmetz: Video Compression Techniques. dpunkt.Verlag, Heidelberg, 1998
4. K. Froitzheim: Multimedia-Kommunikation. dpunkt.Verlag, Heidelberg, 1997 (in German)
5. W. B. Pennebaker, J. L. Mitchell: JPEG Still Image Compression Standard. Van Nostrand Reinhold, New York, 1993
6. J. L. Mitchell, W. B. Pennebaker, Ch. E. Fogg, D. J. LeGall: MPEG Video Compression Standard. Chapman&Hall, New York, 1996
7. Michael F. Barnsley, Lyman P. Hurd: Bildkompression mit Fraktalen. Vieweg-Verlag, Wiesbaden, 1996

Recommended Reading (2)

8. All issues of the "IEEE Multimedia Magazine"
9. All issues of the "Multimedia Systems Journal„ (ACM / Springer-Verlag)
10. All issues of the journal "Multimedia Tools and Applications" (Kluwer Academic Publishers)

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1. Introduction

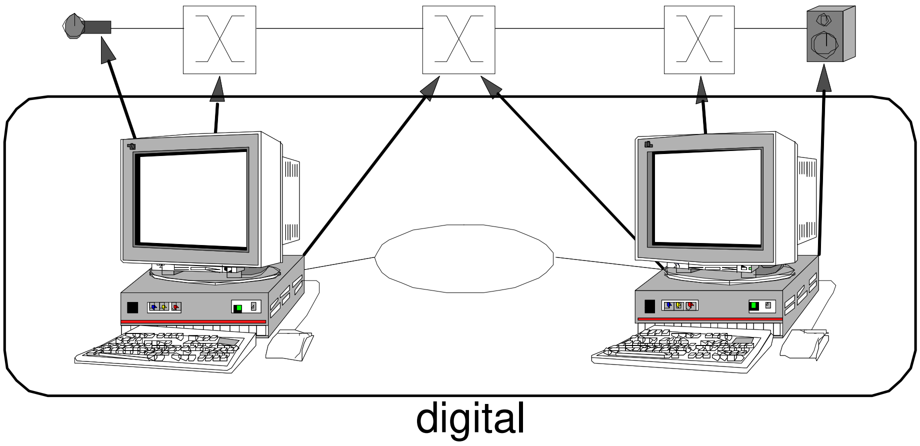
1.1. What is a multimedia system?

A multimedia system supports the integrated storage, transmission and representation of the discrete media types text, graphics and image and the continuous media types audio and video on a digital computer.

A Hybrid (analog/digital) Multimedia System

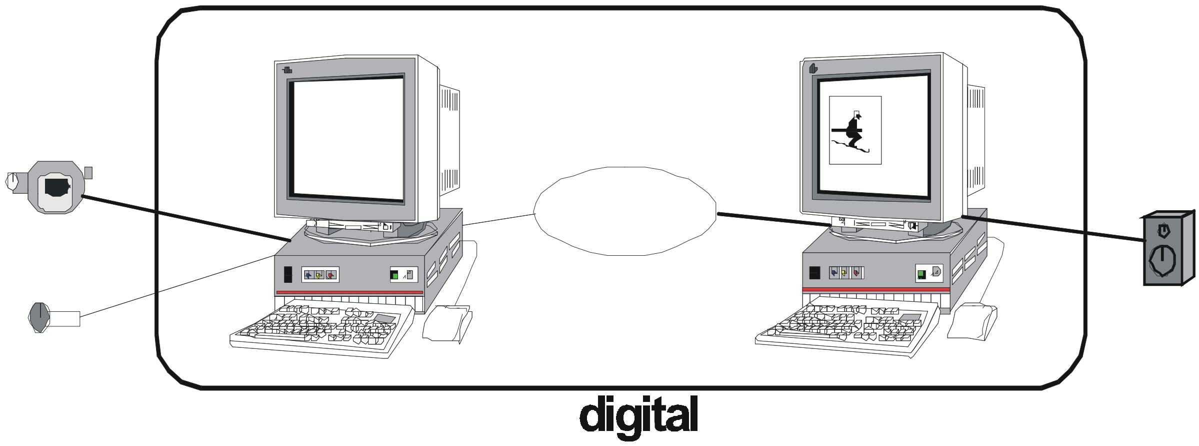
Early multimedia system, around 1985

The Eighties:
Analog solutions



Computers control the analog media streams, e.g., via cross-connect switches.

Digital Multimedia System



The media streams are digital. They can be processed (e.g., compressed/decompressed, analyzed) in the computer.

Time-Independent and Time-Dependent Media

Time-Independent Media

- Information is not related to timing of the data stream
- All „classic“ media in the computer, such as:
  - **text**
  - **graphics** (line drawings, vector graphic)
  - **image** (photo, pixel graphics).

Time-Dependent Media

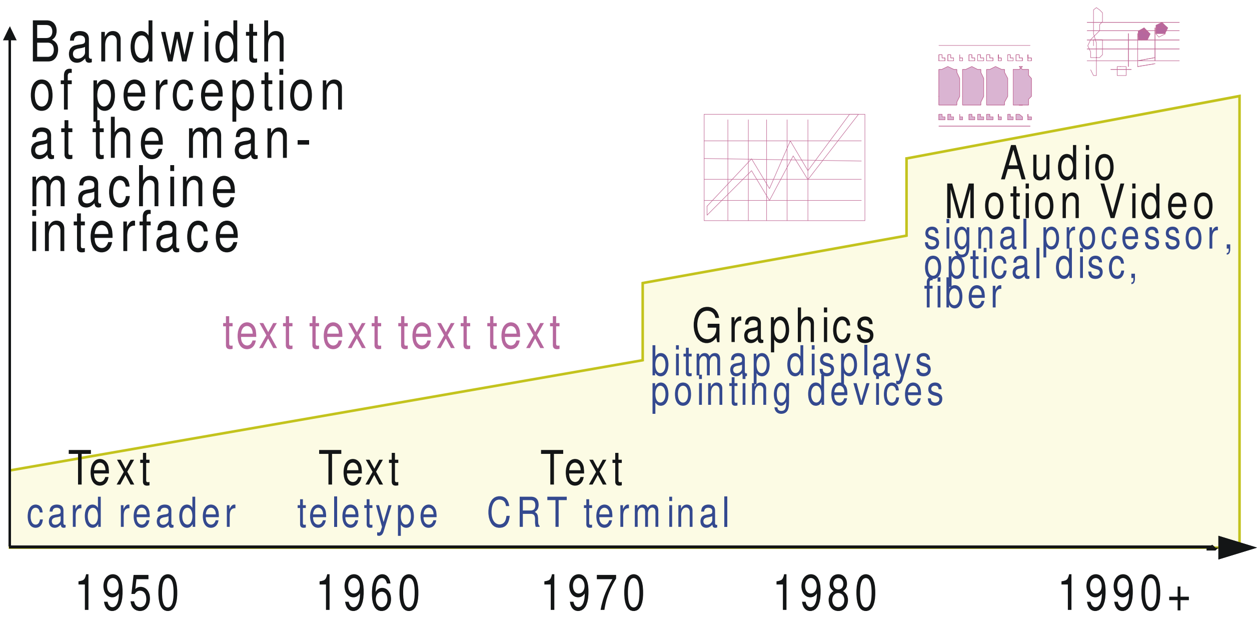
- Information is time-related, must be shown to the user at specific points in time
- **Continuous data streams**
  - Data appears in regular intervals
- Examples:
  - **Audio** (continuous)
  - **Video** (continuous)
  - **An animation** (not a continuous stream, but time-dependent)
  - An **interactive game** on the Internet (not a continuous stream, but has real-time requirements)

Our Definition of Multimedia

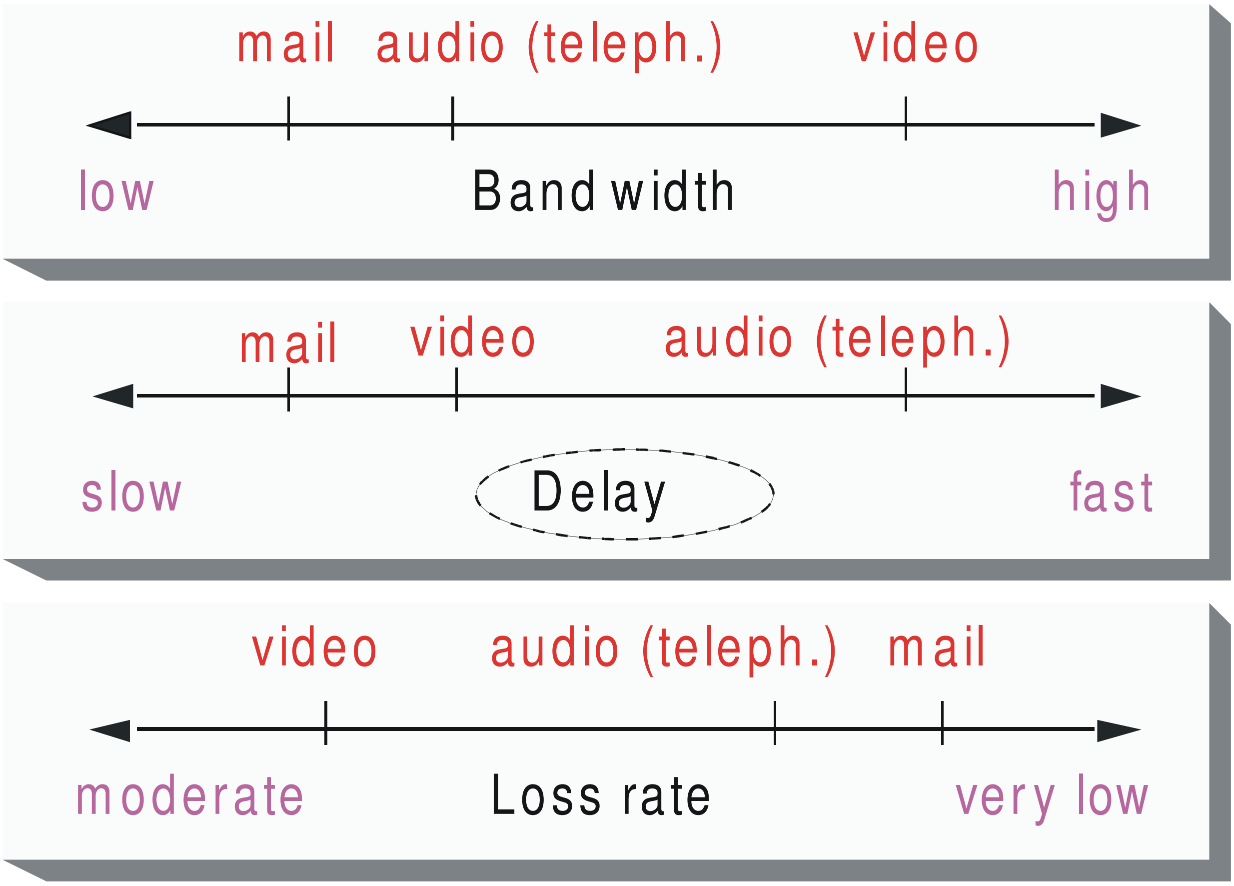
A **multimedia system** is characterized by the

- **integrated**
  - production,
  - processing,
  - storage,
  - representation,
  - and transmission
- **of several time-dependent and time-independent media streams.**

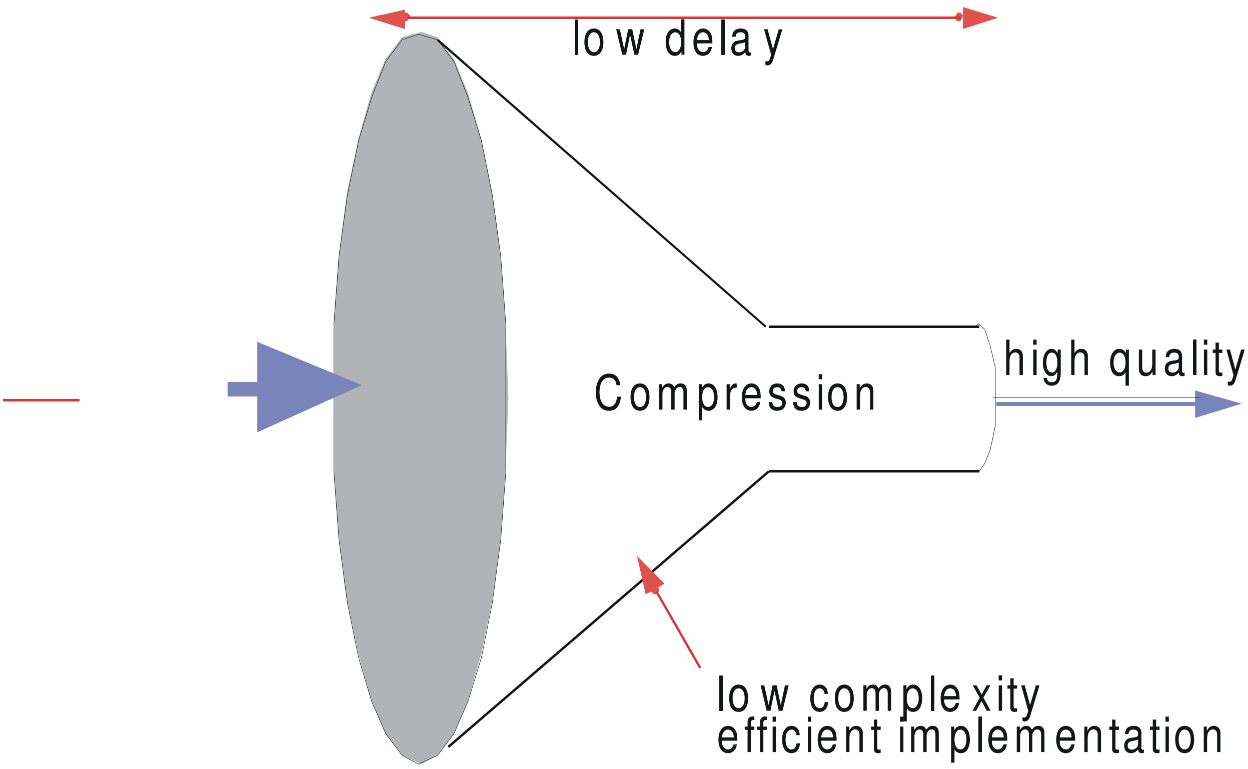
History of Bandwidth in Computer Networks



Network Requirements of Different Types of Data Streams



Goals of Compression



The compression of multimedia data streams saves

- storage space
- transmission bandwidth.

Architecture of a Multimedia Workstation