01076566 Multimedia Systems

Chapter 1: Introduction to Multimedia – Past, Present, and Future

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Outline

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- Multimedia: Historical Perspective
- Multimedia Data and Multimedia Systems
- A Multimedia System Today
- The Multimedia Revolution

Multimedia: Historical Perspective

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- "Multimedia" – the beginning of the 1990s
- Era of
  - Digital audio recording
  - Distribution of digital audio in the form of compact discs (CD)
- Create digital content involving images, text, and video along with audio and distribute it.
- ⇨ Multimedia CD
- ⇨ Interactive CDROM games
- ⇨ Interactive encyclopedia

- Factor
  - Availability of low-cost **capture devices**, rendering devices, and smarter software to create content
  - Larger, less expensive **storage devices** along with research in better **compression** of media content
  - Technological advances in **digital networks** and **standardization** of distribution protocol

- Three processes that are inherent to multimedia systems
  - Multimedia content creation or multimedia authoring
    - Digitizing media using capture devices
    - Assembling/processing them using smart software and hardware
  - Storage and compression
    - Significant memory requirement
    - Have to minimize necessities for storage and distribution
    - Involve state-of-the-art compression algorithm and standard
  - Distribution
    - How multimedia content is distributed via various media – wired cable, optical network, satellite, wireless network, etc.
    - Platforms ranging from television, computer, PDA, smart phone, etc

Age	Time / Era	Type of Information	Storage Medium	Mode of Distribution
Prehistoric	15,000 BC	Sounds to communicate, gesture, painting	Rock surfaces, cave walls	-
Ancient	500 BC	Alphabets, drawing	Invention of paper	People delivering messages, horseback
Middle Ages	400 – 1000 AD	Letters, writing	Books	Beginning of a postal system
Renaissance	13000 – 1800 AD	News, paintings, magazine	Books, libraries	Printing press, steam engines, automobiles
Modern world	1900 AD	Morse code, radio, photographs, movies	Film, magnetic, tapes, phonograph	Telegram service, wireless radio waves
Electronic	1950 – 1980	Telephone, television, fax, computers	Electronic memory, cassette tapes, LP records	Radio and TV broadcasting, satellite communication
Digital	1980 to present day	Computers, digital video, surround sound	Hard disks, CDROM, DVD	Ethernet, wireless networks, optical networks

Multimedia Data and Multimedia Systems

- Multimedia information = information that consists of one or more different media types.

- Today … multimedia information consists of text, audio, video, 2D graphics, and 3D graphics

- Futuristic media
  - Holographs
    - Creation of experiences in 3D
  - Haptics
    - Any form of nonverbal communication involving touch
    - Provide feedback and interactivity using a sense of touch

Inherent Qualities of Multimedia Data

- Digital – multimedia information is always digital
- Voluminous
  - From combining video, audio, and images together
  - Cause problems when data has to be stored, searched, transmitted
- Interactive
  - Can be interacted with from a high-level application point of view
- Real-time and synchronization
  - Involving different media types
  - Real-time – there can be only a very small and bounded delay
  - Synchronization – time-respected rendering of the media, which might be self-contained or interdependent.

Different Media Types Used Today

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- Text
  - Commonly used to express information
  - The representation and writing of text information has evolved from simple text to more meaningful and easy-to-read formatted text, using a variety of fonts.

- Images – consists of a set of units called pixels organized in the form of a two-dimensional array
  - Bit depth
    - The number of bits assigned to each pixel
  - Formats
    - Application specific; e.g., faxes have a format different from digital photographs
  - Dimensionality
    - Can be enjoyed singularly or combined in a variety of ways
      - Stereo images – depth perception effects
      - Mosaics and panoramas – images are stitched together

- Video – a sequence of images. Each image has the same properties of width, height, and pixel depth.
  - Aspect ratio
    - Common ratio for video is 4:3
  - Scanning format – convert the frames of video into a one-dimensional signal for broadcast
    - Interlaced scanning format
    - Progressive scanning

- Audio – characterized by a sampling rate in hertz. A sample is an individual unit of audio information.
  - Dimensionality
    - Signify the number of channels that are contained in the signal
      - Mono (one channel)
      - Stereo (two channels)
      - Surround sound (5.1 channels)
  - Frequency Range
    - Described by the frequency range or frequency band
      - Narrow band; e.g., audio voice
      - Wide band; e.g., music

Classification of Multimedia Systems

- Multimedia system
  - A system that takes care of all content creation, storage, and distribution issues to various platforms

- Classification of multimedia systems
  - Static vs. dynamics; e.g., static/dynamic web page
  - Real-time vs. orchestrated; e.g., live broadcasting / offline
  - Linear vs. nonlinear; e.g., reading an ebook / surfing the web
  - Person-to-machine vs. person-to-person; e.g., playing a game / video conferencing
  - Single user, peer-to-peer, peer-to-multipeer, and broadcast

A Multimedia System Today

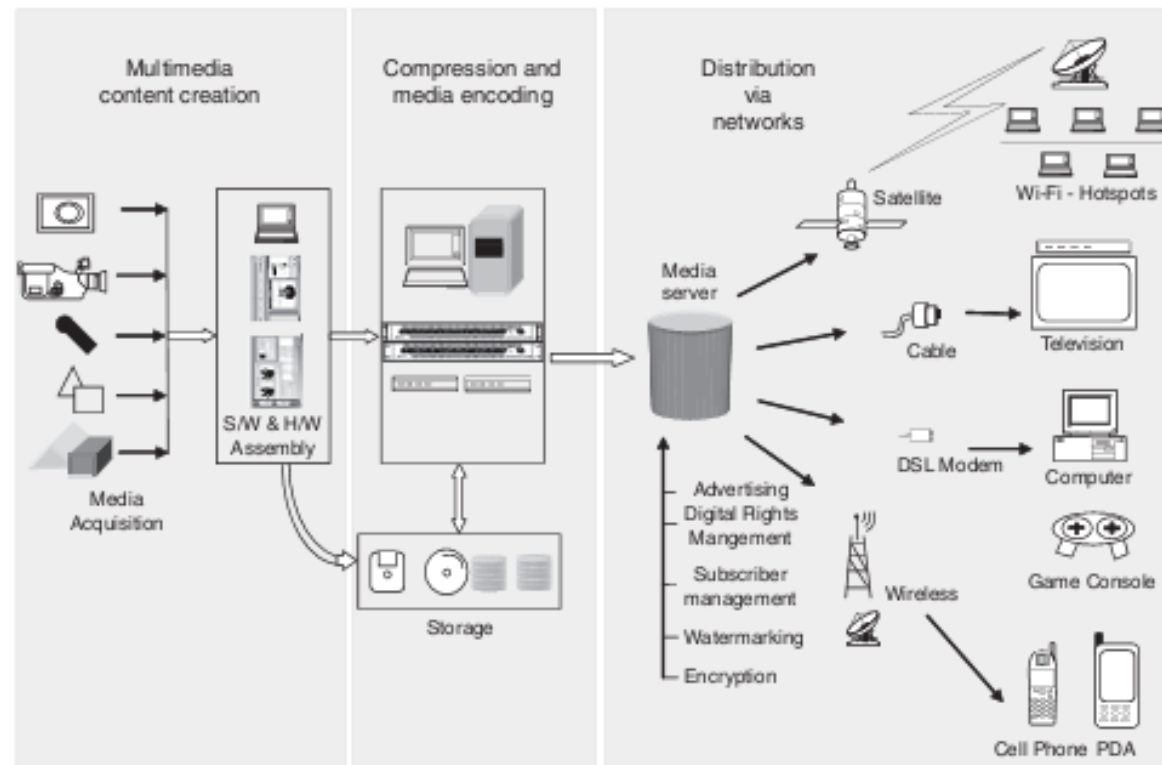Figure 1-2 Components of a multimedia system today

The Multimedia Revolution

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- A few causes for multimedia revolution
    - Digitization of virtually any and every device
    - Digitization of libraries of information
    - Evolution of communication and data networks
    - New algorithms for compression
    - Better hardware performance
    - Smarter users interface paradigms to view/interact with multimedia information on a variety of terminals

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Q & A