Multimedia: from concepts to development
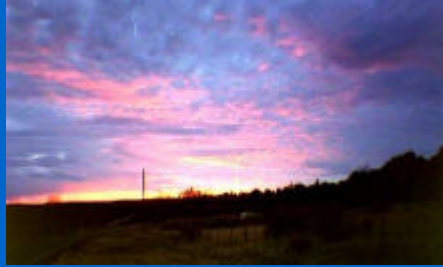
Luis Manuel Borges Gouveia

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What is Multimedia?

- Multimedia: a working definition
  - A combination of two or more categories of information having different transport signal characteristics
  - Typically, one medium is a continuous medium while another is discrete
  - Image, audio, video and graphics are examples of media

Images

- Some Issues
  - Is the image as high-quality as I need?
  - Is the image efficiently stored and transmitted?
  - Can the image be retrieved by its content?

Videos

- Some issues
  - How are the temporal relations between the media represented?
  - What do I need to stream video across the network?
  - Are the different media synchronized?
  - How can I describe a video retrieval request like a query?

What is a Multimedia System?

- A system that involves:
    - generation
    - representation
    - storage
    - transmission
    - search and retrieval
    - delivery

    - ➤ production/authoring tools
    - ➤ compression and formats
    - ➤ file system design
    - ➤ networking issues
    - ➤ database management
    - ➤ server design, streaming

    of multimedia information

Multimedia production

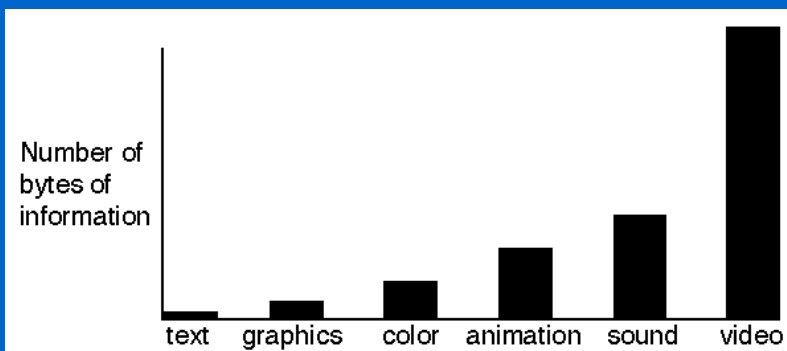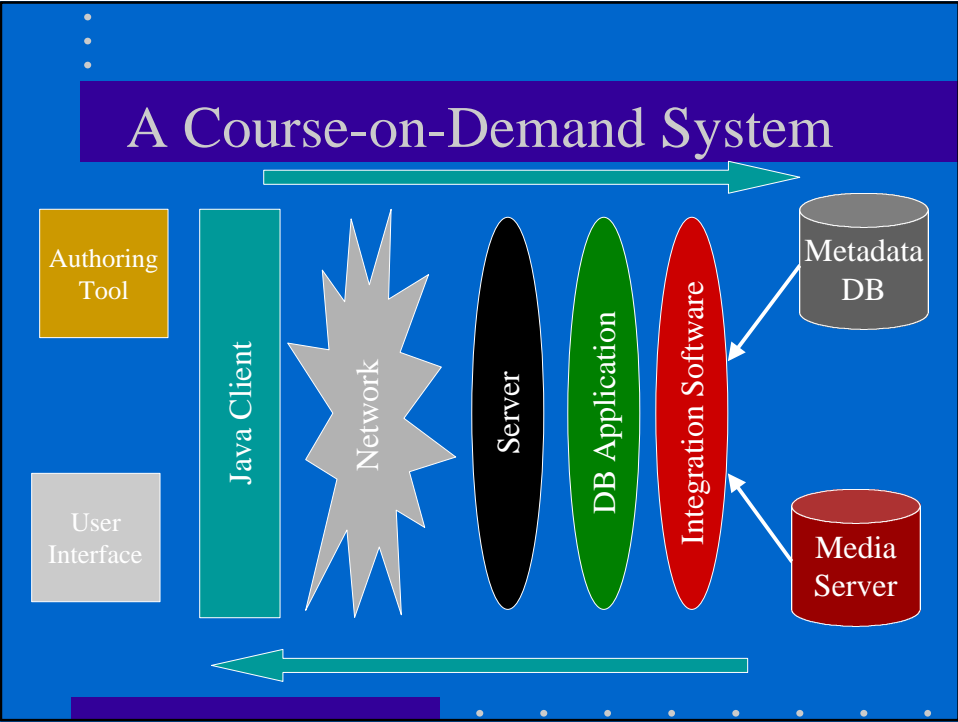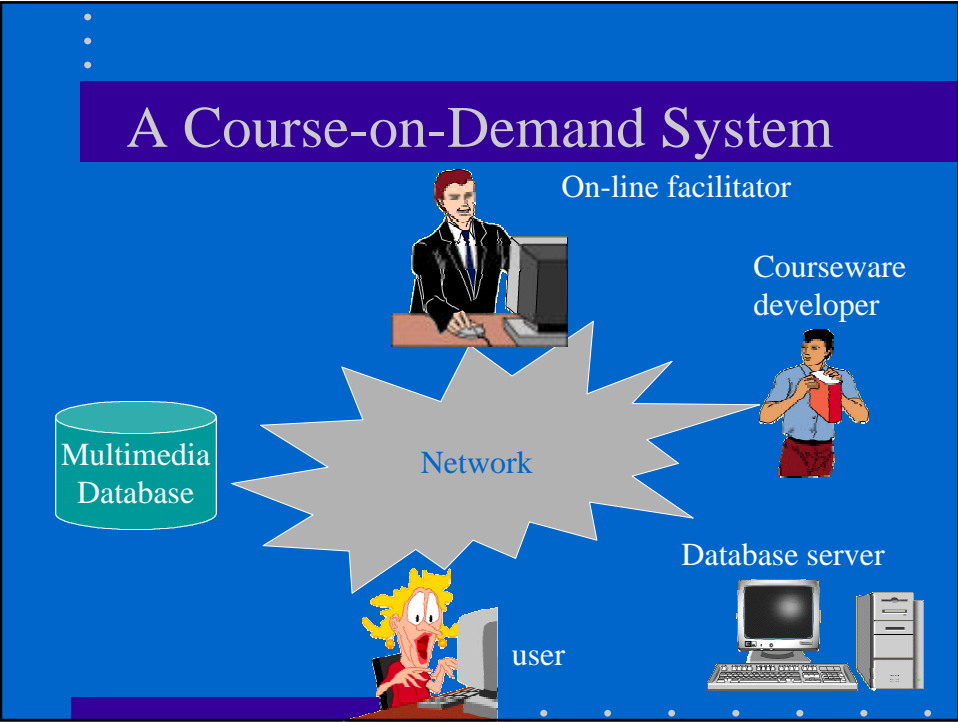| Medium	Collecting	Preparing	Publishing	Using
Video	Video Edit List	Digitize, Enhance, Compress	Ordering	Network Distribution
Image	Selection	Digitize, Enhance, Compress	Correlating Multiple Representation	Optical Publishing
Audio	Audio Edit List	Filter, Digitize, Enhance, Compress	Organizing (layout, order)	
Text	Text Filing	Text Processing Tool Use	Hypermedia Linking	Outline Use
Graphics	(Composite) Object Selection	Rendering, Drawing, Animating Tool Use	Adding Interactive Scripts	Hypermedia Enhanced by Users

Table of Sound File Size

One Minute of sound recorded under different digital audio settings

Sample range	Samples resolution	File size (Mono)	Comments
48 kHz	16 bit	6 MB	DAT
44.1 kHz	16 bit	5.3 MB	CD Quality Sound
44.1 kHz	8 bit	2.6 MB	On a PC CD audio sounds same as above
22.050 kHz	16 bit	2.5 MB	Common Choice for CD ROM and Quicktime movies
22.050 kHz	8 bit	1.3 MB	It's begining to sound like a Portable TV

Comparing different media storage requirements

A Course-on-Demand System

On-line facilitator

Courseware developer

Multimedia Database

Network

Database server

user

A Course-on-Demand System

Authoring Tool

Java Client

Network

Server

DB Application

Integration Software

Metadata DB

User Interface

Media Server

Multimedia Equipment
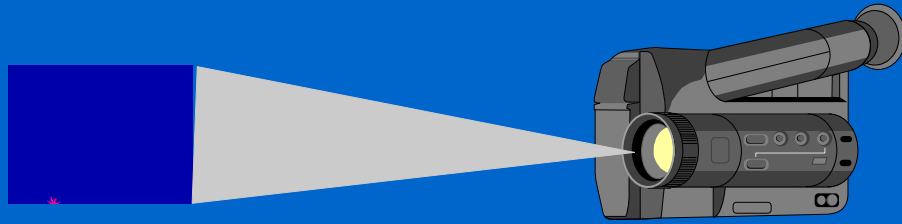
Computer Platforms

- IBM-compatible PC
- Macintosh
  – Favorite among designers
- Different processor and operating system have different color depth, palette, speed and disk format

Lack of Standards

- It creates competition, and reduces prices
- Its own format
- One format is used most often
- Multimedia PC Marketing Council (MPC)
  - created to help sustain the expansion of multimedia
  - Intel, Gateway, IBM, DELL

Developmental Needs

- RAM: reduces data movement to secondary storage devices and improves processing speed
- Video capture cards:placed in expansion slots
  - Use compression technology
  - DVI: digital video interleave
  - MPEG: Motion Picture Experts Group

Developmental Needs

- Video Snap shot: snaps still images from video
- Digital Video cameras: capture full motion images.
- Scanners: digitized developed images recognized by the microprocessor
- Photo CD:photographic digital images

Developmental Needs

- Microphones:used to convert analog signal to digital audio
  - Its sensitivity is related to how much feedback is around
  - Moving Coil: have wires connected to its diaphragm
  - Condenser:Use front electrodes to moves voltages comparable to acoustic signal

Developmental Needs

- Sound Cards: Also know as audio board
  - use to record and play waveform digital audio files
- MIDI:Standard set my manufactures of musical instruments.
  - To allow instruments to be hooked together and communicate with each other
  - The interface translates messages between the computer and the MIDI instruments

Storage Devices

- Require much greater storage capacity than text-based data
- Hard disks:Internal, external, removable
  - Range from a few hundred to over 10 gig.
  - Always get the biggest
- Optical Storage:Best for distributing multimedia products
- Read data more precise
  - MO, CD-ROM, DVD

Storage Devices

- Magneto-Optical(MO): are rewritable
- Hard disks:Internal, external, removable
  - Range from a few hundred to over 10 gig.
  - Always get the biggest
- CD-ROM: Hold about 650 mb
  - High speed of transfer
  - Buffer: Size increases transfer speed
  - Works ask a Temporary Storage

Storage Devices

- Laser Disks: Cost $600, awkward is size
  - record CAV: Constant angular Velocity, 30 minutes/side of freeze-frame video
  - Used mostly in Education
  - CLV: Constant Linear Velocity, 60 minutes side of video
    - Frames can flicker
- DVD: Digital Versatile Disk
  - Holds 4.7 to 8.5 gig, provide sharper and clearer images and sounds

Storage Devices

- AV-Tuned Drives: Designed to work with video and audio
  - Provides a smother flow of data
  - reduces uninterrupted data transfers
- DAT:Linear recording
- Raid:Treat two or more drives as one

Images Output

- **Monitors**
- **Resolutions**
- **Pixels**
- **Screen Size**
- **Multi-sync**
- **Dot Pitch**

- **Have little control**
- **quality image output, number of pixels per inch**
- **Lighted dots the monitor can display**
- **Can handle various scanning frequencies**
- **Distance between pixels**

Images Output

- Projectors: use to present to large audiences
- LCD : use liquid crystal display that uses a light source
  - Are self contained light source
  - Portable
  - Deliver Graphics, Video, Sound
- CD-Burners:Use to produce own multimedia material
- Speakers: can effectively enhance mood
  - should have built in amplifier

Sites to Visit

http://www.chalk.com

http://www.yamaha.com

http://www.syquest.com

http://www.logitech.com

http://www.motorola.com

http://www.westworld.com/~wizard/dad.html

Faça uma lista adicional de referências Web

Graphics

Why are Graphics Vital to Multimedia applications?

- Society has become visually oriented
- Picture is worth a thousands words
- Illustrations provide more visual information
- Can perform a variety of functions
  - backgrounds, buttons, maps, charts, etc…
- Can be obtain from a variety of sources
  - PhotoShop, Paint Shop Pro, Paint, etc.

Image Editing Software

- Use to edit and manipulate
- Apply special effects
- Are larger than text files
- Flexible usage
- High market competition
- Digitizing
  - converting images into a format recognized and manipulated
  - Series of binary data or 1's and 0's

Types of Images

- Line Art: Contain black and white pixels with out tonal variation
- Grayscale: Continuous tone consisting of black, white, and gray data only
- Color: dependent upon the equipment
  - range from 4-bit up to 36 bit color
  - Are referred to as RGB
- 2D/3D: Flat images, images with depth

Image Quality

- Dependent on Equipment
- CD images have a higher quality than images on the web (bandwidth)
- Different types of resolution
  - Amount of information stored
  - Higher resolution with display superior images
  - Larger file size
  - Give up quality for file size

Image Compression

- Algorithm to create smaller files
- Two Types: Lossless vs Lossy
  - Lossless: mathematical algorithms that eliminate redundant data
  - No Data is lost
  - Lossy: scheme in which expendable data is removed
  - Data is usually lost
- PKZIP, WinZip and Stuffit use Lossless compression

Graphic Software

- Also know as graphic editors
  - Drawing, painting, and image editing programs
- Used to create 2D and 3D images
  - Use Tool Palette that contains electronic drawing tools
  - Allows for resize, move, rotate and change their shapes
- Creating your own
  - eliminates the possibility of copyright violations

Graphic Software

- Paint Programs
  - Bitmapped images stored in pixel picture elements
  - Grid layout, when enlarged grids become bigger, decrease resolution

Graphic Software

- Draw programs and Vector Graphics
  - Used for original artwork
  - result is vector based
  - images are series of mathematical formulas that connect geometric shapes
- Draw programs:
  - CorelDraw, Abode Illustrator, MacDraw, Claris Works, FreeHand

Graphic Software

- Bézier Curves:Defined mathematically by four control points.
  - Allows for points to be fin-tuned
- Gradient Fill:Blend between colors
  - Can be linear or radiate from a specific point
  - Referred to as a fountain
- Blending: series of intermediate colors and shapes two selected objects

3D Modeling Programs

- Geometric forms to serve as basic building blocks.
- Textures are used to provide special effects
- Rendering: based on its surface and shape properties
  - Process of capturing a 3D view and saving it as a 2D image
- Shading:surface properties assigned,
  - colors, texture, and finish

Image-Editing Programs

- Use to manipulate digitized images
- Crop: Areas you don't wish to include
- Filters: Special effects applied to an image
  - Use to blur or sharpen
- Layering: Different levels in a document
- File Format Conversion: Convert graphic files from one format to another
- Plug-ins: Add-on features that enhance the capabilities of the programs

File Formats

- Consider where the file will be used
- Applications must support that format
- Variety of programs and equipment has lead to a variety of file formats
  - TIFF: Most widely used bitmapped and is cross platform
  - EPS: Vector-based graphic imported into almost any application
  - BMP: bitmap format on the Windows platform, files are usually large
  - GIF: Standard format used on the web

Sources of Still Images

- Commercial Image Providers
  - Are only selling the writes to images
  - You do not own the images
  - May be used on only one multimedia application
- Clip Art:
  - Collection of drawings that can be purchased or downloaded
  - Public domain
  - Restrictions and royalties may apply

Sources of Still Images

- Photographs
  - reference real people, places, and events
  - take many photos from different angles
  - use to create a sequence of events
  - can be contracted out
  - can be edited with image editing programs

Copyright

- Obtain permission to use other peoples work
- Liable for damages
  - statutory, legal fees, and compensation to the artist
- Property of the creator from the time they are created to 50 years beyond his/her life

Copyright

- Public Domain: can be manipulated and used without permission
- Fair use policy: use for instruction and research in a educational setting, permission may not be needed

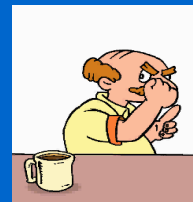## Animation

The Illusion of Movement

Animation

The Illusion of Movement

- **Objects and characters of all types have the potential to be animated**

What is Animation

- The movement of graphics or text images
- Have physical properties such height width depth and time
- To trick the eyes into believing that there is motion

Purpose of Animation

- It grabs attention
- Commonly found on
  - Web Pages (banners)
  - Games (animated characters)
  - CBT (illustrating techniques)

Animation in

- Computer Based Training
  - To demonstrate the correct way to perform a technique or skill
  - Effective teaching tool
  - Used to update employee skills and awareness
- Edutainment
  - Education and entertainment
  - Use to teach effective and ineffective demonstrations

Animation in

- Games
  - Require powerful computer processing capabilities on the development end and user end
- Web
  - Small animations
  - Promote advertisement and information
  - Provide hyperlinks to sites
  - http://services.valdosta.edu/animation/cool.html

Types of Animation

- Two-Dimensional(2D)
  - Changing the position or location of the image and recording the change
- Three-Dimensional (3D)
  - Adding textures and shading to 2D images
  - More complicated and expensive
  - Macromedia Extreme 3D
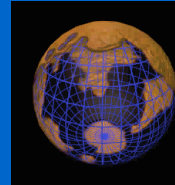
Types of Animation

- Animated GIFs
  - Know as GIF89a
  - 2D and 3D can be used
  - multiple images are streamed
  - viewers don't have to wait for downloads
  - play on most browsers
  - http://www.webreference.com/3d/
  - http://WWW.Stars.com/Authoring/Graphics/3d/Resources.html

Animation Types and Editing Programs

- Gif Construction Set, Webpromotion
  - **Designed for Windows 95/98**
  - **http://www.webreference.com/3d/**
  - **http://WWW.Stars.com/Authoring/Graphics/3d/Resources.html**
- GIFBuilder for the Mac

Animation Types and Editing Programs

- QuickTime: industry-standard software
  - **recognizes photoshop, bitmaps, gif, jpeg images**
  - **non platform specific**
  - **http://www.QuickTime.apple.com**
  - **Free player**
- AVI:Microsoft's movie file format
  - **Audio video interleave**
  - **Is not cross platform friendly**
  - **can be converted to QuickTime file format**

Animation Types and Editing Programs

Animation Specialist

- **Responsible for creating animations**
- **Work with the team**
- **Write documentation**
- **Outline all pieces and ideas**
- **What will work on hardware and software**

- **Should be skilled in the following:**
  - **Graphic Design**
  - **experience in 3D modeling**
  - **interactive multimedia tools**
  - **Storyboards, outlines, flowcharts**
  - **Consistent with goals of the project**

Animation Methods

- Flipbook Approach
  - **Sequence of slightly different visual images**
- Two Rates of animation
  - **Sampling rates: actual numbers of different images that occur per second**
  - **Playback rate: the number of images displayed per second when being viewed**

Animation Methods

- Cell-based
  - **Frame animation using key frames in a timeline (Director)**
- Tweening
  - **filling in the frames between key frames**
- Morphing
  - **Using frames to create the illusion of one object changing**
  - **Used to create smooth transitions**

Animation Methods

- Path-Based
  - **Vector animation, follows an objects transition over a line or vector**
    - **Used in Authorware, Director**
    - **can be combined with cell-based**
- Computational
  - **Varying its x and y coordinates, horizontal and vertical locations on a screen**

Animation Methods

- Program/Script-Based
  - **Programming languages to create animation**
  - **An elaborate set of programs commands**
  - **java-script images and rollovers**
- Lingo
  - **Object oriented scripting language**
  - **Used to create action or command**
  - **Macromedia Director**

Animation Tools

- Created from a series of still images
  - **Programming languages, animation software or a combination of the two**
- Animation engine
  - **compile a series of graphics**
  - **Photoshop, Illustrator, Paint etc**
  - **Each has its own special features**
  - **Many are cross platform**
  - **handle a variety of file formats**

Animation Effects

- Onion Skinning
  - **tracing over an existing images**
  - **Parallel: where parts remain static with another portion changes**
- Trail Effect
  - **previous image is not completely erased when the next frame appears**
- Film Loops
  - **A series of animated frames play over again**