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PG DEPARTMENT OF COMPUTER SCIENCE

SUBJECT NAME: MULTIMEDIA SYSTEMS

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Multimedia systems syllabus

Unit 1: Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

Unit 2: Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software– Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

Unit 3: Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop

Unit 4: Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

Unit 5 : Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

Recommended Texts:

1. S. Heath, 1999, Multimedia & Communication Systems, Focal Press, UK.
2. T. Vaughan, 1999, Multimedia: Making it work, 4th Edition, Tata McGraw Hill, New Delhi.
3. K. Andleigh and K. Thakkar, 2000, Multimedia System Design, PHI, New Delhi.

Reference Books

- 1) Keyes, “Multimedia Handbook”, TMH, 2000.
- 2) R. Steinmetz and K. Naharstedt, 2001, Multimedia: Computing, Communications & Applications, Pearson, Delhi.
- 3) S. Rimmer, 2000, Advanced Multimedia Programming , PHI, New Delhi..

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MULTI-MEDIA UNIT I

WHAT IS MULTIMEDIA

Definitions

→ **Multimedia:**

Multimedia is a woven combination of text, graphic art, sound animation, and video elements.

→ **Interactive Multimedia:**

Allowing end user as a viewer of MM project to control what and when the elements are delivered is called Interactive Multimedia.

→ **Hypermedia:**

Providing a structure of linked elements through which the user can navigate, interactive multimedia becomes Hypermedia.

→ **Multimedia Developers:**

The people who weave multimedia into meaning full tape strives are Multimedia developers.

→ **Multimedia Project:**

The Software vehicle, the messages and the content presented on a computer or TV screen together constitute a Multimedia project.

→ **Multimedia Title:**

The project shipped or sold to consumers or end users, typically in a box with or without instructions, it is a Multimedia title, simply it is a name given to media.

→ **Multimedia Types:**

- Linear:

A project is said to be linear, starting at a beginning and running through to an end.

- Non- Linear:

User are given navigational controls and can pass through the content becomes non- linear

→ **Authoring Tools:**

Multimedia elements are typically sewn together into a project using authoring tools.

These software tools are designed to manage individual multimedia elements and provide user interaction. Most authoring tools also offer other facilities for creating and editing text and images, and they have extensions to drive videodisc players, videotape players, and other relevant hardware peripherals.

→ **Multimedia Platform (or) Environment:**

The sum of what gets played back and how it is presented to the viewer is the graphical user interface, or GUI.

→ **Multimedia Platform (or) Environment:** The hardware and software that govern the limits of what can happen are the multimedia platform or environment.

CD-ROM and Multimedia Highway

Multimedia requires large amounts of digital memory when stored in an end user's library, or large amounts of bandwidth when distributed over wires or glass fiber on a network.

CD-ROM And Multimedia

- CD- ROM (Compact disk read only memory) has emerged during the last few years as the most cost- effective distribution medium for multimedia projects.
- CD- ROM disc can be mass- produced for less than one dollar and can contain up to 72 minutes of full screen video.
- Or it can contain unique mixes of images, sounds, text, video, and animations controlled by an authoring system to provide unlimited user interaction.
- Discs can be stamped out of Polycarbonate plastic.
- Most personal computers sold today include a CD- ROM player, and the software that drives these computers is commonly available on CD- ROM disc.
- Multilayered Digital Versatile Disc (DVD) technology will super cede CD- ROM by the turn of millennium, increasing the capacity and technology.
- CD- ROM and DVD are but interim memory technologies that will be replaced by new devices that do not require moving parts.
- As the data highway described below becomes more and more pervasive and users become more easily connected, Copper wire, glass fiber, and radio/ cellular technologies may prevail as the most commonly used delivery means for interactive multimedia.

The Multimedia Highway

- ➔ Telecommunication networks are global, and 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 , where we pay to acquire and use multimedia – based information.
- ➔ Alliances are under way between the government, cable companies, telephone companies, computer companies, and existing data distribution networks such as the Internet to build a National Information Infrastructure.
- ➔ The actual glass fiber cables that compose much of the physical backbone of the data highway are, in many cases, owned by railroads and pipeline companies that simply buried the cable on existing rights of way where no special permits and environmental reports are necessary.
- ➔ Interest from a confluence of entertainment mega- corps, information publishers and providers , cable and telephone companies , and hardware and software manufacturers is already driving this inevitable evolution, and profound changes in global communications strategy are on the drawing boards.
- ➔ Entertainment companies that own content easily converted to multimedia projects are teaming up with cable TV companies such as QVC or Vaicom.
- ➔ Such companies will own the routes for carrying data, other companies will own the hardware and software interfaces at the end of the line, at offices and homes.
- ➔ Some will knit it all together and provide supply - on – demand and billing services.
- ➔ This is a fresh and exciting industry coming of age , but one still faced with many growing pains.

Use of Multimedia

- Multimedia is appropriate whenever a human interface connects a human user to electronic information of any kind.
- Multimedia enhances traditional text- only computer interfaces and yields measurable benefit by gaining and holding attention and interest multimedia improves information retention.
- When properly woven, multimedia can also be profoundly entertaining.

Multimedia In Business:

- Business Applications for multimedia include presentations, training, marketing, advertising, product demos, databases, catalogues, and networked communications.
- Voice mail and video conferencing will soon be provided on many local and wide area networks.

- A multimedia presentation can make an audience come alive.
- Most presentation software packages let you know add audio and video clips to the usual “slide show” of graphics and text material.
- Multimedia is enjoying widespread use in training programs.
 - ➔ Flight attendants learn to manage international terrorism and security through simulation.
 - ➔ Mechanics learn to repair engines.
 - ➔ Sales people learn about product lines leave behind software to train their customers.
 - ➔ Fighter pilots practice full- terrain sorties before spooling up for the real thing.
 - ➔ MM around the office has become more common place.
 - ➔ As Companies and Businesses catch on to the power of mm, and the cost of installing mm capability decreases, more applications will be developed both in- house and by third parties to allow businesses to run more smoothly and efficiently.

Multimedia In Schools:

- Schools are perhaps the most needy destination for mm.
- Many schools in the US today are chronically under funded and occasionally slow to adopt new technologies, but it is here that the power of mm can be maximized for the greatest long term benefit to all.
- The White House has taken steps to provide governmental supports with a program of “Challenge Grants for Technology in Education” a \$27- million effort to support state- of – the – art technology in about 20 low income rural and urban school districts.
- MM will provoke radical changes in the teaching process in future.
- In Some instances teachers become the core of the teaching and learning process.
- So Educational software is often positioned as “enriching” the learning process.
- Reading Skills grow through word recognition: a mouse click on any word plays it back.
- It provides physicians with over 100 case presentation and gives cardiologists, radiologists and medical students an oppournity for in depth learning of new clinical techniques.
- California, 12 Davidson Junior High School students put together perhaps the first interactive magazine for kids and called it the “ San Rafael Community Express”.

Multimedia at Home:

From gardening to cooking to home design, remodelling , and repair to genealogy software multimedia has entered at the home.

- Eventually most MM projects will reach the home via TV sets or monitors with built in interactive user inputs.
- There is a increasing convergence of computer based multimedia with entertainment and games based media traditionally described as “ Shoot- em- up”.
- The home of the future will be very different when the cost of set of set- top players and MM Tv becomes mass- market affordable and the MM Connection to the data highway widely available.

- When no. of MM households increases from hundreds to thousands to many millions, a vast collection of MM tiles and material will be required to satisfy the demands of the market, and vast amounts of money will be earned producing and distributing these products.

Multimedia In Public Places:

- In hotels, Train stations , Shopping Malls, museums, and grocery stores, MM will become available at stand – alone terminals or kiosks to provide information and help.
- Hotel kiosks list nearby restaurants, maps of the city, airline schedules, and provide guest services such as automated check outs.
- Muesum 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.
- Rich Computer colors and video digitizers and though smell is not yet part of any multimedia standard.
- The Platforms for MM presentation have much improved since Scrabin’s time.

VIRTUAL REALITY:

- The convergence of technology and creative invention in multimedia is virtual reality or VR.
- Goggle, 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, 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 object, the higher the resolution and the and the more realistic view.
- On the World Wide Web, standards for transmitting virtual reality worlds or “scenes” in VRML (Virtual Reality Modeling Language) documents (with the extension. Wrl)have been developed. Using high-speed dedicated computer, multi-million-dollar flight simulators built by Singer, RediFusion, and others have led the way in commercial application of VR.
- Specialized public game arcades have been built recently to offer VR combat and flying experiences for a price.
- The computer keeps score in a fast and sweaty firefight.
- Similar “attractions” will bring VR to the public VR to the public, particularly a youthful public, with increasing presence during the 1990s.

INTRODUCTION TO MAKING MULTIMEDIA

Stages:

- 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
 - 2.Designing and Producing
 - 3.Testing
 - 4.Delivering

1. Planning and Costing:

- A project always begins with an idea or a need that you 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 what writing skills, graphic art, music, video, and other multimedia expertise will be required.
- Develop a creative graphic look and feel, as well as a structure and navigation system that will let the viewer visit the messages and content.
- Estimate the time needed to do all elements, and prepare a budget.
- Work up a short prototype or proof-of-concept.

2. Designing and Producing:

- Perform each of the planned tasks to create a finished product.

3. Testing:

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

4. Delivering:

- Package and deliver the project to the end user.

Requirements to make good multimedia

- Need hardware, software, and good ideas to make multimedia.
- To make good multimedia, you need talent and skill.
- You also need to stay organized, because as the construction work gets under way, all the little bits and pieces of multimedia content.
- Need the help of other people.
- Multimedia is often a team effort:
 - Artwork is performed by graphic artists,
 - Video shoots by video producers,
 - Sound editing by audio producers, and
 - Programming by programmers.

Hardware

- The two most significant platforms for producing and delivering multimedia projects.
 - The Macintosh OS from Apple, and
 - Intel-based IBM PC or PC clone running Microsoft Windows.
- These computers, with their graphical user interfaces and huge installed base of many millions of users throughout the world, are the most commonly used platforms today for the development and delivery of multimedia.
- Detailed and animated multimedia is also created on specialized workstations from Silicon Graphics, Sun Microsystems, and even on main frames, but the Macintosh and the PC offer a compelling combination of affordability, software availability, and worldwide availability.
- Regardless of the delivery vehicle for your multimedia-whether it is destined to play on a computer, on a television set-top box.
- When Windows is discussed, it means Windows 95.
- Microsoft introduced Windows 95 with great fanfare in August 1995 to supercede Windows 3.1, and significant enhancements were made for managing multimedia elements.
- Windows 98 provides improved networking and Internet support and a business focus but is perhaps simply a stepping stone to future broad acceptance of Windows NT.
- Hardware peripherals such as monitors, disk drives , and scanners are described.
- The basic principles for creating and editing multimedia elements are the same for Macintosh and PCs.

Software

- Multimedia software tells the hardware what to do.
- Software is divided into three parts, based on what the software is designed to do for you.
- The basic software tools used to work with text, images, sounds, and video;
- You will also learn about handy tools for capturing screen images, translating between file formats, and editing your resources.
- Common tools, such as word processors, spreadsheets, and databases, for presenting instant multimedia.
- The increasingly wide selection of specialized multimedia authoring tools in detail.
- You do not have to be a programmer or a computer scientist to make multimedia work for you, but you do need some familiarity with terms and building blocks; even the simplest multimedia tools require a modicum of knowledge to operate.

Creativity

- Before beginning a multimedia project, 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 to design their own unique multimedia projects.
- It is very difficult to learn creativity.
- Some might say it's impossible-one is born with it.
- For multimedia, this means you need to know your hardware and software first.
- Once you are proficient with the hardware and software tools, what then can you build that will look great, sound great, and knock the socks off the viewer? The rhetorical answer is simply, "How creative are you?"

Organization

- It's essential that you develop an organized outline and a plan that rationally details the skills, time, budget, tools, and resources at hand.
- These should be in place before you start to render graphics, sounds, and other components, and they should continue to be monitored throughout the project's execution.

MULTIMEDIA SKILLS AND TRAINING

The Team

- A typical team for developing multimedia for CD-ROM or the web consist of people who bring various capabilities to the table.
- A team may also employ animators, art directors, composers and musicians , content developers, creative directors, digital special effects engineers, editors, photographers, researchers, videographers, programmers and others.
- A team consists of project managers, multimedia designer, interface designer, writer, video specialist, audio specialist, multimedia programmer, producer for the multimedia for the web.
- If your talent needs are simple, you can usually get good contract
- advice directly from the union representative in your area or from the
- actors themselves. If your needs are elaborate or undefined, you may wish
- to consult an attorney or agent who specializes in this area and who can
- oversee the many required clauses and details of the contract.
- Talent contracts are filled with quirky details and complicated formu-
- las. Consider, for example, Article I.17.A.4(c)(i) of the AFTRA Interactive
- Media Agreement, which reads:
- If a solo or duo is called upon to step out of a group to sing up to fif-
- teen (15) cumulative bars during a session, the solo/duo shall be paid
- an adjustment of fifty percent (50%) of the solo/duo rate in addition
- to the appropriate group rate for that day.
- Although the concept of "stepping out" may be more in keeping with

- an MTV video project than with your own multimedia work, you need to
- keep an eye out for buried clauses that do apply to your project.

Training opportunities in Multimedia

Multimedia is the field related to computer controlled integration of texts, (still or moving images) graphics, drawings, audio and animations. The information/content in the multimedia can be represented through digitally (audio, video and animation) in contrast to traditional media.

Multimedia technology applies interactive computer elements such as text, pictures, video, graphics, animation and sound into a single form to deliver the message.

Multimedia presentations may be viewed by person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation.

The multimedia programme enables students to learn how to use computer programmes and create interactive presentations materials. Students are trained in website development software like Cascading Style Sheet or the Adobe Creative Suite, which includes Photoshop, Flash, Illustrator and Dreamweaver.

Besides this, they will also learn design techniques using multimedia technology. Minimum education qualification for a degree and diploma course in animation is plus two or its equivalent from any recognised institution

Graduates from any stream are also eligible to join the post graduation course

Motivation for Multimedia usage

Multimedia technology has exploded onto the scene as the answer for educating the "television generation"; Despite research that supports multimedia, many are educators are skeptical...

The purpose of this presentation is to provide effective techniques for using this tool in the classroom... and to suggest ideas that will motivate your students - almost as much as MTV!

"...Multimedia is the use of a computer to present and combine text, graphics, audio and video, with links and tools that let the user navigate, interact, create and communicate. If one of these is missing, you do not have multimedia."

Techniques for Initiating Technology-Based Learning

- Relate each activity to students' prior experience.
- When introducing materials, provide unstructured time. Students will "play" rather than listen, so let them -- but make an agreement up front. When the specified time is over, they need to listen.
- Introduce all new terms in writing. Students will remember and understand new concepts better.
- Organize your technology resources for easy distribution.

- Keep teaching materials hidden until they are needed.
- Once the technology activity starts, check in with each group.
- Separate "talk" time and "work" time.
- Avoid talking over group noise.

Using Multimedia Effectively In The Classroom

- Ask yourself: What do I want it to do?
- Use technology to enhance what you are already doing in your classroom.
- Consider your teaching style and the learning style of your students.
- Restructure your curriculum towards an interdisciplinary approach.
- Don't think you need to know everything there is to know.
- Don't be afraid to learn along with your students --- take advantage of peer teaching.

Motivate Students Using Multimedia!

Determine which application is most appropriate to accomplish your objectives.

- Curriculum products: (e.g. 3-D Atlas; Counting on Frank; What's the Secret?) can be set up for groups/individuals to explore or complete a task.
- Reference materials: (e.g. Groliers; Time Almanac; San Diego Zoo) can be used for student research.
- Teacher presentations: K.I.S.S. ("Keep It Simple Sweetie") -Use to model or enhance your lessons.
- Student presentations - with proper planning, student reports and projects come alive with multimedia.

Frequency domain

In the frequency domain, a digital image is converted from spatial domain to frequency domain. In the frequency domain, image filtering is used for image enhancement for a specific application. A Fast Fourier transformation is a tool of the frequency domain used to convert the spatial domain to the frequency domain. For smoothing an image, low filter is implemented and for sharpening an image, high pass filter is implemented. When both the filters are implemented, it is analyzed for the ideal filter, Butterworth filter and Gaussian filter.

The frequency domain is a space which is defined by Fourier transform. Fourier transform has a very wide application in image processing. Frequency domain analysis is used to indicate how signal energy can be distributed in a range of frequency.

The basic principle of frequency domain analysis in image filtering is to computer 2D discrete

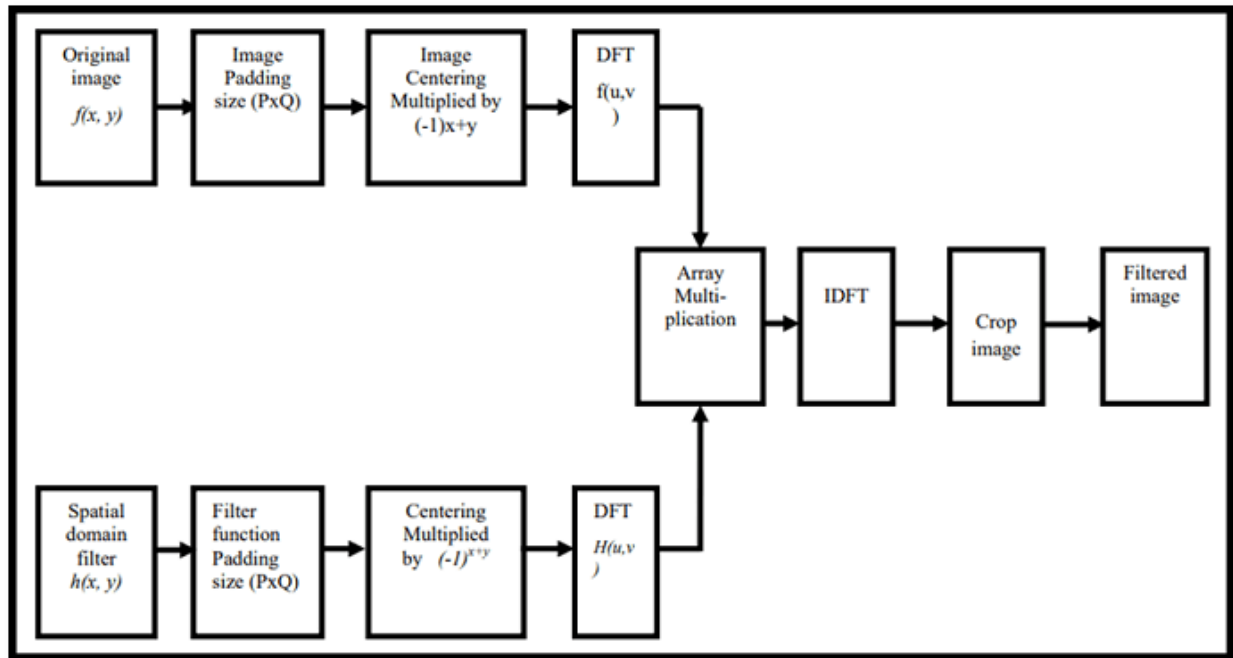


Fig: Frequency domain filtering process

Fourier transform of the image.

Fourier Series and Transform

Fourier Series

Fourier series is a state in which periodic signals are represented by summing up sines and cosines and multiplied with a certain weight. The periodic signals are further broken down into more signals with some properties which are listed below:

1. Broken signals are sines and cosines.
2. New signals are harmonics of each other.

Fourier series analysis of a step edge:

$$f(x) = \begin{cases} -1 & \text{if } x < 0 \\ 1 & \text{otherwise} \end{cases}$$

Fourier decomposition

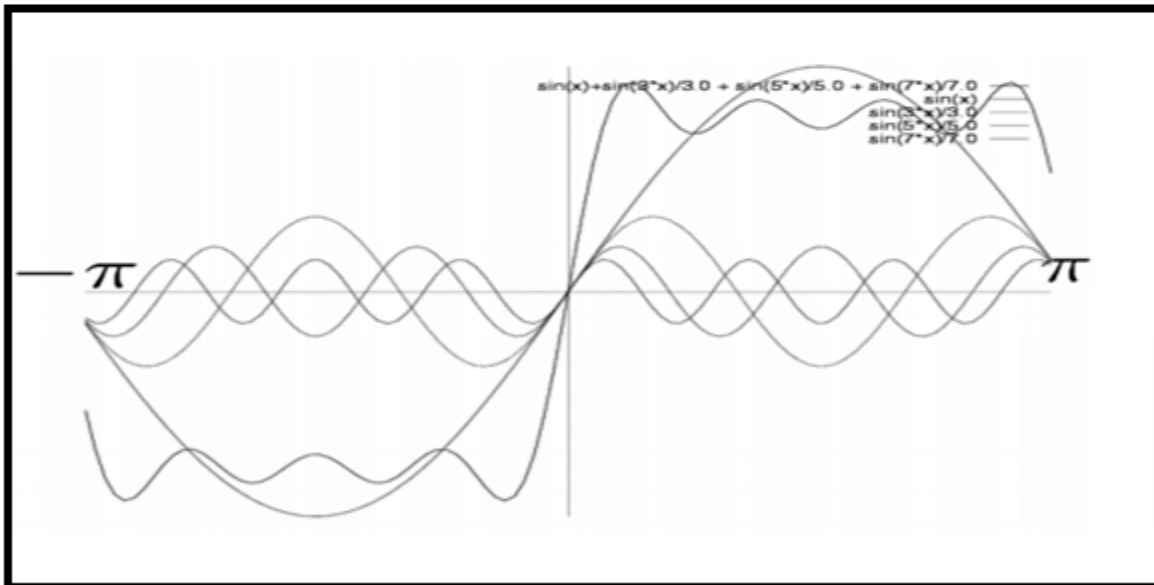
Fourier Series

$$f(x) = \sum_n a_n \sin nx$$

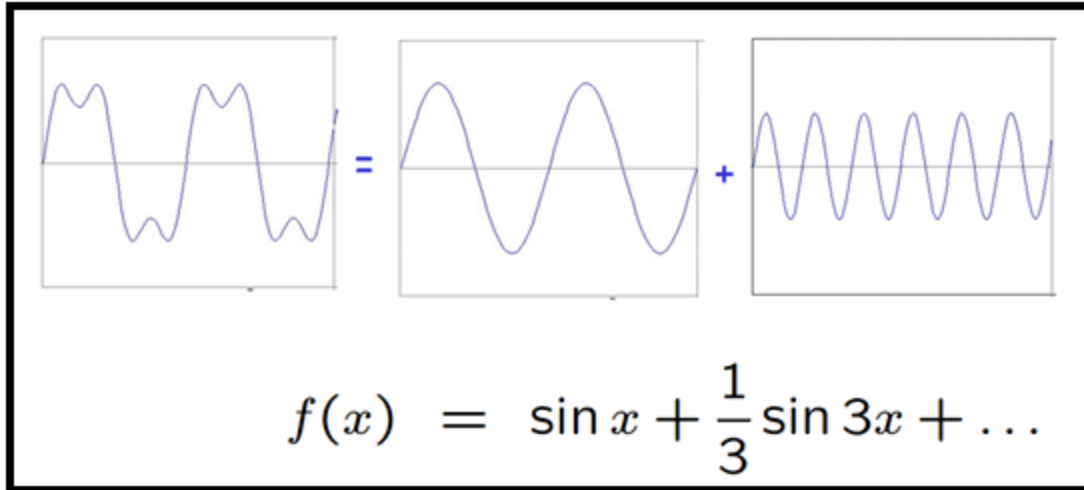
$$a_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin nx \, dx$$

$$= \frac{2}{\pi} \int_0^{\pi} \sin nx \, dx = \begin{cases} \frac{4}{n\pi} & \text{if } n \text{ odd} \\ 0 & \text{otherwise} \end{cases}$$

$$f(x) = \sum_{n=1} \frac{4}{(2n-1)\pi} \sin(2n-1)x$$



Example:



Fourier Transformation

Fourier transformation is a tool for image processing. It is used for decomposing an image into sine and cosine components. The input image is in the spatial domain and the output is represented in the Fourier or frequency domain. Fourier transformation is used in a wide range of applications such as image filtering, image compression, image analysis, and image reconstruction, etc.

The formula for Fourier transformation:

$$F(u) = \int_{-\infty}^{\infty} f(x) e^{-j2\pi ux} dx,$$

$$f(x) = \int_{-\infty}^{\infty} F(u) e^{j2\pi ux} du$$

Application Domain

Following are the common areas of applications of multimedia.

- **Multimedia in Business**- Multimedia can be used in many applications in a business. The multimedia technology along with communication technology has opened the door for information of global work groups. Today the team members may be working anywhere and

can work for various companies. Thus the work place will become global. The multimedia network should support the following facilities:

- Voice Mail
- Electronic Mail
- Multimedia based FAX
- Office Needs
- Employee Training
- Sales and Other types of Group Presentation
- Records Management

•Multimedia in Marketing and Advertising- By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

•Multimedia in Entertainment- By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

•Multimedia in Education- Many computer games with focus on education are now available. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc apart from just playing the rhymes. Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.

•Multimedia in Bank- Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is

thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.

•Multimedia in Hospital- Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture.

In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia based information about various diseases and their treatment. Some hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries.

•Multimedia Pedagogues- Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.

•Communication Technology and Multimedia Services- The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:

- Basic Television Services
- Interactive entertainment
- Digital Audio
- Video on demand
- Home shopping
- Financial Transactions
- Interactive multiplayer or single player games
- Digital multimedia libraries
- E-Newspapers, e-magazines

UNIT - II

Multimedia Hardware

Most of the computers now-a-days come equipped with the hardware components required to develop/view multimedia applications. Following are the various categories in which we can define the various types of hardwares required for multimedia applications.

•**Processor**The heart of any multimedia computer is its processor. Today Core 15 or higher processor is recommended for a multimedia computer.

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate result and instructions (program).
- It controls the operations of all parts of computer.

Macintosh Production Platform

Production of the Macintosh based upon a vertical integration model in those Apple facilities all facilities all aspects of its hardware and creates its own operating system. This is in contrast to PCs, where different brands of hardware run operating system such as Macintosh Windows.

Current Product Line

The iMac is Apple's current flagship consumer desktop computer, powered by the mobile version of the Intel CPU. It is all-in-one unit with screen sizes available at 20" and 24".

Mac Pro and Mac Book

- Mac Pro: The Mac Pro Apple's most expensive, high-end workstation computer, replaces the power Mac G5. The current models are Intel Xeon (Woodcrest) CPUs and Intel xeon ('Clovertown') CPUs. They do not include displays.
- MacBook: The MacBook is Apple's consumer portable. It uses an intel Core 2 Duo Processor running at slightly slower speeds (2.0 GHz or 2.16 GHz) than CPUs in the MacBook Pro line. It replaces both the iBook G4 and the 12-inch PowerBook G4.
- Xserve: The Xserve is an enterprise-grade 1U rack-mount server, specially marketed towards mission-critical data centers and enterprise client services, is mostly used in clusters, for distributed computing (e.g., protein analysis). It uses Intel Xeon "Woodcrest" processors.
- Mac Hardware
 - The current Mac Product family uses Intel x86 processor
 - All Mac models ship with at least 512 MB RAM as standard.
 - Current Mac computers use an ATI Radeon, nvidia GeForce or Intel GMA graphics processor and include either a combo Drive, a DVD player and CD burner all in one; or the SuperDrive, a Dual-function DVD and CD burner.

- Macs include two standard data transfer ports:USB,standardize in 1998 with the iMac; and FireWire, a technology developed by Apple to support higher performance devices; while USB is ubiquitous today,Firewire is mainly reserved for high-performance devices such as hard drives or video cameras.

Processors

- The Mac mini, iMac and Mac Pro all features upgradeable Intel processor although Apple does not officially support this.
- The Power Mac G3, as well as the very first Power Mac G4, had socketed processor which could be upgraded.
- All other Macs, including the Mac mini, most iMacs, and all of Apple's notebooks, have the processor permanently soldered to the logic board.

Peripherals

- The very first Macs (the Macintosh and the Macintosh 512K) used proprietary connectors for the keyboard and the mouse.
- The Apple Desktop Bus was introduced with the Macintosh II and the Macintosh SE. It was the standard input connector for keyboards and mice until USB was introduced with the Macintosh.

Networking

- Early Macs used the built in serial ports for Local Talk, which set up a fast (at the time) network between two machines. Later an AAUI port was added. Eventually, Ethernet replaced everything and emerged as the standard for networking not just Macs, but all computers.
- Fiber channel adapters are also available for the Mac Pro and the X server.
- Apple introduced 802.11 wireless networking in 1999, with Airport technology built into the iBook. Three years later, it was refined into the 802.11g compatible Airport Extreme.
- All current Macs, except Mac Mini, have 802.11n capable Airport Extreme cards.
- All Macs with FireWire support IP over 1394, which allows for two machines to create a high speed network with only a single cable, perhaps a nod to the earlier Local Talk.

Multimedia Software

- Familiar Tools
- Multimedia Authoring Tools
- Elemental Tools

Familiar Tools

- Word Processors
 - Microsoft Word
 - WordPerfect
- Spreadsheets
 - Excel
- Databases
 - Database/VB
- Presentation Tools
 - PowerPoint

HARDWARE PERIPHERALS

(i) Connections

- Among the many devices –computers, monitors, disk drives, video projectors, light valves, videodisc players, VCR’s, mixers, sound speakers, and power strips – there are enough wires and connections.
- The equipment required for developing your multimedia project will depends on the content of project as well as its design .
- You will certainly need as fast a computer as you can lay our hands on, with lots of RAM and disk storage space multimedia developers have separate equipment for digitizing sound from tapes or microphone, scanning photographs or other printed mater, and making digital still or movie images from video videotape.

➤ Small Computer System Interface(SCSI)

- ✓ The Small Computer System Interface[SCSI] is built into all current models of the Macintosh and lets you add peripheral equipment such as disk drives, scanners, CD-ROM players, and other peripheral devices that conform to the SCSI standard.
- ✓ Connect as many as eight devices to th SCSI port, but one of them must be computer itself with ID 7, and one is usually internal hard disk with ID 0.
- ✓ High-end Macintosh have two SCSI buses, internal and external, and so can hook up twice as many devices.
- ✓ With Ultra SCSI, can hook up many as 32 devices.
- ✓ SCSI cards can also be installed in PC’s and external peripheral devices such as hard disks, CD-ROM drives, printers, scanners, rewritable cartridge drives, and magneto-optical drives can be connected to the installed card.
- ✓ When a SCSI device is connected to the interface card in a PC, it is mounted to the system as another drive letter.
- ✓ Thus you may have floppy disk drives mounted as drive A: and B: , a hard disk as drive C: a SCSI-based external devices as drives D: , E: , F: , G: , and so on.
- ✓ Specialized software such as Corel SCSI from Corel is available to maximize the flexibility of a PC-based SCSI system by providing drivers that work with 100’s of hardware devices from many different vendors...
- ✓ To set up SCSI devices carefully, because SCSI cabling is very sensitive to length and to resistance.
- ✓ Follow the instructions in your SCSI user’s guide for proper termination and ID number assignment for SCSI devices.
- ✓ Having more than one external SCSI device can make your system “delicate”, and even more will make it “fragile”.
- ✓ Make sure that ID’s assigned to peripherals are neither 0 nor 7, and that the same ID number is not assigned to two different devices..

- ✓ The h/w and the drivers for SCSI have improved over the years to provide faster data transfers across wider buses: SCSI-1 transfers data at a rate of 5MB per sec and supports up to 7 devices.
- ✓ The newer SCSI-2 is divided into two classifications: Fast SCSI and wide can achieve data transfer rates of 20MB per sec.
- ✓ The latest SCSI -3 can support up to 32 devices and achieve speeds of 40MB or sec.
- ✓ Unlike the less-expensive IDE scheme.

➤ **Integrated Drive Electronics(IDE)**

- ✓ SCSI Connections may connect both internal devices, which are inside the chassis of your computer and use the computer's power supply, external devices, which are outside the chassis, use their own power supply, and are plugged into the computer cable.
- ✓ Integrated Drive Electronics (IDE) connections, on the other hand, are typically only internal and connect hard disks, CD-ROM drives, and other peripherals inside a PC. A PC motherboard can support 2 IDE controllers, each controller in turn can support 2 devices.
- ✓ With IDE, you can install a combination of 4 hard disks, CD-ROM drives, or other devices in your PC.
- ✓ The floppy disk doesn't count because it is operated by a separate controller.
- ✓ The circuitry for IDE is typically much less expensive than for SCSI, but comes with limitations: IDE supports only up to 9GB drive capacity, it requires time from the main processor chip, only one drive in a master/slave pair can be active at once, and because a master drive manages the operations of both drives attached to a controller, a failure of the master drive will disable both drives.

➤ **The Media Control Interface(MCI)**

- ✓ Window provides the Media Control Interface (MCI), a unified, command-driven method of software to talk to related multimedia peripheral devices.
- ✓ With MCI, any hardware device can be connected to a computer running Windows.
- ✓ Using the appropriate drivers, programmers can control the device with simple command strings or codes sent to the MCI. Lists the device types supported by Window's MCI.
- ✓ Applications with internal scripting languages, such as Visual Basic, Icon Author, and Tool Book, can easily be programmed to send MCI commands to these devices.

Memory and Storage Devices - You need memory for storing various files used during production, original audio and video clips, edited pieces and final mined pieces. You also need memory for backup of your project files.

•**Primary Memory**- Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data gets lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast

as registers. The data and instructions required to be processed earlier reside in main memory. It is divided into two subcategories RAM and ROM.

•**Flash Memory**- Cache memory is a very high speed semiconductor memory, which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.

•**Secondary Memory**: This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing Data/Information permanently. CPU directly does not access these memories; instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory and then CPU can access it. For example, disk, CD-ROM, DVD, etc.

(iv) Input Devices

- A great variety of input devices-from the familiar keyboard and handy mouse to touch screens to voice recognition setups-can be used for developments And delivery of a multimedia project.

➤ Keyboard

- ✓ A keyboard is the most common method of interaction with a computer.
- ✓ Keyboard provides various tactile responses (from firm to mushy) and have various layouts depending upon your computer system and keyboard model. Keyboards are typically rated for at least 50 million cycles.
- ✓ The most common keyboard for pc's is the 101 style, although many styles are available with more or fewer special keys, LED's, and other features, such as a plastic membrane cover for industrial or food-service application or flexible "ergonomic" styles.
- ✓ Macintosh keyboard connect to the apple desktop bus (ADB), which manages all forms of user input-from digitizing tables to mice.

➤ Mice

- ✓ A mouse is the standard tool for interacting with a graphical user interface.
- ✓ All Macintosh computer requires a mouse; on PCs, mice are not required but recommended.
- ✓ Even though the windows environment accepts keyboard enter in lieu of mouse point-and-click actions, your multimedia projects should typically designed with the mouse or touch screen in mind.
- ✓ The buttons on the mouse provide additional user input, such as pointing and double-clicking to open a document, or the click-and-drag operation, in which the mouse button is pressed and

held down to drag an object, or to move to and select an item on a pull-down menu, or to access context-sensitive help.

- ✓ The apple mouse has one button.
- ✓ PC mice may have many as three.

➤ **Trackballs**

- ✓ Trackballs are similar to mice, except that the cursor is moved by using one or more fingers to roll across the top of the ball.
- ✓ The trackball does not need the flat space required by the mouse; this is important in small confined environment and for portable laptop computers.
- ✓ Trackball have at least two buttons: one for the user to click or double-click, the other to provide the press-and-hold condition necessary for selecting from menus and dragging objects.

➤ **Touch Screens**

- ✓ Touch screens are monitors that usually have a textured coating across the glass face.
- ✓ This coating is sensitive to pressure and registers the location of the user's finger when it touches the screen.
- ✓ The Touch Mate system, which as no coating, actually measures the pitch, roll, and yaw rotation of the monitor when pressed by a finger, and determines how much force was exerted and the location where the force where applied .
- ✓ Other touch screens use invisible beams of infrared light that crisscross the front of the monitor to calculate where a finger was pressed.
- ✓ Pressing twice on the screen in quick succession simulates the double click action on the mouse.
- ✓ Touching the screen and dragging the finger, without lifting it to another location simulates mouse click and drag.

➤ **Magnetic Card Encoders and Readers**

- ✓ Magnetic card setups are useful when you need an interface for a database application or multimedia project that tracks users.
- ✓ You need both the card encoder and a card reader for this type of interface.
- ✓ The encoder connects to the computer at the serial port and transfers information to a magnetic strip of tape on the back of the card.
- ✓ The card reader then reads the information encoded on the card.

➤ **Graphics Tablets**

- ✓ Flat-surface input device are attached to the computer in the same way as a mouse or trackball.
- ✓ A special pen is used against the pressure-sensitive surface of the table to move the cursor.
- ✓ Graphics tablets provides substantial for editing finely detailed graphic elements, a feature very useful to graphic artists and interface designers.
- ✓ Tablet can also be used as input device for end users: you can design a printed graphic, place it on the surface of table, and let user to work with a pen directly on the input surface.

- ✓ Some tablets are pressure sensitive and are good for drawing: the harder you press the stylus, the wider or darker the line you draw.

➤ **Flat-Bed Scanners**

- ✓ A scanner may be the most useful piece of equipment will use in the course of producing a multimedia project; there are flat-bed and handled scanners.
- ✓ Most commonly available are gray-scale and color fat-bed-scanner that provides a resolution of 300 or 600 dots per inch. professional graphic house may use even higher resolution units.
- ✓ Handheld scanners can be useful for scanning small images and columns of text, but the may prove inadequate for your multimedia development.
- ✓ The final monitor display resolution display resolution for your multimedia project will probably be just 72 or 95 dpi-leave the very expensive ultra-high-resolution scanners for the desktop publisher.

➤ **Optical Character Recognition (OCR) Device**

- ✓ Scanners enable you to use optical character recognition (OCR) software.
- ✓ With OCR software and scanner, you can convert paper documents into a word processing documents on your computer retyping, or rekeying.
- ✓ Barcode readers are probably the most familiar optical character recognition device in use today-mostly at markers, shop, and other point-of-purchase locations.
- ✓ With OCR or” bar coding,” retailers can efficiently process good in and out of there store 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.

➤ **Infrared Remotes**

- ✓ An infrared remotes unit lets interact with your project while he or she is freely moving about.
- ✓ Remotes work like mice and trackballs ,except they use infrared light to direct the cursor and require no cable to communicate.
- ✓ Remote mice work well for a lecture or other presentation in an auditorium or similar environment, when the speaker need to move around the room .

➤ **Voice Recognition Systems**

- ✓ Voice recognition systems hands-free interaction with your project.
- ✓ These system usually provide a unidirectional cardioids, noise-canceling microphone that automatically filters out background noise.
- ✓ Most voice recognition system currently available can trigger common menu events such as save, open, quit, and print, and you can teach the system to recognize other commands that are more specific to your application.

➤ Digital Cameras

- ✓ Digital cameras such as apple's Quick Take, the Dycam 10c, Kodak's dc40, and the Logitech Fotoman and Pixtura use the video technology.
- ✓ The XAPSHOT SV camera can record up to 50 images (300-line video fields) on a reusable 2-inch floppy disk.
- ✓ Images can be played back directly from camera to any standard TV monitor or used with a digitizer for computer input.
- ✓ Software controls the image capture, image adjustment, and save functions of the digitizer.
- ✓ Once the image is saved in the computer environment, of course, it can easily be exported to various applications, incorporated into desktop publishing setups, used to enhance a database, or added as a graphic images to multimedia presentation.

Media Software :

Multimedia software tells the hardware what to do. For example, multimedia software tells the hardware to display the color blue, play the sound of cymbals crashing etc. To produce these media elements(movies, sound, text, animation, graphics etc.) there are various software available in the market such as Paint Brush, Photo Finish, Animator, Photo Shop, 3D Studio, Corel Draw, Sound Blaster, IMAGINET, Apple Hyper Card, Photo Magic, Picture Publisher.

1)BASIC TOOLS

- ✓ 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 format, and moving files among computers when you are part of a team-these are tools for the housekeeping tasks that make your creative and production life easier.

(i)Text Editing and Word Processing Tools

- ✓ A word processor is usually the first software tool computer users learn.
- ✓ The better you're keyboarding or typing skills the easier and more efficient will be your multimedia day-to-day life.
- ✓ An office or workgroup will choose a single word processor to share documents in a standard format.
- ✓ "Office suite" includes spreadsheet, database, E-mail, Web browser and presentation applications.
- ✓ Word processor such as Word and WordPerfect are powerful applications that include spell checkers, table formatters, thesauruses, and prebuilt templates for letters, resumes, purchase orders and other common documents.

- ✓ In many word processors, you can actually embed multimedia elements such as sounds, images and video.

(ii) **OCR Software**

- ✓ With optical character recognition (OCR) software, a flat-bed 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.
- ✓ Most OCR applications for Macintosh and Windows claim about 99 percent accuracy when reading 8 to 36 point characters at 300 dpi and can reach processing speeds of about 150 characters per second.
- ✓ The small box that displays an image of the actual section of the 300 dpi bitmap currently being analyzed.
- ✓ The formatting and layout of the original document can be recognized and imported into Microsoft Word with styles that maintain bolding and font size.

(iii) **Painting and Drawing Tools**

- ✓ Painting and drawing tools, as well as 3-D modelers, are perhaps the most important items in 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, Picture Publisher and Fractal Design 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 using PostScript or another page markup system such as QuickDraw on the Macintosh.
- ✓ Some software applications combine drawing and painting capabilities, but many authoring systems can import only bitmapped images.
- ✓ The difference between painting and drawing, bitmapped images provide the greatest choice and power to the artist for rendering fine detail and effects, and today bitmaps are used in multimedia more often than drawn objects.
- ✓ Look for the following features in a drawing or painting package.
 - *Pull-down menus.
 - *Resize and stretch.
 - *Paint tools to create geometric shapes
 - *Ability to pour a color.
 - *Ability to paint.
 - *Customizable pen and brush shapes and sizes.
 - *Eyedropper tool.
 - *Text fonts and drop shadows.
 - *Multiple undoes capabilities.

- *Support for third-party special effect plug INS.
- *Zooming for magnified pixel editing.
- *Good palette management when in 8-bit mode.

(iv) **3-D Modeling and Animation Tools**

- ✓ With 3-D modeling software objects rendered in perspective appear more realistic you can create stunning scenes and wander through them, choosing just the right lighting and perspective for your final rendered image.
- ✓ 3-D clip art objects such as people, furniture, buildings, cars, airplanes, trees and plants.
- ✓ Each renders 3-D image takes from a few seconds to a few hours to complete, depending upon the complexity of the drawing and the number of drawn objects included in it.
- ✓ A good 3-D modeling tool should include the following features:

- *Ability to drag and drop primitive shapes into scene.
- *Ability to create organic objects from scratch with Bezier spine drawing tools.
- *Lathe and extrude features.
- *Color and texture mapping.
- *Ability to add realistic effects such as transparency, shadowing and fog.
- *Unlimited cameras with focal length control.
- *Ability to draw spine-based paths for animation.

(v) **Image Editing Tools**

- ✓ Image-editing applications are specialized and powerful tools for 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.
- ✓ Some features typical of image-editing applications and of interest to multimedia developers:

- *Multiple windows provide views of more than one image at a time.
- *Direct inputs of images from scanner and video sources.
- *Image and balance controls for brightness, contrast and color balance
- *Good masking features.
- *Multiple undoes and restore feature.
- *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.
- *Ability to resample and resize an image.
- *Multiple typefaces, styles, and sizes, and type manipulation and masking routines.
- *Support for third-party special effect plug-ins.

*Ability to design in layers that can be combined, hidden, and reordered.

- ✓ Plug-ins: Image-editing programs usually support powerful plug-in modules available from third-party developers that allow you to warp, twist, shadow, cut, diffuse, and otherwise "filter" your images for special visual effects.
- ✓ Adobe's Gallery Effects offers an assortment of special effects to transform images. The Photo Tools suite from Extensors lets you quickly add drop shadows, bevels, and embossing effects.
- ✓ The special effects available in these plug-ins make editing fun!

(vi) Sound Editing Tools

- ✓ Sound editing tools for both digitized and MIDI sound let to 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-something impossible to do in real-time.
- ✓ System sounds are shipped with both Macintosh and Windows systems, and they are available as soon as you install the operating system.
- ✓ System sounds are the beeps used to indicate an error, warning, or special user activity.
- ✓ Using sound editing software, you can make your own sound effects and install them as system beeps, to the delight of colleagues and neighbors.
- ✓ For digital waveform sounds, Windows ships with the Sound Recorder program, which provides some rudimentary features for sound editing.
- ✓ The Macintosh does not ship with sound editing tools, so Macintosh users need to invest in an editor such as Sound edit 16 from Macromedia.

Animations, video and Digital Movie Tools

- ✓ Animation and digital video movies are sequences of bitmapped graphics scenes, rapidly played back.
- ✓ But animation can also be made within the authoring system by rapidly changing the location of objects to generate an appearance of motion.
- ✓ To make movies from video, we need special hardware to convert the analog video shop to digital data.
- ✓ Moviemaking tools such as premerie, video Shop and Media Studio Pro let you edit and assemble video clips captured from camera, tape, other digitized audio or MIDI files.
- ✓ Morphing is an animation technique that allows you to dynamically blend two still images, creating a sequence of in-between pictures that, when played back rapidly in QuickTime, metamorphoses the first images into the second.

File Formats

- Formats and systems for storing and playing digitized video to and from disk files are available with QuickTime.
- Audio Video Interleaved ,which works only on windows computer.
- Both systems depend on special algorithms that control the amount of information per video frame that is sent to the screen as well as the rate at which new frames are displayed.
- Both technologies provide methodology for interleaving audio data with video data so that sound remains synchronized with the video.
- Classic videotape involves a video track with two track of audio, QuickTime is multi track recorder in which we can have an almost unlimited range of tracks.
- With QuickTime ,we can have a movie with five different available languages, tiles, MIDI cue tacks, or the potential for interactive commands.

Quick Time For Windows and Macintosh

- The heart of QuickTime is a software-based architecture for seamlessly integrating sound, text, animation, and video on macintosh and windows platforms
- QuickTime is also used to deliver multimedia to the World Wide Web as plug-in for Netscape and Internet Explorer.
- Three elements make up quick time :-
 - QuickTime Movie File Format
 - QuickTime Media Abstraction Layer
 - QuickTime Media Services
- The movie file formats is container that provides a standard method for storing video, audio and even text descriptions about a media composition.
- The media services part of QuickTime not only has built-in support for over 35 media file formats, including most major video, still images, audio, animation etc.,
- QuickTime is an architecture, a system for multimedia delivery, and is extensible.
- The upgrade contains two applications,
- Lets import and combine over 30 different file formats.
- With built in filters in movie Player, we can adjust colors, contrast, and brightness , and we can apply special effects to your composition, such as film noise and edge detection.
- QuickTime includes built-in support for 10 different media types (videos, audio, text, time code , music/MIDI,MPEGetc.,)
- Timing and synchronization
- Audio and image data compression and decompression
- Audio mixing, sample rate conversion, and format conversion
- Audio and video effects and transitions
- Synchronized storage read and write
- Media capture
- Media import and export

Quick Time Embedded Commands for HTML

- AUTOPLAY starts a movie playing automatically
- BGCOLOR sets a background color for the movie play
- CACHE indicates whether the movie should be cached
- CONTROLLER specifies whether to display the QuickTime movie controller bar
- HEIGHT and WIDTH specify size of the movie in WEB PAGES
- PAN sets the initial pan angle
- TILT sets the initial tilt angle
- CORRECTION specifies an image correction mode
- FOV sets the initial fields-of-view angle
- NODE sets the initial node

Microsoft Video For Windows

- ✓ Audio Video Interleaved (AVI) is a Microsoft-developed format for playing full-motion interleaved video and audio sequences in windows, without specialized hardware, at 15 frames per second in a small window.
- ✓ The AVI format is not a extensible, "OPEN" environment and lacks feature needed for serious video editing environments.
- ✓ The AVI provides the following features :-
 - Playback from hard disk.
 - Playback on computer with limited memory; data are streamed from the hard disk player without using great amounts of memory.
 - Quick loading and playing, because only a few frames of video and a portion of audio are accessed at a time.
 - Video compression to boost the quality of our video sequences and reduce their size.

Movie Editor

- ✓ Improved compression and decompression techniques allow quarter-,half-, and full-screen/full-motion movies instead of the small.
- ✓ Video digitizing board for making MACINTOSH QUICKTIME movies from videotape are available from Raster Ops , Radius ,Fast , and others.
- ✓ A familiar push-button control panel is used for stop, rewind, play, fast-forward, record and single-stop, and these applications display time references, frame counts, and audio and transparency levels.

Compressing Movie Files

- ✓ Image compression algorithms are critical to the delivery of the motion video and audio on both the Macintosh and PC platforms.
- ✓ Without compression, there is simply not enough bandwidth on the Macintosh or PC to transfer the massive amounts of data involved in displaying a new screen image every 1/30 of seconds.
- ✓ Consider these three basic concepts :-
 - Compression ratio

- Image quality
- Compression/decompression speed
- ✓ Compression Ratio :-The compression ratio represents the size of the original image divided by the size of the compressed image- that is ,how much the data are actually compressed.
- ✓ image quality :-
 - Compression is either lossy or lossless.
 - Lossy schemes ignore picture information the viewer may not miss, but that means the picture information is in fact lost-even after decompression.
- ✓ Compression/Decompression Speed :-
 - We will prefer a fast compression time developing your project.
 - User, on the other hand , will appreciate a fast decompression time to increase display performance application.

MAKING INSTANT MULTIMEDIA

(i) Linking Multimedia Objects

- ✓ The elements of multimedia are often treated as discrete objects that have particular characteristics.
- ✓ With objects described in a common format using object-oriented programming systems, text, bitmapped images, sounds and video clips can be dynamically linked among applications and document or even embedded in them.
- ✓ Apple Events :-
 - On the Macintosh, Apple Events lets applications communicate with each other, sharing data and commands.
 - IAC-Inter Application Communication.
 - When we publish an application and then edit the data in it ,the changes we make are copied to all of the subscribers to that data, even across a network.
 - Publish-and-subscribe uses a transition file is called EDITION FILE.
 - To use publish-and-subscribe, Follow these steps:
- ✓ Select data that we want to place into another application.
- ✓ From the edit menu,
- ✓ choose Create publisher.
- ✓ This brings dialogue box asking we to name the edition file that will connect the publisher to the other documents subscribing to the data.
- ✓ After we have created the edition file, go to the document or application where we you want to use the data and select subscribe To...from the Edit menu.
- ✓ DDE AND OLE :-
 - DDE – DYNAMIC DATA EXCHANGE
 - OLE - OBJECT LINKING AND EMBEDDING
 - Are the two methods for liking data objects among Windows Application.

- DDE allows data to be transmitted between a client and a server.
- OLE embed or link data objects created in different Windows.
- An embedded object becomes a part of the file into which it is pasted.
- A linked object, on the other hand, is changed automatically in a container file that points to the original file when the original file is updated.

(ii) Office Suites

- ✓ Office suite integrate into a single package the various productivity tools essential to running a business.
- ✓ Suites also provide compatibility across the Macintosh and Windows plat form.

(iii) Word Processors

- ✓ Many word-processed documents are ultimately printed to paper, but many are also delivered on a server or floppy disk, to an electronic mailbox, or as HTML documents on the WORLD WIDE WEB.

Word :-

- ✓ Microsoft's word for Macintosh and Windows provides essentially the same user interface on both platforms and offers special multimedia features.
- ✓ We can make and import various image formats, including PICT, TIFF, BMP, and EPS to place them into our document.
- ✓ AVI movies can also be played with in our Word document.
- ✓ Import digitized sounds, and record voice comments from an internal microphone, saving the recording for play back.

Word Perfect :-

- ✓ In Corel's Word Perfect Macintosh version, a tool palette and drawing commands allow we to create and edit graphics with the standard Macintosh drawing tools, as well as create Bezier curves and polygons, there's also a free rotation tool.
- ✓ Edit, size, scale and crop graphic images, and then click and drag them anywhere in our document while text automatically reformats around them.
- ✓ Using DDE, word perfect for Windows can share data with other DDE compatible programs that use DDE links.
- ✓ If the data changed in a linked program, they are automatically updated in the WordPerfect Document.

Word Pro:-

- ✓ With its Windows DDE and OLE capabilities, Word pro from Lotus can link to other applications and objects, such as sounds and AVI movies.
- ✓ We can paste a link in Windows bitmap or metafile Format into an empty selected frame.
- ✓ Create a macro to control another application through DDE.
- ✓ A spreadsheet organizes its data in columns and rows. Calculations are made based on user-defined formulas.
- ✓ Spreadsheet can answer what-if Questions, build complex graphs and charts, and calculate a bottom line.

- ✓ The latest spreadsheet attach special notes and drawings , Including multimedia display of sounds, pictures, animations, and video clips.

(iv)**Spreadsheets**

Lotus 1-2-3

- ✓ Graph elements by clicking and dragging and using a menu to access data objects from the outside world.
- ✓ We can place bitmapped pictures and other objects such as QuickTime movies anywhere in our spreadsheet.
- ✓ There is a complete color drawing package for placing lines, circles, arrows, and special text on the top of the spreadsheet to help illustrate its contents.

Excel

- ✓ Using a special templates document, we can create a slide show with Microsoft Excel to present worksheets, charts, and graphics.
- ✓ QuickTime and AVI movies can be linked to MS-Excel documents.
- ✓ A database program can store, sort, retrieve, and organize many types of information.
- ✓ Like spreadsheets, databases can exist in a digital environment without ever needing to be printed to paper.

(v)**Databases**

FileMaker Pro

- ✓ FileMaker pro has a relatively simple interface, yet it is powerful enough to handle moderately complex operations through scripting capabilities.
- ✓ FileMaker Pro supports APPLE Events in the Macintosh version and OLE/DDE in the Windows Version.

Access

- ✓ MS-Access is a relational database application available on its own or as part of the MS-professional bundle of products.
- ✓ With access, we can view the data in tables that shows data from many records at once, forms that shows data from each individual record , reports from which to summarize and print data.
- ✓ Access supports OLE objects and allows to import images into forms and reports.

Visual dBASE

- ✓ It is the part of a three-product family of object-oriented, event-driven relational database tools for Windows, and it work with multimedia elements using OLE and DDE.

Presentation Tools

- ✓ Presentation software was originally developed to computerize the creation and delivery of presentations to audiences and conferences as printed output that could be distributed on paper or shown on large screens by overhead projector, or digitally produced as 35mm color slides.
- ✓ A gray area is emerging between presentation tools and multimedia authoring systems, as software publishers develop methods to accommodate the needs of computer based

presenters and as large scale video and LCD panel projection systems become more affordable.

- ✓ Presentation software might, indeed, be considered authoring software, because the publishers of these tools have made their products multimedia capable.
- ✓ Presentation tools add synchronized audio, self running animations, and audio to the slide show presentation armamentarium.

Astound

- ✓ Astound from gold disk, available for both Macintosh and windows, create attention getting presentations that combine text , images, sound effects, video, and animated movies.
- ✓ Create animated effects using built-in transition options and a timeline feature that lets you control when objects enter and leave the screen.
- ✓ Astound can add interactive responses to clicks on buttons, text blocks, and pictures.
- ✓ The presentation as a stand alone, self running file for playing on either Macintosh or windows platforms.

Persuasion

- ✓ Persuasion is available from abode for both Macintosh and windows environments.
- ✓ It's a complete desktop presentation toolkit for producing overhead transparencies, 35mm slides, and printed materials, including, speaker notes and audience handouts.
- ✓ Persuasion includes tools for outlining, word processing, drawing, charting, and formatting, and it works in either black and white or color.
- ✓ Persuasion supports OLE embedded objects for editing of text, graphics and spreadsheets.
- ✓ Persuasion will also present in various slide show formats for on screen viewing.
- ✓ This slide show feature lets you move manually or automatically through an entire presentation using the computer screen, which is useful for creating self running demos.
- ✓ The persuasion player for windows and Macintosh show presentation regardless of the platform on which created it.

PowerPoint

- ✓ Power point from Microsoft, for both Macintosh and windows, offers a complete drawings and text package with an automatic or manual slide show feature.
- ✓ Power point, embed bitmapped images, slides, and presentations from power point into other applications.
- ✓ The windows version supports multimedia extensions for windows by using OLE in conjunction with the media control interface(MCI) command set.
- ✓ Power point includes two wizards (the auto content wizard and the pick a look wizard) to guide through the creation of a presentation.

Delta graph professional

- ✓ Delta graph professional from delta point is a comprehensive and flexible charting, graphics, and presentation application for Macintosh and windows platforms.
- ✓ Large data sets can be organized over multiple pages using the data notebook feature.
- ✓ Text outlining makes it easy to create organization and bullet charts.
- ✓ Data can be imported from and linked to many third party file formats.
- ✓ Adjust axis scaling, tick marks, legends, labels, perspective, and 3d rotations.
- ✓ Create fully customized presentations with the slide show feature, and you can add sound effects as well as QuickTime movies.
- ✓ The chart gallery makes it easy to find one of the 60 chart types, and the chart advisor will examine your data and recommend the best chart to use.

Harvard graphics

- ✓ Harvard graphics from software publishing corporation includes features that guide users through the creation of a presentation.
- ✓ The advisor design checker interactively analyzes a users single slide or entire presentation against various design guidelines developed by presentation experts.
- ✓ Quick advice feature, users can obtain advice regarding the selection and most effective use of specific presentation styles, output devices, and chart types.
- ✓ Harvard graphics is a full featured presentation tool that lets you add images, movies, animation, sound, and interactivity to each slide.

ASAP Word Power

- ✓ ASAP Word Power from software publishing corporation for windows is an inexpensive and basic presentation tool for those with limited graphic creation ability.
- ✓ It does not include a drawing or a painting tool. Made by the same people who make Harvard graphics users can create simple slide presentations that include images, movies, sounds, and transitions.

Media Studio pro

- ✓ Media studio pro for windows from Ulead systems includes a suite of integrated video, audio, and image editing tools as a morphing tool, thumbnail album, and PhotoCD browser.
- ✓ The multimedia converter handles batch processing of images, graphics, waveform files, animation, and video files. Media studio pro supports QuickTime for windows and video for windows.

Media wrangler

- ✓ The media wrangler for windows from Alta Vista Technologies combines a multimedia presentation tool with a multimedia database.
- ✓ This inexpensive tool supports 35 image file formats as well as AVI and MPEG,WAV, and MIDI.

- ✓ To view presentation on the internet, media wrangler converts slides into HTML documents. An extensive collection of clip media includes 41 premade WWW buttons.

SST 3.0

- ✓ Super show and tell from midi soft is a visually intensive multimedia presentation tool.
- ✓ SST lets you integrate text, images, sound, video, and animation files with point and click, drag and drop functions and play them back in sequence.

MULTIMEDIA AUTHORIZING TOOLS

- ✓ 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 multimedia elements into a single, cohesive project.
- ✓ With multimedia authoring software, you can make

Video productions

Animations

Games

Demo disks and interactive guided tours

Presentations

Interactive kiosk applications

Interactive training

Simulations, prototypes, and technical visualizations

Types of Authoring Tools

- ✓ This chapter arranges the various authoring tools into groups based on the metaphor used for sequencing or organizing multimedia elements and events:

Card or page based tools

Icon based, event driven tools

Time based and presentation tools

Object oriented tools

- ✓ Card or page based tools: in case authoring systems, 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, like the pages of a book or cards in a card file.

- ✓ Card or page based authoring systems allow you to play sound elements and launch animations and digital video.
- ✓ Icon based, event driven tools: in these authoring systems, multimedia elements and interaction cues(events) are organized as objects in a structural framework or process.
- ✓ Icon 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.
- ✓ Time based tools: in these authoring systems, elements and events are organized along a timeline, with resolutions as high as 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.
- ✓ Object oriented tools: in these authoring systems, multimedia elements and events become objects that live in a hierarchical order of parent and child relationships.
- ✓ Messages passed among these objects order them to do things according to the properties or modifiers assigned to them.
- ✓ Objects typically take care of themselves.
- ✓ Send them a message and they do their thing without external procedures and programming.
- ✓ Object oriented tools are particularly useful for games, which contain many components with many “personalities,” and for simulating real life situations, events, and their constituent “objects”.

The right tool for the job

- ✓ Each multimedia project you undertake will have its own underlying structure and purpose and will require different features and functions.
- ✓ Authoring tools are constantly being improved by their makers, who add new features and increase performance with upgrade development cycles of six months to a year.
- ✓ It is important that you study the software product reviews in computer trade journals, as well as talk with current users of these systems, before deciding on the best ones for your needs.

Editing features

- ✓ The elements of multimedia images, animations, text, digital audio and MIDI music, and video clips need to be converted to standard file formats.
- ✓ Editing tools for these elements , particularly text and still images, are often included in authoring system.

- ✓ The editors that come with an authoring system will offer only a subset of the substantial features found in dedicated tools.

Organizing features

- ✓ The organization, design, and production process for multimedia involves storyboarding and flowcharting.
- ✓ Some authoring tools provide a visual flowcharting system or overview facility for projects structure at a macro level. Storyboards or navigation diagrams, too, can help organize a project.
- ✓ Because designing the interactivity and navigation flow of your project often requires a great deal of planning and programming effort, your storyboard should describe not just the graphics of each screen, but the interactive elements as well.
- ✓ Features that help organize your material, such as those provided by super edit, author ware, icon author, and other authoring systems, are a plus.

Programming features

- ✓ Multimedia authoring systems offer one or more of the following approaches, which are explained in the paragraphs that follow.
 - Visual programming with cues, icons, and objects
 - Programming with a scripting language
 - Programming with traditional languages, such as basic or c
 - Document development tools
- ✓ Visual programming with icons or objects is perhaps the simplest and easier authoring process.
- ✓ Visual authoring tools such as authorware and iconauthor are particularly useful for slide shows and presentations.
- ✓ Authoring tools that offer a scripting language for navigation control and for enabling user inputs such as supercard, macromedia director, hypercard, and toolbook are more powerful.
- ✓ A scripted handler to generate a system beep may be very similar, regardless of platform.
- ✓ In hypertalk(macintosh), supertalk(macintosh), and lingo(macintosh and windows), a script that makes the computer beep one time reads:

On mouseUp

Beep

End mouseUp

- ✓ A powerful document reference and delivery system is a key component of some projects.
- ✓ Some authoring tools offer direct importing of preformatted text, indexing facilities, complex text search mechanisms, and hypertext linkage tools.

Interactivity features

- ✓ Interactivity empowers the end users of your project by letting them control the content and flow of information. Authoring tools should provide one or more levels of interactivity.

- ✓ Simple branching, which offers the ability to go to another section of the multimedia production(via an activity such as a key press, mouse click, or expiration of a timer).
- ✓ Conditional branching, which supports a go to based on the results of IF THEN decisions or events.
- ✓ A structured language that supports complex programming logic, such as nested IF THENs, subroutines, event tracking, and message passing among objects and elements.

Performance tuning features

- ✓ Complex multimedia projects require exact synchronization of events for example, the animation of an exploding balloon with its accompanying
- ✓ Sound effect. Accomplishing synchronization is difficult because performance varies widely among the different computers used for multimedia development and delivery.
- ✓ To use the authoring tools own scripting language or custom programming facility to specify timing and sequence on systems with different(faster or slower) processors.
- ✓ Be sure your authoring system allows precise timing of events.

Delivery features

- ✓ Delivering your project may require building a run time version of the project using the multimedia authoring software.
- ✓ A runtime version allows your project to play back without requiring the full authoring software and all its tools and editors. the runtime version does not allow users to access or change the content, structure, and programming of the project.
- ✓ The world wide web has become a significant delivery medium for multimedia, authoring systems typically provide a means to convert their output so that it can be delivered within the context of HTML, either with special plug ins or by embedding java or other code structures in the HTML documents.

Cross platform features

- ✓ It is also increasingly important to use tools that make transfer across platform easy.
- ✓ For many developers, the Macintosh remains the multimedia authoring platform of choice, but 80 percent of that developers target market may be windows platform.

(i) Card and page based authoring tools

- ✓ Card and page based authoring systems provide a simple and easily understood metaphor for organizing multimedia elements.
- ✓ Page based authoring systems contain media objects: the objects are the buttons, text fields, graphic objects, backgrounds, pages or cards, and even the project itself.
- ✓ The characteristic of objects are defined by properties highlighted, bold, red, hidden, active, locked, and so forth.
- ✓ Each object may contain programming script, usually a property of that object occurs.

- ✓ Events cause messages to pass along the hierarchy of objects in your project; for example, a mouse click message can be sent from a button to the background, to the page, and then to the project itself.
- ✓ As the message travels, 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.
- ✓ Most page based authoring systems provide a facility for linking objects to pages or cards (by automatically programming branching goto statements for navigating by mouse clicks), but learning to write your own scripts and understanding the message passing nature of these authoring tools is essential to making them perform well.
- ✓ Following are some typical messages that might be passed along the object hierarchy of the hyper card, super card, and tool book authoring systems:

Hypercard, supercard,	toolbook message
closeCard	leavePage
closeStack	leaveBook
idle	idle
mouseDown	buttonDown
mouseStillDown	buttonStillDown
mouseUp	buttonUp
newBackground	newBackground
openCard	enterPage
openStack	enterBook

An example in hypertalk:

```
on mouseUp
go next card
end mouseUp
```

- ✓ Most card or page based authoring systems require a special intermediate file that also receives scripted message handlers and acts as a repository for special routines and resources that are available to all projects being executed by the application.

Hypercard (macintosh)

Hypercard is the most widely available programming system and multimedia authoring tool for macintosh. 1991, however, only a runtime version of hypercard is bundled with new macintoshes; the fully functional version for authoring must be purchased from apple.

Supercard (macintosh/windows):

Allegiant technologies supercard is an authoring application for the macintosh used to produce sophisticated multimedia presentations, front ends to databases, and computer based education and training projects. Hypercard, a supercard project contains windows, and windows contain

backgrounds and cards that in turn contain drawn and bitmapped graphics, buttons, and text fields. Supercard can convert hypercard stacks to supercard format.

(ii) Icon Based Authoring Tools

- Icon-based, event-driven tools provide a visual programming approach to organizing and presenting multimedia.
- To build a structure or flow chart of events, tasks, and decision, by dragging appropriate icons from a library.
- These icons can include menu choices, graphic images, sounds, and computation.
- The flow chart graphically depicts the project's logic.
- When the structure is built, you can add your content: text, graphics, animation, sounds, and video movies.
- There are three types.
 - Authorware
 - Icon Author
 - Quest

AUTHORWARE(MACINTOSH/WINDOWS):

- With authorware from Macromedia, nontechnical multimedia authors can build sophisticated applications without scripting.
- By placing icons on the flow line, you can quickly sequence events and activities, including decisions and user interaction.
- Authorware is useful as a design tool for storyboarding, because it lets you change sequences, add options, and restructure interactions by simply dragging and dropping icons.
- Authorware offers more than 200 system variables and functions
- Variables include interaction, decision, time, video, graphics, general, file, and user.
- Functions include math, string, time, jump, video, graphics, general, file and user and links to external functions.
- Authorware has a complete set of tools for incorporating and editing multimedia elements.
 - Authorware will import files in PICT, DIB, TIFF, EPSF, Windows metafile, and Windows bitmap formats.
 - Authorware provides its own waveform sound editor, sound-wave, and it supports AIFF, SND, PCM, and Windows Waveform and MIDI formats.
 - Authorware has 13 icons:
 - 1 Display icons: Put text and/or graphics on the screen.

- 2 Animation icons: Move the objects of a preceding Display icon from one point to another in a given amount of time or at a specified speed.
- 3 Erase icons: Erase the text and/or graphics displays.
- 4 Wait icons: Interrupt file flow until the user presses a key or clicks the mouse, or until a specified amount of time elapses.
- 5 Decision icons: Select which icons to use next.
- 6 Interaction icons: Present options or questions based on user response.
- 7 Calculation icons: Perform arithmetic or special function and use jumping purpose.
- 8 Map icons: Organize and modularize the file by providing space to put more icons.
- 9 Start Flag icons: Begin running a file from an intermediate location.
- 10 Stop Flag icons: Stops a file from running.
- 11 Movie icons: Provide for playing PICS, FLI, and FLC frame animations.
- 12 Sound icons: Provide many options for loading and controlling their playback.
- 13 Video icons: Provide control of video players and playback of video segments and their sound tracks.

ICON AUTHOR(WINDOWS):

- IconAuthor was discovered from AimTech.
- Its visual programming environment enables nonprogrammers to create applications by building structures and then adding content to the building blocks.
- It is possible to combine the icons into a logical sequence that depicts the flow of your project.
- After building the structure, you can then add content, including text, graphics, animation, and/ or full-motion video.
- Some of the special effects used are wipe, zoom, fade.
- Rezolution can also convert between palettes of 2,8,16, and 256 colors.
-

QUEST(WINDOWS):

- Quest from Allen Communication is a Windows-based authoring tool designed especially for building computer-based training(CBT)application.
- In Quest, postage-stamp representations of modules and frames are placed in a work-flow organization.
- Quest includes two levels of development: the Design Level and the Frame Level.
- At Design Level- instructional designers can map out overall structure and set up links between frames.
- At Quick Frames- features lets you make customized frame groups to insert into a project on the fly.

Production Standards:

Introduction

Standards foster enormously the exchange of contents. If they do not exist the development of the industry can be more difficult because they can be afraid of investing without agreed ways of exchanging content. Very well-know examples of standards are those of TV with names such as PAL, SECAM, NTSC. It is important to be aware of the standards, and use them wisely.

Standards can come from systematic efforts approved by official standardisation bodies devoted to the issue; we say that they are *official standards*. In some cases we label them as *de facto standards*, when there is a wide acceptance by the industry and/or the public

The following list of multimedia standards, can give an idea of how many standards might be interesting for multimedia:

- ➔ CCITT/ISO (now ITU – T) standards for multimedia include F.700, G.711, G.721, G.722, G.725, H.221, H.242, H.261, H.320, HyTime, IIF, JBIG, JPEG, MHEG, MPEG, ODA, T.80, X.400, G.723, G.726, G.727, G.728, G.764, G.765, H.200, H.241, H.243, T.120
- ➔ Internet standards include IP Multicast, MIME, RTP, ST-2, RFC 741, Xv and mvex
- ➔ W3C standards are also very relevant (we will discuss some of them during this course)
- ➔ Proprietary standards are Bento, GIF, QuickTime, RIFF, DVI, MIDI.

Some image and video standards

Unprocessed image and video in digital form occupy a huge amount of space, at least when compared to text. A character is usually one byte and a page will be several hundreds of them. A color image of the size of a small standard VGA screen occupies, in principle, 640x480x3 bytes, i.e., the number of pixels multiplied by the number of bytes per pixel (one for each of the R, G, and B channels). It is extremely important to reduce this size for storage and transmission purposes. This is achieved through coding the image in a compressed way at one end, and decoding it to an uncompressed form at the other side. For this process to be useful it is important its standardization. Otherwise, the exchange would be only possible to the same systems.

JPEG

JPEG stands for Joint Photographic Experts Group, the original name of the committee that wrote the standard. Now the body is officially called ITU – T JTC1/SC2/WG10.

The first generation of this standard intended to provide compression for continuous-tone still images of natural scenes, which could be full-color (24 bit) or gray-scale. This is the first JPEG, dated 1986. JPEG is a *lossy* compression scheme, meaning that the decompressed image is usually worse than the original: some losses exist in the process. Nevertheless, JPEG exploits known characteristics of the

human eye to achieve a very high degree of compression, without much apparent visual degradation. The compression parameters can be adjusted by the user, trading off file size against output image quality. The basic ideas behind the compression scheme are explained later.

A new version called **JPEG2000** has recently become an official standard. It is based on wavelet transforms, and the applications are more ambitious than for the original JPEG.

MPEG 1, 2, 3

MPEG stands for Moving Pictures Expert Group, which is the popular name of the ISO/IEC committee working on digital color video and audio compression, ITU – T JTC1/SC2/WG11, established in 1988. According to MPEG home page, the group is "in charge of the development of standards for coded representation of digital audio and video". MPEG has produced:

- MPEG-1, a standard for storage and retrieval of moving pictures and audio on storage media (approved November 1992); products such as Video CD and MP3 are based on it
- MPEG-2, a standard for digital television (approved November 1994); Digital Television set top boxes and DVD are based on it
- MPEG-4 version 1 and 2, a standard for multimedia applications (approved October 1998 and December 1999, respectively), for the fixed and mobile web
- MPEG-7 a content representation standard for multimedia information search, filtering, management and processing

Apart from other developments, work on the new standard MPEG-21, the multimedia framework, has started in June 2000.

MPEG-1

The specific target of **MPEG-1** is CD-ROM and DAT platforms for multimedia applications with a bandwidth of 1.5 Mbit/sec. The three parts of the standard are *video encoding*, with a binary stream taking almost the 1.15 Mbit/s bandwidth, *audio encoding*, and *systems* (which includes information for synchronization and information about the coding). The target quality of MPEG-1 is that of a VHS video.

MPEG-2 (and 3)

MPEG-2 is designed to offer higher quality than MPEG-1, at a higher bandwidth (between 4 and 10 Mbit/s). The scheme is very similar to MPEG-1, and scalable. **MPEG-3** was targeted for HDTV, but was never developed, as it was realized that one of the versions of MPEG-2 (the level High 1440) could be used for High Definition Television. But as this was realized later, the next forthcoming standard at the time was named MPEG-4.

By the way, it is worth remarking that the very popular MP3 is the audio part of the MPEG-2 standard.

Some (early) multimedia standards

While the main problem of audio and video is compression, multimedia standards have to cater for another type of problems. In this section we review two of the standards, in order to have a better grasp of these problems.

MHEG: an OO path

MHEG stands for Multimedia and Hypermedia Information Coding Experts Group, officially called ITU – T JTC1/SC2/WG12. The goal of the standard was to develop a Coded Representation of Multimedia and Hypermedia Information.

The standard specifies a coded representation of final-form multimedia/hypermedia information objects, for their interchange as units within or across systems, by any means of interchange, from storage devices to telecommunication and broadcast networks. MHEG applications, which are sets of MHEG objects, consist mainly of declarative code, but provisions exist for calling external/procedural code. The objectives of the MHEG standard are situated at different levels:

- *Interchange*: MHEG provides interchange facilities for various media types. The media data may be encoded by using proprietary techniques. In order to support multimedia/hypermedia interchange, MHEG provides means of grouping multiple media types into a single interchange unit.

- *Presentation*: MHEG supports final-form presentation of multiple media types (e.g. audio, video, text...). The media type is identified to enable the use of appropriate resources and services for its presentation. In order to support multimedia/hypermedia presentation, MHEG provides means of grouping multiple media types into a single presentation. Such groups enable media synchronization in time and space, interaction with media, modification of the presentation, e.g. volume, size, position...

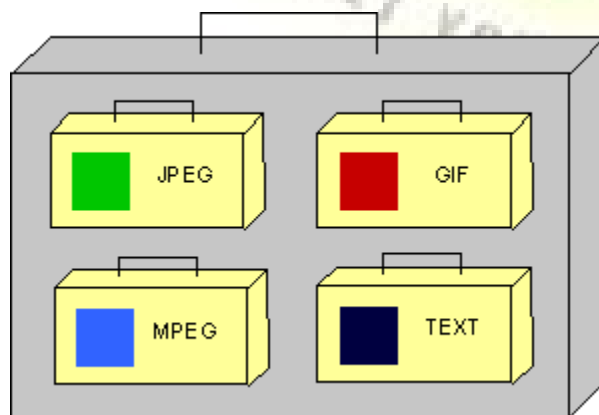


Figure 1. MHEG used as interchange unit and as identification of multimedia information.

- *Minimal Resources*: MHEG is designed to be supported by systems with minimal resources.
- *Real-Time*: MHEG is intended to ease the real-time interchange and presentation of multimedia information.

MPEG-4: a multimedia standard coming from the audiovisual side

Currently, **MPEG-4** is officially described as a standard for multimedia applications. But the initial goal was different: MPEG-4 was intended for very low bit rate coding of video. In the process of the discussion of the standard it became oriented towards a new form of representation of audiovisual content, better suited for multimedia applications. MPEG-4 should be able to support audio-visual interactive services, such as videogames, teleshopping.

The MPEG-4 representation of video represents a departure from the traditional digital signal processing approach. This approach can be labeled as coding oriented towards compression based on Fourier transforms or similar mathematical operations. The new approach is a step towards using more "intelligent" image analysis and understanding in the whole process.

MPEG-4 introduced the concept of a *scene* composed of different *audiovisual objects (AVOs)*. It is implicit that a *segmentation process* of the images exists, which produces these objects. In the MPEG-4 standard, these objects can be compressed in a traditional way, using, for instance, MPEG-1 or 2. But the novelty is the previous process, usually associated to the field of Computer Vision, and not to Digital Signal Processing). AVOs can be *VOCs (video object components)* or *AOCs (audio object components)* or both.

SNHC (Synthetic – Natural Hybrid Coding) is another important and derived concept in MPEG-4. As we have AVOs which are a representation of "natural" video, these "natural" images could eventually be integrated with "synthetic" images, such as those coming from computer animation, CAD packages, etc. This is the goal of SNHC. This representation is also better suited to interactive multimedia applications. One can imagine an example of a teleshopping application, in the form of an "interactive" video advertising a car. We could produce this in MPEG-4 using SNHC: the moving car could be a moving clickable AVO, linked to a web page giving more information, and allowing to order it (and even pay by credit card).

Another important concept introduced in the early stages of MPEG-4 is *MSDL, MPEG-4 Syntactic Description Language*. The MPEG-4 representation of audiovisual content we have described above in a very simplified way requires a powerful language for the description of the scenes, the algorithms for coding-decoding objects, for compositing the scene, for interrelations, for interaction. This language was introduced intended to become a key part of the standard with the name of MSDL. The language included shape, texture, motion, ...Finally, MSDL did not become part of the standard, and was replaced by the Binary Format for Scene description (BIFS), which has a more limited scope. Recently, XMT has been introduced, and could become a MSDL replacement.

A final remark is the interesting evolution of MPEG-4, which started as an audiovisual standard to become focused as a multimedia standard, due to the need to answer pressing existent problems.

SGML: a path from electronic text

SGML stands for Standard Generalized Markup Language; another formal way of naming it is as the standard ISO 8879:1986. In principle, the goal of the standard was to cater for the definition of device-independent, system-independent methods of representing texts in electronic form; the best approach which was accepted was the use marked-up text. SGML was not intended for multimedia representation. Nevertheless, some characteristics (probably the fact that it is a metalanguage, i.e. a language for formally describing a language, in this case, a markup language) have made it become generally used for multimedia representation in some way.

First we start by clarifying what a markup language is and then we go on to SGML.

UNIT-III

BUILDING BLOCKS OF MULTI-MEDIA

Following are the common components of multimedia:

- Text**- All multimedia productions contain some amount of text. The text can have various types of fonts and sizes to suit the professional presentation of the multimedia software.
- Graphics**- Graphics make the multimedia application attractive. In many cases people do not like reading large amount of textual matter on the screen. Therefore, graphics are used more often than text to explain a concept, present background information etc. There are two types of Graphics:
 - Bitmap images**- Bitmap images are real images that can be captured from devices such as digital cameras or scanners. Generally bitmap images are not editable. Bitmap images require a large amount of memory.
 - Vector Graphics**- Vector graphics are drawn on the computer and only require a small amount of memory. These graphics are editable.
- Audio**- A multimedia application may require the use of speech, music and sound effects. These are called audio or sound element of multimedia. Speech is also a perfect way for teaching. Audio are of analog and digital types. Analog audio or sound refers to the original sound signal. Computer stores the sound in digital form. Therefore, the sound used in multimedia application is digital audio.
- Video**- The term video refers to the moving picture, accompanied by sound such as a picture in television. Video element of multimedia application gives a lot of information in small

duration of time. Digital video is useful in multimedia application for showing real life objects. Video have highest performance demand on the computer memory and on the bandwidth if placed on the internet. Digital video files can be stored like any other files in the computer and the quality of the video can still be maintained. The digital video files can be transferred within a computer network. The digital video clips can be edited easily.

•**Animation-** Animation is a process of making a static image look like it is moving. An animation is just a continuous series of still images that are displayed in a sequence. The animation can be used effectively for attracting attention. Animation also makes a presentation light and attractive. Animation is very popular in multimedia application

TEXT

- ✓ Very early in the development of the Macintosh computer's monitor hardware, Apple choose to use a resolution of 72 picture elements (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 what their printed output will look like (called "What You See Is What You Get", or WYSIWYG).

The Fonts Wars

- ✓ In 1985, the desktop publishing revolution was spearheaded by Apple and the Macintosh computer, in combination with word processing and page layout software product that enabled a high-resolution 300-dpi laser printer using special software to "draw" the shapes of characters as cluster of tiny square pixels computed from the geometry of the character.
- ✓ This special software was Adobe's 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 a really a method of describing an image in terms of mathematical constructs(Bezier 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.
- ✓ There are two kinds of PostScript fonts: Type 3 and Type 1. Type 3 font technology is older than Type1 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.
- ✓ For displaying PostScript fonts on both Macintosh and Windows monitors, Adobe developed Adobe Type Manager (Type 3 fonts do not work with ATM).
- ✓ In May 1989, Apple and Microsoft joint effort to develop a "better and faster" quadric curves outline font methodology, called True-Type.

Adobe Type Manager

- ✓ Adobe Type Manager (ATM) is required to display Type 1 Postscript fonts at all sizes without jaggies.
- ✓ The software is available for both Windows and Macintosh.

- ✓ Once it's installed, ATM works automatically with word processing, page layout, spreadsheet, and graphics applications, including multimedia authoring systems.
- ✓ True type fonts are stored in the C:\Windows\Fonts directory.
- ✓ Adding and detecting fonts is a simple procedure using a special options in the pull-down File menu of this directory.
- ✓ On the Macintosh, fonts are stored in suitcases.
- ✓ For PostScript fonts, the suitcase must contain at least one bitmap representation of the fonts, while the outline font, sometimes called the printer font, is stored outside of the suitcase in the Font folder.
- ✓ A collection of special, memory-hungry bitmaps was required to display fonts outside the normal range installed on the computer.
- ✓ True Type and PostScript / ATM, using mathematical formulas, allow you to display smooth-edged type of any size and style on your monitor without requiring a collection of bitmaps files.

Font Foundries

- ✓ Collection of fonts are available through retail channels or directly from their manufactures.
- ✓ Typefaces are created in a foundry, a term much like case, that has carried over from times when lead was poured into molds to make letter faces.
- ✓ There is also a special interest group (SIG) at America Online (go to Computing : Software Libraries: Desktop & Web Publishing Forum : Fonts) where people who enjoy designing and making interesting fonts post them for others to download-hundreds of them with names like Evil of Frankenstein , Coca-Cola, Kerouac, LED, Poncho Via (sic), Spaghetti, Tree Frog, and Sassy.
- ✓ Adobe ships a CD-ROM named Type on call bounded in the box with Photoshop, Premiere, and other products.
- ✓ This disc contains “unlockable” fonts: you pick up from a menu containing fonts and other Adobe products then call a toll-free telephone number and speak with an order taker.

Managing your fonts

- ✓ Choose a system of type management and stick with it so that you will never face the nightmare of your carefully picked fonts being replaced by an ill suited default font (see the text “First Person”).
- ✓ If your work is being distributed to sites that may not have the fonts you are using, or if you do not license these fonts for distribution with your work, be sure to bitmap special font text you use for titles, headlines, buttons and so forth.

Character Sets and Alphabets

- ✓ 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.

The ASCII Character Set

- ✓ The American 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 128 characters, including both lower-and-upercase letters, punctuation marks, Arabic numbers, and math symbols.
- ✓ Also included are 32 control character used for device control messages, such as carriage return, line feed, tab, and form feed.
- ✓ ASCII code numbers always represent a letter or symbol of the English alphabets, so that a computer or printer can work with the number that represents the letters, regardless of what the letter might actually look like on the screen or printout.
- ✓ To a computer working with the ASCII character set, the numbers 65, for example, always represents a Upper case letter A.
- ✓ Later, when displayed on a monitor or printed, the number is turned into a typeface.

The Extended Character Set

- ✓ A byte, which consists of 8 bits, is the most commonly used building block for computer processing.
- ✓ ASCII uses only seven bits to code its 128 characters; the eight bit of 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 28 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 π or ∞ , and international diacritics or alphabets characters, such as \ddot{a} or \acute{n} .
- ✓ This fuller set of 256 characters is also known as the ISO-latin-1 character set; it is used when programming the text of HTML Web pages.
- ✓ Unicode, this new standard can accommodate up to about 65,000 characters and will ultimately 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).

Mapping Text Across Platform

- ✓ If you build your multimedia projects on a Windows platform and play it back on a Macintosh platform (or vice versa), there will be subtle (and some times 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. Windows and Macintosh provide default fonts for this substitution.
- ✓ In many cross-platform-savvy applications, you can explicitly define the mapping of your own fonts.
- ✓ In Director, for example, you can control font-mapping behavior by altering the FONTMAP.TXT file; Director remaps those fonts that the target system cannot provide.

Languages in the World of Computers

- ✓ In modern Western languages, words are made up of symbols or letters string together, representing as a whole the sounds of a spoken word.
- ✓ This is not so far Eastern languages such as Chinese, Japanese and Korean (and the ancient Languages of Sumeria, Egypt, and Mesopotamia).
- ✓ In these languages, an entire concept might be represented by a single word symbol that is unrelated to a specific phonetic sound.
- ✓ The letters or symbols of a language are its alphabet. In English, the alphabet consists of 26 Roman or Latin letters; in Japanese, the Kanji alphabet comprises more than 3,000 kanas or whole words.
- ✓ The Russian alphabet, made up of Cyrillic characters based on the ancient Greek alphabet, has about the same number of letters as a Roman alphabet.
- ✓ All languages, from Navajo to Hebrew, have their own unique alphabets.
- ✓ Most modern alphabets share one very important attribute; the graphical shapes and method for writing the Arabic numbers 0 1 2 3 4 5 6 7 8 9.
- ✓ This is a simple system for representing decimal numbers, which lends itself to easy reading, writing, manipulation, and calculation.
- ✓ Expressing and performing $16+31=48$ is much easier in Arabic numbers than in Roman or Greek numerals: XVI + XXXII + XLVIII and $\gamma\varsigma + \lambda\beta = \mu\eta$.
- ✓ 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.
- ✓ The process deals with everything from the month/day/year order for expressing dates to provide special alphabetical characters on keyboards and printers.

Special Characters in HTML

- ✓ In HTML, character entities based upon the ISO-Latin-1 standard make up the alphabet that is recognized by browser software on the World Wide Web.
- ✓ All of the unusual characters of an English keyboard are included (the 7-bit ASCII set is built in), but for the extended character set that includes tildes, umlauts, accents and special symbols, you must use an escape sequence to represent them in an HTML document.

FONT EDITING AND DESIGN TOOLS

- ✓ Special font editing 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.

Design patterns have been issued for Bigelow & Holmes' Lucida, ITC Stone, and for Adobe's Minion.

(i) ResEdit

- ✓ ResEdit is a resource editor available from Apple that is useful for creating and changing graphics resources such as cursors, icons, dialog boxes, patterns, keyboard maps and bitmapped fonts on the Macintosh.
- ✓ It can be used to edit or create new Font resources for storing the bitmaps of screen fonts.

(ii)Fontographer

- ✓ Fontographer, supplied by Macromedia, is specialized graphics editor for both Macintosh and Windows platforms.
- ✓ You can use it to develop PostScript , TrueType, and bitmapped fonts for Macintosh, Windows , DOS, NeXT , and Sun workstations.
- ✓ Designers can also modify existing typefaces, incorporate PostScript artwork , automatically trace scanned images, and create designs from Scratch.
- ✓ Fontographer 's features include 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.
- ✓ Fontographer for Windows opens any PostScript Type 1 or True Type font for the pc and lets you create condensed, expanded, and oblique versions of the same font or modify any of those fonts to suit your design needs.
- ✓ One character, several characters, or entire fonts can be scaled , rotated, and skewed to create new and unique typefaces.
- ✓ A metric window provides complete control over character width, spacing, offset, and kerning.
- ✓ Nor can the current version read a Macintosh Fontographer database; font transfer is accomplished through Type 1 PostScript.

(iii)Type-Designer

- ✓ Type-Designer for Windows from DS Design is a font editor that lets you create, convert, and manipulate PostScript Type 1 and TrueType fonts as well as EPS file format illustrations.
- ✓ An extensive palette of editing tools allows you to make changes to a font's outline.
- ✓ With Type-Designer you can open up to eight typefaces simultaneously and cut and paste characters between them.

(iv)FontMonger

- ✓ FontMonger (for Macintosh) from Ares Software offers a proprietary hinting technology to ensure that your fonts will look good regardless of size.
- ✓ FontMonger converts Macintosh or PC fonts to either platform, as well as in any directional between PostScript Type 1, Type 3 and TrueType formats.
- ✓ A range of present type modification allows you to edit and expand your type library by generating a new font composed of small caps, obliques, subscript, or superscript characters.
- ✓ To create new fonts or to manipulate existing ones, FontMonger includes a freehand drawing tool, a scissors tool, and a gizmo tool that rotates, slants, and, FontMonger includes a freehand drawing tool, a scissors tool, and a gizmo tool that rotates, slants, and skews character outlines.

(v)FontChameleon

- ✓ Font Chameleon from Ares Software for both the Macintosh and Windows platforms builds millions of different fonts from a single master font outline.
- ✓ The program provides a number of preset font descriptors, which you build into a PostScript Type 1 or TrueType font.

- ✓ With slider bars you can manipulate various aspects of the font, including its weight, width, x-height, ascenders and descenders, and the blend of the serifs.
- ✓ Although you have an indefinite number of possibilities to manipulate the font descriptors of master outline font, you cannot create new master fonts because drawing tools or import capabilities are not included.
- ✓ The fonts you do build from the master outline can be used on the Macintosh, Windows, or OS/2 platforms.

(vi) 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 customer fonts using font-editing and design tools such as Fontographer, Type-Designer, and FontMonger, described above
 - Most image-editing and painting applications let you make text using the fonts available in your system.
 - Three-dimensional modeling programs allow you to create a character, add depth to it or extrude it, shade and light it, and manipulate it into other shapes.
 - The character here was generated in just this way and, when animated using Macromedia's Director, spins in place:

HYPERMEDIA AND HYPERTEXT

- ✓ Multimedia—the combination of text, graphic, and audio elements into single collection or presentation—becomes Interactive Multimedia.
- ✓ Interactive multimedia becomes hypermedia when its designer provides a structure of linked elements through which a user can navigate and interact.
- ✓ 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.
- ✓ Hypertext is what the World Wide Web is all about.
- ✓ When text lives 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 books, locate references to a certain word, and then immediately view the page where the word was found.
- ✓ Create complicated Boolean searches (using terms such as AND, OR, NOT, and BOTH).
- ✓ A word can be made hot, as can a button, thus leading the user from one reference to another.
- ✓ Some authoring systems incorporate a hypertext facility that allows you to identify words in a text field using a bold or colored style, then link them to other words, pages, or activities, such as playing a sound or video clip related to that hot word.
- ✓ 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” 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.
- ✓ In 1945, Vannevar Bush wrote a eight-page article, “As We May Think,” for the Atlantic Monthly(<http://www2.TheAtlantic.com/atlantic/atlweb/flashbks/computer/bushf.htm>).

(i)The Power of Hypertext

- ✓ In a fully indexed hypertext system, all words can be found immediately.
- ✓ Suppose you search a large database for “boats,” and you come up with a whopping 1,623 references or hits—among them.
- ✓ The power of such 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.

(ii)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.
- ✓ Hypertext database 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.
- ✓ A hypertext index by itself can be as large as 50 to 100 percent the size of the original document.
- ✓ Indexes are essential for speedy performance.
- ✓ Commercial hypertext systems were developed historically to retrofit gigantic bodies of information.
- ✓ Licenses for use and distribution of these commercial systems are expensive, and the hypertext-based projects typically require the large mass-storage capability of one or many CD-ROMs and/or dedicated gigabyte hard disks.

(iii) Searching for Words

- ✓ While the designer of a hypermedia database makes assumptions, he or she also presents users with tools and a meaningful interface to exercise the assumptions.
- ✓ Employing this interface, users can tailor word searches to find very specific combinations.
- ✓ Following are typical methods for word searching in hypermedia systems:
 - Categorical: Selecting or limiting the documents, pages, or fields of text within which to search for a word or words.
 - Word relationship: Searching for words according to their general proximity and order. For example, you might search for “patty” 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.
 - Truncation: 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 specifies, 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 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.

(iv) Hypermedia Structures

- ✓ Two buzzwords used often in hypertext systems are linked and node.
- ✓ Links are connections between the conceptual elements, that is, the nodes containing text, graphics, sounds, or related information in the knowledge base.
- ✓ More recently, with the popularization 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 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 that is contained at the nodes.
- ✓ Navigation becomes more complicated when you add associative links that connect elements not directly in the hierarchy or sequence.
- ✓ When you offer full-text search through an information base, there may be links between any number of items at your current node and any number of other nodes with items that meet your relationship criteria.
- ✓ One publisher of hypermedia products claims that becoming lost in “hyperspace” may not be all that bad.
- ✓ The struggle to find your way back can be valuable in itself, and is certainly a learning experience.

(v) Hypertext Tools

- ✓ Two functions are common to most hypermedia text management systems, and they are often provided as separate applications: building 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 fictions, and text and image databases.
- ✓ These tools are used extensively with information organized in a linear fashion; it still may be many years before the majority of multimedia project users become comfortable with fully nonlinear hypertext and hypermedia systems.

SOUND

- ✓ Most sensuous element of multimedia.
- ✓ It can provide the listening pleasure of music, the startling accent of special effects, or the ambience of a mood-setting background.
- ✓ Misuse of sound, can wreck your project.

(i) The power of sound

- ✓ When something vibrates in the air by moving back and forth (such as the cone of a loudspeaker), it creates waves of pressure.
- ✓ Acoustics is the branch of physics that studies sound.
- ✓ Sound pressure levels (loudness or volume) are measured in decibels (dB).

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	0000001	d studio

- ✓ Know the following:

How to make sounds

How to record and edit sounds

How to incorporate sounds into your work

(ii)Multimedia System Sounds

- ✓ Use sound right off the bat on both the Macintosh and on a multimedia PC running Windows because system beeps and warnings.
- ✓ On the Macintosh, you can choose one of several sounds for the system beep to indicate an error or warning: Droplet, Indigo, Quack, Simple Beep, Sosumi, and Wild Eep.
- ✓ In Windows, system sounds are .WAV files, and they reside in the Windows/Media subdirectory: available system sounds include Chimes, Chord, Ding, Tada, and the Microsoft sound.
- ✓ Add your own sound files and install them so they play when system events occur: place the .WAV sound files in your Windows/Media directory and use the sound control panel to select them.
- ✓ Using Macintosh models with a connected microphone or any older Macintosh with a sound digitizing device like Mac Recorder, you can record and label new system sounds.
- ✓ This recording software is built into the system: just click on the sound control panel's Add... Button

(iii)MIDI versus Digital 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, sequences of notes, and what instrument will play these notes, But MIDI data are not digitized sound; they are shorthand representations 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 files is a list of time-stamped commands that are recordings of musical actions.
- ✓ 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.
- ✓ In contrast to MIDI data, digital audio data are the actual representations of sound, stored in the form of thousands of individual numbers (called samples).
- ✓ The digital data represent the instantaneous amplitude (or loud samples) of a sound at discrete slice of time.
- ✓ The advantages
 - MIDI files are much more compact than digital audio files, and the size of a MIDO file is completely independent of playback quality. In CD-quality digital audio files.

- Because MIDI files are small, they don't take up as much RAM, disk space, and CPU resources.
- Because they are small, MIDI files embedded in Web pages load and play more quickly than their digital equivalents.
- In some cases, MIDI files may sound better than digital audio files if the MIDI sound source you are using is of high quality.
- 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.
- ✓ The disadvantages
 - Because MIDI data do not represent sound but musical instruments, you can be certain that playback will be accurate only if the MIDI playback device used for production.
 - Also, MIDI cannot easily be used to play back spoken dialog, although expensive and technically tricky digital samplers are available.
- ✓ There are two additional and often more compelling reasons to work with digital audio:
 - A wider selection of application software and system support for digital audio is available for both the Macintosh and Windows platforms.
 - The preparation and programming required for creating digital audio do not demand a knowledge of music theory; working with MIDI data usually does require a modicum of familiarity with musical scores, keyboards, and notation as well as of audio production.
- ✓ Use MIDI data in the following circumstances
 - Digital audio won't work because you don't have enough RAM,, hard disk space, CPU processing power, or bandwidth.
 - You have a high-quality MIDI sound source.
 - You have complete control over the playback hardware.
 - You don't need spoken dialog.
- ✓ Use digital audio in the following circumstances:
 - You don't have control over the playback hardware.
 - You have the computing resources and bandwidth to handle digital files.
 - You need spoken dialog.

(iv) Digital Audio

- ✓ Digitize sound from a microphone, a synthesizer, existing tape recordings, live radio and television broadcasts, popular CDs, and your favorite long-playing records.
- ✓ Digitize sounds from any source, natural or prerecorded.
- ✓ Digitized sound is sampled sound. Every nth fraction of a second, a sample of sound is taken and stored as digital information in bits and bytes.
- ✓ How often the samples are taken is the sampling rate, and the amount of information stored about each sample is the sample size.
- ✓ The more often you taken 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.

- ✓ The three sampling frequencies most often used in multimedia are CD-quality 44.1 KHz (kilohertz), 22.05 KHz, and 11.025 KHz.
- ✓ Sample sizes are either 8 bits or 16 bits.
- ✓ The value of each sampling 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.
- ✓ Remember that the sampling rate determines the frequency makeup of the recording.
- ✓ Sampling at higher rates more accurately captures the high-frequency content of your sound.
- ✓ Audio resolution determines the accuracy with which a sound can be digitized. Using more bits yields a recording that sounds more like its original.
- ✓ Stereo recordings are more lifelike and realistic, because human beings have two ears.
- ✓ Mono recordings are fine, but tend to sound a bit “flat” and uninteresting when compared with stereo recordings, stereo sound fields require twice as much storage space as mono files for the same length of time.

Setting proper recording levels

- ✓ A distorted sound is terrible.
- ✓ Recordings that are made at too low a level are often unusable because the amount of sound recorded does not sufficiently exceed the residual noise levels of the recording process itself.
- ✓ The trick is to set the right levels when you record.
- ✓ Any good piece of digital audio recording and editing software will display digital meters to let you know how loud your sound.
- ✓ Analog meters that usually have a 0 setting somewhere in the middle and extend up into ranges like +5, +8, or even higher, digital meters peak out.
- ✓ To avoid distortion, do not cross over this limit.

Editing digital recordings

- ✓ Once a recording has been made, it will almost certainly need to be edited.
- ✓ 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 a 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. Don't increase the volume too much, or you may distort the file.

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 Macintosh sound editing software will save files in SND and AIF formats, and most authoring systems will read these formats.
- ✓ In windows, most editing software writes .WAV files.

Resampling or Downsampling

- ✓ If you have recorded and edited your sounds at 16-bit sampling rates but you are using lower rates and resolutions in your project, you must resample or down sample the file.
- ✓ This process will 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 is important 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 to sound brighter or darker.

Time Stretching

- ✓ More 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 length is altered more than a few percent in either direction.

Digital Signal Processing (dsp)

- ✓ Some programs allow you to process the signal with effects such as reverberation, multitap delay, chorus, flange, and other special 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.

	SOUND		ND
	stic grand piano t acoustic piano ric grand piano y-tonk piano es piano		r harmonics stic bass ric bass(finger) ric bass (pick) ss bass

(v)Making MIDI Audio

- ✓ Creating an original MIDI score is hard work. Knowing something about music, being able to play the piano, and having a lot of good ideas are just the prerequisites to building a good score; beyond that, it takes time and musical skill to work with MIDI.
- ✓ Need sequence software and a sound synthesizer.
- ✓ A MIDI keyboard is also useful to simplify the creation of musical scores.
- ✓ The MIDI keyboard is not, however, necessary for playback unless the keyboard has its own built-in synthesizer that you wish to specify for playback.
- ✓ The sequencer software records your actions on the MIDI keyboard.
- ✓ Instruments that you can synthesize are identified by a general MIDI numbering system that ranges from 0 to 127.
- ✓ MIDI to get the flexibility and creative control
- ✓ Once the music is completed and fits your project, lock it down for delivery by turning it into digital audio data.

(vi)Audio File Formats

- ✓ On the Macintosh, digitized sounds may be stored as data file (for example, .AIF OR .SDII), or they may be stored as resource fork of the system or application as SNDs.
- ✓ In Windows, digitized sounds are most commonly stored as wave (.WAV) files.
- ✓ There are many ways to store the bits and bytes that describe a sampled waveform sound.

Extension	File Type	Platform	Description
	Apple II/x-aiff	SGI	Apple II audio data
	Apple II/x-aiff	SGI	Apple II audio data (compressed)
	Apple II/x-aiff	SGI	Apple II audio data
	Apple II/x-aiff	SGI	Apple II audio data
	Apple II/basic	NeXT	Apple II audio data
	Apple II/quickTime	Win	Apple II QuickTime video
	Apple II/mpeg		Apple II MPEG video
	Apple II/mpeg		Apple II MPEG video
	Apple II/mpeg		Apple II MPEG video
	Apple II/quickTime	Win	Apple II QuickTime video
Am	Apple II/x-pn-realaudio		Apple II Audio Sound
	Apple II/basic	NeXT	Apple II Audio Data
	Apple II/		Apple II Voice
	Apple II/x-wav		Apple II Audio

- ✓ The AIFF format (or AIFC when supporting MACE compression schemes of 3:1 and 6:1) is preferred for Macintosh sound files, where all the sound data reside in the data fork.
- ✓ The wave format (.WAV) was introduced by Microsoft and IBM with the introduction of Windows.
- ✓ Both Macintosh and Windows can make use of MIDI files. A MIDI interface is built into many sound boards on the PC.
- ✓ On the Macintosh, a MIDI adapter is required for MIDI instrument input and output. On both platforms, MIDI sounds are typically stored in files with the .MID extension.
- ✓ The common file format for sounds (.au) was the international telephone format of a Law (also known as Mu-law or μ -law, nicknamed the “TalkTadio” or “Geek of the Week” format and pronounced “me-law”).
- ✓ It provided meager 8 KHz sampling rates at 8-bit mono, but produced very small file sized. Today, the uLaw format supports 8 KHz at 16 bits in 2:1 compression.
- ✓ There are two methods for playing either digital or MIDI sound on the Web.
- ✓ First, you can wait for the entire sound file to download to your computer, then play it back with a helper application.
- ✓ Second, you can begin to play a downloading sound as soon as enough of the sound is cached on your computer such that there will always be more sound waiting to be played than still needs to be downloaded.
- ✓ The sound file streams into your computer in the background, keeping ahead of what has already been displayed 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 28.8 Kbps modem (low bandwidth) than when using a high-speed T1 connection.

(vii) Making MIDI Audio

- ✓ Microsoft's approach to MIDI has two parts: one part is MIDI mapping, which directs the flow of MIDI data from application software to MIDI hardware devices.
- ✓ The second part is a set of MIDI file-authoring guidelines for creating MIDI files that play back properly and on the widest possible variety of hardware devices.
- ✓ Windows splits all MIDI devices into two categories: base-level MIDI device and extended-level MIDI devices
- ✓ Base-level MIDI devices can play back at least three melodic instrument parts with at least six notes playing at one time and a percussion track with at least three notes playing at one time.
- ✓ Extended-level MIDI devices can play back at least nine melodic instrument parts with a least 16 notes playing at one time and a percussion track with a least 16 notes playing at one time.

MIDI Mapping

- ✓ MIDI files created to adhere to Microsoft's guidelines are called device-independent MIDI files.
- ✓ Each file stores two arrangements of each piece. one arrangement is intended for extended –level device, in MIDI channels 1 to 10, and a second arrangement is intended for base-level devices, in channels 13 to 16.
- ✓ There are 16 different MIDI channels to work with. Each channel can be sent, or mapped, to a different hardware device.
- ✓ With the multimedia properties control panel, you can set up a configuration that allows channels 13 to 16 to be sent to your device.
- ✓ Windows sees a MIDI message coming its way, it checks to see on which MIDI channels that message is being transmitted.
- ✓ Path mapping is useful when you want to play, on a general MIDI device, MIDI files that were created on a different type of device containing a different set of sounds.
- ✓ Key mapping is similar to patch mapping. Instead of mapping program change numbers from one device to another, key maps map notes (or "piano keys").

General MIDI Standard

- ✓ This standard accomplishes the following
- ✓ Dictates a standardized program change mapping system and a standardized set of sounds.
- ✓ Provides minimum polyphony and channel requirements.
- ✓ All General MIDI devices must be capable of playing 24 notes simultaneously and of receiving MIDI message simultaneously on all 16 MIDI channels.
- ✓ Provides standardized percussion and instrument channel assignments and patch mapping.
- ✓ All General MIDI devices play instrument sounds on channels 1 to 9; channel 10 is for percussion instruments.
- ✓ All General MIDI devices use the same percussion sounds on the keyboard keys (MIDI note numbers) of MIDI channel 10.

(vii) Working with Sounds on the Macintosh

- ✓ The original 128k Macintosh, released in January 1984, was technically a capable multimedia machine.
- ✓ In the windows environment, almost every major publisher of music and audio software has supported Microsoft's approach to MIDI. In contrast, many Macintosh developers are still not supporting Apple's MIDI Manager, The Macintosh software counterpart to the Windows MIDI Mapper, so many programs still rely exclusively on their own proprietary drivers.
- ✓ In fact, while Apple MIDI Manager version 2.0.2 works with 7.5, it is not supported by Apple because it is considered a development tool.
- ✓ MIDI Manager is not a stand-alone application or utility, but a group of tools: Apple MIDI Driver, MIDI Manager, patch Bay Help, patch Bay, and patch bay DA, and serial switch.
- ✓ Apple broke new ground, outpacing Microsoft's Audio/Video Interleaved technology, with the release of Quick Time.
- ✓ Quick Time is a standard file format for displaying digitized motion video from hard disk or CD-ROM without special hardware.
- ✓ Digital audio data is interleaved with video information in the file, and when it is played back, the audio stays synchronized to the motion picture .
- ✓ You can use QuickTime just to play stereo sounds and MIDI; the video part of QuickTime is not required.

MIDI Music in Quick Time

- ✓ QuickTime can play MIDI music from a "music track" embedded within a Quick time movie file.
- ✓ This music track can store samples sounds and a playback list for these sounds.
- ✓ The scheme for playing music in Quick time is called the Macintosh Music Architecture.
- ✓ To convert a standard MIDI file (known as a SMF, with Type=Midi and creator = text or movie) to QuickTime format, you need to have the Quick Time Musical Instrument extension installed.
- ✓ Then you can use Apple's Simple Text or Movie Player applications to convert the file by simply opening or importing it.
- ✓ You can change MIDI instrument settings during the transition from SMF to Quick Time format.

(viii) Notation Interchange File Format (NIFF)

- ✓ Over the centuries, music notation has developed as its own complex language.
- ✓ The NIFF file format was created in the mid-1990 from input from many commercial music software developers, publishers, and experienced music software users who were frustrated by a lack of a standard format for sending and receiving this intricate language of notes, rests, accents, and squiggles.
- ✓ NIFF allows linking of MIDI data and notation as well as inclusion of Encapsulated PostScript (EPS) files and fonts.

- ✓ Its designers recognized that NIFF files will likely be transmitted electronically over low-bandwidth lines, and they deliberately kept the file format as compact as possible.
- ✓ The format complies with the design rules of Microsoft's Resource Interchange file format (RIFF), so the same NIFF format files can be used by software running on any type of machine.
- ✓ The NIFF logical structures were designed to handle situations like the following:
 - ✓ In a Mahler symphony score there are three trumpet parts.
 - ✓ The notes played by the trumpets belong to three separate parts.
 - ✓ In the physical view of the canonic system, each trumpet part is assigned its own staff.
 - ✓ Each staff is labeled with its own name.

(ix) Adding Sound to Your Multimedia Project

- ✓ Certain steps to bring an audio recording into your multimedia project.
- ✓ Decide what kind of sound is needed (such as background music, special sound effects, and spoken dialog).
- ✓ Decide where the audio events will occur in the flow of your project. Fit the sound cues into your storyboard, or make up a cue sheet.
- ✓ Decide where and when you want to use either digital audio or MIDI data.
- ✓ Acquire source material by creating it from scratch or purchasing it.
- ✓ Edit the sounds to fit your project.
- ✓ 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.

(x) Toward Professional Sound: The Red Book Standard

- ✓ The method for digitally encoding the high-quality stereo of the consumer CD music market is an international standard, ISO 10149.
- ✓ This is also known as the red book standard (derived simply from the color of the standard's book jacket).
- ✓ Developers of this standard claim that the digital audio sample size and sampling rate of Red Book Audio (16 bits at 44.1 kHz) allow accurate reproduction of all sounds that humans can hear.
- ✓ Until recently, dedicated professional sound-studio equipment was used for this high-fidelity recording; today high-end sound boards are available that will record and play 16-bit sampled sound at 44.1 kHz and at 48 kHz. These boards are available for both Macintosh and PC platforms.
- ✓ Software is also available to translate the digital files of Red Book Audio on consumer compact discs directly into a digital sound editing file on your computer.

Space Considerations

- ✓ The substantial amount of digital sound information required for high-quality sound takes up a lot of disk storage space, especially when the quantity is doubled for two-channel stereo.
- ✓ It takes about 1.94MB to store 11 seconds of uncompressed Red Book stereo sound.
- ✓ 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

- ✓ You face important trade-offs when deciding how to manage digitized sounds in your multimedia project.

(xi)Production Tips

Audio Recording

- ✓ Most multimedia developers record their sound material to cassette tapes as the first step in the digitizing process.
- ✓ With tape, you can do many takes of the same or voice, listen to all the takes, and pick the best one to digitize.
- ✓ By recording on inexpensive media rather than directly to disk, you avoid filling up your hard disk with throw-away stuff.
- ✓ If your project requires CD-quality digitized sound at 44.1 kHz and 16 bits, you should hire a sound studio.
- ✓ High-fidelity sound recording is a specialized craft, a skill learned in treated room, high-end amplifiers and recording equipment, and expensive microphones.
- ✓ Video cassette and recorders (VCR's) usually have excellent stereo audio circuits, and many good multimedia sounds were first recorded and digitized using the audio tracks of videotape.
- ✓ Digital audio tape (DAT) system have now entered the consumer marketplace. They provide a tape-based 44.1 kHz, 16-bit record and playback capability.
- ✓ You may find, however, that DAT is high-fidelity overkill for your needs, because the recordings are too accurate, precisely recording glitches, background noises, and microphone pops, and coughs from the next room.
- ✓ A good editor can help reduce the impact of these noises, but at the cost of your time and money.

Audio Editing

- ✓ Sound Recorder (Sndrec32.exe) is installed with the multimedia program group in Windows 95.
- ✓ It is a minimal sound recording and editing tool that provide a few simple effects (echo, reverse, and speed changes) and allows saving only in Microsoft's WAV format.
- ✓ With editing software you can manipulate your digitized sounds in myriad ways cutting and pasting, adding special effects, mixing various sounds together, and, if you wish, literally putting words into people's mouths.
- ✓ Deck II from macromedia offers high-end synchronization, digital editing and mixing, and can drive MIDI sequencers at the same time.

Keeping Track of Your Sounds

- ✓ Be sure tape deck or recorder has a good counter built into it, so that you can mark and log the locations of various takes and events on the tape and quickly find them later.
- ✓ Get into habit of jotting down the counter position and tape content whenever you record sounds.
- ✓ In an elaborate project with many sounds, 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.

- ✓ This database is particularly important because you may need to give your sound files such unhelpful names as SND0094A. WAV or CHAPT 1-3. WAV; these names won't contain many cues about the files actual content, and your will need at hand a more descriptive cross-reference.

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 a complicated live presentation, or if you're shipping a commercial multimedia application.
- ✓ The most serious challenge is synchronization of sound element with presentation of visual image on computers that are faster or slower than the machine on which the sound elements were created.
- ✓ Unless you plan ahead, problems will not emerge until you begin testing.
- ✓ Both digital audio and MIDI are time-based events, but most animation and computer-based video will play only as fast as the CPU can handle it.
- ✓ A 60-second digital audio or MIDI files will play for the same length of time on a slow Macintosh classic, a fast PowerMac 9500, a slow 386SX, or a fast Pentium.

Copyright Issues

- ✓ Ownership rights are significant issues for multimedia procedures who would love to use a few bars of Madonna's latest hit or a nostalgic background of Batch suites played by Pablo Casals.
- ✓ Producers may rightfully fret about copyrights and permissions.

IMAGES

Making Still Image

- ✓ Still images may be small or large, even full screen.
- ✓ They may be colored, placed at random on the screen, evenly geometric or oddly shaped. Still images may be a single tree on a wintry hillside; staked boxes of exist against a gray, tartan, or Italian marble background; an engineering drawing; a snapshot of your department manager's new BMW.
- ✓ Whatever there form, still images are generated by the computer in two ways: as bitmap (or paint graphics) and as vector drawn (or just plain drawn) graphics.
- ✓ 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 graphics 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.
- ✓ Both types of images are stored in various file formats and can be translated from one application to another or one computer to another.
- ✓ Image formats already use compression with in the file itself-for example, **GIF**, **JPEG**, and **PNG**.
- ✓ Still images may be the most important element of your multimedia project.

Bitmaps

- ✓ A bitmap is a simple information matrix describing the individual dots that are the smallest elements of resolution on a computer.
- ✓ Screen or other display or printing device.
- ✓ A one-dimensional matrix is required for mono-chrome (black and white); greater depth (more bits of information) is required to describe the more than 16 million colors the picture elements may have.
- ✓ This picture elements can be either on or off, as in the 1-bitmap, most often “monochrome” black or white but, depending upon your software, they can be any 2 colors that represent the on and off states.
- ✓ Represent varying shades of colors (4-bit, 16 colors; 8-bit, 236 colors; 15-bit; 32, 768 colors; 16-bit, 65,536 colors; 24-bit, 16,772,216 colors).
- ✓ You have three different ways to make a bitmap:
 - Make a bitmap from scratch with a 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, artwork, or a television image using a scanner or video capture device that digitizes the image.

Clip Art

- ✓ Clip art is available on CD-ROMs and through on-line services. Many graphics application are shipped with clip art and useful graphics, or the company will send you a collection when you a register the product.
- ✓ A clip art collection may contain a random assortment of images or it may contain a series of graphics, photographs, sound, and video related to a single topic.
- ✓ Once you have a clip art bitmap, you can then manipulate and adjust many of this properties (such as brightness, contrast, color depth, hue, and size).

Bitmap software

- ✓ The abilities and features of paint programs for both the macintosh and windows range from simple to complex.
- ✓ The better painting applications are available in versions that run and look the same on both platforms and the graphics files you make can be saved in many formats, readable across platforms.
- ✓ Paint programs come as part of a bundle when you purchase your computer, monitor, or scanner.
- ✓ Most multimedia authoring tools offer bitmap editing features, director includes a powerful image editor that provides advanced tools such as “oinons kinning” and image filtering common plug-ins from photo shop and other third party designers.

- ✓ More sophisticated are elaborately featured bitmap painting and editing programs such as Adobe's Photoshop or fractal design's painter.
- ✓ Painter for both, Macintosh and windows, provides astoundingly realistic classical art effects, using a complete of brushers and digital tools.

Capturing and Editing Images

- ✓ The simplest way to capture what you see on the screen at any given moment is to press proper keys on your computer keyboard.
- ✓ This causes a conversion from the video bitmap to a bitmap in a format that you can use.
 - On the Macintosh, the keystroke combination COMMAND-SHIFT-3 creates a readable PICT2-format file named picture and places it in your active disk drive's root directory.
 - Both the Macintosh and windows environments have a clipboard, an area of memory where data such as text and images are temporarily stored when you cut or copy them within an application. In windows, when you press PRINTSCREEN, copy of your screen's images goes to the clipboard.
 - Screen capture utilities for macintosh and windows go a step further and are indispensable to multimedia artist. With a keystroke, they let you select an area of the screen and save the selection in various formats.
 - A color photograph of a red rose can be changed into a purple rose, or blue if you prefer.

Morphing

- ✓ Morphing is another effect that can be used to manipulate still images or to create interesting and often bizarre animated transformation.
- ✓ Morphing allows you to smoothly blend two images so that one image seems to melt into the next, often producing some amusing results.
- ✓ Image-editing programs may, indeed, represent the single most significant advance in computer image processing during the late 1980s, bring truly amazing power of PC desktops.

Scanning Images

- ✓ Everyday objects can be scanned and manipulated using image-editing tools, such as those described in the previous section, to create unusual, attention-getting effects, for example, to enliven a screen with a gardening motif, scan a mixer of seeds, some fall foliage, or grass-stained garden gloves.
- ✓ Another alternative to computer-generated graphics is to create artwork using traditional methods: watercolors, pastels, and even crayons.
- ✓ You can then scan the Images, make necessary alternations, and tweak pixels on the computer.

Vector Drawing

- ✓ Most multimedia authoring systems provide for use of vector-drawn objects such as, rectangles, ovals, polygons, and text.
- ✓ Computer-aided design (CAD) programs have traditionally used vector-drawn objects system for creating the highly complex and geometric rendering needed by architects and engineers.
- ✓ Graphic artist designing for print media use vector-drawn objects because the same mathematics that put a rectangle on your screen can also place that rectangle or the fancy Bezier curves of a good liner-art illustration) on paper without jaggies.
- ✓ 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 the extracted corporate logo.

How Vector Drawing Works

- ✓ A vector is a line that is described by the location of its two endpoints. A simple rectangle, example, might be defined as follows:
RECT 0, 0,200,200
- ✓ Using Cartesian coordinates, your software will draw this rectangle starting at the upper-corner of your screen, going 200 pixels horizontally to the right, and 200 pixels downwards.

Vector drawn objects versus bitmaps

- ✓ The concise description of the vector-drawn colored square described in the previous section contains less than 30 bytes of alphanumeric data (even less when the description is tokenized or compressed).
- ✓ On the other hand, the same square as an uncompressed bitmap image, in black and white (which requires the least memory, at 1-bit color depth per pixel) would take 5000 bytes to describe (200*200/8).
- ✓ Thus a single image made up of 500 individual line and rectangle objects, for example, may take longer for the computer to process and place on the screen than an image consisting of just a few drawn circle objects.
- ✓ Vector objects are easily scalable without losing resolution or image quality a large drawn image can be shrunk to the size of postage stamp, and while it may not look good on a computer monitor at 72 dpi, it will likely still good when printed at 300 dpi to a color printer.

Converting Between Bitmaps and Images

- ✓ Most drawing programs offer several file formats for saving your work, and, if you wish, you can convert a drawing that consist of several vector-drawn objects into a bitmap when you save the drawing.
- ✓ Converting bitmaps to drawn objects with a capture program.
- ✓ There are, however, programs and utilities that will compute the bounds of a bitmapped image or the shaped of colors within an image and then derive the polygon objects that describes the image.
- ✓ This procedure is called auto tracing.
- ✓ It is available in some authoring systems that both bitmapped and drawn objects.

3-D Drawing and Rendering

- ✓ Drawing in perspective or in 3D on a two dimensional surface takes special skill and talent.
- ✓ Dedicated software is available to help you render 3D scenes, complete with directional lighting and special effects, but get ready for another steep learning curve.
- ✓ The production values of multimedia projects have increased dramatically since the late 1980s, and as the production bar has risen, end users' expectation have also ratcheted upward.

ANIMATION

- ✓ Animation makes static presentation come alive. It is visual change over time and can add great power to your multimedia projects and web pages.

The power of motion

- ✓ Animate whole project, or you can animate here and there, accenting and adding spice.
- ✓ Visual effects such as wipes, fades, zooms, and dissolves are available in most authoring packages, and some of these can be used for primitive animation.
- ✓ 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.

Principles of Animation

- ✓ Animation is possible because of a biological phenomenon known as persistence of vision and a psychological phenomenon called phi.
- ✓ An object seen by the human eye remains chemically mapped on the eye's retina for a brief time after viewing.
- ✓ Combined with the human mind's need to conceptually complete a perceived action, this makes it possible for a series of images that are changed very slightly and rapidly, one after the other, to seemingly blend together into a visual illusion of movement.

- ✓ Television video builds 30 entire frames or pictures every second; the speed with which each frame is replaced by the next one makes the images appear to blend smoothly into movement.

Animation by Computer

- ✓ In 2-D space, the visual changes that bring an image alive occur on the flat Cartesian x and y axes of the screen.
- ✓ A blinking word, a color-cycling logo, a cell animation, or a button or tab that changes state on mouse rollover to let a user know it is active are all examples of 2-D animations.
- ✓ These are simple and static, not changing their position on the screen.
- ✓ Path animation in 2-D space increases the complexity of an animation and provides motion, changing the location of an image along a predetermined path during a specified amount of time.
- ✓ In $2\frac{1}{2}$ -D animation, an illusion of depth is added to an image through shadowing and highlighting, but the image itself still rests on the flat x and y axes in 2 dimensions.
- ✓ Embossing, shadowing, beveling, and highlighting provide a sense of depth by raising an image or cutting it into a background.
- ✓ In 3-D animation, software creates a virtual realm in 3 dimensions, and changes are calculated along all 3 axes allowing an image or object that itself is created with a front, back, sides, top, and bottom to move towards or away from the viewer, or, in this virtual space of light sources and points of view, allowing the viewer to wander around and get a look at all the object's parts from all angles.

Animation Techniques

- ✓ Create an animation, organize its execution into a series of logical steps.
- ✓ 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.
- ✓ Allowing plenty of time for this phase when you are experimenting and testing. Post-process your animation, doing any special renderings and adding sound effects.

Cell Animation

- ✓ The term cel derives from the clear celluloid sheets that were used for drawing each frame, which have been replaced today by layers of digital imagery.
- ✓ Cell animation artwork begins with key frames (the first and last frame of an action).
- ✓ The series of frames in between the key frames are drawn in a process called tweening.
- ✓ Tweening is an action that requires calculating the number of frames between keyframes and the path the action takes, and then actually sketching with pencil the series of progressively different outlines.
- ✓ As tweening progresses, the action sequences is checked by filling through the frames.

- ✓ The penciled frames are assembled and then actually filmed as a pencil **test** to check smoothness, continuity, and timing.

Computer Animation

- ✓ Computer animation programs typically employ the same logic and procedural concepts as cel animation and use the vocabulary of classic cel animation terms such as layer, key frame, and tweening.
- ✓ The primary difference among animation software programs is in how much must be drawn by the animator and how much is automatically generated by the software.
- ✓ Paint is most often filled or drawn with tools using features such as gradients and anti-aliasing.
- ✓ The word inks, in computer animation terminology, usually means special methods for computing color values, providing edge detection, and layering so that images can blend or otherwise mix their colors to produce special transparencies, inversions, and effects.
- ✓ Kinematics is the study of the movement and motion of structures that have joints, such as a walking man.
- ✓ Animating a walking step is tricky: you need to calculate the position, rotation, velocity, and acceleration of all the joints and articulated parts involved knees bend, hips flex, shoulders swing, and the head bobs.
- ✓ Inverse kinematics, available in high-end 3-D programs such as Light wave and Maya, is the process by which you link objects such as hands to arms and define relationships and limits (for example, elbows cannot bend backwards).
- ✓ Morphing is a popular effect in which one image transforms into another. Morphing applications and other modeling tools that offer this effect can transition not only between still images but often between moving images as well.
- ✓ The morphed images were built at a rate of eight frames per second, with each transition taking a total of four seconds, and the number of key points was held to a minimum to shorten rendering time. Setting key points is crucial for smooth transition between 2 images.

Making Animations That Work

- ✓ Multimedia authoring systems typically provide tools to simplify creating animations within that authoring system, and they often have a mechanism for playing the special animation files created by dedicated animation software.
- ✓ The following sections provide examples to demonstrate that computer generated animations actually consists of many bits and pieces carefully or chest rated to appear as one image, in motion- just like the many layers in classical animations.

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 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.
- ✓ For a realistic rolling effect, the circumference is divided by 8.
- ✓ As each image is successively displayed, the ball is moved 40 pixels along a line.
- ✓ Being where the rubber meets the road, this math applies when you roll any round object in a straight line perpendicular to your line of sight.

A Bouncing Ball

- ✓ This is a version of the GIF 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 makeup 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 GIF89 a file format.
- ✓ In the formula, s equals distance, a equals acceleration due to gravity, and t equals time

$$s = \frac{1}{2}at^2$$
- ✓ Gravity makes your bouncing ball accelerate on its downward course and decelerate on its upward course.
- ✓ Animation requires precision, ignore the hard numbers you learned in high school and 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 100.
- ✓ The amount of squash would be determined by the type of ball – a steel ball or a balloon or a very soft rubber ball.
- ✓ The ball would squash when it hit and un-squash as it bounced up again.

Video

- ✓ Digital video is the most engaging of multimedia venues and it is a powerful tool for bringing computer users closer to the world.
- ✓ It is also an excellent method for delivering multimedia to an audience raised on television with video elements in your project you can effectively present your messages and reinforce your story and viewers tend to retain more of what they see.
- ✓ Of all the multimedia elements video places the highest performance demand on your computer and its memory and storage.
- ✓ Control the delivery platform for your multimedia project you can specify special hardware and software enhancements that will allow you to work with full-screen full-motion video and sophisticated audio for high-quality surround sound.

- ✓ Install a superfast RAID(Redundant Array of Independent Disks) system that will support high-speed data transfer rates.
- ✓ You can include instructions in your authoring system (for example, flash or adobe acrobat connect) that will spool video clips into RAM, ready for high speed playback before they need to play.

Using Video

- ✓ Well-executed video clips can make a dramatic difference in a multimedia project.
- ✓ This is especially true today while broadcast television moves from the analog national television standards committee(NTSC) standard to the new digital television(DTV) standard.
- ✓ According to the federal communications commission's schedule by 2006 all television broadcast stations will be switched over to the digital standard and many consumers will have purchased digital television sets or display monitors.
- ✓ Digital video has supplanted analog video as the method of choice for making and delivering video for multimedia use.
- ✓ A digital camcorder directly connected to a computer work station using FireWire(IEEE1394) cables eliminates the image degrading analog to digital conversion step typically performed by video capture cards bringing the power of nonlinear video editing and production to everyday users.

Obtaining Video Clips

- Project 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.
- On some projects you will have no choice but to pay the price for required footage.
- If your budget can't cover the cost of licensing a particular video clip you may want to consider using other alternatives.
- If you shoot your own video for a project make sure you have talent releases from all persons who appear or speak and permission to use the audio effects and music you weave into it.

How Video Works

- ✓ 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.
- ✓ The output of the CCD is processed by the camera into a signal containing three channels of color information and synchronization pulses.
- ✓ There are several video standards for managing CCD output each dealing with the amount of separation between the components of the signal.

- ✓ If each channel of color information is transmitted as a separate signal on its own conductor the signal output is called RGB(red green and blue)which is the preferred method for higher-quality and professional video work.
- ✓ Output can also be split into two separate chroma (color) channels cb/cr (blue and red chroma components) and a luma component channel(Y) which makes the dark and light part of the video picture.
- ✓ These components are often confused with the YUV color space in which time-Y, x-axis=U and y-axis=V.
- ✓ Lower in quality is the Y/C signal that makes up separate video(S-Video) an analog video signal used in super VHS and Hi-8 video.
- ✓ The video signal is written to tape by a spinning recording head that changes the local magnetic properties of the tape's surface in a series of long diagonal stripes.
- ✓ Because the head is canted or tilted at a slight angle compared with the path of the tape it follows a helical(spiral)path, which is called **helical scan** recording.
- ✓ A single video frame made up of two fields that are interlaced audio is recorded on a separate straight-line track at the top of the videotape although with some recording systems 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.
- ✓ Tracking is fine adjustment of the tape so that the tracks are properly aligned as the tape moves across the playback head.
- ✓ Not so long ago a video cassette recorder would also add the video and sound signals to a sub-carrier and modulate them into a radio frequency(RF) in the FM broadcast band.
- ✓ This is the NTSC PAL or SECAM signal that was available at the antenna out connector of a VCR(these signal standards are explained in the next section).
- ✓ A strong external magnetic field would skew the electron beam to one area of the screen and sometimes caused a permanent blotch that could not be fixed by **degaussing**—an electronic process that readjusts the magnets that guide the electrons.
- ✓ All of these electronic activities work in concert to yield a television picture on a CRT.

Broad Video Standards

NTSC

- ✓ The United States Canada , Mexico, Japan 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.
- ✓ These standards defined a method for encoding information into the electronic signal that ultimately created a television picture.
- ✓ The electron beam actually made two passes as it drew a single video frame first it laid down all the odd-numbered lines and then all the even-numbered lines.

- ✓ Each of these passes(which happen at a rate of 60 per second or 60hz) painted a field and the two fields were then combined to create a single frame at a rate of 30 frames per second (fps).(technically the speed is actually 29.97 Hz).
- ✓ This process of building a single frame from two fields was called interlacing a technique that helps to prevent flicker on television screens.
- ✓ Computer monitors used a different progressive-scan technology and drew the lines of an entire frame in a single pass without interlacing them and without flicker.

PAL

- ✓ The phase alternate line (PAL) system was used in the united kingdom western Europe Australia south Africa china and south America.
- ✓ 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(50hz).

SECAM

- ✓ The **sequential color and memory(SECAM)** (taken from the French name reported variously as system electronic pour color avec memoire or sequential color avec memoire) system was used in France Eastern Europe the Former USSR and a few other countries.

ATSC DTV

- ✓ What started as the high definition television(HDTV) initiative of the federal communications commissions in the 1980s changed first to the advanced television(ATV) initiative and then finished as the digital television(DTV) initiative by the time the FCC announced the change in 1996.
- ✓ This standard which was slightly modified from both the digital television standard(ATSC doc. A/53) and the digital audio compression standard (ATSC doc. A/52)moved U.S. television from an analog to digital standard.

HDTV

- ✓ High definition television(HDTV) provides high resolution in a 16.9 aspect ratio.
- ✓ This aspect ratio allows the viewing of cinemascope and Panavision movies.
- ✓ There is contention between the broadcast and computer industries about whether to use interlacing or progressive-scan technologies.
- ✓ The computer people argue that the picture quality at 1280*720 is superior and steady.
- ✓ Both formats have been included in the HDTV standard by the advanced television systems committee(ATSC).

(iv)Digital Display Standards

- ✓ Advanced Television System Committee(ATSC) is the digital television standard for the united states, Canada, Mexico, Taiwan, and South korea.

- ✓ It is being considered in other countries.
- ✓ It Support wide screen aspect of 16:9 with images up to 1920*1080 pixels in size and up to a number of other images sizes, allowing up to six, standard-definition on “virtual Channels “ to be broad cast on a single TV station using the existing 6MHz channel.
- ✓ It boasts of “threat quality” because it uses Dolby Digital AC-3 format to provide 5.1 channel surround sound.
- ✓ Digital Video Broadcasting (DVB) is mostly used in Europe Where the standards define the physical layer and data link layer of Distribution System.
- ✓ Integrated Service Digital Broadcasting (ISDB) is used in Japan to allow radio and television stations to convert to digital format.

OverScan and the safe title Area

- ✓ 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 Over scan.
- ✓ In contrast, computer monitors display a smaller image on the monitor’s picture tube (under scan) leaving a black border inside the bezel.

Video Color

- ✓ Color reproduction and display is different between television and computer monitor.
- ✓ Consequently color used in a graphics image created for computer video may display differently When that image is transformed into NTSC television video.
- ✓ Most commercial broadcast facilities and TV studios will refuses to run video program that include illegal colors.
- ✓ There are adjustment that can be made but, if these colors are overblown in the original product they will de saturate the other colors involved along with the white level, making the end result of the video below the legal rate for transmission.

Interlacing Effects

- ✓ In television the electron beam actually makes two passes on the screen as it draws a single video frames first laying down all the odd-numbered lines then all the even-numbered lines as they are interlaced.
- ✓ Single pixel lines displayed on an RGB monitor look fine; on television these thin lines flicker brightly because they only appear in every other fields.
- ✓ To prevent this flicker make sure your lines are greater than two pixels thick and that you lines are greater than two pixels thick and that you avoid typeface that are very thin or have elaborate serifs.

Calibration

- ✓ Too little emphasis is put upon calibration of video, light monitors, sound and other equipment used for doing presentation.
- ✓ In some devices you simply push in all the knobs to equalize the recording.

Text and titles for television

- ✓ Here are some suggestion for creating good titles:
 - Fonts for titles should be plain, sans serif , and bold enough to be easily read.
 - When you are laying text onto a dark background , use white or a light colors for the text .
 - Use a drop shadow to help separate the text front and back ground image.
 - Never use black and or colored text on a white background .
 - Do not kern your letters too tightly.
 - Use parallel lines , boxes , and tight concentric circles sparingly. When you use them large and with thick lines
 - Avoid colors that are too hot because they will twinkle and buzz.
 - Bring titles on slowly keep them on screen for a sufficient interval and then fade them out.
 - Avoid making busy titles screens; use more pages instead.

(v)Shooting and Editing Video

- ✓ To add full screen full motion video to your multimedia project you will need to invest in specialized hardware and software or purchase the service of a professional video production studio.
- ✓ Expensive professional video equipment and services may yield proportionately greater benefits than if you used consumer grade equipment and non linear editors.

Story boarding

- ✓ Pre planning 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 at first buy

But you'll find it to be very helpful in the long run.

- ✓ Story boards are like any sequential comic you read daily.

(vi)Video Tips

Shooting Platform

- ✓ Never underestimate the values of a steady shooting platform.
- ✓ A classic symbols of amateur home movies is shaky camera work.

- ✓ Using a tripod or even placing the camera on a stable platform such as a rolled up sweater on the hood a car can improve the shoot .
- ✓ With a little care and careful adjustment of the lockdown screws a case study is done.

Lighting

- ✓ Perhaps the greater difference professional camcorders and consumer camcorder 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-grades video camera and a Hi -8 cam corder

Chroma keys

- ✓ Chroma keys allows you to choose or range of colors that become transparent allowing the video to be seen “through” the computer image.
- ✓ This is the technology used by a newscast weather person who is shot against a blue background that is made invisible when merged with the electrically generated image of the weather map.
- ✓ The weather map is blue screen green screen ,ultimate or chroma key editing .
- ✓ When captain Picard of star trek fame walks on the surface of the moon it is likely that he is actually walking on a studio set in a front of a screen or wall painted blue.

Composition

- ✓ The general rules for shooting quality video for broad cast use also apply to multimedia .
- ✓ When shooting video for play back from CD-ROM or the Web in a small computer window it is best to avoid wide panoramic shots.
- ✓ The effect of sweeping panoramas is lost in small windows.
- ✓ Use close-ups and the medium shots head-and-shoulder or even tighter.

(vii)Recording Formats

MPEG

- ✓ The MPEG Standards were developed by the Moving Picture Experts Group a working group convened by the International Standards Organization (ISO) and the International Electro-technical Commission (IEC) which created standards for the digital representation of picture as well as associated audio and other data.
- ✓ Using MPEG -1 you could deliver 1.2 Mbps of video and 250 Mbps of two – channel stereo audio using CD-ROM technology.
- ✓ MPEG-2 a completely different system from MPEG-1,required higher data rates (3 to 15 Mbps) but also delivered higher image resolution ,picture quality ,

interlaced video formats, multi resolution ,scalability ,and multi channels, audio features.

- ✓ MPEG-4 provides a content-based method for assimilating multimedia element.
- ✓ MPEG-7 called the multimedia Content Description interface went a step further by integrating information about the image sound or motion video element being used in a composition.
- ✓ Digital Right Management (DRM) a crucial issues to content creator is addressed in MPEG-21 which is under continuing development.

Composite Analog Video

- ✓ Composite video combines the luminance and chroma information from the video signal.
- ✓ As a result it produces the lowest quality video and is most susceptible to generation loss the loss quality that occurs as you move from original footage to edit master to copy .

Component Analog Video

- ✓ Component video separates the luminance and chroma information in order to improve the quality of the video and to decrease generation loss.
- ✓ This is the level for “prosumer”-industrial and professional video equipment.

S-video (y/c)

- ✓ In S-video color and luminance information are kept on two separates tracks: (Y/C).
- ✓ The result is a definite improvement in picture quality over composite video.
- ✓ This standard is used in S-VHS and Hi-8. Although basically or oriented towards consumer this format gained rapid acceptance in the “Prosumer” and industrial market because of the shaper image and slightly less generation loss from master to copy.

Three- channel Component (Y/R-Y/B-Y,Y/U,/V)

- ✓ Professional quality requires further separation in the video signal usually divided between luminance (y) and of chroma but some times divided between the Red/Green/Blue primary additive colors the previous discussion in the section “How Video Works”.
- ✓ In the early 1980s Sony began to experiment with a new portable professional video format based on its consumer composite video format Betamax.
- ✓ Betamax it required speeding the tape up considerably and laying the signal on the tape in three component channels.

Composite Digital

- ✓ Composite Digital recording format combine the luminance and the chroma information just as analog composite format do they sample the incoming waveform and encode the information in binary (0/1) digital code.
- ✓ The D-2 format was developed primarily by Apex and Sony the D-3 format was developed primarily by Panasonic.

Component Digital

- ✓ Most of the developed since the Mid-1990s has been in component digital format which adds the advantage of component signal to digital recording.
- ✓ Sony released the first equipment in this category with its D-1 format .
- ✓ The DV format is another component digital format but it takes its sample at smaller bit depth and compresses the video allowing for the use of smaller tape widths.

ATSC Digital TV

- ✓ It is also important not to confuses the digital format using the NTSC standard with the new generation of all Digital DTV production equipment that conforms to standard developed by Advanced Television System Committee(ATSC).
- ✓ These standards provide for the both digital standards TV (STV) and high definition TV (HDTV) recording that can be broadcast by digital TV receivers.
- ✓ Since this video equipment has just been introduced it is extremely expensive and is not of immediate interest to the multimedia.

Comparing the Format

- ✓ Provide basics information about what was the most commonly used video recording format.
- ✓ Format are listed in the chronological order of their release as “industry standards.”

(viii)Digital Video

- ✓ Setting up a production environment for making digital video, however does requires hardware that meets minimum specification for processing speed, transfer, and storage .
- ✓ there are many consideration to keep in mind when setting up your production environment:
 - Computer with fire wire (IEEE 1394 or iLink)connection and cables.
 - Fast processor(s)
 - Plenty of RAM
 - Fast and big hard disk(s) storing DV (digital video) data streams of raw video footage from a camera at DV’s fixed transfer rate of about 3.6MBps.
 - Second display to allow for more real estate for editing software.

- Audio mixer to adjust sound output from the camcorder.
- Television monitor to view your project (if it's for TV).
- Non linear editing (NLE) software.

Digital Video Resolution

- ✓ A video image is measured in pixels for digital video and scan lines for analog video.
- ✓ (HDTV)television are capable of 1920*1080P60 also known as 1920 pixels per scan line by 1080 scan lines progressive at 60 frames per second.

Digital Video Architectures

- ✓ A digital video architectures is made up of a format for encoding and playing video files by a computer and includes a player that can recognize and play files created for that format.
- ✓ Related video file format are Quick Time movie (.mov) ,Audio video interleaved (.avi), and RealMedia (.rm).

Digital Video compression

- ✓ To digitizes and store a 10- seconds clip of full-motion video in your computer requires transfer of an enormous amount of data in very short amount of time.
- ✓ This Overwhelming technological bottleneck is overcome using digital video compression schemes or codecs (coders/decoders).
- ✓ A codec is the algorithm used to compress (code) a video for delivery and then decode it in real-time for fast playback.
- ✓ Real-time video compression algorithm such as MPEG , Indeo JPEG ,cinepak , and Sorenson are available to compress digital video information at rates that ranges from 50:1 to 200:1.

Data compression:

Data compression is a reduction in the number of bits needed to represent data. Compressing data can save storage capacity, speed up file transfer, and decrease costs for storage hardware and network bandwidth.

How compression works

Compression is performed by a program that uses a formula or algorithm to determine how to shrink the size of the data. For instance, an algorithm may represent a string of bits -- or 0s and 1s -- with a smaller string of 0s and 1s by using a dictionary for the conversion between them, or the formula may insert a reference or pointer to a string of 0s and 1s that the program has already seen.

Text compression can be as simple as removing all unneeded characters, inserting a single repeat character to indicate a string of repeated characters and substituting a smaller bit string for a

frequently occurring bit string. Data compression can reduce a text file to 50% or a significantly higher percentage of its original size.

For data transmission, compression can be performed on the data content or on the entire transmission unit, including header data. When information is sent or received via the internet, larger files, either singly or with others as part of an archive file, may be transmitted in a ZIP, GZIP or other compressed format.

Why is data compression important?

Data compression can dramatically decrease the amount of storage a file takes up. For example, in a 2:1 compression ratio, a 20 megabyte (MB) file takes up 10 MB of space. As a result of compression, administrators spend less money and less time on storage.

Compression optimizes backup storage performance and has recently shown up in primary storage data reduction. Compression will be an important method of data reduction as data continues to grow exponentially.

Virtually any type of file can be compressed, but it's important to follow best practices when choosing which ones to compress. For example, some files may already come compressed, so compressing those files would not have a significant impact.

Data compression methods: lossless and lossy compression

Compressing data can be a lossless or lossy process. Lossless compression enables the restoration of a file to its original state, without the loss of a single bit of data, when the file is uncompressed. Lossless compression is the typical approach with executables, as well as text and spreadsheet files, where the loss of words or numbers would change the information.

Lossy compression permanently eliminates bits of data that are redundant, unimportant or imperceptible. Lossy compression is useful with graphics, audio, video and images, where the removal of some data bits has little or no discernible effect on the representation of the content.

Graphics image compression can be lossy or lossless. Graphic image file formats are typically designed to compress information since the files tend to be large. JPEG is an image file format that supports lossy image compression. Formats such as GIF and PNG use lossless compression.

Compression vs. data deduplication

Compression is often compared to data deduplication, but the two techniques operate differently. Deduplication is a type of compression that looks for redundant chunks of data across a storage or file system and then replaces each duplicate chunk with a pointer to the original. Data compression algorithms reduce the size of the bit strings in a data stream that is far smaller in scope and generally remembers no more than the last megabyte or less of data.

Deduplication is most effective in environments that have a high degree of redundant data, such as virtual desktop infrastructure or storage backup systems. Data compression tends to be more effective than deduplication in reducing the size of unique information, such as images, audio, videos, databases and executable files. Many storage systems support both compression and deduplication.

Data compression and backup

Compression is often used for data that's not accessed much, as the process can be intensive and slow down systems. Administrators, though, can seamlessly integrate compression in their backup systems.

Backup is a redundant type of workload, as the process captures the same files frequently. An organization that performs full backups will often have close to the same data from backup to backup.

There are major benefits to compressing data prior to backup:

- Data takes up less space, as a compression ratio can reach 100:1, but between 2:1 and 5:1 is common.
- If compression is done in a server prior to transmission, the time needed to transmit the data and the total network bandwidth are drastically reduced.
- On tape, the compressed, smaller file system image can be scanned faster to reach a particular file, reducing restore latency.
- Compression is supported by backup software and tape libraries, so there is a choice of data compression techniques.

Pros and cons of compression

The main advantages of compression are a reduction in storage hardware, data transmission time and communication bandwidth -- and the resulting cost savings. A compressed file requires less storage capacity than an uncompressed file, and the use of compression can lead to a significant decrease in expenses for disk and/or solid-state drives. A compressed file also requires less time for transfer, and it consumes less network bandwidth than an uncompressed file.

The main disadvantage of data compression is the performance impact resulting from the use of CPU and memory resources to compress the data and perform decompression. Many vendors have designed their systems to try to minimize the impact of the processor-intensive calculations associated with compression. If the compression runs inline, before the data is written to disk, the system may offload compression to preserve system resources. For instance, IBM uses a

separate hardware acceleration card to handle compression with some of its enterprise storage systems.

If data is compressed after it is written to disk, or post-process, the compression may run in the background to reduce the performance impact. Although post-process compression can reduce the response time for each input/output (I/O), it still consumes memory and processor cycles and can affect the overall number of I/Os a storage system can handle. Also, because data initially must be written to disk or flash drives in an uncompressed form, the physical storage savings are not as great as they are with inline compression.

Data compression techniques: File system compression

File system compression takes a fairly straightforward approach to reducing the storage footprint of data by transparently compressing each file as it is written.

Many of the popular Linux file systems -- including Reiser4, ZFS and btrfs -- and Microsoft NTFS have a compression option. The server compresses chunks of data in a file and then writes the smaller fragments to storage.

Read-back involves a relatively small latency to expand each fragment, while writing adds substantial load to the server, so compression is usually not recommended for data that is volatile. File system compression can weaken performance, so it should be deployed selectively on files that are not accessed frequently.

Historically, with the expensive hard drives of early computers, data compression software, such as DiskDoubler and SuperStor Pro, were popular and helped establish mainstream file system compression.

Storage administrators can also apply the technique of using compression and deduplication for improved data reduction.

Technologies and products that use data compression

Compression is built into a wide range of technologies, including storage systems, databases, operating systems and software applications used by businesses and enterprise organizations. Compressing data is also common in consumer devices, such as laptops, PCs and mobile phones.

Many systems and devices perform compression transparently, but some give users the option to turn compression on or off. It can be performed more than once on the same file or piece of data, but subsequent compressions result in little to no additional compression and may even increase the size of the file to a slight degree, depending on the data compression algorithms.

WinZip is a popular Windows program that compresses files when it packages them in an archive. Archive file formats that support compression include ZIP and RAR. The BZIP2 and GZIP formats see widespread use for compressing individual files.

Other vendors that offer compression include Dell EMC with its XtremIO all-flash array, Kaminario with its K2 all-flash array and RainStor with its data compression software.

Data differencing

Data differencing is a general term for comparing the contents of two data objects. In the context of compression, it involves repetitively searching through the target file to find similar blocks and replacing them with a reference to a library object. This process repeats until it finds no additional duplicate objects. Data differencing can result in many compressed files with just one element in the library representing each duplicated object.

In virtual desktops, this technique can feature a compression ratio of as much as 100:1. The process is often more closely aligned with deduplication, which looks for identical files or objects, rather than within the content of each object.

Data differencing is sometimes referred to as deduplication.

WORKING EXPOSURE ON TOOLS LIKE DREAM WEAVER, FLASH, PHOTOSHOP

Photoshop, Fireworks, and Flash are powerful web-development tools for creating and managing graphics and SWF files. You can tightly integrate Dreamweaver with these tools to simplify your web design workflow.

For Fireworks and Flash, product integration is achieved through roundtrip editing. *Roundtrip editing* ensures that code updates are transferred correctly between Dreamweaver and these other applications (for example, to preserve rollover behaviors or links to other files).

Dreamweaver also relies on Design Notes for product integration. *Design Notes* are small files that allow Dreamweaver to locate the source document for an exported image or SWF file. When you export files from Fireworks, Flash, or Photoshop directly to a Dreamweaver defined site, Design Notes containing references to the original PSD, PNG, or Flash authoring file (FLA) are automatically exported to the site along with the web-ready file (GIF, JPEG, PNG, or SWF).

In addition to location information, Design Notes contain other pertinent information about exported files. For example, when you export a Fireworks table, Fireworks writes a Design Note for each exported image file in the table. If the exported file contains hotspots or rollovers, the Design Notes include information about the scripts for them.

As part of the export operation, Dreamweaver creates a folder named `_notes` in the same folder as the exported asset. This folder contains the Design Notes that Dreamweaver needs to integrate with Photoshop, Flash, or Fireworks.

UNIT - IV

Internet History

The Internet began as a research network funded by the Advanced Research Projects Agency (ARPA) of the U.S. Defense Department, when the first node of the ARPANET was installed at the University of California at Los Angeles in September 1969. By the mid-1970s, the ARPANET “inter-network” embraced more than 30 universities, military sites, and government contractors, and its user base expanded to include the larger computer science research community. By 1983, the network still consisted of merely several hundred computers on only a few local area networks.

In 1985, the National Science Foundation (NSF) aligned with ARPA to support a collaboration of supercomputing centers and computer science researchers across the ARPANET. The NSF also funded a program for improving the backbone of the ARPANET, by increasing its bandwidth from 56 Kbps to T1 and then T3 (see “Connections” a little later in the chapter for more information) and branching out with links to international sites in Europe and the Far East.

In 1989, responsibility and management for the ARPANET was officially passed from military interests to the academically oriented NSF, and research organizations and universities (professors and students alike) became increasingly heavy users of this ever-growing “Internet.” Much of the Internet’s etiquette and rules for behavior (such as for sending e-mail and posting to newsgroups) was established during this time.

More and more private companies and organizations linked up to the Internet, and by the mid-1990s, the Internet included connections to more than 60 countries and more than 2 million host computers with more than 15 million users worldwide. Commercial and business use of the Internet was not permitted until 1992, but businesses have since become its driving force. By 2001 there were 109,574,429 domain hosts and 407.1 million users of the Internet, representing 6.71 percent of the world’s population. By the beginning of 2010 (see Table 12-1), about one out of every four people around the world (26.6 percent) had access to the Internet, and more than 51 million domain names had been registered as “dot coms.”

Internetworking

In its simplest form, a network is a cluster of computers, with one computer acting as a server to provide network services such as file transfer, e-mail, and document printing to the client computers or users of that network. Using gateways and routers, a local area network (LAN) can be connected to other LANs to form a wide area network (WAN).

These LANs and WANs can also be connected to the Internet through a server that provides both the necessary software for the Internet and the physical data connection (usually a high-bandwidth telephone line, coaxial cable TV line, or wireless). Individual computers not permanently part of a network (such as a home computer or a laptop) can connect to one of these Internet servers and, with proper identification and onboard client software, obtain an IP address on the Internet

Chapter 12 The Internet and Multimedia

Internet Addresses

Let's say you get into a taxi at the train station in Trento, Italy, explain in English or Spanish or German or French that you wish to go to the Mozzi Hotel, and half an hour later you are let out of the car in a suburban wood—you have an address problem. You will quickly discover, as you return to the city in the back of a bricklayer's lorry to report your missing luggage and the cab driver, Mauro, who sped away in the rain, that you also have a serious language problem.

If you know how addresses work and understand the syntax or language of the Internet, you will likely not get lost and will save much time and expense during your adventures. You will also be able to employ shortcuts and workarounds.

Connections

If your computer is connected to an existing network at an office or school, it is likely you are already connected to the Internet. If you are an individual working from home, you will need a telephone dial-up account or broadband cable, Digital Subscriber Line (DSL), or wireless equipment to connect to the backbone (the ultra-high-bandwidth underlying network operated by MCI, AT&T, Sprint, and other tele-

communications companies) of the Internet through an Internet service provider (ISP).

The Bandwidth Bottleneck

Bandwidth is how much data, expressed in bits per second (bps), you can send from one computer to another in a given amount of time. The faster your transmissions (or the greater the bandwidth of your connection), the less time you will spend waiting for text, images, sounds, and animated illustrations to upload or download from computer to computer, and the more satisfaction you will have with your Internet experience. To think in bytes per second, divide the rate by eight.

Internet Services

To many users, the Internet means the World Wide Web. But the Web is only the latest and most popular of services available today on the Internet. E-mail; file transfer; discussion groups and newsgroups; real-time chatting by text, voice, and video; and the ability to log into remote computers are common as well. Internet services are shown here.

Service	Purpose
Ftp	For transferring files between computers; can be anonymous or password protected (from File Transfer Protocol)
gopher	For menus of material available on the Internet (seldom used)
http	For posting and reading documents (from the Hypertext Transfer Protocol used by the World Wide Web)
https	For posting and reading encrypted (secure) documents
imap	For receiving electronic mail (from Internet Message Access Protocol)
irc	For real-time text messaging (from Internet Relay Chat) mud For real-time game playing (from MultiUser Dimension)

	pop For receiving electronic mail (from Post Office Protocol)
rtsp	For streaming media control (from Real Time Streaming Protocol)
	telnet For logging on and working from remote computers
telnet	For logging on and working from remote computers
smtp	For sending mail (Simple Mail Transport Protocol)
usenet	For participating in discussion groups (from USErs NETwork)
mud	For real-time game playing (from MultiUser Dimension)
pop	For receiving electronic mail (from Post Office Protocol)

The World Wide Web and HTML

The World Wide Web (www.w3.org/) started in 1989 at the European Particle Physics Laboratory (CERN) as a “distributed collaborative hyper-media information system.” It was designed by Tim Berners-Lee as a protocol for linking a multiplicity of documents located on computers anywhere within the Internet. This new Hypertext Transfer Protocol (HTTP) provided rules for a simple transaction between two computers on the Internet consisting of (1) establishing a connection, (2) requesting that a document be sent, (3) sending the document, and (4) closing the connection. It also required a simple document format called Hypertext Markup Language (HTML) for presenting structured text mixed with inline images.

An HTML document could contain hyperlinks or anchors that referred to other similar documents. With browser software, users could then click on designated areas of hot text in one document and jump to another, which itself might have more hot text pointing to yet other documents. Users could surf from document to document across the Web, with HTML as the underlying buoyant framework. Berners-Lee is currently developing the next evolution, the Semantic Web, which “provides a common framework that allows data to be shared and reused across applica-

tion, enterprise, and community boundaries.” Visit www.w3.org/2001/sw/ for more

Multimedia on the Web

During the coming years, most multimedia experiences on the Internet will occur on the World Wide Web, programmed within the constraints of HTML, then stretched by the enhanced capabilities provided by XML, Java, JavaScript, AJAX, and special plug-ins like Flash and QuickTime to enable browsers to exceed their limits. These tools are used to build “Web 2.0” sites where there is collaboration and information sharing such as seen in blogs, on wikis, and at social networking sites such as Facebook and Twitter.

To design and make effective multimedia for this environment, developers need to understand not only how to create and edit the elements of multimedia, but also how to deliver it for HTML browsers and plug-in/player vehicles. Well-crafted, professionally rendered sites on the Web include text, images, audio, and animation presented in a user-friendly interface that balances the bandwidth deficit against user patience.

Inside the event horizon of the amazing World Wide Web explosion are many uncertainties and unsolved challenges. The bandwidth deficit will certainly be met with technology solutions that will reach the last mile into homes and businesses. There is a terrific need for high-quality, compelling content; multimedia developers and entrepreneurs will fill this creative void.

Tools for the World Wide Web

In the late 1990s, multimedia plug-ins and commercial tools aimed at the Web entered the marketplace at a furious pace, each competing for visibility and developer/user mind share in an increasingly noisy venue. In the few years since the birth of the first line-driven HTTP daemon in Switzerland, millions of web surfers had become hungry for “cool” enhancements to entertaining sites. Web site and page developers needed creative tools to feed the surfers, while surfers needed browsers and the plug-ins and players to make these cool multimedia enhancements work.

A combination of the explosion of these tools and user demand for performance stresses the orderly development of the core HTML standard. Unable to evolve fast enough to satisfy the demand for features (there are committees, international meetings, rational debates, comment periods, and votes in the standards process), the HTML language is con-

stantly being extended de facto by commercial interests. These companies regularly release new versions of web browsers containing tags (HTML formatting elements) and features not yet formally approved. By the time (measured in weeks!) millions of users have become dependent upon the features of the new browser versions, the more carefully considered official specification has no choice but to incorporate them. By the time features are “official,” of course—after more meetings, votes, and understated demonstrations of power—still newer browser versions have been released with yet newer, unofficial features.

What keeps this cycle from being chaotic are the natural selection forces of the marketplace: developers strive toward a successful product that works better and satisfies more users without mutating so far from the core standard that there are no sales and the company collapses. Developers also complain about the contention among browser vendors because they must program workarounds that compensate for the performance differences among them, and they must test the performance of their site on all or as many as possible.

Browsers provide a method for third-party developers to “plug in” special tools that take over certain computational and display activities. They also support the Java and JavaScript languages by which programmers can create bits of programming script and Java applets to extend and customize a browser’s basic HTML capabilities, especially into the multimedia realm. Java and JavaScript are only related by name. Java is a programming language much like C++ that must be compiled into machine code to be executed by a computer’s operating system. JavaScript is a “scripting language” whose commands are executed at runtime by the browser itself. JavaScript code can be placed directly into HTML using `<script>` tags or referenced from a file with the “.js” extension.

Thus, while browsers provide the orchestrated foundation of HTML, third-party players and even nonprogrammers can create their own cadenzas to enhance browser performance or perform special tasks. It is often through these plug-ins and applets that multimedia reaches end users. Many of these tools are available as freeware and shareware while others, particularly server software packages, are expensive, though most any tool can be downloaded from the Internet in a trial version. Try it. If you like it or use it, buy it.

The stunning growth of the Internet as well as expansion of wireless mobile phone connectivity to the Internet has caused many multimedia

developers to redirect their creative efforts toward providing software solutions for these arenas. This remains a new and lucrative frontier, and no developer wishes to be left behind.

Web Servers

The workings of the Web involve communication between two computers: a server and a client. The server delivers a file when a client asks for it. Because the playback or display performance of your multimedia content—particularly when it is a streaming MIME-type such as RealAudio or Shockwave/Flash or a QuickTime video—depends upon the speed and capabilities of the computer and software serving it (as well as the bandwidth and load factors of the Internet), you should know some basics. A growing number of software vendors provide web servers of varying strength and capacity and for a variety of platforms, all of which meet the requirements of the Hypertext Transfer Protocol. A server is technically not the hardware, but the software—you should invest in server software that will stand up to your intended use and be supported by the vendor. Most vendors will also recommend hardware configurations. This combination of software and hardware is critical to your success and happiness if you wish to optimize response time (less than a second), your connections per second (as many as possible), and your throughput (plenty of room before your Internet connection is overwhelmed by traveling packets).

Web Browsers

Your computer's performance is as important as the bandwidth of your connection to the Web. Web browsers are applications that run on a user's personal computer (on the client side on the Internet) to provide the interactive graphical interface for searching, finding, and viewing text documents, sounds, animations, and other multimedia resources on the Web. In 1996, as many as 50 browsers competed for market share, each boasting special or unique features, performance, and cost. Rich Santalessa, editor of NetGuide magazine, predicted even then that "the browser wars are over—it's a battle between Microsoft and Netscape, and everyone else is going to dry up and blow away." Indeed, by mid-2001, only two serious competitors remained: Netscape and Microsoft, and Netscape, despite more than 40 million registered users, was beginning a chameleon act. Purchased by AOL, then allowed by a merger with Time Warner, Netscape was repositioned as a "media hub," not a software company, giving the new Netscape a chance to sell advertising across its many media properties

and experiment with subscriptions rather than just free services within the AOL-Time Warner media empire (which includes properties such as Fortune and Time magazines and the 24-hour cable news network CNN). By 2006, Netscape was dead. From Netscape's ashes arose Mozilla Firefox as an open-source competitor to Microsoft Internet Explorer.

Despite the legal and financial seriousness of this competition, manifesting in very real congressional hearings and complicated multimillion-dollar antimonopoly lawsuits, some of those involved kept their sense of humor. Back in October 1997, late in the night after the gala announcement and rollout of Microsoft's new Explorer 4.0 in San Francisco, a group of Microsoft engineers drove 30 miles south to Netscape's headquarters and placed a truck-sized Explorer logo (the world-circling "e") on the front lawn of the competitor's headquarters, accented with a helium balloon saying "We Love You" and a greeting card with the message, "It's just not fair. Good people shouldn't have to feel bad. Best wishes, the IE team." By midmorning, Netscape's own engineers had crowned the Explorer logo with a giant dinosaur (their company mascot, named Mozilla), and nailed up a cardboard sign declaring, "Netscape 72, Microsoft 18" (the companies' market share at that time). Mozilla later spun out of Netscape in a free, open-source effort to standardize the browser's HTML engine.

Today, the majority of visitors to your web site will be using Microsoft's Internet Explorer, winner of the "browser wars" (see Table 12-4). In designing a web site, then, you should be certain that your documents and plug-ins work and look good using Internet Explorer.

Web Page Makers and Site Builders

To deliver multimedia on the Web today, you should know some HTML, meaning that you must place the proper tags and references into your documents to launch and control your multimedia. Many HTML editors and web page-making applications offer to shortcut your HTML learning curve and working effort. If you use one of these editors, enjoy its easing your work effort, but do not shy away from learning the syntax and tags of the language. Often these "helpers" generate extremely complicated HTML code (described by some programmers as "garbage") with the idea that if this code is hidden "under the hood," who cares? As you yourself become more informed and better at HTML coding, you might discover that you are the person who cares! HTML documents are simple ASCII text files saved to disk without

any formatting at all—no bolding, underlining, special fonts, margins, or tabs. Professional web page developers often use only a word processor like BBEdit for the Mac (see Figure 12-1) or WordPad in Windows rather than a souped-up, drag-and-drop, HTML page builder, and they insert text and tags into their documents manually or with personalized shortcut keys and helper scripts. HTML currently includes about 50 tags, and once you understand their properties and uses, coding, or marking up, a document and saving it to your web site can be a straightforward process. Plain HTML may not be enough to create dynamic sites on the fly, sites based upon user preferences or that display “live” information pulled from databases or spreadsheets. To build these kinds of pages, you should be familiar with programming environments such as Microsoft’s Active Server Pages (.asp); Adobe’s ColdFusion (.cfm), which uses ColdFusion Markup Language (CFML); or the open-source and readily available PHP. For other powerful options beyond plain HTML, knowledge of Dynamic HTML (DHTML), Extensible Markup Language (XML), and Cascading Style Sheets (CSS) will enhance your skill set.

Most web browsers allow you to read the HTML code behind the page you are viewing. In Firefox, click View:Page Source. The SeaMonkey browser, based on the Mozilla engine, includes a basic visual page editor, with several different modes, including a “Tag” mode, which visually shows the tags related to various elements on the page.

HTML translators are built into many word processing programs, so you can export a word-processed document with its text styles and layout converted to HTML tags for headers, bolding, underlining, indenting, and so on. Some are more powerful than others. These work well for simple text documents but tend to choke on powerful HTML features such as tables, forms, frames, and other extensions. Dedicated editors are usually WYSIWYG (What You See Is What You Get) word processors, and they provide more power and more features specifically geared to exploiting HTML. Microsoft Word, for example, automatically opens web pages in a WYSIWYG view. On the downside, these “helpful” features may cause a page with many embedded graphics to load into the word processor very slowly while it interprets and lays out the page as a browser would, instead of just loading the text of the page’s HTML code and letting you change a few tags or lines.

Plug-ins and Delivery Vehicles

Plug-ins add the power of multimedia to web browsers by allowing users to view and interact with new types of documents and images. Helper applications, or players, also provide multimedia power by displaying or running files downloaded from the Internet by your browser, but helpers are not seamlessly integrated into the operation of the browser itself. When an unrecognized embedded MIME-type that can't be displayed within your browser is called from an HTML document (sounds, movies, unusual text or image files), most browsers will automatically launch a helper application (if it is specified in the browser's preferences) to view or run it. However, this helper starts up and runs separately from the browser. Many plug-ins are designed to perform special tasks not available without the plug-in installed. If you land on a web page containing embedded, compressed images, for example, and the proper plug-in to decompress those images is not installed, you will not be able to view the images. Designers work around this problem by including hyperlinks in their pages, which direct the user to the site where the missing plug-in may be found. Users must then download and install the required plug-in, and then restart their browser. This is all a bit cumbersome. Until the marketplace determines which plug-ins will become de facto standards for the Web, however, developers have no alternative. Because downloading and installing plug-ins is perceived as a hassle for the end user, many tool developers use the Java and JavaScript capabilities already built into today's web browsers. To offer a plug-in's functionality to visitors at your own web site, you may need the addition of MIME-type information to a special setup file on your server that many plug-ins require. If you do not control or operate your own server, you should let your service provider know the MIME-types that you need to have supported. Setting up servers for some of the multimedia plug-ins is not a trivial task, and many Internet service providers will not support high-bandwidth data streams for fear of overwhelming their Internet connection by serving your streaming voice or video to the world. Indeed, while a plug-in or a player may be free and readily available to anyone who wishes it, the software to actually build, compress, manipulate, and serve the special data (such as for compressed images, compressed audio, streaming video, animations, and VRML worlds) may be difficult and expensive, since the company makes money from the development tool, not the client software.

HTML

When an ingot of pure silicon is “pulled” from a furnace, the process begins with a “seed crystal,” around which the ingot forms. HTML is the seed crystal that is shaping and forming the nature of multimedia on the World Wide Web as it extrudes itself onto the Internet’s data highway. Within the latticework of HTML servers and browsers, tags such as <OBJECT> (browser-specific for Internet Explorer) or <EMBED> (browser-specific for Firefox) enable text, sound, images, animations, and motion video across the Web. Hooks for powerful platform-independent Java applets and JavaScripts are built into most browsers, so you can design local interaction and activities without a lot of communication between client- and server-based Common Gateway Interface (CGI) programming. CGI is a standard for interfacing external applications with information servers, such as HTTP or web servers, and CGI programs can be written in C/C++, Fortran, PERL, TCL, a Unix shell, Visual Basic, or even AppleScript, as long as the language is supported by the server platform.

The following is an example of the combined <OBJECT> and <EMBED> tags used to display a Flash movie in both the Internet Explorer and Firefox browsers. A browser will only act on a tag it understands, ignoring tags it does not recognize.

VRML

What is VRML?

The Virtual Reality Modeling Language (VRML) allows you to describe 3D objects, and combine them into interactive scenes and worlds. The virtual worlds - which can integrate 3D graphics, multimedia, and interactivity - can be accessed through the WWW (http). The remote users can explore the content interactively in much more sophisticated ways than clicking/scrolling.

VRML is not a programming language like JAVA, nor is it a "Markup Language" like HTML. It is a modelling language, which means you use it to describe 3D scenes. It's more complex than HTML, but less complex (except for the scripting capability) than a programming language.

VRML is a (text)file-format that integrates 3D graphics and multimedia: a simple language for describing 3D shapes and interactive environments.

You can create(write) a VRML file using either any text editor or "wordbuilder" authoring software. To view a VRML file you need either a standalone VRML browser or a Netscape plug-in.

You should always distinguish between VRML 1.0 and 2.0 (and hopefully in the near future VRML98) browsers/plugins/authoring tools. To view/explore a VRML 2.0 world you need a VRML

2.0 browser/plugin, in the other hand (in most cases) you can use VRML 2.0 browsers/plugins to examine VRML 1.0 files. Obviously you can't create VRML 2.0 content with a 1.0 authoring tool.

What's new in VRML 2.0?

VRML 1.0 allowed you to create static 3D worlds assembled from static objects, which could be hyperlinked to other worlds, as well as to HTML documents. Visitors of the worlds were able to "fly" or "walk" around the static objects, and the only way of interaction was possible by "clicking" on a hyperlinked object, which worked like a hyperlink on a www-page: dropped you to the target of the link.

In VRML 2.0 objects can be animated, and they can respond to both time-based and user-initiated events. VRML 2.0 also allows you to incorporate multimedia objects (for example sound and movies) in your scenes.

The new features can be grouped:

- Enhanced static worlds
 - sound node
 - extrusion node (actually a modelling tool that lets you create extrusions, surfaces of revolution, and shapes formed by bending, twisting, and tapering different types of curves)
 - background node (lets you describe a background panorama for your scene, such as mountains, plains, or some other distant landscape, as well as color gradations for the sky and ground)
 - fog node (you can create foggy atmospheres)
 - new kind of texture node (allows you to show movie clips within your scene. Combining this movie texture node with the audio clip node provides you with true multimedia resources: video and sound)
 - shape node (encapsulates both appearance and geometry: appearance properties are no longer inherited within the file resulting a simplified scene graph)
- Interaction
 - collision detection node (contains collision information > user can no longer walk through walls in the scene)
 - sensor nodes (they wait for a particular event to occur and then do something in response to that event. This way you can sense the user's presence at a particular area of the scene, and respond to it. For example, one kind of sensor can wait until the camera gets to a certain point in the scene and then trigger a change in part of

the scene in response to the proximity of the user-perhaps by opening a door or turning on a light.)

- Animation and behavior scripting
 - interpolators (You can incorporate keyframe animations. You supply the object description at certain critical points, and then the interpolator performs the calculations for the in-between descriptions.)
 - script node (routines written in a programming language such as Netscape's JavaScript or Sun Microsystems' Java)
- Prototyping new VRML objects VRML comes with a fixed set of objects (called nodes). The prototyping feature lets you create complex objects that you can reuse, changing certain characteristics of the objects when desired.
- VRML File Information You can describe the defaults for the browser: navigation style(walk, fly, examine), the navigation speed, headlight on/off.

Designing for the World Wide Web

Launched in 1989, the World Wide Web was not originally designed with multimedia in mind, but rather as a simple method for delivering text documents formatted in HTML, with occasional inline graphic illustrations and figures. By 1995, because it was operational, essentially free, and good enough to support traffic (see “Vaughan’s Law of Multimedia Minimums” in Chapter 4), the Web had become a full-bore information highway of words and pictures with tens of millions of users cruising along it. The Doppler back-draft of passing travelers has exposed the gristle of an overwhelming number of disappointing audio and visual experiences on the Web: “This is my home page; here is a list of my favorite places; this is me with my dog . . .” To fill this vacuum of content and presentation, inventive multimedia solutions and enhancements now compete for mind share, stretching the capabilities of HTML, web browsers, PCs, and the very fabric of the Internet in order to bring multimedia power to this environment.

All modern browsers allow you to examine the HTML code. Look for a menu item such as “View Source.” Use this feature to dig around in the source HTML code of web sites to see how the page is laid out. As you explore, you will discover that some code is neat and clear, some has plenty of embedded descriptive comments, and some is a mess of what programmers call “spaghetti” code. HTML Is a Markup Language

You should have a basic understanding of HTML and CSS before you begin developing multimedia for the Web. HTML-coded documents, which are the fundamental vehicles

for all types of information delivered on the World Wide Web, are explained in Chapter 12, but for this chapter you need to understand the basics of how HTML works.

HTML stands for Hypertext Markup Language. The “Markup Language” part of the name means that tags are used to do such things as format text and embed media. The tags are enclosed by angled brackets: <>. Some tags are bounding tags, requiring both an opening tag and a closing tag. The closing tag is indicated by a leading forward slash inside the angled brackets. This example for bolded text illustrates the use of the two tags: This text is emphasized

Other tags, such as the tag for inserting an inline image, stand by themselves:

```
<IMG src="grey_ball.gif">
```

Note that the tags may be written in either upper- or lowercase; some HTML text-editing programs have a switch allowing you to select the case in which you want the tags written in your document.

Tags listed in Table 13-1 are used by HTML5. These simple tags along with CSS elements are used to build web pages. Deprecated tags such as and <CENTER> are no longer supported in the HT

Multimedia Applications

Following are the common areas of applications of multimedia.

•Multimedia in Business- Multimedia can be used in many applications in a business. The multimedia technology along with communication technology has opened the door for information of global work groups. Today the team members may be working anywhere and can work for various companies. Thus the work place will become global. The multimedia network should support the following facilities:

- Voice Mail
- Electronic Mail
- Multimedia based FAX
- Office Needs
- Employee Training
- Sales and Other types of Group Presentation
- Records Management

•Multimedia in Marketing and Advertising- By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in

composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

•**Multimedia in Entertainment-** By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

•**Multimedia in Education-** Many computer games with focus on education are now available. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc apart from just playing the rhymes. Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.

•**Multimedia in Bank-** Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.

•**Multimedia in Hospital-** Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture.

In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia based information about various diseases and their treatment. Some hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries.

•**Multimedia Pedagogues-** Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing

only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.

•Communication Technology and Multimedia Services- The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:

- Basic Television Services
- Interactive entertainment
- Digital Audio
- Video on demand
- Home shopping
- Financial Transactions
- Interactive multiplayer or single player games
- Digital multimedia libraries
- E-Newspapers, e-magazines

MULTIMEDIA 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. In the workplace, use quality equipment and software for your communications setup. The cost—in both time and money—of stable and fast networking will be returned to you.

MEDIA CONSUMPTION

Media consumption is the sum of information and entertainment media taken in by an individual or group. It includes activities such as interacting with new media, reading books and magazines, watching television and film, and listening to radio.[1] An active media consumer must have the capacity for skepticism, judgement, free thinking, questioning, and understanding.[2]

Multimedia Entertainment

Definition: Multimedia entertainment applications aim at diverting users, engaging them in amazing experiences such as reading a book, listening to music, enjoying videos, and playing a game.

To understand modern multimedia entertainment applications a definition of both entertainment and multimedia notions is needed. *Entertainment* is something diverting or engaging, i.e. a public performance, a usually light comic or an adventure novel. *Multimedia* means using, involving, or encompassing several media. Classic media are hypertexts, sound, image, video and animation. From these standpoints, multimedia entertainment applications aim at diverting users, engaging them in amazing experiences such as reading a book, listening to music, enjoying videos, and playing a game. While in the past, traditional multimedia entertainment technology offered predominantly passive experiences, such as, video on demand for example, advances in ICT are promoting a greater interactivity as well as..

Multimedia Games

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations (VFX, 3D animation, etc.). Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online. Video games class as multimedia, as such games meld animation, audio, and, most importantly, interactivity, to allow the player an immersive experience. While video games can vary in terms of animation style or audio type or even lack thereof, the element of interactivity makes them a striking example of *interactive multimedia*. *Interactive multimedia* defines multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information. In the arts there are multimedia artists, whose minds are able to blend techniques using different media that in some way incorporates interaction with the viewer. Another approach entails the creation of multimedia that can be displayed in a traditional fine arts arena, such as an art gallery. Although multimedia display material may be volatile, the survivability of the content is as strong as any traditional media. Digital recording material may be just as durable and infinitely reproducible with perfect copies every time.

UNIT – V

DESIGNING AND PRODUCING

- ✓ Designing and building multimedia projects go hand in hand. Indeed, design input to a project is never over until the product is actually frozen and shipped.

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 path ways 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.
- 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 multimedia design.
- The method you choose depends on whether the same people will do the whole thing or whether design and implementation are tasked to separate teams by other members, who of course need a more detailed specification.
- Both approaches require the same through knowledge of the tools and capabilities of multimedia, and both demand a story board or a project outline.
- The first approach is often favored by clients who wished to tightly control the production process and labor cost.
- The second approach gets you more quickly in to the nitty-gritty, hands-on tasks, but you may ultimately have to give back that time because more iterations and editing will be required to smooth the work in progress.

Interactive Television (ITV) Mean?

Interactive television (iTV) is the integration of traditional television technology and data services. It is a two-way cable system that allows users to interact with it via commands and feedback information. A set-top box is an integral part of an interactive television system. It can be used by the viewer to select the shows that they want to watch, view show schedules and give advanced options like ordering products shown in ads, as well as accessing email and Internet.

Interactive television refers to technology where traditional TV services are combined with data services. The major aim of interactive TV is to provide an engaging experience to the viewer.

Interactive TV allows various forms of interaction, such as:

- Interacting with the TV set
- Interacting with the program content

- Interacting with TV-related content
- Interactive TV services
- Closed-circuit interactive television

Interactive TV is similar to converged TV services, but should not be confused with it. Interactive TV is delivered through pay-TV set-top boxes, whereas converged TV services are delivered using Internet connectivity and Web-based services with the help of over-the-top boxes like Roku or gaming consoles.

Interactive TV increases engagement levels by allowing user participation and feedback. It can also become part of a connected living room and be controlled using devices other than the remote control, like mobile phones and tablets.

The return path is the channel that is used by viewers to send information back to the broadcaster. This path can be established using a cable, telephone lines or any data communications technology. The most commonly used return path is a broadband IP connection.

However, when iTV is delivered through a terrestrial aerial, there is no return path, and hence data cannot be sent back to the broadcaster. But in this case, interactivity can be made possible with the help of appropriate application downloaded onto the set-top box.

DIGITAL BROADCASTING

Digital multimedia broadcasting (DMB) is a method of multicasting multimedia content to mobile and portable devices, such as cell phones, by satellite or terrestrial services, or a combination of the two. Some DMB-capable receiving devices can render content that is individualized to the location or subscriber.

Common examples of multimedia broadcast content include:

- Text and audio
- Text, audio, and still or animated graphics
- Audio and full-motion video
- Text, audio, and full-motion video
- Multiple, concurrent display areas, images, or programs

The most popular application of DMB is mobile television. Movies, video clips, music, RSS feeds, and text messages can also be transmitted. Most existing and proposed DMB services operate on a

fee-based subscription basis, although advertising has been suggested as a revenue source. A free state-operated DMB service is available in South Korea.

Digital radio

DAB + is the chosen European technology for digital radio.

One of the most distinctive feature for users that best represents the digital radio DAB+ adoption is the possibility to contextualize and enrich a program with images and text. Images (SLS), that are showed on the enabled radio display, allow you to have a major impact on the radio program: conductor photos, channel and program logo, live images from the studio.

Textual information (DLS) consists of short text messages displayed on the radio screen periodically: news, traffic information, title and artist of the listening track.

SLS and DLS content on one side allow to create a more complete service and on other side it requires an additional work for broadcasters to find, manage and publish this additional information. MIND, which is an automatic system for the correct processing and transmission of multimedia content on a digital media (DAB +, Web, App or Hybrid Radio), has been designed precisely with the purpose of making this work easier.

The framework is a “Content Management” and “Multichannel Publishing” system that allows you to associate and synchronize images and textual information to each of the radio channels distributed in the DAB + network nationwide.

With MIND, which has been in operation since 2011, publishers of each channel can manage the media content associated with their offer via a web browser.

For each program you can insert new archive images, enable webcam images or dynamic QR codes, insert news feeds from external sources (traffic information, agency launches) or write new ones from the keyboard, publish the listeners’ contributions (MMS, email, SMS).

The content can be published in real time or can be pre-loaded before the start of the broadcast, leaving MIND in charge of publishing them at the right time.

The frequency with which SLS and DLS change can be set in the MIND settings.

Moreover, MIND has been designed to dynamically and automatically produce some content from available metadata. Here are some examples:

- QR Code: the images that display the QR code of the program web site, allowing you to connect to it with your smartphone.
- Song information: the images that display real-time information about the track on and on what will follow.

- Studio cameras: some Rai radio studios are equipped with Webcam and capture studio images periodically making them available for publication.
- listeners' sms: the images that represent listeners' sms content. The radio audience can directly take part into the program.
- Textual News: the last updated news which deals about several topics.
- Traffic News: it collects key traffic information on short text messages.

MIND' ability to synchronize with the channel's schedule and to choose and create new content to be transmitted, allows to get a channel dynamism even without the publisher's intervention.

MIND has also been designed to pilot enrichment content for other services such as App and Web Radio: any MIND's modification has an impact on all of these publishing platforms.

Multimedia Conferencing

The fundamental change in telecommunications brought about by the increase in computer power and the emergence of viable multimedia technologies has had a major impact.

Conferencing has applications in a variety of fields including collaborative learning, distributed (global) tele-conferencing, general video Conferencing, groupware (See Section [26.3](#) below) etc.

Multimedia Conferencing may be defined as :

- Pure teleconferencing + cooperative work supported by computer

The following requirements are necessary for a Multimedia Conferencing:

- Multipoint facility -- many connections over a network
- Personalization -- customisation of the environment to suit user needs and to identify users on systems
- Unification of teleconference facilities with existing office automation facilities
- User-friendly interfaces for displaying documents and facial images

The typical media ingredients of a multimedia conference, as part of computer supported cooperative work, include audio, video, and perhaps a shared whiteboard or similar. These media each need specific treatment:

- The intelligibility of digitised audio is very sensitive to missing samples and playout jitter. A bandwidth share of 64 kbps is necessary for the uncompressed transmission of one audio source at telephone quality. Compression mechanism can further reduce the data rate. In any case, the bandwidth demand is small compared to the capacities of current LANs, whereas packet loss due to congestion occurs often over the Internet.

- Video generated by a typical computer-mounted camera is less sensitive to loss and jitter than audio, but the data rate even of compressed video is much higher than the audio data rate.
- Because audio and video conferences are real-time interactive applications, a low transmission latency is required for both media; the low-latency requirement further implies that buffering cannot be used in larger scale to compensate for transmission jitter, as could be done on the receiving end of video-on-demand systems.
- Compared to the other two media, whiteboard applications generate very little traffic. Their real-time demands, concerning delay, latency or jitter, are also comparably low. However, the reliable transmission of every single event is absolutely necessary to give each participant an identical, consistent view of the virtual board. Microsoft's Netmeeting <http://www.microsoft.com/netmeeting/> is a simple example of this approach.

Examples systems include:

- NEC's MERMAID
- Fujitsu's THE MONSTER
- Hitachi's THE PERSONAL MULTIMEDIA TELLECONFERENCING TERMINAL
- BELL CORE's CRUISER
- Olivetti's VOX
- MIT's Project Athena's Galatea
- Xerox Parc's Etherphone

Designing The Structure

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

Navigation

- A navigation map provides you with a table of contents as well as a chart of the logical flow of the interactive interface.
- Just as eight story plots might account for 99 percent of all literature ever written, a few basic structures for multimedia projects will cover most cases: linear, hierarchical, nonlinear, and composite.
- Linear: User 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: User may navigate freely, but are occasionally constrained to linear presentations of movies or critical information and data that is most logically organized in a hierarchy.
- A good user interface is critical to the overall success of your project.

Structural Depth

- Structural depth professor Judith junger from the open university of the Netherlands in Amsterdam suggests that when you design your multimedia product you should work with two types of structure: depth structure represents the complete navigation map and describes all the links between all the components of your project surface structure, on the other hand, represents the structures actually realized by a user while navigating the depth structure.
- The architectural drawings for your multimedia project are the story boards and navigation maps.
- A simple navigation map is illustrated where the subject matter of all a small project to teach the basics of animation was organized schematically.
- The items in boxes are not only description of content but also active buttons that can call up this screen and then navigate directly to chosen subject.
- Multimedia provides great power for jumping about within your project's content.
- Even with in a linear, time-based structure, you may still wish to sort events into categories regardless of when they occur.
- There is no reason you can't do this and offer more than one method of navigating through your content.

Hot Spot, Hyperlinks, And Buttons

- Most multimedia authoring systems allow you to make any part of the screen, or any object, into a hot spot.
- Hot spots scan be given more specific names based upon either their function or form.
- If the hot spot connects the user to another part of the document or program or to a different program or web site, it is referred to as a hyperlink.

Cross Platform

- Icon are graphic objects designed specifically to be meaningful buttons and are usually small icons are fundamental graphic objects symbolic of an activity or concept.
- Once a style has been selected, you need to determine how your user will know that the button is active or is being selected.
- Drop shadows placed slightly below and to the right of a button can give it a 3-D look and, depending upon how you arrange the highlighting, can make a button appear out or in as illustrated.

Hot Spots In Web Pages

- Html documents do not directly support interactive buttons that follow the rules of good interface design by highlighting or otherwise confirming a mouse-down action.
- But you can make plain and animated buttons for your html documents on the web using plug-ins such as flash and shockwave or java script.
- A simple java script in an html document can be used to replace one image with another on mouse over or hover.
- Larger images may be sectioned into hot areas with associated links; these are called image maps.

Icons

- On the macintosh, icons have a special meaning, in that they constitute a suite of image resources that can be linked to the finder and then used to identify an application or project.
- They are small (16*16 pixels) or large (32*32 pixels), may be colored, and usually have a text label attached.

DESIGNING AND PRODUCING

Designing The User Interface

- The user interface of your multimedia product is a blend of its graphic elements and its navigation system. If your message and content are disorganized and difficult to find, or if users become disoriented or bored, your project may fail.

Novice/Expert Modes

- Be aware that there are two types of end users: those who are computer literate and those who are not. Creating a user interface that will satisfy both types has been a design dilemma since the invention of computers.

GUI:

- The macintosh and windows graphical user interfaces 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.

Multimedia authoring systems provide you with the tools to design and implement your own graphical user interface from scratch.

Graphical Approach

- Designing excellent computer screens requires a special set of fine art skills, and not every programmer or graduate in fine art may be suited to creating computer graphics.

- The artist must make board design choices: cartoon stick figures for a children's game, rendered illustration for a medical reference, scanned bitmaps for a travel tour of Europe.
- Once the approach is decided, the artist has to put real pixels on to a computer screen and do the work.

Things That Work

- Neatly executed contrasts: big/small, heavy/light, bright/dark, thin/thick, cheap /dear.
- Simple and clean screens with lots of white spaces.
- Shadow and drop shadows in various shades.
- Gradients
- Reversed graphics to emphasize important text or images.
- Shaded objects and text in 2-D and 3-D.

Things To Avoid

- Clashes of color
- Busy screen (too much stuff)
- Trite humor in oft-repeated animations
- Frilly pattern borders
- Cute one-liners from famous movies
- Too many substantive elements presented too quickly.

Audio Interfaces

- A multimedia user interface may include important sound elements that reflect the rhythm of a project and may affect the attitude of your audience.
- The tempo and style of background music can set the "tone" of a project.
- And always test a project that contains sound with potential users.

PRODUCING

- Production is the phase when your multimedia project is actually rendered. During this phase you will contend with important and continuous organizing task.

Starting Up:

- Before you begin your multimedia project, it's important to check your development hardware and software and review your organizational and administrative setup.
- This is a serious last-minute task. It prevents you from finding yourself halfway through the project with nowhere to put your graphics files.
- With a network that bogs down and quits every two days.

Here are some examples of things to think about:

- Desk and mind clear of obstructions?
- Fastest CPU and RAM you can afford?
- System for regular backup of critical files?
- Latest version of your primary authoring software?
- Latest version of software tools and accessories?
- Communication path ways open with client?
- Breathing room for administrative tasks?
- Kick of meeting completed?

Working With Clients

- Making multimedia for client 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.

Client Approval Cycles:

- Provide good management oversight to avoid endless feedback loops-in this situation the client is somehow never quite happy, and you are forced to tweak and edit many times.

Data Storage Media And Transportation

- It's important that the client be able to easily review your work.
- 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.
- Because multimedia files are large, your means of transporting the project to distant clients is particularly important.

Tracking

- Develop a file naming convention specific to your project's structure. Stores the files in directories of folders with logical names. If you are working across platforms, develop a file identification system that uses the DOS file naming convention of eight characters plus a three character extension.

Version Control

- Version control of your files is critically important, too, especially in large projects. If more than one person is the latest and who as the current version.

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.
- Insert a copyright statement in your project that clearly designates the code as your intellectual property but the code, tricks, and programming techniques remain accessible for study, learning, and tweaking by others.

Hazards And Annoyances:

- Expect problems beyond your control, and be prepared to accept them and solve them. Small annoyances, too, can become serious distraction that are counterproductive.
- Be prepared to deal with some common irritants for example:
 - More than two all-nighters in a row
 - Too many custom-coded routines
 - Instant coffee and microwave corn dogs
 - Too many meeting; off-site meetings
 - Missed deadlines

CONTENT AND TALENT

- ✓ Every multimedia project includes content. It is the “stuff” from Which you fashion your message. content can be any and all of the elements of multimedia. content can have low and high production value.

(i) Acquiring Content

- ✓ Content acquisition 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
 - suppose you are working with 100 graphs and charts about the future of petroleum exploration.

- 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.

(ii) Using Content Created By Others

- ✓ Among the right most relevant to a multimedia producer are electronic rights the rights to publish a work in a computer-based storage and delivery medium such as a CD-ROM or on the web

Locating Preexisting Content

- ✓ Preexisting content can come from a variety of sources, ranging from a trunk of old photographs in your neighbor's attic to a stock house or image bank offering hundreds of hours of film and video or still images , available for licensing for a fee.
- ✓ If needs are simple and fairly flexible, you may be able to use material from collection of clip art. Such collection of photograph, graphics, sounds, music, animation, and video are becoming widely available from many sources, for anywhere from fifty to several hundred dollars.
- ✓ Part of the value of many of these packages is that you are granted unlimited use, and you can be comfortable creating derivative versions tailored to your specific applications.
- ✓ Even if the collection is described as allowing "free use," you may discover that the collection comes with severe restrictions on the way material can be used, or that a royalty is required for any use beyond wallpaper on your computer.
- ✓ If content needs are more specific or complex, a good place to start your search for material might be at a still photo library, a sound library, or a stock footage house .
- ✓ These resources may be public or private and may contain copyrighted works as well as materials that are in the public domain.
- ✓ Public domain means either that the work was never copyrighted in the first place or its copyright protection has expired over time and not been renewed ; you can use public domain material without a license.

Copyrights

- ✓ Copyright protection applies to " original works of authorship fixed in any tangible medium of expression. " the copyright act of 1976 , as amended (17 U.S.C.A \$101).
- ✓ Protects the legal rights of the creator of an original work. Find yourself being used for copyright infringement.
- ✓ Several changes in the law have created confusion over copyright protections.
- ✓ One change is that works now come under copyright protection as soon as they are created and presented in a fixed form.
- ✓ Prior to 1976, protection was only granted upon registration, but now works do not have to be registered with the U.S copyright office to be protected.

- ✓ Because of this there is another crucial change: works no longer need a properly formatted statement of copyright ownership to be protected.
- ✓ There are fair use exception in which copyright material can be used without permission, but they are very limited and specific—primarily for educational and journalistic use and rarely for commercial use.
- ✓ Owning a copy of a work does not entitle you to reproduce the work, and you still need to obtain permission from the copyright owner to use it.

Digital Rights Management (DRM)

- ✓ As rights and ownership are redefined for the information age, various rights management technologies are emerging and competing to become industry standard.
- ✓ Microsoft windows media rights manger (WMM. Windows only)and the window media 9 format incorporate extensive DRM capabilities.
- ✓ The association of American publishers is promoting DRM methodologies for protecting unauthorized copying of e-books.
- ✓ The internet streaming media alliance (ISMA) offers a content protection specification designed to provide a single, end- to –end encryption scheme for streaming media and file downloading that can be integrated with different key and rights management software and licensed content protection devices.
- ✓ A digital object identifier (DOI), which has been proposed for identifying and exchanging intellectual content, for linking customers with content suppliers, for facilitating electronic commerce, and enabling automated copyright management for all types of media.

Obtaining Rights

- ✓ License the rights to use the copyrighted material before you develop a project around it. You may be able to negotiate outright ownership of copyrighted material .
- ✓ If the owner does not wish to give up or sell ownership rights , however, you may still be able to license the rights to use that material.
- ✓ There are few guidelines for negotiating content rights for use in multimedia products.
- ✓ If you are dealing with content providers who are professionals familiar with electronic media, you may be given a standard rate card listing licensing fees for different uses, formats, and markets.
- ✓ Some licensing agreements may be as simple as a signed permission letter or release form describing how you may use the material.
- ✓ Other agreements will specify in minute detail how, where, when, and for what purpose the content may be used.
- ✓ Ideally, you would seek rights for unlimited use, which allows you to use the content anytime, anywhere, and in any way you choose; more likely, however, the final license would contain restrictions about how the material may be used.

- ✓ The following items are but a few of the issues you need to consider when negotiating for rights to use preexisting content:
 - How will the content be delivered? If you limit yourself to CD-ROMs, for example, you may not be able to distribute your product over the internet without renegotiation.
 - Is the license for asset period of time?
 - Is the license exclusive or nonexclusive?
 - Where will your product be distributed? There may be different rates for domestic and international distribution.
 - Do you intend to use the material in its entirety, or just a portion of it?
 - What rights do you need?

Derivative Works

- ✓ Any text taken verbatim, or any image or music perfectly copied, clearly requires permission from its owner to incorporate it into your work. But there are some other, less clear –cut issues.
- ✓ Indeed, how much of the original must you change before the product becomes yours or remains a derivative work? There are no simple answers to these tough questions

(iii) Using Content Created For A Project

- ✓ 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 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 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 commissioned for use and qualifies as a work made for hire, in which case the copyright belongs to the entity commissioning the work.

(iv) Using 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.
- ✓ You don't want to settle for a voice or an actor who is not quite polished or is ill suited to the part, or your whole project may have an amateurish feel.

- ✓ Professional voice-over talents and actors in the united states usually 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

- ✓ 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 a collection of videotapes or cassettes as samples of the actors' work after reviewing the tapes, you can arrange auditions of the best candidates, at your office or at studio.
- ✓ You can also get in touch with several agencies and put out a casting for screen or audio auditions.
- ✓ Furthermore, you are not limited to using union talent, and if your call is posted on bulletin boards in public places, you may find yourself with many applicants, both union and nonunion, who are eager for the work.

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.

Acquiring Releases

- ✓ A union talent contract explicitly states what rights you have to the still and 13 motion images and voices you make and use.
- ✓ If, however, your talent is non-union, be sure to require the person to sign a release form.

DELIVERING

- ✓ Test it – and then test it again; that's the unavoidable rule.

(i) Testing

- ✓ The term alpha and beta are used by software developers to describe levels of product development when testing is done and feedback is sought.
- ✓ Alpha releases are typically for internal circulation only and are passed among a selected group of mock users—often just the team working on the project.
- ✓ These versions of a product are often the first working drafts of your project and you can expect them to have problems or to be incomplete.
- ✓ Beta releases, on the other hand, are sent to a wider but still select audience with the same caveat: this software may contain errors, bugs and unknown alligators that slither out of the swamp at day's end to bite startled designers from behind.

Alpha Testing

- ✓ You should remain flexible and amenable to changes in both the design and the behavior of your project as you review the comments of your alpha testers.

- ✓ Beware of alpha testing group made up of kindly friends who can provide positive criticism.

Beta Testing

- ✓ The beta testing group should be representative of real user and should not include person who have been involved in the project's production.
- ✓ Beta tester must have no preconceived ideas.
- ✓ You want them to provide commentary and reports in exchange for getting to play with the latest software and for recognition as part of this "inside" process.
- ✓ Managing beta test feedback is critical.
- ✓ If you ignore or overlook tester's comments, the testing effort is waste.

Polishing to Gold

- ✓ As you move through alpha and beta testing, and then through the debugging process towards a final release, you may want to use terms that indicate the current version status of your project
- ✓ For example, bronze when you are close to being finished, gold when you have determined there is nothing left to change or correct and are ready to reproduce copies from your golden master.
- ✓ Some software developers also use the term release candidate (with a version number) as they continue to refine the product and approach a golden master.
- ✓ Going gold, or announcing that the job is finished, and then shipping, can be scary thing.

Preparing For Delivery

- ✓ Simply copying a project's files to the user's hard disk is often not enough for proper installation; frequently, you will also need to install special system and run-time files.
- ✓ So that end users can easily and automatically set up your project or application on their own computers, you may need to provide a single program that acts as an installer.
- ✓ It is critical that include appropriate warnings in user and installation document, like these examples.

1. Must have at least 256mb of ram
2. Will not run unless QuickTime is installed
3. 3mb available disc space disables all screensavers before running
4. back up older versions before installing this update

File Archives

- ✓ Shareware and commercial utility programs for compressing and decompressing files have been widely used for the Macintosh and windows environments for some time.
- ✓ These have been particularly popular with users of bulletin boards, the Internet and online services such as America online because compress files take less time to transmit by modem than to uncompressed files.
- ✓ One or more of the files in a project can be compressed into a single file called an archive.

Compression Software	Extension	Platform
PKZIP	.zip	Windows
ARC	.arc	Windows
PAK	.pak	Windows
Windows Install	.xx_	Windows
Stuffit	.sit	Macintosh
PackIt	.pit	Macintosh
DiskDoubler	.dd	Macintosh
CompactPro	.cpt	Macintosh
AppleLink	.pkg	Macintosh
Self-extracting	.sea	Macintosh

- ✓ Self extracting archives are useful for delivering projects on disc in compressed form. On the Mac, this file typically carries the windows like filename extension .sea.
- ✓ On windows platforms these are safe for executable file with an .exe filename extender.

Delivering on the World Wide Web

- ✓ Delivering multimedia projects built for the World Wide Web can be as simple as renaming a directory or transferring a group of files to a web server.
- ✓ Servers and networked systems are discussed in Chapters 9 and 13. On the face of it, the mechanics of actually putting a project on the Web are trivial, particularly because you have likely been designing, building, and testing within "web space" throughout the development of your project, anyway.
- ✓ But delivery of your project and activation of your pages by making them available to your intended audience on the Web, whether to the general public or to an intranet of select users behind a firewall, should be approached with caution.

Delivering On CD- Rom

- ✓ The majority of multimedia products sold in the retail and business channels are delivered on CD-Rom or DVD.

Compact Disc Technology

- ✓ A compact disc or CD is it anyway for of crystal polycarbonate plastic and metal measuring 4.75 inches (120 mm) in diameter with a small hole, or hub, in its centre.
- ✓ The metal layer is usually pure aluminum, sputtered on to the polycarbonate surface in a thickness measurable in molecules.
- ✓ As the disc spins in a CD player, the metals reflect light from the tiny infrared laser into light sensitive receiver diode.
- ✓ Compact does a made in what is generally referred to as family process the glass is made using the well developed photo lithographic techniques crafted in microchip industry.
- ✓ First an optically ground glass disc is coated with the layer of photo resistant material 1/10 micron thick.
- ✓ A lesser than exposes write a pattern of it on to the surface of the chemical layer of material.
- ✓ The disc is developed the exposé areas are washed away and it is silvered, resulting in the actual pit structure of the finished master disc.
- ✓ The master is then electroplated with the layers of nickel one molecule thick, one layer at a time, until the desired thickness is reached.
- ✓ The nickel layer is separated from the glass disk and forms a metal negative or father. In cases where low runs of the just a few disks are required the father is used to make the actual discs.
- ✓ Most projects do require a several mother or positives to be made by plating the surface of the father.
- ✓ In a third plating stage sons or stamp or made from the mother, and these or the parts that are used in the injection moldings machine.

CD-R

- ✓ CD-R (compact disc-recordable) is an excellent method for distributing multimedia projects.
- ✓ CD-R writers and blank CD-R discs are inexpensive, and for short runs of a product, it is more cost effective to burn your work onto CD-Rs and custom label them with your own printer than to have the discs mastered and pressed using the expensive father and son method described previously .

Compact Disc Standards

- ✓ In 1979, Philips and Sony together launched CD technology as a digital method of delivering sound and music (audio) to consumers.
- ✓ This collaboration resulted in the Red Book standard (named for the color of the document's jacket), officially called the Compact Disc Digital Audio Standard.
- ✓ The Red Book standard defines the audio format for CDs available in music stores today; the Yellow Book is for CD-ROM; the Green Book is for CD-I (Interactive); the Orange

Book is for write-once, read-only (WORM) CD-ROMs; and the White Book is for Video CD (Karaoke CD).

- ✓ Though a CD contains tracks, the primary logical unit for data storage on a CD is a sector.
- ✓ Philips and Sony developed the Yellow Book to provide established standards for data storage and retrieval.
- ✓ Other standards were developed to deal with specific user requirements, such as synchronized interleaving of compressed audio and visual data in interactive digital movies (Green Book), and with formats for write-once, read-only (WORM) and magneto-optical CD technologies (Orange Book). A CD-R can have several separate images or sessions on it, each recorded at different times.
- ✓ Many multimedia developers place both Macintosh files and PC files on the same CD in a hybrid format, letting the user launch the proper applications for the appropriate platform.

DVD

- ✓ Digital Versatile Discs (DVDs) employ a different (multi-layer, high-density) manufacturing process than audio and data CDs, and this technology provides as much as 15.9GB of storage on a single disc in the Double Sided, Dual-Layered format (DVD-18).
- ✓ More common and readily available are Single-Sided, Single-Layered discs offering 4.37GB of storage (DVD-5), often called "4.7GB Media."

Wrapping It Up

- ✓ Packaging is an important area where sales and marketing issues extend the process of making multimedia into the real world of end users.
- ✓ Like the cover of a book, people will judge your work based upon the impression it makes.
- ✓ If your project is destined to be sold into the consumer retail channel, then you have made a title.
- ✓ Retailers claim that consumers typically relate the finish of a package to quality and price of the product inside.
- ✓ The fancier, bigger, and heavier the package is, the higher its perceived value.
- ✓ Software manufacturers juggle the elements of this equation when they determine the cost of goods and shipping/freight add-ons and set the product's price point.
- ✓ Many big software boxes are shipped with plenty of sailboat fuel inside, and with cardboard or open-cell foam to hold the thin CD and manuals in place.
