

MAR GREGORIOS COLLEGE OF ARTS & SCIENCE

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DEPARTMENT OF COMPUTER APPLICATION

SUBJECT NAME: MULTIMEDIA SYSTEMS

SUBJECT CODE: SED6D

SEMESTER: VI

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Title of the Course/ Paper	MULTIMEDIA SYSTEMS		
Elective	III Year & Sixth Semester	Credit: 4	
Objective of the course	This course gives an exposure to Multimedia and its applications.		
Course outline	<p>Unit-1: What is Multimedia: Definitions - CD-ROM and the Multimedia Highway - Where to use Multimedia - Introduction to Making Multimedia: The stages of a Project - What You Need - Multimedia Skills and Training: The team - Macintosh and Windows Production Platforms: Macintosh Versus PC - The Macintosh Platform - The Windows Multimedia PC Platform - Networking Macintosh and Windows Computers-Hardware Peripherals Connection - Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices.</p> <p>Unit-2: Basic Tools: Text Editing and Word Processing Tools - OCE Software - Painting and Drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories - Making Instant Multimedia: Linking Multimedia Objects - Office Suites - Word Processors - Spreadsheets - Databases - Presentation Tools: Multimedia Authoring Tools: Types of Authoring Tools - Card-and-Page-Based Authoring Tools - Icon-Based Authoring Tools - Time-Based Authoring Tools - Object-Oriented Authoring Tools - Cross-Platform Authoring Notes</p> <p>Unit-3: Text: The Power of Meaning - About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext - Sound: The Power of Sound - Multimedia System Sounds - MIDI Versus Digital Audio - Digital Audio - Making MIDI Audio - Audio File Formats - Working with Sound on the Macintosh - Notation Interchange File Format (NIFF) - Adding Sound to Your Multimedia Project - Toward Professional Sound: The Red Book Standard - Production Tips</p> <p>Unit-4: Images: Making Still Images -Color - Image File Formats. Animation: The Power of Motion - Principles of Animation - Making Animations That Work -Video: Using Video - How Video works - Broadcast Video Standards - Integrating Computers and Television - Shooting and Editing Video - Video Tips - Recording Formats - Digital Video.</p>		

Unit-5: Planning and Costing : Project Planning - Estimating - RFPs and Bid Proposals - Designing and Producing : Designing - Producing - Content and Talent : Acquiring Content - Using Content Created by Others - Using Content Created for a Project - Using Talent -Delivering : Testing - Preparing for Delivery - Delivering on CD-ROM - Compact Disc Technology - Wrapping It Up - Delivering on the World Wide Web.
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UNIT I

1) WHAT IS MULTIMEDIA

(i) 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 meaningful 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.

(ii) 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 supersede 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.

(iii)Where To Use 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 in the best 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 that 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 opportunity 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- 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 files 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.
- Museum kiosks are not only used to guide patrons through the exhibits, but when installed at each exhibit provide great added depth allowing visitors to browse through richly detailed information specific to that display.
- 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, particularly a youthful public, with increasing presence during the 1990s.

2)INTRODUCTION TO MAKING MULTIMEDIA

(i)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.

(ii)What You Need

- 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 supersede 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.

3) MULTIMEDIA SKILLS AND TRAINING

(i)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.

4) MACINTOSH AND WINDOWS PRODUCTION PLATFORM

- Selection of the proper platform for developing your multimedia project may be based on your personal preference of computer, your budget constrains, project delivery requirements, and the type of material and content in the project.
- Many developers believe that multimedia project development is smoother and easier on the Macintosh than in Windows, even though projects destined to run in Windows must then be ported across platforms.
- But hardware and authoring software tools for Windows have improved.
- Today you can produce many multimedia projects with equal ease in either the Windows or Macintosh Environment.

(i)Macintosh Versus PC

- It has been by definition, a multimedia computer: at the famous rollout of the Macintosh in Jan-1984 at APPLE'S.
- It had good built-in audio right from the start, in 1984 IBM Personal computers could not process sound without very expensive add-on components.

- With its focus on business computing, the PC remained for many years able to provide only system beeps and limited sound effects on a tiny onboard speaker.
- Other Multimedia tools and hardware, such as video digitizers, are now readily available in PC marketing channels. A sound board, Super VGA graphics, the PC readily challenges the Macintosh in delivering excellent audio and visual presentations.
- An MPC computer, moreover, will always provide sound capability, a CD-ROM player, access to the Media Control Interface (MCI) for extensions to video overlay boards and other peripherals, and minimum CPU and memory configuration.

(ii) The Macintosh Platform

- All Macintoshes can play sound. And the latest generation of Macintoshes includes h/w and software for digitizing sound without additional hardware or sound cards.
- For most Macintoshes, 8-bit, 16-bit, 24-bit graphics capability is available.
- The AV series of Macintoshes can digitize video as well as sound.
- The Macintosh computer you will need for developing a project depends entirely upon the project's delivery requirement its content, and the tools you will need for production.
- The ideal production station is newest, fastest and most flexible computer you can get your hands on, but such a configuration may be beyond the scope of budget.
- Most Macintosh models sold today are sufficient for multimedia development.
- Apple (RISC) Microprocessors during 1994.
- RISC technology was typically used in engineering workstations and commercial database servers designed for raw computational power, but in an alliance with IBM and Motorola, Apple designed and built this new line RISC-based models.

(ii) The Windows Multimedia PC Platform

- The Multimedia PC Marketing Council was rolled out with support of Microsoft and major PC manufactures in 1990.
- The Original MPC Level 1 minimum standard workstations consisted of a 16MHz 386SX microprocessor, at least 2MB of RAM, a 30MB hard disk, a CD-ROM drive, VGA video (16 colors), an 8-bit audio board, speakers and or headphones, and Microsoft Windows software with the Multimedia Extensions package.
- The minimum-configuration MPC was not powerful enough to develop serious multimedia and was hardly powerful enough to play multimedia at all.
- A more realistic MPC Level 2 minimum standard was released in 1993.
- In June 1995, the multimedia PC Working Group released the Multimedia PC Level 3 specification providing for improved sound and video performance.
- The big upgrade in this MPC3 standard, following many months of meetings and negotiations within the Working Group.
- The MPC3 platform consequently provides full motion video with TV-quality and CD-quality sound.

(iv) Networking Macintosh and Windows Computers

- Working in a multimedia development environment consisting of a mixture of Macintosh and Windows computers.

- LANs (local area networks) and WANs(wide area network) can connect the members of a workgroup.
- In a LAN, workstations are usually located within a short distance of one another, on the same floor of a building.
- WANs are communication systems spanning great distances, typically set up and managed by large corporations and institutions for their own use, or to share with other use.
- LAN's allow direct communication and sharing of peripheral resources such as file servers, printers, scanners and n/w modems.
- They use a variety of proprietary technologies, most commonly Ethernet or TokenRing, to perform the connections.
- They can usually be set up with twisted-pair telephone wire, but be sure to use "data-grade Level-5" wire-it makes a real difference, even if it's a little more expensive.
- Bad wiring will give you a never-ending headache of intermittent and often untraceable crashes and failures.
- WANs are expensive to install and maintain, but other methods for long-distance communication are available without a dedicated telephone network. Dial-up connections to the Internet through an Internet Service Provider(ISP).
- ETHERNET is only a method for wiring up computers, so you still will need client/server software to enable the computer to speak with other and pass files back and forth.
- Here have 2 options: add software to your Macintosh to allow it to connect to a network of Windows PCs that use the Microsoft Client TCP/IP protocols, or add software to your Windows PC that allows it to connect to a n/w of Macintoshes that uses AppleTalk.
- Both require Ethernet as the connection method.
- To connect a PC to a n/w of Macintoshes, you can use MACLAN Connect from Miramar to share the directories and files on all your computers using AppleTalk protocols...

5) 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,

(ii) Integrated Drive Electronics (IDE)

- ✓ SCSI Connections may connect with 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.

(iii)Memory and Storage Devices

According to Moore's law, "the number of transistors in a dense integrated circuit doubles about every two years", the memory capacity of computers has grown enormously.

Types of memory:

1. RAM -SRAM & DRAM.
2. ROM - PROM, EROM, EEROM.

When the computers are given more memory, their processing speed will also increase. The following are the Semiconductor memories:

Random Access Memory (RAM):

Other name for RAM is read write memory or the main memory or the primary memory. It stores the programs and data that the CPU requires during execution of a program. It is a volatile memory (i.e.) data will be lost once the power is off. Color images, text, sound bites, video clips, and the programming code that binds all these elements are stored in the RAM. If the computer has low RAM capacity, then the processing time will be more. A powerful processor without sufficient RAM will degrade the performance. RAM is classified as follows;

- 1. Static RAM (SRAM):** It retains data bits in its memory as long as power is being supplied. They need not be refreshed. It provides faster access and is expensive.
- 2. Dynamic RAM (DRAM):** It stores each bit of data or program code in a storage cell consisting of a capacitor and a transistor. The storage cell is dynamic (i.e.) It needs to be refreshed (new electronic charge) every few milliseconds.

Read-Only Memory (ROM):

- ✓ This is a non-volatile memory that stores crucial information essential to operate the system, like BIOS booting program.
- ✓ This is used in components that do not need changes.
- ✓ Used in calculators and peripheral devices.
- ✓ ROM is further classified into: ROM, PROM, EPROM, and EEPROM

Programmable Read Only Memory (PROM): The blank memory is programmed to store the information using PROM programmer or PROM burner. The data stored cannot be modified. Hence it is called one-time programmable device. They are used in cell phones, video game consoles, RFID tags, medical devices etc.

Erasable Programmable Read Only Memory (EPROM): The information burnt in EPROM could be altered by placing it under ultraviolet rays. All the contents will be lost and the EPROM will be left blank. It was used in micro-controllers.

Electrically Erasable Programmable Read-Only Memory (EEPROM): This is similar to EPROM, but only a part of it could be modified. It can erase or burn one byte of data at a time. It is used in storing BIOS program.

Hard Disks:

This is a non-volatile magnetic storage device with rotating platters. This is non-volatile memory capable of storing large amount of data. Since multimedia data demands bulk memory for storing and processing data hard disk would be less expensive option. Recent hard disks are manufactured with high capacity of storing terabytes of data.

Flash Memory or Thumb Drives:

This is highly portable device without moving parts. It is a plug and play device.

CD-ROM Discs:

Compact disc read-only memory (CD-ROM) is a storage device that can be read but not written to. It is a conventional device that was used widely before the advent of flash drives. They can store wide range of developer utilities, graphic backgrounds, stock photography and sounds, applications, games, reference texts, and educational software.

Digital Versatile Discs (DVD):

This holds a minimum of 4.7GB of data best suited for storing multimedia applications. This ensures rendering high resolution videos with high quality audio. The variations in DVD are:

- ✓ DVD-Read Write
- ✓ DVD-Video
- ✓ DVD-ROM

Blu-ray Discs (BD):

This is a high-capacity optical disk medium developed for recording, rewriting and playing back high definition video. It can store large amounts of data. The motivation of Blu-ray was from High Definition TV (HDTV), BD can support high definition audio and video with high quality camcorder recording.

(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 development 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 has 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 was 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 devices 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.

(v) Output Devices

- ✓ Output devices are connected to the PC and sometimes may not be a part of the PC.
- ✓ **Speakers:** They are to amplify the sound.
- ✓ **Monitors:** LCD panels, CRT (Cathode Ray Tubes), Digital Light Processing (DLP) projectors, liquid crystal on silicon (LCOS) projectors, Grating-Light-Valve (GLV) technology are most commonly used output devices. The monitors must have accurate RGB values for getting high resolution images
- ✓ **Hard-copy printed output:** Certain projects need direct visual representation, so hard copy output has also been widely employed.

(vi) Communication Device

- ✓ A communication device is a hardware device capable of transmitting an analog or digital signal over the telephone, other communication wire, or wirelessly.
- ✓ A classic example of a communication device is a computer modem, which converts a computer's digital information to an analog signal for transmission over a telephone line.
- ✓ Similarly, a modem receives analog signals, and converts them to digital, for processing by the computer. This process is called modulation/demodulation, from which the modem gets its name.
- ✓ Other examples of communication devices include a NIC (network interface card), Wi-Fi devices, and access points.

Communication device examples

Below is a full listing of all the different types of communications devices you may encounter when dealing with a computer.

- ✓ Bluetooth devices
- ✓ Infrared devices
- ✓ Modem (over phone line)
- ✓ Network card (using Ethernet)
- ✓ Smartphone
- ✓ Wi-Fi devices (using a Wi-Fi router)

Communication device errors

Any time a communication device encounters problems communicating with another device, you may encounter a communication error.

Below is a list of general steps that can be verified when this error is encountered.

- ✓ If your communication device uses a wire, make sure it is firmly connected.

- ✓ Make sure the proper drivers are installed and that no errors or conflicts are occurring with the driver, and that the device is detected.
- ✓ If your communication device requires settings, make sure they're correct. For example, a network card requires the proper IP, DNS, and Subnet settings to establish a connection with the network, and be able to find its route to other network devices.

Why do computers need communication devices?

- ✓ A computer can work fine without a communication device.
- ✓ However, for a computer to communicate with other computers, they need a communication device.
- ✓ For example, for your computer to connect to the Internet to view this web page, it needs a communication device.
- ✓ Without a communication device, you'd have to use a sneaker net to transfer or share data between computers.

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 a 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, PicturePublisher 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 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.

(vi) 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 premiere, videoShop and MediaStudio 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 a plug-in for Netscape and Internet Explorer.
- Three elements make up QuickTime :-
 - QuickTime Movie File Format
 - QuickTime Media Abstraction Layer
 - QuickTime Media Services
- The movie file format is a 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, timecode, music/MIDI, MPEG,etc.,)
- 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 player
- 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 an extensible, "OPEN" environment and lacks features 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 RasterOps, 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.

2) 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 documents or even embedded in them.
- ✓ Apple Events :-
 - On the Macintosh, AppleEvents 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 linking 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 platform.

(iii) Word Processor

- ✓ 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 WordPerfect Macintosh version, a tool palette and drawing commands allow us 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 reformat 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.

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.

3) 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

(i) 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”.

(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 characteristics 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
 closeCardleavePage
 closeStackleaveBook
 idle idle
 mouseDownbuttonDown
 mouseStillDownbuttonStillDown
 mouseUpbuttonUp
 newBackgroundnewBackground

openCardenterPage
 openStackenterBook
 An example in hypertext.
 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 hypercard authoring must be purchased from apple.

Supercard (macintosh/windows):

Alliegiant 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.
- Resolution 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.

(iii) Time-based Authoring tools:

- ✓ When these types of tools are used, the elements and events are arranged along a timeline.
- ✓ The speed of appearance of a multimedia object can be controlled by adjusting the timeframe of the play.
- ✓ It is for content with a beginning and an end. The developer can coordinate the time, speed and display length of each element.
- ✓ One element can trigger the appearance of another element on the screen. For example, at the appearance of a scene, music can also be played. Examples: Director, Flash.

Flash:

It is an authoring software developed by Macromedia that is used to create timeline based animation programs. It is rich in full-screen navigation interfaces, graphic illustrations, and simple interactivity in an antialiased, resizable file format that is small enough to stream across a normal modem connection. It is mainly meant for web based applications.

Director:

This has a built in 3D engine for creating games and presentations. It requires expertise since it allows creations of 3D objects. The terminologies in Director are given below:

Movie -The elements are assembled in sequence

Cast - Multimedia database with images, sound files, shapes etc.

Score -Binding the Cast elements with Movie in some sequence.

Tempo Channel - It specifies the speed at which an element has to be played.

Lingo-It is an object oriented scripting language that controls the interactivity.

(iv) Object Oriented Authoring tools:

Object-based authoring tools consist of the object-based authoring program contains preprogrammed objects with sensible properties, messages, and functions. That includes all the multimedia elements such as text, images, audio, video, animation and graphics.

Text:

- ✓ It is the simplest of data types and requires the least amount of storage.
- ✓ Text is the base element of a relational database.
- ✓ It is also the basic building of a document.
- ✓ The major attributes of text include paragraph styling, character styling, font families and sizes, and relative location in a document.

Hypertext:

- ✓ It is an application of indexing text to provide a rapid search of specific text strings in one or more documents
- ✓ It is an integral component of hypermedia documents.
- ✓ A hypermedia document is the basic complex object of which text is a sub object.
- ✓ Sub-objects include images, sound and full motion video.
- ✓ A hypermedia document always has text and has one or more other types of sub-objects.

Images:

- ✓ Image object is an object that is represented in graphics or encoded form.
- ✓ Image object is a sub object of the hypermedia document object.
- ✓ In this object, there is no direct relationship between successive representations in time.
- ✓ The image object includes all data types that are not coded text
- ✓ It do not have a temporal property associated with them.
- ✓ The data types such as document images, facsimile systems fractals, bitmaps, meta files, and still pictures or still video frames are grouped together.

- ✓ Non-Visible: This type of images are not stored as images. But they are displayed as images. Example: Pressure gauges and temperature gauges
- ✓ Abstract: Abstract images are computer-generated images based on some arithmetic calculations. They are really not images that ever existed as real-world objects. Example of these images is fractals.

Audio And Voice:

- ✓ Stored-Audio and Video objects contain compressed audio information.
- ✓ This can consist of music, speech, telephone conversation and voice commands.
- ✓ An Audio object needs to store information about the sound clip.
- ✓ Information here means length of the sound clip, its compression algorithm, playback characteristics, and any annotations associated with the original clip.

Full Motion and Live Video:

- ✓ Full motion video refers to pre-stored video clips.
- ✓ Live video refers to live and it must be processed while it is being captured by the camera.
- ✓ From a storage perspective, we should have the information about the coding algorithm used for compression. It need decoding also.
- ✓ From a processing perspective, video should be presented to user with smooth and there should not be any unexpected breaks.
- ✓ Hence, video object and its associated audio object must be transferred over the network to the decompression unit.
- ✓ It should be then played at the fixed rate specified for it.
- ✓ For successful playback of compressed video, there are number of technologies.
- ✓ They are database storage, network media and protocols, decompression engines and display engines.

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, iconauthor, 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 toolbox 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.

UNIT-III

IV.COMPUTERS AND 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).

(i)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 Type 1 and was developed for output to printers; it is rarely used by multimedia developers.
- ✓ There are currently over 6,000 different Type 1 typefaces available. Type 1 fonts also contain hints, which are special instructions for grid-fitting to help improve resolution.
- ✓ 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.

(ii)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, TreeFrog, 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.

(iii)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.

(iv)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-uppercase 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 print.
- ✓ 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 or ∞, and international diacritics or alphabets characters, such as ä or í.
- ✓ 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).

(v) Mapping Text Across Platforms

- ✓ 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 $\iota\varsigma + \lambda\beta = \mu\eta$.
- ✓ 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.

V.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 FontDS 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

- ✓ FontChameleon 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 a 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 this way and, when animated using Macromedia's Director, spins in place.

VI.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/atweb/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 ends 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.

2.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).

WATTS	EXAMPLE
25-40 million	Saturn rocket
100,000	Jet engine with afterburner
0.000000001	Sound 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 MacRecorder, 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 file 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 MIDI 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 digitalequivalents.
- 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 sounds 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.

ID	SOUND	ID	SOUND
0	Acoustic grand piano	31	Guitar harmonics
1	Bright acoustic piano	32	Acoustic bass
2	Electric grand piano	33	Electric bass(finger)
3	Honky-tonk piano	34	Electric bass (pick)
4	Phodes piano	35	Fretless bass

- ✓ 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 once.
- ✓ 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 Down Sampling

- ✓ 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.

(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 1 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	MIMI Type	Platform	Use
Aif	Audio/x-aiff	Mac,SGI	Audio
Aifc	Audio/x-aiff	Mac,SGI	Audio (compressed)
AIFF	Audio/x-aiff	Mac,SGI	Audio
Aiff	Audio/x-aiff	Mac,SGI	Audio
Au	Audio/basic	Sun,NeXT	ULAW audio data
Mov	Video/quickTime	Mac,Win	Quick Time video
Mpe	Video/mpeg	All	MPEG video
Mper	Video/mpeg	All	MPEG video
Mpg	Video/mpeg	All	MPEG video
Qu	Video/quickTime	Mac,Win	QuickTime video
Ra, ram	Audio/x-pn-realaudio	All	RealAudio Sound
Snd	Audio/basic	Sun, NeXT	ULAW Audio Data
Vox	Audio/	All	VoxWare Voice
Wav	Audio/x-wav	win	WAV 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 (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

- ✓ MIDI in windows 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.
- ✓ The sound manager (consisting of the Sound control panel and the Sound manager extension) allows applications to play and record sound using Macintosh built-in sound hardware.
- ✓ Sound manager supports 16bit CD-quality audio, redirection of sound to third-party hardware cards, plug-in audio compression /decompression software (codecs for MACE, IMA, and uLaw formats), integration with quick time (see “Sound with Quick Time,” below), and asynchronous alert sounds (so alert dialogs and other interface elements can continue processing while an alert sound is playing).
- ✓ 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 4.0.2 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 SimpleText 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 electronic ally 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 there 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 board 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.

$$(\text{Sampling rate} * \text{bits per sample}) / 8 = \text{bytes per second}$$

- ✓ 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) systems 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 provides 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 sequences 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.

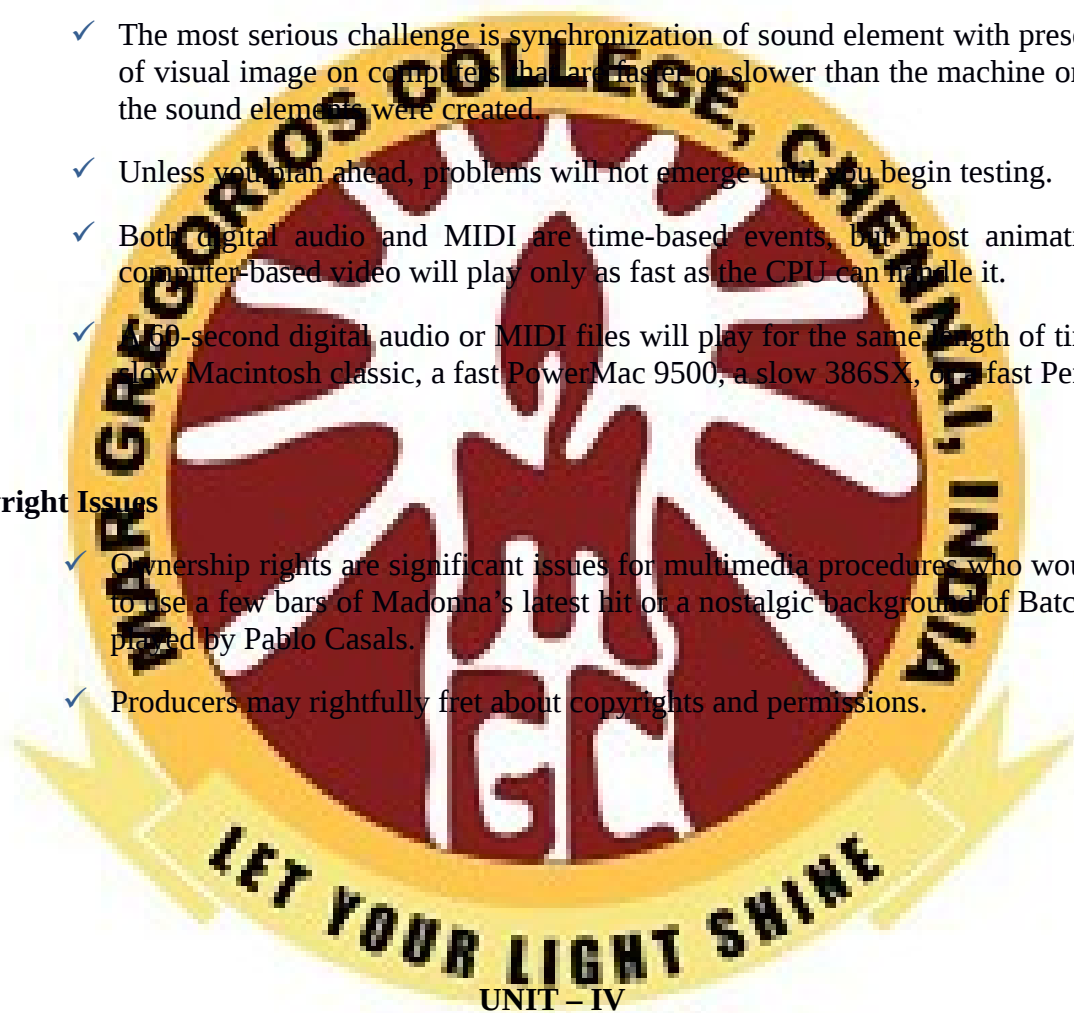
- ✓ This database is particularly important because you may need to give your sound files such unhelpful names as SND0094A.WAV or CHAPT 1-3.WAV; these names won't contain many cues about the files actual content, and you will need at hand a more descriptive cross-reference.

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 producers who would love to use a few bars of Madonna's latest hit or a nostalgic background of Bach suites played by Pablo Casals.
- ✓ Producers may rightfully fret about copyrights and permissions.



I.IMAGES

(i)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 their 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.
- ✓ Each picture element can be either on or off, as in the 1-bit map, 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 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 “oinonskinning” and image altering 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 brushes 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 makes static presentation come alive. It is visual change over time and can add great power to your multimedia projects and web pages.

(i) 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.

(ii) 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 motion, 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 for 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 keyframes (the first and last frame of an action).
- ✓ The series of frames in between the keyframes 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, keyframe, 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 walkingman.
- ✓ 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.

(iii) 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 GIF89a 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.

III. 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.

(ii) 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 analognational 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 non-linear 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.

(iii) 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.

(iii) 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 a 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-definitionon “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 DistributionSystem.
- ✓ 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 desaturate 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 camcorder

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 combine 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 separate 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 oriented towards consumer this format gained rapid acceptance in the “Prosumer” and industrial market because of the sharper 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 confuse 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 (DTV) 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 ,video JPEG ,cinepak, and Sorensonare available to compress digital video information at rates that ranges from 50:1 to 200:1.

UNIT - V

II.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 thorough 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.

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 can 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

- Icons 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 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 them 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 meetings; off-site meetings
 - Missed deadlines

III.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 exceptions 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 (WMMR. 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 a set 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 derivate 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 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.

IV. 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.

(ii) 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 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.

(iii) 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 laser then 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 of 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.

Delivering on the World Wide Web

- ✓ Delivering multimedia projects built for the World Wide Web can be as simple as creating 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.

