Internet and Multimedia Technology (INS607)

Lesson 2: Multimedia Information System

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Multimedia system

- A system that takes care of all content creation, storage, and distribution issues to various platforms.
- A system capable of processing multimedia data and applications.
- A computer system that has ability to store, compress, decompress, capture, digitize, and present information.

Characteristics of a Multimedia Systems

- 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

Computer Controlled

- Producing the content of the information – e.g. by using the authoring tools, image editor, sound and video editor

- Storing the information – providing large and shared capacity for multimedia information.

- Transmitting the information – through the network.

- Presenting the information to the end user – make direct use of computer peripheral such as display device (monitor) or sound generator (speaker).

Integrated

- All multimedia components (audio, video, text, graphics) used in the system must be somehow integrated.
- Every device, such as microphone and camera is connected to and controlled by a single computer.
- A single type of digital storage is used for all media type.
- Video sequences are shown on computer screen instead of TV monitor.

Interactivity

- **Level 1:** Interactivity strictly on information delivery. Users select the time at which the presentation starts, the order, the speed and the form of the presentation itself.
- **Level 2:** Users can modify or enrich the content of the information, and this modification is recorded.
- **Level 3:** Actual processing of users input, and the computer generate genuine result based on the users' input.

Digitally Represented

- Digitization:
  - process involved in transforming an analog signal to digital signal

Challenges for Multimedia Systems

- The key issues multimedia systems need to deal with here are:
  - How to represent and store temporal information.
  - How to strictly maintain the temporal relationships on play back/retrieval.
  - What process are involved in the above.

Desirable Features for a Multimedia System

- Very High Processing Power
  - To deal with large data processing and real time delivery of media
- Multimedia Capable File System
  - Needed to deliver real-time media
- Data Representations/File Formats that support
  - Multimedia easy to handle yet allow for compression/decompression in real-time.
- Efficient and High I/O
  - I/O to the file subsystem needs to be efficient and fast
- Special Operating System
  - Process data efficiently and quickly
- Storage and Memory: large storage units
- Network Support:
  - Client-server systems common as distributed systems common
- Software Tools:
  - User friendly tools needed to handle media, design and develop applications, deliver media.

Activity

- Why macOS is most preferred than Windows in multimedia manipulation.

Components of Multimedia System

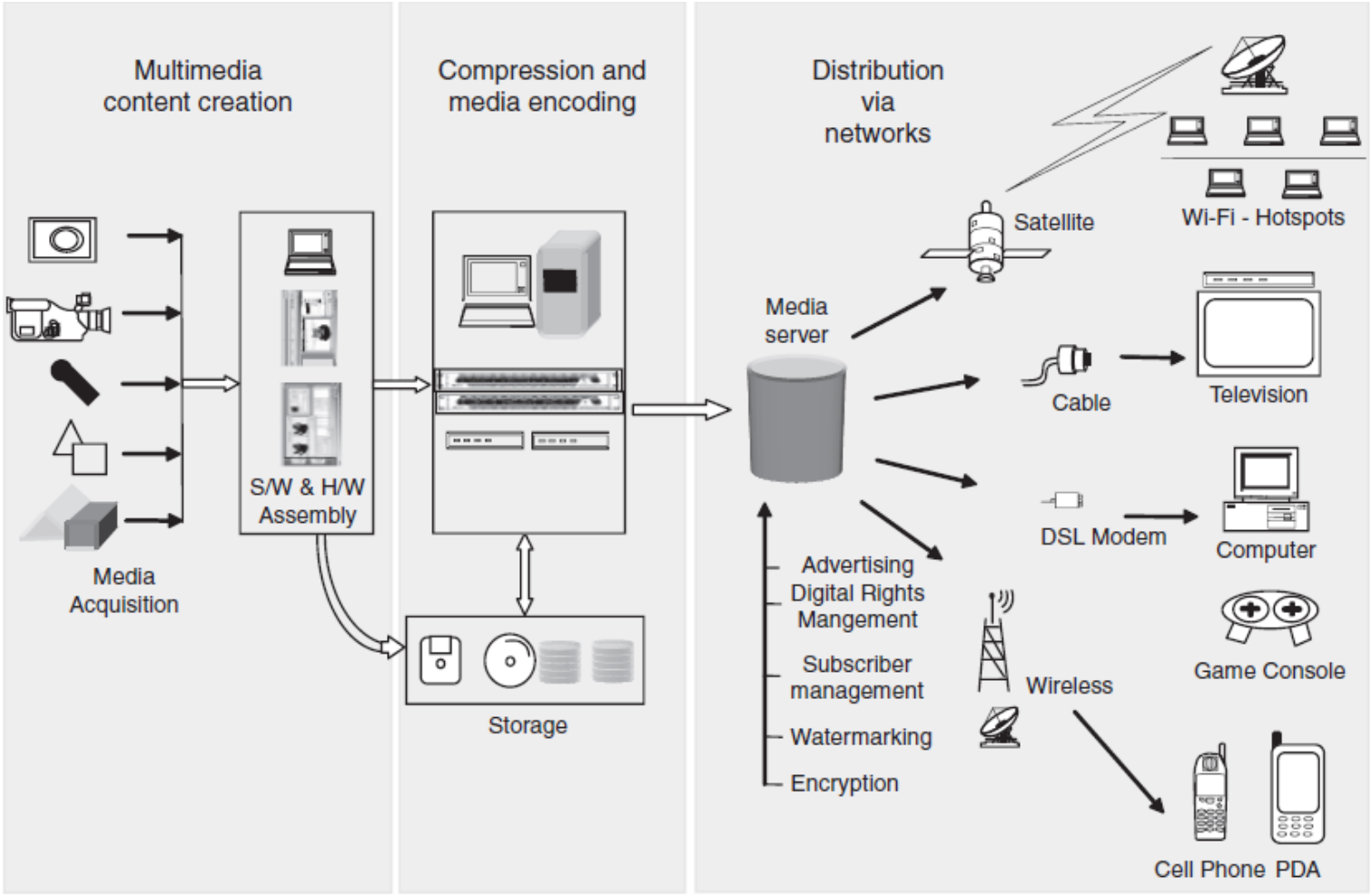


Figure 1-2 Components of a multimedia system today

Components of Multimedia System

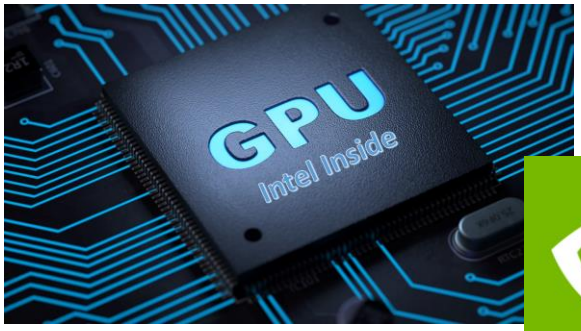
1. Content production
   - Capture different media types
2. Compression and storage
   - Use of various compression technologies to compress video, audio, graphics, and soon.
3. Distribution to various end users and platforms
   - Distribution across a variety of low-bandwidth and high-bandwidth networks.

Content Production

- Digital cameras
- Camcorders or video cameras
- Sound recording devices
- Scanners to scan images
- 3D graphical objects

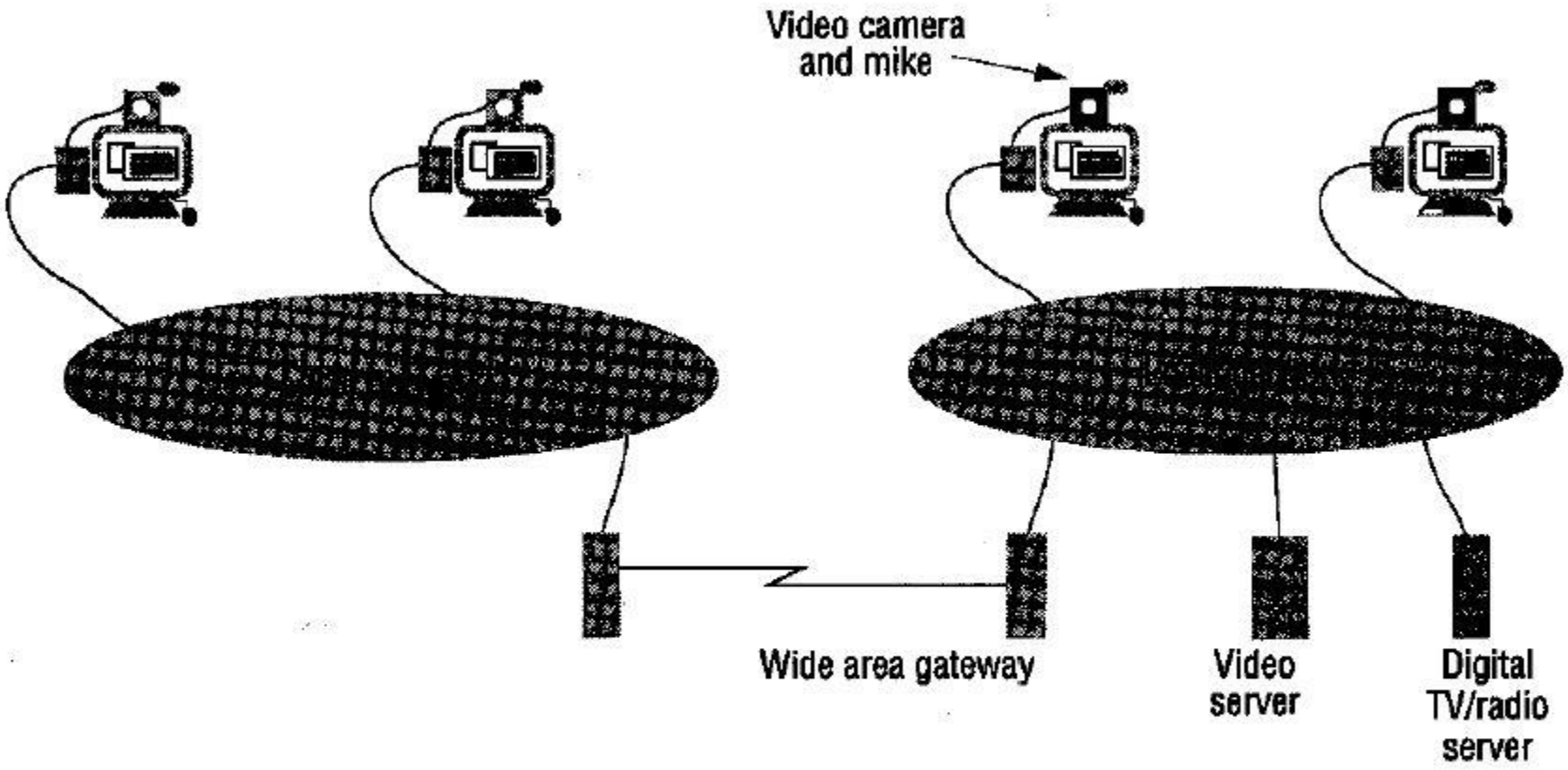
Compression and storage

CPU and GPU



- A central processing unit (CPU) is generalized processor that is designed to carry out a wide variety of tasks
- Graphics processing unit (GPU) is a specialized processing unit with enhanced mathematical computation capability, ideal for computer graphics and machine-learning tasks

Distributed multimedia systems



Activity

- Provide some examples of distributed multimedia systems.
- What are the challenges of distributed multimedia systems.

Challenges for Multimedia

- Computer network renders the application distributed.
- Render a variety of media at the same instant
- Sequencing within the media -- playing frames in correct order/time frame in video
- Synchronisation -- inter-media scheduling (e.g. Video and Audio).

Challenges of Distributed Multimedia

- Server properties
- Protocols used in the communication
- Requires expertise
- Requires high power technical devices
- Requires constant bandwidth
- Synchronization of devices
- Requires considering global clock.

Stages of Multimedia Project

- A multimedia project is a classic software project
  - developed using multimedia technology
  - specific aim of distributing information in an entertaining and compelling manner.
- Multimedia projects require creativity, artistic as well as programming skills.

Stages of Multimedia Project

- Three main sequential stages of a multimedia project:
  - **Pre-production**
    - The process before producing multimedia project.
  - **Production**
    - The process in which multimedia project is produced.
  - **Post-production**
    - The process after the production of multimedia project.

Pre-Production

- Idea or Motivation
  - "why" you want to develop a multimedia project?
  - Is the idea marketable and profitable?
  - Is multimedia the best option or more effective?
- Product Concept and Project Goals
  - It takes several brainstorming sessions to produce an idea.
  - Activities such as developing a planning document, interviewing the client and building specifications for production help in doing so.

Pre-Production

- Target Audience
  - The production team thinks about target age groups, and how it affects the nature of the product.
  - It is imperative to consider the background of target customers and the types of references that will be fully understood.
  - It is also important to think about any special interest groups to which the project might be targeted towards, and the sort of information those groups might find important.
- Delivery Medium and Authoring Tools
  - The production team decides the medium through which the information reach the audience.
  - Web, DVDs and CD-ROMs are some of the common delivery mediums.
  - The production team also ascertain what authoring tools should be used in the project.

Pre-Production

- Planning
  - Lack of planning in the early processes of multimedia can cost later.
  - Group discussions take place for strategic planning and often the common points of discussions are given below:
    - What do you require for the multimedia project?
    - How long will each task take?
    - Who is going to do the work?
    - How much will the product cost?
  - The plan include:
    - Creating and finalizing flowchart and resource organization
    - Timeline, content list, storyboard
    - Work distribution among various roles such as designers, graphic artists, programmers, animators, audiographers, videographers, and permission specialists

Production

- All components of planning come into effect
- Activities
  - Scriptwriting
    - The scripts for the text, transitions, audio narrations, voice-overs and video are written.
  - Art
    - Illustrations, graphics, buttons, and icons are created using the prototype screens as a guide.
    - Existing photographs, illustrations, and graphics are digitized for use in an electronic medium.
    - Production provides the raw components that will be blended to create the final outcome of the multimedia project.
    - If the components are flawed, the end product will also be flawed.

Post-Production

- The stage of post-production involves:
  - Testing
    - The product is tested on multiple computers and monitors.
    - It is imperative to evaluate, test and revise the product to make sure the quality and success of the product.
  - Mastering
    - Writing a CD-ROM or floppy disk.
    - Sending the files to a service that will create a pre-master from which the master is made.

Multimedia Skills Required in a Team

- A multimedia team members:
  - Project manager
  - Multimedia designer
  - Interface designer
  - Multimedia programmer
  - Computer programmers
  - Writer
  - Subject matter expert
  - Audio specialist
  - Video specialist
  - Producer for the Web
  - Permission specialist

Project manager

- The project manager is responsible for:
  - The overall development, implementation, and day-to-day operations of the project.
  - The design and management of a project.
  - Understanding the strengths and limitations of hardware and software.
  - Make schedules.
  - Decide the budget of the project.
  - Interact with team and clients.
  - Provides resolution to development and production problems.
  - Motivate people and should be detail oriented.

Multimedia designer

- The teams is made:
  - graphics designers
  - Illustrators
  - Animators
  - Image processing specialists, who deal with visuals
- Responsibilities
  - Instructional designers
    - Make sure that the subject matter is presented clearly for the target audience.
  - Interface designers
    - Devise the navigational pathways and content maps.
  - Information designers
    - Structure content, determine user pathways and feedback, and select presentation media.

Interface Designer

- Creating a software device that organizes content.
- It allows users to access or modify content and presents that content on the screen.
- Building a user-friendly interface.

Multimedia writer

- Creating characters, actions, point of view, and interactivity.
- Writing proposals and test screens.
- Scripting voice-overs and actors' narrations.

Video specialist needs

- The delivery of video files on CD, DVD, or the Web.
- How to shoot quality video.
- How to transfer the video footage to a computer.
- How to edit the footage down to a final product using digital non-linear editing system (NLE).

An audio specialist

- Locating and selecting suitable music talent.
- Scheduling recording sessions.
- Digitizing and editing recorded material into computer files.

Multimedia programmer

- Locating audio/video resources.
- Selecting suitable audio/video clips.
- Creating audio/video clips.
- Interacting with project managers and instructional designers.
- Participating in the design process.
- Working on storyboard and uses it as a guideline.
- Finding out problems, solving them and fixing bugs.
- Writing understandable, easy and reusable codes
- Liaising with designers
- Integrates all the multimedia elements into a seamless project, using authoring systems or programming language.
- Manages timings, transitions and record keeping.

Multimedia System Requirement

1. Software tools
2. Hardware Requirement

Software Requirement

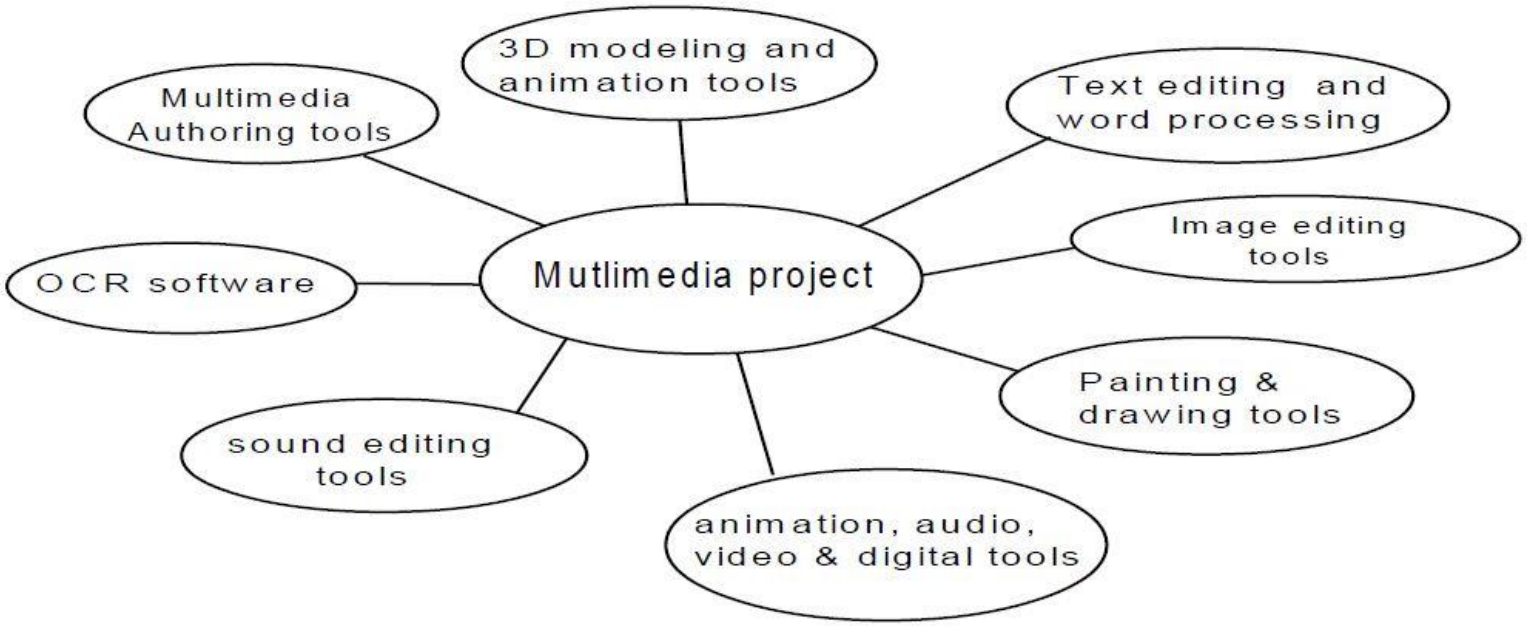


Figure 1. 3 Multimedia Software requirement

3-D and Animation Tools

- This software provide 3D clip art object such as people, furniture, building, car, airplane, tree, etc.
- You can use these objects in your project easily.
- A good 3D modeling tool should include the following features:
  - Ability to drag and drop primitive shape into screen
  - Ability to create objects from scratch
  - Ability to add realistic effects such as transparency, shadowing, etc
  - Multiple window that allow user to view model in each dimension
  - Color and texture mapping

Text editing and word processing tool

- Word processors are used for writing letters, invoices, project content, etc.
- They include features like:
  - spell check
  - table formatting
  - Thesaurus
  - templates (e.g., letters, resumes, & other common documents) Examples: Microsoft Word, Word perfect, Note pad

Sound Editing Tools

- They are used to edit sound (music, speech, etc.)
- The user can see the representation of sound in fine increment, score or waveform.
- User can cut, copy, and paste any portion of the sound to edit it.
- You can also add other effects such as distort, echo, pitch, etc.
- Examples: -sound forge
- E.g., Sound Forge Sound Forge is a sophisticated PC-based program for editing WAV files.
- Sound can be captured from a CD-ROM drive or from tape or microphone through the sound card, then mixed and edited.
- It also permits adding complex special effects.