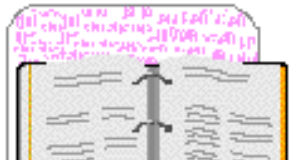
What is Multimedia?

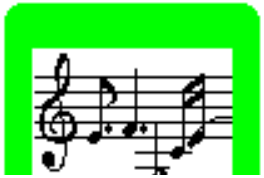
- **Multimedia is any combination of**
  - **text,**
  - **graphic art,**
  - **sound,**
  - **animation,**
  - **video,**

  delivered by computer or electronic means

What is Multimedia?

- Text
- Graphics
- Sound
- Animation
- Video





Multimedia takes may forms

- **Greeting Cards**
- **Conferencing**
- **Movies**
- **Photo albums**
- **Image catalogs**

Types of Multimedia

- **Interactive multimedia**
- **Hyperactive multimedia**
- **Linear multimedia**

Interactive Multimedia

- **Allows the user to control**
  - **what and**
  - **when the elements are delivered**

Hypermedia

- **Interactive Multimedia which provides a structure of linked elements through which the user can navigate**

Multimedia Project

- **Software vehicle, messages and content presented on a computer or TV screen**
  - **Multimedia title - if sold or shipped to users with or without instructions**
  - **Web page if on the www and composed of HTML or DHTML (Dynamic Hypertext Markup Language)**

Multimedia Project

- **Linear - users watch from beginning to end**
- **Non-linear and interactive - users are given navigational control and can wonder through the content**

Authoring Tools

- **Multimedia elements are “sewn” together using tools like Authorware**
  - **to provide facilities for creating and editing text and images**
  - **have extensions to drive videodisc players and other peripherals**
  - **playback the sound and movie elements created with other tools**

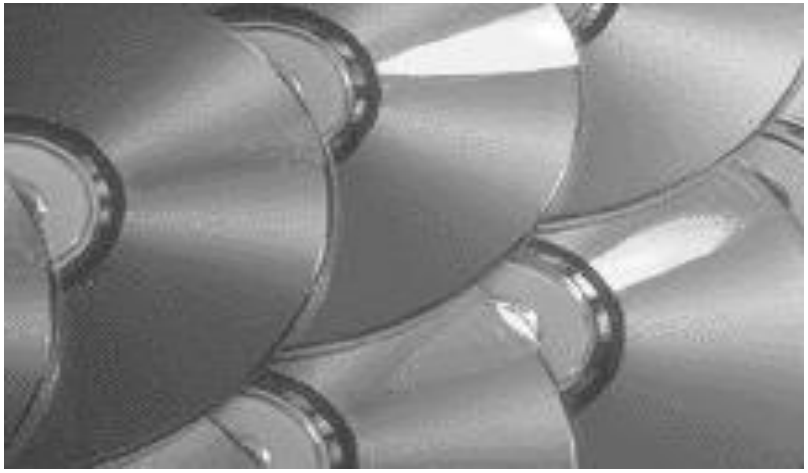
Requirements

- **Multimedia requires:**
  - **large amounts of digital memory and network bandwidth;**
  - **GUI (“gooey”) - a graphical user interface**
  - **CD-Rom or DVD technology for storage**

    In the future these may be replaced by “connected” fiber, and radio/cellular technology
  - **DVD – Digital Versatile Disc**

Delivering and Using Multimedia

- **Multimedia demands bandwidth**
- **CD-ROMs hold 650-700 MB (80 minutes of full screen video)**
- **DVD-ROMs hold 4.7-18 GB**
- **Multimedia can be delivered on line**



Why Multimedia?

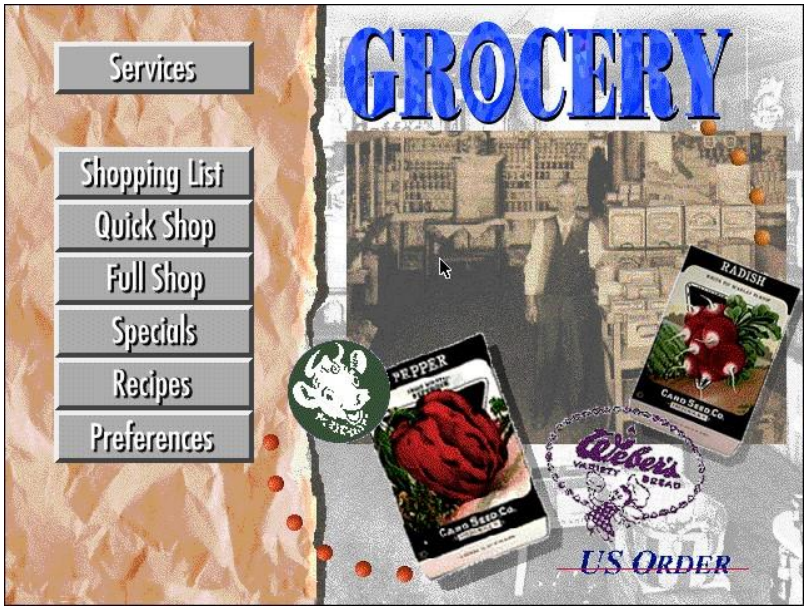
- **Multimedia enhances learning, memory and retention**
  - **audio stimulation - 20% retention rate**
  - **audio/visual - up to 30% retention rate**
  - **interactive multimedia - up to 60% retention rate**

Delivering and Using Multimedia

- **Online uses include:**
  - **Books and Magazines**
  - **Movies**
  - **News and Weather**
  - **Education**
  - **Maps**
  - **Entertainment**

Appropriate uses

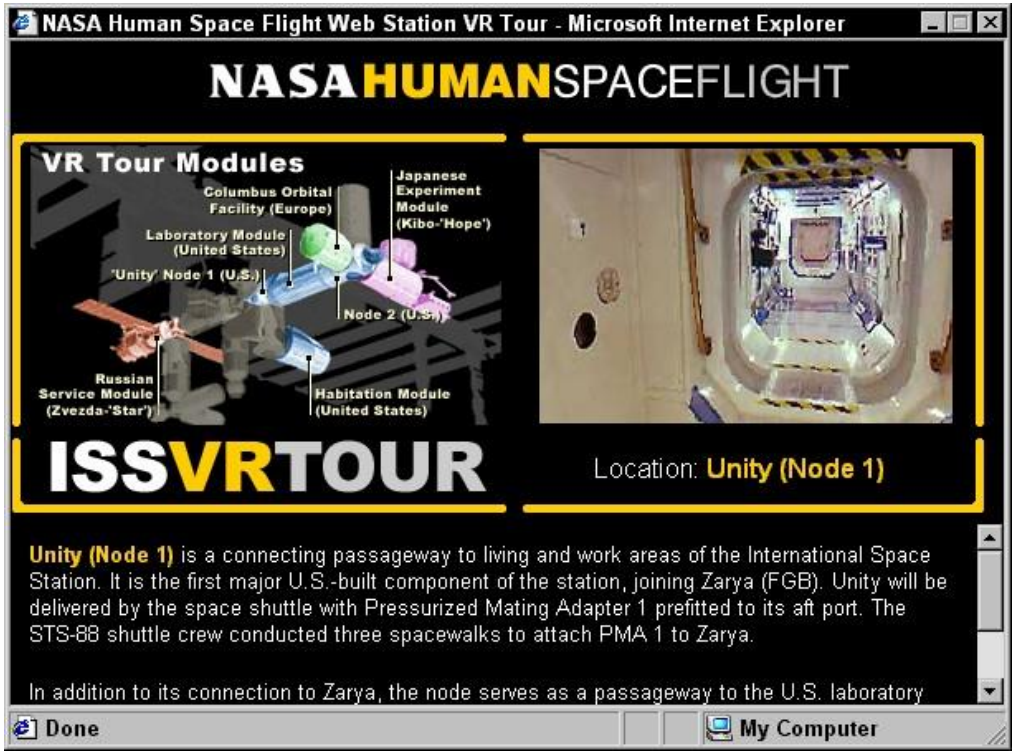
- Business
- Schools
- Homes



- Public Places
  - 1995 Al Gore - White House Challenge to connect every classroom, clinic, hospital to Information Superhighway by 2000

Delivering and Using Multimedia

- **Virtual Reality**



Stages of a Project

- **Planning and costing-begin with an idea**
  - **plan text, graphics,music, video**
  - **develop graphic layout (“look and feel”)**
  - **develop a structure and navigation system**
  - **estimate time needed to complete**
  - **prepare budget (if necessary)**
  - **work up a prototype**

Stages of a Project

- **Plan**
  - Develop an idea
  - Identify objectives
  - Identify skills and resources
  - Develop a prototype
  - Estimate time and cost

Stages of a Project

- **Designing and Producing - perform each planned task**
- **Testing - test to be sure project meets objectives and needs of client**
- **Delivering- package and deliver to end user**
  - **create CD-ROM, labels, etc.**
  - **prepare user manual**

What You Need

- **Hardware**
- **Software**
- **Creativity**
- **Organization**

Hardware

- **The Macintosh as well as Windows PC offers a combination of affordability, and software and hardware availability.**
- **The Macintosh platform is better suited for multimedia production than the Windows platform.**
- **The hardware platforms provided by Apple are better equipped to manage both, sound and video editing.**

Software

- **Multimedia software provides specific instructions to the hardware for performing tasks.**
- **Software tools are divided into production tools and authoring tools.**

Project:

- **The plan should include:**
  - **A flow chart or timeline showing the basic flow of the project**
  - **A list of hardware and software resources that will be required**
  - **A list of skills that will be required**
  - **A time estimate for project completion**

Overview

- Importance of text in a multimedia presentation.
- Understanding fonts and typefaces.
- Using text elements in a multimedia presentation.
- Computers and text.
- Font editing and design tools.
- Multimedia and hypertext.

Text in History

- **Text came into use about 6,000 years ago**

Revolution in Communication

- **Using symbols for communication relatively recent - 6,0000 years old**
- **15th Century- Johann Gutenburg printing press revolutionized information**
- **Recently - another revolution - the World Wide Web and its native language - HTML**

The Power of Meaning and the Importance of Text

- Words must be chosen carefully
- Words appear in:
  - Titles
  - Menus
  - Navigational aids
- Test the words you plan to use
- Keep a thesaurus handy

Using Text in Multimedia

Type terminology

- Typeface

Arial

Courier

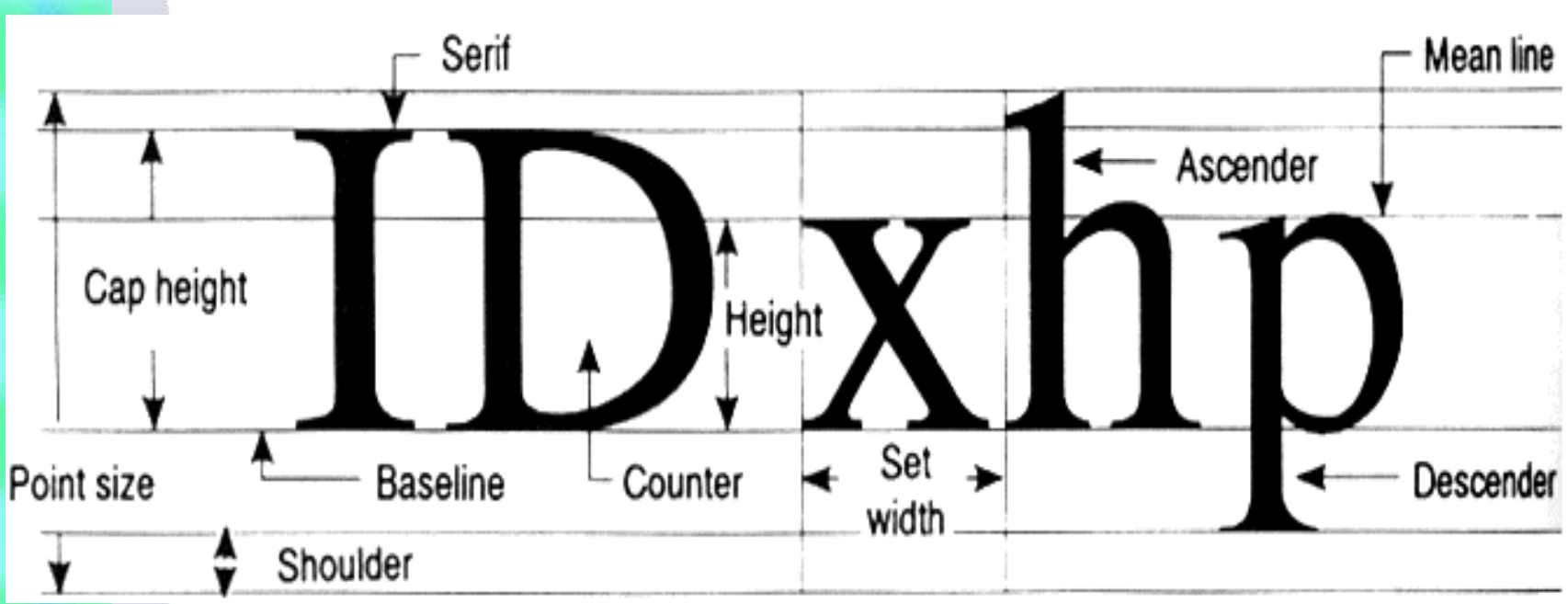
Times

- Fonts
- Points
- Styles
- Leading
- Kerning

Fonts and Faces

- A **typeface** is a family of graphic characters that includes many type sizes and styles (such as Times, Arial, Helvetica)
- A **font** is a collection of characters of a single size and style belonging to a typeface family (such as bold, italic)
- **Font sizes** are in points 1 point = 1/72 inch (measured from top to bottom of descenders in capital letter)
- **X-height** is the height of the lower case letter x

Character Metrics



Factors affecting legibility of text

- **Size.**
- **Background and foreground color.**
- **Style.**
- **Leading (pronounced “ledding”).**

Styles

- **Examples of styles are boldface and italic**
  Italic

Bold

Underlined

Outlined

Leading and Kerning

Computers can

- **adjust the line spacing (called leading)**

and

- **the space between pairs of letters, called kerning**

Fonts and Faces

- **PostScript, TrueType and Master fonts can be altered**
- **Bitmapped fonts cannot be altered**
- **The computer draws or rasterizes a letter on the screen with pixels or dots.**

Using Text In Multimedia

- **WYSIWYG - What you see is what you get!**
- **Aim for a balance between too much text and too little**
- **Make web pages no more than 1 to 2 screenfuls of text**
- **Bring the user to the destination with as few actions as possible**

Menus For Navigation

- **A Multimedia project or web site should include:**
  - **content or information**
  - **navigation tools such as menus, mouse clicks, key presses or touch screen**
  - **some indication or map of where the user is in the presentation**

Buttons for Interaction

- **Buttons are objects that make things happen when they are clicked**
- **Use common button shapes and sizes**
- **Label them clearly**
- **BE SURE THEY WORK!**

Animating Text

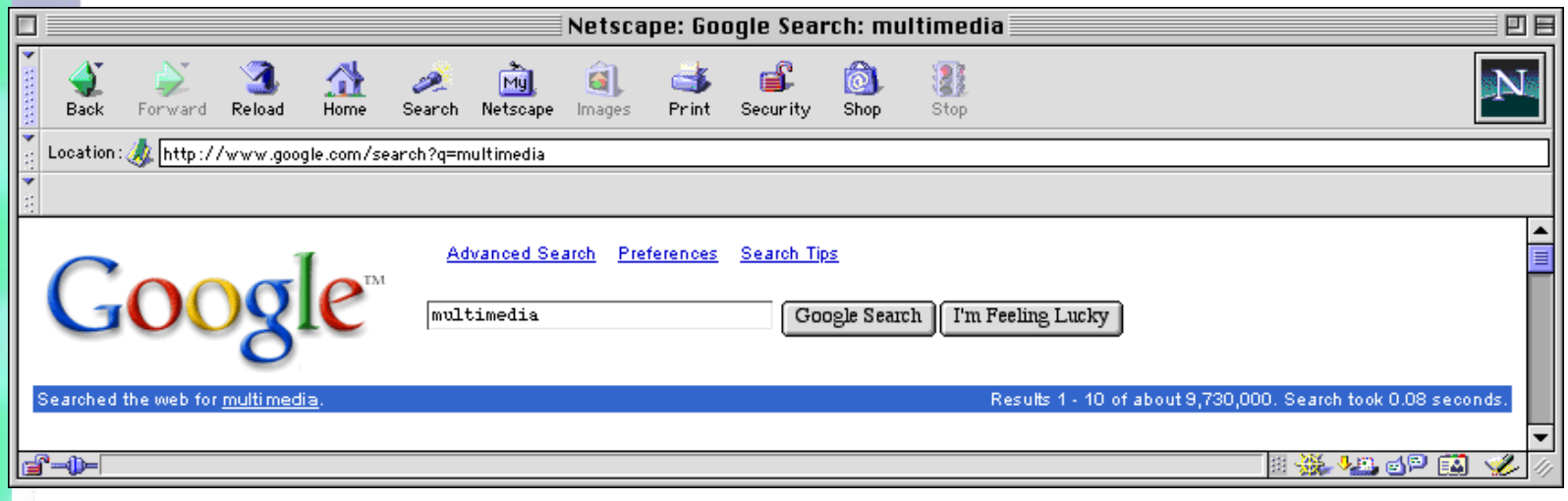
- To grab a viewer‟s attention:
  - let text “fly” onto screen
  - rotate or spin text, etc.
- Use special effects sparingly or they become boring

Computers and Text

- **Mac standard - 72 pixels/ inch**
- **PC - VGA - 96 pixels/inch**
- **Screen (640 pixels across x 480 down, called 640 x480 resolution)**
- **Today much higher resolution possible**

Hypermedia and Hypertext

- ***Hyper media*** **provides a structure of links**
- ***Hypertext*** **words are linked to other elements**
- **Hypertext is usually searchable by software robots**



Hypermedia and Hypertext

- **Multimedia - combines text, graphics and audio**
- **Interactive multimedia - gives user control over what and when content is viewed (non-linear)**
- **Hypermedia -provides a structure of linked elements through which user navigates and interacts**

Hypermedia Structures

- **Hypermedia elements are called *nodes***
- **Nodes are connected using *links***
- **A linked point is called an *anchor***

Hypermedia Structures

- **Link - connections between conceptual elements (navigation pathways and menus)**
- **Node - contains text, graphics sounds**
- **Anchor - the reference from one document to another document, image, sound or file on the web**
- **Link anchor - where you came from**

Hypermedia and Hypertext

- **Doug Englebart - inventor of mouse**
- **1965 Ted Nelson coined the word "hypertext"**
- **Computer-based hypertext systems will fundamentally alter the way humans think, approach literature and the expression of ideas**
- **Hotlinks - lead user from one reference to another**

Using Hypertext

- **Searching for words**
  - **boolean search using AND, OR, NOT**
  - **truncation - using only part of word, such as geo might yield result with geology, geography, George, etc.**
- **Search engines employ “robots” to visit web pages and create indexes.**

Hypertext Tools

- **Building or authoring**
  - **builder creates links, identifies nodes, generates an index of words**
- **Reading**
  - **both linear and increasingly non-linear**
- **Becoming more comfortable with non-linear hypertext systems will change the way we think….**

Overview

- **Introduction to sound.**
- **Multimedia system sound.**
- **Digital audio.**
- **MIDI audio.**
- **Audio file formats.**

Overview

- **MIDI versus digital audio.**
- **Adding sound to multimedia project.**
- **Professional sound.**
- **Production tips.**

Power of Sound

- **Vibrations in the air create waves of pressure that are perceived as sound.**
- **Sound waves vary in sound pressure level (amplitude) and in frequency or pitch.**
- **„Acoustics" is the branch of physics that studies sound.**
- **Sound pressure levels (loudness or volume) are measured in decibels (dB).**
- **Humans hear sound over a very broad range**

Sound

- **Sound is energy, caused by molecules vibrating**
- **Too much volume can permanently damage your ears and hearing**
- **The perception of loudness depend on the frequency or pitch**
- **Harmonics cause the same note played on a cello to sound different from one played on a piano.**

Using Sound in Multimedia

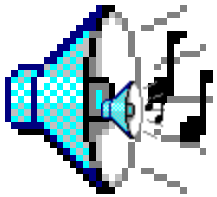
- **You need to know**
  - **How to make sounds**
  - **How to record and edit sounds on the computer**
  - **How to incorporate sounds into your multimedia project**

Multimedia System Sounds

- **Mac and Windows have built in sound recorders**

MIDI Audio

- **MIDI is a series of musical instructions**



Click

MIDI vs. Digital Audio

- **MIDI (Musical Instrument Digital Interface) is a communications standard developed in the 1980‟s for electronic instruments and computers.**
- **It allows instruments from different manufacturers to communicate.**

MIDI vs. Digital Audio

- **MIDI data is NOT digitized sound- it is music stored in numeric format**
- **Digital audio is a recording, which depend on your sound system**
- **MIDI is a *score* and depends on both the quality of the instruments and the sound system**
- **Quality depends on end user‟s device**
  rather than on the MIDI device and is device dependent.

Making MIDI Audio

- **Creating a MIDI score requires:**
  - **Knowledge of music and some talent**
  - **Ability to play a musical instrument**
  - **Sequencer software**
  - **Sound synthesizer**
    - **Built into PC board**
    - **Add-on for MAC**
- MIDI can synthesize over 100 instruments

MIDI

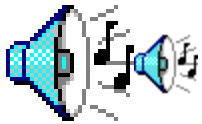
- A **MIDI** file is a list of commands that are recordings of musical actions, that when sent to a MIDI player results in sound
- MIDI data is device dependent
- MIDI represents musical instruments and is not easily used to playback spoken dialog

MIDI Audio

- **MIDI is a shorthand representation of music stored in numeric form.**
- **Since they are small, MIDI files embedded in web pages load and play promptly.**
- **Length of a MIDI file can be changed without affecting the pitch of the music or degrading audio quality.**
- **Working with MIDI requires knowledge of music theory.**

Digital Audio

- **Digital audio is a representation of the original sound**
- **Sampling rate is measured in kilohertz (kHz)**



Click to play

Digital Audio

- **Digital audio represents a sound stored in thousands of numbers or samples.**
- **Digital data represents the loudness at discrete slices of time.**
- **It is NOT device dependent and should sound the same each time it is played**
- **It is used for music CD‟s**

Digital Audio

- **The three sampling frequencies most often used in multimedia are CD-quality 44.1 kHz, 22.05 kHz and 11.025 kHz.**
- **The number of bits used to describe the amplitude of sound wave when sampled, determines the sample size.**
- **Digital audio is device independent.**
- **The value of each sample is rounded off to the nearest integer (quantization).**

MIDI vs. Digital Audio

- **MIDI data and digital audio are like vector and bitmapped graphics:**
- **Digital audio like bitmapped image – samples original to create a copy**
- **MIDI – like vector graphic- stores numeric data to recreate sound**

MIDI vs. Digital Audio

- **MIDI data is device dependent; digital audio is not**
- **MIDI sounds (like vector graphics) are different on different devices;**
- **Digital sounds are identical even on different computers or devices.**

MIDI Advantages

- MIDI file are much more compact and take up less memory and system resources
- MIDI files embedded in web pages load and play much faster than digital
- You can change the length of a MIDI file by varying its tempo
- With high quality MIDI devices, MIDI files may actually sound better than digital

MIDI Disadvantages

- **MIDI represents musical instruments not sounds and will be accurate only if your playback device is identical to the production device**
- **MIDI sound is inconsistent**
- **MIDI cannot be easily used to reproduce speech**

Digital Audio Advantages

- **Digital audio sound is consistent and device independent**
- **A wide selection of software support is available for both MAC and PC**
- **A knowledge of music theory is not required for creating digital audio, but usually is needed for MIDI production**

Audio File Formats

- **CD-ROM/XA (Extended Architecture) format enabled several recording sessions to be placed on a single CD-R (recordable) disc.**
- **Linear Pulse Code Modulation is used for Red Book Audio data files on consumer-grade music CDs.**

Sound for the World Wide Web

- **To play MIDI sound on the web**
  - **wait for the entire file to download and play it with a helper application**
  - **stream the file, storing it in the buffer and playing it while it downloads**
- **Streaming is dependent on the connection speed**
- **FLASH allows sound to be integrated in a multimedia presentation, controlled by buttons and saved as .mp3**

Adding sound to Multimedia

- **CD- quality audio**
  - Standard is ISO 10149, a.k.a. the “Red Book Standard”
  - Sample size is 16-bit
  - Sample rate is 44.1 kHz
  - 11 seconds of audio uses 1.94 MB of space

Professional Sound

- **The Red Book Standard- ISO 10149**
  - **(16 bits at 44.1 kHz) allows accurate reproduction of all sounds humans can hear**
  - **Software such as Toast and CD-Creator can translate digital files from CD"s directly into a digital sound editing file or decompress.mp3 files into CD-Audio**

Summary

- **MIDI is a shorthand representation of music stored in numeric form.**
- **Digital audio provides consistent playback quality.**
- **MIDI files are much smaller than digitized audio.**
- **MIDI is device dependent digital audio is not**
- **MIDI files sound better than digital audio files when played on high-quality MIDI device.**

Bitmaps

- **Bitmap is derived from the words „bit", which means the simplest element in which only two digits are used, and „map", which is a two-dimensional matrix of these bits.**
- **A bitmap is a data matrix describing the individual dots of an image.**

Bitmaps

Bitmaps are an image format suited for creation of:

- **Photo-realistic images.**
- **Complex drawings.**
- **Images that require fine detail.**

Bitmaps

- **Bitmapped images are known as paint graphics.**
- **A bitmap is made up of individual dots or picture elements known as pixels or pels.**
- **Bitmapped images can have varying bit and color depths.**

Bitmaps

Bit Depth	Number of Colors Possible	Available Binary Combinations for Describing a Color
1-bit	2	0, 1
2-bit	4	00, 01, 10, 11
4-bit	16	0000, 0001, 0011, 0111, 1111, 0010, 0100, 1000, 0110, 1100, 1010, 0101, 1110, 1101, 1001, 1011

Available binary Combinations for Describing a Color

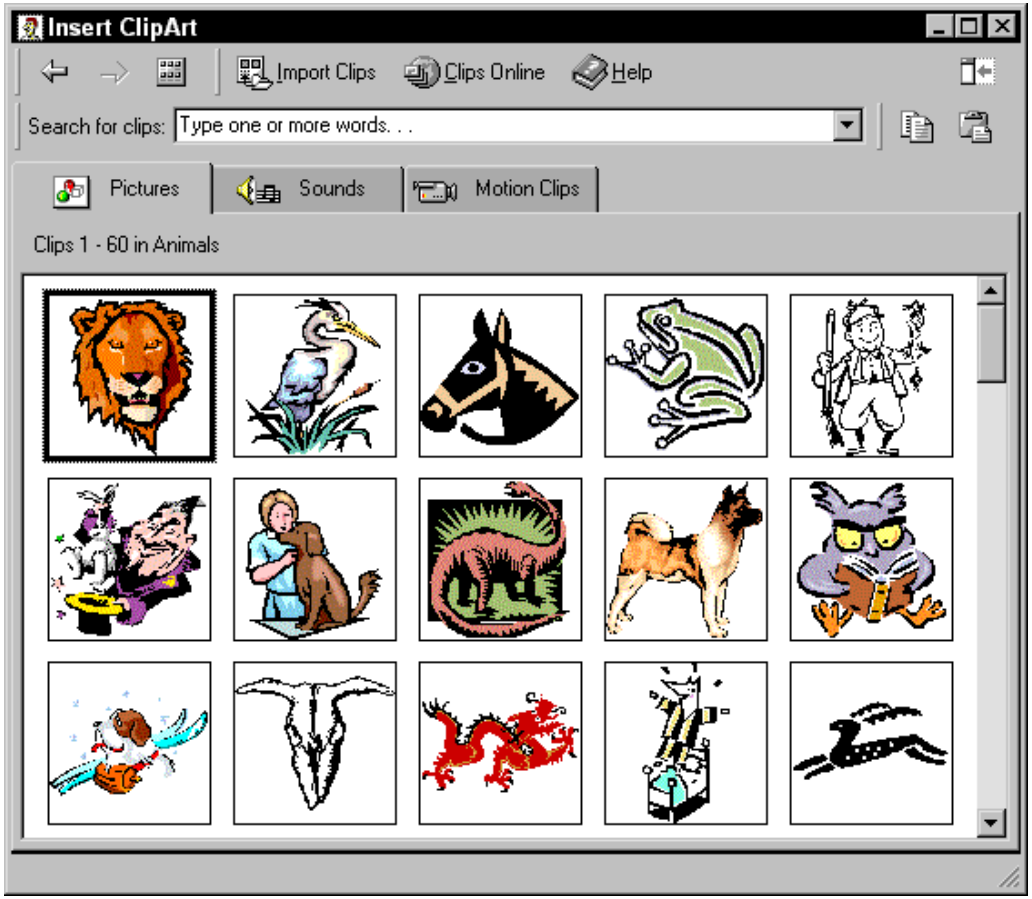
Bitmaps

Bitmaps can be inserted by:

- **Using clip art galleries.**
- **Using bitmap software.**
- **Capturing and editing images.**
- **Scanning images.**

Bitmap Example

- **Clipart**



Clip Art

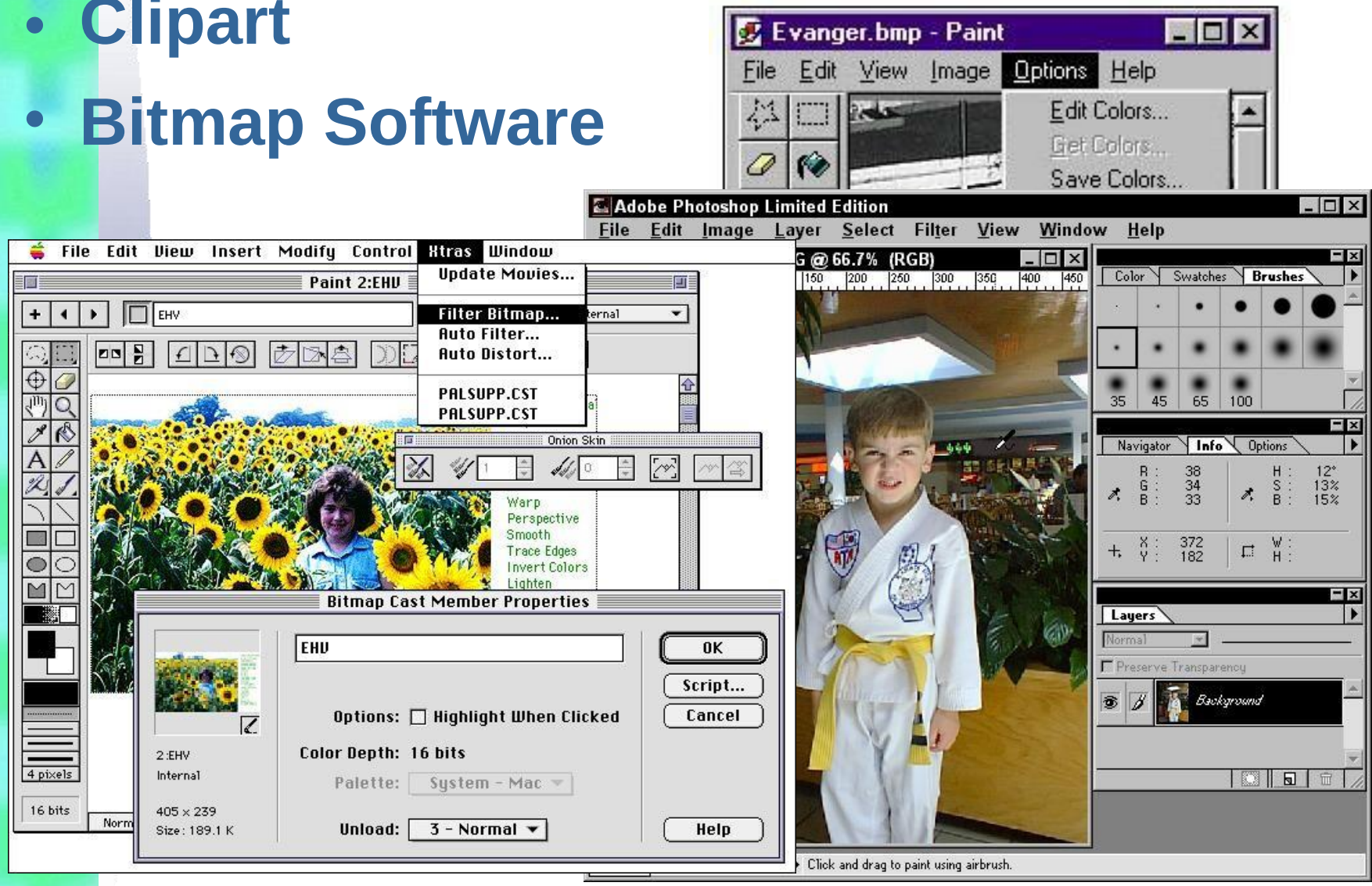
- **Available from many sources on the web or on CD (such as PHOTODISC)**
- **Often included with packages such as Corel Draw, Office, etc.**
- **Can manipulate some properties such as brightness, color, size**
- **Can paste it into an application**

Clip Art Galleries

- **A clip art gallery is an assortment of graphics, photographs, sound, and video.**
- **Clip arts are a popular alternative for users who do not want to create their own images.**
- **Clip arts are available on CD-ROMs and on the Internet.**

Bitmaps

- Clipart
- Bitmap Software



Using Bitmap Software

The industry standard for bitmap painting and editing programs are:

- **Adobe's Photoshop and Illustrator.**
- **Macromedia's Fireworks.**
- **Corel's Painter.**
- **CorelDraw.**
- **Quark Express.**

Bitmap Software

- **Primitive Paint programs included with windows and MAC**
- **Director included a powerful image editor with advanced tools such as onion-skin and image filtering**
- **Adobe Photoshop and Fractal Design‟s Painter are more sophisticated painting and editing tools**

Tip

- **Use paint program for cartoon, text, icons, symbols, buttons, or graphics.**
- **For photo-realistic images first scan a picture, then use a paint or image editing program to refine or modify them**

Bitmaps

- Clipart
- Bitmap software
- Capturing
- Scanning

Image File Formats

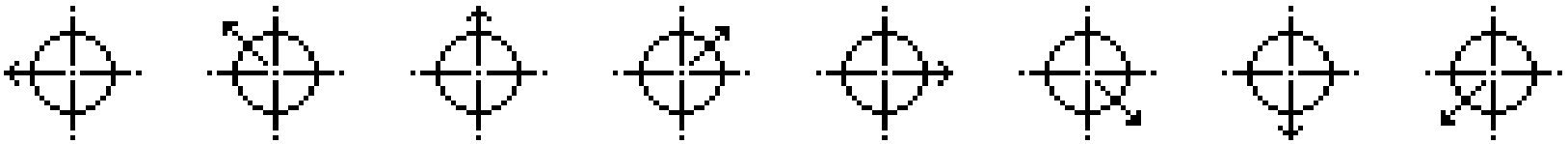
- **Be sure that your program can import the files that you create or save.**
- **Most common bitmap formats for the web are GIF and JPEG, since all browsers can display them**

The Power of Animation

- **Animation grabs attention**
- **Transitions are simple forms of animation**
  - Wipe
  - Zoom
  - Dissolve

Principles of animation

- **How Animation Works**
  - **Persistence of vision**
  - **Still images are flashed in sequence**
  - **Frame rate measures the speed of change**



Principles of Animation

- **Persistence of Vision -biological phenomenon - an object seen by the human eye remains mapped on the retina for a brief time after viewing.**
- **Causes the visual illusion of movement, when images change slightly and rapidly**

Principles of Animation

- Television video creates 30 frames per second
- Movies are shot at a rate of24 frames per second and replayed at48 frames per second
- Both are used to create motion and animation

Principles of Animation

- **Cel Animation**
  - ***Keyframes* identify the start and end of action**
  - **The process of filling in the action is called *tweening***

Animation Techniques

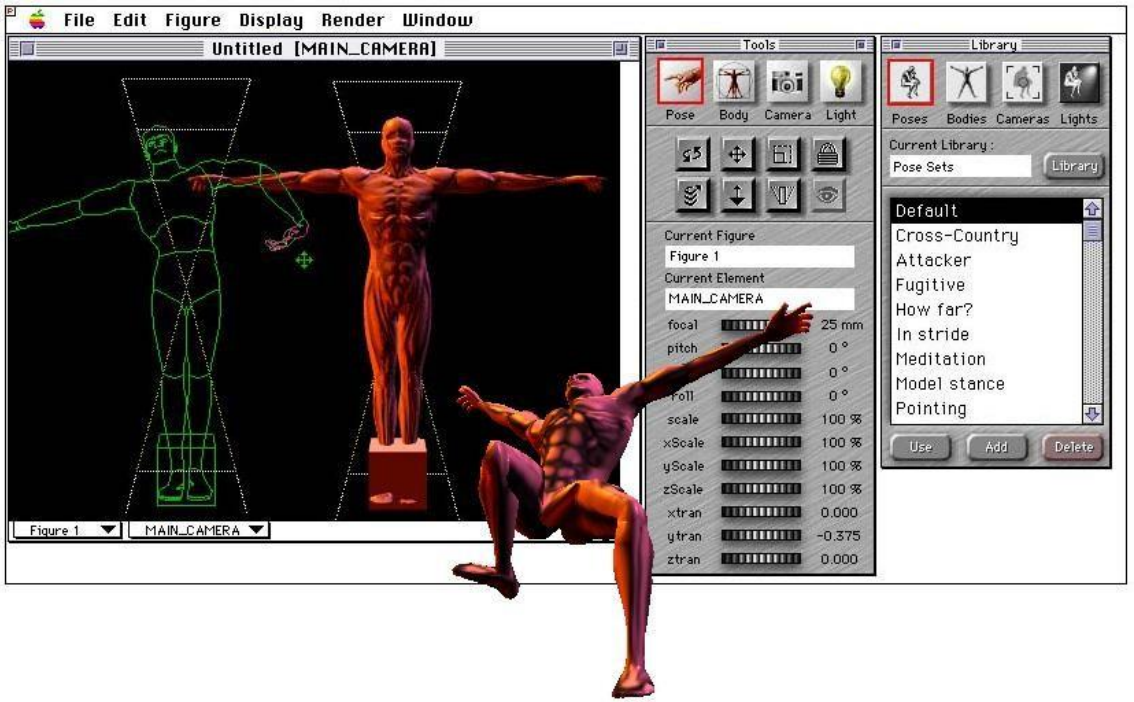
- **Cel Animation**
  - **The technique made famous by Disney**
  - **Progressively different graphics on each frame of movie film**
  - **Clear celluloid sheets were used to draw each frame**
  - **(24 frames/sec. * 60 sec/min) = 1440 separate frames needed to produce one minute of a movie**

Animation Techniques

- **Cel Animation**
  - **Begins with keyframes (first and last frames of an action)**
  - **Tweening – the series of frames drawn in between the first and last**
  - **Originally hand drawn and “flipped” through to check the “motion”**
  - **Now replaced by computer generated graphics**

Principles of Animation

- **Computer Animation**
  - ***Kinematics* is the study of motion of jointed structures**



Overview

- Using video.
- How video works?
- Broadcast video standards.
- Analog video.
- Digital video.
- Video recording and tape formats.
- Shooting and editing video.
- Optimizing video files for CD-ROM.

Video

- Video is the most recent addition to the elements of multimedia
- It places the greatest demands on the computer and memory (using about 108 GB per hour for full motion)
- Often requires additional hardware (video compression board, audio board, RAID - Redundant Array of Independent Disks- for high speed data transfer)

Using Video

- **Carefully planned video can enhance a presentation (eg. film clip of JFK, better than an text box of same message)**
- **Before adding video to a project, it is essential to understand the medium, how to integrate it, its limitations, and its costs**

Using Digital Video

- **Digital video has replaced analog as the method of choice for making and delivering video for multimedia.**
- **Digital video device produces excellent finished products at a fraction of the cost of analog.**

Digital Video Compression

- **Digital video compression schemes or “codecs” (coder/decoder) is the algorithm used to compress (code) a video for delivery.**
- **The codec then decodes the compressed video in real-time for fast playback.**
- **Streaming audio and video starts playback as soon as enough data has transferred to the user‟s computer to sustain this playback.**

Video Compression

- To store even a 10 second movie clip requires the transfer of an enormous amount of data in a very short time
- 30 seconds of video will fill a 1 GB hard drive
- Typical hard drives transfer about 1MB/second and CD- ROMs about 600K/second

Video Compression

- **Full motion video requires the computer to deliver the data at 30 MB/second more than today‟s PCs and MACs can handle**
- **Solution- use video compression algorithms or codecs**
- **Codecs compress the video for delivery and then decode it for playback at rates from 50:1 to 200:1**

Video Compression & Streaming

- **Codecs (such as MPEG, JPEG) use lossy compression schemes**
- **Streaming technologies are also used to provide reasonable quality , low-bandwidth on the WEB**
- **Playback starts as soon as enough data have been transferred to the user"s computer instead waiting for the whole file to download**
- **(RealAudio and RealVideo software)**

MPEG

- **Standard developed by the Moving PIcturesExperts Group for digital representation of moving pictures and associated audio**
-

Digital Video Compression

- **MPEG is a real-time video compression algorithm. (Moving Picture Experts Group)**
- **MPEG-4 (1998-1999) includes numerous multimedia capabilities and is a preferred standard.**
- **MPEG-7 (2002) (or Multimedia Content Description Interface) integrates information about motion video elements with their use.**
- **MPEG –21 under development**

Digital Video

- **Video clips can be shot or converted to digital format and stored on the hard drive.**
- **They can be played back without overlay boards, second monitors or videodiscs using QuickTime or Active Movie for Windows**
- **Analog video can be converted to digital or now created in digital form**

P*64

- Video telephone conferencing standard for compressing audio and motion video images
- Encodes audio and video for transmission over copper or fiber optic lines
- Other compression systems are currently being developed by Kodak, Sony, etc.

Optimizing Video files for CD-ROMs

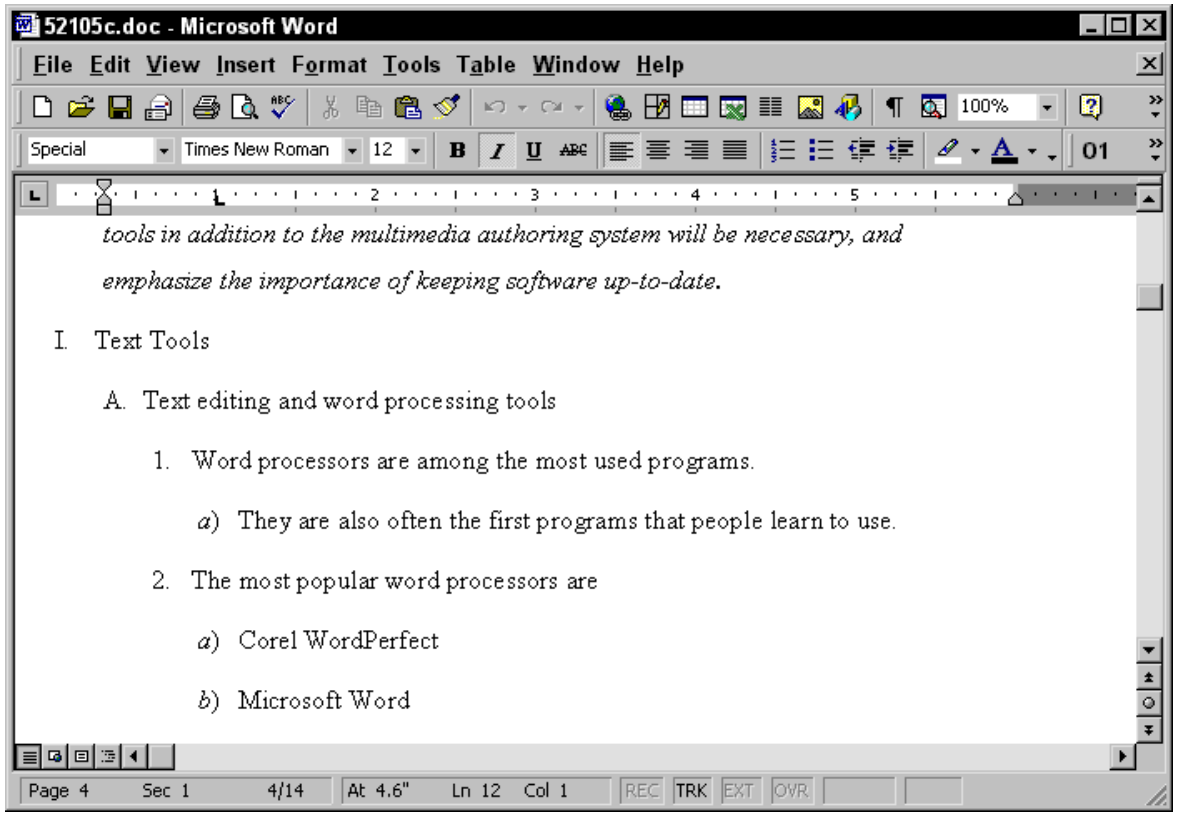
- **CD- ROMs are an excellent distribution media for multimedia: inexpensive, store great quantities of information, with adequate video transfer rates**
- **Suitable for QuickTime and AVI file formats as well as those produced by Director, etc.**

Basic Tools - Overview

- Authoring system (Authorware)
- Text Editing, Word Processing Tools (Word)
- Painting and Drawing Tools
- 2D,3D Modeling and Animation Tools
- Image Editing Tools
- Sound Editing Tools
- Animation, Video, and Digital Movie Tools
- Utilities useful for multimedia

Text Tools

- Word Processors



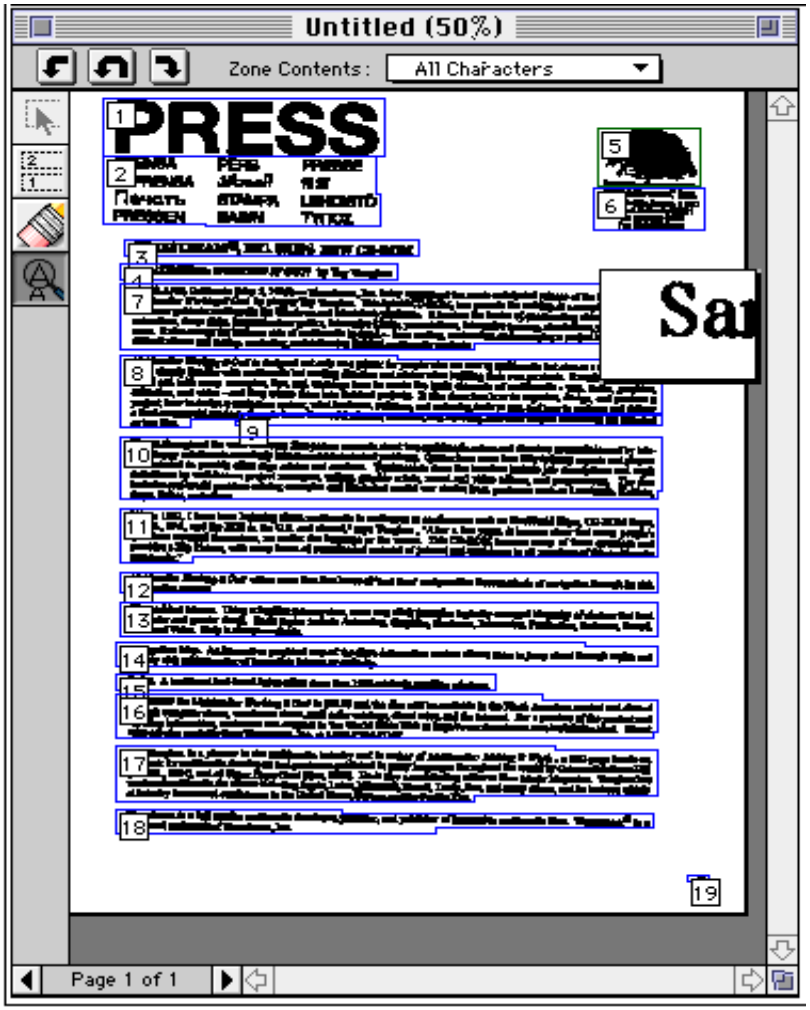
Text-based tools

Word processors:

- **Are powerful applications that include spell checkers, table formatters, thesaurus, and pre-built templates for commonly used documents.**
- **Are used for creating project letters, invoices, and storyboards.**
- **Allow embedded multimedia elements.**
- **Microsoft Word and WordPerfect are Word processors.**
- **Often come bundled in an "Office Suite."**

Text Tools

- Word Processors
- OCR Software



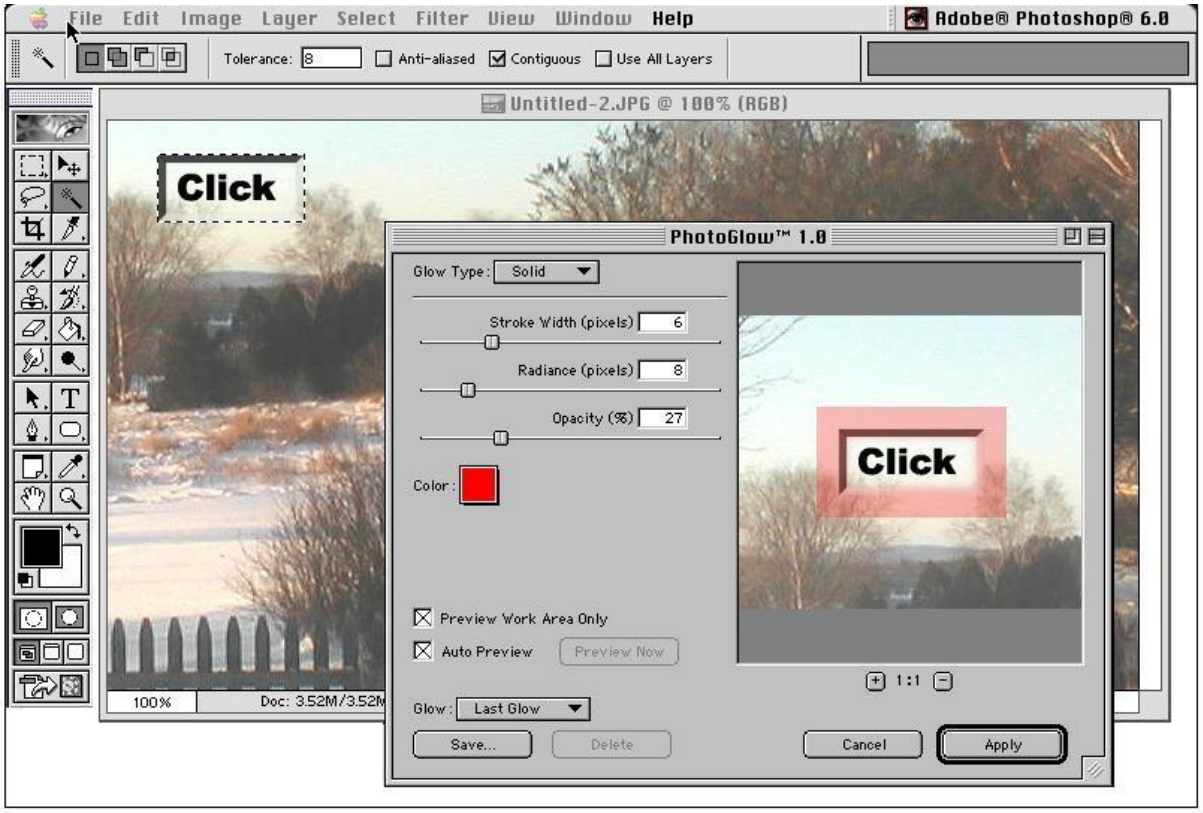
Text-based Tools

Optical Character Recognition (OCR) software:

- **Converts bitmapped characters into electronically recognizable ASCII text.**
- **Makes use of probability and expert system algorithms.**
- **Is very accurate and saves time and effort.**

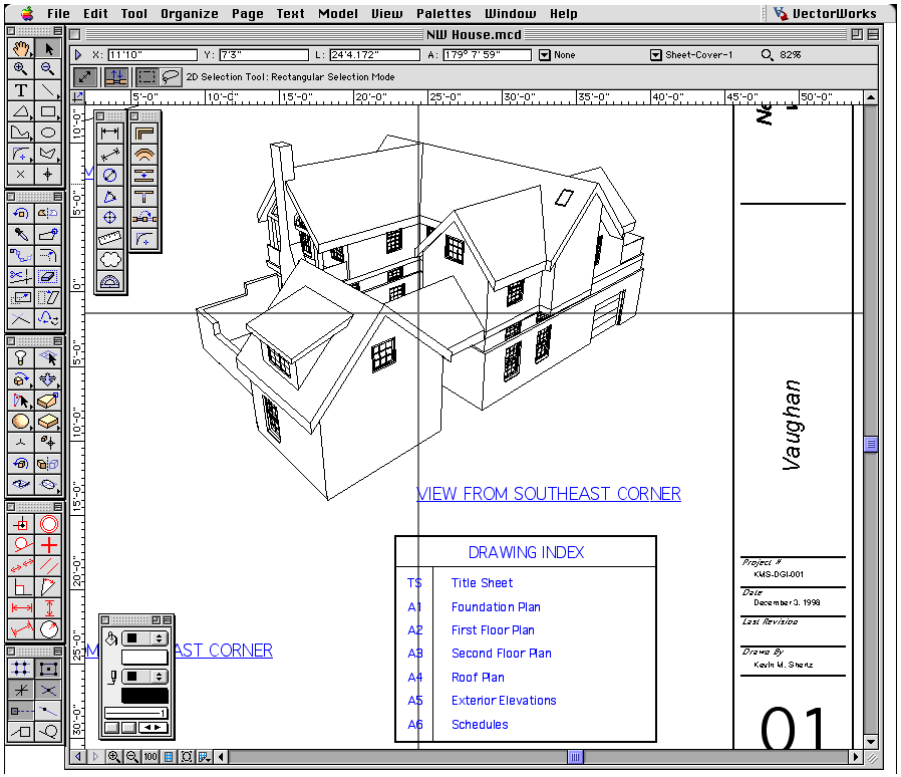
Graphics Tools

- Painting and Drawing Tools



Graphics Tools

- Painting and Drawing Tools
- 3-D Modeling Tools



Video Formats

QuickTime (continued):

- **Includes built-in support for ten different media types.**
- **Offers a comprehensive set of services.**
- **Allows embedded commands in HTML documents.**

Video Formats

Audio Video Interleaved (AVI):

- Is a Microsoft-developed format for playing full-motion interleaved video and audio sequences in Windows.
- Does not require specialized hardware.
- Is an inextensible, open environment.
- Lacks serious video editing features.
- The OpenDML format was developed to make AVI more functional.

Video Formats

- **QuickTime and Audio Video Interleaved (AVI) formats support special algorithms, provide a methodology for interleaving, and allow organized streaming of data from disk into memory.**
- **Digital Versatile Disc (DVD) is a hardware format that uses laser light to store and read digital information.**

Common Video Formats

- **QuickTime from Apple for both Mac and PC**
- **AVI – MS Audio Video Interleaved for Windows**
- **Both blend (interleave) audio and video**
- **Neither is currently capable of producing full screen images at 30 frames/second (TV standard)**

QuickTime

- **Multitrack recorder with almost unlimited range of tracks.**
- **Supports digitized video and sound, computer animations, MIDI data, and external devices (CD-ROM players, videodisks, etc.)**
- **Provides imbedded support and services for 10 media types (p.101)**
- **Provides embedded HTML commands**

QuickTime

- Integrates sound, text, animation and video
- Can be used on the internet to deliver multimedia through plug-ins
- Provides the foundation for the new MPEG-4 Multimedia format for the web

QuickTime

- **Movie file format- provides a standard method for storing audio, video, text**
- **Media Abstraction Layer – describes how your computer should access the media**
- **Media Services- includes built-in support for different media types and offers services for: timing, synchronization, data compression, format conversion, audio mixing, special effects, media capture, movie controllers, etc. (See p.114-115)**

Some QuickTime Embedded Commands for HTML

- **Powerful commands for controlling a QuickTime file can be embedded right in the HTML code:**
  - **AUTOPLAY- starts movie automatically**
  - **BGCOLOR – sets background color for movie**
  - **HEIGHT and WIDTH specifies size of movie in web page**
  - **LOOP- plays movie in continuous loop**
  - **VOLUME- sets default playback volume**
  - **HIDDEN – plays sound only**

Windows Video

- **Media Control Interface (MCI) provides a uniform command interface for managing audio and video that interleaves them together in the file called AVI – (audio video interleaved).**
- **AVI plays about 15 frames/second in a small window**
- **Lacks features needed for serious video/sound editing**

Windows Video Features

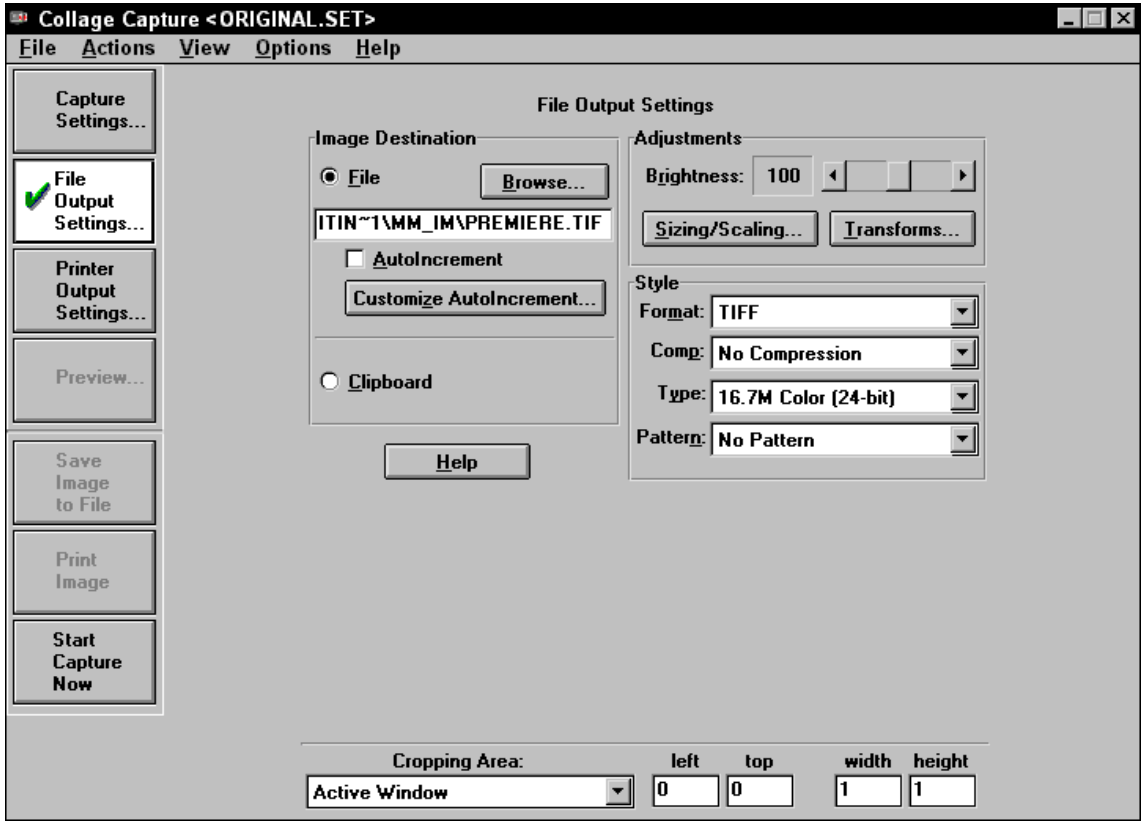
- **Playback from hard disk or CD-ROM**
- **Uses limited amount of memory**
- **Quick loading and playing**
- **Video compression available**
- **Some tools VidCap and VidEdit to capture and edit video (see p. 116)**

Movie Compression

- **Compression ratio- size of the original image divided by the size of the compressed image; usually only the part of the image that changes form image to image (delta), The higher the ratio, the lower the image quality**
- **Image quality**
  - **Lossy- ignores picture information that the viewer may not miss**
  - **Lostless- preserves the original data precisely**
- **Compression/decompression speed – ideally as fast as possible**

Helpful Accessories

- Screen Capture Software
- Format Converter



Summary

- **Word processors and OCR software are used to handle text in multimedia.**
- **Painting and drawing tools, 3-D modeling tools, and image editing tools manipulate the graphical content of the project.**
- **QuickTime for Macintosh and AVI for Windows are the two most widely used video formats.**

Multimedia Authoring

- Multimedia authoring involves collating, structuring and presenting information in the form of a digital multimedia, which can incorporate text, audio, and still and moving images.

Multimedia Authoring Tools

- A program that helps you write hypertext or multimedia applications.
- Authoring tools usually enable you to create a final application merely by linking together objects, such as a paragraph of text, an illustration, or a song.

Multimedia Authoring Tools

- Most authoring systems also support a scripting language for more sophisticated applications.
- Authoring tools require less technical knowledge to master and are used exclusively for applications that present a mixture of textual, graphical, and audio data.

Multimedia Authoring Tools

- Two basic features:
  - Ability to create and edit a product
  - Presentation scheme for delivering product

Multimedia Authoring Tools

- Four main perspectives in **multimedia authoring tools** :
  - **Tool** (any software package that could authors **multimedia** product)
  - **Product** (the result of combining all **multimedia** components)
  - **Developer** (designers, programmers, and **multimedia** authors)
  - **End user** (customer or viewer)

Multimedia Authoring Tools

- There are three types of authoring tools, which are divided by the style in which the multimedia presentation is created:
  - Card-based
  - Time-based
  - Icon-based

Multimedia Authoring Tools

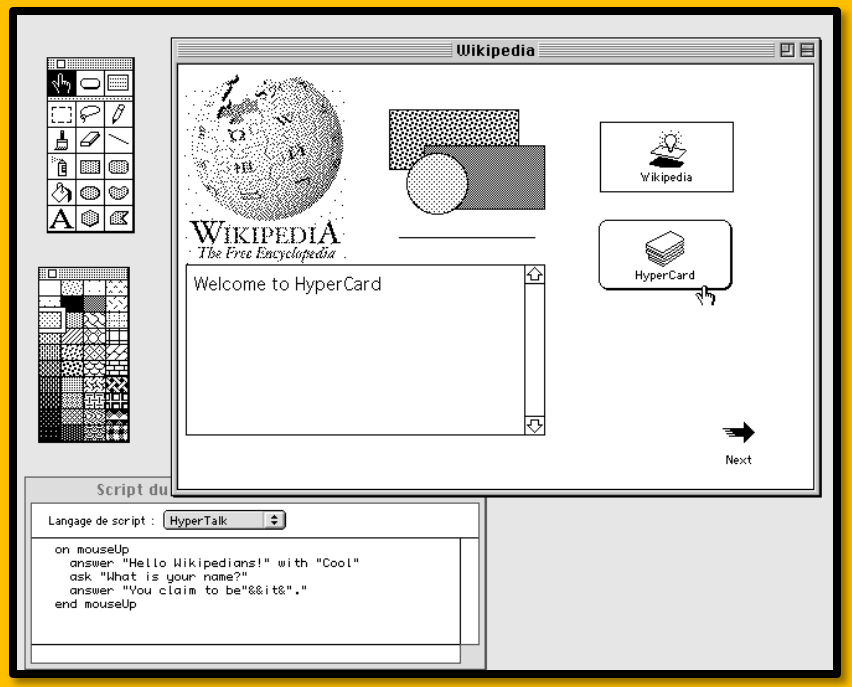
1. Card-based Authoring Tools

- Using a card stack metaphor.
- Cards are developed that have different elements associated with them and are put in stacks.
- You can link the cards by allowing the user to click on buttons or other elements and jump to a different card in the stack.

Multimedia Authoring Tools

1. Card-based Authoring Tools Example:

- Hypercard
- ToolBook
- HyperNext Studio
- Hyper Studio
- PhytonCard
- Revolution



Multimedia Authoring Tools

2. Time-based Authoring Tools

- Time Based Authoring Programs use a movie metaphor.
- Like a movie on videotape, you start the multimedia title and it plays until some action causes it to pause or stop.

Multimedia Authoring Tools

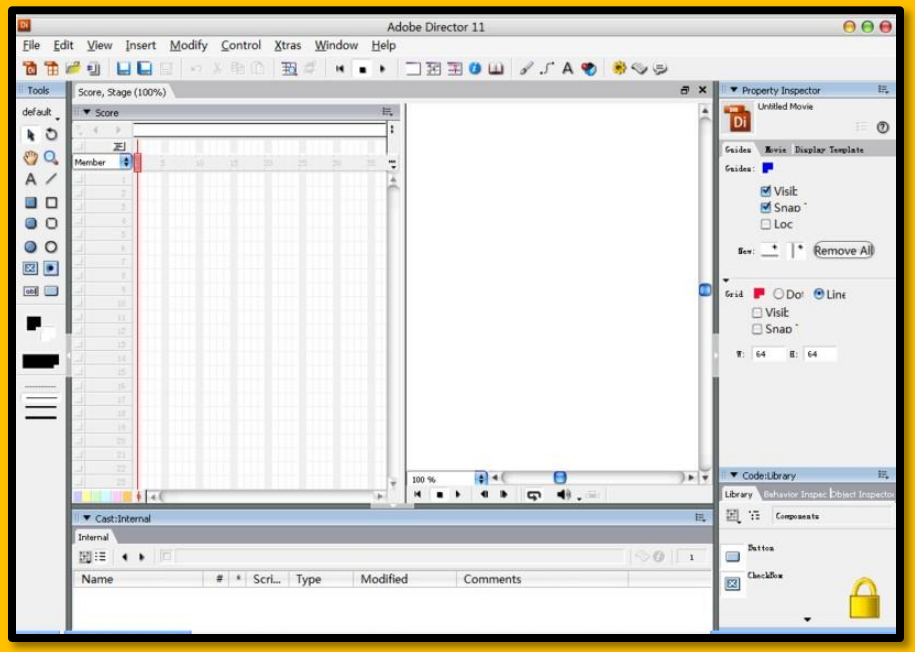
2. Time-based Authoring Tools

- These programs also allow for branching to different parts of the movie, and any amount of user control and interactivity may be build in.
- Good for creating animations.

Multimedia Authoring Tools

2. Time-based Authoring Tools Examples:

- Director
- Flash



Multimedia Authoring Tools

3. Icon-based Authoring Tools

- With icon-based programs, you use symbols in a flowchart scheme.
- Each icon represents a particular event.
- For example, the Wait icon stops the process until the user clicks the mouse button or presses a key or a specific amount of time passes.

Multimedia Authoring Tools

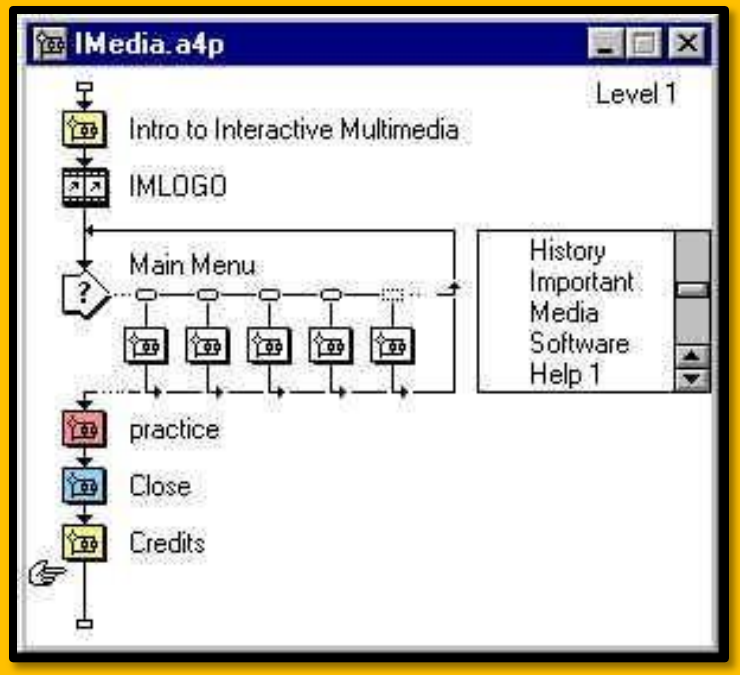
3. Icon-based Authoring Tools

- An advantage of icon-based programs is that you can easily see how a title is structured, that is, the flow of a program and especially the branching.

Multimedia Authoring Tools

3. Icon-based Authoring Tools Example:

- Macromedia Authorware
- IconAuthor



Using Programming Language

- **Multimedia** product still can be developed using programming language.
- Quality is about the same.
- Amount of work to code every element and function in the product can be extensive and labor-intensive.
- **Authoring tools** can save a lot of time and money.
- Not suitable for beginners.

Text Editor

- A **text editor** is a type of program used for editing plain text files.
- Text editors are often provided with operating systems or software development packages, and can be used to change configuration files and programming language source code.

Text Editor

- Common features:
  - Cut, copy and paste
  - Text formatting
  - Undo and redo
  - Data transformation

Text Editor

- Examples:
  - Windows Notepad
  - Emacs

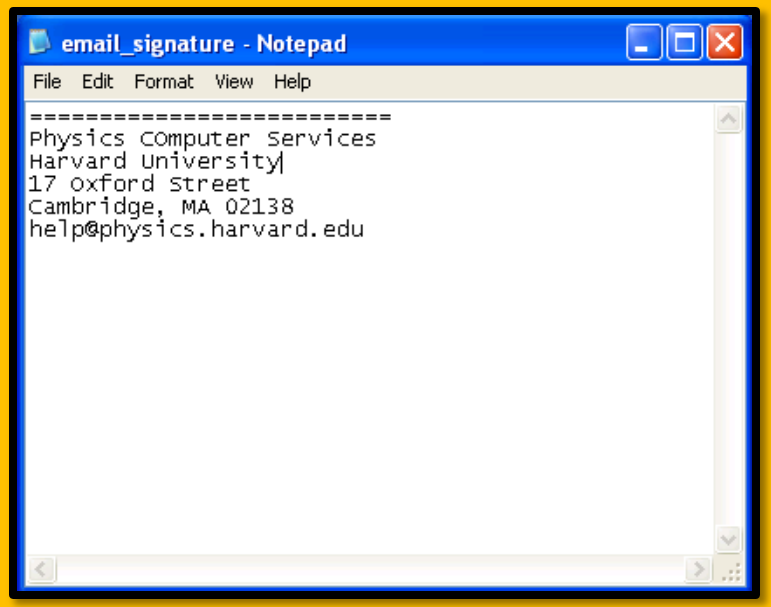


Image Editor

- A graphics program that provides a variety of special features for editing bitmap images.
- Common features:
  - Selection
  - Layers
  - Image size alteration
  - Crop
  - Enhancing images
  - Change color depth

Examples of Image Editor

- Adobe Photoshop
- GIMP (freeware)
- Microsoft Office Picture
- Fotografix (freeware)

Drawing Program

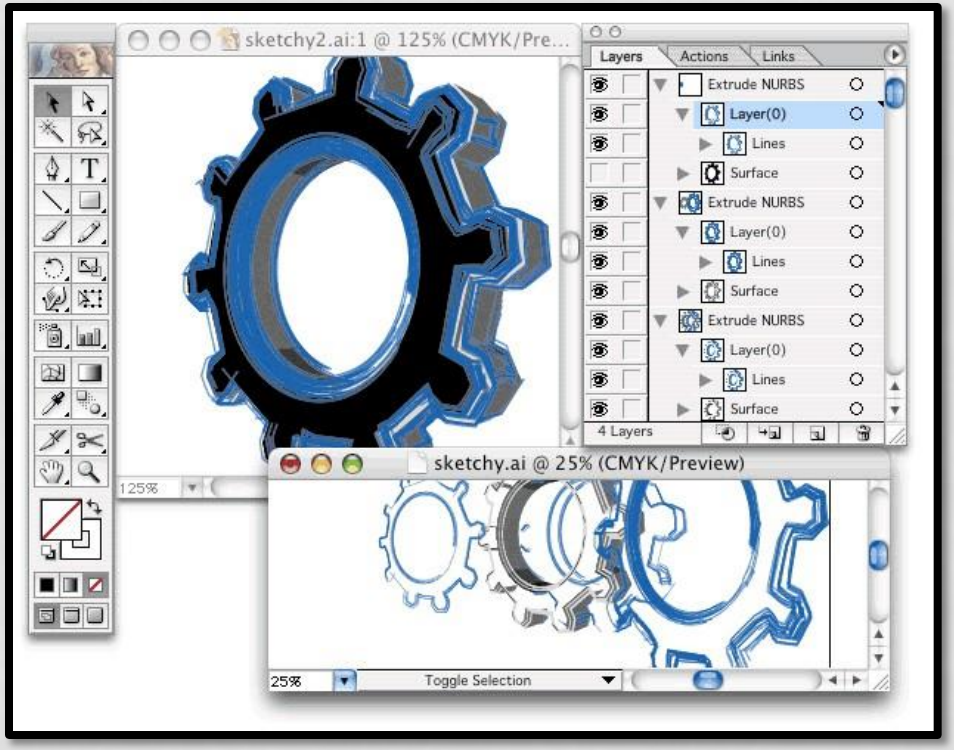
- Drawing program is a computer program that allows users to compose and edit vector graphics images interactively on the computer screen.

Drawing Program

- Drawing programs are better for
  - graphic design
  - page layout
  - typography
  - Logos
  - sharp-edged artistic illustrations (e.g. cartoons, clip art, complex geometric patterns)
  - technical illustrations, etc.

Drawing Program Examples

- Xfig
- Inkscape (freeware)
- Adobe Illustrator
- CorelDRAW



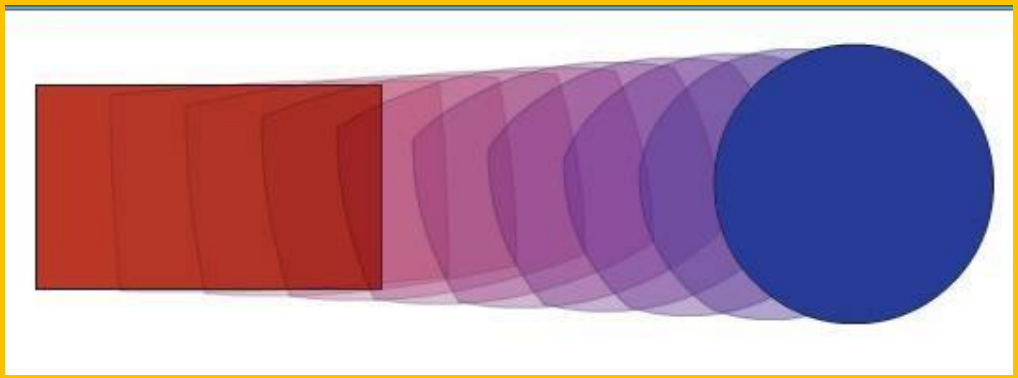
Computer Animation

- Computer animation can be created with an animation software.
- Some impressive animation can be achieved even with basic programs; however, the rendering can take a lot of time on an ordinary home computer.

Computer Animation Techniques

1. Tweening

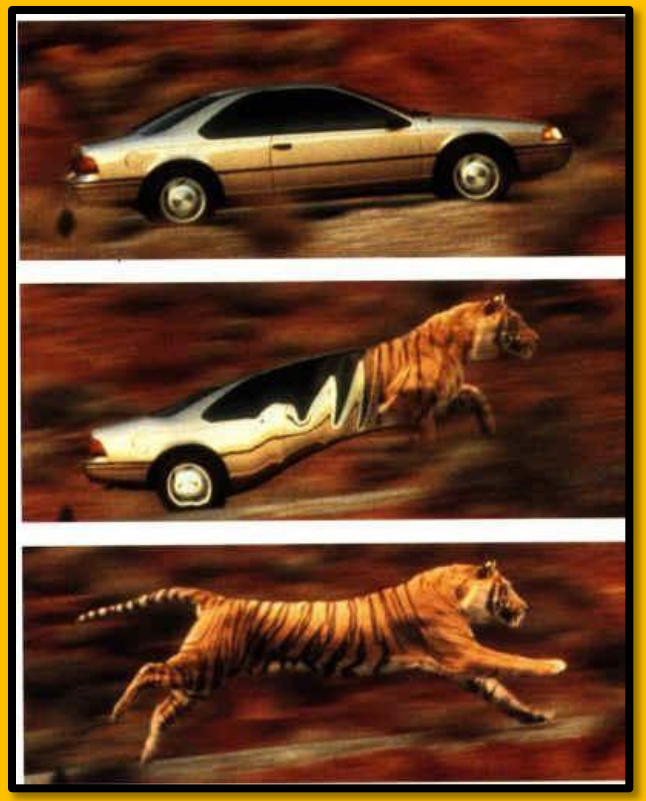
- **Inbetweening** or ***tweening*** is the process of generating intermediate frames between two images to give the appearance that the first image evolves smoothly into the second image.



Computer Animation Techniques

2. Morphing

- **Morphing** is a special effect in motion pictures and animations that changes (or morphs) one image into another through a seamless transition.



Computer Animation Techniques

3. Onion Skinning

- Onion skinning a technique used in creating animated cartoons and editing movies to see several frames at once.
- This way, the animator can make decisions on how to create or change an image based on the previous image in the sequence.

Computer Animation Software

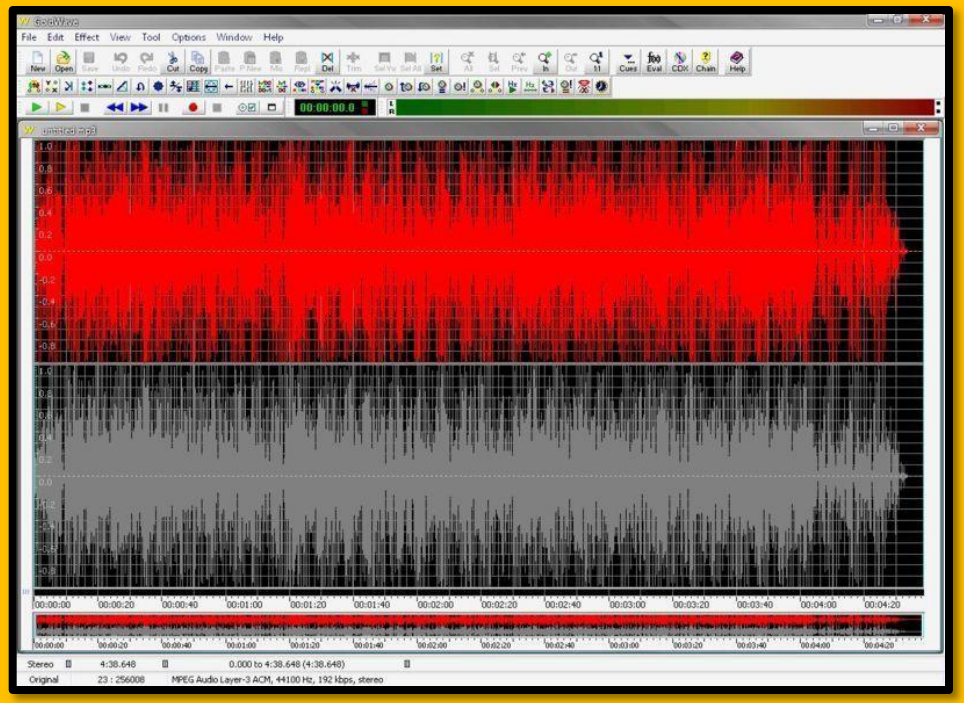
- Adobe Flash
- Adobe Image Ready
- XARA 3D
- Ulead GIF Animator

Waveform Editor

- Waveform programs is a computer application for audio editing, i.e. manipulating digital audio.
- Allow the user to do the following:
  - Record audio and store as digital audio
  - Mix multiple sound sources/tracks
  - Apply simple or advanced effects or filters
  - Conversion between different audio file formats, or between different sound quality levels

Examples of Waveform Editor:

- Adobe Audition
- Creative Wavestudio
- Goldwave
- Sound Forge
- Wavelab

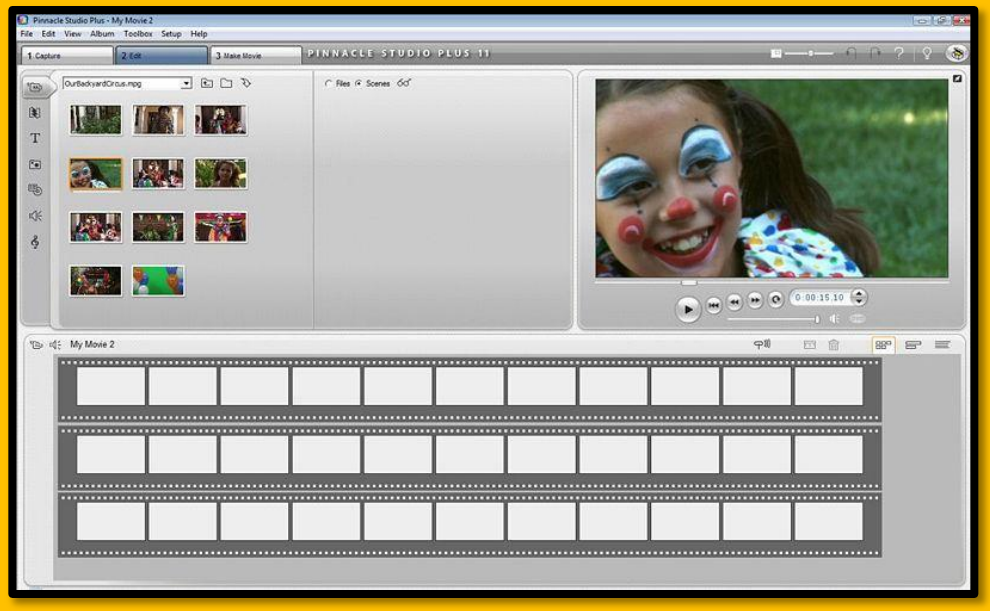


Video Editing Program

- **Video editing program** is application software which handles the editing of video sequences on a computer.
- Common features:
  - Splitting
  - Add background sound
  - Transition
  - Crop
  - Add title
  - Add special effect

Examples of Video Editing Program

- Adobe Premiere
- Pinnacle Studio
- Video Studio
- Windows Movie Maker



Tutorial

1. What is an Authoring Tool? What are two basic features in Authoring Tool?
2. What are the four main perspectives in Multimedia authoring tools?
3. There are three types of Authoring Tool. Briefly explain each one of them.
4. Explain the differences between image editing program and drawing program.
5. List any four common features in Image Editor program.
6. What are the three computer animation techniques?
7. Give four basic features of Waveform Editor program.
8. Give four basic features in Video editing program.