

---

# UNIT 1 AN OVERVIEW OF MULTIMEDIA

---

## Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Multimedia - The Concept
- 1.3 Hardware for Multimedia Computer
  - 1.3.1 The CPU
  - 1.3.2 The Monitor
  - 1.3.3 Input-Output Devices
  - 1.3.4 CD-ROM
  - 1.3.5 Soundcard
  - 1.3.6 Laserdisc
  - 1.3.7 DVD
- 1.4 Software for Multimedia
- 1.5 Components of Multimedia
  - 1.5.1 Textual Information
  - 1.5.2 Images
  - 1.5.3 Animation
  - 1.5.4 Digital Audio
  - 1.5.5 Digital Video
- 1.6 Multimedia-Design, Production and Distribution
  - 1.6.1 Planning Design of Multimedia
  - 1.6.2 Production of Multimedia
  - 1.6.3 Distribution of Multimedia
- 1.7 Summary
- 1.8 Model Answers

---

## 1.0 INTRODUCTION

---

Multimedia has become a popular technology in the ever-changing world of computers. Since last few years, it seems to be much sought after the talked about, not only in the world of Information Technology, but also in various functional fields like advertisement, corporate sector, cinema, fashion design and education, to name a few. More and more research work on this new technology of sound, animation and text, is making it better and better with every passing day. It is one of the most realistic ways of working even for people having no knowledge of computers. It targets people from almost all ages of life from a toddler to an aged one.

In this unit, we will be discussing about the basic concepts relating to digital interactive multimedia.

---

## 1.1 OBJECTIVES

---

After going through this unit, you will be able to:

- define the basic concept of multimedia
- appreciate multimedia as a new chapter in information technology



- identity and describe various components of multimedia like, sound, animation and graphics
- discuss various hardware requirement for multimedia
- Describe how pages and sound works in multimedia.

---

## 1.2 MULTIMEDIA - THE CONCEPT

---

With the fast growing technology the computational speed and data communication Media are enhanced rapidly. Thus, it is not surprising that many multimedia-related Applications are emerging. But what is Multimedia? How is related to computer and Communication speed? Let us try to answer these questions.

The term multimedia is often associated with the information superhighway, or with Produce videos (information on demand) or with hypermedia. An be considered as text, graphics, images, video and audio in computer. One of the key features of multimedia is Interactivity. It may, convey enriched interactive information to its users.

Multimedia system support the physical and logical coexistence and interactive use of heterogeneous media classes such as print, audio and video in specific application Environment. Hypermedia. And virtual reality application are based on multimedia System. Hypermedia extends the media oriented features of multimedia system by the concept of hyperlink i.e., logical structures that provide means for organizing media objects in a flexible, logically coherent, network-oriented and non-sequential way. Thus, making it available on the web based systems. Virtual reality extends the interaction-oriented features of multimedia by the concept of cyberspace, i. e., modeling objects and their behavior in virtual environments, integrating position tracked man-machine in interaction devices and performing numerically intensive computations to guarantee real-time navigation.

By definition, the media class print includes static media types such as text, graphics, facsimile and natural image; the media class audio includes dynamic media types such as natural and synthetic sound, speech, and music; and finally, the media class video includes dynamic media types such as natural and synthetic image sequences.

About the above definitions the question is whether multimedia is a computer itself or a computer software product. In practical sense it is the combination of both. The fact remains that it has the best potential to be one of the most powerful form of Communicating ideas, searching for information and experiencing new concept of Common media ever developed.

The basic advantage of multimedia over the conventional form of media, which uses Sound, graphic and text for example, TV, audio etc. is the interactive feature of Multimedia. For example, a multimedia version of news bulletin would be the situation where you can request the broadcaster the type of news you are interested in, when you want to hear it and with the press of a button or click of the mouse you can hear the news.

Non-availability of a wide range of multimedia products in the market was one of the Strong reason that it remained a mystery to the general public. However, as the costs Have reduced and product functionality increasing, the multimedia is here to stay. It May become part of our everyday life just like the PCs. For achieving these goals, Several important technologies are being developed to solve, the problems associated With multimedia applications and interactive TV services to the home



Some of these technologies are video servers, multimedia groupware, network resource management, and hypermedia courseware etc. Some of the new products are being equipped with real-time video-compression system. A newer broadband systems based on MPEG (Moving Picture Expert Group) standard, will allow transmission of several video signals using a single satellite transponder. Flow communication terminals, also known as digital set-top boxes, are equipped with computer capabilities offering features such as on-screen interactive program guides, near movie on-demand. Capability, and personalized information channels. These home communication terminals will soon feature robust graphics and full user interactivity as well as MPEGbased video, all controlled and managed by an open architecture operating system running on a set-top box.

But if you think a bit seriously, you can see one way or the other, multimedia 'has Started creeping into our day to day life in various forms, and information has started Becoming available; in the digital format. Please note, when the information is stored in the digital format we get a lot of flexibility in handling it. It can be edited according to specific requirement processed and produced in various style and taste.

Multimedia is interactive, non-linear media in comparison to broadcast television. In Addition, it may provide a user with several meaningful paths. Thus, it is the interaction between user and information that makes it a very powerful media for activities that require the process. Of communicating information, such as education and training, reference material, business presentations, manuals, multimedia databases, geographic information system, advertising, documentaries and so on. The basic component of multimedia can be used for:

- The text can be used for adding emphasis
- Graphics provides a visual impact. It is generally said that a picture is worth a thousands words. Thus, graphics can be used for enhancing a presentation.
- Voice tries to enhance a presentation to the extent that a presentation moves on to the form of persuasion. Many people want to listen about a particular topic rather than reading about it.
- The animation can be used effectively for attracting attention. Animation also Makes a presentation light, thus, can be used for presentation of several complex subjects. It is also a tool, which helps in focusing attention; for example, a chart if drawn through animation may be focused on to quickly.
- The video part of multimedia can be used as a powerful communicator providing clear-cut instructions.

Use of multimedia in various applications can be justified by the levels of user Friendliness it provides (to its) user with its interactivity and customization. Multimedia is widely used now days in various applications and business is one of them. As the market competition is increasing with the introduction of better products in the market everyday, it has become absolutely necessary to provide better service and timely information to your client in a brief, precise and more understandable manner in a short time. Multimedia provides various ways to maintain a competitive edge for a company especially in training, market speculation, and public relation.

The interactive feature of multimedia brings life to the business presentations, where Can call present various aspects of a business such as, marketing plan for a new Product, its impact in the market consumer reaction etc. simultaneously or even you can combine all these to make the assessment of the consumer feedback on the product launching. The information, which is digitized, makes it more assessable as compared to the conventional ways of presentation using video, chart etc., where you can't edit or modify whatever is already video taped. Even if you do it, the cost involved will be high. Business organisations have already started creating powerful databases that can store and distribute digital media as easily as text.



Another critical, application of multimedia is educational sector. It enhances the quality of education. It provides new way for teacher to encourage one of the most rare and important elements of learning i.e., curiosity to know and explore. Topics can be linked with other related information. Linking is possible with graphics, text and sound (may be a lecture session from the subject teacher and so on).

With a large screen projector and a multimedia playback system, teachers can use Multimedia as a way to enhance their standard lesson plan and stimulate questions. On the other hand students will be able to further explore the topics using standard Multimedia platform. The assignments, which require students to make their own Interpretation of facts can be represented in the multimedia topics. There are several Applications possible in the area of education using multimedia. The use of multimedia in education would go a long way. We will discuss more about its applications in the next unit. In a complete sense pictures, graphics, text and sound is the essence of multimedia and it provides the user friendly environment with most flexible interactive facilities.

### **Roles in Multimedia**

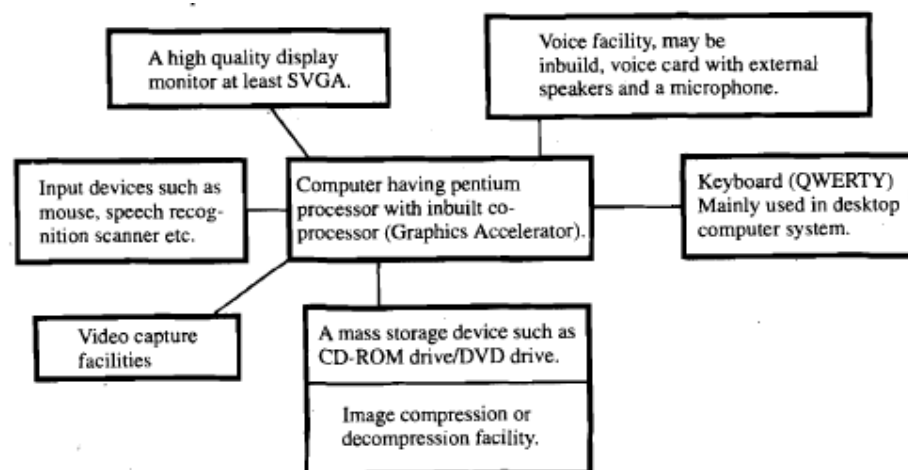
The Multimedia development require quite a number of skills some of those skills are: Graphics Designer, Script Writer, Multimedia Author, Animator, Instructional Designer, sound engineer, video producer, interface designer, technical support, project management etc. Thus, opening up lot of new opportunities.

---

## **1.3 HARDWARE FOR MULTIMEDIA COMPUTER**

---

A typical multimedia computer usually include devices like CD-ROM player, sound card such as Sound Blaster, Master Blaster and some times a microphone and a range of multimedia software. And probably with either MIDI (Musical Instrument Digital Interfiice) a standard interface can be in hardware or software which is used for playing a digital instrument through PC interface on the card as an add on utility. Let us look into the requirements of hardware for a multimedia PC. Figure 1 gives the diagram of such requirements.



**Figure 1: Requirements of Multimedia Computer**



One cannot record video using such a system. For doing recording one requires an Overview of additional equipments such as digital video camera. However, once various Multimedia components of multimedia are recorded in the required format, this machine can be used to put various pieces together to form a multimedia information system. The software tools required for such production are discussed in the next unit. Many multimedia machines however are equipped to record sound. Let us explore more about the hardware related to multimedia technology

### 1.3.1 The CPU

The CPU which is recommended for a multimedia computer should be Pentium Processor on a PC or other advanced chips such as PowerPC etc. Apple Macintosh and Silicon graphics have their own set of powerful processors for multimedia. However, the CPU of multimedia computer should be at least 486 with math co-processor attached otherwise the response time of multimedia will be poor. The co-processor chip greatly reduces the load of the CPU. The powerful co-processor chip added for supporting graphics is called graphics accelerator. The memory capacity for such a machine should be 8 MB or above. A 16 MB memory enhances the performance of a Multimedia machine by 50% over 8 MB machines.

### 1.3.2 The Monitor

The multimedia PC should be equipped with a monitor having Super Video Graphics Arrays (SVGA) card. The basic advantage of having SVGA is that it has a better Resolution, thus, the display will be of better quality for the graphics and pictures. A typical representation which may be used in multimedia can be 720x640 or 1200x680 Etc.

### 1.3.3 Input-Output Devices

Keyboard and Mouse are two important components for any multimedia PC. Since Multimedia computers are accessed using a graphical user interface therefore; mouse is an essential input device for it. Here special mention is to be made about two important input-output devices. These are the sound speakers, which produce sound output and microphones, which are used for on-line recording of sound using various multimedia software. In addition to this, multimedia also supports MIDI interface, thus, a digital musical instrument can be connected to it on the socket provided for it. This audio interface normally allows data transmission using DMA channels, that is, it does not require the intervention of the CPU while transferring digital data to memory.

Some of the newer machines are coming up with a TV board, which is installed inside the computer and allows connection of VCR/video Camera/Cable connection. This TV board can be operated with the help of software, which are normally provided with this board. Thus, you can watch TV programmes on the multimedia machine. However, please note that this interface does not allow digital recording of video on to your computer. This interface is meant only for the purpose of display. If you want to capture these video frames a video capture board is to be added in the multimedia PC

CD-ROM is a very important storage device, which has become an essential Component of a multimedia computer because of its mass storage capacity and Portability. A CD-ROM drive is a common hardware component of a multimedia Computer. We will be providing more details on it in the next subsection. A scanner can also be used along with a multimedia PC for scanning the pictures and putting them in digitized form in the computer.



### **1.3.4 CD-ROM**

Multimedia uses digitized audio and video which not only take huge amount of storage space, but also required high speed storage media, which can send large amount of data back and forth quickly to keep audio and video playing and recording smoothly.

Because of this requirement most of multimedia packages uses hard disk drive, which Offer high speed, high data throughput, and plenty of storage devices like 1 GB or More. Sometimes, two or more hard disk drives are used as an array to work together so that they act like a single hard drive.

However using a disk array of two or more disk for multimedia storage, can no doubt Boost the processing speed for the multimedia element, but these are not durable in Nature. Magnetic optical disk media offer large amount of storage in a durable package. CD-ROM is now widely used for multimedia storage as it has an amazing amount of flexibility and potential as a multimedia storage and distribution medium. One CDROM can hold up to one and half hour of digital audio or around 700 to 750 MB of computer data for that matter.

To install a CD-ROM drive, there must be a free drive bay and the computer system also have a sound card installed or a square slot into which either a sound card or CDROM drive can be placed. Before installation all the jumper settings should be properly done according to the specification. Once the CD-ROM drive is fitted in the drive bay with proper jumper settings, necessary software can be installed to make the CD-ROM drive work.

As far as CD-ROM is concerned, the main feature of it is the huge storage space and very high immunity from damage. It is easy to locate different pieces of data in CDROMS, so that comparatively simple software can be used to guide the laser beam to find what is required.

### **1.3.5 Sound Card**

Sound output from a computer has been a feature of machines usually used for sending warning error message or games. If better quality and capabilities for sound output or inputs are required, then there must be a device, which can be added to the basic machine. This device is known as Sound Card, which is added to the basic machine by inserting it in free slot. The most common reason for adding a sound card to a PC is to be able to use multimedia fully by recording and playing back the digital audio. While selecting an add on sound card, quality of sound from the loudspeaker has to be taken into consideration and the software provided with a sound card should be adequate enough to suit your requirements for handling sound effects in multimedia.

While installing a sound card one should keep in mind that it should not conflict with any other external devices installed in the computer system. Installation of sound card might require some default settings to be changed to make it compatible with the computer system.

Once all the settings are done correctly, place the card in a free slot and check all the connected cables to ensure that all connections are fitted properly. After this task is over, run the designated installation software to install the sound card i.e., to make necessary changes in the computer software settings.

The most common element of software is the install program, which installs drivers to work with the sound card. In addition to adding drivers, the installation program modifies the registry files so as to activate the sound card when the computer is switched on.

### 1.3.6 Laser Disc



Like CD-ROM, a laser disc uses the same recording media. It can record and play back high quality digital audio files. As compared to the CD-ROM, a laser disc can play back four channels at a time (two digital and two analog channels) whereas CD-ROM can play only two channels at a time. CD-ROM stores digital data on only one side of the disc, whereas the laser disc stores an analog video signal on both sides of the disc. But the biggest difference between them is that laser disc stores video in analog form.

The disadvantages of using a laser disc are like any other video source. The only plus point being that you can access video from any location on the disk. The older multimedia systems used to have a laser disc under computer control for playing video; they used to have a separate TV screen in addition to a computer screen. Laser Disc is old technology; the DVD has replaced it.

### 1.3.7 DVD

DVD is the cohesion of multimedia and digital video player, movies and interactivity. By employing the latest advances in digital technology, DVD can hold up to 25 times more digital info than a CD-ROM and DVD can be used to create innovative, cutting edge videodiscs with all sorts of data including director's cuts, photo galleries, interview with actors in fact practically anything today's video producers can imagine. Using DVD technology, besides multilingual capabilities of DVD the producers can create a limitless range of interactive titles, instead of watching a video in the linear fashion as with traditional videotape.

Originally it was felt that DVD is the short for Digital Video Disc but now it is more commonly referred to as "Digital Versatile Disc" as it has many potential applications than video. The new multimedia storage format of choice, DVD is more than just a high quality video formatting. DVD-ROM can combine hours of stunning video, audio and music with computer data and instructions to offer high capacity media-rich games with exceptional video quality, specialized educational and entertainment programs, software libraries, and training programs, digitized photo collections and, of course, high quality interactive encyclopedias and interactive experiences, all on a single disk. Even today's most popular game consoles have DVD at the core of their technology. A single-sided, single-layer DVD can contain up to 133 minutes of video enough to handle 95% of all movies, without the interruption of flipping the disc over or changing discs. DVD was designed to be the next generation of home video entertainment. DVDs offer digital sound and picture and high video resolution. However, our object is to use it as rich multimedia source.

DVD is the first standard designed specifically with the consumer and computer Electronic industries in mind. Consumers will be able to enjoy the benefits and Enhanced performance of DVD and PC users can turn their PC into genuine multimedia machines. The main advantage for PC users is the enormous capacity of 4.7 to 17 GB that DVD offers. More storage intensive graphics and video sequences can be incorporated into software applications. A PC equipped with the necessary hardware and appropriate playback software can then read DVD-Video discs. Thus, PC users can take advantage of the consumer side of DVD.

For the computer world, the main type of DVD disc used is called the DVD-ROM. This is a read only disc similar to the CD-ROM. In order to read DVD-ROM discs, PC users will also need a special DVD-ROM drive. With this equipment, PC users can access any data in standard PC formats or even video in MPEG-1 format. It is possible to use a PC for cross platform applications with a wide variety of audio and video material.



## DVD-ROM drives

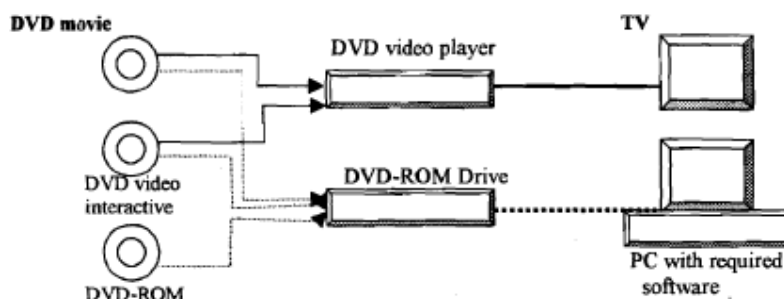
DVD-ROM drives are designed to read both CDs and DVD discs. The drives have seek times ranging from 150-200 ms, access time between 200 and 250 ms, and data transfer rates of 1.2 to 1.4 Mbps with burst transfer rates of up to 17 Mbps. This is the data equivalent of an 8x CD-ROM drive. DVD spin rates are about three times faster than those of single speed CD-ROM drives. Hence, when reading CD-ROMs, DVD-ROM drives transfer data at 3x speed. For PC users, upgrading to a DVD-ROM does not involve complicated installation procedures or exotic hardware. Connectivity is similar to CD-ROM drives. DVD-ROM drives are available with standard interfaces such as EIDE (ATAPI) and SCSI-2. Audio connections allow playback of audio CDs. With the correct audio decoding equipment, a PC can produce DVD-audio quality sound.

### DVD-RAM - for writing and deleting many times

Another DVD product for PCs is DVD-RAM. These discs and drives have a capacity of 2.6 GB that can be rewritten many times. It includes functions and applications similar to those of floppy discs or MO (magneto optical) discs. DVD-RAM is an efficient rewriteable medium for handling and storing any data that requires a large capacity, such as moving pictures. Because ultra precise writing is necessary, even a fingerprint left on the disc's recording side before writing would change the optical intensity so that accurate writing could not be achieved. Therefore, a DVD-RAM (rewriteable) disc must be contained in a special cartridge.

### Standard File System

The DVD volume and file management architecture allows movie discs to be read by a ROM drive, and a DVD player to read data stored on a rewriteable disc. In addition, the adoption of the Reed-Solomon Product Code, the new error correction scheme. Ensures the high data reliability required for computing.



## CD-ROM VS DVD-ROM

	CD-ROM	DVD-ROM
<b>Diameter</b>	120mm	120mm
<b>Thickness</b>	1.2mm	1.2mm(0.6mm per layer)
Track pitch(distance Between successive turn of a spiral)	1.6mm	0.74mm
Min pit length	0.83mm	0.40mm
Laser Wavelength	780nm	680nm
Layers	1	1.2 or 4
Data Capacity	0.65GB	4.7GB
Data Capacity per layer	0.650GB	4.7Gigabytes(2 hours 15 minutes)-single side single layer 8.5 Gigabytes(4 hours)single side dual layer 9.4 Gigabytes(4 hour 30 Minutes) Double side single layer 17 Gigabyte(8 hours)Double side double Layer





- Interactive Video does not fit in the category of Multimedia. True ☐ False ☐
- MPHG is a standard used for compression of audio in multimedia. True ☐ False ☐
- "CD-ROM is an optical storage device, which is portable. True ☐ False ☐
- however has the capacity equivalent to a hard disk. True ☐ False ☐
- SVGA monitor is a digital display technology. True ☐ False ☐
- flic minimum requirements for a digital multimedia Display workstations are:
- Pentium processor + graphics accelerator
  - So; in MB RAM
  - Kov board. Mouse. CD-ROM drive
  - 51? or 2 GB hard disk
  - SVGA display
  - 16 bit sound card (for stereo sound)
- True ☐ False ☐

---

## 1.4 SOFTWARE FOR MULTIMEDIA

---

By now it must have been clear to you those movies, sound, text animation and graphics are the integral part of multimedia software. To produce these media elements, there are various software available in the market, such as Paint Brush. Photo Finish. Animator, Photo Shop. 3D Studio, Coral Draw. Sound Blaster. Master Blaster etc. Software also available in the market to combine these independently created media elements. Some of these software are IMAGINET, Apple Hyper Card, Authbware Professional Icon author, Multimedia Director etc.

Software for Multimedia among various types also include software for creation of graphics, animation etc. Designer, Corel Draw, Picture Publisher, Photo Magic, Animator pro etc. are most commonly used programs.

Designer is one of the professional rating drawing and graphics package for windows, which is also available in OS/2 system. It is specially meant for graphic artists and technical illustrators. It has a wide range of drawing tools and powerful text handling features. Similarly Photo Publisher is a professional photo retouching or image-editing package designed to enable retouching and enhancing photos faster. It has powerful masking and retouching tools and more than 30 special effects and filters. It has an image browser, processor, scanner, printer calibration, a stitching tool and over 50 ready to use textures and images.

Similarly other multimedia related software also work on the same type of working environment, but they have their own features to experiment upon. Some of the recent software used in multimedia industry are:

- **Photoshop:** Industry standard digital imaging software,
- **Director:** Authoring multimedia for CD-ROM & the Web
- **Premiere:** Digital video and post-production tool
- **Sound Edit:** Sound capture and editing for multimedia, music or the net
- **Flash:** Vector-based animation tool
- **Frontpage:** Authoring tool for intranets and the WWW
- **Alias | Wave front:** 3d tools for games, films.



## Multimedia Extension in windows

To provide all PC the same standard to multimedia, Microsoft developed multimedia extension for Windows operating environment. This feature add several multimedia capabilities to the Windows operating system, including Resource Interchange File Format (RIFF), a standard format for multimedia data including Bitmap, graphics, animation, digital video and audio recording and playback facility for digital audio. It also includes MIDI (Musical Instrument Digital Interface) files and MCI (Media Control Interface) to interface one's work with external devices such as CD-ROM, Sound card, laser disc players etc. Most of the multimedia extension software for Windows works in the background. The utilities like MIDI mapper, sound recorder and media player are the direct interface to the software the multimedia extension for Windows.

Most standard window graphics are limited to, 256 colours if it is not interfaced with any external custom software and graphic card, all external device outside the multimedia extension for windows are controlled by MCI for windows. The main interface to MCI is the media player, which in turns control any external devices such As CD-ROM, Video Player, and Laser Disc Player etc. Whereas sound recorder utility provides facility to playback and record digital audio as ". WAV" files, directly into the PC with the external sound device such as sound card. It has the unction like start, record, stop, play etc. Similarly MIDI mapper makes sure that events that are specified in the MIDI file are sent to the correct MIDI instruments.

The video for windows is an external set of software works along with multimedia extension for windows. It has the feature for digitized video recording, playback and Editing. The video cap utility of this software is used to capture the video and audio clips using external hardware. The captured sequence can be viewed in a number of different size and speed and also different colour palates can be created for individual frame. Video for windows has four different types of editing features named as Video Edit, PalEdit, Waved it and BitEdit. As the name suggests Video Edit is used to cut and paste captured video segments together, WavEdit is the feature which work with the recorded digital audio and helps you to edit it. Where as Pal Edit is the work with the colour plates within the captured video to improve the colour, BitEdit helps clean up the rough patches in the images. It also has the interface to the media control panel to control digital video files.

In the present environment there are many files formats existing for multimedia in Widows and Internet. The following table shows the details on these multimedia Formats

Multimedia File Format Table

File Extension	Description
AVI (Audio Video Interleaved)	Video With Sound track accessible through Windows media player.
BMP (Bitmap)	Graphics, accessible through windows Paintbrush
CGM (Computer Graphics Metafile)	16 Color graphics. An international Standard for moving simple graphics between families of Corel Draw and most major graphics package.
FLC, FLI (Flick)	Animation, a format started by Autodesk. That can be played back from a wide variety of graphics software.
JPG (JPEG: Joint Photo Expert Group)	Photos: High quality photographs stored Using a special graphics compression format.
MFF (MIDI File Format)	Music: A slightly abbreviated MIDI Format designed for Microsoft windows, accessible



File Extension	Description
	through media player.
MOV (Quick time) _	Video: A video format that originated on Apples macintosh computers, now in windows too.
MPG (MPEG: Motion Expert Group)	Video: A highly compressed format Requiring special pictures hardware and software for DOS playback and recording.
PCD (Photo CD)	Photos: Photographs stored on Kodak Photos CDs, accessible by Kodak's own software.
PCX (Picture Paintbrush)	Graphics: A popular format accessible by Most graphics programs, including paintbrush.
Tif (TIFF: Tagged Image File Format)	Graphics: A format popularized by Aldus PageMaker for moving graphics between different types of software and computers, often used by scanners.
VOC (Creative Voice)	Sound: Sound Blaster cards record sounds in the format
Wav (Waveform)	Sound: Windows preferred format for Storing recorded sounds

## 1.5 COMPONENTS OF MULTIMEDIA

After discussing about the definition, hardware and basic software requirements for Multimedia, we still face a question: "What are the various components of multimedia in computer and how to create them?" Let us try to answer this question in this section.

### 1.5.1 Textual Information

All multimedia productions contain some amount of text, and even some might contain a large amount of textual matter. The text can have various types of fonts and type sizes to suit the professional presentation of the multimedia software. The standard software interlinks which is now days provided on multimedia is the windows interface. This Interact allow large amount of fonts to be stored in multimedia.

### 1.5.2 Images

Another important and interesting component of multimedia is graphics. One of the Basic facts in multimedia production is that, people do not like reading large amount of textual matter on the screen. Also, it is a myth about human nature that a subject is Better explained to them when represented in pictorial or graphical form, instead of Textual matter i.e., graphics are used more often than text to explain a concept, present background information etc.

Unlike text that is represented in universal ASCII format, graphics does not have any single agreed format. To start with these are two different ways in which graphs or images can be described, Bitmap and Vectors.

#### Bitmap Images –

A bitmap image assumes an image to consist of two-dimensional squares, which are Called the pixel or dots on the screen. The size and the quality of such a image depends on the pixel density and number of colors it uses. For example, a standard VGA screen uses 640x480 i.e., a total of 307200 dots or pixel to display an image. If your image is in black and white, then only one digital bit is required to store this Information about the image for each dot (0 for black and 1 for white), and the position



To the dots can be taken as the order in which they are produced. As a byte consists of 8 bits, one can store a black and white image of this type in  $((640 \times 480)/8) = 38400$  bytes = 37.5 KB, so imagine the storage place required to store all the images involved in multimedia production. If you are using colors for the images then the size of the bitmap images become larger depending upon the number of color used. A standard VGA, which uses 16 colors, needs 4 bit of storage to store the information, so only two dots can be coded in a single byte. Hence  $((640 \times 480)/2) = 153600$  bytes of space is required to store a single image with 16 colors. Similarly for an image with 256 colors (8 bit per dot). 32000 colors (16 bits per dot) or 16,000,000 colors (24 bit per dot) storage requirement will be very high. So a standard image with 16 colors will be ideal solution for a low cost multimedia package. These bit map files can be edited easily, however, require large memory space for editing purposes.

As bitmap images are stored as large files and you require large amount of disk space To deal with it. To avoid this constraint, the images can be compressed, which make the use of the fact that many entries in a bitmap file has repeated information or contain very little information. But there is no single standard compression method for image files. There are various formats such as PCX, TIF, BMP, and GIF etc., in which images are stored.

The software packages, which normally are used for creation of bitmap images, are Called Painting programs. This program allows drawing of object using a paintbrush. Free hand drawings can easily be produced using these packages. One such package is the Paintbrush program available in Windows.

### **Vector Images**

Other formats for storing images is vector or object oriented format. In this format, an image is formed as a set of straight or curved lines instead of dots. A line can be Represented by a mathematical equation, whose number can be stored as a set of binary codes? This form of coding is potentially more economical for disk storage space. The draw back is that it requires software to produce the image that is time consuming. CAD package use this type of images. A vector image file is always of the same size no matter how large a image is. Thus, for display clarity this type of images should be projected on better resolution display units.

There are several technology and sources available to produce images or graphics for Multimedia package. Image can be created by using a Paint program, by scanning Photographs using a scanner and by drawing artwork. You can generate 3D graphics And animation using various sophisticated software. You can combine these images Using image manipulation programs that can combine many different types of graphics files, to create new images.

### **1.5.3 Animation**

Animation also plays vital part in the multimedia program. The dedicated hardware and Software built into the system increases the animation speed. An animation is just a Continuous series of still images that are displayed in a sequence. There are mainly two types of animation used in multimedia, namely 2D and 3D animation. 2D animation, also known as cel (pixel based) animation, is the most common kind of animation, where flat images are drawn one frame at a time. This process is very time consuming but result obtained is spectacular in nature. Computer animation has increased the efficiency, and enhanced the results of cel animation with introduction of wide ranges of colour and speed. Many animation packages are now equipped with tweening Facility, that is, automatic creation of a series of graphics frames between two Previously created frames. Thus, many steps required for cel-based animation can be eliminated making it very simple to do. The animation packages also involve some special effects. Morphing and Warping are two commonly used special effects.



Morphing takes two images and seamlessly changes one image to another. The second image actually seems to grow out of the first one. Morphing can also be used to show the pace of changes more clearly than photos. Warping is variation of the morphing where one image is used to show various changes that take place. It uses the key points of one image to create different effects, instead of mixing up two images.

In 3-D animation mathematical model of 3-D object is created to realistically portray with depth. Now it has become a common media element in film, video and multimedia packages. 3-D animations follow mainly three steps; modeling, animation and rendering. Of these three first two are crucial and take long time to finish. Modelling is the design phase where a 3-D object is created. In a 2-D animation an object can move up (called Y axis) and sideways (called X axis). But in the case of a 3-D model, a third axis is used: depth or the Z-axis. Once an object is created along these three axes, colour, shading and light source can be added to the image to make it more realistic.

In the second phase, the 3-D image is moved along a motion path, which is defined using key frames of the animation sequence. These key frames are used to create the in-between frames in the sequence automatically.

And in the final stage, the entire sequence is rendered to create a 3-D animation. Blending texture maps into the model to add realism causes one of the main slowdowns during rendering. A texture map is wallpaper for 3-D models, in which a graphics image is wrapped over the surface of a model. When a 3-D animation program renders an image, it mixes up intimately all the colour, texture maps, light source and surface attributes in each frame of the 3-D animation sequence. The rendering process is a computationally intensive step.

#### 1.5.4 Digital Audio

The most common reason for using digital audio in computer is to be able to use Multimedia in its full potential. The most common requirement is to be able to input sound such as a spoken commentary on an image or a document.

The sound is a repeated pattern of pressure in the air and a microphone converts a sound wave into an electrical wave. The shape and frequency of the electrical wave is identical to the shape and frequency of the sound wave and the clarity of what we hear is entirely dependent on the shape and frequency of the sound wave. Sound can also be recorded and reproduced using digital signals and the errors can be reduced drastically in digital recording of the sound. For replaying the sound, audio has to be converted into digital form to produce digital audio in order to use it in the multimedia. And the digital audio system will then reconvert the entire digitised audio into analog form, which can be heard on the speaker. This two-way transformation of audio is known as analog-to-digital conversion and digital to analog conversion respectively. But the storage space required for digital audio is huge, somewhere around more than 1 MB for one minute of audio. The entire process of digitization is a simple process of converting analog or electrical signal of audio to computer data file in the digital format. The microphone (which is normally used for recording) converts the voice into electrical signal or analog audio signal. Then the analog signal is passed into the audio input of a digital card or sound card. Once inside, the signal is fed into the analog to digital converter, which converts the analog audio signal to digital form and stores it as a computer data file. Playing back a digital audio data file is just the reverse process of converting analog to digital. Once the digital audio file is sent to the sound card for playback the file is channelled through a converter and the digitised version of the original message is converted into analog and put into the speaker. As constant or frequent conversions can reduce the sound quality, it is always advisable to keep all audio in digital format while working on a multimedia program.



A Digital signal processor is always embedded in the sound card to provide additional capabilities without affecting the CPU. A simple recording of digital sound can be done and may be compressed if desired. A common digital sound file existing in personal computers are known as .WAV files. The MIDI sound saves disk space as it only stores the instructions about how to play a musical instrument. It prestores the sound relating to the sound notes of various instruments and reproduces it when a voice signal asks for it. Several software which are used for creation of digital sound files (may be as .WAV file) are media player for windows.

### **1.5.5 Digital Video**

Digitised video is one of the many technologies used in the development of interactive multimedia. It is one of the ways to play back and record video in multimedia program. It offers a wide range of flexibility as compared to standard video signal.

Unlike regular video, quality of image would not degrade from copy to copy as digital video is made up of a digital code and not an electrical analog signal. However, the final output depends on how the video images are converted to digital form during the development phase. Video signal comes from an external source such as TV or VCR or camera to the video-digitiser-card inside the system. Some systems use a digitiser card, which has dual function for both audio and video conversion. The process of Converting analog video signal to digital format is called 'sampling'. Using this Process, the converter card in the system converts the analog video signals into digital data streams so that these signals can be stored in the binary data structure format of 1s and 0s. The digital data file is then compressed to a considerable amount using some compression program. During this process the digitiser fuses the digital video into a digital movie format and saves all the sections of the compressed movie in the hard disk. Once the conversion and compression process is complete, the file can be played back on the computer screen. These digitised files can also be edited according to requirement using various video editing software. However, you may find that the video if used as full screen video may be jerky in certain machines. The main reason for this is that to present a moving picture, we have to store and process enormous amount of data, as we need to show 30 frames of continuous pictures per second considering one frame itself requires lot of data a moving picture requires 30 times of it per second. However, standards such as Moving Pictures Expert Group (MPEG) have specified compression standards, which have enabled a full screen video. MPEG compression only records the key frames and tries to predict the remaining frames from this key frame by comparing the changes of missing frames from key frames. Another technology, which is using this kind of compression, is video conferencing. ".AVI" files in windows basically contains interleaved data for audio/video. This compressed data can be decompressed and passed through a digital to analog converter to produce the video. These components of a multimedia system are integrated after they have been stored digitally by using Authoring software, which provide the necessary interactivity in the overall mix of information. These software are discussed in unit 3.

---

## **1.6 MULTIMEDIA - DESIGN, PRODUCTION AND DISTRIBUTION**

---

All the development works are based on three basic principles; planning and design, Production and distribution of the final product, this is also true for multimedia Development.



### 1.6.1 Planning Design of Multimedia

During the initial design phase all the aspects of the related multimedia project is Carefully thought about and planned, well before the production start. Every key Element involved is discussed. There are various tools available to plan the project. A Flowchart is one of them. It is one of the commonly used tools to prepare a blue print of the plan during the design phase. It shows how all the elements involved in the project are related to each other, with adequate information about their controlling features. Like any other video program or movie, multimedia programs require a script on the subject involved. The script and flowchart works together to provide a printed version of text, graphics and sound to be used in the production of the multimedia program.

### 1.6.2 Production of Multimedia

The process of creating the related media elements in a multimedia project including graphics, sound, animation and digital video is called production. In multimedia all these creation of media elements, can even be independent in terms of tools used to Produce them. For example, graphics elements are created independently using various c computer graphic package such as Paintbrush, 3D studio etc. These are created and modified accordingly so as to work under various multimedia platforms. All the video scenes of the project are digitised and edited into various sequences and when the digitised video sequences has all the required scenes, titles and transitions, they are I compressed to playback in the required speed and predefined sequence. The sound and music effects relevant to the project, and digitised scene sequences are created using digital recording system and MIDI (Musical Instrument Design Interface) equipment in a music studio, edited and recorded in the computer as a digital audio file. All textual matter in project are edited and converted into ASCII format and then modified later and placed at the appropriate location within the scene sequences. One of the most important production tasks in a multimedia project is regular checking of all the sequences.

Once, all the related media elements are created and digitised according to the Specifications, then comes the final stage of the production process i.e., joining or Combining these media elements which is also known as authoring. This process is Used to join all the independent media elements such as graphics, text, animation and Sound to produce an interactive framework. The testing and debugging of the entire Package is done at the stage before putting them into distribution media.

The first step of authoring is to bring all the independent media elements used in the Multimedia project, as each of them are developed using various graphics, audio, video and animation tools.

Once all graphics, text, animation and digital video are combined together, different relationship and actions with each of the media element can be worked out by adding interactive control. When multimedia program is executed, the interpreter part of the authoring program takes all necessary commands and relationships that has been defined for each media elements and convert them into binary code or machine code that computer operating system can understand. The converted program is then executed by the CPU of the computer system, which sends out instructions to the system to play the music or audio, display the text, video and animation.

Multimedia productions are tailored to specifically meet the users needs, whether your needs include employee training, customer service, or product development and marketing. The basic facilities needed for multimedia production include video Capture, video editing, sound editing, photograph scanning and editing, picture Digitization, morphing, creation of 2D and 3D models, and animation and authoring.



### 1.6.3 Distribution of Multimedia

Once all the media elements are combined together using authoring software they are Bundled into a package and stored in various storage media for distribution. Creating Multimedia package for various platforms is one of the most crucial stages that Multimedia development procedure faces today. There are many platforms available for multimedia, each of which has their own advantages and disadvantages. To work with full potential, multimedia packages need to be available in as many platforms as Possible. The main storage media used to store multimedia package is the CD- ROM. Distribution of Multimedia can also be made through World Wide Web.

#### Check Your Progress 2

##### State 'True or False

1. Window extensions of multimedia provide a standard Platform for Multimedia programs True ☐ False ☐
2. object linking and embedding in window does not Allow to combine video and audio clips True ☐ False ☐
3. The file size for bitmap images is similar then the File size for vector images True ☐ False ☐
4. Morphing and Warping are two special effects Which can be performed with bit mapped images only. True ☐ False ☐
5. Digital Audio as well as digital video both are Dependent on the type of frame sampling Based On this sampling the quality of audio or video can Be good or bad True ☐ False ☐
6. Multimedia production process involves not only the Production of individual components but also integration Of those components using an authoring tool True ☐ False ☐

---

## 1.7 SUMMARY

This unit has introduced you to a new concept in information technology the Multimedia. Slowly but steadily it has started to creep into our life in one or the other way. The basic hardware components of multimedia were explained to you. In addition, you were also explained various components of multimedia like graphics, Sound, animation, digital audio and video. We have also mentioned about their characteristics and various storage formats they use. It also introduces you to various stages used for multimedia development.

---

## 1.8 MODEL ANSWERS

#### Check Your Progress 1

- 1, False 2. False 3. True  
4. False 5. True

#### Check Your Progress 2

1. True 2. False 3. False  
4. False 5. True 6. True