Bharat Ratna Puratchi Thalaivar Dr.MGR Government Arts and Science College, Palacode – 636808

B.Sc. COMPUTER SCIENCE SEMESTER

SEMESTER V

ELECTIVE I – MULTIMEDIA

UNIT I :

Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

UNIT II:

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

UNIT III :

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

UNIT IV:

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs. Multimedia Production Team.

UNIT V:

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent

TEXT BOOK

1. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw-Hill, 2001.

REFERENCE BOOK

1. Ralf Steinmetz & Klara Nahrstedt - "Multimedia Computing, Communication & Applications", Pearson Education, 2012.

UNIT –I

MULTIMEDIA DEFINITION:

- **Multimedia** is any combination of text, art, sound, animation, and video delivered to you by computer or other electronic or digitally manipulated means.
- Multimedia is, as described **digitally manipulated** text, photographs, graphic art, sound, animation, and video elements. To control what and when the elements are delivered, it is called **interactive multimedia**. Provide a structure of linked elements through which the user can navigate, interactive multimedia becomes **hypermedia**.

CHARACTERISTICS OF MULTIMEDIA:

- Multimedia is any combination of text, graphic art, sound, animation, and video delivered by computer or other electronic means.
- Multimedia production requires creative, technical, organizing, and business ability.
- Multimedia presentations can be nonlinear (interactive) or linear (passive).
- Multimedia can contain structured linking called hypermedia

USE OF MULTIMEDIA:

- Multimedia is appropriate whenever a human user is connected to electronic information of any kind, at the "human interface." Multimedia enhances minimalist, text-only computer interfaces and yields measurable benefit by gaining and holding attention and interest; in short, multimedia improves information retention. When it's properly constructed, multimedia can also be profoundly entertaining as well as useful.

Multimedia in Business:

- Business applications for multimedia include presentations, training, marketing, advertising, product demos, simulations, databases, catalogs, instant messaging, and networked communications.
- Voice mail and video conferencing are provided on many local and wide area networks (LANs and WANs) using distributed networks and Internet protocols.
- Multimedia is enjoying widespread use in training programs. Flight attendants learn to manage international terrorism and security through simulation.
- Drug enforcement agencies of the UN are trained using interactive videos and photographs to recognize likely hiding places on airplanes and ships.
- Medical doctors and veterinarians can practice surgery methods via simulation prior to actual surgery. Mechanics learn to repair engines.
- Salespeople learn about product lines and leave behind software to train their customers.
- As companies and businesses catch on to the power of multimedia, the cost of installing multimedia capability decreases, meaning that more applications can be developed both in-house and by third parties, which allow businesses to run more smoothly and effectively.

Multimedia in Schools:

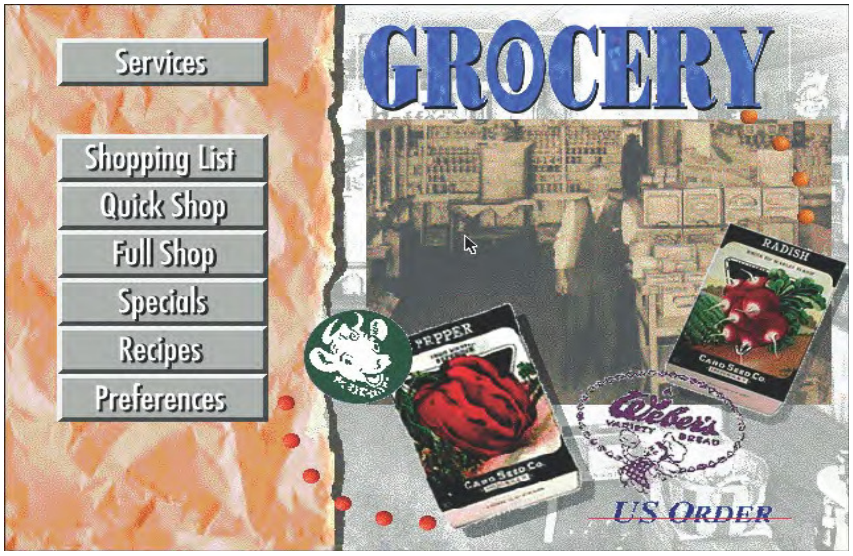
- Multimedia will provoke radical changes in the teaching process during the coming decades, particularly as smart students discover they can go beyond the limits of traditional teaching methods.
- There is, indeed, a move away from the transmission or passive-learner model of learning to the experiential learning or active-learner model.
- In some instances, teachers may become more like guides and mentors, or facilitators of learning, leading students along a learning path, rather than the more traditional role of being the primary providers of information and understanding.
- The students, not teachers, become the core of the teaching and learning process.
- E-learning is a sensitive and highly politicized subject among educators, so educational software is often positioned as "enriching" the learning process, not as a potential substitute for traditional teacher-based methods.
- **ITV** (Interactive TV) is widely used among campuses to join students from different locations into one class with one teacher.
- Remote trucks containing computers, generators, and a satellite dish can be dispatched to areas where people want to learn but have no computers or schools near them.
- In the online version of school, students can enroll at schools all over the world and interact with particular teachers and other students—classes can be accessed at the convenience of the student's lifestyle while the teacher may be relaxing on a beach and communicating via a wireless system.

Multimedia at Home:

- From gardening, cooking, home design, remodeling, and repair to genealogy software, multimedia has entered the home.
- Eventually, most multimedia projects will reach the home via television sets or monitors with built-in interactive user inputs either on old-fashioned color TVs or on new high-definition sets.
- The multimedia viewed on these sets will likely arrive on a pay-for-use basis along the data highway.
- Today, home consumers of multimedia own either a computer with an attached CD-ROM or DVD drive or a set-top player that hooks up to the television, such as a Nintendo Wii, X-box, or Sony PlayStation machine.
- There is increasing **convergence** or melding of computer based multimedia with entertainment and games-based media traditionally described as "shoot-em-up."
- Live Internet pay-for-play gaming with multiple players has also become popular, bringing multimedia to homes on the broadband Internet, often in combination with CD-ROMs or DVDs inserted into the user's machine.
- Microsoft's Internet Gaming Zone and Sony's Station web site boast more than a million registered users each—Microsoft claims to be the most successful, with tens of thousands of people logged on and playing every evening.

Multimedia in Public Places:

- In hotels, train stations, shopping malls, museums, libraries, and grocery stores, multimedia is already available at stand-alone terminals or kiosks, providing information and help for customers.
- Multimedia is piped to wireless devices such as cell phones and PDAs. Such installations reduce demand on traditional information booths and personnel, add value, and are available around the clock, even in the middle of the night, when live help is off duty.
- The way we live is changing as multimedia penetrates our day-to-day experience and our culture. Imagine a friend's bout of maudlin drunk dialing (DD) on a new iPhone, with the camera accidentally enabled.
- Figure shows a menu screen from a supermarket kiosk that provides services ranging from meal planning to coupons.



Kiosks in public places can make everyday life simpler.

- Hotel kiosks list nearby restaurants, maps of the city, airline schedules, and provide guest services such as automated checkout.
- Printers are often attached so that users can walk away with a printed copy of the information. Museum kiosks are not only used to guide patrons through the exhibits, but when installed at each exhibit, provide great added depth, allowing visitors to browse through richly detailed information specific to that display.
- Today, multimedia is found in churches and places of worship as live video with attached song lyrics shown on large screens using elaborate sound systems with special effects lighting and recording facilities.

Virtual Reality:

- At the convergence of technology and creative invention in multimedia is virtual reality, or VR. Goggles, helmets, special gloves, and bizarre human interfaces attempt to place you "inside" a lifelike experience.
- Take a step forward, and the view gets closer; turn your head, and the view rotates. Reach out and grab an object; your hand moves in front of you.
- VR requires terrific computing horsepower to be realistic. In VR, your cyberspace is made up of many thousands of geometric objects plotted in three-dimensional space: the more objects and the more points that describe the objects, the higher the resolution and the more realistic your view.

- As you move about, each motion or action requires the computer to recalculate the position, angle, size, and shape of *all* the objects that make up your view, and many thousands of computations must occur as fast as 30 times per second to seem smooth.
- On the World Wide Web, standards for transmitting virtual reality worlds or scenes in VRML (Virtual Reality Modeling Language) documents (with the filename extension .wrl) have been developed. Intel and software makers such as Adobe have announced support for new 3-D technologies.
- Virtual reality (VR) is an extension of multimedia—and it uses the basic multimedia elements of imagery, sound, and animation.
- Because it requires instrumented feedback from a wired-up person, VR is perhaps interactive multimedia at its fullest extension.

DELIVERING MULTIMEDIA:

- Multimedia requires large amounts of digital memory when stored in an end user's library, or large amounts of **bandwidth** when distributed over wires, glass fiber, or airwaves on a network.
- The greater the bandwidth, the bigger the pipeline, so more content can be delivered to end users quickly.
- Multimedia projects often require a large amount of digital memory; hence they are often stored on CD-ROM or DVDs.
- Multimedia also includes web pages in HTML or DHTML (XML) on the World Wide Web, and can include rich media created by various tools using plug-ins.
- Web sites with rich media require large amounts of bandwidth.
- The promise of multimedia has spawned numerous mergers, expansions, and other ventures.
- These include hardware, software, content, and delivery services.
- The future of multimedia will include high bandwidth access to a wide array of multimedia resources and learning materials.

CD-ROM, DVD, Flash Drives

- **CD-ROM** (compact disc read-only memory) discs can be mass-produced for pennies and can contain up to 80 minutes of full-screen video, images, or sound. The disc can also contain unique unlimited user interaction.
- Virtually all personal computers sold today include at least a CD-ROM player, mixes of images, sounds, text, video, and animations controlled by an authoring system to provide and the software that drives these computers is commonly delivered on a CD-ROM disc.
- Many systems also come with a DVD player combination that can read and burn CD-ROMs as well.
- Multilayered Digital Versatile Disc (**DVD**) technology increases the capacity and multimedia capability of CDs to 4.7GB on a single-sided, single-layered disc to as much as 17.08GB of storage on a double-sided, double-layered disc. CD and DVD **burners** are used for reading discs and for making them, too, in audio, video, and data formats.
- In the very long term, however, CD-ROM and DVD discs are but interim memory technologies that will be replaced by new devices such as flash drives and thumb drives that do not require moving parts.
- As high speed connections become more and more pervasive and users become better connected, copper wire, glass fiber, and radio/cellular technologies may prevail as the most common delivery means for interactive multimedia files, served across the broadband Internet or from dedicated computer farms and storage facilities.

The Broadband Internet

- These days telecommunications networks are global, so when information providers and content owners determine the worth of their products and how to charge money for them, information elements

will ultimately link up online as **distributed resources** on a data highway (actually more like a toll road), where you will pay to acquire and use multimedia-based information.

- Full-text content from books and magazines is downloadable; feature movies are played at home; real-time news feeds from anywhere on earth are available; lectures from participating universities are monitored for education credits; street maps of cities are viewable—with recommendations for restaurants, in any language—and online travelogues include testimonials and video tracks.
- ShowTime's for many major cities, restaurants, vacation trips, and current news items are quickly available on the Web. Interactive multimedia is delivered too many homes throughout the world.
- Multimedia also includes web pages in HTML or DHTML (XML) on the World Wide Web, and can include rich media created by various tools using plug-ins. Web sites with rich media require large amounts of bandwidth. The future of multimedia will include high bandwidth access to a wide array of multimedia resources and learning materials.

TEXT

➔All multimedia content consists of texts in some form. Even a menu text is accompanied by a single action such as mouse click, keystroke or finger pressed in the monitor in case of a touch screen

➔The text in multimedia is used to communicate information to the user. Proper use of text and words in multimedia presentation will help the content developer to communicate the idea and message to the user.

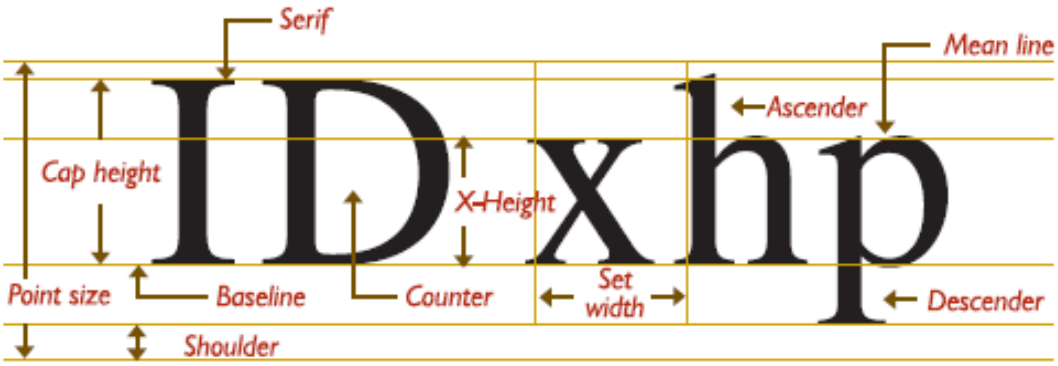
➔Text-keyword using text and symbols is used to communicate with the human.

Text in multimedia

- ✓ Words and symbols in any form, spoken or written, are the most common system of communication. They deliver the most widely understood meaning to the greatest number of people.
- ✓ Most academic related text such as journals, e-magazines are available in the web browser readable form.
- ✓ Since multimedia is usually defined as the integration of sound etc. with text, we start with text.
- ✓ Strictly, speaking, text is created on a computer, so it doesn't really extend a computer system the way audio and video do. But, understanding how text is stored will set the scene for understanding how multimedia is stored.

About Fonts and Faces

- A **typeface** is a family of graphic characters that usually includes many type sizes and styles.
- A **font** is a collection of characters of a single size and style belonging to a particular typeface family.
- Typical font **styles** are boldface and italic. Your computer software may add other style **attributes**, such as underlining and outlining of characters.
- Type sizes are usually expressed in points; one **point** is 0.0138 inch, or about 1/72 of an inch.
- The font's size is the distance from the top of the capital letters to the bottom of the descanters in letters such as *g* and *y*. Helvetica, Times, and Courier are typefaces; Times 12-point italic is a font.
- In the computer world, the term font is commonly used when typeface or face would be more correct.
- A font's size does not exactly describe the height or width of its characters.
- Computer fonts automatically add space below the descended (and sometimes above) to provide appropriate line spacing, or **leading**.



The measurement of type

- With a font editing program like Fontographer from Fontlab, Ltd. at www.fontlab.com, adjustments can also be made along the horizontal axis of text.
- In this program the character metrics of each character and the kerning of character pairs can be altered.
- **Character metrics** are the general measurements applied to individual characters; **kerning** is the spacing between character pairs.
- When working with PostScript, TrueType, and Master font but not bitmapped fonts the metrics of a font can be altered to create interesting effects.
- For example, you can adjust the body width of each character from regular to **condensed** to **expanded**, as displayed in this example using the Sabon font:

Regular
Condensed
Expanded

- Or you can adjust the spacing between characters (**tracking**) and the kerning between pairs of characters:

Tighter Track
Looser Track
Av Av
Kerned Unkerned

- When it converts the letter *A* from a mathematical representation to a recognizable symbol displayed on the screen or in printed output (a process called **rasterizing**), the computer must know how to represent the letter using tiny square **pixels** (picture elements), or dots.
- It does this according to the hardware available and your specification, from a choice of available typefaces and fonts. Search for "free fonts."
- High-resolution monitors and printers can make more attractive-looking and varied characters because there are more fine little squares or **dots per inch (dpi)**.
- And today's broad selection of software fonts makes it easier to find the right typeface and font for your needs.
- The same letter can look very different when you use different fonts and faces:

Cases:

- A capital letter is called **uppercase**, and a small letter is called **lowercase**. In some situations, such as for passwords, a computer is **case sensitive**, meaning that the text's upper- and lowercase letters must match exactly to be recognized.
- But nowadays, in most situations requiring keyboard input, all computers recognize both the upper- and lowercase forms of a character to be the same. In that manner, the computer is said to be **case insensitive**.
- Placing an uppercase letter in the middle of a word, called an **intercap**, is a trend that emerged from the computer programming community, where coders discovered they could better recognize the words they used for variables and commands when the words were lowercase but intercapped.
- Company and product names such as **W**ord**P**erfect, **O**mni Page, **P**hoto Disc, **F**ile**M**aker, and **W**eb Star have become popular

Serif vs. Sans Serif

- Serif versus sans serif is the simplest way to categorize a typeface; the type either has a serif or it doesn't (*sans* is French for "without").
- The serif is the little decoration at the end of a letter stroke. Times, New Century Schoolbook, Bookman, and Palatino are examples of serif fonts.
- Helvetica, Verdana, Arial, Optima, and Avant Garde are sans serif.
- Notice the difference between serif (on the left) and sans serif:

- On the printed page, serif fonts are traditionally used for body text because the serifs are said to help guide the reader's eye along the line of text. Sans serif fonts, on the other hand, are used for headlines and bold statements.
- But the computer world of standard, 72 dpi monitor resolution is not the same as the print world, and it can be argued that sans serif fonts are far more legible and attractive when used in the small sizes of a text field on a screen.
- The Times font at 9-point size may look too busy and actually be difficult and tiring to read. And a large, bold serif font for a title or headline can deliver a message of elegance and character in your graphic layout.

Using Text in Multimedia

- A single item of menu text accompanied by a single action (a mouse click, keystroke, or finger pressed to the monitor) requires little training and is clean and immediate.
- Use text for titles and headlines (what it's all about), for menus (where to go), for navigation (how to get there), and for content (what you see when you get there).

Designing with Text:

- Computer screens provide a very small workspace for developing complex ideas. At some time or another, you will need to deliver high-impact or concise text messages on the computer screen in as condensed a form as possible.
- Too little text on a screen requires annoying page turns and unnecessary mouse clicks and waits; too much text can make the screen seem overcrowded and unpleasant.
- On the other hand, if you are creating presentation slides for public speaking support, the text will be keyed to a live presentation where the text accents the main message.
- In this case, use bulleted points in large fonts and few words with lots of white space. Let the audience focus on the speaker at the podium, rather than spend its time reading fine points and sub points projected on a screen.

Use Appropriate Type Fonts

- Decorative
  - Hard to read
  - Used for emphasis
- Serif
  - Creates illusion of a line and guides the eye across the screen facilitating readability
  - Used on large blocks of text
- San serif
  - Clean, Simple
  - Good for headings
  - Examples of: serif, sans serif, and other fonts

Choosing Text Fonts:

Picking the fonts to use in your multimedia presentation may be somewhat difficult from a design standpoint. Here are a few design suggestions that may help:

- For small type use the most legible font is available. Decorative fonts that cannot be read are useless.
- Using text fonts on the same page is called ransom note typography. In text blocks, adjust the leading for the most pleasing line spacing. Lines too tightly packed are difficult to read.
- Anti aliasing blends the color along the edges of the letters to create a soft transition between the letter and its background.
- Coding an initial cap for a web page is simple. Use HTML3.0's tag's size attributes

  <!--Set to your desired font and size→

  <!—Increase the size of the initial letter→
  T try drop caps
- Use meaningful words or phrases for links and menu items.
- Use of Cascading Style Sheets (CSS), preferred over the deprecated HTML <font> tag, allows you to be quite precise about font faces, sizes, and other attributes
- Vary the size of a font in proportion to the importance of the message you are delivering.
- In large-size headlines, adjust the spacing between letters (kerning) so that the spacing feels right.
- Big gaps between large letters can turn your title into a toothless waif. You may need to kern by hand, using a bitmapped version of your text.
- To make your type stand out or be more legible, explore the effects of different colors and of placing the text on various backgrounds. Try reverse type for a stark, white-on-black message.

- Use anti-aliased text where you want a gentle and blended look for titles and headlines. This can give a more professional appearance. **Anti-aliasing** blends the colors along the edges of the letters (called **dithering**) to create a soft transition between the letter and its background.
- Try drop caps (like the T to the left) and initial caps to accent your words. Most word processors and text editors will let you create drop caps and small caps in your text. Adobe and others make initial caps (such as the one shown to the right from Adobe, called Gothic).
- If you are using centered type in a text block, keep the number of lines and their width to a minimum.
- For attention-grabbing results with single words or short phrases, try graphically altering and distorting your text and delivering the result as an image. Wrap your word onto a sphere, bend it into a wave, or splash it with rainbow colors.
- Experiment with drop shadows. Place a copy of the word on top of the original, and offset the original up and over a few pixels. Then color the original gray (or any other color). The word may become more legible and provide much greater impact.
- With web sites, shadowed text and graphics on a plain white background add depth to a page. Surround headlines with plenty of white space.
- **White space** is a designer's term for roomy blank areas, while programmers call the invisible character made by a space (ASCII 32) or a tab (ASCII 9) white space. Web designers use a nonbreaking space entity ( ) to force spaces into lines of text in HTML documents.
- Pick the fonts that seem right to you for getting your message across, then double-check your choice against other opinions.
- Use meaningful words or phrases for links and menu items.
- Text links on web pages can accent your message: they normally stand out by color and underlining. Use link colors consistently throughout a site.
- Bold or emphasize text to highlight ideas or concepts, but do not make text look like a link or a button when it is not.
- On a web page, put vital text elements and menus in the top 320 pixels.
- The most commonly reported fonts available on Windows computers are Tahoma, Microsoft Sans Serif, Verdana, and Courier New. On Macs expect Helvetica, Lucida Grande, and Courier.

Animating Text:

- There are plenty of ways to retain a viewer's attention when displaying text. For example, you can animate bulleted text and have it "fly" onto the screen. You can "grow" a headline a character at a time.
- For public speakers, simply highlighting the important text works well as a pointing device. When there are several points to be made, you can stack keywords and flash them past the viewer in a timed automated sequence.
- You might fly in some keywords, dissolve others, rotate or spin others, and so forth, until you have a dynamic bulleted list of words that is interesting to watch.
- But be careful—don't overdo the special effects, or they will become boring.
- For simple presentations, PowerPoint has bells and whistles to reveal a line of text one word or one letter at a time, or to animate an entire line.

Symbols and Icons:

- Symbols are concentrated text in the form of stand-alone graphic constructs. Symbols convey meaningful messages.
- The trash can symbol, for instance, tells you where to throw away old files; the hourglass cursor tells you to wait while the computer is processing.
- Symbols such as the familiar trash can and hourglass are more properly called **icons**: these are symbolic representations of objects and processes common to the graphical user interfaces of many computer operating systems.
- Certainly text is more efficient than imagery and pictures for delivering a precise message to users.

- On the other hand, pictures, icons, moving images, and sounds are more easily recalled and remembered by viewers.
- With multimedia, you have the power to blend both text and icons (as well as colors, sounds, images, and motion video) to enhance the overall impact and value of your message.
- Word meanings are shared by millions of people, but the special symbols you design for a multimedia project are not; these symbols must be learned before they can be useful message carriers.
- Some symbols are more widely used and understood than others, but readers of even these common symbols had to grow accustomed to their meanings.

Menus for Navigation:

- An interactive multimedia project or web site typically consists of a body of information, or content, through which a user navigates by pressing a key, clicking a mouse, or pressing a touch screen.
- The simplest menu consists of text lists of topics. Users choose a topic, click it, and go there.
- As multimedia and graphical user interfaces become pervasive in the computer community, certain intuitive actions are being widely learned.

Buttons for Interaction:

- In multimedia, **buttons** are the objects, such as blocks of text, a pretty blue triangle, or a photograph, that make things happen when they are clicked.
- They were invented for the sole purpose of being pushed or prodded with cursor, mouse, key, or finger—and to manifest properties such as highlighting or other visual or sound effects to indicate that you hit the target.
- On the Web, text and graphic art may be buttons.
- The automatic button-making tools supplied with multimedia and HTML page authoring systems are useful.
- You can choose from many styles of buttons and several standard methodologies for highlighting.

COMPUTERS AND TEXT

- The Computers used as WHYIWYG font style. Because each and every computers having lot of fonts to write a text for getting the information. Adope type manager is required to display type 1 postscript fonts at all sizes without jaggies.
- Very early in the development of the Macintosh computer's monitor hardware, Apple chose to use a resolution of 72 pixels per inch. This matches the standard measurement of the printing industry (72 points per inch) and allows desktop publishers and designers to see on the monitor their printed output.
- In addition, Apple made each pixel square-shaped, providing even measurements in all directions. Until the Macintosh was invented, and the VGA video standard set for the PC (at 96 pixels per inch), pixels were typically taller than they were wide.
- The aspect ratio for a pixel on older EGA monitors, for example, is 1.33:1, taller than it is wide. VGA and SVGA monitor resolutions for both Macintosh and Windows display pixels at an aspect ratio of 1:1 (square).

The Font Wars

- In 1985, the desktop publishing revolution was spearheaded by Apple and the Macintosh computer, in combination with word processing and page layout software products that enabled a high-resolution 300 dpi laser printer using special software to "draw" the shapes of characters as a cluster of square pixels computed from the geometry of the character.
- This special software was the **Adobe PostScript** page description and **outline font** language. It was licensed by Apple and included in the firmware of Apple's LaserWriter laser printer.

- PostScript is really a method of describing an image in terms of mathematical constructs (Bézier curves), so it is used not only to describe the individual characters of a font but also to describe entire illustrations and whole pages of text.
- Because each PostScript character is a mathematical formula, it can be easily scaled bigger or smaller so it looks right whether drawn at 24 points or 96 points, whether the printer is a 300 dpi Laser Writer or a high-resolution 1200, 2400, or even 3600 dpi image setter suitable for the finest print jobs.
- And the PostScript characters can be drawn much faster than in the old-fashioned way. Before PostScript, the printing software looked up the character's shape in a bitmap table containing a representation of the pixels of every character in every size.
- PostScript quickly became the de facto industry font and printing standard for desktop publishing and played a significant role in the early success of Apple's Macintosh computer.
- There are two kinds of PostScript fonts: Type 3 and Type 1. Type 3 font technology is *older* than Type 1 and was developed for output to printers; it is rarely used by multimedia developers.
- There are currently over 6,000 different Type 1 typefaces available. Type 1 fonts also contain **hints**, which are special instructions for grid-fitting to help improve resolution.
- Hints can apply to a font in general or to specific characters at a particular resolution
- In 1989, Apple and Microsoft announced a joint effort to develop a "better and faster" quadratic curves outline font methodology, called **TrueType**.
- In addition to printing smooth characters on printers, True- Type would draw characters to a low-resolution (72 dpi or 96 dpi) monitor.
- Furthermore, Apple and Microsoft would no longer need to license the PostScript technology from Adobe for their operating systems. Because TrueType was based on Apple technology, it was licensed to Microsoft.

Character Sets and Alphabets

The ASCII Character Set:

- The **American Standard Code for Information Interchange (ASCII)** is the 7-bit character coding system most commonly used by computer systems in the United States and abroad.
- ASCII assigns a number or value to 128 characters, including both lower- and uppercase letters, punctuation marks, Arabic numbers, and math symbols.
- Knowing that there is a wide selection of characters available to you on your computer and understanding how you can create and use special and custom-made characters will broaden your creative range when you design and build multimedia projects.
- Since 1989, a concerted effort on the part of linguists, engineers, and information professionals from many well-known computer companies has been focused on a 16-bit architecture for multilingual text and character encoding. Called Unicode

The Extended Character Set:

- A byte, which consists of eight bits, is the most commonly used building block for computer processing.
- ASCII uses only seven bits to code its 128 characters; the eighth bit of the byte is unused.
- This extra bit allows another 128 characters to be encoded before the byte is used up, and computer systems today use these extra 128 values for an extended character set.
- The extended character set is most commonly filled with ANSI (American National Standards Institute) standard characters, including often-used symbols, such as ¢ or ∞, and international diacritics or alphabet characters, such as *a* or *n*.
- This fuller set of 255 characters is also known as the ISOLatin- 1 character set; it is used when programming the text of HTML web pages

Unicode:

- As the computer market has become more international, one of the resulting problems has been handling the various international language alphabets.
- It was at best difficult, and at times impossible, to translate the text portions of programs from one script to another.
- Since 1989, a concerted effort on the part of linguists, engineers, and information professionals from many well-known computer companies has been focused on a 16-bit architecture for multilingual text and character encoding called **Unicode**, the original standard accommodated up to about 65,000 characters to include the characters from all known languages and alphabets in the world.
- Where several languages share a set of symbols that have a historically related derivation, the shared symbols of each language are unified into collections of symbols (called **scripts**).
- A single script can work for tens or even hundreds of languages (for example, the Latin script used for English and most European languages). Sometimes, however, only one script will work for a language.

Mapping Text across Platforms

- If you build your multimedia project on a Windows platform and play it back on a Macintosh platform (or vice versa), there will be subtle (and sometimes not-so-subtle) differences.
- Fonts are perhaps the greatest cross platform concern, because they must be mapped to the other machine.
- If a specified font doesn't exist on the target machine, a substitute must be provided that does exist on the target. This is **font substitution**.
- In many cross-platform-savvy applications, you can explicitly define the **font mapping**.
- Following Table shows some typical mappings when crossing platforms.

Mac→Win	Win→Mac
Mac:Chicago→Win:System	Win:Arial→Mac:Helvetica
Mac:Courier→Win:Courier New	Win:Courier→Mac:Courier
Mac:Geneva→Win:MS Sans Serif	Win:Courier New→Mac:Courier
Mac:Helvetica→Win:Arial	Win:MS Serif→Mac:New York
Mac:Monaco→Win:Terminal	Win:MS Sans Serif→Mac:Geneva
Mac:New York→Win:MS Serif	Win:Symbol→Mac:Symbol Map None
Mac:Symbol→Win:Symbol Map None	Win:System→Mac:Chicago
Mac:Times→Win:Times New Roman (sizes: 14→12, 18→14, 24→18, 30→24)	Win:Terminal→Mac:Monaco
Mac:Palatino→Win:Times New Roman	Win:Times New Roman→Mac:Times (sizes: 12→14, 14→18, 18→24, 24→30)

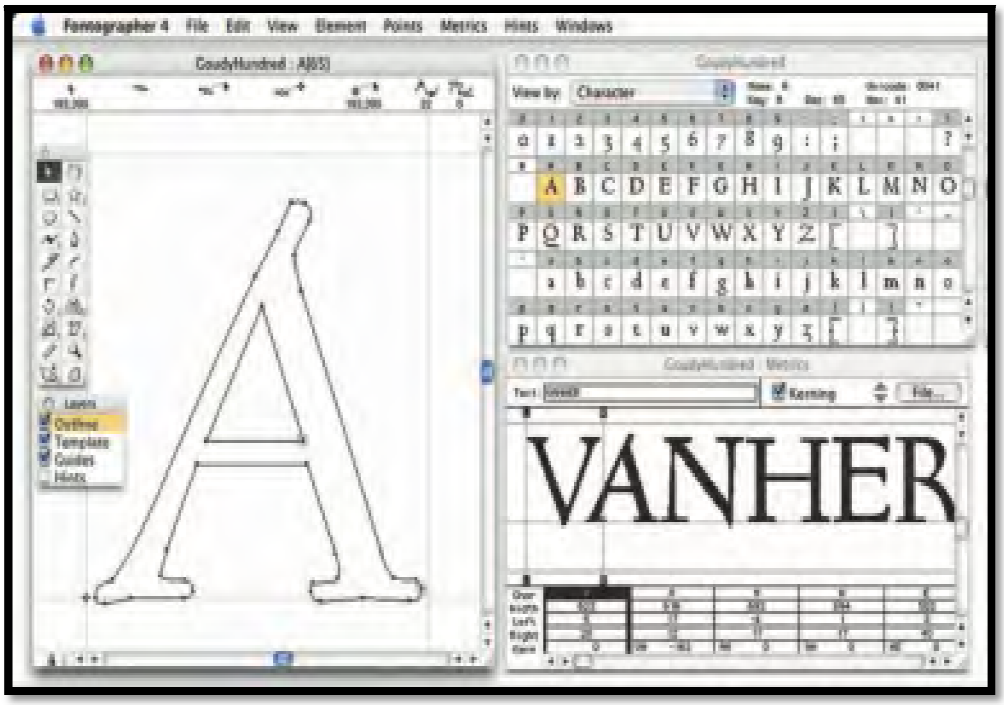
- Translating or designing multimedia (or any computer-based material) into a language other than the one in which it was originally written is called **localization**.
- This process deals with everything from the month/ day/year order for expressing dates to providing special alphabetical characters on keyboards and printers.

FONT EDITING AND DESIGN TOOLS

- Special font editing tools can be used to make your own type, so you can communicate an idea or graphic feeling exactly.
- With these tools, professional typographers create distinct text and display faces. Graphic designers, publishers, and ad agencies can design instant variations of existing typefaces.

Fontlab

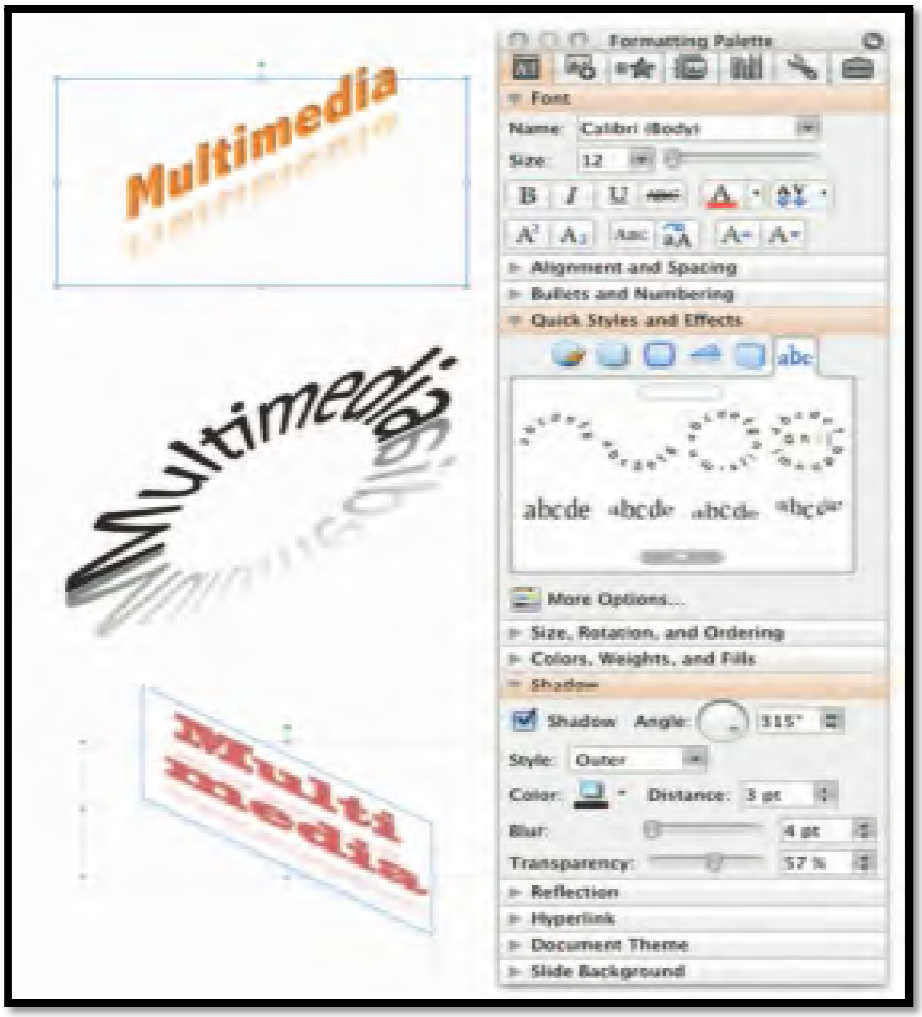
- ✓ In font editors for both Macintosh and Windows platforms you can use this software to develop PostScript, TrueType, and OpenType fonts.
- ✓ Designers can also modify existing typefaces, incorporate PostScript artwork, automatically trace scanned images, and create designs from scratch.
- ✓ This is a freehand drawing tool to create professional and precise inline and outline drawings of calligraphic.



- Fontographer's features include a freehand drawing tool to create professional and precise inline and outline drawings of calligraphic and script characters, using either the mouse or alternative input methods (such as a pressure-sensitive pen system).
- Fontographer allows the creation of multiple font designs from two existing typefaces, and you can design lighter or heavier fonts by modifying the weight of an entire typeface.

Making Pretty Text

- To make your text look pretty, you need a toolbox full of fonts and special graphics applications that can stretch, shade, shadow, color, and anti-alias your words into real artwork.
- Pretty text is typically found in bitmapped drawings where characters have been tweaked, manipulated, and blended into a graphic image.
- Simply choosing the font is the first step. Most designers find it easier to make pretty type starting with ready-made fonts, but some will create their own custom fonts using font editing and design tools.
- With the proper tools and a creative mind, you can create endless variations on plain-old type, and you not only choose but also customize the styles that will fit with your design needs.



- Most image-editing and painting applications (see Figure for a PowerPoint example) let you make text using the fonts available in your system.
- You can colorize the text, stretch, squeeze, and rotate it, and you can filter it through various plug-ins to generate wild graphic results.

HYPERMEDIA AND HYPERTEXT

- Multimedia—the combination of text, graphic, and audio elements into a single collection or presentation—becomes interactive multimedia when you give the user some control over what information is viewed and when it is viewed.
- Interactive multimedia becomes hypermedia when its designer provides a structure of linked elements through which a user can navigate and interact.
- When a hypermedia project includes large amounts of text or symbolic content, this content can be indexed and its elements then linked together to afford rapid electronic retrieval of the associated information.
- When words are keyed or indexed to other words, you have a hypertext system; the "text" part of this term represents the project's content and meaning, rather than the graphical presentation of the text.
- When text is stored in a computer instead of on printed pages, the computer's powerful processing capabilities can be applied to make the text more accessible and meaningful.
- The text can then be called hypertext; because the words, sections, and thoughts are linked, the user can navigate through text in a nonlinear way, quickly and intuitively.

- Using hypertext systems, you can electronically search through all the text of a computer-resident book, locate references to a certain word, and then immediately view the page where the word was found.
- Or you can create complicated Boolean searches (using terms such as AND, OR, NOT, and BOTH) to locate the occurrences of several related words, such as "Elwood," "Gloria," "mortgage," and "happiness," in a paragraph or on a page.
- Whole documents can be linked to other documents. Because hypertext is the organized cross-linking of words not only to other words but also to associated images, video clips, sounds, and other exhibits, hypertext often becomes simply an additional feature within an overall multimedia design.
- The term "hyper" (from the Greek word "over") has come to imply that user interaction is a critical part of the design, whether for text browsing or for the multimedia project as a whole.
- When interaction and cross-linking is then added to multimedia, and the navigation system is nonlinear, multimedia becomes **hypermedia.**

The Power of Hypertext

- The power of search-and-retrieval systems provided by a computer for large volumes of data is immense, but clearly this power must be channeled in meaningful ways.
- Links among words or clusters of information need to be designed so that they make sense.
- Judgments must be made about relationships and the way information content is organized and made available to users.
- The lenses through which vast amounts of data are viewed must necessarily be ground and shaped by those who design the access system.

Using Hypertext

- Special programs for information management and hypertext have been designed to present electronic text, images, and other elements in a database fashion.
- Commercial systems have been used for large and complicated mixtures of text and images.
- Such searchable database engines are widely used on the Web, where **software robots** visit millions of web pages and index entire web sites.
- Hypertext databases rely upon proprietary indexing systems that carefully scan the entire body of text and create very fast cross-referencing indexes that point to the location of specific words, documents, and images.
- Indeed, a hypertext index by itself can be as large as 50 percent to 100 percent the size of the original document.
- Indexes are essential for speedy performance. Google's search engine produces about 1,220,000,000 hits in less than a quarter of a second!
- Simpler but effective hypertext indexing tools are available for both Macintosh and Windows

Searching for Words

Following are typical methods for word searching in hypermedia systems:

- ***Categories:***

Selecting or limiting the documents, pages, or fields of text within which to search for a word or words.

- ***Word relationships:***

Searching for words according to their general proximity and order. For example, you might search for "party" and "beer" only when they occur on the same page or in the same paragraph.

- ***Adjacency:***

Searching for words occurring next to one another, usually in phrases and proper names. For instance, find "widow" only when "black" is the preceding adjacent word.

- ***Alternates*:**

Applying an OR criterion to search for two or more words, such as "bacon" or "eggs."

- ***Association:***

Applying an AND criterion to search for two or more words, such as "skiff," "tender," "dinghy," and "rowboat."

- ***Negation*:**

Applying a NOT criterion to search exclusively for references to a word that are not associated with the word. For example, find all occurrences of "paste" when "library" is not present in the same sentence.

- **T*runcation:***

Searching for a word with any of its possible suffixes. For example, to find all occurrences of "girl" and "girls," you may need to specify something like **girl#**.

Multiple character suffixes can be managed with another specifier, so **geo*** might yield "geo," "geology," and "geometry," as well as "George."

- ***Intermediate words:***

Searching for words that occur between what might normally be adjacent words, such as a middle name or initial in a proper name.

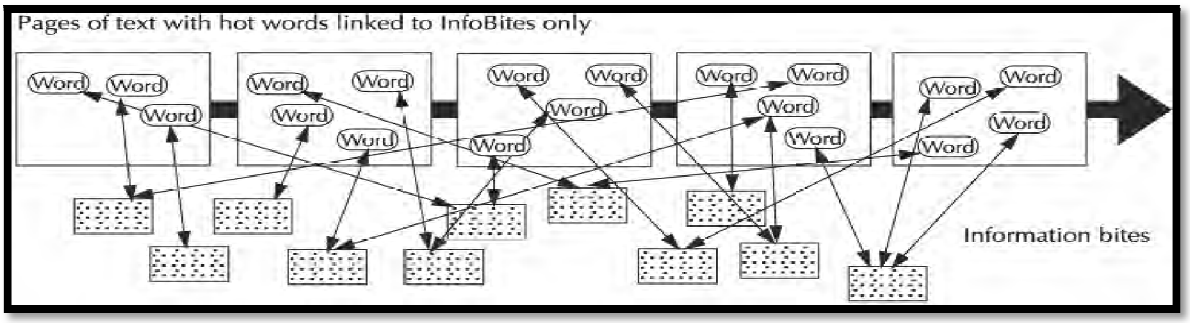
- ***Frequency:***

Searching for words based on how often they appear: the more times a term is mentioned in a document, the more relevant the document is to this term.

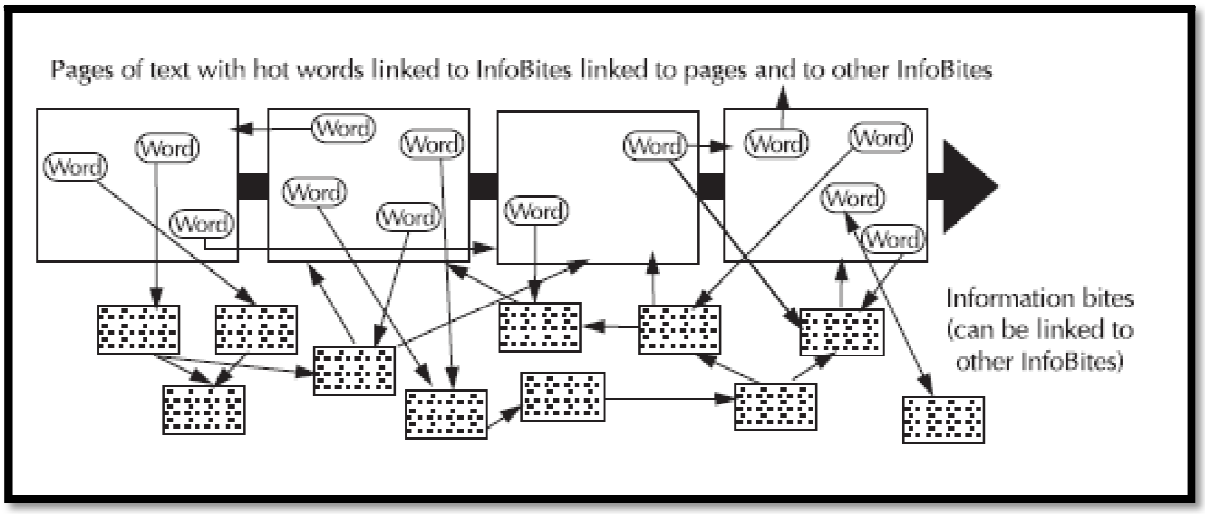
Hypermedia Structures

- Two buzzwords used often in hypertext systems are link and node. **Links** are connections between the conceptual elements, that is, the **nodes**, which may consist of text, graphics, sounds, or related information in the knowledge base.
- Links connect Caesar Augustus with Rome, for example, and grapes with wine, and love with hate.
- The art of hypermedia design lies in the visualization of these nodes and their links so that they make sense and can form the backbone of a knowledge access system.
- Along with the use of HTML for the World Wide Web, the term **anchor** is used for the reference from one document to another document, image, sound, or file on the Web.
- Links are the navigation pathways and menus; nodes are accessible topics, documents, messages, and content elements.

- A **link anchor** is where you come from; a **link end** is the destination node linked to the anchor. Some hypertext systems provide unidirectional navigation and offer no return pathway; others are bidirectional.
- The simplest way to navigate hypermedia structures is via buttons that let you access linked information (text, graphics, and sounds) that is contained at the nodes.
- A typical navigation structure might look like the following:



- A link can lead to a node that provides further links, as shown here:



- The standard document format used for pages on the Web is called **Hypertext Markup Language (HTML).**
- In an HTML document you can specify typefaces, sizes, colors, and other properties by "marking up" the text in the document with tags.
- The remarkable growth of the Web is straining the "old" designs for displaying text on computers.
- **Dynamic HTML** uses Cascading Style Sheets (CSS) to define choices ranging from line height to margin width to font face. HTML character entities are represented either by a number or by a word and always prefixed by an ampersand (escape) and followed by a semicolon.

Hypertext Tools

- Two functions are common to most hypermedia text management systems, and they are often provided as separate applications: building (or authoring) and reading.
- The builder creates the links, identifies nodes, and generates the all-important index of words.
- The index methodology and the search algorithms used to find and group words according to user search criteria are typically proprietary, and they represent an area where computers are carefully optimized for performance—finding search words among a list of many tens of thousands of words requires speed-demon programming.
- Hypertext systems are currently used for electronic publishing and reference works, technical documentation, educational courseware, interactive kiosks, electronic catalogs, interactive fiction, and text and image databases.
- Today these tools are used extensively with information organized in a linear fashion.

UNIT –I COMPLETED

UNIT I

2 Marks

1. Define Multimedia?
2. What is interactive multimedia?
3. What is hypermedia?
4. List out the characteristic of multimedia?
5. Write about virtual reality?
6. Expand CDROM and give its use.

5 Marks

1. Write about delivering multimedia?
2. Give away the uses of ASCII Character sets.
3. Explain about Fontlab?
4. Write about the power of hypertext?
5. Explain about character sets and alphabets?

10 Marks

1. Discuss about the use of multimedia?
2. Explain in detail about font and faces?
3. How will you use text in multimedia?
4. Write about font editing and design tools?
5. Write short notes on Hypermedia structures.
6. Explain about hypermedia and hypertext?

UNIT II

IMAGES

✓ An image is a rectangular grid of pixels. It has a definite height and a definite width counted in pixels is square and has a fixed size on a given display. However different computer monitors may use different sized pixels.

Plan Approach

- Work out your graphic approach, either in your head or during creative sessions with your client or colleagues.
- To get a handle on any multimedia project, you start with pencil, eraser, and paper.
- Outline your project and your graphic ideas first: make a flowchart; storyboard the project using stick figures; use three-by-five index cards and shuffle them until you get it right

Organize Tools

- Most authoring systems provide the tools with which you can create the graphic objects of multimedia (text, interactive buttons, vector-drawn objects, and bitmaps) directly on your screen.
- If one of these tools is not included, the authoring system usually offers a mechanism for importing the object you need from another application.
- When you are working with animated objects or motion video, most authoring systems include a feature for activating these elements, such as a programming language or special functions for embedding them. Likely, too, your tools will offer a library of special effects—including zooms, wipes, and dissolves.
- Many multimedia designers do not limit their toolkits to the features of a single authoring platform, but employ a variety of applications and tools to accomplish many specialized tasks.

Configure Computer Workspace

- When developing multimedia, it is helpful to have more than one monitor to provide lots of screen real estate (viewing area).
- In this way, you can display the full-screen working area of your project or presentation and still have space to put your tools and other menus.
- This is particularly important in an authoring system such as Flash or Director, where the edits and changes you make in one window are immediately visible in the presentation window.
- During development there is a lot of cutting and pasting among windows and among various applications, and with an extra monitor, you can open many windows at once and spread them out.
- Both Macintosh and Windows operating systems support this extra hardware.

Making Still Images

- Still images may be small or large, or even full screen.
- They may be colored, placed at random on the screen, evenly geometric, or oddly shaped.
- Still images are generated by the computer in two ways: as bitmaps (or paint graphics) and as vector-drawn (or just plain "drawn") graphics.
- Bitmaps may also be called "raster" images. Likewise, bitmap editors are sometimes called "painting" programs. And vector editors are sometimes called "drawing" programs.
- Bitmaps are used for photo-realistic images and for complex drawings requiring fine detail.

- Vector-drawn objects are used for lines, boxes, circles, polygons, and other graphic shapes that can be mathematically expressed in angles, coordinates, and distances.
- A drawn object can be filled with color and patterns, and you can select it as a single object.
- The appearance of both types of images depends on the display resolution and capabilities of your computer's graphics hardware and monitor.
- Both types of images are stored in various file formats and can be translated from one application to another or from one computer platform to another.
- Typically, image files are compressed to save memory and disk space; many bitmap image file formats already use compression within the file itself—for example, GIF, JPEG, and PNG.
- Still images may be the most important element of your multimedia project or web site.

Bitmaps

- A bit is the simplest element in the digital world, an electronic digit that is either on or off, black or white, or true (1) or false (0).
- This is referred to as binary, since only two states (on or off) are available. A map is a two dimensional matrix of these bits.
- A bitmap, then, is a simple matrix of the tiny dots that form an image and are displayed on a computer screen or printed.
- A one-dimensional matrix (1-bit depth) is used to display monochrome images—a bitmap where each bit is most commonly set to black or white.
- Depending upon your software, any two colors that represent the on and off (1 or 0) states may be used.
- More information is required to describe shades of gray or the more than 16 million colors that each picture element might have in a color image.
- These picture elements (known as pels or, more commonly, pixels) can be either on or off, as in the 1-bit bitmap, or, by using more bits to describe them, can represent varying shades of color (4 bits for 16 colors; 8 bits for 256 colors; 15 bits for 32,768 colors; 16 bits for 65,536 colors; 24 bits for 16,772,216 colors).

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

Bitmap Sources

Bitmaps can be made from the following:

- Make a bitmap from scratch with paint or drawing program.
- Grab a bitmap from an active computer screen with a screen capture program, and then paste it into a paint program or your application.
- Capture a bitmap from a photo or other artwork using a scanner to digitize the image.
- Once made, a bitmap can be copied, altered, e-mailed, and otherwise used in many creative ways.

Bitmap Software

- The abilities and features of painting and image-editing programs range from simple to complex.
- The best programs are available in versions that work the same on both Windows and Mac platforms, and the graphics files you make can be saved in many formats, readable across platforms.
- Macintosh computers do not ship with a painting tool, and Windows provides only a rudimentary Paint program, so you will need to acquire this very important software separately.
- Many multimedia authoring tools offer built-in bitmap editing features. Director, for example, includes a powerful image editor that provides advanced tools such as "onion-skinning" and image filtering using common plug-ins.
- Adobe's Photoshop, however, remains the most widely used image-editing tool among designers worldwide;
- Many designers also use a vector-based drawing program such as Adobe's Illustrator, CorelDraw, or InDesign to create curvy and complicated looks that they then convert to a bitmap.
- You can use your image editing software to create original images, such as cartoons, symbols, buttons, bitmapped text

Capturing and Editing Images:

- The image you see on your monitor is a digital bitmap stored in video memory, updated about every 1/60 of a second.
- As you assemble images for your multimedia project, you may often need to capture and store an image directly from your screen.
- The simplest way to capture what you see on the screen at any given moment is to press the proper keys on your computer keyboard.
- This causes a conversion from the screen buffer to a format that you can use. Both the Macintosh and Windows environments have a **clipboard** an area of memory where data such as text and images is temporarily stored when you cut or copy them within an application.
- In Windows, when you press print screen, a copy of your screen's image goes to the clipboard. From the clipboard, you can then paste the captured bitmap into an application (such as Paint, which comes with Windows).
- On the Macintosh, the keystroke combination command-shift-3 creates a readable PNG-format file named Picture and places it on your desktop.
- You can then import this file's image into your multimedia authoring system or paint program.
- You can also press command control- shift-4 to drag a rectangle on your screen and capture what is inside the rectangle onto the clipboard, ready for pasting.

- In addition to letting you enhance and make composite images, image-editing tools allow you to alter and distort images.
- A color photograph of a red rose can be changed into a purple rose, or blue if you prefer.

- **Morphing** is another effect that can be used to manipulate still images or to create interesting and often bizarre animated transformations.
- Morphing (see Figure) allows you to smoothly blend two images so that one image seems to melt into the next, often producing some amusing results

Vector Drawing

Most multimedia authoring systems provide for use of vector-drawn objects such as lines, rectangles, ovals, polygons, complex drawings created from those objects, and text.

- Computer-aided design (CAD) programs have traditionally used vector-drawn object systems for creating the highly complex and geometric renderings needed by architects and engineers.
- Graphic artists designing for print media use vector-drawn objects because the same mathematics that put a rectangle on your screen can also place that rectangle on paper.
- This requires the higher resolution of the printer, using a page description format such as Portable Document Format (PDF).
- Programs for 3-D animation also use vector-drawn graphics. For example, the various changes of position, rotation, and shading of light required to spin an extruded corporate logo must be calculated mathematically.

How Vector Drawing Works

- A **vector** is a line that is described by the location of its two endpoints.
- Vector drawing uses **Cartesian coordinates** where a pair of numbers describes a point in two-dimensional space as the intersection of horizontal and vertical lines (the x and y axes).
- The numbers are always listed in the order x, y. In three-dimensional space, a third dimension—depth— is described by a z axis (x,y,z).
- So a **line** might be simply

  <line x1="0" y1="0" x2="200" y2="100">

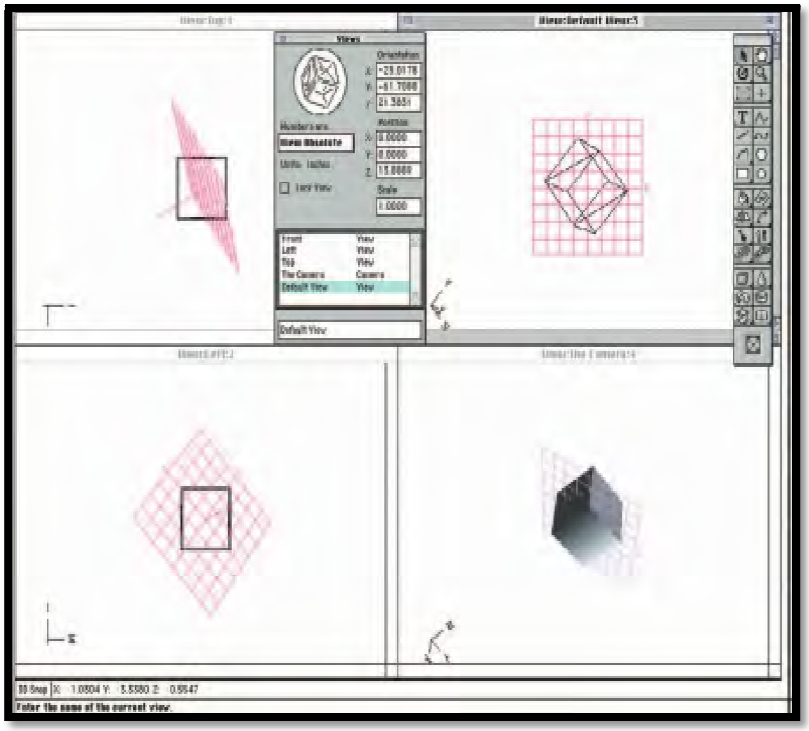
  Where x1 and y1 define the starting point (in the upper-left corner of the viewing box) and x2 and y2 define the end point.
- A simple rectangle is computed from starting point and size: your software will draw a rectangle (rect) starting at the upper-left corner of your viewing area (0,0) and going 200 pixels horizontally to the right and 100 pixels downward to mark the opposite corner.

- Add color information like and your software will draw the rectangle with a red boundary line and fill it with the color white.
- Difference between the bitmap image and vector image:

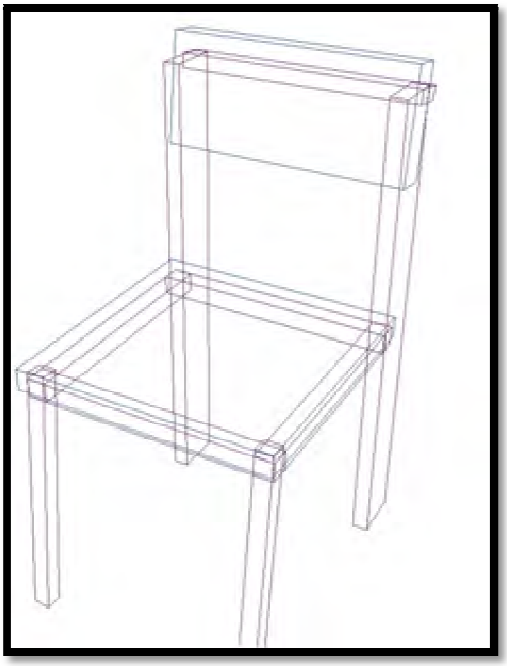
Bitmap	Vector
Bitmaps are an image type most appropriate for photo realistic images and complex drawing requiring	Vector images are most appropriate for lines, boxes, circle, polygons and other graphic shapes that can be mathematically expressed in angles, coordinates and distances.
Limitations of bitmapped images include large files sizes and the inability to scale or resize the image easily while maintaining quality	Vector object can be filled with color and patterns
Bit map is a simple information matrix describing the individual dots of an image called pixel	Vector drawn objects use a fraction of the memory space required to describe and store the same object in bitmap form
Manipulate and adjust many of its properties and cut and paste among many bitmaps using specialized image editing or darkroom program.	Converting bitmaps to vector drawn objects is difficult, auto tracing programs can compute the bounds of shapes and colors in bitmapped images and then derive the polygon object. Vector cannot be used for photo realistic images.

3-D Drawing and Rendering

- Drawing in perspective or in 3-D on a two-dimensional surface takes special skill and talent.
- Creating objects in three dimensions on a computer screen can be difficult for designers comfortable with squares, circles, and other x (width) and y (height) geometries on a two-dimensional screen.
- Flat and colorless 2-D screens are no longer sufficient for a successful commercial multimedia project.
- 3-D-rendered graphic art and animation has become commonplace since the late 1980s, providing more lifelike substance and feel to projects.
- Today many products—including Daz3D (www.daz3d.com) and form•Z (www.formz.com)—are touted as essential tools for illustration, animation, and multimedia production.
- For 3-D, the depth (**z dimension**) of cubes and spheres must be calculated and displayed so that the perspective of the rendered object seems correct to the eye.
- As illustrated in Figure, most 3-D software packages provide adjustable views so that you can see your work from the top, bottom, or sides.



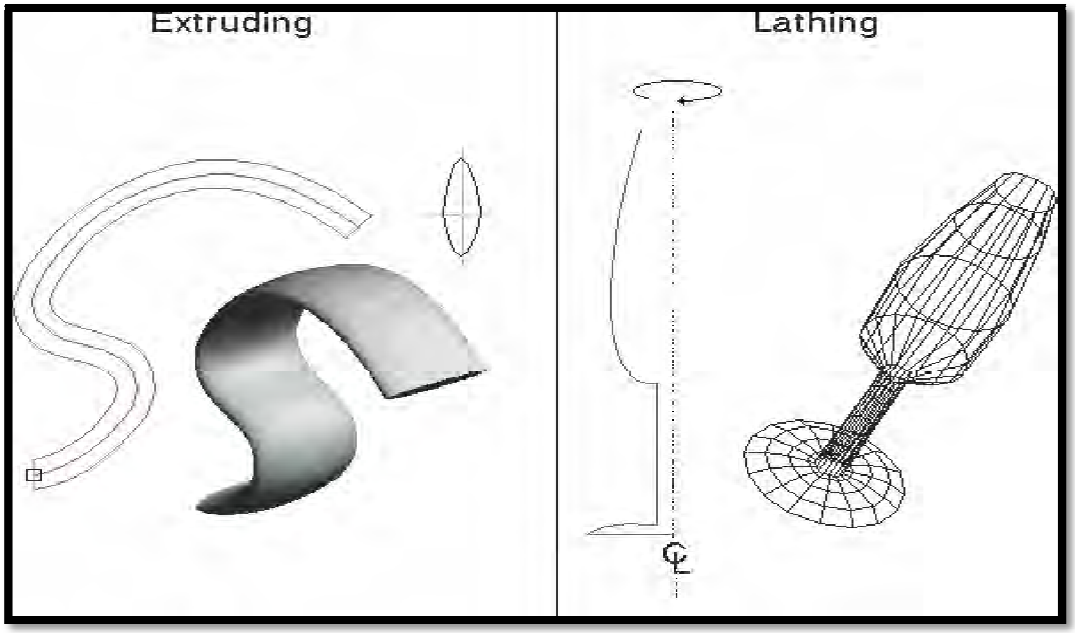
3-D applications provide x, y, and z axes and adjustable perspective views.



Chair modeled in 3-D is made up of various blocks and rectangles.

- A great deal of information is needed to display a 3-D scene. **Scenes** consist of **objects** that in turn contain many small elements such as blocks, cylinders, spheres, or cones (described using mathematical constructs or formulas).
- The more elements contained in an object, the more complicated its structure will be and, usually, the finer its resolution and smoothness.
- Objects and elements in 3-D space carry with them **properties** such as shape, color, texture, shading, and location.
- A scene contains many different objects. Imagine a scene with a table, chairs, and a background. Zoom into one of the objects—the chair, for example, in Figure.

- It has 11 objects made up of various blocks and rectangles. Objects are created by **modeling** them using a 3-D application**.**
- To model an object that you want to place into your scene, you must start with a **shape**.
- You can create a shape from scratch, or you can import a previously made shape from a library of geometric shapes called **primitives**, typically blocks, cylinders, spheres, and cones.
- In most 3-D applications, you can create any 2-D shape with a drawing tool or place the outline of a letter, then extrude or lathe it into the third dimension along the z axis
- When you **extrude** a plane surface, its shape extends some distance, either perpendicular to the shape's outline or along a defined path.
- When you **lathe** a shape, a profile of the shape is **rotated** around a defined axis (you can set the direction) to create the 3-D object.
- Other methods for creating 3-D objects differ among the various software packages.



- Once you have created a 3-D object, you can apply textures and colors to it to make it seem more realistic

COLOR

- Color is a vital component of multimedia.
- A color may be expressed in known physical values (humans, for example, perceive colors with wavelengths ranging from 400 to 600 nanometers on the electromagnetic spectrum), and several methods and models describe color space using mathematics and values

Natural Light and Color

- Light comes from an atom when an electron passes from a higher to a lower energy level; thus each atom produces uniquely specific colors.
- This explanation of light, known as the **quantum theory.**
- Infrared light is radiated heat. Ultraviolet light, on the other hand, is beyond the higher end of the visible spectrum and can be damaging to humans.
- The color white is a noisy mixture of all the color frequencies in the visible spectrum.
- Sunlight and fluorescent tubes produce white light (though, technically, even they vary in color temperature—sunlight is affected by the angle at which the light is coming through the atmosphere, and fluorescent tubes provide spikes in the blue-green parts of the color spectrum); tungsten lamp

filaments produce light with a yellowish cast; sodium vapor lamps, typically used for low-cost outdoor street lighting, produce an orange light characteristic of the sodium atom.

- These are the most common sources of light in the everyday (or every night) world.
- The light these sources produce typically reaches your eye as a reflection of that light into the lens of your eye.
- The eye can differentiate among about 80,000 colors, or **hues**, consisting of Combinations of red, green, and blue.

Computerized Color

- Although the eye perceives colors based upon red, green, and blue, there are actually two basic methods of making color: additive and subtractive.

Additive Color

- In the **additive color** method, a color is created by combining colored light sources in three primary colors: red, green, and blue (**RGB**).
- This is the process used for cathode ray tube (CRT), liquid crystal (LCD), and plasma displays.

Subtractive Color

- In the subtractive color method, color is created by combining colored media such as paints or ink that absorb (or subtract) some parts of the color spectrum of light and reflect the others back to the eye.
- Subtractive color is the process used to create color in printing.
- The printed page is made up of tiny halftone dots of three primary colors: cyan, magenta, and yellow (designated as CMY). Four-color printing includes black (which is technically not a color but, rather, the absence of color).
- Since the letter B is already used for blue, black is designated with a K (so four-color printing is designated as CMYK).
- The color remaining in the reflected part of the light that reaches your eye from the printed page is the color you perceive.
- The following chart shows the three primary additive colors and how, when one of the primary colors is subtracted from this RGB mix, the subtractive primary color is perceived.
- A zero indicates a lack of that primary color, while 255 is the maximum amount of that color.

RGB Combination (R,G,B)	Perceived Color
Red only (255,0,0)	Red
Green only (0,255,0)	Green
Blue only (0,0,255)	Blue
Red and green (blue subtracted) (255,255,0)	Yellow
Red and blue (green subtracted) (255,0,255)	Magenta
Green and blue (red subtracted) (0,255,255)	Cyan
Red, green, and blue (255,255,255)	White
None (0,0,0)	Black

Computer Color Models

- Models or methodologies used to specify colors in computer terms are RGB, HSB, HSL, CMYK, CIE, and others.
- Using the 24-bit RGB (red, green, blue) model, you specify a color by setting each amount of red, green, and blue to a value in a range of 256 choices, from 0 to 255. Eight bits of memory are required to define those 256 possible choices, and that has to be done for each of the three primary colors; a total of 24 bits of memory (8 + 8 + 8 = 24) are therefore needed to describe the exact color, which is one of "millions" (256 × 256 × 256 = 16,777,216).
- When web browsers were first developed, the software engineers chose to represent the color amounts for each color channel in a hexadecimal pair.
- Rather than using one number between 0 and 255, two hexadecimal numbers, written in a scale of 16 numbers and letters in the range "0123456789ABCDEF" represent the required 8 bits (16 × 16 = 256) needed to specify the intensity of red, green, and blue.
- Thus, in HTML, you can specify pure green as #00FF00, where there is no red (first pair is #00), there is maximum green (second pair is #FF), and there is no blue (last pair is #00).
- The number sign (#) specifies the value as hexadecimal.

Red	Green	Blue	Color
255 (#FF)	255 (#FF)	255 (#FF)	White (#FFFFFF)
255 (#FF)	255 (#FF)	0 (#00)	Yellow (#FFFF00)
255 (#FF)	0 (#00)	255 (#FF)	Magenta (#FF00FF)
0 (#00)	255 (#FF)	255 (#FF)	Cyan (#00FFFF)
255 (#FF)	0 (#00)	0 (#00)	Red (#FF0000)
0 (#00)	255 (#FF)	0 (#00)	Green (#00FF00)
0 (#00)	0 (#00)	255 (#FF)	Blue (#0000FF)
0 (#00)	0 (#00)	0 (#00)	Black (#000000)

- In the HSB (hue, saturation, brightness) and HSL (hue, saturation, lightness) models, you specify hue or color as an angle from 0 to 360 degrees on a color wheel, and saturation, brightness, and lightness as percentages.
- Saturation is the intensity of a color. At 100 percent saturation a color is pure; at 0 percent saturation, the color is white, black, or gray.
- Lightness or brightness is the percentage of black or white that is mixed with a color. A lightness of 100 percent will yield a white color; 0 percent is black; the pure color has 50 percent lightness.
- The CMYK color model is less applicable to multimedia production. It is used primarily in the printing trade where cyan, magenta, yellow, and black are used to print process color separations.

Color	Degrees
Red	0°
Yellow	60°
Green	120°
Cyan	180°
Blue	240°
Magenta	300°

- YIQ and YUV were developed for broadcast TV (composite NTSC).
- They are based on luminance and chrominance expressed as the amplitude of a wave and the phase of the wave relative to some reference.

Color Palettes

Palettes are mathematical tables that define the color of a pixel displayed on the screen. The most common palettes are 1, 4, 8, 16, and 24 bits deep:

Color Depth	Colors Available
1-bit	Black and white (or any two colors)
4-bit	16 colors
8-bit	256 colors (good enough for color images)
16-bit	Thousands of colors (65,536; excellent for color images)
24-bit	More than 16 million colors (16,777,216; totally photo-realistic)

- When color monitors became available for computers, managing the computations for displaying colors severely taxed the hardware and memory available at the time. 256-color, 8-bit images using a color lookup table or palette were the best a computer could do.
- 256 default system colors were statistically selected by Apple and Microsoft engineers (working independently) to be the colors and shades that are most "popular" in photographic images; their two system palettes are, of course, different.

Dithering

- If you start out with a 24-bit scanned image that contains millions of colors and need to reduce it to an 8-bit, 256-color image, you get the best replication of the original image by dithering the colors in the image.
- **Dithering** is a process whereby the color value of each pixel is changed to the closest matching color value in the target palette, using a mathematical algorithm.
- Often the adjacent pixels are also examined, and patterns of different colors are created in the more limited palette to best represent the original colors.
- Since there are now only 256 colors available to represent the thousands or even millions of colors in the original image, pixels using the 256 remaining colors are intermixed and the eye perceives a color not in the palette, created by blending the colors mixed together.

- Dithering software is usually built into image-editing programs and is also available in many multimedia authoring systems as part of the application's palette management suite of tools

IMAGE FILE FORMATS

- Most applications on any operating system can manage JPEG, GIF, PNG, and TIFF image formats.
- An older format used on the Macintosh, **PICT**, is a complicated but versatile format developed by Apple where both bitmaps and vector-drawn objects can live side by side.
- The **device-independent bitmap (DIB)**, also known as a **BMP**, is a common Windows palette–based image file format similar to PNG.
- **PCX** files were originally developed for use in Z-Soft MS-DOS paint packages; these files can be opened and saved by almost all MS-DOS paint software and desktop publishing software.
- **TIFF**, or Tagged Interchange File Format, was designed to be a universal bitmapped image format and is also used extensively in desktop publishing packages.
- Often, applications use a proprietary file format to store their images. Adobe creates a PSD file for Photoshop and an AI file for Illustrator; Corel creates a CDR file.
- **DXF** was developed by Autodesk as an ASCII-based drawing interchange file for AutoCAD, but the format is used today by many computer-aided design applications.
- **IGS** (or **IGES**, for **Initial Graphics Exchange Standard**) was developed by an industry committee as a broader standard for transferring CAD drawings.
- These formats are also used in 3-D rendering and animation programs. JPEG, PNG, and GIF images are the most common bitmap formats used on the Web and may be considered cross-platform, as all browsers will display them.
- Adobe's popular PDF (Portable Document File) file manages both bitmaps and drawn art (as well as text and other multimedia content), and is commonly used to deliver a "finished product" that contains multiple assets.

SOUND

- Sound is produced by the vibration of matter. During the vibration, pressure variations are created in the air surrounding it. The pattern of the oscillation is called a waveform

The Power of Sound:

- Sound pressure levels (loudness or volume) are measured in **decibels (dB)**

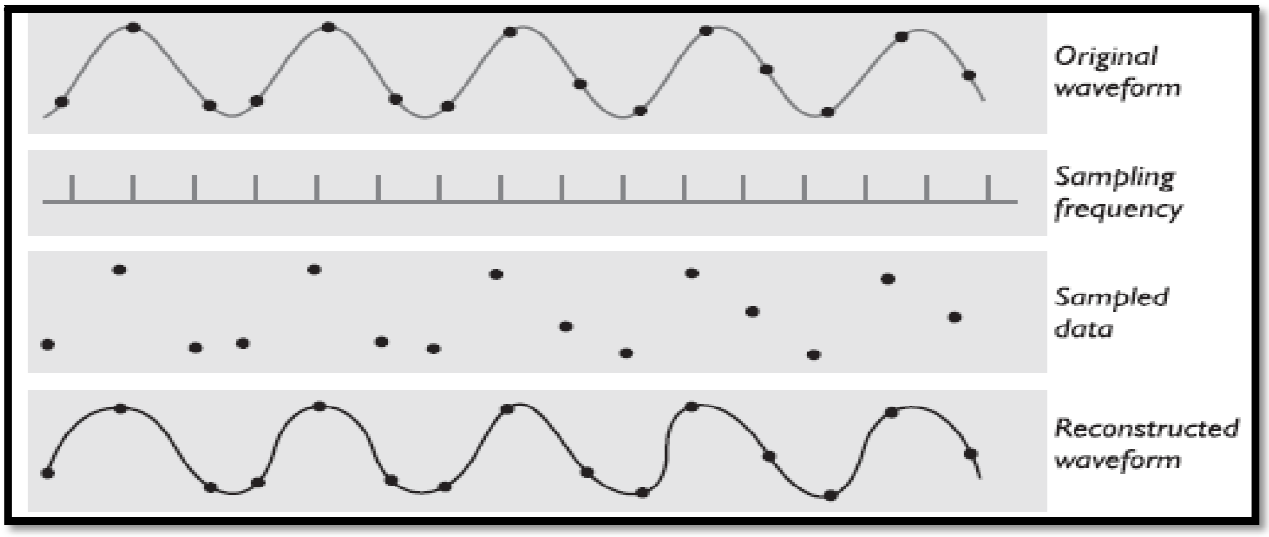
Infra-sound	from 0 to 20 Hz
Human hearing frequency range	from 20 Hz to 20 kHz
Ultrasound	from 20 kHz to 1 GHz
Hyper sound	from 1 GHz to 10 THz

- Multimedia systems typically make use of sound only within the frequency range of human hearing.
- Human hearing is less able to identify the location from which lower frequencies are generated.

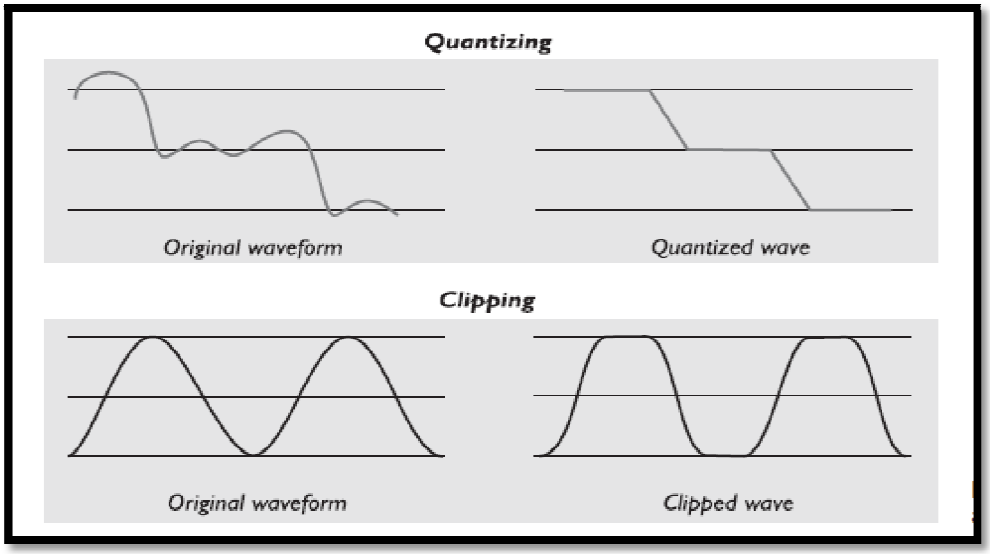
- In surround sound systems, subwoofers can be placed wherever their energy is most efficiently radiated (often in a corner), but midrange speakers should be carefully placed

Digital Audio:

- **Digital audio** is created when you represent the characteristics of a sound wave using numbers—a process referred to as digitizing.
- You can digitize sound from a microphone, a synthesizer, existing recordings, live radio and television broadcasts, and popular CD and DVDs.
- Digitized sound is sampled sound. Every *n*th fraction of a second, a **sample** of sound is taken and stored as digital information in bits and bytes.
- The quality of this digital recording depends upon how often the samples are taken (**sampling rate** or frequency, measured in kilohertz, or thousands of samples per second) and how many numbers are used to represent the value of each sample (**bit depth**, **sample size**, resolution, or dynamic range).
- The more often you take a sample and the more data you store about that sample, the finer the resolution and quality of the captured sound when it is played back.
- Since the quality of your audio is based on the quality of your recording and not the device on which your end user will play the audio, digital audio is said to be **device independent**.
- The three sampling rates most often used in multimedia are 44.1 kHz (**CD-quality**), 22.05 kHz, and 11.025 kHz. Sample sizes are either 8 bits or 16 bits.
- The larger the sample size, the more accurately the data will describe the recorded sound.

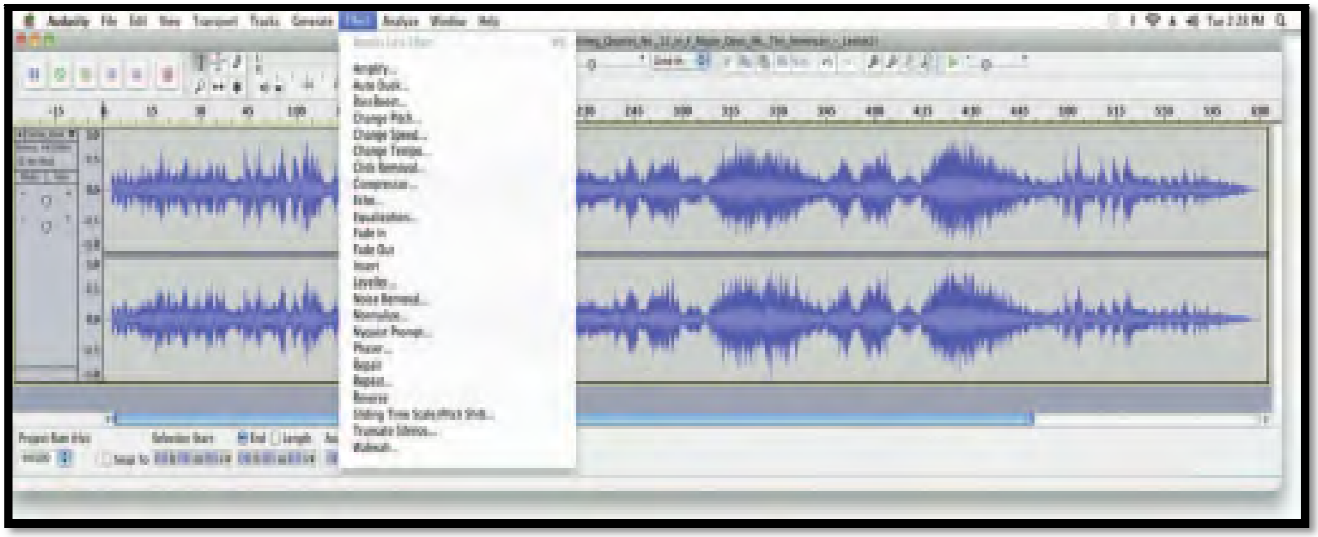


- The value of each sample is rounded off to the nearest integer (**quantization**), and if the amplitude is greater than the intervals available, clipping of the top and bottom of the wave occurs.
- Quantization can produce an unwanted background hissing noise, and clipping may severely distort the sound.



Making Digital Audio Files

- Making digital audio files is fairly straightforward on most computers. Plug a microphone into the microphone jack of your computer.
- If you want to digitize archived analog source materials—music or sound effects that you have saved on videotape, for example—simply plug the "Line-Out" or "Headphone" jack of the device into the "Line-In" jack on your computer.
- Then use audio digitizing software such as **Audacity,** to do the work.



Audacity is an open-source, cross-platform editing tool for digitizing sound

Focus on two crucial aspects of preparing digital audio files:

- Balancing the need for sound quality against file size. Higher quality usually means larger files, requiring longer download times on the Internet and more storage space on a CD or DVD Setting proper recording to get a good clean recording.

Basic Sound Editing Operations

The basic sound editing operations that most multimedia producers need are described in the paragraphs that follow.

Trimming:

- Removing "dead air" or blank space from the front of a recording and any unnecessary extra time off the end is your first sound editing task.
- Trimming even a few seconds here and there might make a big difference in your file size.
- Trimming is typically accomplished by dragging the mouse cursor over a graphic representation of your recording and choosing a menu command such as Cut, Clear, Erase, or Silence.

Splicing and Assembly:

- Using the same tools mentioned for trimming, you will probably want to remove the extraneous noises that inevitably creep into a recording.
- Even the most controlled studio voice-overs require touch-up.
- Also, you may need to assemble longer recordings by cutting and pasting together many shorter ones.
- In the old days, this was done by splicing and assembling actual pieces of magnetic tape.

Volume Adjustments:

- If you are trying to assemble ten different recordings into a single sound track, there is little chance that all the segments will have the same volume.
- To provide a consistent volume level, select all the data in the file, and raise or lower the overall volume by a certain amount.
- It is best to use a sound editor to **normalize** the assembled audio file to a particular level, say 80 percent to 90 percent of maximum (without clipping), or about –16 dB.

Format Conversion:

- In some cases, your digital audio editing software might read a format different from that read by your presentation or authoring program.
- Most sound editing software will save files in your choice of many formats, most of which can be read and imported by multimedia authoring systems.
- Data may be lost when converting formats.

Resampling or Down sampling:

- If you have recorded and edited your sounds at 16-bit sampling rates but are using lower rates and resolutions in your project, you must **resample** or **down sample** the file.
- Your software will examine the existing digital recording and work through it to reduce the number of samples. This process may save considerable disk space.

Fade-ins and Fade-outs:

- Most programs offer enveloping capability, useful for long sections that you wish to fade in or fade out gradually.
- This enveloping helps to smooth out the very beginning and the very end of a sound file.

Equalization:

- Some programs offer **digital equalization (EQ)** capabilities that allow you to modify a recording's frequency content so that it sounds brighter (more high frequencies) or darker (low, ominous rumbles).

Time Stretching:

- Advanced programs let you alter the length (in time) of a sound file without changing its pitch.
- This feature can be very useful, but watch out: most **time-stretching** algorithms will severely degrade the audio quality of the file if the length is altered more than a few percent in either direction.

Digital Signal Processing (DSP):

- Some programs allow you to process the signal with reverberation, multitap delay, chorus, flange, and other special effects using **digital signal processing (DSP)** routines.
- Being able to process a sound source with effects can greatly add to a project. To create an environment by placing the sound inside a room, a hall, or even a cathedral can bring depth and dimension to a project. But a little can go a long way—do not overdo the sound effects!

Reversing Sounds:

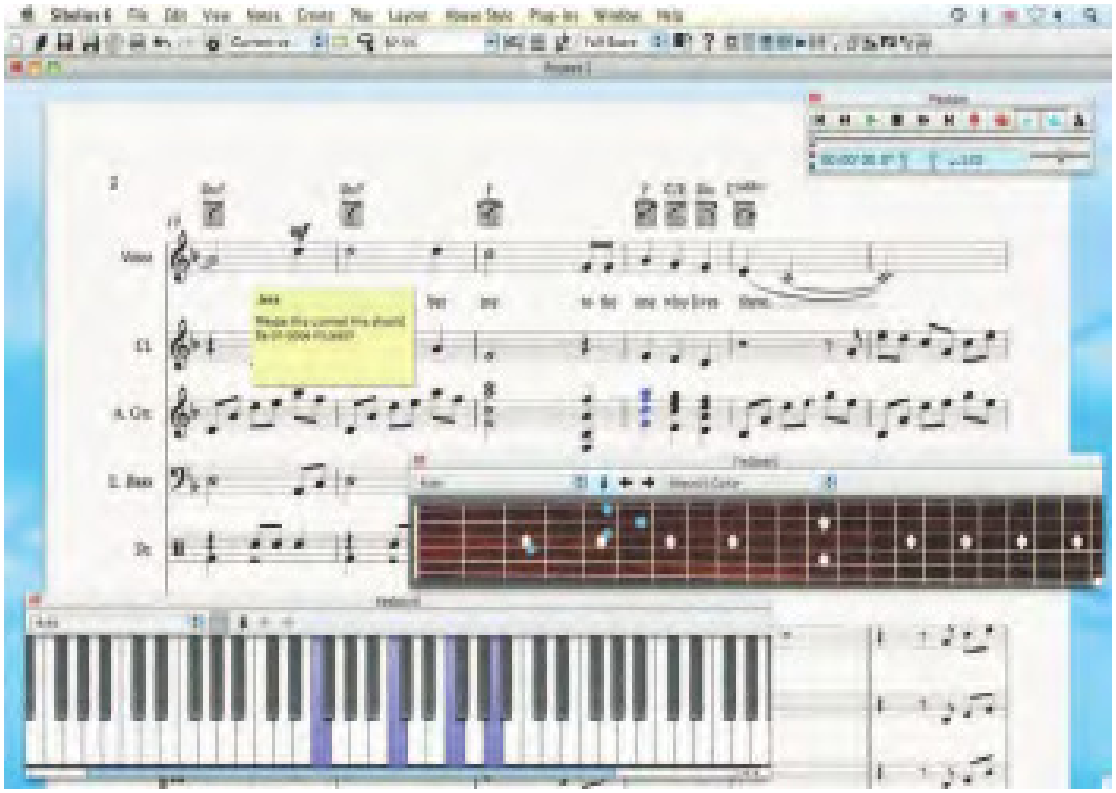
- Another simple manipulation is to reverse all or a portion of a digital audio recording.
- Sounds, particularly spoken dialog, can produce a surreal, otherworldly effect when played backward.

Multiple Tracks:

- Being able to edit and combine multiple tracks (for sound effects, voice-overs, music, etc.) and then merge the tracks and export them in a "final mix" to a single audio file is important.

MIDI Audio

- **MIDI** (Musical Instrument Digital Interface) is a communications standard developed in the early 1980s for electronic musical instruments and computers.
- It allows music and sound synthesizers from different manufacturers to communicate with each other by sending messages along cables connected to the devices.
- MIDI provides a protocol for passing detailed descriptions of a musical score, such as the notes, the sequences of notes, and the instrument that will play these notes.
- But MIDI data is not digitized sound; it is a shorthand representation of music stored in numeric form.
- Digital audio is a recording, MIDI is a score—the first depends on the capabilities of your sound system, the other on the quality of your musical instruments *and* the capabilities of your sound system.
- A MIDI file is a list of time-stamped commands that are recordings of musical actions (the pressing down of a piano key or a sustain pedal, for example, or the movement of a control wheel or slider).
- When sent to a MIDI playback device, this results in sound.
- A concise MIDI message can cause a complex sound or sequence of sounds to play on an instrument or synthesizer; so MIDI files tend to be significantly smaller (per second of sound delivered to the user) than equivalent digitized waveform files.
- Composing your own original score can be one of the most creative and rewarding aspects of building a multimedia project, and MIDI is the quickest, easiest, and most flexible tool for this task.
- To make MIDI scores, however, you will need **notation software**, **sequencer software** and a **sound synthesizer** (typically built into the software of multimedia players in most computers and many handheld devices). A **MIDI keyboard** is also useful for simplifying the creation of musical scores.



Notation and composition software - Sibelius

Sequencer software- Pro Tools

- Rather than recording the sound of a note, MIDI software creates data about each note as it is played on a MIDI keyboard (or another MIDI device)—which note it is, how much pressure was used on the keyboard to play the note, how long it was sustained, and how long it takes for the note to decay or fade away, for example.
- This information, when played back through a MIDI device, allows the note to be reproduced exactly.

- Because the quality of the playback depends upon the end user's MIDI device rather than the recording, MIDI is **device dependent**.
- The sequencer software quantizes your score to adjust for timing inconsistencies (a great feature for those who can't keep the beat), and it may also print a neatly penned copy of your score to paper.
- An advantage of structured data such as MIDI is the ease with which you can edit the data.
- Let's say you have a piece of music being played on a piano, but your client decides he wants the sound of a saxophone instead. If you had the music in digitized audio, you would have to re-record and re digitize the music.
- When it is in MIDI data, however, there is a value that designates the instrument to be used for playing back the music.
- To change instruments, you just change that value. Instruments that you can synthesize are identified by a **General MIDI** numbering system that ranges from 0 to 127 (see Table).

ID	Sound	ID	Sound
0	Acoustic grand piano	16	Hammond organ
1	Bright acoustic piano	17	Percussive organ
2	Electric grand piano	18	Rock organ
3	Honky-tonk piano	19	Church organ
4	Rhodes piano	20	Reed organ
5	Chorused piano	21	Accordion
6	Harpsichord	22	Harmonica
7	Clarinet	23	Tango accordion
8	Celesta	24	Acoustic guitar (nylon)
9	Glockenspiel	25	Acoustic guitar (steel)
10	Music box	26	Electric guitar (jazz)
11	Vibraphone	27	Electric guitar (clean)
12	Marimba	28	Electric guitar (muted)
13	Xylophone	29	Overdriven guitar
14	Tubular bells	30	Distortion guitar
15	Dulcimer	31	Guitar harmonics

General MIDI Instrument Sounds

- Since MIDI is device dependent and the quality of consumer MIDI playback hardware varies greatly, MIDI's true place in multimedia work may be as a production tool rather than a delivery medium.
- MIDI is by far the best way to create original music, so use MIDI to get the flexibility and creative control you want.
- Then, once your music is completed and fits your project, lock it down for delivery by turning it into digital audio data.
- In addition to describing the instrument and the note, MIDI data can also describe the **envelope** of the sound: the **attack** (how quickly a sound's volume increases), the **sustain** (how long the sound continues), and the **decay** (how quickly the sound fades away).

MIDI vs. Digital Audio

- In contrast to MIDI data, digital audio data is the actual representation of a sound, stored in the form of thousands of individual numbers *(samples)*.
- The digital data represents the instantaneous amplitude (or loudness) of a sound at discrete slices of time.
- MIDI data is to digital audio data what vector or drawn graphics are to bitmapped graphics.
- That is, MIDI data is device dependent; digital data is not.
- The sounds produced by MIDI music files depend on the particular MIDI device used for playback.

- Digital data, on the other hand, produces sounds that are more or less identical regardless of the playback system.
- The MIDI standard lets instruments communicate in a well-understood language.

- MIDI has several advantages over digital audio and two huge disadvantages.

Advantages:

- MIDI files are much more compact than digital audio files, and the size of a MIDI file is completely independent of playback quality.
- In general, MIDI files will be 200 to 1,000 times smaller than CD-quality digital audio files. Because MIDI files are small, they don't take up as much memory, disk space, or bandwidth.
- Because they are small, MIDI files embedded in web pages load and play more quickly than their digital equivalents.
- In some cases, if the MIDI sound source you are using is of high quality, MIDI files may sound better than digital audio files.
- You can change the length of a MIDI file (by varying its tempo) without changing the pitch of the music or degrading the audio quality.
- MIDI data is completely editable—right down to the level of an individual note.
- You can manipulate the smallest detail of a MIDI composition (often with sub millisecond accuracy) in ways that are impossible with digital audio.
- Because they represent the pitch and length of notes, MIDI files can generally be converted to musical notation, and vice versa.
- This is useful when you need a printed score; in reverse, you can scan a printed score and convert it to MIDI for tweaking and editing.

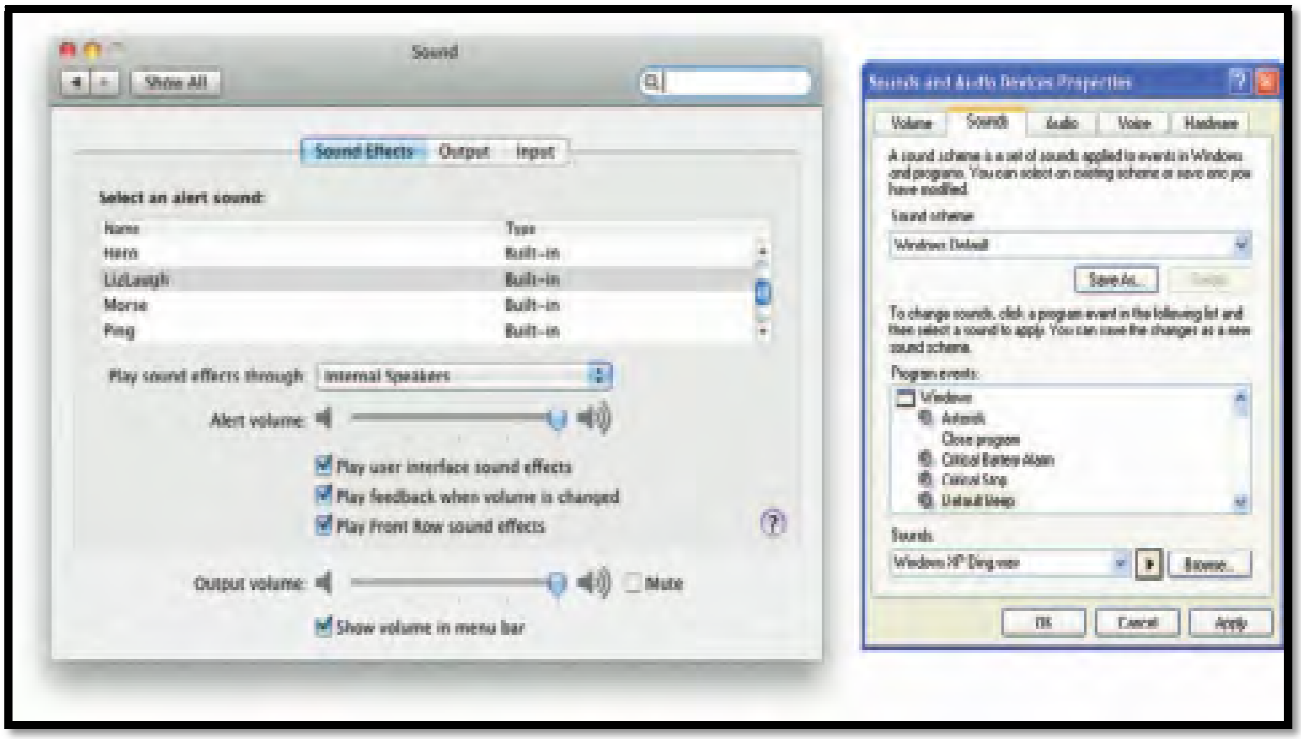
Disadvantages:

- Because MIDI data does not represent sound but musical instruments, you can be certain that playback will be accurate only if the MIDI playback device is identical to the device used for production.
- Also, MIDI cannot easily be used to play back spoken dialog, although expensive and technically tricky digital samplers are available.

MULTIMEDIA SYSTEM SOUNDS

- You can use sound right off the bat on your computer because beeps and warning sounds are available as soon as you install the operating system.
- Open the Sound Control Panel to listen to your system sounds, change them, or make a new, custom sound (see Figure).
- In Windows, system sounds are WAV files, and they reside in the Windows\ Media subdirectory.
- System event sounds include start.wav, chimes.wav, chord.wav, ding.wav, logoff.wav, notify.wav, recycle.wav, tada.wav, and the Microsoft sound.wav that typically plays when Windows starts up.
- As you can see in Figure, you can assign these sounds to system events such as Windows startup, warnings from other applications, or clicks outside of an open dialog box (which causes the default beep in Windows).
- And you can create schemes of sounds and select a particular scheme according to your mood.

- You can also add your own sound files and install them so they play when system events occur: place the WAV sound files into your ~\Windows\Media directory and use the Sound Control Panel to select them.
- In OS X on a Macintosh, you can only change your system alert sound.
- Put your custom sound file (in **AIF format**) into ~/System/Library/Sounds, and then select it in the Sound preference pane.



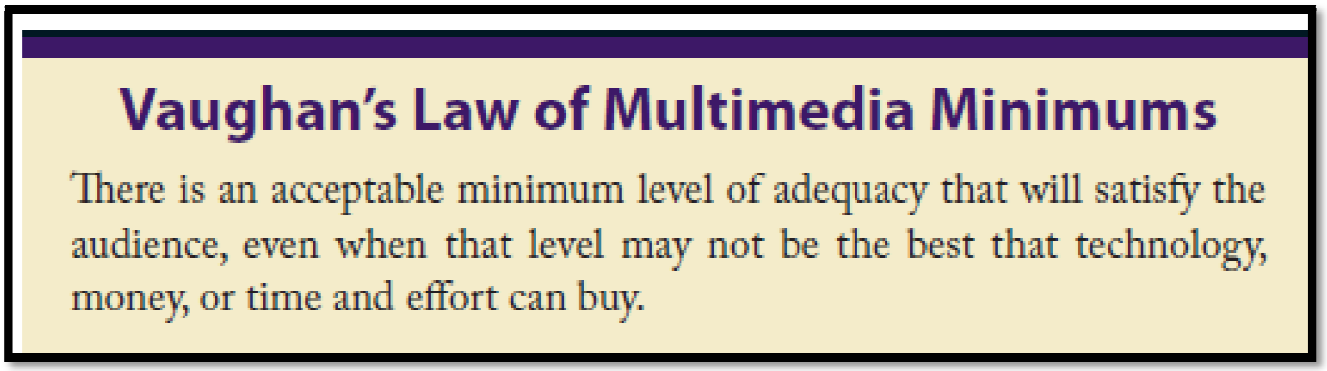
Sound Control Panels for Macintosh and Windows

Audio File Formats

- When you create multimedia, it is likely that you will deal with file formats and translators for text, sounds, images, animations, or digital video clips.
- A sound file's format is simply a recognized methodology for organizing and (usually) compressing the digitized sound's data bits and bytes into a data file.
- The structure of the file must be known, of course, before the data can be saved or later loaded into a computer to be edited and/or played as sound.
- The file name extension identifies which method of storage is used. There are many ways to store the bits and bytes that describe a sampled waveform sound.
- The method used for consumer-grade music CDs is **Linear Pulse Code Modulation (LPCM)**, often shortened to PCM The **CD-ROM/XA (extended architecture)** format for reading and writing CDs was developed later so you could put several recording sessions of music or data onto a single CD-R (recordable) disc.
- LPCM tracks from an audio CD are usually converted and stored on a computer in uncompressed **AIFF** (Audio Interchange File Format) or **wave format (WAV)** files when copied from the CD.
- AIFF is historically used for Macintosh sound files. The WAV format was introduced by Microsoft when Windows was first released. Both formats contain uncompressed sound data.
- The MP3 format was developed by the Moving Picture Experts Group (**MPEG**) and evolved during the 1990s into the most common method for storing consumer audio. It incorporates a "**lossy**" compression algorithm to save space.

- An audio CD, for example, may hold an hour or so of uncompressed LPCM sound. That same CD, using MP3 compression, can store almost seven hours of the same music, but with a slight loss of quality.
- WMA (Windows Media Audio) is a proprietary Microsoft format developed to improve MP3.
- MP4 is a format based on Apple's **QuickTime movie (.mov)** "container" model and is similar to the MOV format, which stores various types of media, particularly time-based streams such as audio and video.
- The mp4 extension is used when the file streams audio and video together.
- The AAC (Advanced Audio Coding) format, which is part of the MP4 model, was adopted by Apple's iTunes store, and many music files are commercially available in this format.
- ACC is the default format for iPod, iPhone, PlayStation, Wii, Dsi, and many mobile phones including Motorola, Nokia, Philips, Samsung, Siemens, and Sony Ericsson.
- The SWF format is a container for vector-based graphics and animations, text, video, and sound delivered over the Internet.
- Typically created using Adobe's Flash, SWF files require a plug-in or player be installed in the user's browser.
- Adobe claims that the Flash Player is installed in more than 98 percent of Web users' browsers and in more than 800 million handsets and mobile devices Flash video files (FLV) contain both a video stream and an audio stream, and the FLV format has been adopted by YouTube, Google, Yahoo, Reuters.com, BBC.com, CNN.com, and other news providers for Internet delivery of content.
- A **codec** (compressor-decompressor) is software that compresses a stream of audio or video data for storage or transmission, then decompresses it for playback.
- There are many codecs that do this with special attention to the quality of music or voice after decompression.
- Some are "lossy" and trade quality for significantly reduced file size and transmission speed; some are "lossless," so original data is never altered.

Vaughan's Law of Multimedia Minimums



Adding Sound to Your Multimedia Project

Follow certain steps to bring an audio recording into your multimedia project. Here is a brief overview of the process:

1. Determine the file formats that are compatible with your multimedia authoring software and the delivery medium(s) you will be using (for file storage and bandwidth capacity).

2. Determine the sound playback capabilities (codecs and plug-ins) that the end user's system offers.
3. Decide what kind of sound is needed (such as background music, special sound effects, and spoken dialog). Decide where these audio events will occur in the flow of your project. Fit the sound cues into your storyboard or make up a cue sheet.
4. Decide where and when you want to use either digital audio or MIDI data.
5. Acquire source material by creating it from scratch or purchasing it.
6. Edit the sounds to fit your project.
7. Test the sounds to be sure they are timed properly with the project's images. This may involve repeating steps 1 through 4 until everything is in sync.

Space Considerations:

- The substantial amount of digital information required for high quality sound takes up a lot of storage space, especially when the quantity is doubled for two-channel stereo.
- It takes about 1.94MB to store 11 seconds of uncompressed stereo sound. Many multimedia developers use 8-bit sample sizes at 22.05 kHz sampling rates because they consider the sound to be good enough (about the quality of AM radio), and they save immense amounts of digital real estate.
- The following formula will help you estimate your storage needs.
- If you are using two channels for stereo, double the result.

  (Sampling rate * bits per sample) / 8 = bytes per second
- Many people feel that MP3s files sampled at 128 Kbps provide decent audio quality for music, especially when played through small speakers.
- For better quality, sample your music at 192 Kbps. Because the human voice does not use a wide range of frequencies, you can sample speech or voice at 96 Kbps or even 64 Kbps.
- **Digital audio tape (DAT)** systems provide a tape-based 44.1 kHz, 16-bit record and playback capability.
- You may, however, find that DAT is high-fidelity overkill for your needs, because the recordings are too accurate, precisely recording glitches, background noises, microphone pops, and coughs from the next room.
- A good editor can help reduce the impact of these noises, but at the cost of time and money.
- Mobile phones can often record audio (and video), and applications and hardware attachments are available to manage external microphones and file transfer.
- USB and flash memory recorders range in quality, some suitable for voice only, some generating compressed MP3 files, and some recording in CD-quality stereo.
- Recordings can be directly downloaded as digital files using a USB cable or flash memory card reader.

Keeping Track of Your Sounds:

- In an elaborate project with many sounds, it is important to maintain a **good database**, keeping a physical track of your original material—just in case you need to revert to it when your disk drive crashes or you accidentally delete the work file.

Audio CDs:

- The method for digitally encoding the high-quality stereo of the consumer CD music market is an international standard, called ISO 10149. This is also known as the **Red Book Audio** standard
- Unlike DVDs, audio CDs do not contain information about artists, titles, or tracklists of songs.
- But player software such as Apple iTunes and AOL Winamp will automatically link to a database on the Internet when you insert a music CD.
- The precise length of your CD's Table of Contents (TOC) is then matched against the known TOC length for more than five million CDs containing more than 60 million songs.
- When it finds a match, the database service sends back what it knows about the CD you inserted.

Sound for the Internet:

- There are several methods for playing digital or MIDI sound from a web page. The sound is actually not part of the web page but is a separate file with its own address on the Internet, which is "embedded" in the page.
- The simplest way to embed a sound file in a web page is to call it from an inline HTML anchor:

  ** Click here to play MySound! **
- Media players are designed to play files as soon as enough of the data is cached in your computer's **buffer** (a place where data is stored temporarily).
- The downloading continues to fill the buffer faster than you empty it by playing the sound file, allowing the sound file to stream into your computer in the background, keeping ahead of what has already been played so the playback doesn't pause or break up.
- **Streaming** files are dependent upon connection speed: you must wait longer (**streaming latency**) before the streamed sound begins to play when using a dial-up modem (low bandwidth) than when using a high-speed DSL connection (high bandwidth).
- Adobe's Flash allows you to integrate the sound tracks that you have made using a sound editor into a Web-based multimedia presentation, including both event sounds like button clicks and streaming sounds like background music.
- Because it can read and save MP3 files, Flash offers web designers serious and powerful options for solving the quality conundrum of high-quality (big) files and slow downloads versus low-quality (small) files and speedy delivery—with nice results.
- Because it must break a sound into "frames" so it plays in sync with the timeline, Flash resample the audio track if you ask it to "stream" in a movie clip; for the best quality, import an uncompressed audio clip into the Flash library and let Flash do the compression.

Testing and Evaluation

- Putting everything together can be tough, but testing and evaluating what you've done can be even tougher—especially if your project involves acomplicated live presentation, or if you're shipping a commercial multimedia application.
- Unless you plan ahead, problems will not emerge until you begin testing. In the world of professional film and video production, sound is incorporated during **post-production**, or a **post-session**, after all the film and video footage has been assembled.
- During editing and authoring, regularly test the sound-and-image synchronization of your project. If you are delivering your sound on the Web, test it with different browsers and different connection speeds.

UNIT –II COMPLETED

Unit –II

2Marks

1. Define image?
2. What is morphing?
3. What is vector drawing?
4. List out basic methods of making color?
5. Define dithering?
6. Expand TIFF.

7. What is trimming?
8. What is vaughan's law of multimedia minimums?

5 Marks

1. Write short notes on Bitmaps.
2. Explain the various ways of making still images.
3. Differentiate between MIDI vs. Digital Audio
4. Distinguish bitmap and vector drawing.
5. What is Dithering? Explain.

10 Marks

1. Write short notes on MIDI Audio.
2. Describe on various image file formats used in Multimedia.
3. How to add sound to your multimedia project. Explain.
4. What is vaughan's law of multimedia minimums?

UNIT III

ANIMATION

- Animation is a type of optical illusion. It involves the appearance of motion caused by displaying still images one after another. Often, animation is used for entertainment purposes.
- In addition to its use for entertainment, animation is considered a form of art. It is often displayed and celebrated in film festivals throughout the world. Also used for educational purposes, animation has a place in learning and instructional applications as well.

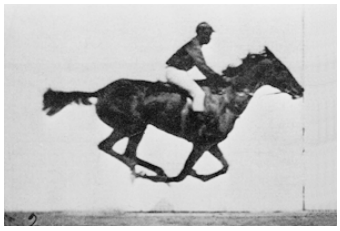
The Power of Motion

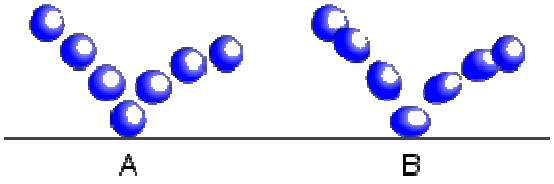
- Visual effects such as wipes, fades, zooms, and dissolves are available in most multimedia authoring packages, and some of these can be used for primitive animation.
- Many transition effects that may be available in editing software.
- But animation is more than wipes, fades, and zooms.
- Animation is an object actually moving across or *into* or *out of* the screen; a spinning globe of our earth; a car driving along a line-art highway; a bug crawling out from under a stack of papers, with a screaming voice from the speaker telling you to "Shoot it, now!"
- Animations were the primary source of dynamic action in multimedia presentations.

Principles of Animation

- The **12 Basic Principles of animation** is a set of principles of animation introduced by the Disney animators Ollie Johnston and Frank Thomas. The main purpose of the principles was to produce an illusion of characters adhering to the basic laws of physics, but they also dealt with more abstract issues, such as emotional timing and character appeal. The principles still have great relevance for today's more prevalent computer animation

1. Squash and stretch





- ♣ Animated sequence of a race horse galloping. The horse's body demonstrates squash and stretch in natural musculature.
- ♣ Illustration of the "squash and stretch"-principle: Example A shows a ball bouncing with a rigid, non-dynamic movement. In example B the ball is "squashed" at impact, and "stretched" during fall and rebound.

2. Anticipation

- ♣ Anticipation is used to prepare the audience for an action, and to make the action appear more realistic. A dancer jumping off the floor has to bend the knees first; a golfer making a swing has to swing the club back first.

- ♣ Anticipation: A baseball player making a pitchprepares for the action by moving his arm back

3. Staging

- ♣ This principle is akin to staging in theatre, as it is known in theatre and film, Its purpose is to direct the audience's attention, and make it clear what is of greatest importance in a scene; What is happening and what is about to happen.

4. Straight ahead action and pose to pose

- ♣ These are two different approaches to the drawing process. straight ahead action scenes are animated frame by frame from beginning to end, while "pose to pose" involves starting with drawing a few key frames, and then filling in the intervals later.

5. Follow through and overlapping action

- ♣ These closely related techniques help render movement more realistic and give the impression that characters follow the laws of physics. “Follow through” means that separate parts of a body will continue moving after the character has stopped

6. Slow in and slow out

- ♣ The movement of the human body and most other objects, needs time to accelerate and slow down.

7. Arc

- ♣ Most human and animal actions occur along an arched trajectory, and animation should reproduce these movements for greater realism. This can apply to a limb moving by rotating a joint, or a thrown object moving along a parabolic trajectory.

8. Secondary action

- ♣ Adding secondary actions to the main action gives a scene more life, and can help to support the main action.

- Secondary action: as the horse runs, its mane and tail follow the movement of the body

9. Timing

- Timing in reality refers to two different concepts: physical timing and theatrical timing. It is essential both to the physical realism, as well as to the story telling of the animation, that the timing is right.

10. Exaggeration

- Exaggeration is an effect especially useful for animation, as animated motions that strive for a perfect imitation of reality can look static and dull in cartoons. The level of exaggeration depends on whether one seeks realism or a particular style, like a caricature or the style of an artist.

11. Solid drawing

- The principle of solid or good drawing, really means that the same principles apply to an animator as to an academic artist.

12. Appeal

- Appeal in a cartoon character corresponds to what would be called charisma in an actor. A character who is appealing is not necessarily sympathetic villains or monsters can also be appealing the important thing is that the viewer feels the character is real and interesting.

Animation by Computer

- Computer animation or CGI animation is the art of creating moving images with the use of computers
- It is a subfield of computer graphics and animation. Increasingly it is created by means of 3D computer graphics, though 2D computer graphics are still widely used for stylistic, low bandwidth and faster real time rendering needs.
- Sometimes the target of the animation is the computer itself, but sometimes the target is another medium, such as film.
- To create the illusion of movement, an image is displayed on the computer screen and repeatedly replaced by a new image that is similar to the previous image, but advanced slightly in the time domain (usually at a rate of 24 or 30 frames / second).
- This technique is identical to how the illusion of movement is achieved with television and motion pictures.
- Computer animation is essentially a digital successor to the art of stop motion animation of 3D models and frame by frame animation of 2D illustrations.
- Then the limbs, eyes, mouth, cloths, etc., of the figure are moved by the animator on key frames.
- The differences in appearance between key frames are automatically calculated by the computer in a process known as tweening or morphing, finally the animation is rendered.

Architectural Animation

- Architects use services from animation companies to create 3-dimensional models for both the customers and builders. It can be more accurate than traditional drawings. Architectural

animation can also be used to see the possible relationship the building will have in relation to the environment and its surrounding buildings.

Animation File Formats

- Some file formats are designed specifically to contain animation and the can be ported among application and platform with the proper translators
- Director *.dir, *.dcr
- AnimationPro *.fli, *.flc
- D studio Max *.max
- Compuserve *.gif
- Flash *.fla, *.swf
- Following is the list of few software used for computerized animation:
  - 3D Studio Max
  - Flash
  - AnimationPro

Animation Techniques

When you create an animation, organize its execution into a series of logical steps.

1. First, gather up in your mind all the activities you wish to provide in the animation. If it is complicated, you may wish to create a written script with a list of activities and required objects and then create a storyboard to visualize the animation.
2. Choose the animation tool best suited for the job. Then build and tweak your sequences.
3. Allow plenty of time for this phase when you are experimenting and testing. Finally, post-process your animation, doing any special renderings and adding sound effects.

1. Cel Animation

- The term cel derives from the clear celluloid sheets that were used for drawing each frame which have been replaced today by acetate or plastic.
- Cels of famous animated cartoons have become soughed after suitable for framing collector's items.

2. Computer animation

- Computer animation programs topically employee the same logic and procedural concepts as cel animation using layer key frame and tweening techniques and even borrowing from the vocapulary of classic animators
- On the computers, paint is most often filled or drawn with tools using features such as gradients and antialiasing.
- The word links, in computer animation terminology, usually means special methods for computing RGB pixel values, providing edge detection, and layering so that images can blend or otherwise mix their colors produce special transparencies, inversions , and effects.

3. Kinematics:

- It is study of the movement and motion of structures that have joints, such as a walking amn.
- Inverse kinematics is in high end 3D programs, it is the process by which you link objects such as hands to arms and define their relationship and limits
- Once those relationships are set you can drag these parts around and let the computer calculate the result.

Inverse kinematics,

- Available in high-end 3-D programs such as Lightwave and Maya, is the process by which you link objects such as hands to arms and define their relationships and limits (for example, elbows cannot bend backward).
- Once those relationships and parameters have been set, you can then drag these parts around and let the computer calculate the result.

Morphing

- Morphing is popular effect in which one image transforms into another.
- Morphing application and other modeling tools that offer this effect can perform transition not only between moving images as well.

Making Animations That Work

Today, the most widely used tool for creating multimedia animations for Macintosh and Windows environments and for the Web is Adobe's Flash. Flash directly supports several 2½-D features,

including z-axis positioning, automatic sizing and perspective adjustment, and kinematics. External libraries can extend Flash's capabilities: open-source Papervision3D (http://blog.papervision3d.org) provides extensive support for true 3-D modeling and animation

A Rolling Ball

First, create a new, blank image file that is 100 × 100 pixels, and fill it with a sphere.

Create a new layer in Photoshop, and place some white text on this layer at the center of the image

Make the text spherical using Photoshop's "Spherize" distortion filter, and save the result.

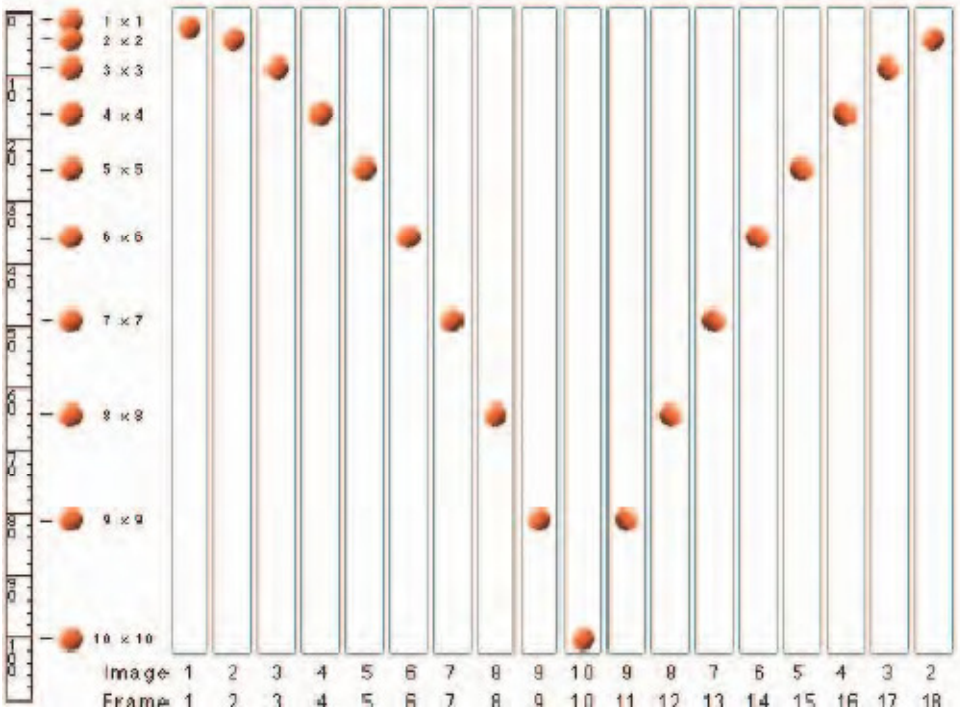
To animate the sphere by rolling it across the screen, you first need to make a number of rotated images of the sphere. Rotate the image in 45-degree increments to create a total of eight images, rotating a full circle of 360 degrees. When each is displayed sequentially at the same location, the sphere spins:

For a realistic rolling effect, the circumference (calculated at pi times 100, or about 314 pixels) is divided by 8 (yielding about 40 pixels). As each image is successively displayed, the ball is moved 40 pixels along a line.

A Bouncing Ball

With the simplest tools, you can make a bouncing ball to animate your web site using GIF89a, an image format that allows multiple images to be put into a single file and then displayed as an animation in a web browser or presentation program that recognizes the format. The individual
frames that make up the **animated GIF** can be created in any
paint or image-processing program, but it takes a specialized program to put the frames together into a GIF89a animation. simply figure that your ball will uniformly accelerate and decelerate up

and down the pixels of your screen by the squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100 are the squares of 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. This is illustrated in Figure. You can use the same images for downward motion as you use for upward—as in frames 11 through 18 in Figure —by *reversing* them



Open a graphics program and paint a ball about 15 pixels in diameter. If you wish to be fancy, make the ball with a 3-D graphics tool that will shade it as a sphere. Then duplicate the ball, placing each copy of it in a vertical line at the ten locations 1, 4, 9, 16, 25, 36, 49, 64, 81, and 100.

The goal is to create a separate image file for each location of the ball, like the pages of a flip-book. With Photoshop, you can create a single file with ten layers to contain each ball at its proper location, and you can add an eleventh background layer, too. Then save each layer showing against the background as a separate file.

Creating an Animated Scene

- A creative committee organized a brief storyboard of a gorilla chasing a man.
- From a stock library containing many images licensed for unlimited use, a photograph was chosen of Manhattan's Central Park where a bridge crossed a small river and high-rise apartments lined the horizon.
- The chase scene would occur across the bridge. To produce frames of the running man, a real actor was videotaped running in place against an Ultimatte chroma-keyed blue background in a studio; a few frames of this were grabbed, and the blue background was made transparent in each image.
- The gorilla was difficult to find, so a toy model dinosaur about 25 centimeters tall was used; again, a few frames were captured and the background made transparent to form a composite.
- That was all that was required for image resources.

As illustrated in Figure *a,* the background was carefully cut in half along the edge of the bridge, so that the bridge railing could be placed in front of the runners. The running man was organized in a series of six frames that could be repeated many times across the screen to provide

the pumping motions of running. The same was done for the dinosaur, to give him a lumbering, bulky look as he chased the little man across the bridge (see Figure *b*). The result, in Figure *c,* was simple and quickly achieved.

Figure *a*

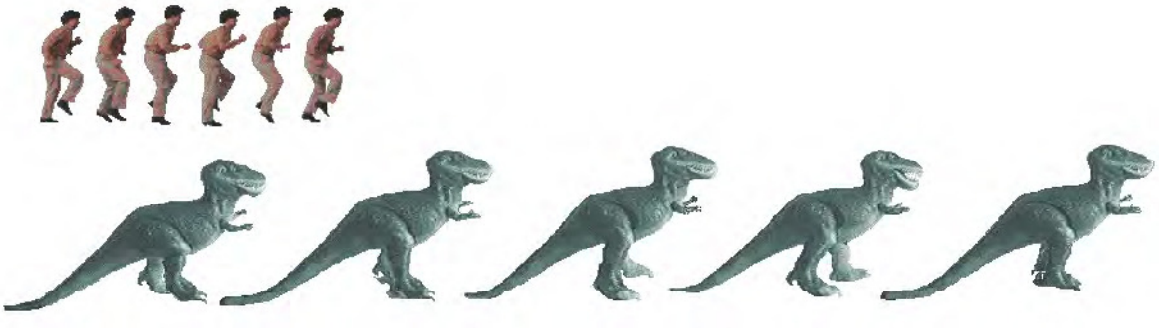


Figure b

Figure *c*

The upper portion of the photo was placed behind the runners (*b*) and the lower portion in front of them, to make them appear to run behind the bridge railing (*c*).

Video

- Video is the most challenging multimedia content to deliver via the web.
- One second of uncompressed NTSC video, the international standard for television and video, requires approximately 27 megabytes of disk storage space.
- The amount of scaling and compression required to turn quantity of data into something that can possible tailor your video content for the web.

Using Video

- Carefully planned, well-executed video clips can make a dramatic difference in a multimedia project.
- All the multimedia elements, video places the highest performance demand on your computer or device—and its memory and storage.
- Consider that a high-quality color still image on a computer screen could require as much as a megabyte or more of storage memory.
- Compression (and decompression), using special software called a **codec**, allows a massive amount of imagery to be squeezed into a comparatively small data file, which can still deliver a good viewing experience on the intended viewing platform during playback.
- If you control the delivery platform for your multimedia project, you can specify special hardware and software enhancements that will allow you to work with high-definition, full-motion video, and sophisticated audio for high-quality surround sound.
- you can design a project to meet a specific compression standard, such as MPEG2 for **Digital Versatile Disc (DVD)** playback or MPEG4 for home video.

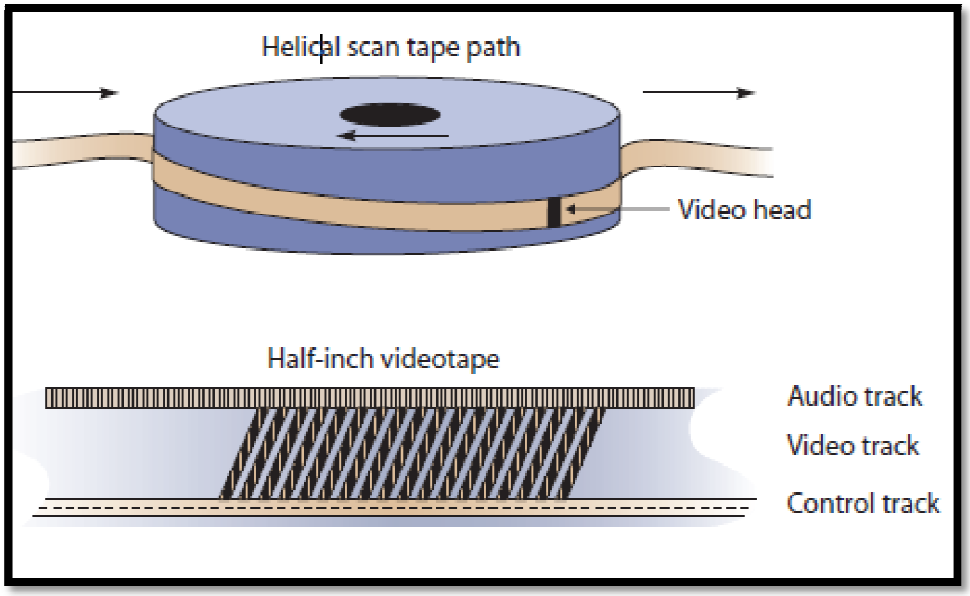
- You can install a superfast **RAID (Redundant Array of Independent Disks)** system that will support high-speed data transfer rates.

Working with Video and Displays

- When light reflected from an object passes through a video camera lens, that light is converted into an electronic signal by a special sensor called a **charge-coupled device (CCD)**.
- Top-quality broadcast cameras and even camcorders may have as many as three CCDs (one for each color of red, green, and blue) to enhance the resolution of the camera and the quality of the image.
- It's important to understand the difference between analog and digital video.
- Analog video has a resolution measured in the number of horizontal scan lines (due to the nature of early cathode-tube cameras), but each of those lines represents continuous measurements of the color and brightness along the horizontal axis, in a linear signal that is analogous to an audio signal.
- Digital video signals consist of a discrete color and brightness (RGB) value for each pixel.
- Digitizing analog video involves reading the analog signal and breaking it into separate data packets. This process is similar to digitizing audio, except that with video the vertical resolution is limited to the number of horizontal scan lines.

Analog Video

- In an analog system, the output of the CCD is processed by the camera into three channels of color information and synchronization pulses (sync) and the signals are recorded onto magnetic tape.
- There are several video standards for managing analog CCD output, each dealing with the amount of separation between the components—the more separation of the color information, the higher the quality of the image (and the more expensive the equipment).
- If each channel of color information is transmitted as a separate signal on its own conductor, the signal output is called **component**
- Lower in quality is the signal that makes up **Separate Video (S-Video)**, using two channels that carry luminance and chrominance information. The least separation (and thus the lowest quality for a video signal) is **composite**, when all the signals are mixed together and carried on a single cable as a composite of the three color channels and the sync signal.
- Audio is recorded on a separate straight-line track at the top of the videotape, although with some recording systems (notably for ¾-inch tape and for ½-inch tape with high fidelity audio), sound is recorded helically between the video tracks.
- At the bottom of the tape is a control track containing the pulses used to regulate speed.
- T**racking** is the fine adjustment of the tape during playback so that the tracks are properly aligned as the tape moves across the playback head. These are the signals your grandmother's VCR reads when you rent *Singing in the Rain* (on video cassette) for the weekend.



- Diagram of tape path across the video head for analog recording Many consumer set-top devices like **video cassette recorders (VCRs)** and satellite receivers add the video and sound signals to a subcarrier and modulate them into a radio frequency (RF) in the FM broadcast band.

Multimedia Interface (HDMI)

- **A** connector for purely digital input. Video displays for computers typically provide analog component (red, green, blue) input through a 15-pin **VGA connector** and also a purely digital **Digital Visual Interface (DVI)** and/or an HDMI connection.
- Three analog broadcast video standards are commonly in use around the world: NTSC, PAL, and SECAM.
- In the United States, the NTSC standard has been phased out, replaced by the **ATSC Digital Television Standard**. Because these standards and formats are not easily interchangeable, it is important to know where your multimedia project will be used.

NTSC

- The United States and many other countries used a system for broadcasting and displaying video that is based upon the specifications set forth by the 1952 **National Television Standards Committee (NTSC)**.
- These standards defined a method for encoding information into the electronic signal that ultimately created a television picture.

PAL

- The **Phase Alternate Line (PAL)** system was used in the United Kingdom
- PAL increased the screen resolution to 625 horizontal lines, but slowed the scan rate to 25 frames per second. As with NTSC, the even and odd lines were interlaced, each field taking 1/50 of a second to draw (50 Hz).

SECAM

- The **Sequential Color and Memory (SECAM)** (taken from the Frenchname, reported variously as Système Électronic pour Couleur Avec Mémoire or Séquentiel Couleur Avec Mémoire)

Digital Video

- In digital systems, the output of the CCD is digitized by the camera into a sequence of single frames, and the video and audio data are compressed before being written to a tape (see Figure) or digitally stored to disc or flash memory in one of several proprietary and competing formats.
- Digital video data formats, especially the codec used for compressing and decompressing video (and audio) data, are important

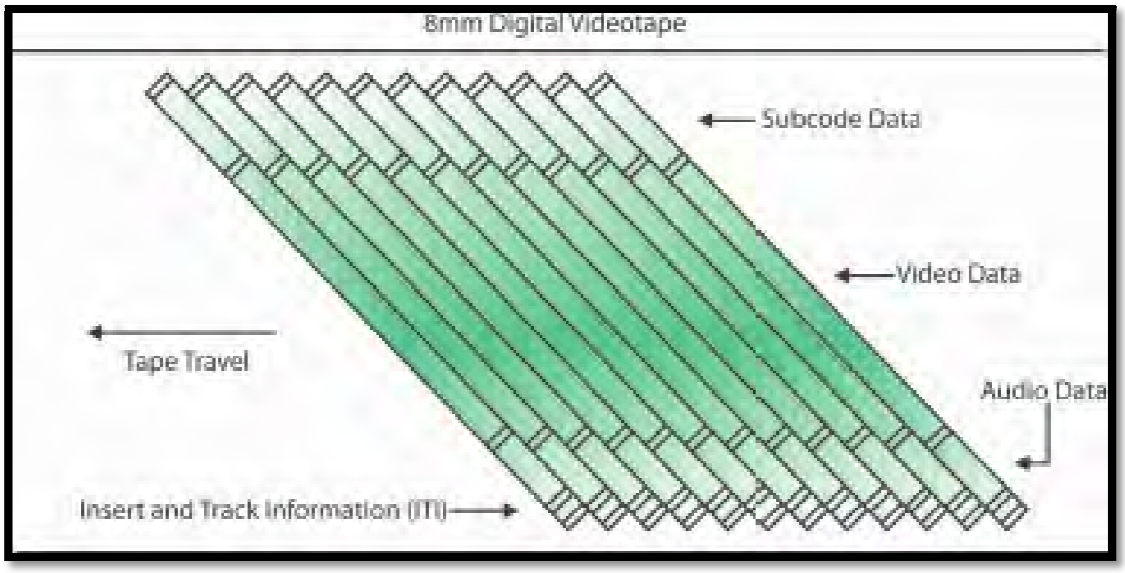


Diagram of tape path across the video head for digital recording

HDTV

- **High Definition Television (HDTV)** This standard, which was slightly modified from both the Digital Television Standard and the Digital Audio Compression Standard from an analog to a digital standard.
- It also provided TV stations with sufficient bandwidth to present four or five Standard Television signals or one HDTV signal
- HDTV provides high resolution in a **16:9** aspect ratio

DISPLAYS:

- Colored phosphors on a **cathode ray tube (CRT)** screen glow red, green, or blue when they are energized by an electron beam.
- Because the intensity of the beam varies as it moves across the screen, some colors glow brighter than others
- Finely tuned magnets around the picture tube aim the electrons precisely onto the phosphor screen, while the intensity of the beam is varied according to the video signal.
- This is why you needed to keep speakers (which have strong magnets in them) away from a CRT screen.

- If a computer displays a still image or words onto a CRT for a long time without changing, the phosphors will permanently change, and the image or words can become visible, even when the CRT is powered down.
- Screen savers were invented to prevent this from happening. Flat screen displays are all-digital, using either **liquid crystal display (LCD)** or **plasma** technologies, and have supplanted CRTs for computer use.

Interlacing and Progressive Scan

- The process of building a single frame from two fields is called interlacing, a technique that helps to prevent flicker on CRT screens.
- Computer monitors use a different **progressive-scan** technology, and draw the lines of an entire frame in a single pass, without interlacing them and without flicker.
- In television, the electron beam actually makes two passes on the screen as it draws a single video frame, first laying down all the odd-numbered lines then all the even-numbered lines, as they are interlaced.

Overscan and the Safe Title Area

- It is common practice in the television industry to broadcast an image larger than will fit on a standard TV screen so that the "edge" of the image seen by a viewer is always bounded by the TV's physical frame, or bezel. This is called **overscan**.
- In contrast, computer monitors display a smaller image on the monitor's picture tube (**underscan**), leaving a black border inside the bezel.

DIGITAL VIDEO CONTAINERS

- A digital video architecture is made up of an algorithm for compressing and encoding video and audio, a container in which to put the compressed data, and a player that can recognize and play back those files.
- Common containers for video are Ogg (.ogg, Theora for video, Vorbis for audio),Flash Video (.flv), MPEG (.mp4), QuickTime (.mov), Windows Media Format (.wmv), WebM (.webm), and RealMedia (.rm).
- Containers may include data compressed by a choice of codecs, and media players may recognize and play back more than one video file container format.
- Container formats may also include metadata—important information about the tracks contained in them—and even additional media besides audio and video.
- The QuickTime container, for example, allows inclusion of text tracks, chapter markers, transitions, and even interactive sprites.

Codecs

A codec is the algorithm used to compress a video for delivery and then decode it in real time for fast playback. Different codecs are optimized for different methods of delivery .

Some codecs store only the image data that changes from frame to frame instead of the data that makes up each and every individual frame. Other codecs use computation intensive methods to predict what pixels will change from frame to frame and store the predictions to be deconstructed during playback. These are all lossy codecs where image quality is (somewhat) sacrificed to significantlyreduce file size.

MPEG

The MPEG standards were developed by the **Moving Picture Experts Group** (**MPEG**, www.mpeg.org), a working group convened by the International Organization for Standardization (ISO) and the International Electro-technical Commission (IEC), which created standards for the digital representation of moving pictures as well as associated audio and other data. Using **MPEG-1** 1.2 Mbps (megabits per second) of video and 250 Kbps (kilobitsper second) of two-channel stereo audio using CD-ROM technology.

MPEG-2 3 to 15 Mbps but also delivered higher image resolution, improved picture quality, interlaced video formats, multi resolution scalability, and multichannel audio features.MPEG-2 became the video compression standard required for digital television (DTV) and for making DVDs.

As a container, **MPEG-4** provides a content-based method for assimilating multimedia elements. It offers indexing, hyper linking, querying, browsing, uploading, downloading, and deleting functions, as well as "hybrid natural and synthetic data coding," which will enable harmonious integration of natural and synthetic audiovisual objects.

OBTAINING VIDEO CLIPS

After you've decided that your project should and will include video consider whether you should shoot new "**footage**" (a legacy term from the film and analog world) or acquire preexisting content for your video clips. There are many sources for film and video clips: a friend's home movies may suffice, or you can go to a "stock" footage house or a television station or movie studio. Video screen capture tools for both PC and Macintosh systems will generate video files that can then be edited and integrated with audio.

SHOOTING AND EDITING VIDEO

Setting up a production environment for making digital video requires hardware that meets minimum specifications for processing speed, data transfer, and storage. There are many considerations to keep in mind when setting up your production environment, depending on the capabilities of your camcorder:

- Fast processor(s)
- Plenty of RAM
- Computer with FireWire (IEEE 1394 or i.Link) or USB connection and cables
- Fast and big hard disk(s)
- A second display to allow for more real estate for your editing software
- External speakers
- Nonlinear editing (NLE) software

The Shooting Platform

Storyboarding

Preplanning a video project is a factor that cannot be ignored without costing time loss, lots of unnecessary aggravation, and money that would be better spent elsewhere. Successful video production, of any sort, deserves the time it takes to make a plan to carry it out. It may take a little time at first, but you'll find it to be very helpful in the long run. Storyboards are like any sequential comic you read daily.

Every day there are three or four panels showing a progression of story or information. Take the time to structure your production by writing it down and then engineer a sequential group of drawings showing camera and scene, shooting angles, lighting, action, special effects, and how objects move through from start to finish. A storyboard can get everyone on one page quickly.

Lighting

Perhaps the greatest difference between professional camcorders and consumer camcorders is their ability to perform at low light levels. With proper lighting, however, it may be difficult for uninitiated viewers

to differentiate between shots taken with an expensive studio-grade video camera and an inexpensive camcorder. Using a simple floodlight kit, or even just being sure that daylight illuminates the room, can improve your image.

Chroma Keys

Chroma keys allow you to choose a color or range of colors that become transparent, allowing the video image to be seen "through" the computer image. This is the technology used by a newscast's weather person, who is shot against a blue background that is made invisible when merged with the electronically generated image of the weather map. The weatherman controls the computer part of the display with a small handheld controller. A useful tool easily implemented in most digital video editing applications is **blue screen**, **green screen**, **Ultimatte**, or **chroma key editing**.

Blue Screen:

Blue screen is a popular technique for making multimedia titles because expensive sets are not required. Incredible backgrounds can be generated using 3-D modeling and graphic software, and one or more actors, vehicles, or other objects can be neatly layered onto that background. Video editing applications provide the tools for this.

When you are shooting blue screen, be sure that the lighting of the screen is absolutely even; fluctuations in intensity will make this "key" appear choppy or broken. Shooting in daylight, and letting the sun illuminate the screen, will mitigate this problem. Also be careful about "color spill." If your actors stand too close to the screen, the colored light reflecting off the screen will spill onto them, and parts of their body will key out. While adjustments in most applications can compensate for this,the adjustments are limited. Beware of fine detail, such as hair or smoke, that wisps over the screen; this does not key well. Figure shows frames taken from a video of an actor shot against blue screen on a commercial stage. The blue background was removed from each frame, and the actor himself was turned into a photo-realistic animation that walked, jumped, pointed, and ran from a dinosaur.

This walking, jumping, and pointing actor was videotaped against a blue screen.

Composition

The general rules for shooting quality video for broadcast use also apply to multimedia. When shooting video for playback in a small window, it is best to avoid wide panoramic shots, as the sweeping majesty will be lost.Use close-ups and medium shots, head-and-shoulders or even tighter.

Depending upon the compression algorithm used consider also the amount of motion in the shot: the more a scene changes from frame to frame, the more "delta" information needs to be transferred from the computer's memory to the screen. Keep the camera still instead of panning and zooming; let the subject add the motion to your shot, walking, turning, talking.

Beware of excessive backlighting—shooting with a window or a bright sky in the background—is a common error in amateur video production. Many cameras can be set to automatically compensate for backlighting.

Titles and Text

Titles and text are often used to introduce a video and its content. They may also finish off a project and provide credits accompanied by a sound track. Titles can be plain and simple, or they can be storyboarded and highly designed.

For plain and simple, you can use templates in an image editor and then sequence those images into your video using your video editing software. Or you can create your own imagery or animations and sequence them. More elaborate titles, typical for feature films and commercial videos, can become multimedia projects in themselves.

Nonlinear Editing (NLE)

Top-of-the-line **nonlinear editing (NLE)** software includes Adobe's Premiere, Apple's Final Cut, and Avid's Media Composer, the "A Team" of professional video editors. These are feature-packed and expensive packages designed to work hand-in-hand with fast and powerful computers (six gigabytes of RAM recommended) and dedicated file servers.

Many hours of training and many days of experience are needed before users become proficient.If your project involves simple cutting and editing of footage, with a few transitions and titles thrown in, then you may be satisfied with simpler software such as Microsoft's Windows Live Movie Maker or Apple's iMovie for Macs that come free with the operating system. Remember not to edit and re-edit and re-edit again. The video codecs used are lossy, so each time you finalize a file, it will be less true than the original material—this is called **generation loss**.

Questions

2 marks:

1. Define animation.
2. What is called Kinematics?
3. Mean out the term HDTV.
4. Give away the meaning of Codec.
5. What are chrome keys?

5 marks:

1. Differentiate Analog and Digital Video.
2. Write Short Notes On Morphing.

3. What is the use of Cell Animation?
4. How to shoot and edit a video?
5. Brief out the term Analog Video.

-

1. Elaborate on the various animations used by the computer.
2. How to create a working animation? Provide examples.
3. Describe the Digital Video Containers.
4. Give a brief note on animation displays.

UNIT IV

MAKING MULTIMEDIA

The Stages of a Multimedia Project

Most multimedia and web projects must be undertaken in stages. Some stages should be completed before other stages begin, and some stages may be skipped or combined. Here are the four basic stages in a multimedia project:

1. Planning and costing:

- A project always begins with an idea or a need that you then refine by outlining its messages and objectives.
- Identify how you will make each message and objective work within your authoring system.
- Before you begin developing, plan out the writing skills, graphic art, music, video, and other multimedia expertise that you will require.
- Develop a creative "**look and feel**" (what a user sees on a screen and how he or she interacts with it), as well as a structure and a navigational system that will allow the viewer to visit the messages and content.
- Estimate the time you'll need to do all the elements, and then prepare a budget. Work up a short **prototype** or **proof-of-concept**, a simple, working example to demonstrate whether or not your idea is feasible.

2. Designing and producing:

- Perform each of the planned tasks to create a finished product. During this stage, there may be many feedback cycles with a client until the client is happy.

3. Testing:

- Test your programs to make sure that they meet the objectives of your project, work properly on the intended delivery platforms, and meet the needs of your client or end user.

4. Delivering:

- Package and deliver the project to the end user. Be prepared to follow up over time with tweaks, repairs, and upgrades.

The Intangible Needs

- Hardware, software, time, money and good ideas to make multimedia
- Multimedia development of any scale greater than the most basic level is inherently a team effort: artwork is performed by graphic artists, video shoots by video producers, sound editing by audio producers, and programming by programmers

Creativity:

- Before beginning a multimedia project, you must first develop a sense of its scope and content.
- The most precious asset you can bring to the multimedia workshop is your creativity.
- The evolution of multimedia is evident when you look at some of the first multimedia projects done on computers and compare them to today's titles.

- Taking inspiration from earlier experiments, developers modify and add their own creative touches for designing their own unique multimedia projects.

Organization:

- It's essential that you develop an organized outline and a plan that rationally details the skills, time, budget, tools, and resources you will need for a project.
- These should be in place before you start to render graphics, sounds, and other components, and a protocol should be established for naming the files so you can organize them for quick retrieval when you need them.
- These files—called **assets**—should continue to be monitored throughout the project's execution.

Communication:

- Many multimedia applications are developed in workgroups comprising instructional designers, writers, graphic artists, programmers, and musicians located in the same office space or building.
- The workgroup members' computers are typically connected on a local area network (LAN).
- The client's computers, however, may be thousands of miles distant, requiring other methods for good communication.
- Communication among workgroup members and with the client is essential to the efficient and accurate completion of your project.
- If your client and you are both connected to the Internet, a combination of Skype video and voice telephone, e-mail, and the **File Transfer Protocol (FTP)** may be the most cost-effective and efficient solution for both creative development and project management.

Hardware Needs

- The **Apple Macintosh operating system** (OS) and the **Microsoft Windows** OS, found runningon most Intel-based PCs (including Intel-based Macintoshes).
- Thesecomputers, with their graphical user interfaces and huge installed base ofmany millions of users throughout the world, are the most commonly usedplatforms for the development and delivery of today's multimedia.
- Certainly, detailed and animated multimedia is also created on specializedworkstations from Silicon Graphics, Sun Microsystems, and even onmainframes, but the Macintosh and the Windows PC offer a compellingcombination of affordability, software availability, and worldwide obtainability.
- Regardless of the delivery vehicle for your multimedia—whetherit's destined to play on a computer, on a Wii, Xbox, or PlayStation gamebox, or as bits moving down the data highway—most multimedia willprobably be made on a Macintosh or on a PC.
- The basic principles for creating and editing multimedia elements arethe same for all platforms.
- A graphic image is still a graphic image, and adigitized sound is still a digitized sound, regardless of the methods or toolsused to make and display it or to play it back.
- Indeed, many software toolsreadily convert picture, sound, and other multimedia files (and even wholefunctioning projects) from Macintosh to Windows format, and vice versa,using known file formats or even **binary compatible** files that require noconversion at all.
- While there is a lot of talk about **platform-independent** delivery of multimedia on the Internet, with every new version of a browserthere are still annoying failures on both platforms.
- These failures in **cross platform** compatibility can consume great amounts of time as you prepare for delivery by testing and developing workarounds and tweaks so yourproject performs properly in various target environments.
- Selection of the proper platform for developing your multimedia projectmay be based on your personal preference of computer, your budget constraints,project delivery requirements, and the type of material and contentin the project.

- Many developers believe that multimedia project developmentis smoother and easier on the Macintosh than in Windows, even thoughprojects destined to run in Windows must then be ported and tested acrossplatforms.

Windows vs. Macintosh

- A Windows computer is not a computer per se, but rather a collection of parts that are tied together by the requirements of the Windows operating system.
- Power supplies, processors, hard disks, CD-ROM and DVD players and burners, video and audio components, monitors, keyboards, mice, WiFi, and Bluetooth transceivers—it doesn't matter where they come from or who makes them.
- These components are assembled and branded by Dell, HP, Sony, and others into computers that run Windows.
- In the early days, Microsoft organized the major PC hardware manufacturers into the Multimedia PC Marketing Council, in order to develop a set of specifications that would allow Windows to deliver a dependable multimedia experience.
- Unlike Microsoft, primarily a software company, Apple is a hardware manufacturing company that developed its own proprietary software to run the hardware.
- In 2006, Apple adopted Intel's processor architecture, an engineering decision that allows Macintoshes to run natively with any x86 operating systems, same as Windows.
- All recent models of Macintosh come with the latest Mac operating system, and using Boot Camp or Parallels software, Macs can also run the Windows operating system.

Networking Macintosh and Windows Computers

- If you are working in a multimedia development environment consisting of a mixture of Macintosh and Windows computers, you will want them to communicate with each other.
- You will also wish to share other resources among them, such as printers. **Local area networks (LANs)** and **wide area networks (WANs)** can connect the members of a workgroup.
- In a LAN, workstations are usually located within a short distance of one another, on the same floor of a building, for example.
- WANs are communication systems spanning greater distances, typically set up and managed by large corporations and institutions for their own use, or to share with other users.
- LANs allow direct communication and sharing of peripheral resources such as file servers, printers, scanners, and network routers.
- They use a variety of proprietary technologies to perform the connections, most commonly **Ethernet** (using twisted-pair copper wires) and **WiFi** (using radio).
- Ethernet is only a method for wiring up computers, so you still will need **client/server software** to enable the computers to speak with each other and pass files back and forth.
- The Windows and Mac operating systems provide this networking software, but you may need expert help to set it up—it can be complicated!

Memory and Storage Devices

- To estimate the memory requirements of a multimedia project—the space required on a hard disk, thumb drive, CD-ROM, or DVD, not the **random access memory (RAM)** used while your computer is running— you must have a sense of the project's content and scope.
- Color images, text, sound bites, video clips, and the programming code that glues it all together require memory; if there are many of these elements, you will need even more.
- If you are *making* multimedia, you will also need to allocate memory for storing and archiving working files used during production, original audio and video clips, edited pieces, and final mixed

pieces, production paperwork and correspondence, and at least one backup of your project files, with a second backup stored at another location.

Random Access Memory (RAM)

- If you are faced with budget constraints, you can certainly produce a multimedia project on a slower or limited-memory computer.
- On the other hand, it is profoundly frustrating to face memory (RAM) shortages time after time, when you're attempting to keep multiple applications and files open simultaneously.
- It is also frustrating to wait the extra seconds required of each editing step when working with multimedia material on a slow processor.
- In spite of all the marketing hype about processor speed, this speed is ineffective if not accompanied by sufficient RAM.
- A fast processor without enough RAM may waste processor cycles while it swaps needed portions of program code into and out of memory.
- In some cases, increasing available RAM may show more performance improvement on your system than upgrading the processor chip.

Read-Only Memory (ROM)

- Unlike RAM, **read-only memory (ROM)** is not *volatile*.
- When you turn off the power to a ROM chip, it will not forget, or lose its memory.
- ROM is typically used in computers to hold the small BIOS program that initially boots up the computer, and it is used in printers to hold built-in fonts. **Programmable ROMs** (called **EPROMs**) allow changes to be made that are not forgotten when power is turned off.

Hard Disks

- Adequate storage space for your production environment can be provided by large-capacity hard disks, server-mounted on a network.
- As multimedia has reached consumer desktops, makers of hard disks have built smaller-profile, larger-capacity, faster, and less-expensive hard disks.
- As network and Internet servers drive the demand for centralized data storage requiring **terabytes** (one trillion bytes)

Flash Memory or Thumb Drives

- These flash memory data storage devices are about the size of a thin cigarette lighter and can be integrated with USB or FireWire interfaces to store from eight megabytes to several GB of data.
- They are available in every color of the rainbow, are extremely portable, and, because they have fewer moving parts, are more reliable than disk drives.
- Consisting of a small printed circuit board encased in a sturdy metal or plastic casing with a USB connector covered with a cap, the flash drive is trendy as a status symbol, and convenient to use.
- This same solid-state storage is used in digital cameras, cell phones, and audio recording devices, and for solidstate hard drives (no spinning platters or moving parts) that are found in some netbooks and other handheld devices.

CD-ROM Discs

- **Compact disc read-only memory (CD-ROM)** players have become an integral part of the multimedia development workstation and are an important delivery vehicle for mass-produced projects.
- A wide variety of developer utilities, graphic backgrounds, stock photography and sounds, applications, games, reference texts, and educational software are available on this medium.
- CD-ROM players have typically been very slow to access and transmit data (150 KBps, which is the speed required of consumer Audio CDs), but developments have led to double-, triple-, quadruple speed, 24x, 48x, and 56x drives designed specifically for computer (not Red Book Audio) use.

- With a compact disc recorder, you can make your own CDs, using CD-recordable (CD-R) blank discs to create a CD in most formats of CD-ROM and CD-Audio.
- Software, such as Roxio's Toast and Easy CD Creator, lets you organize files on your hard disk(s) into a "virtual" structure, and then writes them to the CD in that order. CD-R discs are manufactured differently than normal CDs but can play in any CD-Audio or CD-ROM player.
- These write once, enhanced CDs make excellent high-capacity file archives and are used extensively by multimedia developers for pre-mastering and testing CD-ROM projects and titles.
- Because they have become very inexpensive, they are also used for short-run distribution of finished multimedia projects and data backup.
- A CD-RW (read and write) recorder can rewrite 700MB of data to a CD-RW disc about 1,000 times.

Digital Versatile Discs (DVD)

- In December 1995, nine major electronics companies (Toshiba, Matsushita, Sony, Philips, Time Warner, Pioneer, JVC, Hitachi, and Mitsubishi Electric) agreed to promote a new optical disc technology for distribution of multimedia and feature-length movies called **Digital Versatile Disc(DVD)**.
- With a DVD capable not only of gigabyte storage capacity but also full-motion video (MPEG2) and high-quality audio in surround sound, this is an excellent medium for delivery of multimedia projects.
- Commercial multimedia projects will become more expensive to produce, however, as consumers' performance expectations rise.
- There are three types of DVD, including DVD-Read Write, **DVD-Video**, and **DVD-ROM**. These types reflect marketing channels, not the technology.

Input Devices

- A great variety of input devices—from the familiar keyboard and handy mouse to touchscreens and voice recognition setups—can be used for the development and delivery of a multimedia project.
- If you are designing your project for a public kiosk, use a touchscreen. If your project is for a lecturing professor who likes to wander about the classroom, use a remote handheld mouse.
- If you create a great deal of original computer-rendered art, consider a pressure-sensitive stylus and a drawing tablet.
- Scanners enable you to use **optical character recognition (OCR)** software, such as OmniPage from ScanSoft.
- With OCR software and a scanner, you can convert paper documents into a word processing document on your computer without retyping or rekeying.
- Barcode readers are probably the most familiar optical character recognition devices in use today—mostly at markets, shops, and other pointof- purchase locations.
- Using photo cells and laser beams, barcode readers recognize the numeric characters of the **Universal Product Code** (UPC) that are printed in a pattern of parallel black bars on merchandise labels.
- With OCR, or **barcoding**, retailers can efficiently process goods in and out of their stores and maintain better inventory control.
- An OCR terminal can be of use to a multimedia developer because it recognizes not only printed characters but also handwriting

Output Devices

- Presentation of the audio and visual components of your multimedia project requires hardware that may or may not be included with the computer itself, such as speakers, amplifiers, projectors, and motion video devices.
- It goes without saying that the better the equipment is, of course, the better the presentation.
- There is no greater test of the benefits of good output hardware than to feed the audio output of your computer into an external amplifier system: suddenly the bass sounds become deeper and richer, and even music sampled at low quality may sound acceptable.

- Speakers with built-in amplifiers or attached to an external amplifier are important when your project will be presented to a large audience or in a noisy setting.
- The monitor you need for development of multimedia projects depends on the type of multimedia application you are creating, as well as what computer you're using.
- A wide variety of monitors is available for both Macintoshes and PCs. High-end, large-screen graphics monitors and LCD panels are available for both, and they are expensive. Serious multimedia developers will often attach more than one monitor to their computers because they can work with several open windows at a time.
- For example, you can dedicate one monitor to viewing the work you are creating or designing, and you can perform various editing tasks in windows on other monitors that do not block the view of your work.
- **Cathode-ray tube (CRT)** projectors, liquid crystal display (LCD) panels, Digital Light Processing (DLP) projectors, and liquid crystal on silicon (LCOS) projectors, as well as (for larger projects) Grating-Light-Valve (GLV) technologies, are available.
- Hard-copy printed output has also entered the multimedia scene. From storyboards to presentations to production of collateral marketing material, printouts are an important part of the multimedia development environment.

Software Needs

- The basic tool set for building multimedia projects contains one or more authoring systems and various editing applications for text, images, sounds, and motion video.
- A few additional applications are also useful for capturing images from the screen, translating file formats, and moving files among computers.
- The tools used for creating and editing multimedia elements on both Windows and Macintosh platforms do image processing and editing, drawing and illustration, 3-D and CAD, OCR and text editing, sound recording and editing, video and moviemaking, and various utilitarian housekeeping tasks.

Text Editing and Word Processing Tools

- A **word processor** is usually the first software tool computer users learn. From letters, invoices, and storyboards to project content, your word processor may also be your most often used tool, as you design and build a multimedia project.
- Typically, an office or workgroup will choose a single word processor to share documents in a standard format.
- And most often, that word processor comes bundled in an **office suite** that might include spreadsheet, database, e-mail, web browser, and presentation applications.
- Word processors such as Microsoft Word and WordPerfect are powerful applications that include spell checkers, table formatters, thesauruses, and prebuilt templates for letters, résumés, purchase orders, and other common documents.
- Many developers have begun to use Open Office (www.openoffice.org) for word processing, spreadsheets, presentations, graphics, databases, and more.
- It can be downloaded and used completely free of charge for any purpose and is available in many languages.
- It can read and write files from other, more expensive, office packages. In many word processors, you can embed multimedia elements such as sounds, images, and video.

OCR Software

- With OCR software, a flatbed scanner, and your computer, you can save many hours of rekeying printed words, and get the job done faster and more accurately than a roomful of typists.

- OCR software turns bitmapped characters into electronically recognizable ASCII text. A scanner is typically used to create the bitmap.
- Then the software breaks the bitmap into chunks according to whether it contains text or graphics, by examining the texture and density of areas of the bitmap and by detecting edges.
- The text areas of the image are then converted to ASCII characters using probability and expert system algorithms. Most OCR applications claim about 99 percent accuracy

Painting and Drawing Tools

- Painting and drawing tools, as well as 3-D modelers, are perhaps the most important items in your toolkit because, of all the multimedia elements, the graphical impact of your project will likely have the greatest influence on the end user.
- **Painting software**, such as Photoshop, Fireworks, and Painter, is dedicated to producing crafted bitmap images. **Drawing software**, such as CorelDraw, FreeHand, Illustrator, Designer, and Canvas, is dedicated to producing vector-based line art easily printed to paper at high resolution.
- Some software applications combine drawing and painting capabilities, but many authoring systems can import only bitmapped images.
- Look for these features in a drawing or painting package:
    - An intuitive graphical user interface with pull-down menus, status bars, palette control, and dialog boxes for quick, logical selection
    - Scalable dimensions, so that you can resize, stretch, and distort both large and small bitmaps
    - Paint tools to create geometric shapes, from squares to circles and from curves to complex polygons
    - The ability to pour a color, pattern, or gradient into any area
    - The ability to paint with patterns and clip art
    - Customizable pen and brush shapes and sizes
    - An eyedropper tool that samples colors
    - An auto trace tool that turns bitmap shapes into vector-based outlines
    - Support for scalable text fonts and drop shadows
    - Multiple undo capabilities, to let you try again
    - A history function for redoing effects, drawings, and text
    - A property inspector
    - A screen capture facility
    - Painting features such as smoothing coarse-edged objects into the background with anti-aliasing (see illustration); airbrushing in variable sizes, shapes, densities, and patterns; washing colors in gradients; blending; and masking.

    - Support for third-party special-effect plug-ins
    - Object and layering capabilities that allow you to treat separate elements independently
    - Zooming, for magnified pixel editing
    - All common color depths: 1-, 4-, 8-, and 16-, 24-, or 32-bit color, and gray-scale
    - Good color management and dithering capability among color depths using various color models such as RGB, HSB, and CMYK
    - Good palette management when in 8-bit mode
    - Good file importing and exporting capability for image formats such as PIC, GIF, TGA, TIF, PNG, WMF, JPG, PCX, EPS, PTN, and BMP

3-D Modeling and Animation Tools

- **3-D modeling software** has increasingly entered the mainstream of graphic design as its ease of use improves.
- As a result, the graphic production values and expectations for multimedia projects have risen.
- 3-D is an abbreviation for "three dimensions." While in a 2-D graphics program, images are painted in the "x" (horizontal or width) and "y" (vertical or height) axes, in 3-D depth is labeled as the "z" axis.
- Every program that layers objects on the screen must know each object's "z" axis. Web browsers, for example, place objects on the screen using the CSS "z-index" attribute.
- Some software programs (such as Flash CS4 and ToonBoom Studio) can simulate depth by automatically scaling images based on a z-axis value to create a cartoonish or simulated 3-D effect.
- Powerful modeling packages such as VectorWorks, AutoDesk's Maya, Strata 3D, and Avid's SoftImage are also bundled with assortments of prerendered 3-D clip art objects such as people, furniture, buildings, cars, airplanes, trees, and plants
- A good 3-D modeling tool should include the following features:
    - Multiple windows that allow you to view your model in each dimension, from the camera's perspective, and in a rendered preview
    - The ability to drag and drop primitive shapes into a scene
    - The ability to create and sculpt organic objects from scratch
    - Lathe and extrude features
    - Color and texture mapping
    - The ability to add realistic effects such as transparency, shadowing, and fog
    - The ability to add spot, local, and global lights, to place them anywhere, and manipulate them for special lighting effects
    - Unlimited cameras with focal length control
    - The ability to draw spline-based paths for animation

Image-Editing Tools

- **Image-editing applications** are specialized and powerful tools for creating, enhancing, and retouching existing bitmapped images.
- These applications also provide many of the features and tools of painting and drawing programs and can be used to create images from scratch as well as images digitized from scanners, video frame-grabbers, digital cameras, clip art files, or original artwork files created with a painting or drawing package.

Sound-Editing Tools

- Sound-editing tools for both digitized and MIDI sound let you see music as well as hear it.
- By drawing a representation of a sound in fine increments, whether a score or a waveform, you can cut, copy, paste, and otherwise edit segments of it with great precision
- Here are some features typical of image-editing applications and of interest to multimedia developers:
    - Multiple windows that provide views of more than one image at a time
    - Conversion of major image-data types and industry-standard file formats
    - Direct inputs of images from scanner and video sources
    - Employment of a virtual memory scheme that uses hard disk space as
    - RAM for images that require large amounts of memory
    - Capable selection tools, such as rectangles, lassos, and magic wands, for selecting portions of a bitmap
    - Image and balance controls for brightness, contrast, and color balance
    - Good masking features
    - Multiple undo and restore features

- Anti-aliasing capability, and sharpening and smoothing controls
- Color-mapping controls for precise adjustment of color balance
- Tools for retouching, blurring, sharpening, lightening, darkening, smudging, and tinting
- Geometric transformations such as flip, skew, rotate, and distort, and perspective changes
- The ability to resample and resize an image
- 24-bit color, 8- or 4-bit indexed color, 8-bit gray-scale, black-andwhite, and customizable color palettes
- The ability to create images from scratch, using line, rectangle, square, circle, ellipse, polygon, airbrush, paintbrush, pencil, and eraser tools with customizable brush shapes and user-definable bucket and gradient fills
- Multiple typefaces, styles, and sizes, and type manipulation and masking routines
- **Filters** for special effects, such as crystallize, dry brush, emboss, facet, fresco, graphic pen, mosaic, pixelize, poster, ripple, smooth, splatter, stucco, twirl, watercolor, wave, and wind
- Support for third-party special-effect plug-ins
- The ability to design in layers that can be combined, hidden, and reordered

Animation, Video, and Digital Movie Tools

- Animations and digital video movies are sequences of bitmapped graphic scenes (**frames**), rapidly played back.
- But animations can also be made within the authoring system by rapidly changing the location of objects, or **sprites**, to generate an appearance of motion.
- Most authoring tools adopt either a frame- or object-oriented approach to animation, but rarely both.
- To make movies from video, you may need special hardware to convert an analog video signal to digital data. Macs and PCs with FireWire (IEEE 1394) or USB ports can import digital video directly from digital camcorders.
- Moviemaking tools such as Premiere, Final Cut Pro, VideoShop, and MediaStudio Pro let you edit and assemble video clips captured from camera, tape, other digitized movie segments, animations, scanned images, and from digitized audio or MIDI files.
- The completed clip, often with added transition and visual effects, can then be played back—either standalone or windowed within your project.

Authoring Systems Needs

- Multimedia authoring tools provide the important framework you need for organizing and editing the elements of your multimedia project, including graphics, sounds, animations, and video clips.
- Authoring tools are used for designing interactivity and the user interface, for presenting your project on screen, and for assembling diverse multimedia elements into a single, cohesive product.
- Authoring software provides an integrated environment for binding together the content and functions of your project, and typically includes everything you need to create, edit, and import specific types of data; assemble raw data into a playback sequence or cue sheet; and provide a structured method or language for responding to user input.
- With multimedia authoring software, you can make
  - Video productions
  - Animations
  - Games
  - Interactive web sites
  - Demo disks and guided tours
  - Presentations
  - Kiosk applications

- Interactive training
- Simulations, prototypes, and technical visualizations

- Consider the following tips for making your production work go smoothly:
  - Use templates that people have already created to set up your production.
  - These can include appropriate styles for all sorts of data, font sets, color arrangements, and particular page setups that will save you time.
  - Use wizards when they are available—they may save you much time and pre-setup work.
  - Use named styles, because if you take the time to create your own it will really slow you down. Unless your client specifically requests a particular style, you will save a great deal of time using something already created, usable, and legal.
  - Create tables, which you can build with a few keystrokes in many programs, and it makes the production look credible.
  - Help readers find information with tables of contents, running headers and footers, and indexes.
  - Improve document appearance with bulleted and numbered lists and symbols.
  - Allow for a quick-change replacement using the global change feature.
  - Reduce grammatical errors by using the grammar and spell checker provided with the software. Do not rely on that feature, though, to set all things right—you still need to proofread everything.
  - Include identifying information in the filename so you can find the file later.

Types of Authoring Tools

The various multimedia authoring tools can be categorized into three groups, based on the method used for sequencing or organizing multimedia elements and events:

- Card- or page-based tools
- Icon-based, event-driven multimedia and game-authoring tools
- Time-based tools

Card- and Page-Based Authoring Tools

- **Card-based** or **page-based**tools are authoring systems, wherein the elements are organized as pages of a book or a stack of cards.
- Thousands of pages or cards may be available in the book or stack.
- These tools are best used when the bulk of your content consists of elements that can be viewed individually, letting the authoring system link these pages or cards into organized sequences.
- You can jump, on command, to any page you wish in the structured navigation pattern.

- Page-based authoring systems such as LiveCode from Runtime Revolution (www.runrev.com) and ToolBook (www.toolbook.org) contain media objects: buttons, text fields, graphic objects, backgrounds, pages or cards, and even the project itself.

- The characteristics of objects are defined by properties (highlighted, bold, red, hidden, active, locked, and so on).
- Each object may contain a programming script, usually a property of that object, activated when an event (such as a mouse click) related to that object occurs.
- Events cause messages to pass along the hierarchy of objects in the project; for example, a mouse-clicked message could be sent from a button to the background, to the page, and then to the project itself.
- As the message traveled, it looks for handlers in the script of each object; if it finds a matching **handler**, the authoring system then executes the task specified by that handler.

- Following are some typical messages that might pass along the object hierarchy of the LiveCode and ToolBook authoring systems:

- For example, to go to the next card or page when a button is clicked, place a message handler into the script of that button. An example in RunRev's LiveCode language would be:

on mouseUp
go next card
end mouseUp

- An example in ToolBook's OpenScript language would look like:

to handle buttonUp
go next page
end buttonUp

- The handler, if placed in the script of the card or page, executes its commands when it receives a "mouseUp" or "buttonUp" event message that occurs at any location on the card or page—not just while the cursor is within the bounds of a button.
- Card- and page-based systems typically provide two separate layers on each card: a **background layer** that can be shared among many cards, and a foreground layer that is specific to a single card.

Icon- and Object-Based Authoring Tools

- **Icon- or object-based**, **event-driven** tools are authoring systems, wherein multimedia elements and interaction cues (events) are organized as objects in a structural framework or process.
- Icon- or object-based, event-driven tools simplify the organization of your project and typically display flow diagrams of activities along branching paths.
- In complicated navigational structures, this charting is particularly useful during development.

- Icon-based, event-driven tools provide a visual programming approach to organizing and presenting multimedia.
- First you build a structure or flowchart of events, tasks, and decisions, by dragging appropriate icons from a library.

- These icons can include menu choices, graphic images, sounds, and computations. The flowchart graphically depicts the project's logic.
- When the structure is built, you can add your content: text, graphics, animation, sounds, and video movies.
- Then, to refine your project, you edit your logical structure by rearranging and fine-tuning the icons and their properties.
- With icon-based authoring tools, non-technical multimedia authors can build sophisticated applications without scripting.
- In Authorware from Adobe, by placing icons on a flow line, you can quickly sequence events and activities, including decisions and user interactions.
- These tools are useful for storyboarding, as you can change sequences, add options, and restructure interactions by simply dragging and dropping icons.
- You can print out your navigation map or flowchart, an annotated project index with or without associated icons, design and presentation windows, and a cross-reference table of variables.

Time-Based Authoring Tools

- **Time-based tools** are authoring systems, wherein elements and events are organized along a timeline, with resolutions as high as or higher than 1/30 second.
- Time-based tools are best to use when you have a message with a beginning and an end. Sequentially organized graphic frames are played back at a speed that you can set.
- Other elements (such as audio events) are triggered at a given time or location in the sequence of events.
- The more powerful time-based tools let you program jumps to any location in a sequence, thereby adding navigation and interactive control.
- Each tool uses its own distinctive approach and user interface for managing events over time.
- Many use a visual timeline for sequencing the events of a multimedia presentation, often displaying layers of various media elements or events alongside the scale in increments as precise as one second.
- Others arrange long sequences of graphic frames and add the time component by adjusting each frame's duration of play.

Flash :

- Flash is a time-based development environment.
- Flash, however, is also particularly focused on delivery of rich multimedia content to the Web.
- With the Flash Player plug-in installed in more than 95 percent of the world's browsers, Flash delivers far more than simple static HTML pages.

Director:

- Adobe's Director is a powerful and complex multimedia authoring tool with a broad set of features to create multimedia presentations, animations, and interactive multimedia applications.
- It requires a significant learning curve, but once mastered, it is among the most powerful of multimedia development tools.
- In Director, you assemble and sequence the elements of your project, called a "movie," using a Cast and a Score.
- The **Cast** is a multimedia database containing still images, sound files, text, palettes, QuickDraw shapes, programming scripts, QuickTime movies, Flash movies, and even other Director files.

- You tie these Cast members together using the **Score** facility, which is a sequencer for displaying, animating, and playing Cast members, and it is made up of frames that contain Cast members, tempo, a palette, timing, and sound information.
- Each frame is played back on a **stage** at a rate specified in the tempo channel. Director utilizes **Lingo**, a full-featured object-oriented scripting language, to enable interactivity and programmed control.

Multimedia Production Team

- A typical team for developing multimedia for DVD or the Web consists of people who bring various abilities to the table.
- Often, individual members of multimedia production teams wear several hats: graphic designers may also do interface design, scanning, and image processing.
- A project manager or producer may also be the video producer or scriptwriter
- **A multimedia production team** may require as many as 18 discrete roles, including:
    - Executive Producer
    - Producer/Project Manager
    - Creative Director/Multimedia Designer
    - Art Director/Visual Designer
    - Artist
    - Interface Designer
    - Game Designer
    - Subject Matter Expert
    - Instructional Designer/Training Specialist
    - Scriptwriter
    - Animator (2-D/3-D)
    - Sound Producer
    - Music Composer
    - Video Producer
    - Multimedia Programmer
    - HTML Coder
    - Lawyer/Media Acquisition
    - Marketing Director

Project Manager

- A project manager's role is at the center of the action. He or she is responsible for the overall development and implementation of a project as well as for day-to-day operations.
- Budgets, schedules, creative sessions, time sheets, illness, invoice, and team dynamics—the **project manager** is the glue that holds it together.
- A good project manager must completely understand the strengths and limitations of hardware and software so that he or she can make good decisions about what to do and what not to do.

Multimedia Designer

- The look and feel of a multimedia project should be pleasing and aesthetic, as well as inviting and engaging.
- Screens should present an appealing mix of color, shape, and type. The project should maintain visual consistency, using only those elements that support the overall message of the program.
- Navigation clues should be clear and consistent, icons should be meaningful, and screen elements should be simple and straightforward.
- Graphic designers, illustrators, animators, and image processing specialists deal with the visuals.

- **Instructional designers** are specialists in education or training and make sure that the subject matter is clear and properly presented for the intended audience.
- **Interface designers** devise the navigation pathways and content maps.
- **Information designers** structure content, determine user pathways and feedback, and select presentation media based on an awareness of the strengths of the many separate media that make up multimedia.

Interface Designer

- Like a good film editor, an interface designer's best work is never seen by the viewer—it's "transparent."
- In its simplest form, an interface provides control to the people who use it.
- It also provides access to the "media" part of multimedia, meaning the text, graphics, animation, audio, and video— without calling attention to itself.
- The elegant simplicity of a multimedia title screen, the ease with which a user can move about within a project, effective use of windows, backgrounds, icons, and control panels—these are the result of an interface designer's work.

Writer

- Multimedia writers do everything writers of linear media do, and more. They create character, action, and point of view—a traditional **scriptwriter**'s tools of the trade—and they also create interactivity.
- They write proposals, they script voice-overs and actors' narrations, they write text screens to deliver messages, and they develop characters designed for an interactive environment.
- Writers of text screens are sometimes referred to as content writers.
- They glean information from content experts, synthesize it, and then communicate it in a clear and concise manner.
- Scriptwriters write dialog, narration, and voice-overs. Both often get involved in overall design.

Video Specialist

- Video images delivered in a multimedia production have improved from postage-stamp-sized windows playing at low frame rates to full-screen (or nearly full-screen) windows playing at 30 frames per second.
- As shooting, editing, and preparing video has migrated to an all-digital format and become increasingly affordable to multimedia developers, video elements have become more and more part of the multimedia mix.
- For high-quality productions, it may still be necessary for a **videospecialist** to be responsible for an entire team of videographers, sound technicians, lighting designers, set designers, script supervisors, gaffers, grips, production assistants, and actors.

Audio Specialist

- The quality of audio elements can make or break a multimedia project.
- **Audio specialists** are the wizards who make a multimedia program come alive, by designing and producing music, voice-over narrations, and sound effects.
- They perform a variety of functions on the multimedia team and may enlist help from one or many others, including composers, audio engineers, or recording technicians.
- Audio specialists may be responsible for locating and selecting suitable music and talent, scheduling recording sessions, and digitizing and editing recorded material into computer files

Multimedia Programmer

- A **multimedia programmer** or software engineer integrates all the multimedia elements of a project into a seamless whole using an authoring system or programming language.
- Multimedia programming functions range from coding simple displays of multimedia elements to controlling peripheral devices and managing complex timing, transitions, and record keeping.

- Creative multimedia programmers can coax extra (and sometimes unexpected) performance from multimedia-authoring and programming systems.
- Without programming talent, there can be no multimedia. Code, whether written in JavaScript, OpenScript, Lingo, RevTalk, PHP, Java, or C++, is the sheet music played by a well-orchestrated multimedia project.

Producer of Multimedia for the Web

- Web site **producer** is a new occupation, but putting together a coordinated set of pages for the World Wide Web requires the same creative process, skill sets, and (often) teamwork as any kind of multimedia does.
- With a little effort, many of us could put up a simple web page with a few links, but this differs greatly from designing, implementing, and maintaining a complex site with many areas of content and many distinct messages.
- A web site should never be finished, but should remain dynamic, fluid, and alive. Unlike a DVD multimedia product replicated many times in permanent plastic, the work product at a web site is available for tweaking at any time

QUESTIONS:

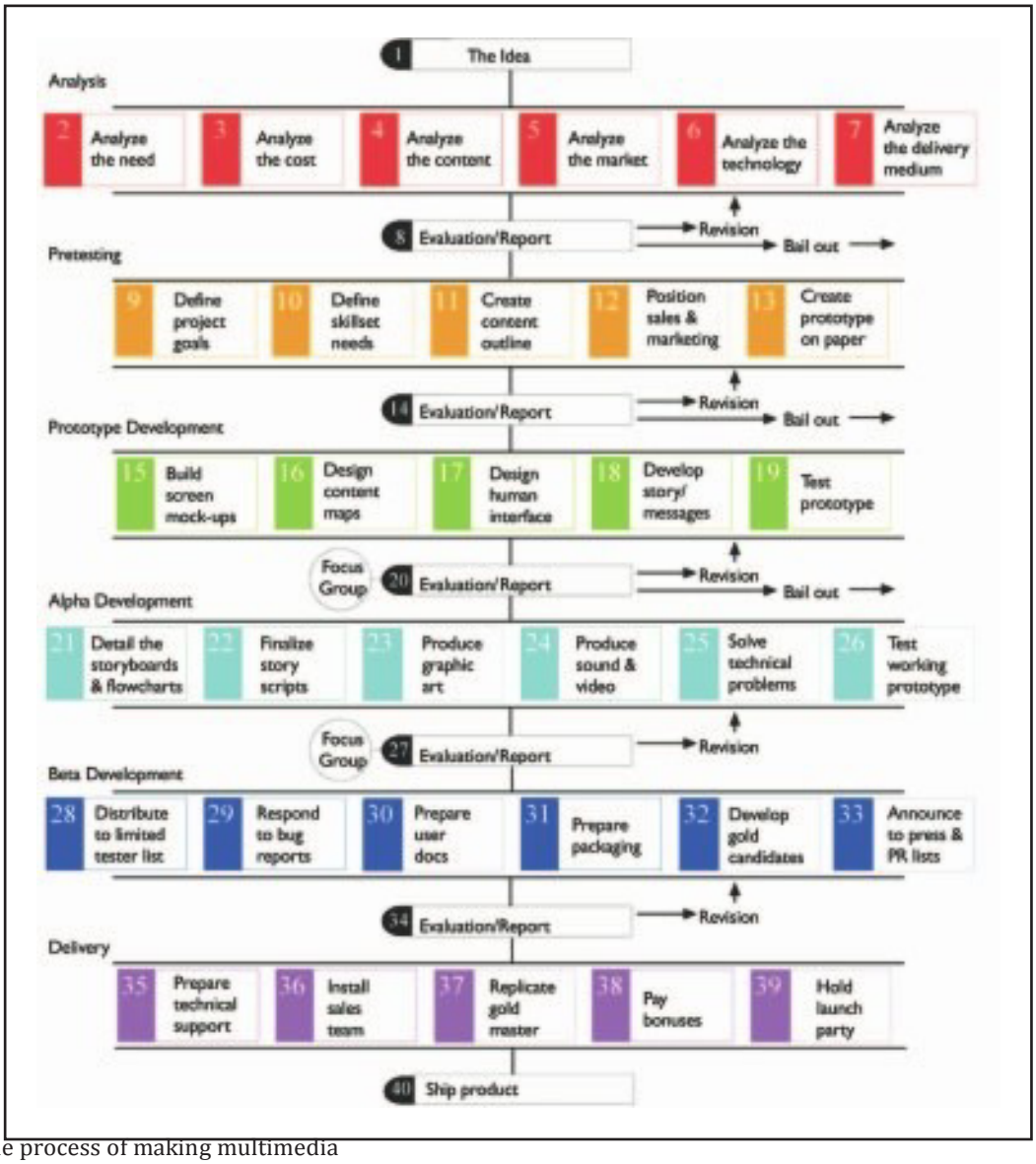
1. Describe stages of a multimedia project.
2. Detail about intangibles in multimedia
3. What is hardware need for multimedia?
4. What is the software is need for multimedia?
5. What is the need in authoring system?
6. Who are playing the role in multimedia skill?

UNIT 5

PLANNING AND COSTING

The process of making multimedia:

- Plan for the entire process: beginning with your first ideas and ending with completion and delivery of a finished product.Think in the overview.
- The stepwise process of making multimedia is illustrated in Figure Use this chart to help you get your arms around a new web site or DVD production



The process of making multimedia

Idea Analysis

- Ultimately, you will generate a plan of action that will become your road map for production.
- Who needs this project? Is it worthwhile? Do you have the materials at hand to build it? Do you have the skills to build it?

Your idea will be in balance if you have considered and weighed the proper elements:

- What is the essence of what you want to do? What is your purpose and message?
- Is there a client, and what does the client want?
- How can you organize your project?

- What multimedia elements (text, sounds, and visuals) will best deliver your message?
- Will interactivity be required?
- Is your idea derived from an existing theme that can be enhanced with multimedia, or will you create something totally new?
- What hardware is available for development of your project? Is it enough?
- How much storage space do you have? How much do you need?
- What multimedia software is available to you?
- What are your capabilities and skills with both the software and the hardware?
- Can you do it alone? Who can help you?
- How much time do you have?
- How much money do you have?
- How will you distribute the final project?
- Will you need to update and/or support the final product?

Pretesting

- If you decide that your idea has merit, take it to the next step. Define your project goals in greater detail and spell out what it will take in terms of skills, content, and money to meet these goals.
- If you envision a commercial product, sketch out how you will sell it. Work up a prototype of the project on paper, with an explanation of how it will work. All of these steps help you organize your idea and test it against the real world.

Task Planning

- There may be many tasks in your multimedia project. Here is a checklist of action items for which you should plan ahead as you think through your project:

- Design Instructional Framework
- Hold Creative Idea Session(s)
- Determine Delivery Platform
- Determine Authoring Platform
- Assay Available Content
- Draw Navigation Map
- Create Storyboards
- Design Interface
- Design Information Containers
- Assemble Team
- Build Prototype
- Conduct User Test
- Revise Design
- Create Graphics
- Create Animations
- Produce Audio
- Produce Video
- Digitize Audio and Video
- Program and Author
- Test Functionality
- Fix Bugs
- Conduct Beta Test
- Create Golden Master
- Replicate
- Prepare Package
- Deliver or Install at Web Site
- Award Bonuses

Prototype Development

Once you have decided that a project is worth doing, you should develop a working prototype. This is the point at which you begin serious work at the computer, building screen mock-ups and a human interface of menus and button clicks.

Your messages and story lines will take shape as you explore ways of presenting them. For the prototype, sometimes called a **proof-of-concept** or **feasibility study**, you might select only a small portion of a large project and get that part working as it would in the final product.

Indeed, after trying many different approaches in the course of prototyping, you may end up with more than one viable candidate for the final product.

Alpha Development

As you go forward, you should continually define the tasks ahead, because just as if you were navigating a supertanker, you should be aware of the reefs and passages that will appear along your

course and prepare for them. With an **alpha** stage prototype in hand and a commitment to proceed, the investment of effort will increase and, at the same time, become more focused. More people may become involved as you begin to flesh out the project as a whole.

Beta Development

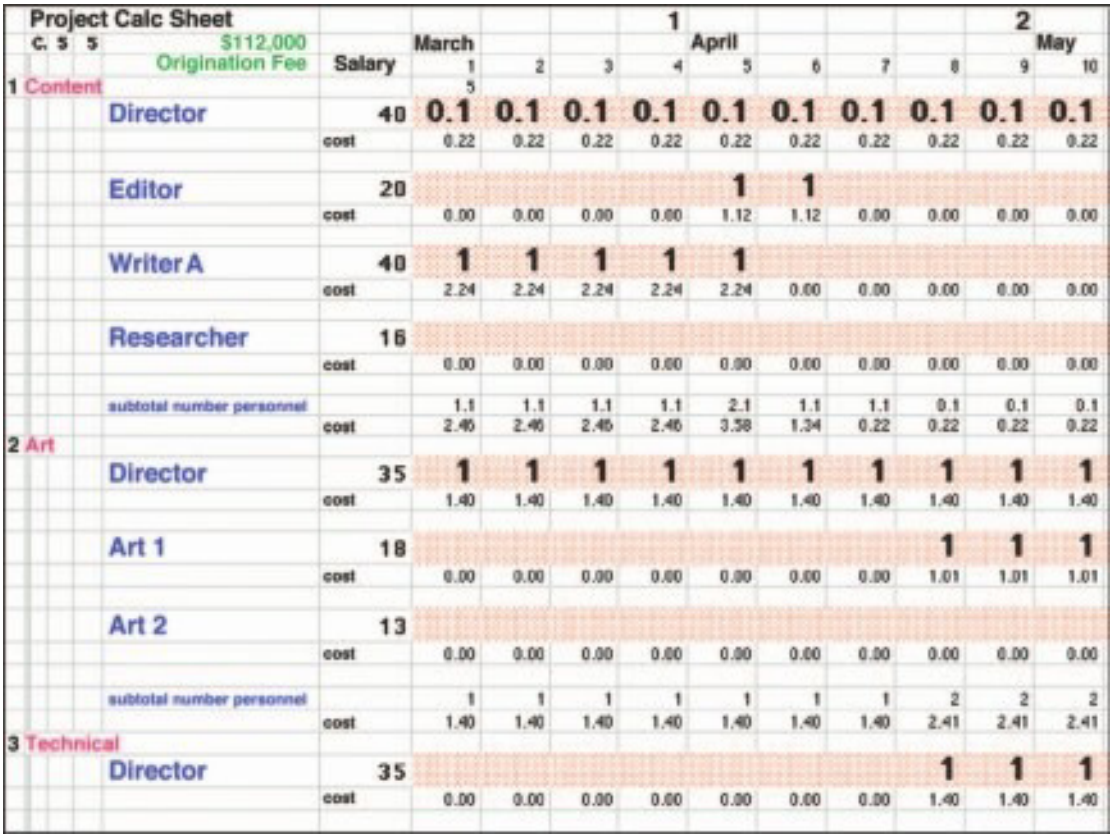
By the time your idea reaches the **beta** stage of development, you will have committed serious time, energy, and money, and it is likely too late to bail out. You have gone past the point of no return and should see it through.

Delivery

By the time you reach the delivery stage, you are **going gold**—producing the final product. Your worries slide toward the marketplace

Scheduling

- . To create this schedule, you must estimate the total time required for each task and then allocate this time among the number of persons who will be asynchronously working on the project (see, for example, Figure).
- Scheduling can be difficult for multimedia projects because so much of the making of multimedia is artistic trial and error.
- A recorded sound will need to be edited and perhaps altered many times. Animations need to be run again and again and adjusted so that they are smooth and properly placed.
- A QuickTime or MPEG movie may require many hours of editing and tweaking before it works in sync with other screen activities.
- Scheduling multimedia projects is also difficult because the technology of computer hardware and software is in constant flux, and upgrades while your project is under way may drive you to new installations and concomitant learning curves.
- The general rule of thumb when working with computers and new technology under a deadline is that everything will take longer to do than you think it will.
- In production and manufacturing industries, it is a relatively simple matter to estimate costs and effort. To make chocolate chip cookies, for example, you need ingredients, such as flour and sugar, and equip- ment, such as mixers, ovens, and packaging machines.
- Once the process is running smoothly, you can turn out hundreds of cookies, each tasting the same and each made of the same stuff. You then control your costs by fine-tuning known expenses, like negotiating deals on flour and sugar in quantity, installing more efficient ovens, and hiring personnel at a more competitive wage. In contrast, making multimedia is not a repeti- tive manufacturing process.



Project Calc Sheet						1					2	
C. S S	$112,000		March				April					May
	Origination Fee	Salary	1	2	3	4	5	6	7	8	9	10
1 Content			5									
	Director	40	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		cost	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
	Editor	20					1	1				
		cost	0.00	0.00	0.00	0.00	1.12	1.12	0.00	0.00	0.00	0.00
	Writer A	40	1	1	1	1	1					
		cost	2.24	2.24	2.24	2.24	2.24	0.00	0.00	0.00	0.00	0.00
	Researcher	16										
		cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	subtotal number personnel		1.1	1.1	1.1	1.1	2.1	1.1	1.1	0.1	0.1	0.1
		cost	2.46	2.46	2.46	2.46	3.58	1.34	0.22	0.22	0.22	0.22
2 Art												
	Director	35	1	1	1	1	1	1	1	1	1	1
		cost	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
	Art 1	18								1	1	1
		cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.01	1.01	1.01
	Art 2	13										
		cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	subtotal number personnel		1	1	1	1	1	1	1	2	2	2
		cost	1.40	1.40	1.40	1.40	1.40	1.40	1.40	2.41	2.41	2.41
3 Technical												
	Director	35								1	1	1
		cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	1.40	1.40

Figure Portion of a spreadsheet used to schedule manpower and project costs

Billing Rates

Your billing rate should be set according to your cost of doing business plus a reasonable profit margin. Typical billing rates for multimedia production companies and web designers range from $60 to $150 an hour, depending upon the work being done and the person doing it.

If consultants or specialists are employed on a project, the billing rate can go much higher.

Everyone who contributes to a project should have two rates associated with their work: the employee's cost to the employer (including salary and benefits), and the employee's rate billed to the customer.

Multimedia production companies and web site builders with high billing rates claim their skill-sets and experience allow them to accomplish more work in a given amount of time, expertly, thus saving money, time, and enhancing the finished quality and reliability of a project. This is particularly the case with larger-scale, complex projects.

Smaller and leaner companies that offer lower billing rates may claim to be more streamlined, hungry, and willing to perform extra services. Lower rates do not necessarily mean lower-quality work, but rather imply that the company either supports fewer overheads or is satisfied with a reduced profit margin.

RFP's and Bid proposal:

The Cover and Package

You have many options for designing the look and feel of your proposal.

Size up the people who will read your proposal and ferret out their expectations; tailor your

proposal to these expectations.

If your client judges from the cover of your proposal that the docu- ment inside is amateurish rather than professional, you are already fighting an uphill battle.

There are two strategies for avoiding this negative first impression:

1. Develop your own special style for a proposal cover and package, including custom fonts, cover art and graphics, illustrations and figures, unique section and paragraph styles, and a clean binding. Do your proposal first class.
2. Make the entire package plain and simple, yet businesslike. The plain part of the approach means not fussing with too many fonts and type styles. This austerity may be particularly successful for proposals to government agencies, where 12-point Times New Roman or
12-point Courier may be not just a de facto standard, but a required document format. If you must submit hardcopy documents in addi- tion to PDF or DOC files, a stapled sheaf of papers is adequate.
Don't try to dress up your plain presentation with Pee-Chee folders or cheap plastic covers; keep it lean and mean.

Table of Contents

Busy executives want to anticipate a document and grasp its content in short order. A table of contents or index is a straightforward way to present the elements of your proposal in condensed overview.

In some situations, you may also wish to include an **executive summary**—a prelude containing no more than a few paragraphs of pithy description and budget totals.

The summary should be on the cover page or immediately following. In an electronic submission, you can hotlink to the Table of Contents and to important sections.

Needs Analysis and Description

In many proposals, it is useful to describe in some detail the reason the project is being put forward. This **needs analysis** and description is particularly common in proposals that must move through a company's executive hierarchy in search of approval and funding.

Target Audience

All multimedia proposals should include a section that describes the target audience and target platform. When the end user's multimedia capabilities have a broad and uncertain range, it is crucial to describe the hardware and software delivery platform you intend to provide.

Creative Strategy

A **creative strategy** section—a description of the look and feel of the project itself—can be important to your proposal, especially if the executives reviewing your proposal were not present for creative sessions or did not participate in preliminary discussions

If you have designed a prototype, describe it here, or create a separate heading and include graphics and diagrams.

Project Implementation

A proposal must describe the way a project will be organized and scheduled. Your estimate of costs and expenses will be based upon this description.

The Project Implementation section of your proposal may contain a detailed calendar, PERT and Gantt project planning charts, and lists of specific tasks with associated completion dates, deliverables,

and work hours. This information may be general or detailed, depending upon the demands of the client.

The project implementation section is not just about how much work there is, but how the work will be managed and performed. You may not need to specify time estimates in work hours, but rather in the amount of calendar time required to complete each phase.

Budget

The budget relates directly to the scope of work you have laid out in the project implementation section. Distill your itemized costs from the project implementation description and consolidate the minute tasks of each project phase into categories of activity meaningful to the client.

Designing and producing:

Designing

The design part of your project is where your knowledge and skill with computers; your talent in graphic arts, video, and music; and your ability to conceptualize logical pathways through information are all focused to create the real thing. Design is thinking, choosing, making, and doing.

It is shaping, smoothing, reworking, polishing, testing, and editing. When you design your project, your ideas and concepts are moved one step closer to reality.

Competence in the design phase is what separates amateurs from professionals in the making of multimedia.

Depending on the scope of your project and the size and style of your team, you can take two approaches to creating an original interactive multi- media design. You can spend great effort on the **storyboards**, or graphic outlines, describing the project in exact detail—using words and sketches for each and every screen image, sound, and navigational choice, right down to specific colors and shades, text content, attributes and fonts, but- ton shapes, styles, responses, and voice inflections

Designing theStructure

A multimedia project is no more than an arrangement of text, graphic, sound, and video elements (or *objects*). The way you compose these elements into interactive experiences is shaped by your purpose and messages.

Navigation

A **navigation map** (or **site map**) provides you with a table of contents as well as a chart of the logical flow of the interac- tive interface. While with web sites a site map is typically a simple hier- archical table of contents with each heading linked to a page, as a more detailed design document your map may prove very useful to your project, listing your multimedia objects and describing what happens when the user interacts.

Just as eight story plots might account for 99 percent of all literature ever written (boy meets girl, protagonist versus antagonist, etc.), a few basic structures for multimedia projects will cover most cases: **linear naviga- tion**, **hierarchical navigation**, **nonlinear navigation**, and **composite navigation**. Figure illustrates the four fundamental organizing struc- tures used in multimedia projects, often in combination:

- **Linear** Users navigate sequentially, from one frame or bite of information to another.
- **Hierarchical** Also called "linear with branching," since users navigate along the branches of a tree

structure that is shaped by the natural logic of the content.

Nonlinear Users navigate freely through the content of the project,unbound by predetermined routes.

Composite Users may navigate freely (nonlinearly) but are occasionally con- strained to linear presentations of movies or critical information and/or to data that is most logically organized in a hierarchy.

Designing the User Interface

Novice/Expert Modes

Creating a user interface that will satisfy both types has been a design dilemma since the invention of computers.

The simplest solution for handling varied levels of user expertise is to provide a **modal interface**, where the viewer can simply click a Novice/ Expert button and change the approach of the whole interface—to be either more or less detailed or complex. Modal interfaces are common on bulletin boards,

GUIs

The Macintosh and Windows graphical user interfaces (GUI, pronounced "gooey") are successful partly because their basic point-and-click style is simple, consistent, and quickly mastered. Both these GUIs offer built-in help systems, and both provide standard patterns of activity that produce standard expected results.

The following actions, for example, are consis- tently performed by similar keystrokes when running most programs on the Macintosh or in Windows:

A Multimedia Design Case History

Storyboarding a Project

The source material (all that was available) practically sorted itself into logical groups: a pile of old photographs, a magazine article and news- paper clippings, engineering drawings, official documents, and some recorded sounds

The first storyboard was a simple hierarchical structure with branches to each subject area, as shown in Figure .

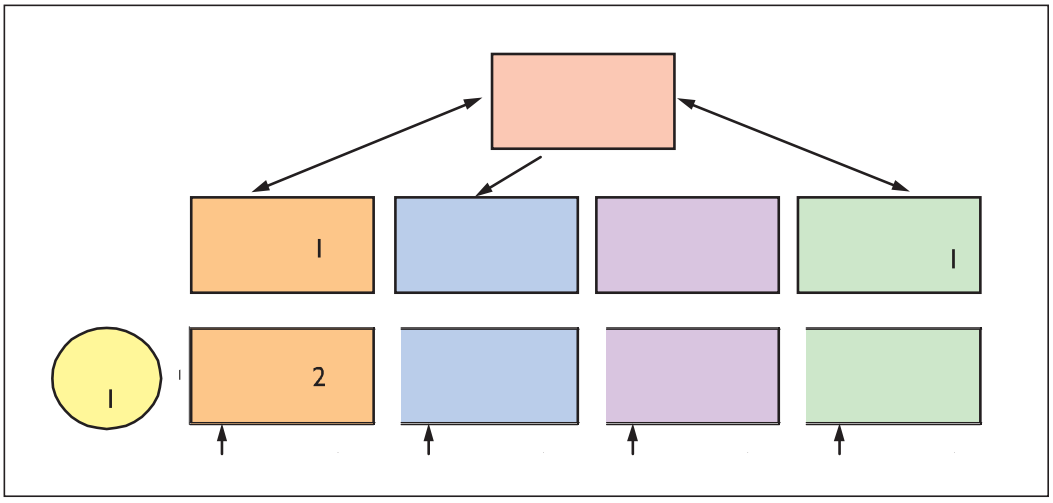


Figure The first storyboard

Producing

Production is the phase when your multimedia project is actually rendered. During this phase you will contend with important and continuous organizing tasks.
There will be times in a complex project when graphics files seem to disappear from the server, when you forget to send or cannot produce milestone progress reports, when your voice talent gets lost on the way to the recording studio, or when your hard disk crashes.

Starting Up

Here are some examples of things to think about.

- Desk and mind clear of obstructions?
- Best computers you can afford?
- Time-accounting and management system in place?
- Biggest (or most) monitors you can afford?
- Sufficient disk storage space for all work files?
- System for regular backup of critical files?
- Conventions or protocols for naming your working files and managing source documents?
- Latest version of your primary authoring software?
- Latest versions of software tools and accessories?
- Communication pathways open with client?
- Breathing room for administrative tasks?
- Financial arrangements secure (retainer in the bank)?
- Expertise lined up for all stages of the project?
- Kick-off meeting completed?

Working withClients

Making multimedia for clients is a special case. Be sure that the organization of your project incorporates a system for good communication between you and the client as well as among the people actually building the project. Many projects have turned out unhappily because of communication breakdowns.

Data Storage Media and Transportation

It's important that the client be able to easily review your work. Remember that either you or the distant site need to have matching data transfer systems and media, or you need to provide a web or FTP site for your project. Organize your system before you begin work, as it may take some time for both you and the client to agree on an appropriate system and on the method of transportation.

Tracking

Organize a method for tracking the receipt of material that you will incorporate into your multimedia project. Even in small projects, you will be dealing with many digital bits and pieces.
Develop a **file-naming convention** specific to your project's structure. Store the files in directories or folders with logical names. **Version control** of your files (tracking editing changes) is critically important, too, especially in large projects.

If more than one person is working on a group of files, be sure that you always know what version is the latest and who has the current version. If storage space allows, archive all file iterations, in case you change your mind about something and need to go back to a prior rendering.

Copyrights

Commonly used authoring platforms may allow access to the software programming code or script that drives a particular project. The source code of HTML pages on the Web may also be easily viewed.

In such an open-code environment, are you prepared to let others see your programming work? Is your code neat and commented? Perhaps your mother cautioned you to wear clean underclothing in case you were suddenly on a table among strangers in a hospital emergency room—well, apply this rule to your code.

Hazards andAnnoyances

Small annoyances, too, can become serious distractions that are counterproductive. The production stage is a time of great creativity, dynamic intercourse among all contributors, and, above all, hard work. Be prepared to deal with some common irritants, for example:

- Creative coworkers who don't take (or give) criticism well
- Clients who cannot or are not authorized to make decisions
- More than two all-nighters in a row
- Too many custom-coded routines
- Instant coffee and microwaved corn dogs
- Too many meetings; off-site meetings
- Missed deadlines
- Software and hardware upgrades that interrupt your normal operations

Content and Talent

Acquiring Content

Contentacquisition can be one of the most expensive and time-consuming tasks in organizing a multimedia project. You must plan ahead, allocating sufficient time (and money) for this task.

- If your project describes the use of a new piece of robotics machinery, for example, will you need to send a photographer to the factory for the pictures? Or can you digitize existing photographs?
- Suppose you are working with 100 graphs and charts about the future of petroleum exploration. Will you begin by collecting the raw data from reports and memos, or start with an existing spreadsheet or data- base? Perhaps you have charts that have already been generated from the data and stored as TIFF or JPEG files?
- You are developing an interactive guide to the trails in a national park, complete with video clips of the wildlife that hikers might encounter on the trails. Will you need to shoot original video footage, or are there existing tapes for you to edit?

OwnershipofContent CreatedforaProject

In the process of developing your multimedia project, interfaces will be designed, text written, lines of code programmed, and original artwork illustrated with photographs, animations, musical scores, sound effects, and video footage. Each of these elements is an original work.

If you are creating a project single-handedly for yourself, you own the copyright outright. If other persons who are not your employees also contribute to the final product, they may own copyright of the element created by them or may share joint ownership of the product unless they assign or license their ownership rights to you

The ownership of a project created by employees in the course of their employment belongs solely to the employer if the work fits the requirements of a "work made for hire."

To meet the definition of a work made for hire, several factors must be weighed to determine whether the individual is legally an employee or an independent contractor.

Among these factors are where the work is done, the relationship between the parties, and who provides the tools and equipment.

If the individual contributing to a project is not an employee, the commissioned work must fall within one of the following "work made for hire" categories: a contribution to a collective work, a work that is part of a motion picture or other audiovisual work, a translation, a supplementary work, a compilation, an instructional text, a test, answer material for a test, or an atlas (1976 Copyright Act, 17 U.S.C. § 201(b)).

copyright ownership of works created in whole or in part by persons who fall under the definition of **independent contractor** may belong to that contractor unless the work is specially ordered or commis- sioned for use and qualifies as a work made for hire, in which case the copyright belongs to the entity commissioning the work.

Acquiring Talent

After you have tested everybody you know and you still have vacant seats in your project, you may need to turn to professional talent. Getting the perfect actor, model, or narrator's voice is critical.

Professional voice-over talents and actors in the United States usu- ally belong to a union or guild, either **AFTRA (American Federation of Television and Radio Artists)** or **SAG (Screen Actors Guild)**. They are usually represented by a talent agent or agency that you can find in the yellow pages.

Locating the Professionals You Need

Before you can safely put a professional in front of a camera or a micro- phone, you have to find the talent first and then deal with hiring and union contracts.

Begin by calling a **talent agency** and explain what you need. The agency will probably suggest several clients who might fit your needs and send you to their web site for video or audio samples of the actors' work. After reviewing the samples, you can arrange **auditions** of the best candidates, at your office or at a studio.

Working with Union Contracts

The two unions, AFTRA and SAG, have similar contracts and terms for minimum pay and benefits. AFTRA has approved an Interactive Media Agreement to cover on- and off-camera performers on all interactive media platforms.

AFTRA definitions related to interactive media.

QUESTIONS:

1. Describe about process of multimedia?
2. Detail about scheduling?
3. Detail about estimation?
4. Describe RFP's and Bid Proposals?
5. Detail about designing.
6. Describe about producing.
7. Details about acquiring content.
8. Detail about acquiring talent.