



Dr. Babasaheb Ambedkar Open University

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DMA-101

Introduction to Multimedia



Diploma in Multimedia and Animation (DMA)

2020

Introduction to Multimedia

Dr. Babasaheb Ambedkar Open University



Introduction to Multimedia

Editor

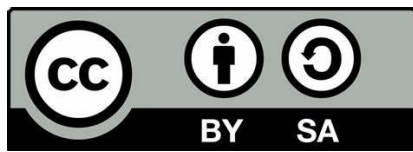
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Block – I: Introduction to Computers & Networks

Unit-1 Multimedia Hardware

Introduction

Computers are now capable of combining text, sound, images and motion together to form a kind of content called multimedia. A multimedia content may involve one or more of these elements.

Now-a-days, a wide variety of hardware and software tools are available for developing multimedia content. So, for the development of these contents, one has to identify the appropriate hardware to meet the required purpose and quality standard.

The delivery requirement of the project, its content and budget helps to determine the type of hardware that is required for multimedia PC.

In the following unit we shall discuss different hardware types used in multimedia computer systems.

Outcomes

Upon completion of this unit you will be able to:

Outcomes

- Have a conceptual idea on multimedia system, its application and different components.
- Identify and classify different input/output devices in computer systems
- Choose appropriate input/output devices for multimedia development
- List and describe the functions of various communication devices
- Identify various storage devices and their applications for multimedia content

Terminology

Keyboard: It is a device that enables you to enter data into a computer or other devices. Computer keyboards are similar to typewriters but contain additional typing keys.

RAM: Random Access Memory, a type of computer memory that stores the data at random interval of current usage while operating different system applications which can be quickly accessed by processor to compute faster.

ROM: Read Only Memory, built-in computer memory containing data that normally can only be read, not written to. ROM contains the programming data that allows your computer to be "booted up" or regenerated each time you turn it on.

A multimedia computer system is a computer system, which has the capability to integrate two or more types of media i.e. text, graphics, images, audio, and video to generate, manipulate, store, represent and access multimedia information. In general, the data size for multimedia information is much larger than textual information, because representation of

such varieties of data in digital form requires much larger number of bits than the ones required for representation of plain text.

The current market scenario demands a faster processing computer with large storage capacity and higher speed. So it is necessary to know the components that will make the computer more efficient.

The components of a typical multimedia computer are categorised in to five types, namely Output devices, Input devices, Memory and storage devices and System devices along with Communication devices.

System Devices:

One of the important components of the computer is system devices which include the memory, motherboard as well as the microprocessor; the microprocessor is the heart of the computer.

The processor of a computer looks like a small microchip and performs some of the operations of the computer when it is turned on. BIOS, a part of the computer's memory provide instructions to the microprocessor to load the operating system onto the RAM while booting the computer. A motherboard is responsible for containing the basic circuitry as well as the other components of the system like basic input/output system (BIOS), memory, microprocessor, interconnecting circuitry and expansion slots. The expansion slot in the motherboard can also add additional components to the system. RAM (Random Access Memory), also called primary memory is responsible for containing the operating system, data and the application programs which are present in the computer so that they can be accessed easily by the processor when needed. RAM is referred to as "random access" because it allows direct access to the storage locations. The speed of RAM is too faster than the hard disk; the floppy disk and the CD-ROM. RAM and hard disk are the long-term and short-term memory of the computer but it tends to slow down after a certain limit. And since more memory is required while working on the multimedia, the personal computers these days come with 40 GB RAM or more.

A GPU or Graphics Processing Unit in addition, is primarily used for 3-D applications. It is a single-chip processor that creates lighting effects and transforms objects every time a 3D scene is redrawn. These are mathematically-intensive tasks, which otherwise, would put quite a strain on the CPU.

Input Devices:

Those devices which are under the direct control of the user and are used for the purpose of communicating instructions or commands to the computer are referred to as the input devices. The command that they provide to the computer are then processed and the output is transmitted back to the user with the help of output devices.

Classification of Input Devices:

The classification of input devices is as follows:

- The different ways of input (e.g. sound, visual, mechanical motion, audio etc.)

- If the input is continuous (e.g. a mouse position, though digitized is in the form of a discrete quantity; either a highresolution can be considered as a continuous one or a discrete one (e.g. key press)
- Those involved number of degrees of freedom (e.g. the 2D positional input is allowed by many mice and the 3D input is allowed by some devices like the Logitech Magellan Space Mouse)
- Other input gazettes or devices will be basically the pointing devices specify a position in space and that could be again subdivided in accord to the direct and indirect nature of the input device. The input space in case of occurrence of direct input corresponds to that of the display space, i.e. you need to do the pointing in the space where the cursor or the visual feedback is shown.
- Whether the positional information of the input device is absolute (e.g. on a touch screen) or relative (e.g. using a mouse that can be repositioned or lifted)

Keyboards

The most common device which is used to interact with the computer is the keyboard. Keyboards have different tactile responses (from mushy to firm) and they also have different layouts according to the model of the computer as well as the keyboard.



Title :Keyboard

Attribution :

Source :pexels.com

Link :<https://www.pexels.com/photo/white-computer-keyboard-34490/>

The most 110 style keyboard are the most common ones (which provides 101 keys) but there are different styles available with certain exceptional keys(also), LEDs, and various others features, such as the flexible “ergonomic” styles or food-service applications or plastic membrane cover for industrial. Macintosh keyboards can likewise get easily connected to the Apple Desktop Bus (ADB) and controls the entire forms of input that is providedby the user- from digitizing tablets to mice.

Examples of types of keyboards include

- Computer keyboard
- Keyer
- Chorded keyboard
- LPFK

Pointing devices

A hardware component which helps the client to input spatial (i.e., multi-dimensional and continuous) information to the PC is called as a pointing device. The graphical user interfaces (GUI) or CAD systems help the user to control the computer by providing data to it using physical gestures - point, drag and click. This can be fulfilled when in the surface by moving a hand-held mouse over the surface of the physical desktop and pressing the mouse buttons as and when required.



Title: Light Pen

Attribution:Jess Watters

Source:pexels.com

Link:<https://www.pexels.com/photo/person-holding-white-stylus-768472/>

Examples of common pointing devices include

- Touch screen
- Touchpad
- Trackball
- Space ball - 6 degrees-of-freedom controller
- Mouse
- Graphics tablets (or digitizing tablet) that use a stylus
- Light gun
- Eye tracking devices
- Light pen
- Yoke (aircraft)
- Isotonic joysticks - where the user can freely change the position of the stick,
- Steering wheel - can be thought of as a 1d pointing device
- With more or less constant force
 - Joystick
 - Analog stick
- Jog dial - another 1d pointing device
- Isometric joysticks - where the user controls the stick by varying amount of force they push with, and the position of the stick remains more or less
- Discrete pointing devices
 - Directional pad - a very simple keyboard
 - Dance pad - used to point at gross locations in space with feet

- Constant
 - Pointing stick

High-degree of freedom input devices:

A few devices permit ceaseless continuous degrees of freedom for input, and at some point can be utilized as pointing devices. These could be likewise utilized as in different methods it do not reasonably involve pointing at a location in space.



Title :Pointing Devices

Attribution :

Source : pexels.com

Link :<https://www.pexels.com/photo/computer-mouse-equipment-components-42255/>

Composite devices

Joysticks and buttons are some of the input devices which could be joined with a solitary physical device that is called as a composite device. Many gaming devices have controllers like this.

- Game controller
- Gamepad (or joypad)
- Paddle (game controller)
- Wii Remote controller



Title: Game Controller

Attribution: laleshaldarwish

Source: pexels.com

Link: <https://www.pexels.com/photo/gray-scale-image-of-xbox-gamecontroller-194511/>

Imaging and Video Input Devices

Flat-Bed Scanners

A scanner proves to be a very important component for producing multimedia projects. There are two types of scanners: flat-bed and hand-held. The most common ones are available in gray-scale but the colour flat-bed ones have a resolution of around 300 or 600 dots per inch (dpi). The electronic images of the artwork are like the pen drawings, cartoons, photos, ads etc. are cleared with the help of a scanner. In this way the time otherwise required to incorporate proprietary art into the application is saved. Scanners help in starting the creative diversions. The different devices through which videos and images can be captured are:

- Fingerprint scanner
- Image scanner
- Barcode reader
- Webcam
- 3D scanner
- Medical imaging sensor technology
- Computed tomography
- Magnetic resonance imaging

Audio input devices

The devices through which audio can be captured are:

- Microphone
- Speech recognition

Note that through MIDI the musical instruments can also be used as input devices.

Touch screen

Touch screens are monitors that usually have a textured coating across the glass face. This coating is sensitive to pressure screen.



Title: Touch Screen

Attribution:

Source: pexels.com

Link: <https://www.pexels.com/photo/laptop-technology-ipad-tablet-35550/>

Other touch screens which are present use invisible beams of infrared light which appear in a crisscross pattern in front of the monitor in order to calculate the position where the cursor has been pointed. A mouse click and drag can be done here by doubleclicking over the screen and then dragging the cursor, without lifting it, to a different area.

Output Devices:

Certain hardware devices are used as components of a multimedia project for the presentation of the audio as well as visual components. These devices include the computer itself as well as the amplifiers, speakers, motion video devices, monitors and the other capable storage systems.

Audio Devices

All Macintoshes have internal speakers along with a dedicated sound chip which provide the audio output without the need of any additional software or hardware. The built-in stereo sound can be utilized properly with the help of external speaker.

Amplifiers and Speakers

Often it happens that the speakers which are utilized during the development of a project are inadequate. The built-in amplifiers in the speakers or which are attached to the external amplifiers are used to present the project before a substantial gathering of people in a noisy setting.



Title : Speakers

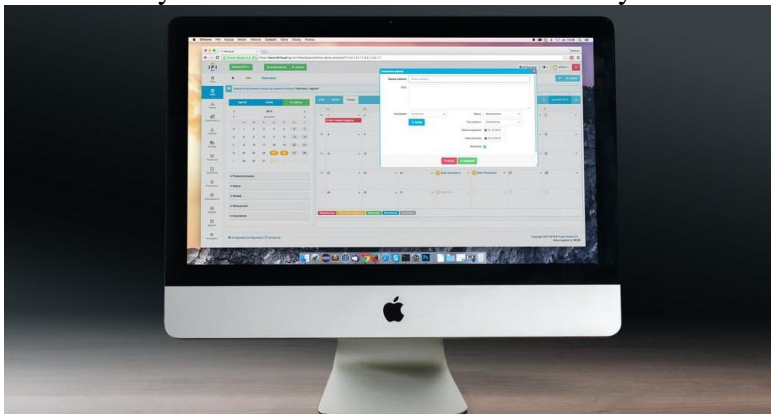
Attribution :

Source : pexels.com

Link : <https://www.pexels.com/photo/black-and-white-bose-floormusic-75509/>

Monitors

The monitors which are used in the multimedia projects depend on the types of computer which is used in the project. Different types of high-end monitors with large-screen graphics will be accessible by both Macintoshes and PCs but they are a bit expensive.



Title : Monitor

Attribution :

Source : pexels.com

Link: <https://www.pexels.com/photo/apple-technology-ipadcomputer-38568/>

Video Device

The visual impact to the video is provided by this contemporary message medium. The digitizing board on the computer is used to display a television picture on it. The frame-grabber in the boards is used to capture the image so that they can be converted into a colour

bitmap and then saved as a PICT or TIFF file. This can be then utilized as a background or graphic in the project.

Projectors

The viewers need to huddle around the computer monitor when something is shown to them. So a projector is used to project the information on the large screen or on the white wall. The information is displayed onto a large screen through a Cathode Ray Tube (CRT) projectors, the liquid crystal display (LCD) which are attached to the stand-alone LCD projectors, light-valve projectors and overhead projectors.

CRT projectors are compatible and provide outputs which are similar to television. The LCD panels are portable devices. The small LCD panels are popular for on-the-road presentations as they can be connected to a laptop computer with the help of an overhead projector which are locally available.



Title:LCD Projector

Attribution:ThamizhparithiMaari

Source:wikimedia.org

Link:https://commons.wikimedia.org/wiki/File:%22LCD_Projector%22.jpg

Printers

As the reasonably priced colour printers entered into the market, the hard-copy of the output could be obtained. The colour printers provide the storyboards, presentations, produce the collateral marketing material for the multimedia development environment. The colour in the output helps to elucidate ideas, enhance understanding and retention of data as well as helps to organize complex data. The multimedia designers use colours in an intelligent way for the project to succeed. A Tektronix provides solid ink and laser alternatives, and either Phases 560 would be printing more than 10000 pages in an speed of of 5 colour pages or 14 monochrome pages per minute before the requirement of a new toner.

Multimedia Storage Systems:

To keep in pace the need and habits of computing more of storage and memory space is needed to be added to the computer, the main aim will be to increase the capacity of the computer. In an event that in the project of your making of multimedia, you will likewise

require to distribute or provide memory for storing and archiving worked or working files utilized while production, edited pieces, original video and audio clips and final blended pieces, creation of printed material and correspondence, and no less than one backup of your project files, with you need to store a sa second backup in any other location.

Before going to study different types of storage systems and their capacity, we should discuss the units in which their capacity is measured.

The capabilities of storage devices are measures using the following units.

Bit: A bit is a value of either a 1 or 0 (on or off).

Nibble: A Nibble is 4 bits.

Byte: A Byte is 8 bits. 1 character, e.g. "a", is one byte.

Kilobyte (KB): A Kilobyte is 1,024 bytes.

- 2 or 3 paragraphs of text.

Megabyte (MB): A Megabyte is 1,048,576 bytes or 1,024 Kilobytes

- 873 pages of plaintext (1,200 characters)
- 4 books (200 pages or 240,000 characters)

Gigabyte (GB): A Gigabyte is 1,073,741,824 (2^{30}) bytes. 1,024 Megabytes, or 1,048,576 Kilobytes.

- 894,784 pages of plaintext (1,200 characters)
- 4,473 books (200 pages or 240,000 characters)
- 640 web pages (with 1.6MB average file size)
- 341 digital pictures (with 3MB average file size)
- 256 MP3 audio files (with 4MB average file size)
- 1 650MB CD

Terabyte (TB): A Terabyte is 1,099,511,627,776 (2^{40}) bytes, 1,024 Gigabytes, or 1,048,576 Megabytes.

- 916,259,689 pages of plaintext (1,200 characters)
- 4,581,298 books (200 pages or 240,000 characters)
- 655,360 web pages (with 1.6MB average file size)
- 349,525 digital pictures (with 3MB average file size)
- 262,144 MP3 audio files (with 4MB average file size)
- 1,613 650MB CD's
- 233 4.38GB DVD's
- 40 25GB Blu-ray discs

Petabyte (PB): A Petabyte is 1,125,899,906,842,624 (2^{50}) bytes, 1,024 Terabytes, 1,048,576 Gigabytes, or 1,073,741,824 Megabytes.

- 938,249,922,368 pages of plaintext (1,200 characters)
- 4,691,249,611 books (200 pages or 240,000 characters)

- **671,088,640** web pages (with 1.6MB average file size)
- **357,913,941** digital pictures (with 3MB average file size)
- **268,435,456** MP3 audio files (with 4MB average file size)
- **1,651,910** 650MB CD's
- **239,400** 4.38GB DVD's
- **41,943** 25GB Blu-ray discs

Exabyte (EB): An Exabyte is 1,152,921,504,606,846,976 (2^{60}) bytes, 1,024 Petabytes, 1,048,576 Terabytes, 1,073,741,824 Gigabytes, or 1,099,511,627,776 Megabytes.

- **960,767,920,505,705** pages of plaintext (1,200 characters)
- **4,803,839,602,528** books (200 pages or 240,000 characters)
- **687,194,767,360** web pages (with 1.6MB average file size)
- **366,503,875,925** digital pictures (with 3MB average file size)
- **274,877,906,944** MP3 audio files (with 4MB average file size)
- **1,691,556,350** 650MB CD's
- **245,146,535** 4.38GB DVD's
- **42,949,672** 25GB Blu-ray discs

Zettabyte (ZB): A Zettabyte is 1,180,591,620,717,411,303,424 (2^{70}) bytes, 1,024 Exabytes, 1,048,576 Petabytes, 1,073,741,824 Terabytes, 1,099,511,627,776 Gigabytes, or 1,125,899,910,000,000 Megabytes.

- **983,826,350,597,842,752** pages of plaintext (1,200 characters)
- **4,919,131,752,989,213** books (200 pages or 240,000 characters)
- **703,687,443,750,000** web pages (with 1.6MB average file size)
- **375,299,970,000,000** digital pictures (with 3MB average file size)
- **281,474,977,500,000** MP3 audio files (with 4MB average file size)
- **1,732,153,707,691** 650MB CD's
- **251,030,052,003** 4.38GB DVD's
- **43,980,465,111** 25GB Blu-ray discs

Yottabyte (YB): A Yottabyte is 1,208,925,819,614,629,174,706,176 (2^{80}) bytes, 1,024 Zettabytes, 1,048,576 Exabytes, 1,073,741,824 Petabytes, 1,099,511,627,776 Terabytes, 1,125,899,910,000,000 Gigabytes, or 1,152,921,500,000,000,000 Megabytes.

- **1,007,438,183,012,190,978,921** pages of plaintext (1,200 characters)
- **5,037,190,915,060,954,894** books (200 pages or 240,000 characters)
- **720,575,937,500,000,000** web pages (with 1.6MB average file size)
- **384,307,166,666,666,666** digital pictures (with 3MB average file size)
- **288,230,375,000,000,000** MP3 audio files (with 4MB average file size)
- **1,773,725,384,615,384** 650MB CD's
- **257,054,773,251,740** 4.38GB DVD's
- **45,035,996,273,704** 25GB Blu-ray discs

Memory and storage devices:

A computer memory refers to the physical devices used to store programs (sequences of instructions) or data (e.g. program state information) on a temporary or permanent basis for use, in a computer or other digital electronic device.

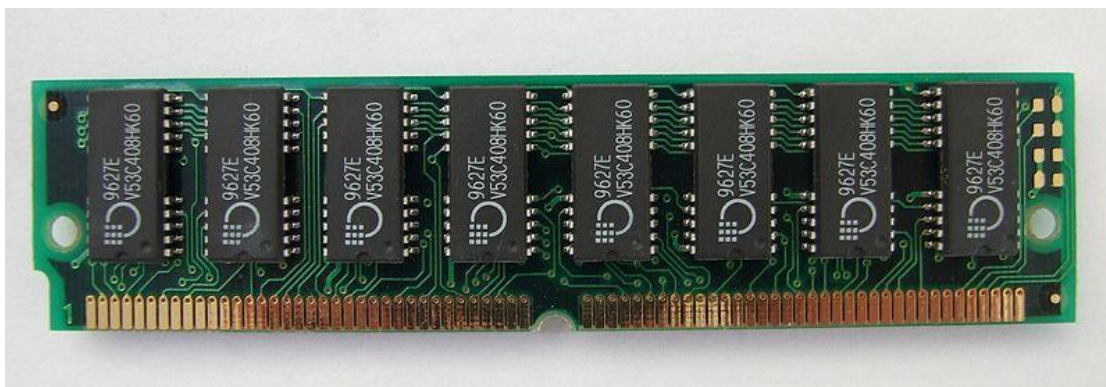
A computer system memory is divided into two parts:

- Read Only Memory (ROM) and
- Random Access memory (RAM) which is better known as Read Write Memory (RWM).

Random Access Memory (RAM)

A RAM memory chip is an integrated circuit (IC) made of millions of transistors and capacitors. In the most common form of computer memory, dynamic random access memory (DRAM), a transistor and a capacitor combines to create a memory cell, which represents a single bit of data. RAM is the vital memory where initially the Operating system is loaded and at a later stage the application programs are loaded.

RAM is known to be volatile. Whenever a program is ended the RAM erases it out of its memory. The RAM capacity is directly proportional to the processing speed i.e. If the RAM capacity is more, the processing speed will be higher.



Title : RAM

Attribution : Appaloosa

Source : wikimedia.org

Link : https://commons.wikimedia.org/wiki/File:PS2_RAM_Module.jpg

Read-Only Memory (ROM)

Read-only memory is basically non-volatile. It never loses its memory even after the power to a ROM chip is turned off so its different from RAM. ROM is normally utilized as a part of PC in order to held fixed applications such as the small BIOS program that is used at first to boot up the computer and also utilized as a part of printers in order to held inbuilt fonts. Programmable ROMs (called EPROM's) are such in which the changes made cannot be changed and are permanent. Another new and economical innovation technology, optical read-only memory (OROM), is given in proprietary information cards that utilizes licensed holographic storage. Commonly, OROM offers storage of 128MB (units), it does not have any mobile parts and use only about 200 milliwatt of power. It is perfect for devices that are handy and batteryoperated gadgets.



Title : ROM

Attribution : RaimondSpekking

Source : wikimedia.org

Link: [https://commons.wikimedia.org/wiki/File:Elitegroup_761GX-M754_-_AMIBIOS_\(American_Megatrends\)_in_a_Winbond_W39V040APZ-5491.jpg](https://commons.wikimedia.org/wiki/File:Elitegroup_761GX-M754_-_AMIBIOS_(American_Megatrends)_in_a_Winbond_W39V040APZ-5491.jpg)

The storage devices can be divided into the following categories:-

Hard Disks

A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive," that store and provides relatively quick access to large amount of data on an electromagnetically charged surface or set of surfaces. Today's computers typically come with a hard disk that contains several billion bytes (gigabytes) of storage.



Title : HARD DISK DRIVE

Attribution : Azz Bad

Source : pexels.com

Link : <https://www.pexels.com/photo/analogue-business-close-up-computer-117729/>

A hard disk is extremely an arrangement of stacked "disks," each of which, similar to phonograph records, has information recorded electromagnetically in concentric circles or "tracks" on the disk. A "head" (like a phonograph arm but in a generally fixed position) records (writes) or reads the data on the tracks. Two heads, one on each side of a disk, read or write the data as the disk spins.

Each read or write operation requires that data be located, which is an operation called "seek" (Data already present in a disk cache, however, will be located more quickly).the hard disks are well known widely recognized mass-storage device utilized on PC's, and while creation of multimedia projects, it is important that one should have at least one huge limit or capacity of drives of hard disk.

Zip, jaz, SyQuest, and Optical storage devices

SyQuest the cartridges that can be removed of 44MB that is generally utilized versatile medium, portable medium within multimedia professionals & developers. Iomega has economical Zip drives with their in like manner cheap 100MB cartridges. They have altogether entered market share of SyQuest's for removable media. Iomega's Jaz cartridges has a provision of gigabyte of removable storage media and also provides quicker rate of transfer for audio and video improvement and better production. Yamaha, Pinnacle Micro, Philips, Sony, , and others provides CD-R "burners" in order to create write-once compact discs, and some double as quad-speed players. As blank CD-R disc are modest so the write-once media contends as a vehicle used for transfer and distribution. Compact disc R is depicted in more noteworthy detail in the content in later part.

Digital Versatile Disc (DVD)

In December 1995, nine noteworthy electronics organizations (Matsushita, Toshiba, Philips, Sony, Pioneer, JVC, Mitsubishi Electric, Time Waver, and Hitachi) consented to advance another new optical disc technology for circulation of multimedia and DVD (also known as feature-length movies).

The newly developed medium is competent of storing gigabyte capacity as well as entire movie (MPEG2) along with large-quantity of audio in surround sound. The level rose for multimedia developers. Commercial multimedia projects became even more costlier as production has turned out to be more costly to create as consumers or buyer's expectations rose. There are two sorts of

DVD-DVD-Video and DVD-ROM; these mirror the advertising marketing channels, but the innovative technology used differs.

CD-DVD ROM Players

Compact disc read-only memory (CD-ROM) and Digital versatile disk read-only memory (DVD-ROM) players have turned into a basic piece of the multimedia development workstation. They are a vital conveyance medium for substantial, projects that require massive production. A vast assortment of graphic backgrounds, utilities of developer, stock applications & photography, games, sounds, educational software, and reference texts are accessible just using this media. Compact disc ROM players are commonly too slow for accessing and transmitting the data (150k per second that is the basic speed required for consumer Red Book Audio CDs). DVD-ROM players perform better than CD-ROM players as well as it offers more storage space in order to access the content.

CD or DVD Recorders/Writers

You can make your own CDs and DVDs, with a disc recorder. Making own CDs and DVDs require the use of special CD recordable (CD-R) or DVD recordable (DVD-R) blank optical discs in order to produce a disk in different formats for storing data or digital content. Software, such as Adaptec's Toast for Macintosh or Easy CD Creator for Windows, enables to arrange documents on the hard disk(s) into a "virtual" structure, and after that in the same order write those in the CD. They could be accessible as indicated by recording time, in either a "63 minute" or "74 minute" limit with respect to the previous, that implies around 560MB, and for the last mentioned, around 650MB.

CD-ROM

A Compact Disc or CD was originally developed for storing digital audio. This is basically an optical disc that are utilized store digital data. Till date the CD, available in the market since late 1982, remains the standard playback medium for commercial audio recordings, though in recent years it has lost ground to MP3 players. An audio CD consists of one or more stereo tracks stored using 16-bit PCM coding at a sampling rate of 44.1 kHz. Standard CDs configuration is that it has a diameter of 120 mm and can hold approximately 80 minutes of audio.

CD-ROM History

To design an innovative digital audio disc, in 1979, Philips and Sony set up a joint task force of engineers. The CD was initially thought of as a development of the gramophone record, instead of principally as a data storage medium. Sony and Philips in 1990, introduced CD-Recordable and in June 1985, developed the CDROM (read-only memory).

Physical details of CD-ROM

A Compact Disc is produced using a 1.2 mm thick disc of relatively pure polycarbonate plastic and weighs around 16 grams. A thin layer of aluminium (or, more rarely, gold, utilized for its longevity, such as in some restricted version-edition audiophile CDs) is applied to the surface which makes it reflective, and is protected by a film of lacquer. The areas between pits are known as "lands". Each pit is approximately 100 nm deep by 500nm wide, and varies from 850 nm to 3.5 μ m in length.

Disc Shapes and Diameters

On a CD the digital data writing starts with the centre of the disc and continues outwards to the edge. It enables adjustment to the diverse size formats accessible. Basically the Standard CD's are accessible in two sizes. By and large the most well-known is 120 mm in diameter, with a 74 or 80-minute audio capacity and a 650 or 700 MB data capacity. Originally 80 mm discs ("Mini CDs") were designed for CD singles and can hold up to 21 minutes of music or 184 MB of data but never been so noticeable or popular.

Logical formats of CD-ROM

Audio CD

In 1980, the logical format of an audio CD (officially Compact Disc Digital Audio or CD-DA) is described in a document. It was given by the joint creators, Sony and Philips who gave

the format. The document is known colloquially as the "Red Book" after the colour of its cover. The format is a two-channel 16-bit PCM encoding at a 44.1 kHz sampling rate. Within the Red book format four-channel sound is an allowed option, but has never been implemented.

CD-Text

Compact disc Text is an augmentation of the Red Book specification for audio CD that enables for storage of extra content data (e.g., album name, song name, and artist) on a standard principle agreeable to an audio CD. The data is stored either in the lead-in area of the CD, where there is approximately five kilobytes of room accessible, or in the sub code channels R to W on the disc, which can store around 31 megabytes.

CD + Graphics: [Compact Disc + Graphics (CD+G)] these are a specialized audio compact disc that consists of graphic data apart from the audio data on the disc. To play the disc a regular audio CD player can be used.

CD + Extended Graphics: [Compact Disc + Extended Graphics (CD+EG, also known as CD+XG)] these are an enhanced variation of the Compact Disc + Graphics (CD+G) format. Like CD+G, CD+EG utilizes essential CD-ROM highlights to show content and video data. It can likewise play the music. This additional information is stored in sub code channels R-W.

CD-MIDI: Compact Disc MIDI or CD-MIDI is a kind of audio CD that is used to record sound in MIDI format, other than the PCM format of Red Book audio CD. Utilizing the MIDI format gives considerably more noteworthy capacity in terms of playback duration, however its playback is commonly less sensible than PCM playback.

Video CD: Video CD (otherwise known as VCD, View CD, Compact Disc digital video) is a standard digital format for storing video on a Compact Disc. VCDs are playable in committed VCD players. They can likewise be played in the greater part of the advanced DVD-Video players, and some video game consoles.

Super Video CD: Super Video CD (Super Video Compact Disc or SVCD) is a format basically utilized on standard compact discs for storing video. SVCD was proposed as a successor to Video CD. It is a superior variant to DVD-Video, and falls somewhere close to both regarding to technical capability and picture quality. Over 100 minutes of video onto one SVCD bring about critical quality loss, and numerous hardware players can't play video with a prompt bitrates lower than 300 to 600 kilobits per second.

Photo CD: Kodak designed Photo CD that is basically a system for digitizing and storing photos in a CD. In 1992 the discs were launched; using special proprietary encoding this design could

hold nearly 100 scanned prints, high quality images, and slides. Photo CD discs are characterized and defined in the Beige Book and comply with the CD-ROM XA as well as CD-i Bridge specifications. Irrespective of the operating system they are intended to play on CD-i players, Photo CD players and any computer with the suitable software. With a special Kodak machine the images can also be printed out on photographic paper

Picture CD: following on from the earlier Photo CD product, Kodak has developed another is another photo product i.e. Picture CD. Using JPEG compression it holds photos from a

single roll of colour film, stored at 1024×1536 resolution. The product is targeted for the consumers.

CD Interactive: For CD-i players Philips "Green Book" designed and specifies the standard for interactive multimedia Compact Discs. This Compact Disc format is not usual as it hides the initial tracks which contain the software and data files utilized by CD-i players by precluding the tracks from the disc's Table of Contents. As a result of which the audio CD player's skip the CD-i data tracks. This is not quite the same as the CD-i Ready format, which puts CD-I software and data into the pre gap of Track 1.

Enhanced CD: Enhanced CD, otherwise called CD Extra and CD Plus, is a of the Recording Industry Association of America issued a certification mark known as Enhanced CD for numerous technologies that combine audio and computer data for both compact disc and CD-ROM players.

Recordable CD: Recordable compact discs or CD-Rs are injection moulded with a "blank" data spiral. The discs are metalized and coated with lacquer after application of photosensitive dye. To allow the read laser of a standard CD player to see the data on the injection moulded compact disc the write laser of the CD recorder changes the colour of the dye. Henceforth the resultant discs can be played in several (but not all) audio CD players and read by most (but not all) CD-ROM drives.

Recordable Audio CD: The Recordable Audio CD is developed to be utilized in a consumer audio CD recorder, which would not (without modification) acknowledge standard CD-R discs. SCMS (Serial Copy Management System) is used by these consumer Recording Act), it is an early form of digital rights management (DRM)

Rewritable CD: CD-RW is a re-recordable medium that uses a metallic alloy instead of a dye. The writelaser in this case is used to heat and alter the properties (amorphous vs. crystalline) of the alloy, and hence change its reflectivity. A CD-RW does not have as great a difference in reflectivity as a pressed CD or a CD-R, and so many earlier CD audio players cannot read CD-RW discs, although later CD audio players and stand-alone DVD players can. CD-RWs follow the Orange Book standard.

DVD: DVD (also known as "Digital Versatile Disc" or "Digital Video Disc") is a popular optical disc storage media format. It is mainly used for video and data storage. Despite of being of same dimensions as compact discs (CDs) most DVDs store more than six times the data. Variations of the term DVD frequently depict the way information is stored on the discs like:

- DVD-RAM or DVD-RW holds data that can be re-written multiple times.
- DVD-ROM has data which can only be read and not written, and
- DVD-R can be written once and afterward works as a DVDROM.



Title :DVD

Attribution :Public Domain Pictures

Source :pexels.com

Link :<https://www.pexels.com/photo/abstract-art-background-blank-270456/>

DVD disc capacity

	Single layer capacity		Dual/Double layer capacity	
	GB	GiB	GB	GiB
12 cm, single sided	4.7	4.37	8.54	7.95
12 cm, double sided	9.4	8.74	17.08	15.90
8 cm, single sided	1.4	1.30	2.6	2.42
8 cm, double sided	2.8	2.61	5.2	4.84

The 12 cm type is a standard DVD, and the 8 cm variety is known as a mini-DVD. These are the same sizes as a standard CD and a mini-CD.

Example: A disc with 8.5 GB capacity is equivalent to: $(8.5 \times 1,000,000,000) / 1,073,741,824 \approx 7.92$ GB.

DVD recordable and rewritable

To store data for back-up and transport which was a major need HP initially developed recordable DVD media. Even today the DVD recordable is utilized for consumer audio and video recording.

Three formats were created:

- DVD+R/RW (plus),
- DVD-RAM,
- DVD-R/RW (minus/dash).

Dual layer recording

When compared with 4.7 Gigabytes for single layer discs, Dual Layer recording enables DVD-R and DVD+R discs to store comparatively more information, up to 8.5 Gigabytes per side, per disc. Pioneer Corporation for the DVD Forum developed DVD-R DL, Philips and Mitsubishi Kagaku Media (MKM) for the DVD+RW Alliance developed DVD+R DL

DVD-Video: DVD-Video is a standard for storing video content on DVD media. Most consumer DVD-Videodiscs use either anamorphic 16:9 or 4:3 aspect ratio MPEG-2 video, stored at a resolution of 720×576 (PAL) or 720×480 (NTSC) at 24, 30, or 60 FPS even if many resolutions and formats are supported. The Digital Theatre System (DTS) or Dolby Digital (AC-3) formats, ranging from 16-bits/48kHz to 24- bits/96kHz format with monaural to 7.1 channel "Surround Sound" presentation, and/or MPEG-1 Layer 2 is utilized to store audio.

Many DVD players support all possible formats even after the variations in specifications for video and audio requirements by global region and television system. Many features like menus, selectable subtitles, multiple camera angles, and multiple audio tracks is supported by DVD-Video.

DVD-Audio: In order to deliver high-fidelity audio content on a DVD a special format is developed known as DVD-Audio. At various sampling frequencies (up to 24-bits/192kHz versus CDDA's 16-bits/44.1kHz) it offers many channel configuration options (from mono to 7.1 surround sounds).

Competitors and successors to DVD: There are many conceivable successors to DVD. They are being created by various consortia to fulfill the need to store vast measure of information. Toshiba's HD DVD and 3D optical data storage and Sony/Panasonic's Blue-ray Disc (BD) are being effectively developed. The up and coming age of DVD will be HD DVD.

Communication devices

The role of a modem is to modulate those digital signals that goes out from a computer or other digital device to analog form for a telephone line and demodulates the analog signal to convert it to a digital signal that is to be inputted in a computer. Most new PCs accompany with 56 Kbps modems. Modems help your PC to interface with a network.

Configuration of a multimedia Computer

A decent multimedia system framework ought to have a Pentium 3.0 GHz (or the one with similar capabilities) onwards processor,

- 1TB onwards hard disk drive,
- 3 button mouse and a touch panel.
- 19 inch onwards LED monitor,
- 1GB VRAM PCI express card (GPU),
- no less than 4GB of RAM,
- Dual Layer DVD Writer,
- a 5:1 or 7:1 bit sound card,
- Standard Multimedia keyboard,
- high wattage sub-woofer speakers,

On the off chance that you wish you can include a scanner, printer, digital camcorder and a video-capture card. Note that, there is no set rule to characterize the correct hardware combination of a decent multimedia computer.

The combination relies on the nature and contents of the multimedia project that is dealt with. Luckily, hardware tools exist for performing performing any activity; one needs to be wise to select and use only that hardware, which satisfies and suits your need.

Unit summary

In this unit we have explained the applications of different input, output and the storage devices used in multimedia systems. The input devices help you to feed the multimedia data in to the computer systems and the output devices display or print the multimedia data. The RAM is a storage device for temporary storage which is used to store all the application programs under execution. The secondary storage devices are used to store the data permanently. The storage capacity of secondary storage is more compared to RAM. CDs and DVD's are optical storage devices used for storage of multimedia content for distribution purposes.

Assignments

1. What is an input device? List any four input devices.
2. What are the functions of output devices? List any three output devices.
3. List any five storage devices and specify their storage capacity.
4. List the different CD-ROM formats.
5. What are the different storage capacities available in a DVDs:

Resources

1. Tay Vaughan, "Multimedia Making it work" , Mc Grow Hill,Eighth Edition
2. Jeffcoat , "Multimedia in Practice – Technology and applications" By Jeffcoat.
3. <http://www.wacona.com/input/input.html>
4. www.webopedia.com/TERM/I/input_device.html
5. http://en.wikipedia.org/wiki/Input_device
6. Storage: From Floppy to DVD
7. Steinmetz and Klara Nahrstedt, "Multimedia Computing, Communication and application"
8. Setrag Khoshafian, A. Brad Baker. "Multimedia and Imaging Databases"
9. <http://en.wikipedia.org/wiki/Image:CDTXlogo.svg>
10. <http://www.toptenreviews.com/computers/desktops/bestmultimedia-computers>

Unit-2: Multimedia Software

Introduction

The mix of texts sound, animation, graphics and video refers as Multimedia. Multimedia is a fundamental component in a significant number of the other programming applications. For instance, desktop publishing documents and word processing can be improved with charts, photos and graphics. Presentations can be can be additionally energizing when they incorporate sound and animation.

Multimedia software can be can be engaging and valuable. One while browsing a disc related to zoo can actually view the clipping along with the sound effects of animal, on the computer can play music, one can hear well known recordings or famous speeches, see a video clip related to historic event, can know about the working of a car engine by watching its animation, can hear the exact pronunciation of a phrase or word, see shaded photos of popular masterpieces or scenes from nature, tune in to the sounds of various melodic instruments, hear works of music by prestigious music composers, or watch a film on your PC.

Outcomes

Upon completion of this unit you will be able to:

- Describe the fundamentals of Software
- Differentiate between various types of Software
- Write the basic operation of Software
- Explain the fundamentals of computer Paint Brush
- Analyze the Specification and Design of Multimedia Software Systems
- List the Different types of Animation Software
- Describe the Software Licensure Agreement

Terminology

Software	It consists of computer programs, which are sequences of instructions for the computer. The process of writing (or coding) programs is called programming, and individuals who perform this task are called programmers.
System Software:	It is a set of instructions that serves primarily as an intermediary between computer hardware and application programs, and may also be directly manipulated by users.
Application Software	It is a set of computer instructions that provide more specific functionality to a user.

In the beginning of computing, a large portion of the data comprised of content or text and numbers. Nonetheless, from that point onwards photograph, video and audio have turned into an essential piece of utilizing PC frameworks. Relatively every site you visit utilizes some type of audio- visuals. A significant number of the posts via web-based networking media utilize imagination or symbolism. Media services, for example, Netflix and YouTube now represent a considerable segment of the world's Internet traffic.

The audio and video software are divided in to two general categories:

- Media players that only provide playback options and
- Software that can be used to record and edit audio and video.

Media Players: it is basically an application of the software to playback the multimedia files along with the audio and/or video. Some media players concentrate only one type like either audio players or video players while most of the media players has developed players that can play both audio and video.

Audio Software: For professionals high end audio systems are developed known as digital audio workstations. **Digital audio editor** are the software to edit and record audio.

Audio can comprise of just talked content, for example, the portrayal of this video, or music and other sound impacts. A digital audio editor typically contains normally contains capacities for the accompanying undertakings:

- Mix multiple tracks to get one output track
- Edit sound clips by removing certain parts, exchanging the order of clips, etc.
- Apply effects, such as noise reduction and equalization, to improve quality
- Convert different formats
- Record audio from various input sources

Video Software: Video editing software comprises of the software for video editing for its post-production. The source material is gathered by advanced camcorders, and after that imported into the product for altering and editing.

Apart from these, authoring software is available by using which one can create multimedia applications involving different media. Ex : Author ware professional.

Fundamental Software

Software consists of computer programs, which are sequences of instructions for the computer. The process of writing (or coding) programs is called programming, and individuals who perform these tasks are called programmers.

The computer can only do a certain task when it is instructed by any software. Although computer hardware is, by design, general purpose, software enables the user to instruct a computer system to perform specific functions that adds to the business value.

There are three types of software: System software, Application software and Utility Software.

System software: System software is a set of instructions that serves primarily as an intermediary between computer hardware and application programs, and might get directly manipulated by users. System software provides important self-regulatory functions for computer systems, such as loading itself when the computer is switched on, managing hardware resources such as secondary storage for all applications, and provides for

commonly used sets of instructions for all applications. System programming is either the creation or maintenance of system software.

Few examples of system software are:

- Operating system
- Programming language translators
- Communication software
- Compilers and Interpreters
- Command line shell

Features of system software are as follows:

- Close to system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate
- Generally written in low-level language

System Control Programs

Operating system is the fundamental system control programme. The main role of the system control programme is to establish control over the utilization of the software, hardware and information resources of the computer system. The entire operation of the PC, including checking the PC's status and booking operations, which incorporate the input and output processes is supervised by the operating system. Apart from this, the operating system assigns CPU time and main memory to programs those running on the computer, and it likewise gives an interface between the hardware and the user. Because of this interface complexity of the hardware is hidden from the user. So that you don't have to enter over the details of how a hard ware works, you will be concerned mainly what the hardware will do and what you are supposed to do to obtain the end results. The operating system gives benefits that incorporate virtual memory, process management, security, file management, adaptation to internal failure, and the user interface.

Process management

The term Process management implies in dealing with the programs (also named as jobs) that runs on the processor at an allocated time. Let's take a simple example (a desktop operating system), here the operating system executes after loading a program into its main memory. The program uses the PC's assets until the point when it surrenders control. More refined types of process management, such as multithreading, multitasking, and multiprocessing are offered by some operating systems.

Multitasking, or multiprogramming is basically in the same time managing two or more jobs running simultaneously on the computer system. The first program is executed until the point that an interference happens, for example, a demand for input. While the input command is dealt with the execution of the second next programs start. Since switching across the programs occurs so rapidly, they appear to be executing at the same time. But, since there is only one processor, at a time only a single program can be executed. Whereas Multi-

threading is a type that concentrates on running multiple tasks inside a single application at the same time. For instance, a word processor application while editing one document simultaneously another document is being spell-checked.

Application software: It is a set of computer instructions that executes specific functions for a user. These functions may be broad or narrow, like general word processing and an organization's payroll respectively. Application programming is creation, modification or improvisation of application software. There are various programming applications being used which we will cover them in this part. An application program applies on a computer for specific commands. For an application like marketing, for instance, see the 'Market Intelligence box' on a site.

Few examples of application software are:

- Word processing software
- Spreadsheet software
- Database software
- Education software
- Entertainment software

Features of application software are as follows:

- Close to user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

Utility software: It is a collection of one or more programs that helps the user in performing and maintaining tasks that are routine in nature. Utility programs help the users in disk formatting, data compression, data backup, scanning for viruses etc.

Few examples of utility software are:

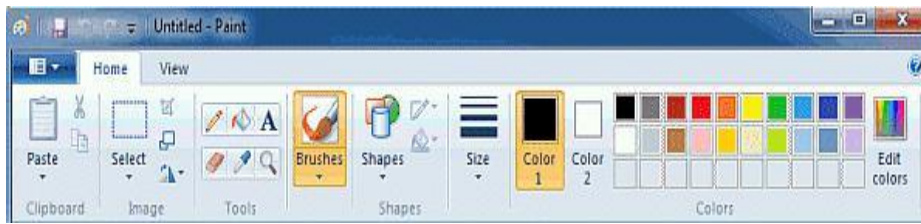
- Anti-virus
- Registry cleaners
- Disk defragmenters

- Data backup utility
- Disk cleaners

Basic Unit of Software

Drawing Simple Picture Using Ms-Paint

The Paint Window: You can view this on of the top of the Paint window.



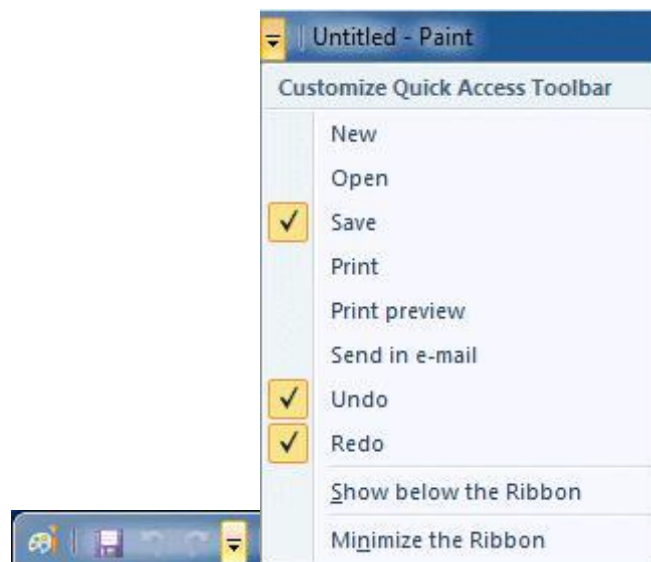
The Title Bar



In title bar in its extreme left end the first item visible is a small paint palette. Clicking over this button a standard window menu will be opened. The window contains options like Restore, Move, Size, Minimize, Maximize and Close.

The other four items make up the **Quick Access Bar**, containing buttons for **Save**, **Undo**, **Redo** and **Customize**.

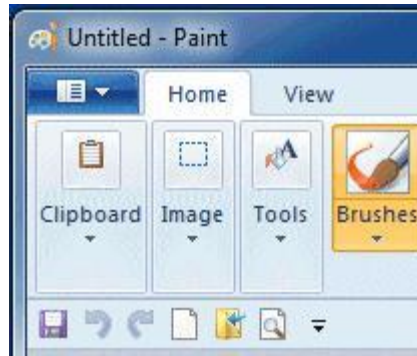
How we are going to move the Quick Access Toolbar to below the Ribbon



Screenshot

If you want that the **Save**, **Undo** and **Redo** beneath the ribbon, you need to light up the customize icon for this the cursor needs to be moved over the left end of the title bar till the **Customize** icon lights up. Click on **Customize** and you can see an appearance of a menu.

A menu has an option **Show below the Ribbon** which can be seen near the bottom. Click on the **Show below the Ribbon**.



Screenshot

According to your wish you can add other commands also that are there. Suppose I choose to add **New**—for adding a new

Paint page, or **Open**—to open a page that is saved previously and closed picture and **Print Preview** for a pre-view of the picture.

Adding Ribbon items to the Quick Access Toolbar



Many other items can also be added to the Quick Access Toolbar. Right click on items you want to add to the Quick Access Toolbar from the Ribbon and a menu will appear.

You can always unselect or remove the unwanted items from the Ribbon with a right click on the Remove option.

Other things on the Title Bar

Your pictures title that is followed by the name of the program—Paint. But If the picture is not been saved, the title appears as "Untitled."



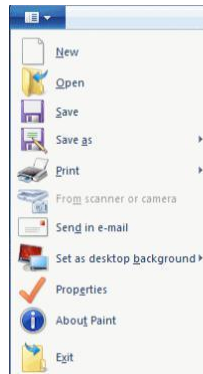
The three usual window buttons, **Minimize**, **Maximize** and **Close** appears at the extreme right end of the Title Bar. If Paint Window is already maximized— taking entire screen—the middle button is restored.

The Menu Bar



The Menu bar consists of three items on the left and a Help button at the far right.

Paint Button



The **Paint Button is on the left** that has a comprehensive menu, as displayed in the figure. It also shows a list of recently saved paint works. Most of these files are self-explanatory; **Save as** is crucial as it helps saving a newer (or compatible) version of the file while retaining the original file.

Home Tab

The **Home** tab comes handy for almost all functions. The Home tab comprises of the Ribbon, from where you can select the tools and colours. If you are using the View tab, you can flipback and forth among the Home and View (tabs) on and often as you require.

View Tab



Screenshot

Paint in Windows 7 has an improved feature of zooming in and out. As you Click on the View tab in front of you an entire set of useful options will be available. Either you can use these options alone or together with the Zoom Tool on the Ribbon or along with the slider present on the Status Bar. You can click over the **Zoom in** and **Zoom out** continuously in order to get a closer or distant view.

The option 100% is used when your work is finished in a zoomed in view. By clicking over the **100% option** you're back to the original form of the picture.

The **Show or Hide** part of this tab is basically used for hiding the status bar. It is advised not to do that as the status bar could be used many times.

Gridlines are the best thing as it provide the convenience if you need to align shapes accurately.

In order to set alignments **Use Rulers**.

In the **Display** section, click over the **Full Screen View**. A Full Screen View can also be obtained by clicking over F11 key. In both the cases, **on pressing the Esc key you can come back to a normal view.**

Thumbnail is the option that will be available only in the moment when you are in zoom in view. It allows you to visualise that how the changes made by you are affecting your picture in normal view.

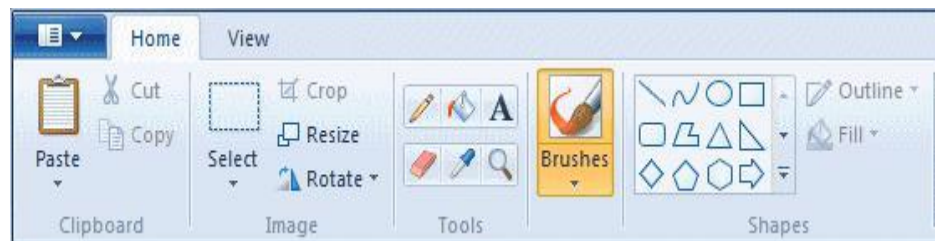
The Ribbon

In the ribbon tools like the color palette, the shapes, brushes and most of the commands are arranged together. With some exceptions such as Save, **Undo** and **Redo**, that can be seen at the **title bar in its left end**, in the **Quick Access Toolbar**.

Screenshot



If you are visualising in a smaller window, the ribbon is supposed to appear like this. The Drop-down arrows beneath each item shall provide different options, which can be accessed in their menus.



Screenshot

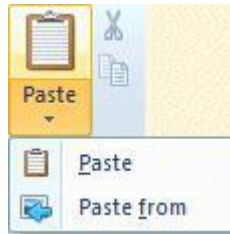
Option to minimize the ribbon makes the ribbon disappear entirely, but you can see it again if you click on the **Home** tab.

The Clipboard Menu



Screenshot

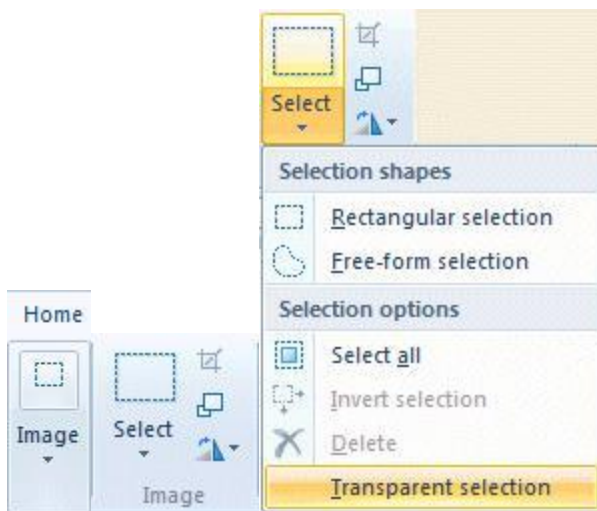
In the clipboard menu three options are offered— **Cut**, **Copy** and **Paste**. Only if a selected picture is active then only the Cut and Copy icons will be shown as ready.



Screenshot

The Paste option is always active, because there is always a probability you would like to **Paste from** a picture from a different file. For example you've earlier drawn and saved a small cartoon and now you want to include it to your present work. You need to click the down arrow under Paste, click **Paste from** and move it to the saved picture in its folder, click its name and then click **Open**.

The Image Menu—Select

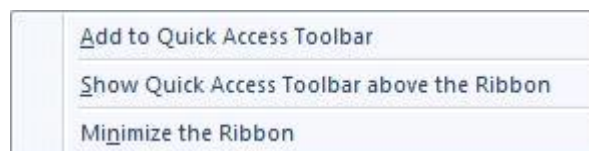


Screenshot


The Image Menu will look like either of these but that depends over the size of the window. Just below the word Image

on clicking the down arrow with a dotted rectangle, a menu will arise that will offer you more choices further.

Transparent selection



At the bottom of the Select menu you'll see **Transparent selection**. If you want to use it frequently, add it to the Quick Access toolbar. To do this, right click on transparent selection and then click on **Add to Quick Access toolbar**. On your Quick Access Toolbar, there will

be a checkbox in front of transparent selection.  While that box is selected the texts will be transparent. To make your selections opaque, just click the unselect the checkbox.


Selection Options

To the right of the selection icon you will see three options, **Crop**, **Resize** and **Rotate flip**.

Crop

A square shape with a line through it, is the icon for crop. It allows you to crop your picture so that only the selected area remains. This has replaced the old **Copy to** option and can be used if you want to save cutouts from a drawing.

How to save a cutout

- Save the picture from which you want a cutout.
- Select the part you want to save as a cutout.
- Click the Crop button.
-  Go to the Paint button and open the menu.

 Click **Save as**

Be very sure that you do click Save **as** and not Save.

Give a name for the cutout and click Save.

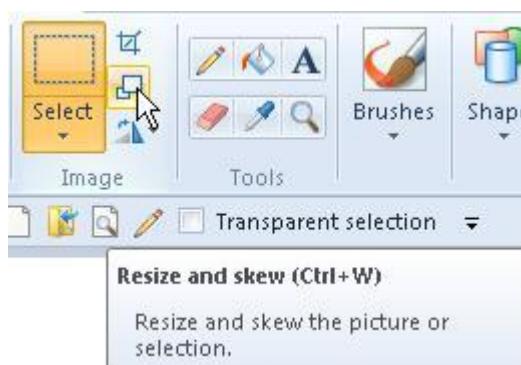
You will see the Paint window with the cutout displayed in it. The name of cutout used while saving it is shown on the Title bar.

Click the Open icon on your Quick Access Toolbar or from the Paint Button menu.

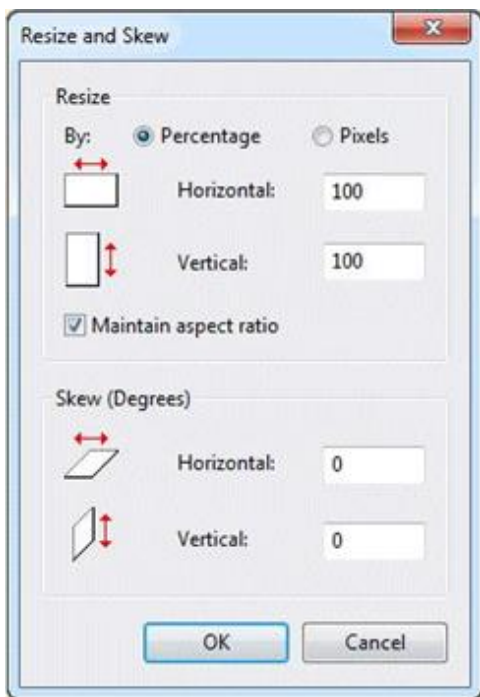


Open the picture with which you wish to continue working.

Resize and Skew



The second button below the crop button will open the Resize and Skew dialogue.




Resize



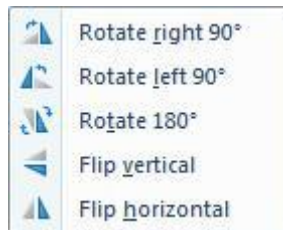
You can resize any selected item by dragging any of the little blocks—or handles—on the selection rectangle. Use your cursor to hover over the handle you want to pull or push until a double-ended arrow appears. Press down your mouse button and adjust the shape to your liking.

Skew



The bottom part of the same dialogue box invites you to skew your selection. When using this option, make your selection including a large border area to avoid having part of the picture chopped off, as has happened here. If this happens, click **Undo**  and make a wider selection before trying again.

Rotate or flip

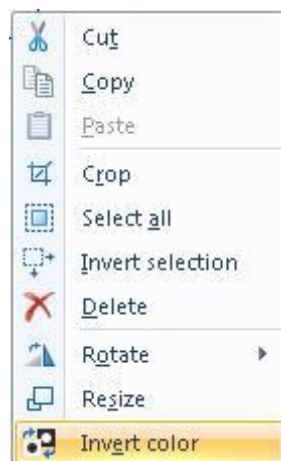


This menu lets you make mirror images of selections, either vertically or horizontally, and it also lets you rotate an item 90 degrees.

To make a symmetrical object mirror image comes handy.

Just copy half of the picture, flip it and join it to the picture itself.

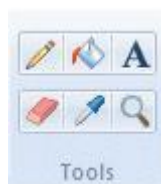
See [Making a Picture the Same on Both Sides.](#)



Invert Color


A different set of options are available if you **right** click on a selection you've made.

The Tools Menu



Screenshot

Pencil

 The pencil tool is used for free-hand drawing. It can also be used in a zoomed in view for pixel-by-pixel editing.

Fill with Color



The Fill with color tool, or the Flood Fill tool, is used to fill **an area of a single color** with a different color. It can hold two different colors; Color 1 will be used if you press the left mouse button on the area to be filled. Color 2 will be used if you press with the right mouse button.

The Text Tool



The Text tool in Paint for Windows 7 is a great improvement from earlier versions.



The one exception to this is that Paint 7 always anti-aliases text, so the idea of stacking red text on top of black to get a shadowed effect seems to be a thing of the past—unless you turn off **Smooth screen fonts** in the **Performance** section of **Advanced System Settings**.

Instead of using the old technique of inserting text, it is recommended that you open a new document and operate this tool.

To begin inserting text, click on the text tool. Your cursor changes to an insertion bar.

Use the cursor to drag and draw an oblong that you think will be about right to hold your text.

Unless these steps have been followed, **do not click anywhere outside that oblong**.

The **Text Toolbar** appears.

Type your text.

The Eraser



With the left button depressed, the eraser tool changes whatever it is dragged across to the background color—Color 2.

With the right button pressed, the eraser tool changes pixels of Color 1 to Color 2. It leaves everything else unaffected.

You can use this to quickly and easily change an area, say, red to one of, say, blue.



The left mouse button was clicked while the Eraser has been dragged across the first picture. Color 2: the background color, is white.

For the second picture, Color 1 to blue and Color 2 to white have been set.

Press the right mouse button while dragging the cursor across the picture.

In the third picture, pink has been set as Color 2 to and lie green has been set as Color 1. And in a similar manner we Press the right mouse button while dragging the cursor across the picture.

There's no color tolerance in Paint; only pixels of exactly the same color are affected, so it is pretty useless on textured color.

The Color Picker



The Color Picker Tool is used to sample and match any color in your picture.

The Magnifier



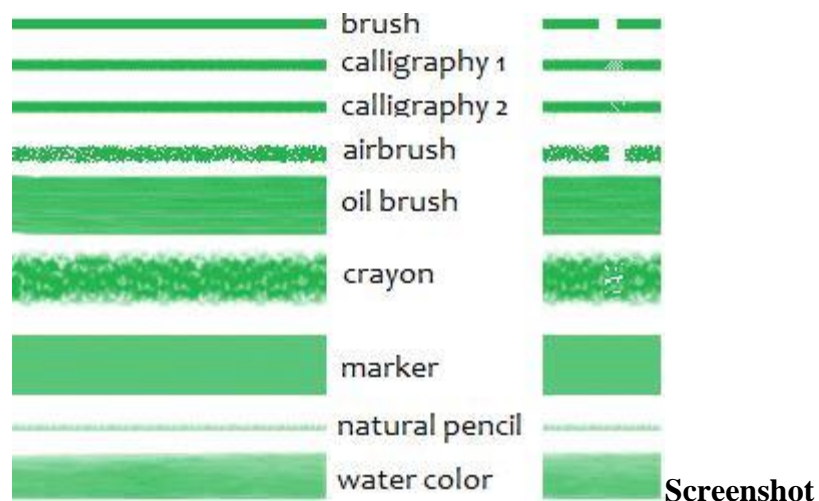
The Magnifier Tool can be clicked over an area to get a closer view. Left clicks give a closer view. Right clicks zoom out.

Brushes



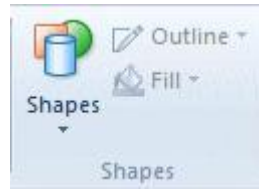
Brushes let you paint in various widths and textures.

Widths are controlled by the brushes and the Size Tool together, textures with the brushes.



The lines above, has been drawn using the brushes available in the tool box using the same color and the same width. Each line has been labeled according to its tooltip in the gallery.

Shapes

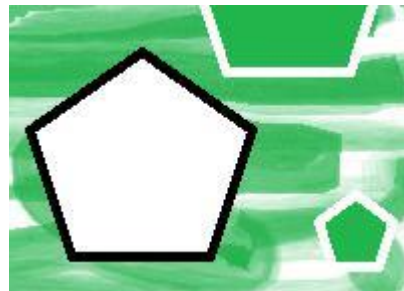


The Line and the Curved Line Tools are concealed in the shapes gallery, along with rectangles, rounded rectangles, ellipses and freehand polygons. There are various shapes: arrows, speech balloons, various stars and others.

Basics for All Shapes



Open the **Shapes Gallery** by clicking the down arrow under the Shapes picture and click the shape you want to draw. Choose a shape before you try to use the Outline or Fill buttons and before you choose a line thickness.



Line Thickness, the Size Tool



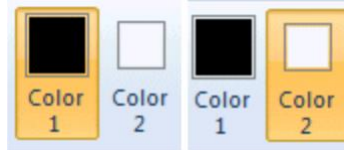
This tool becomes active only **after** you have chosen either a Brush or a Shape, so choose your Brush or Shape and you'll then find out that you can click the down arrow under Size and choose a line thickness.

The line thicknesses often vary according to the brush you have chosen.

Colors

The Color section of the ribbon has three parts: Boxes showing the active colors—Color 1 and Color 2, the Color Palette and the Edit Colors button.

The Color Boxes

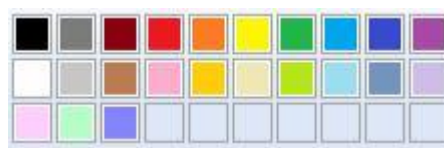


Screenshot

Color 1 is the **Foreground Color**, and is always black when you open Paint or open a different Paint page.

Color 2 is the **Background Color**, and is always white when you open Paint or open a different Paint page.

The Color Palette



Screenshot

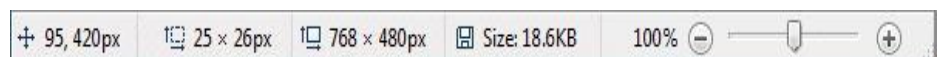
Whenever you are making a picture the two top lines of the Color Palette show all the colors available.

Edit Colors



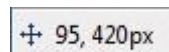
The Edit Colors button takes you into the Edit Colors dialogue. There you can click any color on an extended palette and click the Add to Custom Colors button.

The Status Bar



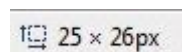
The Status Bar is situated at the bottom of the Paint Window. It offers information and can be used to help as you work. Let's look at its features from left to right.

Cursor Position



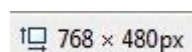
Gives your Cursor Position, which is helpful when you want to position something precisely.

Selection Size



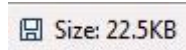
Shows the size of a selection you're making, or of an object you're drawing.

Image Size



Shows the size of your entire picture, even if it is very large and does not contain in the window completely. If you haven't changed the units in the Properties dialogue this measurement will be in pixels, but you do have the option of changing to inches or centimetres.

Disk Size



Once you've saved a picture, this will show its Size on Disk.

In a very small window, this figure may not be shown.

Zoom Slider



The Zoom Slider is convenient if you are working in a zoomed-in view and want to zoom out. However, you cannot zoom **in** on a particular spot, as you can with the Magnifier.

Saving Your Work

When you hit **Save** for the first time, you'll find yourself in a dialogue box where you are invited to type a name for the picture. Do so, and accept the default format, which is in PNG file format—unless, of course, you have a particular reason for choosing some other format. Having typed a name, click the **Save** button and you'll be returned to your picture.

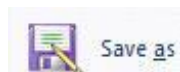
After that, when you click the Save button your work will not be interrupted.

Saving a Copy—Save as


Sometimes you may have made a really good picture, want to add something to it but worry that you might spoil it. The thing to do then is (to) **Save a Copy**.



Go to the Paint button and open the menu.



Click **Save as**

Hit **Ctrl+Z** or click the Undo button  and start over again. It seems that the only way to avoid this is to move your cursor well away before you click to cancel the bounding box.

Requirements for Multimedia Software

Multimedia provides a plethora of media applications. Multimedia subjects include children's learning, artwork, reference work, health and medicine, science, history, geography, hobbies and sports, games and much more. Because of the large storage requirements of this type of media, most multimedia software comes on a compact disk (CD-ROM) format.

To use multimedia software, a system must meet the minimum requirements set forth by the Multimedia Personal Computer (MPC) Marketing Council. These requirements include a CD-ROM drive, hard disk drive with ample storage capacity, an i5 or better central processing unit (CPU), at least 4 to 8 gigabytes of RAM (memory), a 256 color or better

video adapter, and a sound card with speakers or headphones. Most new computers far exceed these specifications. A microphone is optional if you want to record your own sounds. While these are suggested minimum requirements, many multimedia programs would run better on computer equipped with a AMD Athlon CPU or intel i5 CPU and 4 or more gigabytes of RAM.

Definition of Software Component

A software component simply cannot be differentiated from other software elements by the programming language used to implement the component. The difference must be in the usage of software components. Software comprises of many abstract, quality features, i.e. the degree to which a component or process meets specified requirement (IEEE Std 610.12-1990). It would be inappropriate, to define a software component as "an efficient unit of functionality." Elements that comprises the following definition of the term, software components are described in the "Terms" sidebar.

These definitions demonstrate the important relationship between a software component and its infrastructure and a component model.

Specification and Design of Multimedia Software Systems

Specification and design of multimedia applications pose new challenges to authoring systems due to temporal and spatial relations. Common designs of hierarchical composition of objects need to be found, thus leading to object-oriented tools. For specification of multimedia software systems a new paradigm is espoused: software engineers will do evolutionary design using an object-oriented architecture description language [Tsai99] of complex systems through:

- Architecture specification
- Design rationale capture
- Architecture V&V
- Architecture transformation

Another recent approach is to extend UML, the Universal

Modelling Language, for the modelling of multimedia applications.

Software Licensure Agreement

When installing software via Internet or CD-ROM, users agree to a licensure agreement before they are able to test the software. If this agreement is broken or violated, then the user is guilty of software piracy. The software licensure agreement is a contract between the software user and the software developer. Usually, this agreement has certain terms and conditions the software user must follow. When the user does not follow the rules and regulations, they are guilty of software piracy. Some of these terms and conditions prohibit:

- Using multiple copies of a single software package on several computers.
- Passing out copies of software to others without the proper documentation (Not having a multiple site license for more than one computer).
- Downloading or uploading pieces of software via bulletin boards for others to copy.
- Downloading and installing shareware without paying for it.

Unless otherwise stated, most software licensure agreements allow you to place one copy on a single computer and make a second copy for backup purposes. Software piracy comes in many different forms. The three most common types are End User Piracy, Internet Piracy and Reseller Piracy.

Unit summary

In this unit we learnt about the fundamentals of software and different types of software used in multimedia system. Paint is type of software which is basic idea to paint a picture for multimedia software. Through painting, the artist expresses ideas and emotions, as well as a version of the reality he or she perceives, in a two-dimensional visual form. The language of the artist consists of shapes, lines, colors, tone, and textures that are blended in various ways to produce in the viewer sensations of light, space, and movement. Some artists paint concrete forms with which viewers are generally familiar. Others try to create entirely abstract relationships. To study the paintings of any age is to look in on the diverse interpretations of the era in which they are produced.

Assignment

- 1- Write a short note on computer software.
- 2- What are different types of software?
- 3- Name any five application software.
- 4- List the different options available in HOME tab in Paint brush.
- 5- Write the steps how to fill color of a art using paint brush:

Resources

- Shi-Kuo Chang, Timothy K. Shih, Multimedia Software Engineering, Department of Computer Science University of Pittsburgh Pittsburgh, PA 15260 USA, 2000
- <http://study.com/academy/lesson/multimedia-software-working-with-audio-and-video.html>
- <http://fay.iniminimo.com/paint7.html>
- George T. Heineman, Bill Councill, Definition of a Software Component and Its Elements, Chapter-1.
- <http://www.arena-multimedia.com/softwarecovered.aspx>

Unit-3: Multimedia Operating Systems

Introduction

The main job of the operating system is to make an interface between the computer hardware and software components. It not only guarantees the effective use of the computer hardware but also provides an easy domain for the execution of programs. The operating system offers various services, related to the best utilization of the essential resources of a computer: CPU, main memory, storage and all input and output devices. In case of multimedia production, the Operating System has the great role in processing the multimedia data that needs a lot of computing resources. This is the reason why we need to choose the operating system for efficient management of resources that is essential to increase the multimedia playback and production.

Outcomes

Upon completion of this unit you will be able to:

- Describe the fundamental concepts of Operating System
- Identify different types of Operating systems
- Describe the various generation computers
- Explain the functions of Multimedia Operating System
- Describe various issues related to resources management
- Identify the characteristics of Real Time Operating System
- Explain (concepts) Operating System Process management

Terminology

Operating System: It is system software that supports a computer's basic functions, such as scheduling tasks and controlling peripherals.

Microsoft Window: It is a family of graphical operating systems developed by Microsoft. All Windows versions are proprietary closed-source system software.

Linux: It is an open source freely available, cross-platform operating system based on UNIX that can be installed on PCs, laptops, notebooks, mobile and tablet devices.

What is an Operating system?

An operating system is an important part of every computer system. A computer can be divided into four components: the hardware, the operating system, the application program and the user.

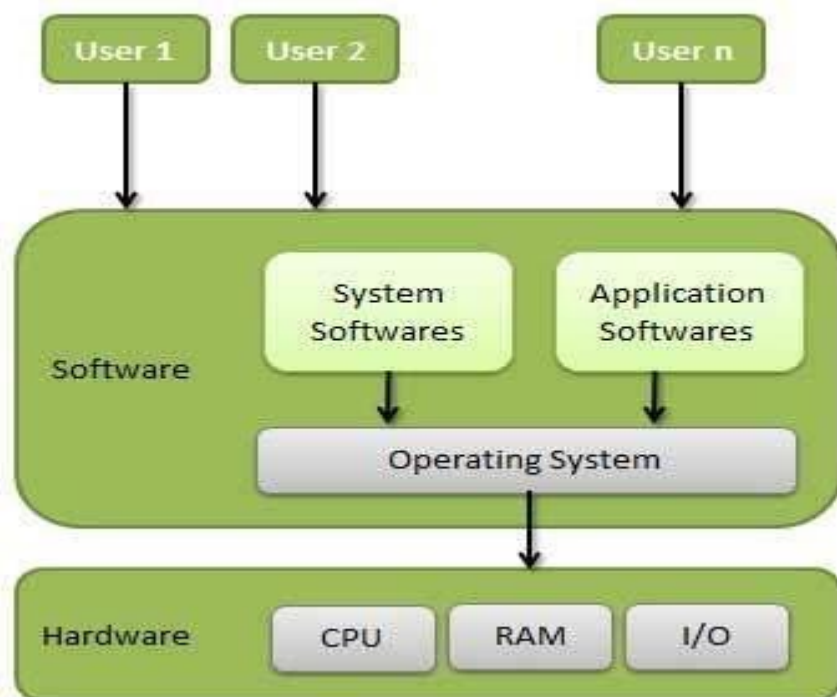
An operating system (OS) is the software component of a computer system that is responsible for the management and coordination of activities and the sharing of the resources of the computer.

The utilization of hardware among different application programs for different users is controlled and co-ordinated by the operating system. The role of the operating system (OS) is to provide a medium for the best utilization of these resources during the operation of the personal computer. The operating system can be investigated from two perspectives: the user and the system.

User View: The client perspective of the PC fluctuates by the interface being utilized. A computer system comprises of a monitor, keyboard, mouse and system unit. This type of system is basically designed for single user to have monopoly over its resources and to expand the work the user is doing. For this situation, the operating system is basically designed in the way focussing for a simple use by the user, while executing an important factor.

System View: The most important feature of the operating system is its compatibility with the hardware through its program; its job is to allocate the resource. There are numerous resources in a computer system like – hardware and software these help to root.

out a problem like file-storage space, memory space, CPU time, I/O devices etc. All these resources are managed by the operating system. In order to operate the computer system in an efficient and fair way the operating system should be very particular about the allocation of resources to users and specific programs.



Title: Organization of Operating System Components Attribution:

Source: tutorialpoints.com

Link: https://www.tutorialspoint.com/operating_system/os_overview.htm

If we view an operating system in a slightly different way it stress upon the requirement to have a control over different I/O devices and user programs. On and around an operating system is basically a control program. The job of control program is to manage the execution

of the programs of users for the prevention of errors and for checking the proper utilization of the computer. Its main concern is the control and operation of I/O devices.

An operating system has three main functions:

- Manage the computer's resources, such as the central processing unit, memory, disk drives, and printers.
- Establish a user interface, and
- Execute and provide services for applications software.

Operating System Concepts:

Multi-user and Single-user Operating Systems

Multi-user operating systems allow multiple users to access a computer system simultaneously. Time-sharing can be classified as multi-user systems as they enable multiple user access to a computer by sharing time slot. Single-user operating systems, contradictory to a multi-user operating system, can only be operated by one user at a time. MS-DOS and Windows XP are designed for single user only.

Windows operating system cannot be said as a multi-user system only if it is able to have multiple accounts. Other than this, the real user is the network administrator.

But for an operating system -like Unix, UNIX, LINUX and Windows 2000 Server are some of the examples of multi-user operating systems. The main advantage of these systems is that two users can login at the same time and because of this specific feature of the OS makes it a multi-user operating system.

Multi-tasking and Single-tasking Operating Systems

By Multi-tasking it means that a computer is able to run various programs at the same time. This the operating system do by the allocation of slots of processor time to programs turn by turn, so that the slots can be distributed rapidly so that the programs finally run concurrently. . In such cases where the operating system allows for execution of multiple tasks at a time, it is classified as a multi-tasking operating system.

The system will be grouped under the single-tasking system category, when a single program is allowed to run at a time.

UNIX and Windows 95 are examples of multitasking Operating Systems. In contrast, MS-DOS and Windows 3.1 are "single tasking" Operating Systems.

Multi-tasking can be of two types namely, pre-emptive or co-operative. In pre-emptive multitasking, the operating system slices the CPU time and dedicates each slot to one program. Unix-like operating systems such as Solaris and Linux support pre-emptive multitasking.

Multi-processing Operating System

Operating Systems that are more advanced are capable to spread processing between multiple CPUs. Since this is a complicated task so here the programs are being broken into threads. Grid computing is a type of design that is available at bigger scale on networks.

UNIX, Windows NT and Windows XP are some of the examples of multi-processing operating systems. Whereas, MS-DOS and Windows 98 are capable of running only on a single processor.

Embedded System

The Operating Systems which are designed for use in embedded computer systems are known as (Embedded Operating Systems). They are designed to operate on small machines like with less autonomy. They can operate with limited number of resources. They are very compact and have extremely efficient design. Windows CE, FreeBSD and Minix 3 are some examples of embedded operating systems (Embedded Operating Systems).

Mobile Operating Systems

Even if the Mobile Operating Systems are not a very different kind of Operating System, but it has an essential specification in the list of types of Operating System. A mobile device is controlled by a mobile OS it's designed such that it supports wireless communication along with mobile applications. It additional has a built-in or default support for mobile multimedia formats. Few examples are Tablet PCs and smart phones that run on mobile Operating Systems. So the main contribution of the Operating Systems is to simplify human interface with the computer hardware. There main responsibility is to link application programs with the hardware, so that an easy user access to computers can be achieved. A portion of the prominent Operating Systems are, Android OS, BlackBerry OS, iOS , Palm OS, Symbian OS so forth.

Command Line Interface (CLI)

With a CLI, the computer is controlled by text instruction given through the keyboard. The Operating System's command shell interprets the given instruction to launch programs or carry out OS processes. CLI is often confusing and difficult to use for many people. UNIX and MS-DOS are examples of Operating Systems based on command-line interface.

Graphical User Interface (GUI)

In 1973 researchers at Xerox's Palo Alto research labs developed the WIMP system for controlling computers. The WIMP system consists of; a Window, Icon, Mouse and Pointer. This graphical interface was much easier for novices and revolutionized the operation of computers but didn't really take off until the mid 1980s. Windows, Mac OS and UNIX's X-Window shell, Ubuntu are examples of Operating Systems featuring GUIs.

Popular operating Systems:

Some popular operating systems are as follows.

UNIX: Multi-tasking, multi-processing, multi-user, protected system that derives from the original AT&T UNIX developed by Ken Thompson, Dennis Ritchie, and others few scientists in early 1970s at the Bell Labs research center.

Windows: Multi-tasking, multi-processing, single-user, unprotected system developed by Microsoft Corporation to run personal computers (PCs). Featuring the first graphical user interface (GUI) for IBM-compatible PCs, the Windows OS soon dominated the PC market.

Mac OS: It is a series of graphical user interface-based operating systems developed by Apple Inc. for their Macintosh line of computer systems. The original operating system was first introduced in 1984 and was integral to the original Macintosh; it was referred to as the "System".

Windows operating Systems:

The operating system for windows began with the presentation of Windows OS and Windows for the general work force and for networking as well. From that point forward it has made considerable progress. Afterwards Windows 95, 98 and 2000 group of Operating Systems were presented. To the computer user it provided highly integrated and simple to use operating system with all inbuilt facilities. In the Windows family The Windows XP is an infant. It was based on the windows 2000 idea and system. It has more highlights to furnish the client with more noteworthy steadiness, security and upgraded execution and performance.

Types of Windows operating system

Windows 1.01: Windows 1.0 presents incomplete multi-tasking of the MS-DOS programs and focuses on (providing an interface) generating an interfacial pattern, (which is) an effective replica and a steady API for indigenous programs for the next generation.

Windows 2.03: Windows 2.0 permits functional windows to override on one another, unlike Windows 1.0, which is capable of exhibiting only tiled windows. Windows 2.0 has also brought additional stylish keyboard-shortcuts and the terms like "Maximize" and "Minimize" in place of "Zoom" and "Iconize" in Windows 1.0.

Windows 2.11: After a year of the production of Windows 2.0, Windows/286 2.1 and Windows/386 2.1 were made. These versions contain explicit features of the Intel 80286 and Intel 80386 processors.

Windows 3.0: Windows 3.0 was the 3rd most important production of Microsoft Windows which was released on 22nd May 1990. It turned out to be the 1st broadly used version of Windows.

Windows 3.1

Windows For Workgroups 3.1: Windows 3.1 (also known as Janus), came up on March 18, 1992. This version includes a TrueType inbuilt font system making Windows the only desktop implementing platform for the 1st time. Windows 3.0 could have similar functionality with the use of the Adobe Type Manager (ATM) font system from Adobe.

Windows NT 3.1

Windows For Workgroups 3.11: Microsoft's Windows NT line of server and business desktop operating systems had first released Windows NT. Progress of this windows had started in November 1988 and was officially released on July 27, 1993.

Windows 3.2: This is the 1st version of Windows NT having the names like Windows NT Server and Windows NT Workstation for its different versions.

Windows NT 3.5

Windows NT 3.51: Windows 95 was planned to amalgamate MS-DOS and Windows. It contained an improved version of DOS.

Windows NT 4.0:It is a pre-emptively multitasked, graphical operating system, designed to work with either uniprocessor or symmetric multi-processor computers. It was released after manufacturing on 31 July 1996.

Windows 98: Windows 98 is a modern version of Windows 98. It was released on May 5, 1999.

Windows 98 SE

Windows 2000: Windows 2000 (also called Windows Me) is an extension of the Windows 9x version, but with access to the actual mode MS-DOS, it was limited so as to get a move for the system boot time.

Windows Me

Windows XP: Microsoft developed Windows XP. It is a line of Operating Systems for applying on general functional computer systems which includes business as well as home desktops, media centers and notebook computers. Windows XP was released on 25th October 2001.

Windows XP 64-bit Edition 2003

Windows Server 2003

Windows XP Professional x64 Edition

Windows Fundamentals for Legacy PCs

Windows Vista: After a world-wide success of XP and its service packs Microsoft has designed and created Windows Vista the operating system for use on personal computers, including business and home desktops, Tablet PCs, laptops and media centers.

Windows Home Server

Windows Server 2008

Windows 7: Windows 7 is a popular Operating System developed by Microsoft. It is a part of the Windows NT family of Operating Systems. Windows 7 was released July 22, 2009, and became generally available on October 2009.

Windows 8: It is developed by Microsoft as a part of the Windows NT family of operating systems. It was released on August 2012, and was released for general availability on October 26, 2012.

Windows 10: It is also a popular Operating System developed and released by Microsoft as part of the Windows NT family of Operating Systems. The first version of the Operating System entered a public beta testing process in October, leading up to its consumer release on July, 2015.

Windows is the most dominant OS in the market today. The two most popular versions of Windows for the desktop are Windows-7 and Windows-10. Windows is all proprietary, closed-source which is much different than Linux license. Most of the popular manufacturers make all their hardware compatible with Windows which makes Windows able to operate almost all kinds of new hardware.

Security

Windows OSs(are) most vulnerable to attacks. Security software is a must when you are using Windows which is far different than Linux and OS X. It has been criticized for its susceptibility to malware, viruses, Trojan horses, and worms. Security issues are compounded by the fact that users of the Home edition, by default, receive an administrator account that provides unrestricted access to the underpinnings of the system. If the administrator's account is broken into, there is no limit to the control that can be asserted over the PC.

UNIX/Linux Operating Systems

UNIX is a family of multi-tasking, multi-user computer OS) that derive from the original AT&T Unix, developed around the 1970s at the Bell Labs research center by Ken Thompson, Dennis Ritchie, and others.

The term "Linux" is originated from the Linux kernel that began in 1991 by Linus Torvalds. GNU/Linux is so called because the system's utilities and libraries has its basic origin from GNU OS.

Linux is predominantly well known as it's broadly used in server. For a vast number of various computer hardware it's basically used as an operating system, including supercomputers embedded devices desktop computers, video game systems, and such as mobile routers and phones.

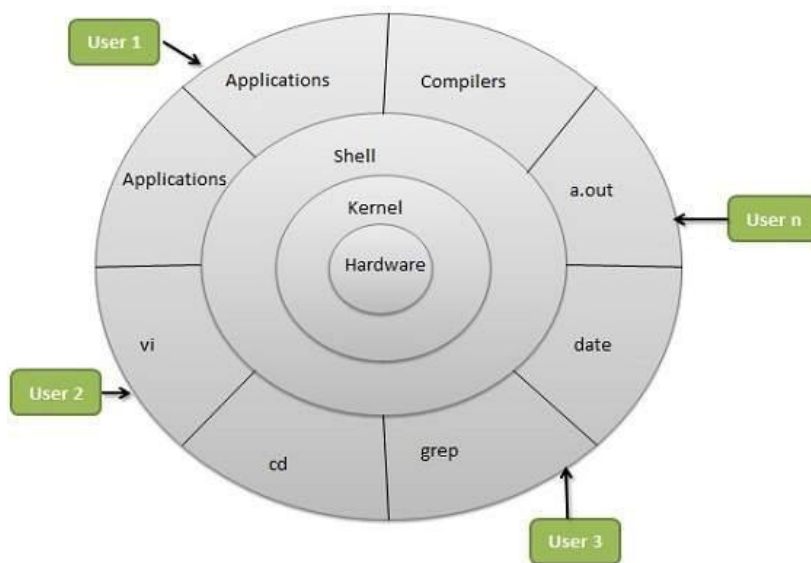
Linux is a modular Unix-like OS. During the 1970s and 1980s much of its base specifications or design is derived from principles established in UNIX. Linux utilizes a monolithic kernel which takes care of file system access, networking, peripheral and process control. Within the kernel the device drivers are integrated. In most of Linux's separate projects are used to provide higher level of functionality that intervenes with the kernel.

The UNIX/LINUX systems are most commonly portrayed as an onion; several layers surrounding an inner core.

The main concept that unites all the versions of UNIX/LINUX are categorised as four basic components.

Kernel: The kernel is the heart of the OS. It interacts with the hardware and does most of the tasks like memory management, task scheduling and file management.

Shell: The shell is the utility that processes your requests. When you type in a command at your terminal, the shell interprets the command and calls the program that you want. The shell uses standard syntax for all commands. C Shell, Bourne Shell and Korn Shell are



famous shells which are available with most of the UNIX variants.

Title: The UNIX/LINUX Systems

Attribution:

Source: tutorialspoint.com

Link: https://www.tutorialspoint.com/operating_system/os_linux.htm

Commands and Utilities: There are various commands and utilities which are put to use in day to day activities; cp, mv, cat and grep, etc. are few examples of commands and utilities. There are over 250 standard commands plus numerous others provided by the 3rd party software. All the commands come along with various options.

Files and Directories: All the data of UNIX are organized into files. All files are then organized into directories. These directories are further organized into a tree-like structure called the file system.

Different Distributions of LINUX Operating System

Debian: It is composed entirely of free software, most of which is under the GNU General Public License and packaged by a group of individuals participating in the Debian Project.

Ubuntu: It is based on the Debian Linux distribution and distributed as free and open source software, using its own desktop environment. It is named after the Southern African philosophy of Ubuntu.

RedHat Enterprise Linux (RHEL) is a distribution of the Linux OS developed for the business market. RHEL was formerly known as Red Hat Linux Advanced Server.

CentOS (Community Enterprise OS) is a Linux distribution that attempts to provide a free, enterprise-class, community-supported computing platform functionally compatible with its upstream source, Red Hat Enterprise Linux (RHEL).

Fedora (formerly Fedora Core) is based on the Linux kernel, developed by the community-supported Fedora Project and sponsored by Red Hat. Fedora contains software distributed under a free and open-source license and aims to be on the leading edge of such technologies.

SUSE Linux is built on top of the open source Linux kernel and is distributed with system and application software from other open source projects.

Linux Mint is a community-driven Linux distribution based on Debian and Ubuntu that strives to be a modern, elegant and comfortable OS which is both powerful and easy to use.

Multimedia Operating systems

The OS provides a comfortable environment for the execution of programs. It also ensures effective utilization of the computer hardware.

The OS offers various services related to the essential resources of a computer: CPU, main memory, storage and all input and output devices.

In multimedia applications, a lot of data manipulation (e.g. A/D, D/A and format conversion) is required and this involves a lot of data transfer, which consumes many resources.

The integration of discrete and continuous multimedia data demand additional services from many OS components.

The major aspect in this context is real-time processing of continuous media data.

Issues concerned:

- Process management: a brief presentation of traditional real-time scheduled algorithms
- File systems: outlines disk access algorithms, data placement and structuring
- Inter-process communication and synchronization
- Memory management
- Database management
- Device management

Process management must take into account the time required for handling multimedia data concerned in process management (Scheduling):

Table: Comparison of Traditional OS and MM OS

Criteria	Traditional OS	Multimedia OS
Timing Requirements	No	Yes
Fairness	Yes	Yes

Single components are conceived as resources that are reserved prior to execution to obey timing requirements and this resource reservation has to cover all resources on a data path.

The communication and synchronization between a single process must meet the restrictions of real-time requirements and timing relations among different media.

Memory management has to provide access to data with a guaranteed time delay and efficient data manipulation functions. (E.g. should minimize physical data copy operations.) Database management should rely on file management services.

Real-time process

A real-time process is one which delivers the results of the processing in a given time span.

The main characteristic of real-time systems is the correctness of the computation.

- Errorless computation.
- The time in which the result is presented.
- Speed and efficiency are not the main characteristic of real-time systems, e.g. the video data should be presented at the right time, neither too quickly nor too slowly.
- Timing and logical dependencies among different related tasks, processed at the same time, must also be considered.

Deadlines: Deadline represents the latest acceptable time for the presentation of a processing result.

Soft deadline: A deadline which cannot be exactly determined and which failing to meet does not produce an unacceptable result.

Missing the deadline) may be tolerated as long as (1) not many deadlines are missed and/or (2) the deadlines are not missed by (a long duration as it deems fit to the institution).

Hard deadline:

- A deadline which should never be violated.
- Its violation causes a system failure.
- Determined by the physical characteristics of real-time processes.

Characteristics of real time systems

The necessity of deterministic and predictable behaviour of real-time systems requires processing guarantees for time-critical tasks. A real-time system is distinguished by the following features:

Predictably, fast response to time-critical events and accurate timing information.

A high degree of accountability: to meet the deadlines.
Stability under transient overload: critical task first.)

The real-time requirements of traditional real-time scheduling techniques usually have a high demand for security and fault-tolerance (most of them involve system control).

Real-time requirements of multimedia systems are as follows,

The fault-tolerance requirements of multimedia systems are usually less strict than those of real-time systems that have a direct physical impact.

For many multimedia system applications, missing a deadline is not a severe failure, although it should be avoided. (e.g. playing a video sequence)

In general, all time-critical operations are periodic and considering the schedule for periodic tasks are much easier.

The bandwidth demands continuous media which is usually negotiable and the media is usually scalable.

Resource management

Multimedia systems with integrated audio and video processing are at the limit of their capacity even with data compression and utilization of new technology (their demand increases drastically).

No redundancy of resource capacity can be expected in the near future.

In a multimedia system, the given timing guarantees for the processing of continuous media must be adhered to along the data path.

The actual requirements depend on (1) the type of media and (2) the nature of the application sit supports.

The shortage of resources requires careful allocation.

The resource is first allocated and then managed.

At the connection establishment phase, the resource management ensures that the new connection; does not violate performance guaranteed as promised to existing connections.

Applied to OS, resource management covers the CPU (including process management), memory management, and the file system and device management.

The resource reservation is identical for all resources, whereas the management is different for each of them.

Resources

A resource is a system entity required by tasks for manipulating data.

A resource can be active or passive.

Active resource: e.g. the CPU or a network adapter for protocol processing.
It provides a service.

Passive resource: e.g. main memory, communication bandwidth or file systems.

It denotes some system capability required by active resources.

A resource can be either used exclusively by one process at a time or shared between various processes.

Active ones are often exclusive while passive ones can usually be shared.

Each resource has a capacity in a given time-span. (E.g. processing time for CPU, the amount of storage for memory and etc.)

For real-time scheduling, only the temporal division of resource capacity among real-time processes is of interest.

Requirements

The requirements of multimedia applications and data streams must be served.

The transmission/processing requirements of local and distributed multimedia applications can be specified according to the following characteristics:

Throughput: Determined by the needed data rate of a connection to satisfy the application requirements.

Delay "at the resource" (local): The maximum time span for the completion of a certain task at this resource.

End-to-end delay (global): The total delay for a data unit to be transmitted from the source to its destination.

Jitter: Determines the maximum allowed variance in the arrival of data at the destination.

Reliability: Defines error detection and error correction mechanisms used for the transmission and processing of multimedia tasks.

How to handle errors: Ignored, indicated and/or corrected.

Retransmission may not be acceptable for time critical data.

These requirements are known as Quality of Service (QoS) parameters.

Components and phases

Resource allocation and management can be based on the interaction between clients and their respective resource managers.

The client selects the resource and requests a resource allocation by specifying its QoS specification.

The resource manager checks their own resource utilization and decides if the reservation request can be served or not.

Performance can be guaranteed once it is accepted.

Phases of the resource reservation and management process are:

Schedule

The resource manager checks the given QoS parameters (e.g. throughput and reliability).

QoS Calculation

The resource manager calculates the best possible performance (e.g. delay) the resource can guarantee for the new request.

Resource reservation

Allocates required capacity to meet the QoS standards guaranteed for each request.

Resource scheduling

Incoming messages (i.e. LDUs) from connections are scheduled according to the given QoS standards.

Allocation Scheme

Reservation of resources can be made either in a pessimistic or optimistic way:

The pessimistic approach avoids resource conflicts by making reservations for the worst case (its conservative).

The optimistic approach reserves resources according to an average workload only.

Table: Comparison of Resources allocation Schemes

	Pessimistic approach	Optimistic
Account for	Worst Case	Average Case
QoS	Guaranteed	Best effort
Utilization	Low	High
Remarks		May need a monitor to detect overload situation and act

Continuous Media resources Model

A model is frequently adopted to define QoS parameters and the characteristics of the data stream. It is based on the model of linear bounded arrival process (LBAP). A distributed system is decomposed into a chain of resources traversed by the messages on their end-to-end path. The data stream consists of LDUs (messages).

Various data streams are independent of each other.

The model considers a ‘burst of messages’ (is a steady flow of messages) that arrived ahead of (its) schedule.

LBAP is a message arrival process at a resource defined by 3 parameters:

1. M = maximum message size (byte/message)
2. R = maximum message rate (message/second)
3. B = maximum burst (message)

Example: Single channel audio data are transferred from a CD player attached to a workstation over the network to another computer

As CD audio is handled, the bit rate is constant.

The audio signal: sampled at 44.1 kHz, each sample is coded with 16 bits.

Samples are grouped into 75 frames of equal size (corresponds to messages) in a second and transmitted in CD-format standard.

Assume up to 12000 bytes are assembled into 1 packet and transmitted over the LAN.

Then, we have data rate= $44100 \times 16/8 = 88200$ bytes/s $R = 75$ messages/second
 $M = 88200/75 = 1176$ bytes/message $B = 10$ messages $\leq 12000/1176$

That $B=10$ means we receive 1 packet at a time and each of them carries 10 messages, which implies we receive no more than 10 messages at a time.

Burst:

Bursts are generated, (Burst occurs) when data is transferred from disk in a bulk transfer mode, when messages are assembled into larger packets and traffic congestion is experienced. In the model, it is assumed that, during a time interval of length t , the maximum number of messages arriving at a resource must not exceed $t \text{ RBM} \times \text{message}$

Maximum buffer size: Messages arriving ahead must be queued in a buffer. • The buffer size is $1 \times \text{BMS}$ (bytes)

Logical backlog: Logical backlog is the number of messages which have already arrived "ahead of schedule" at the arrival of message m .

Guaranteed logical delay: The guaranteed logical delay of a message m denotes the maximum time between the logical arrival time of m and its latest valid completion time i.e. its deadline.

Work ahead messages: If a message arrives "ahead of schedule" and the resource is in an idle state, the message can be processed immediately and it's called a work ahead message.

If a message is processed 'ahead of schedule' the logical backlog is greater than the actual backlog.

Operating System Process Management

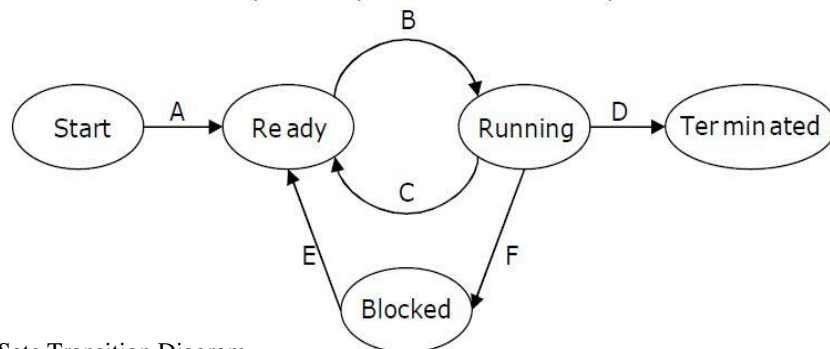
In the context of an OS, a process is a program in execution.

Processes are the individual entities to execute the user programs or tasks or a job allocated to the processor.

The task of process management is handled by the OS module called process manager.

The process manager maps single processes onto resources according to a specified schedule policy such that all processes meet their requirements.

A process under control of the process manager can be in one of the 4 states:



Title: Process State Transition Diagram

Attribution:

Source: gateoverflow.in

Link: <https://gateoverflow.in/1318/gate2009-32>

Idle state: No process is assigned to the program.

Blocked state: The process is waiting for an event, i.e., it lacks one of the necessary resources for processing.

Ready-to-run state: All necessary resources except the processor are assigned to the process.

Running state: A process is running as long as the system processor is assigned to it.

The process manager is the scheduler.

The scheduler transfers a process into the ready-to-run state by assigning it a position in the respective queue of the dispatcher.

Dispatcher is the essential part of the OS kernel.

The next process to run is chosen according to a priority policy.

The process with the longest ready time is chosen if more than one process have equal priority.

Real-time processing requirements

The real-time process manager determines a schedule for the resource CPU that allows it to make reservations and to give processing guarantees.

Each of them can meet its deadlines.

In a multimedia system, continuous and discrete media data are processed concurrently.

There are two conflicting goals for scheduling of multimedia tasks.

An uncritical process should not become stagnant because time-critical processes get executed. (E.g. should handle text while handling video.)

A time-critical process must never be subject to priority inversion.

One should minimize

The overhead caused by the schedule ability test and the connection establishment

The costs for the scheduling of every message. The latter is more critical because they occur periodically.

Traditional real-time Scheduling

The goal of traditional scheduling on time-sharing computers is optimal throughput, optimal resource utilization and fair queuing. The main goal of real-time tasks is to provide a schedule that allows all, respectively, as many time-critical processes as possible, to be processed in time, according to their deadline.

Two basic algorithms for solving real-time scheduling problems:
Earliest deadline first algorithm and Rate monotonic scheduling.

File Systems

Files are stored in secondary storage, so they can be used by different applications. The life-span of files is usually longer than the execution of a program.

In traditional file systems, the information types stored in files are sources, objects, libraries and executables of programs, numeric data, text payroll records, etc. In multimedia systems, the stored

information also covers digitized video and audio with their related real-time “read” and “write” demands. Therefore, additional requirements in the design and implementation of file systems must be considered.

Multimedia File systems

Compared to the increased performance of processors and networks, storage devices have become only marginally faster. The effect of this increasing speed mismatch is the search for new storage structures, and storage and retrieval mechanisms with respect to the file system. Continuous media data are different from discrete data in:

Real Time Characteristics

As mentioned previously, the retrieval, computation and presentation of continuous media is time-dependent. The data must be presented (read) before a well-defined deadline with small jitter only.

File Size

Compared to text and graphics, video and audio have very large storage space requirements. Since the file system has to store information ranging from small, unstructured units like text files to large, highly structured data units like video and associated audio, it must organize the data on disk in a way that efficiently uses the limited storage.

Multiple Data Streams

A multimedia system must support different media at one time. It does not only have to ensure that all of them get a sufficient share of the resources; it also must consider tight relations between streams arriving from different sources.

There are different ways to support continuous media in file systems. Basically there are two approaches. With the first approach, the organization of files on disk remains as is. The necessary real-time support is provided through special disk scheduling algorithms and sufficient buffer to avoid jitter. In the second approach, the organization of audio and video files on disk is optimized for their use in multimedia systems. Scheduling of multiple data streams still remains an issue of research.

Operating System Functions

Inter process Communication and Synchronization:

In multimedia systems, inter process communication refers to the exchange of different data between processes. This data transfer must be very efficient because continuous media require the transfer of a large amount of data in a given time span. For the exchange of discrete media data, the same mechanisms are used as in traditional OSs. Data interchange of continuous media is close related to memory management and is discussed in the previous section.

Synchronization guarantees timing requirements between different processes. In the context of multimedia, this is an especially interesting aspect.

Memory Management:

The memory manager assigns physical resource memory to a single process. Virtual memory is mapped onto memory that is actually available. With paging, less frequently used data is swapped between main memory and external storage. Pages are transferred back into the main memory when data on them is required by a process. Note, continuous media data must not be swapped out of the main memory.

Device Management

Device management and the actual access to a device allow the OS to integrate all hardware components. The physical device is represented by an abstract device driver. The physical characteristics of devices are hidden. In a conventional system, such devices include a graphics adapter card, disk, keyboard and mouse. In multimedia systems, additional devices like cameras, microphones, speakers and dedicated storage devices for audio and video must be considered. In most existing multimedia systems, such devices are not often integrated by device management and the respective device drivers.

Unit summary

In this unit we have explained the fundamental concepts of OSs and the different types of OSs. We have discussed various OS software are developed in different generations. Among them popular and contemporary OSs include Microsoft Windows, Mac OS X, and Linux. We have also discussed the characteristics of Multimedia OSs that provide access and control

functions for the storage and retrieval of files, resources allocation strategies and some OS Issues. Requirements of multimedia OS and Files are usually organized in directories. Most of the current OS's has tree-structured directories.

Assignment-1

Choose the appropriate answer from the options given in each of the following questions.

User-Friendly Operating Systems are:

- a. Required for Multimedia processing
- b. Easy to develop
- c. Common among traditional mainframe OSs
- d. Becoming more common and popular
- e. None of the above

An OS Process is

- a. Program in High level language kept on disk
- b. Contents of main memory
- c. A program in execution
- d. A job in secondary memory
- e. None of the above

Which of the following are loaded into main memory when the computer is booted?

- a. Internal command instructions
- b. External command instructions
- c. Utility programs
- d. Word processing instructions
- e. None of the above

The organized collection of software that controls the overall operation of a computer is called _____.

- a. Working system
- b. Peripheral system
- c. Operating system
- d. Controlling system
- e. None of the above

Assignment-2

- What is an Operating System? List any three popular Operating systems.
- Mention any three popular versions of Ms-Windows operating System.
- List any three versions of LINUX operating System.
- What is a process? Discuss different states of a process during its life cycle.

- Write short notes on the following.
 - Multitasking
 - Device Management
 - Memory Management

Resources

- Atul Puri, Tsuhan Chen, "Multimedia Systems, Standards, and Networks"
- Stephen Mc Gloughlin, "Multimedia: Concepts and Practice"
- Steinmetz and Klara Nahrstedt, "Multimedia Computing, Communication and application"
- http://osr507doc.xinuos.com/en/OSUserG/_The_design_of_the_u1_Operating_System.html
- Argonne National Laboratory, Mathematics and Computer Science Division
- Henry. C. Lucas, Jr. (2001) 'Information Technology'; Tata McGraw Hill Publication Company Limited, New Delhi.
- <http://www.indiabix.com>
- https://en.wikipedia.org/wiki/Operating_system
- http://openbookproject.net/courses/intro2ict/system/os_intro.html
- Source: https://www.tutorialspoint.com/operating_system

Unit-4 Multimedia Communication Systems

Introduction

Multimedia communication deals with components and mechanisms to transfer multimedia data (such as text and graphics, audio and video) over the digital networks. Such a communication requires all involved components to be capable of handling a well-defined quality of service.

The multimedia applications such as kiosks, multimedia mail, collaborative work systems, virtual reality applications and others require high-speed network with a high transfer rate and communication systems with adaptive, lightweight transmission protocols on top of the networks.

Outcomes

Upon completion of this unit you will be able to:

- Name different types of multimedia data representation
- Identify the various types of networks that are used to provide multimedia communication services
- Describe the various layers of communication subsystem
- Examine the group communication architecture
- Explain the concepts of multimedia conferencing
- Compare the terms that are associated with multimedia communications

Terminology

ISO/OSI	ISO/OSI stands for International Organization of Standardization. This is a model for Open System Interconnection (OSI) commonly known as OSI model.
LAN	It is a group of computers and associated devices that share common communications line or wireless link to a server.
WAN	This is a telecommunications network or computer network that extends over a large geographical distance. Wide area networks are often established with leased telecommunication circuits.
MAN	Metropolitan area network (MAN) is a computer network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN).
ISDN	Integrated Services Digital Network (ISDN) is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network.
QOS	Quality of Service (QOS) refers to the capability of a network to provide better service to selected network traffic over various technologies, including Frame Relay, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, SONET, and IP-routed networks that may use any or all of these underlying technologies.

Multimedia Communication Systems

Multimedia systems have attracted much attention during the past years in the society as a whole and in the information technology field in particular. Multimedia communication comprises the techniques needed for communication between multimedia systems. To enable the access to information such as audio and video data, techniques must be developed which allow for the handling of audiovisual information in computer and communication systems.

Multimedia information/data that are being transferred over the network may be composed of one or more of the following types: Text, images, audio and video.

Two main objectives of Multimedia Communication Systems are:

- person-to-person communications (e.g. email)
- person-to-system communications (e.g. web-browsing)

In this unit, we are going to discuss, representation of different media types and different types of networks that are used to provide multimedia communication services. We will also discuss the criteria of selection of the applications that these networks support and familiarize with the meaning of a range of terms that are associated with multimedia communications.

Basic concept of Communication Systems

Computer Network

A Computer Network may be defined as an interconnection of two or more autonomous computers. Two computers are said to be interconnected if they can share or exchange information and data.

A computer network system is often confused with a distribution system. A distribution system, like a computer network system, is also interconnection of computers which are geographically dispersed or distributed over a network. In a computer network each computer operates independently on separate tasks. Each computer is an autonomous unit itself with its own CPU, memory and other peripheral devices. They can start and stop of their own in the way as the user wants.

Typically all networks consist of the following components:

Server - A server is a computer (known as master computer) that provides resources to the other computers present on the network.

Client - Client refers to the set of computers that access shared network resources provided by the server.

Media - Media is the way of connecting the computers to share information.

Resources - Resources are other hardware devices like files, printers etc. used by network users.

Benefits of computer networks

Computer Networks have highly benefited various fields of educational sectors, business world, and many organizations. They can be seen widely connecting a huge number of masses from different sectors.

There are some major advantages which computer networks has provided making the human file more relaxed and easy, some of them are listed below:

Sharing of information or data: This is one of the largest benefit that is provided via by the computer networks. **Various and nearly all type of data information and** resources, such as reports, documents, , accounts information, multi mediafiles etc. could be shared by using the computer network.

Instant and Multiple Accesses: they can be processed in a multiple basis, such that a same information can be accessed by numerous clients or users at the same time from different computers.

High Reliability: A computer network can be highly reliable and this is accomplished by reproducing critical information or documents data or files on two or more systems. This is helpful in the event that one machine goes down, the user can access the data through some other different machines on the network.

Video Conferencing: LAN and WAN have made it workable for associations and business parts to have essential dialogs and meeting over live video conferencing.

Internet Service: All the computers the network will encounter to the work load distribution, fast processing and high speed internet.

Broad Casting: News and vital messages can be communicated just in the matter of seconds that spares a great deal of time and exertion of the work. Over the network, Individuals, can exchange messages quickly round the clock.

Cost Saving: Computer networks spare cost for any organizations in various ways. Linkage building via the computer networks promptly exchanges documents and message to the next individuals which lessen transportation and correspondence cost.

Remote Access and Login: Individuals working in the same organization and are inter connected via the network can have access to the network by basically through the network remote IP or web remote IP.

Flexibility: Computer networks are very adaptable the greater part of its topologies and networking strategies supports expansion of additional segments and terminals to the network.

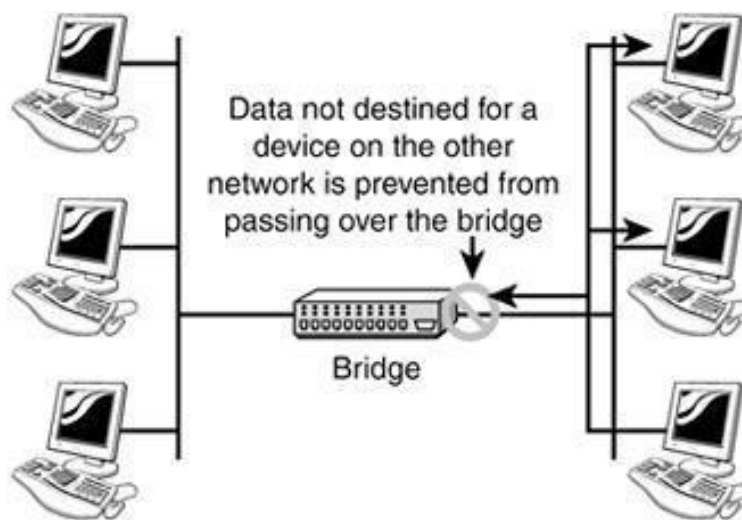
Communication: Computer systems fills in as an intense medium of correspondence between individuals who are isolated by geological separation. Communication is one of the greatest points of interest of computer network.

Computer network devices

Computer networking devices are units that are capable of sharing or exchanging data in a computer network. Network devices are parts used to interface PCs or other electronic gadgets with the goal that they can share documents or assets like printers or fax machines. Devices that are utilized to setup a Local Area Network (LAN) are the most widely recognized sort of system gadgets utilized by the general population. A LAN requires a hub, switch, and router. Computer networking devices are also known as communication devices and they constitute a data communication network.

The normal fundamental computer networking devices are:

Bridge: Network sections that commonly utilize a similar communication protocol utilize extensions or bridges to pass data starting with one network segment then onto the next.



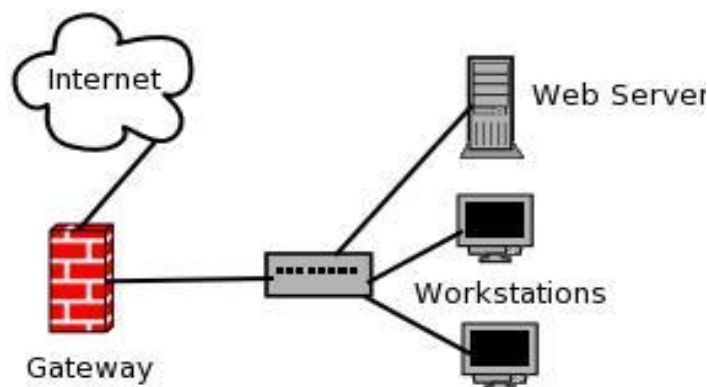
Title : Bridge Network

Attribution : [RedEagle](#) at English Wikibooks

Source : [wikimedia.org](#)

Link : <https://commons.wikimedia.org/wiki/File:Bridge.JPG>

Gateway: When different communication protocols are used by networks then gateways are used to convert the data from the sender's site to the receiver's site.



Title :Gateway

Attribution : [Andrew Weber](#)

Source : beginlinux.wordpress.com

Link : <https://beginlinux.wordpress.com/tag/gateway/>

Hub: Another name for a hub is a concentrator. Hubs reside in the core of the LAN cabling system. The hub connects workstations and it transmits the data to all the connected workstations.



Title :Hub

Attribution :

Source : pixabay.com

Link: <https://www.pexels.com/photo/white-switch-hub-turned-on-159304/>

Media Dependent Adapter: A MDA is a plug-in module allowing selection among fiber-optic, twisted pair, and coaxial cable.



Title:Media dependent Adapter

Attribution:

Source: officeworks.com.au

Link: <http://www.officeworks.com.au/shop/officeworks/p/d-link-usb3-0-to-gigabit-ethernet-adaptor-dub-1312-dldub1312>

Media Filter: When the electrical characteristics of various networks are different, media filter adapter connectors make the connections possible.

Multi-station Access Unit: MAUs are special concentrators or hubs for use in Token Ring networks instead of Ethernet networks.

Network Interface Card: NICs are printed circuit boards that are installed in computer workstations. They provide the physical connection and circuit required to access the network.

Repeater: Connectivity device are used to regenerate and amplify weak signals, thus extending the length of the network. Repeaters perform no other action on the data.

Title: Repeater

Attribution:

Source: settopsurvey.com

Link: http://www.settopsurvey.com/settop_website/product/settop-repeater

Router: Links two or more networks together, such as an Internet Protocol network. A router



receives packets and selects the optimum path to forward the packets to other networks.



Title:Router

Attribution:

Source:pcmag.com

Link:<https://www.pcmag.com/review/352074/tp-link-archer-c7-ac1750-wireless-dual-band-gigabit-router>

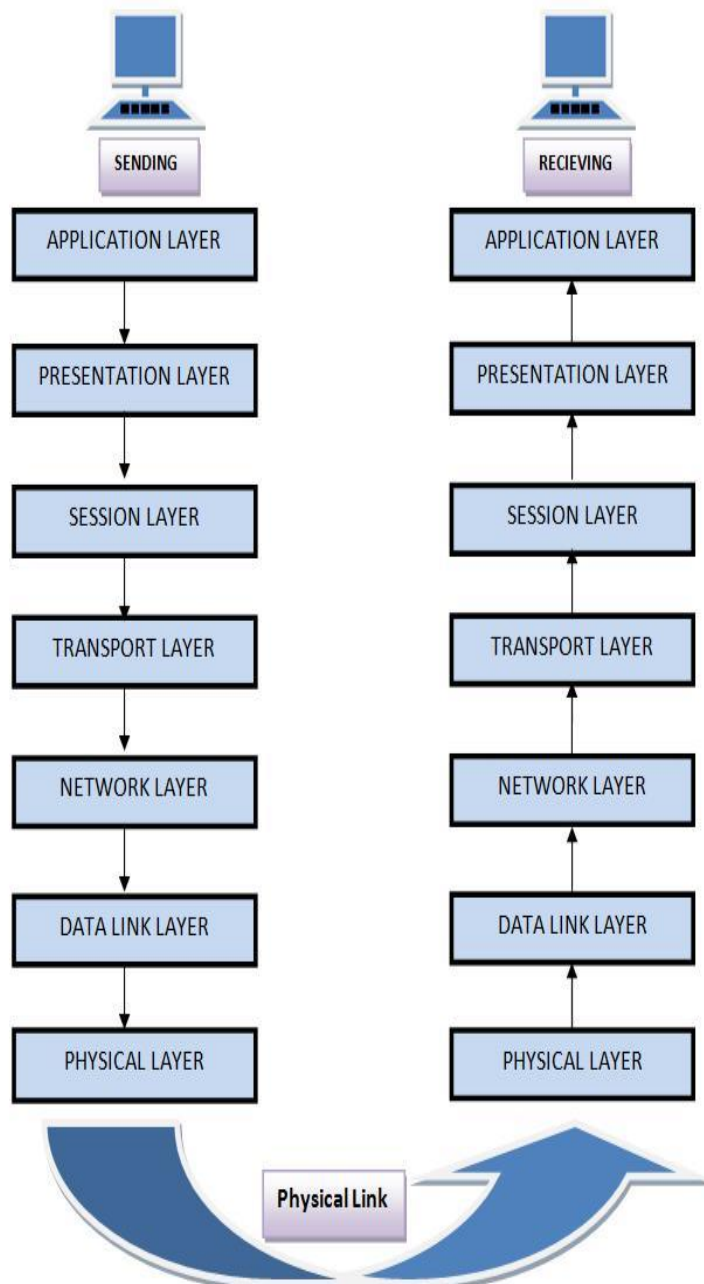
Switch: It is connecting device in a network that functions much like a bridge, but directs transmissions to specific workstations rather than forwarding data to all workstations on the network.

Transceiver: The name transceiver is derived from the combination of the words transmitter and receiver. It is a device that both transmits and receives signals and connects a computer to the network. A transceiver may be external or located internally on the NIC.

ISI/OSI Model in communication networks

There are numbers of users of computer network and are located in different part of the world. So to ensure, national and worldwide data communication, systems must be developed which are compatible to communicate with each other. ISO has developed a model as an open system for interconnectivity. ISO stands for **International Organization of Standardization**. This is called a model for **Open System Interconnection** (OSI) and is commonly known as OSI model.

The ISO-OSI model is seven layer architecture. It defines seven layers or levels in a complete communication system.



Title:ISO/OSI Model in communication networks

Attribution:

Source: nhprice.com

Link:<http://nhprice.com/what-is-ios-model-the-overall-explanation-of-ios-7-layers.html>

Features of OSI Model:

- Big picture of communication over network can be understood through this OSI model.
- We see how hardware and software work together.
- We can understand new developing technologies.

- Troubleshooting is easier by separate networks.
- Can be used to compare basic functional relationship on different networks.

Functions of Different Layers:

Layer 1: The Physical Layer:

- It is the lowest layer of the OSI Model.
- It is responsible for activation and deactivation, as well as the maintenance of the physical connection.
- It transmits and receives the unstructured raw data over a network.
- Voltage and data rates needed for transmission is defined in the physical layer.
- It converts the digital/analog bits into electrical signal or optical signals.

Layer 2: Data Link Layer:

- Data link layer synchronizes the information which is to be transmitted from the physical layer.
- The main function of this layer is to make sure data transfer is error free from one node to another, in the physical layer.
- Transmitting and receiving data frames sequentially is managed by this layer.
- This layer sends and accepts acknowledgements for frames received and sent respectively. Resending of non-acknowledged received frames is also handled by this layer.
- This layer establishes a logical layer between two nodes and also manages the Frame traffic control over the network. It signals the transmitting node to stop, when the frame buffers are full.

Layer 3: The Network Layer:

- It routes the signal through different channels from one node to other.
- It acts as a network controller. It manages the Subnet traffic.
- It decides the route data should take to travel from one network to another.
- It divides the outgoing messages into packets and assembles the incoming packets into messages from higher levels.

Layer 4: Transport Layer:

- It decides if data transmission should be on parallel path or single path.
- Functions such as Multiplexing, Segmenting or Splitting on the data are done by this layer
- It receives messages from the Session layer above it, converts the message into smaller units and passes it on to the Network layer.
- Transport layer can be very complex, depending upon the network requirements.
- Transport layer breaks the message (data) into small units so that they are handled more efficiently by the network layer.

Layer 5: The Session Layer:

- Session layer manages and synchronizes the conversation between two different applications.
- During transfer of data from source to destination in session layer, streams of data are marked and are resynchronized, so that the ends of the messages are not cut prematurely and data loss is avoided.

Layer 6: The Presentation Layer:

- Presentation layer takes care of sending of data. Data should be sent in such a way that the receiver will understand the information (data) and will be able to use the data.
- While receiving the data, presentation layer prepares the data for the application layer. Language (syntax) of the two communicating system scan be different. Under this condition presentation layer plays a role of translator.
- It performs Data compression, Data encryption, Data conversion etc.

Layer 7: Application Layer:

- It is the topmost layer.
- Transferring of files, distribution of the results to the user is also done in this layer. Mail services, directory services, network resource etc are services provided by application layer.
- This layer mainly holds application programs to act upon the received and sent data.

Multimedia Communication Systems

There are 5 types of communication network that are used to provide multimedia communication services:

- Telephone network
- Data network
- Broadcast television network
- Integrated services digital network (ISDN)
- Broadband multiservice network

Telephone network

A telephone network is a telecommunication network used for telephone calls between two or more parties. There are a number of different types of telephone network: A landline network where the telephones must be directly wired into a single telephone exchange.

The telephone network transmits analog signals and hence a modem is required whenever a computer or terminal is connected to the telephone line. The modem then converts digital data from a computer to analog signal that can be transmitted via a telecommunication line and converts the analog signal received to computer data.

There are a number of different types of telephone network:

- A landline network where the telephones must be directly wired into a single telephone exchange. This is known as the public switched telephone network or PSTN.
- A wireless network where the telephones are mobile and can move around anywhere within the coverage area.
- A private network where a closed group of telephones are connected primarily to each other and use a gateway to reach the outside world. This is usually used inside companies and call centers and is called a private branch exchange (PBX).

Data Network

A **data network** is a type of telecommunications **network** whose main role is to enable nodes to share resources. In a computer **network**, a data link is used to exchange **data** with each other by networked computing devices. The nodes are interconnected using either wired or cable media or wireless media.

The Seven Types of Data Network

Local Area Network (LAN) – LAN can be defined as a network of computers that are present in a localized territory, such as in an office or in a campus. Every one of the PCs are associated with each other through the LAN by means of a hub or a switch. The bigger the quantity of PCs on the LAN, the slower the LAN works.

Wide-Area Network (WAN) – A wide-area network covers a huge geographic zone and normally comprises of numerous computer networks. For example Internet is a kind of WAN that depends on a huge global network of service providers who utilizes routers, switches, modems, and servers to provide connectivity to users and organizations around the globe. It is a network of interconnected computers that carries data, media, and Webpages.

Public Switched Telephone Network (PSTN) – The public switched network is basically the telephone's version of the Internet. It is a network of public circuit-switched telecommunication. Today's network is mostly digital and includes services for both cellular and landline phones. Telecommunication is the transmission of signals over a large distance, usually by electromagnetic waves. It is used by radio and telephones. Computer data transmission is also a form of telecommunication.

Metropolitan Area Network (MAN) – A MAN is a network that uses technology designed to extend over an entire city. For example, a company could employ a MAN to connect the LANs in all its offices throughout a city.

Wireless Networks – Wireless networks provide transmission and network connectivity to devices without cables or wires. Wi-Fi is a wireless network for computers and cellular devices that have remote access to the network. Bluetooth, which connects with a nearby mobile phone, is a shorter-range version of a wireless network and supports transmission of voice and data. It works only at a distance of a few feet from the communication device that it connects with.

Cellular and PCS – These systems use several radio communications technologies for cellular and PCS devices. The systems divide the region covered into multiple geographic areas. Each area has a low-power transmitter or radio relay antenna device to relay calls from one area to the next area.

Satellite Networks – Satellite networks are offered in a number of configurations. Telephone operating companies use satellites for data and voice transmission to mobile phones on the ground. Some satellite networks provide navigation information, military surveillance, and weather data. Some others provide television programming, radio broadcasts, and even broadband Internet service.

Broadcast Television Network

A broadcast television network is a group of radio stations, television stations, or other electronic media outlets, that form an agreement to broadcast content from a centralized source. For example, PBS (U.S.) and BBC (U.K.) are TV networks that provide programming for local TV station affiliates to air using signals that can be picked up by the home television sets of local viewers.

Integrated services digital network (ISDN)

Integrated Services Digital Network (ISDN) is a set of communication standards for digital telephone connection and the transmission of voice and data over a digital line. These digital lines are commonly telephone lines and exchanges established by the government. Before ISDN, it was not possible for ordinary telephone lines to provide fast transportation over a single line.

ISDN was designed to run on digital telephone systems that were already in place. As such, it meets telecom's digital voice network specifications. However, it took so long for ISDN to be standardized that it was never fully deployed in the telecommunications networks it was intended for.

Broadband multiservice networks

Airport systems require a network for voice and data transmission, inside and across buildings, allowing connectivity between heterogeneous systems. This network requires an extensive virtualization and is composed by wire and wireless systems (including Wi-Fi infrastructure). Multi Service Networks must be designed with high availability, reliability and simplicity in O&M to support airport operations.

From the perspective of communication, we divide the higher layers of the Multimedia Communication System (MCS) into two architectural subsystems: an application subsystem and a transport subsystem.

Application subsystem

Collaborative Computing

The current infrastructure of networked workstations and PCs and the availability of audio and video at these end-points makes it easier for people to cooperate and bridge space and time. In this way, network connectivity and end-point integration of multimedia provides users with a collaborative computing environment. Collaborative computing is generally known as Computer-Supported Cooperative Work (CSCW).

Tools for Collaborative Computing

There are many tools for collaborative computing, such as electronic mail, bulletin boards (e.g., Usenet news), screen sharing tools (e.g., Show Me from Sunsoft), text-based conferencing systems (e.g., Internet Relay Chat, CompuServe, American Online), telephone conference systems, conference rooms (e.g., Video Window from Bellcore), and video conference systems (e.g., M Bone tools nv, vat). Further, there are many implemented CSCW systems that unify several tools, such as Rapport from AT&T, MERMAID from NEC and others.

Collaborative Dimensions

Electronic collaboration can be categorized according to three main parameters: time, user scale and control, thus, partitioned into a three-dimensional space.

Time

With regard to time, there are two methods of cooperative work: asynchronous and synchronous. Asynchronous cooperative work indicates processing exercises that don't occur in the meantime the synchronous cooperative work occurs in the meantime.

User Scale

The user scale parameter indicates whether a solitary user teams up with another user or a group of users collaborate and work together. Groups can be again categorized as below:

During its lifetime a group might be static or dynamic. A gathering is static if its part taking individuals are pre-decided and participation does not change amid the completion of the activity. A gathering is dynamic if the quantity of gathering individuals changes during the collaborative activity, i.e., group individuals can join or leave the activity at any time.

Group members may have diverse parts in the CSCW, e.g.,

- a member of a group (if he or she is listed in the group definition),
- a participant of a group activity (if he or she successfully joins the conference),
- a conference initiator,
- a conference chairman,
- a token holder or an observer.

Groups may comprise of individuals who have homogeneous or heterogeneous attributes and necessities of their shared condition environment.

Control

A collaborative control can be centralized or decentralized. By Centralized control means that the collaborative work is controlled by a chairman (e.g., main manager) and all the group members (e.g., user agent) reports to him or her. Decentralized control implies that each group member has control over his/her own assignments in the cooperative work and appropriated control conventions are set up to give predictable joint effort.

Group Communication Architecture

Group communication (GC) includes the correspondence of different multiple users in a synchronous or asynchronous mode with centralized or decentralized control.

Group communication architecture comprises of a support model, system model and interface model. The GC support model incorporates group correspondence specialists that convey through a via a multi-point multicast communication network

Group communication agents may utilize the following or their coordinated effort:

Group Rendezvous

Group rendezvous denotes indicates a strategy which enables one organize meeting, and to get data about the group, progressing meetings and other static and dynamic data.

Shared Applications

Application sharing signifies methods which enable one to imitate data to numerous users at the same time. The remote users may reveal or point some facts (e.g., by means of tele-pointing)) of the data and adjust it with the goal so that all users can promptly observe the updated information (e.g., joint editing). Shared applications are basically have a place in collaboration transparent applications.

Conferencing

Conferencing is a basic type of collaborative computing. This service gives the administration of different multiple users for communicating or corresponding with each other utilizing numerous multiple media. Conferencing applications have a place in collaboration-aware applications.

Application Sharing Approach

Sharing applications is perceived as an indispensable instrument for supporting group communication activities. Sharing applications implies that when a mutual shared application program (e.g., editor) executes any input from a participant, all execution results are performed on the shared object (e.g., document text) are disseminated among all the participants. Shared objects are shown, by and large, in shared windows.

Issue in Application Sharing

An essential issue in application sharing is shared control. The essential outline choice decision in sharing applications is to decide if they ought to be centralized or replicated:

Centralized Architecture

In a centralized architecture, first of all a single copy of the shared application runs at one site. After that all participants' input to the application is then circulated to all destinations. The benefit of the centralized approach is easy and simple maintenance as there is just a single copy of the application through which the shared object is updated. The hindrance is high network traffic in light of the fact that the yield of the application should be conveyed every time without fail.

Replicated Architecture

In a repeated design or in a replicated architecture, at each site a copy of the shared application runs locally. Input events to each application are disseminated to all destinations and each duplicate is executed locally at each site.

The main benefits of this design or architecture are reduced network congestion or traffic, because as only input events are disseminated to all destinations, and reduced reaction times, as all participants get their yield from local copies of the application. The impediments are the necessity of a similar execution condition for the application at each site, and the trouble in looking after consistency.

Conferencing

Conferencing is an administration service that controls the communication among various multiple users via multiple media, such as video and audio, in order to accomplish synchronous face-to-face communication. All the more unequivocally, video and sound have the accompanying purposes in a tele-conferencing framework:

Video is utilized as a part of technical discussions to show view-graph and to demonstrate what number of users are still physically present and attending the conference. For visual support, workstations, PCs or video walls can be utilized.

Establishing a conference, where the conference participants agree upon a common state, such as identity of a chairman (moderator), access rights (floor control) and audio encoding. Conference systems may perform registration, admission, and negotiation services during the conference establishment phase, but they must be flexible and allow participants to join and leave individual media sessions or the whole conference. The flexibility depends on the control model.

Closing a conference.

Adding new clients and expelling clients who leave the meeting or conference.

Conference states can be stored (located) either on a central machine (*centralized control*), where a central application goes about as the storehouse for all data identified with the meeting, or in an appropriated form.

Multimedia Application

A Multimedia Application is an Application which utilizes an accumulation of various media sources e.g. text, graphics, images, sound/audio, animation and/or video. Hypermedia can be considered as one of the multimedia applications.

Multimedia discovers its application in different territories including, yet not constrained to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial, temporal applications.

Category	Media	Application descriptions
Interpersonal communications	Speech	Telephony, voice-mail, teleconferencing
	Image	Facsimile
	Text	Electronic mail
	Text and images	Computer-supported cooperative working
	Speech and video	Video telephony, video mail, videoconferencing
	Text, image, audio and video	Multimedia electronic mail, multiparty video games etc.
Interactive applications over the Internet	Text, image, audio and video	Information retrieval (news, weather, books, magazines, video games, product literature etc.) Electronic commerce
Entertainment services	Text, image, audio and video	Audio/CD-on-demand
		Movie/video-on-demand
		Analog and digital television broadcasts
		Interactive television

Multimedia Communication Network Terminologies

We review some of the terminology used in relation to the different media types and operational characteristics of the different type of communication channels provided by different networks.

Media types

The information flow associated with the different applications can be either continuous or block mode.

In the case of continuous media:

Mode of operation: streaming

The information stream is generated by the source continuously in a timely-dependent way and played out directly as it is received at the destination. e.g. audio, video

The continuous media is called real-time media as it's generated in a time-dependent way. The source stream can be generated at a constant bit rate (CBR) or a variable bit rate (VBR).

In the case of block-mode media:
Mode of operation: downloading

The source information comprises a single block of information that is created in a time-independent way. E.g. text, image

The delay between the request being made and the contents of the block being outputted at the destination is called round-trip delay. (should be < few seconds)

Communication Modes

The transfer of the information streams associated with an application can be 1 of the 5 modes:

- **Simplex:** 1 direction only
- **Half-duplex:** flows in both directions but alternately
- **Full-duplex:** flows in both directions simultaneously (1-to-1 transmission)
- **Broadcast:** 1-to-all transmission
- **Multicast:** 1-to-many transmission

In duplex communications, if the flows in the 2 directions are equal, the information flow is symmetric. Otherwise, it's asymmetric.

Network types

There are 2 types of communications channel associated with the various network types: circuit-mode & packet mode.

Channels in circuit-mode: Operates in a time-dependent way. Also known as a synchronous communications channel since it provides a constant bit rate service.

Channels in packet-mode: Operates in a time-varying way. Also known as an asynchronous communications channel since it provides a variable bit rate service.

Circuit-mode: This type of network is also known as a circuit switched network. A circuit-mode network comprises an interconnected set of switching offices/exchanges to which the subscribers/computers are connected. Prior to sending any information, the source must first set up a connection through the network. The bit rate associated with the connection is fixed. The messages associated with the setting up and clearing of a connection are known as signaling messages. There is a call/connection setup delay. Examples: PSTN and ISDN.

Packet-mode: There are 2 types of packet-mode networks: connection-oriented (CO) and connectionless (CL). This type of network is also known as a packet switched network.

connection-oriented network: A connection-oriented network comprises an interconnected set of packet-switching exchanges (PSEs). Prior to sending any information, a connection is first set up through the network. The connection utilizes only a variable portion of the bandwidth of each link and hence it's known as a virtual connection or a virtual circuit (VC). Each PSE has a routing table which defines a packet coming from which input link will be delivered to which output link. Examples: X.25, ATM network

Connectionless network: The establishment of a connection is not required and the two communicating terminals/computers can communicate and exchange information as and when they wish. Each packet must carry the full source and destination addresses in its header in order for each PSE to route the packet onto the appropriate outgoing link. The term router is normally used rather than PSE. Example: Internet

Basic mode of operation (Common to PS networks):

When a packet is forwarded to a PSE/router, it's stored in a buffer, checked, discarded if there is any problem (due to congestion or error), or else forwarded to next PSE/router if the outgoing link is available.

Each PSE/router has a routing table and it's used to determine the outgoing link to which a packet from a particular incoming link should forward.

This mode of operation is called store-and-forward as a packet has to wait in a PSE/router until the outgoing link is available. The service offered by a packet-switched network is said to be a best-effort service as the transmission of a packet is not guaranteed to be successful.

Mean packet transfer delay: The mean of overall transfer delay of a packet across the network.

Delay variation or jitter: the variation about the mean packet transfer delay.

Multipoint conferencing

- It's implemented in one of the 2 ways: centralized and decentralized.
- The centralized mode is used with circuit-switched networks such as a PSTN or an ISDN.
- The decentralized mode is used with packet-switched networks which support multicast communications. (e.g. LAN, intranet and the Internet)
- A third mode known as the hybrid mode can be used.

Network QOS

The networks Quality of Service (QOS) parameters are the operational parameters associated with a communications channel through a network, and collectively determine the suitability of the channel in relation to its use for a particular application.

Circuit-switched network: (CBR network)

The QoS associated with a CBR channel that is set up through a circuit-switched network include:

- The bit rate
- The mean bit error rate

- The transmission delay

The mean bit error rate (BER) of a channel is the probability of a bit being corrupted during its transmission across the channel in a defined time interval.

Issue of the block size: In practice, most networks provide an unreliable service (best-effort service). Information is partitioned into blocks during its transmission so as to minimize the propagation of error. Any blocks containing bit errors will be discarded. A reliable service can be offered by using error detection and block retransmission, which results in high transmission overheads and additional delay. The choice of the block size is a compromise between the delay and the overhead in this case.

The transmission delay associated with a channel is determined by the bit rate, the codec delay and the propagation delay. The propagation delay is determined by

The physical separation of the 2 communicating devices and

The velocity of propagation of a signal across the transmission medium.

Packet-switched network

The QOS parameters associated with a packet-switched network include:

- The maximum packet size
- The mean packet transfer rate
- The mean packet error rate
- The mean packet transfer delay
- The worst-case jitter
- The transmission delay

Mean packet transfer rate is a measure of the average number of packets that are transferred across the network per second

Mean bit rate of the channel = mean packet transfer rate x mean packet size

Mean packet error rate (PER) is the probability of a received packet containing bit errors.

Mean packet transfer delay is the summation of the store-and-forward delay that a packet experiences when it travels along the route.

The transmission delay

Includes the codec delay and the signal propagation delay is the same whether the network operates in a packet mode or a circuit mode

Application QOS

The application QOS parameters that relate to the network include:

- The required bit rate or mean packet transfer rate
- The maximum start up delay
- Maximum delay variation/jitter
- Maximum round-trip delay

Start up delay defines the amount of time that elapses between an application making a request to start a session and the confirmation being received from the application at the destination.

circuit-switched network would be most appropriate for applications that involve the transfer of a constant bit rate stream.

- The call setup delay is not important.
- The channel provides a constant bit rate service of a known rate.

connectionless packet-switched network would be more appropriate for interactive applications.

There is no network call setup delay
Any variations in the packet delay are not important.

When packet-switched network is used:

A technique known as buffering is used to overcome the effect of jitter in a packet-switched network. The effect of jitter is overcome by retaining a defined number of packets in a memory buffer at the destination before play out of the information bit stream is started. Buffering delay plus the time for playing a packet must be larger than the worst-case jitter. Packetization delay is the delay incurred at the source to packetize the information. The larger the size of a packet, the larger the packetization delay is some other concerns when determining the packet size:

Is retransmission required?

Is the destination buffer larger enough to handle the worst-case jitter?

Unit summary

Multimedia communication has been used by various centralized and distributed multimedia applications: Video-conferencing, retrieval systems and video-on-demand will address all network types, LANs (e.g., in-house information systems), MANs (e.g., city information systems, campus networks) and WANs (e.g., distributed over the Internet).

QoS is of particular concern for the continuous transmission of high-bandwidth video and multimedia information. Transmitting this kind of content dependably is difficult in public networks using ordinary "best effort" protocols.

So a communication system has to provide a complete multimedia communication infrastructure that is needed to support distributed multimedia applications with more user control and interactivity. Faster processors and hardware, higher network bandwidth and data compression ratios as well as improvements in a variety of related technologies are necessary this purpose. For the communication system to be commercially viable, two considerations are very important: quality of service and cost.

Assessment

1. List the advantages of setting up Computer Networks.
2. Outline the functions of Network Layer of OSI Model.
3. List the types of communication network that are used to provide multimedia communication services
4. Name the Seven Types of Data Networks.
5. State the different data communication modes?

Resources

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- Jeffcoat "Multimedia in Practice – Technology and applications"
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- <http://www.studytonight.com/computer-networks/complete-osi-model>
- Lars C. Wolf , CarstenGriwodz , Ralf Steinmetz,
- "Multimedia Communication", Proceedings of the IEEE, Vol. 85, No.12, December 1997, pp. 1915-1933.
- Ralf Steinmetz and Klara Nahrstedt, "Multimedia :Computing, Communications and applications "
- Stephen McGloughlin, "Multimedia: Concepts and Practice".

Block –II:
Content Development and
Distribution

Unit-1 Desktop Publishing

Introduction

Desktop Publishing i.e. *DTP* is the trend of today's world in the segment of printed communication. There were days when printing technology and computers were costly and beyond the reach of common man.

Desktop Publishing is the process of creating documents using Digital techniques. There are specialized software's available for creating contents. The presentation and documents created out of computer designing software gives a good and professional outlook of a page layout. Contents are arranged in a very neat, clean and aligned manner.

It is used from large scale printing units to a small DTP centre's in a corner of a village or city. Apart from advancement in the software's for Desktop Publishing, there are lots of advancements which have occurred in the printing machinery segment. Lots of manual labour has been replaced by machinery which gives a lot more perfect output with minimal error.

Computer software's are designed with lots of scope in typography which is called "Fonts" in the computer terminology. The output design can be decorated with stylish Fonts as per the need of the theme. A single person gets the capability and power to create a best looking documentation with varieties of input data on his own. Any person who has creative skills and interest can learn Desktop Publishing on the comfort of his/her own and create output equal to Industry Professionals.

In this unit you will learn about Desktop Publishing and the various software utilized in it.

Outcomes

Upon completion of this unit you will be able to:

- Describe the concept of Desktop Publishing.
- Identify the open source software used in Desktop Publishing.
- List Digital Terminologies.
- Identify design tools of various software.
- State the technical aspects of designing.
- Assess the interface of various Desktop Publishing software.

Terminology

Analog It is relating to or using signals or information represented by a continuously variable physical quantity such as spatial position, voltage, etc.

Digital: Digital describes electronic technology that generates, stores, and processes data in terms of two states: positive and non-positive.

DPI Dots per Inch or Pixel per Inch used as resolution for designing and printing purpose.

RGB Red, Green, Blue. These colours symbolises Primary Colours.

CMYK Cyan, Magenta, Yellow, Black. These colours symbolises secondary colours which are used for printing.

Introduction to Desktop Publishing

Desktop Publishing is not limited to creating contents related to text and office documentation only. It has spread its wings from text to advanced graphic presentations. Graphical presentations may be used in creating sales graphs, using image processing in designs and many other latest techniques.

It plays a much bigger role in advertising segment for preparing visual campaigns to promote Products and Services. You see lots of hoardings, banners, posters etc. all over roads, shopping complexes, business house etc. They are all the creation of advanced technological software's in Desktop Publishing.

History of Desktop Publishing

The year **1983** saw the sunrise of the Desktop Publishing for the first time when **James Davise** developed a code in Philadelphia. It was for a community newspaper. In olden days, software's were called *Programs* which were written in codes. The program was *Type Processor One*. It ran on computers which had a Graphics card on WYSIWYG display. In 1984, the software was released in open market commercially by Best Info.

The major breakthrough of Desktop Publishing was in the year **1985** when Apple's *Laser Writer Printer* was introduced in the market in the month of January. In the same year, in the month of July, *PageMaker* software was launched into the market by *Aldus*. PageMaker has been designed in such a way that documentation of hundreds of pages can be done with convenience.

"*Desktop Publishing*" term is a contribution to the founder of Aldus Corporation, **Mr. Paul Brainerd**. In the world of expensive software and equipment's related to colour printing techniques, PageMaker was like an affordable solution to the artists and designers who sought computer as the future tools and technique of advanced designing.

Apart from the introduction of Desktop Publishing in those days, people faced lots of problems like small screen size, monochrome monitors, inability to use letter spacing, line spacing etc. The computer display out did not accurately match the print output. The developers have strived a lot to create graphic designing software's which were compatible with hardware's, operating systems and output devices like printers. There have been lot of developments step by step which has given scope to the Desktop Publishing Industry to flourish.

Now in the 21st century, Advanced & High speed Computer system emerged and Advanced and High End Offset printers also came into existence. These developments led to a lot of scope in Printing Industry. Anything can be designed & printed and printing can be done anywhere. We can print on paper, we can print on canvas, print on glass as well as we can print on wood, iron and steel also. Desktop Publishing is already on an advanced mode and is marching ahead to set new avenues for high standard design and printing.

Digital Artist and Graphic Designer

Art and Science have helped people to attain a higher standard of living. But, there are differences in the process of an Artist and a technical person.

The people who were called Artists now use Digital technology and are called *DigitalArtists*. The communicators or advertisers who used manual techniques to communicate now use Digital techniques and are called *GraphicDesigners*.

A graphic designer creates the graphics primarily for published, printed or electronic media, such as brochures (sometimes) and advertising. They are also sometimes responsible for typesetting, illustration, user interfaces, and web design. A core responsibility of the designer's job is to present information in a way that is both accessible and memorable.

Graphic Designers create the bridge between the product company and the consumers of the product. He portrays the benefits of the product and services of the company in a visually interesting and persuasive format to attract the consumer. The simplicity of the design and communicative approach makes the design successful. These kind of people do not create designs on their own. They have to study the product, the people and the market and create output as per the requirement. Graphic Design is basically more of a science rather than an Art. The following categories of people can be termed as a Graphic Designer:

- Web Designers
- Desktop Publishing (DTP) Designers
- Packaging Designers
- Motion Graphics Designers
- User Interface Designers

A **digitalartist** makes art using the computer as his or her primary tool. He/she is a person who creates Art and Design as per his/her own capabilities and idea. This art can be intended for a CD-ROM, video game, or website; but almost as often, it is printed out and hung on a wall. In many places, the customer or the creative designer brief him to create designs and art according to a particular requirement. He has to keep updating his skills, whether he/she is an illustrator, a graphic designer, an animator, or a game designer, the softwares used by them constantly evolve. The following categories of people can be termed as Digital Artists:-

- Background Designers
- Matte Painters
- Layout Designers
- Character Designers
- Concept Artists
- 3DArtists

In today's world, there has been a amalgamation of both the Digital Artist and Graphic Designer sector. A company wants to employ a person with the capabilities of both segments. Hence, the work of a Graphic Designer has become more challenging, as he is required to be creative on one hand and technicalay skilled on the onter hand.

Applications of Desktop Publishing

Desktop Publishing is used in creating the following works:-

1. Designing for Advertising Campaigning

In promotion and advertisement of a company, designing the identity of the company is very important. It is the looks and feel of the campaign which drags the customer to a company. Information documents such as brochures, leaflets, fliers, magazine advertisement, newspaper advertisement, visiting card, danglers, posters, flex banners etc. are done using Desktop Publishing software's.

2. Designing for In-house Stationary

A company requires in-house stationary items like letterheads, catalogues containing the details of the product, business cards, directories, Annual reports etc. These are also designed and maintained in a very systematic manner in companies.

3. Designing for Publishing Industry

Desktop Publishing is mostly used in Print and Publishing Industry. Books, Magazines, Newspapers come on daily, weekly and monthly basis. These documents will last ever till the existence of the world. Every time new designs and designers evolve out of these Production companies. It is innovative, creative and variety which rules the design world today. New comers are welcome with greatness as equal to experienced professionals. The extreme competition compels the designers to be up-to-date in technology and create new designs every moment.

4. Designing for Project Reports

Student's life today is full of projects and reports. From school to college even in offices lots of project, research, etc. are required to be documented uniquely by each and every student. Hence every year lots of designs are made out of same content, but presented in a creative way using advanced designing techniques.

5. Designing for Resumes

A Resume means Bio-data. It is information of the candidate for a particular job. Today, Resume writing has become one of the expertise service activities. Resumes, Bio-data's, Curriculum Vitae etc. are now even termed as Profile Design of a Candidate. Simple information is represented in a colourful and graphical way by the designer which makes the information elaborate and easily analysed and understandable.

6. Designing for Web Pages and Smartphone

Designing is not limited to the print technology itself. It is used in lots of on-screen presentations also. Designs related to on-screen are PowerPoint presentations, Webpage design templates, sales graphs, production graphs etc. Even Smartphone App design and layout is also done using Desktop Publishing. Blog designs are done using readymade templates available through the WebPages. These template designs are built by the designers and sold as stock to the requisite candidates.

Job prospects after learning Desktop Publishing

Desktop publishers require above average computer skills, including the ability to operate and utilize desktop publishing and graphic software programs to complete jobs. An eye for detail, organizational skills and artistic ability are all skills that desktop publishers utilize on a daily basis. Publishers are expected to follow through to the end of each project, including proofing, correcting errors and finalizing documents for publication. The skills necessary for

desktop publishing may also qualify a publisher for a job in graphic design or as a web designer. There are lots of opportunities for a designer in this era. The digital medium has enabled to develop designs for all the categories which used hand drawn paintings and drawings in the past. These are the following employment areas where a person with an in-depth of knowledge of Desktop Publishing can opt for:

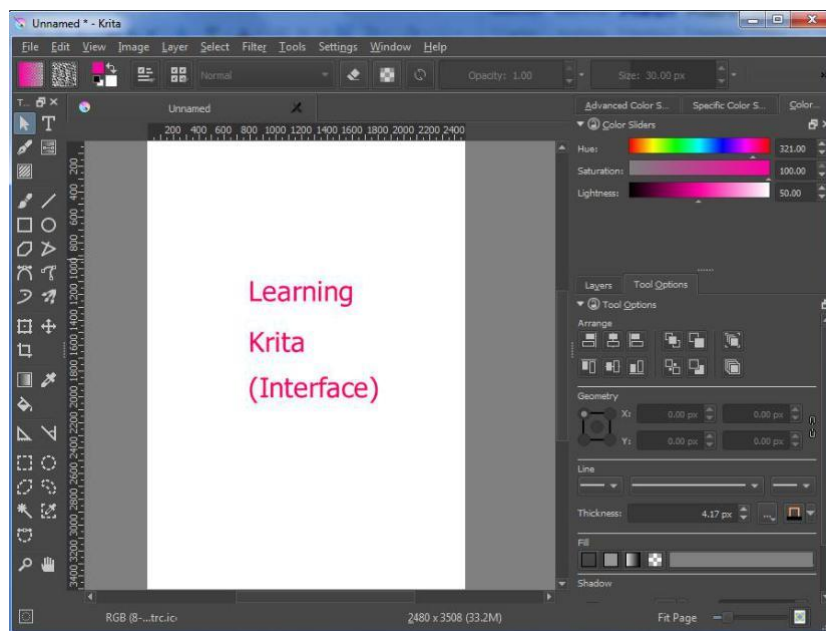
Job Title :- Graphics Designer, Advertising Agencies, Textile Designing Agencies, Illustration / Book / Magazine Publishing Industries, Designing for Web Page Interfaces

The Basic Software used in Desktop Publishing

Open source software's for image editing and vector based designs

There are lots of open source software's available on internet today which enables any person with availability of computers to download them and use it. The facilities available in these kind of software's are almost at par with the commercial software's even though they are not 100 percent equal. These kind of software's act as a stepping stone for the budding designers to enter into the world of Digital design.

Krita



Krita is open source raster based software which is used for creating Digital Painting and also capable of creating Image editing. Digital Paintings is a big market and players like Photoshop used to rule it and still is one of the leader in the Industry. But people from different art communities have created this kind of open source software's with independent coding systems. Developers from all around the world can open the code of the software and create new options as per their expertise and create advancement to the software.

The digital paintings created out of *Krita* are very magnificent and remarkable. People from all around the world use *Krita* to create digital art, paintings, comic books, illustration for books, children's magazine cover designs etc.

Software is only about tools and techniques, it is the creativity of the person which makes the output created out of the tool a master piece.

Features of Krita

- It has lots of varieties of brushes which an artist can use for creating a great art content.
- The screen of Krita is compatible with desktop, laptops and touch screen monitor and touch screen devices.
- Brushes can be used with pressure sensitivity options while drawing using Wacom tablets.
- Textures of seamless size can be created with extreme clarity.
- OpenGL system is used so that the colour depth can be of maximum quality.
- Previews can be seen on real time mode for the filters applied using Krita.
- It has ability to utilize layer capabilities.
- It can import files of some formats.
- It can save or export the file in different formats like JPEG, TIFF etc.

Inkscape

Inkscape is a vector graphics editor which is available as open source on the internet. Vector graphics is the most powerful source of using design works on a digital platform.

Commercial software's for Image Editing and Vector based designs

There are lots of commercial software's available for Image Editing purpose. Softwares like Photoshop, CorelDRAW, and Pagemaker etc. are used for designing purposes. These software's have very good tools and techniques as compared to open source software's. Students can learn these software's by downloading the trial version from the Internet. After learning, whoever is interested to work on these software can purchase the license from the company.

Photoshop

Photoshop is the first preferred commercial software used in the Industry for creating designs. Almost every person in the design industry use Photoshop. Photoshop contains all tools and elements related to Image Editing. Advertisement content creation, personal designs like greeting card, invitation card etc.

In technical terms, designing in computer is called Graphic Designing, Digital Image Processing and in combination termed as Desktop Publishing.

Photoshop has got variety of tools which include retouching tools, which can restore the damaged sections of a photograph, drawing and painting tools helps an artist to portray his creations on digital canvas with rich quality of output, web tools helps a web page designer to create templates for a better webpage. Hence, Photoshop is a perfect commercial package for a designer. It has the capability to finish any designing task effectively and efficiently.

CorelDraw

CorelDraw is a vector based commercial software. This software is one of the leaders in commercial designing segment. It is the product of Corel Corporation. The vector capability of the software has advantages like no pixel distortion while enlargement, less memory consumption for bigger size designs and smooth functionality while operating.

It gives the designer the speed and joy while working in CorelDraw. The creative imagination of the designer quickly converts in form of output with its comprehensive tools and techniques.

CorelDraw is especially used in creating the following types of designs:

- Cover design
- Logo design
- Banners
- Illustration
- Leaflets
- Brochures
- Stickers
- Card Design
- Visiting Card
- Identity Card

Hence, CorelDraw is mostly preferred by Commercial artists.

Illustrator

Illustrator is the product of Adobe Systems Incorporated. This software is a boon for artists who like to draw free hand and create shape related art. The tools of *illustrator* are excellent and have got varieties of scope in drawing geometrical and non-geometrical shapes. The concept of using this software is equivalent to using CorelDraw. Most of the tools and techniques of *Illustrator* is similar to CorelDraw. Hence, it makes learning for the student easier. Learning any one of *Illustrator* or CorelDraw enables him to use both the software's with ease and utilize the benefits of both the software's.

Illustrator is basically used for creating

- Cartoon characters
- Comicbook illustrations
- Book cover
- Magazine cover
- Decorative-Shirt design etc.

This is also a vector based software and the utilisation of vector software's in any operating system is smoother and faster. The options work with perfection and takes very little time to executive as compared to a Raster based software. Hence, *Illustrator* is mostly preferred by Creative Artists.

PageMaker/In-design

PageMaker, which is now known as *In-design* is a perfect package for creating documentations. It is a perfect blend of design and documents. This software is mostly used in the print and publication industry where books, magazines, newspapers etc. are published.

If we have to a make a book of 150 pages which required varieties of designs and placing of common elements in various pages, *In-design /PageMaker* is the best software to do so. This software is a master in creating page layouts. Any type of layout containing images, text, graphs, quotes, tables etc. can be designed efficiently using these software's.

This software has the capability to import design in many formats from other software's. Designs done using Photoshop, Corel CorelDRAW, *Illustrator*, *Krita*, *Inkscape*, etc. can be imported into *In-design/PageMaker* and composed to create a final output.

PageMaker and In-design have the capability to handle text, raster graphs and vector graphics uniquely rather than any other software.

Commonly used terms and elements of Desktop Publishing

Resolution

Resolution is the number of square dots i.e. pixels used on the computer screen. The resolution required for printing differs as per the requirement of the customer. For example, if a person wants to take a print of a subject which he needs to read from nearby of the eyes, then the resolution of the print required is 300 pixels/inch or 300 DPI (Dots per inch).

If the requirement of print is to be read from a far distance like a flex or a hoarding then the resolution needed for the print is 72/100 pixels inch.



Reading a Magazine from nearby *Resolution needed: 72/100 pixels/inch*

the eyes *Resolution needed: 300pixels/ inch*

Imagine a computer monitor of 19” in which we have to design a banner or hoarding of 10’ by 10’. How can a 10’ by 10’ design fit into the monitor of a 19” medium? Here is where the scaling works in computer which we term as resolution.

When we say a resolution of 72 pixels per inch, then the pixel size of a 10’ by 10’ banner design would be-

$$10' \times 10' = 120 \text{ inch} \times 120 \text{ inch} (1' = 12 \text{ inches})$$

$$(120 \times 72) \text{ pixels} \times (120 \times 72) \text{ pixels} = 8640 \text{ pixels} \times 8640 \text{ pixels}.$$

This is the size which is taken in Digital software to create an image of 10’ x 10’ with 72 pixels/inch of resolution. More pixel size will result in slow operation of the computer hence less resolution is taken for larger size printouts.

Resolution of an image has to be considered while designing a commercial design. We have to choose the appropriate size of image while placing it in an artwork. If we use an image with lesser resolution (for example 300 pixel/inch) in a document, then the print quality of the image will get distorted. Hence, while designing resolution, mega pixels and types of camera for photography plays a very vital role.

CMYK

CMYK stands for *Cyan, Magenta, Yellow and Black*. This is the colour mode which is used for printing documents. These four inks are used for printing a multi-colour document. So, whenever we create a document in software for printing purpose, we have to choose CMYK as the colour mode.

Alignment

An operator will become a perfect designer if he sets the alignment of text and images in a correct manner. The types of alignment are left, centre, right, justified and full justified. The alignment is done according to the requirement of the document for i.e., justified for paragraphs, centre for headings etc.

Bleed

After the print of the document is done in the press, the edges are trimmed or cut from the corners to give a perfect look. The area of the page which will get cut is called *Bleed*. So, while designing the designer has to keep in mind the matter which falls on the corner of the documents. Our required designs should not overlap on the bleed area.

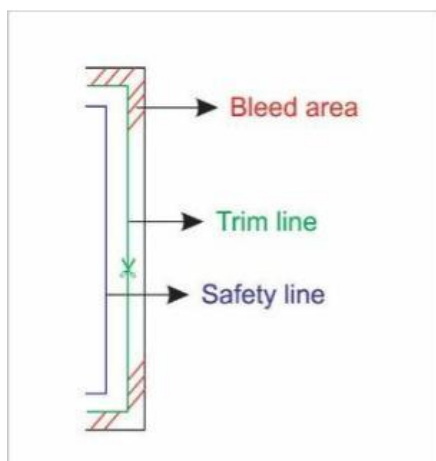


Fig 1.3Bleed area in a design

Attribution: Drawn by Author

Concept

While preparing any design or documentation, the pre-production part of the work is called the *concept*. Concept relates to the thoughts and brainstorming sessions a designer does with clients to get an overall idea of the output before starting the original production of work.

Cropmarks

A '+' mark is created on the corners of a page or document which is called the *cropmark*. This crop mark acts as a guide to cut the documents. Basically crop marks are used in visiting card, invitation card designs etc.

Die-cut



Title-A visiting Card design [Using Diet Cut in the “n” shape] **Attribution-** Nyla Smith

Source- nvision-that.com

Link- <http://nvision-that.com/design-from-all-angles/d-is-for-die-cutting>

Now-a-days, prints are not restricted to 4 sided pages. Designs are done as per various shapes required and then the paper is cut as per the design. So, for cutting as per the design, a die is made which includes of a positive and a negative. Some examples of documents or designs of die-cut’s are dangler’s hanging in a shop of various shapes, packaging designs of biscuits, cartons etc.

Export

There are various software’s used for creating designs and a designer works on different software’s for different utilities. In this case, the design needs to be *exported* in various formats as per requirement. There are some universal formats like PDF which can be viewed on any system with Adobe Reader immaterial of whatever software the design has been created.

Grid

Grid is a very important helping option for an Artist who wishes to do designs based on Geometry. Grid is a formation of horizontal or vertical dots or lines which is displayed as a guide and does not occur in the printouts. It helps in maintaining the structure of the content.

Gutter

A Gutter is a space which is left over for stitching or stapling in the process of binding of a book. The space required in between two facing pages is more than the space required in the corners. A designer has to think and design as per printing technology guidelines.

Layers

Layer gives organisational capability to the designer which helps him to add or remove elements from his design work at any time preferred by him. Layer also helps in placing common contents in design without repeating or duplicating the content.

Margin

Every document is given margins as per the content of the user/writer. Margins enable to place the text or images inside a particular area so that it does not get cut or trimmed in the printout from the corners.

Proof

Before submission of a final document to the next stage a proof reading is done to identify spelling mistakes, grammatical mistakes, spacing etc. It is basically done by the user and in some cases proof reading is made by third parties who are expert in the same.

Future of Desktop Publishing

Desktop Publishing is an evergreen Industry and it will be a necessity till the mankind exists. Designing and printing is required in all phases of life. There was a period where Desktop Publishing was limited to designers. But now-a-days, using software's Desktop Publishing is used by a school kid to a high end professional for making school projects and business sales proposal respectively.

The demand for DTP operators are increasing day by day. People are always greedy for new and quality designs. Each and every new user brings variety in content with the mixture of his knowledge and creativity. The scope and career options in Desktop Publishing is beyond the limitations of sky.

Due to the utilisation of faster internet and Digital techniques, designers are hired from across the continents as well. A good designer with an updated knowledge of Desktop Publishing has a lifelong scope across the world. The payment structure of designers who are good in design and software's are paid very handsomely.

Traditional designing is replaced by Digital designing. It is the knowledge of geometrical drawings and updated software's which makes an ordinary person a useful resource for designing. People of all categories have a taste and design sense in the corner of their minds. Hence, Desktop Publishing has become immensely popular and has a great future.

Unit summary

In this Unit you have learned about the basic of Desktop Publishing and about the open source software's and commercial software's used in the Industry. Now you can download the open source software's which are available on the net for free of cost and practice the possibilities of creating a digital content.

Assignment

Design a visiting card for any company utilizing your creativity and desktop publishing skills.

Assessment

- Write the full form of DTP?
- Write the full form of RGB?
- Write the full form of CMYK?
- List any 3 job prospects after learning DTP.
- Name any three raster based open source software's.

- List three vector based open source software's.
- Write the name of two commercial raster based image editing software's.
- List 10 types of works which can be done through Desktop Publishing.
- What is the resolution required to print for documents which are read nearby our eyes?
- What is the resolution required to print for banners and flex which are viewed from a distance?

Objective Type questions:

State whether the following are True/False:

1. The hardware's used for Analog signs are very powerful.
2. Card Design is the application of Desktop Publishing.
3. Sumopaint is a Raster Based Image Editing Software.
4. Illustrator is used for creating cartoon characters.
5. Resolution is the number of square dots used in computer.
6. Krita is commercial software used for creating Digital Painting

Resources

- www.col.org
- www.wikieducator.org
- www.slideshare.net
- www.ebookbou.edu.bd
- www.knowledge

Unit 2 Multimedia Animation and Special Effects

Introduction

Multimedia is a representation in form of audio and visual to convey information or messages in a convenient manner. Now-a-days all forms of data are processed in the digital way using computers. Computers help to create the data, store the data, process the data and transmit it to various other platforms and devices.

Outcomes

Upon completion of this unit you will be able to:

- Describe about Multimedia.
- Illustrate the history of Animation.
- Exhibit knowledge of 2D & 3D Animation and its process.
- Explain Visual effects in films.

Terminology

Animation	An illusion of motion.
2D	Two dimensional drawings represented on a flat surface.
3D	Three dimensional objects created on an open space.
VFX	Visual Effects used in films made up of Animation and Real time mixing

Basic Elements of Multimedia

As the world is made of five elements i.e., Space, Air, Fire, Water and Earth, in the same way a Multimedia presentation is made up of five elements i.e., **Text, Graphics, Animation, Video and Audio**. The utilization of all the elements creates a beautiful composition of output to create a treat to the eyes of the audience as well as pass on information which can be understood in a very easy way.

Knowledge is the key of everyday happiness. And knowledge is attained by better understanding of a subject. Multimedia applications help to understand matters with comfort.

Introduction to Animation

“*Animate*” word means “*to give life to*”. We call something has life if it has got movement or changes in its shape and structure. Animating an object means that, the movement to the object is given by some external force, not itself. Presenting information in an animated manner gives more visual impact and understanding in comparison to static graphics.

There are various principles of animation which has to be followed for creating a meaningful and appealing subject in Animation.

Animation is a combination of art and science. What to do is the art here and how to do is the science. An output of animation requires lots of trial and errors. For getting a perfect output as desired needs lots of knowledge and information about the technical process of animation. Lots of software's are available in the market for creating animations. An animator has to learn and apply the techniques as per his need.

Definition and Perception

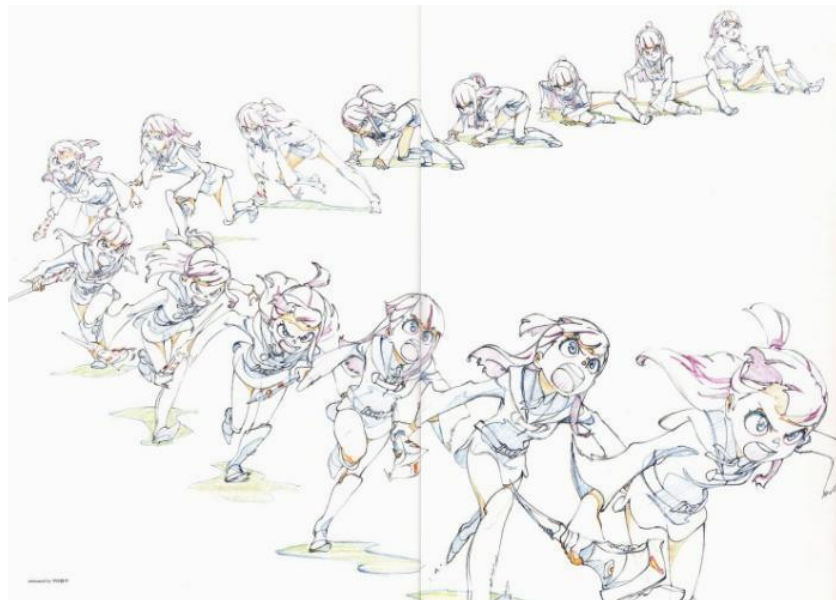
Animation is an illusion of motion created when a sequence of frames consisting of drawing, painting or photographs are arranged in a systematic and planned manner.

A moving sequence of image tells a broader story than a single image. Our human process catches the things which are in motion first rather than what are still. It interprets the situation as per the motion because a motion at various times conveys different information at different time.

Animation came into existence years ago. It started with pencil drawings, which is called 2D Animation. In 2D Animation, an animator has to draw each and every frame. After that came CGI (Computer Generated Imagery). Computers made the animation process lot easier and attractive.

Our eyes generate images to the brain which is processed. Now, if the movement is continuous, then only the information flow is maintained. If the flow of images is not continuous or abstract, then the movement will flicker and create disturbance in understanding.

A figure is shown below which shows a jumping sequence of a body. The frames are arranged in a systematic way of the flow of jump.



Title- Jumping sequence drawn frame by frame

Attribution-

Source-lostmarble.com

Link-

Hence, an artist has to maintain the movement speed of Animation. There are two types of speed, one is called images per second and the other is differential images per second.

No. of images per second	No. of differential images per second
24 frames per second	24 frames per second
A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U	A,A,A,A,B,B,B,C,C,C,D,D,D,E,E,E
,V,W,X (example of images)	,F,F,F,F (example of images)
In the above, there are 24 different images per second.	In the above, there are only 6 different images which are repeated 4 times each to create 24 images per second output.

Fig 2.2 Table showing types of movement in an animation

Attribution : Drawn by Author

Animation is an evergreen industry. It will be existent till humanity exists as it contains all the elements from education, infotainment to Entertainment.

- Go to youtube.com and search some Animation videos
- Go to google.co.in and search for the First Animation Film

Go to google.co.in and search for the biography of Walt Disney.

Terminology in Animation

Append

In animation, if we need to add frames either in the beginning or in between or at the end as required, the process of adding key frames is called *Append*.

In the below example, frames D & E were appended in normal frames of A, B and C.

Frames: A, B, C □ □
 Appended Frames: A, B, D, C, E

Camera

Cameras are used in Animation to add movement to the space where the backgrounds and characters are placed either in 2D or 3D. A camera can show the same object in different angles to give the viewer an extra view. As per the story, the moving of camera gives a great feel.

Frame

A representation of an image in a sequence of image is called *frame*. We can say that each image in an animation sequence is a frame.

Keyframe (key)

Computer Generated Animation has keyframe. Computer software's have the capability to generate the in-between frames by itself from the extreme positions given by the user. The extreme position is called *Keyframe*.

Frames per second (FPS)

It is the number of *frames in one second* which maintains the speed of the animation. It can be defined by the user in the software.

Transition time

The time which is in-between the keyframe is called *transition time*.

Transition type

Transition type defines how the object will transform from one keyframe to the other keyframe.

Update keyframe

The keyframe can be changed from time to time as per requirement which in turn changes the animation. We can *update keyframe* at any time.

Timeline pane

Timeline Pane is the bible of an Animator. He can plan, visualize and control the total animation according to his ideas. It consists of keyframe, layers, frames, locking system, hiding system, transparency or opacity control etc.

Current time indicator

In the timeline, we have got frames i.e., 1, 5, 10, 15, etc. The time or frame at which we are currently in is indicated by a line which is called *current timeline marker*. We can interactively move this line and view the various timeline action of the animation.

Cluster

Cluster is a group of keyframe nearby each other. It makes easy for the animator to move a cluster than selecting a group of frames each time. We can expand the cluster and adjust the individual keyframe as well.

Overlay

Overlays are on-screen text or image elements that add extra detail and information to the animation. Text overlays include titles and paragraphs. Images include watermarks and full-

screen or centred images. Dynamic text overlays include text that changes based on whether it is pulling properties from the map's camera, time, and/or range settings.

Extremes

The main drawings in 2D Animation is called Extremes. They are drawn by the Senior Animators.

In-betweens

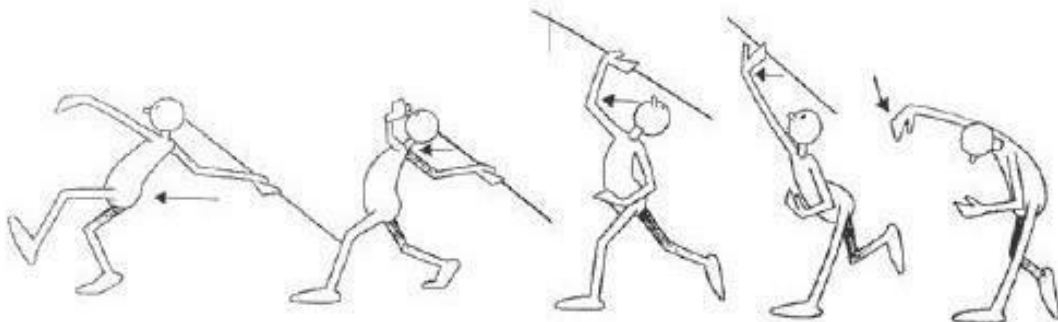
These are the drawings which are drawn in between two extreme frames. They are mostly drawn by Junior Animators.

Introduction to 2D Animation

2D means TWO DIMENSIONAL.

2D animation is divided into two parts. One is called *Classical Animation* and the other is called *Flash Animation*.

In **classical animation**, the artist or the animator draws each and every frame to create an illusion of motion. It is the traditional process where hundreds of animators create thousands of drawing to create an animation film. Animators used to draw frames which are arranged in a sequential manner and played at a speed of 24 frames per second in a projector to create motion.



Title- Fig 2.4 2D animation

Attribution-

Source- animationbrain.com

Link- <http://www.animationbrain.com/follow-through-overlapping-2d-animation-principle.html>

In **Flash animation**, computer is used and the tools and techniques are in digital form. From drawings to animation, everything can be done through computers. Computer software has an advantage of optics animation where the in-between frames are automatically generated from the keyframe. It reduces the animator's time of work and creates a perfect calculative output.

With a mixture of traditional process of animation and CGI (Computer Generated Imagery) a complete animation production is carried out.

Heritage of 2D Animation

Animation is an age old profession which started from an unknown seed and has grown to become a huge tree which is a multi-billion dollar industry now. The output of animation today had been the dream of animators of the olden days.



Title-Fig 2.5 the traditional Zoetrope

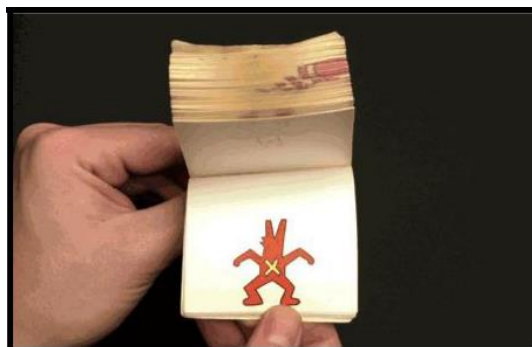
Attribution- [Andrew Dunn](#)

Source- <http://www.andrewdunnphoto.com>

Link- <https://commons.wikimedia.org/wiki/File:Zoetrope.jpg>

Persistence of vision, which displays a series of images to form a movement, was known to the human being in the 1800's.

Zoetrope was a device which was invented that displayed a series of picture as a motion which was also called “wheel of life”. Zoetrope was made up of a cylindrical shaped object which had an axis of rotation in the centre. A series of drawings were pasted along the cylinder. Outside was a small frame where people would peep into with their eyes. When the zoetrope is spun, the images looked like a motion in the single frame area. This led to the invention of a new type of industry to provide education as well as entertainment which we call as Animation Industry today.



Title-Fig 2.6 A Flipbook or “Kineograph”

Attribution-

Source- flickr.com

Link: <https://www.flickr.com/photos/cambodia4kidsorg/77297367>

The next step to visualization of motion was *flipbook*. This was a bit easier process than zoetrope. It did not need such solid equipment's. Flipbooks can be created from a sequence of pages on our own. An artist would draw a series of drawing on the flipbook and then by scrolling the flipbook, the animation can be seen.

Flip book is also called "*Kineograph*" in the olden days.

So, step-by-step from manual process things changed to digital. 2D Animation software's were a big breakthrough in the Animation world. Animation software's like **Toon Boom, US Animation, Animo** etc. created a lot more comfort zone for the animators to create contents. In olden days, only trained artists who can draw well had the scope of becoming an animator, but today any person with creative interest and technical knowledge of Animation software can create a piece of Animation content on his own or with a team.

In history, people struggled to survive with animation knowledge, but today people struggle to create excellence in animation. It is all about passion and quality and not limited to bread and butter only. Excellent and creative animators have raised much beyond history to create a great fortune for themselves as well as Animation lovers in form of giving great Animation Films.

Process of 2D Animation

The procedure of animation is divided into three parts:

- **Pre-Production**
- **Production**
- **Post Production.**

Pre-Production

Concept:

The production of an Animation, an Advertisement or any documentary starts with a concept. The concept can be entertainment, information spreading or education etc.

Script:

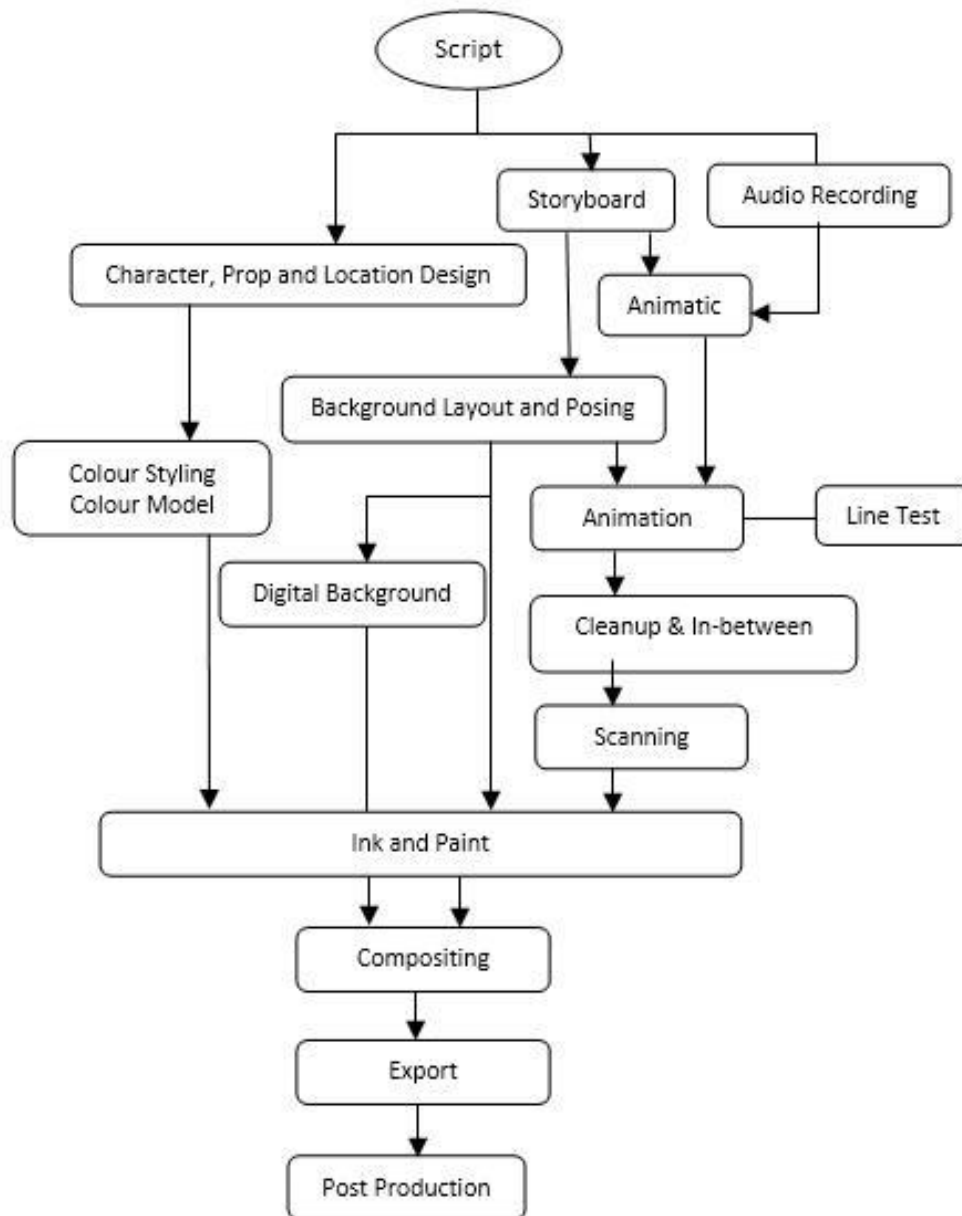
The concept is developed into a story. Then the story is written in form of a script where all the characters, backgrounds, situations etc. are described.

Storyboard:

The script is then developed into a storyboard which shows the sequence of happenings in a drawn or visual manner. This helps in understanding the story in a better way and provides plan for creating the animation scene-wise.

Audio Recording:

Before starting the actual animation process, the sound is roughly recorded and arranged scene-wise. The recording includes the narration, character voice over dialogues, background music etc.



Title:Fig. 2.7 Flowchart of 2D Animation Process

Attribution :Drawn by Author

Animatics:

A rough animation is done out of the storyboard where still or semi animated substances are placed and matched with the sound. It is also called "*leica reel*". These animatics help the animators to fit the animation or draw the animation according to the requirement of time.

Design:

Before starting actual animation, lots of still designs have to be made. Background art sketches, character design art sketches with colour shades are made in plenty and then the director decides the final style of design to adopt in the animation.

Colour Styling:

There are lots of colour styles. One is called *flatcolouring* where only flat colours are used. Second is *flat and patch colouring*. Here the patch is also a flat colour but in the shades of dark and bright which adds depth to the subject. Third is called *gradient shading*. This involves gradient shade of colours. This is very difficult to apply in each and every frame of character animation. Basically, gradient shades are used in Background matte paintings.

Production

Layout:

Layouts are the detailing out of the storyboards. A storyboard is formed into a scene which is divided into Background, Props, Character animation etc. It also gives information about the camera movement in the scene. From this stage, the work of different artist and animator is established by director and distribute it to them with a deadline.

Background painting:

From the pre-production stage of design, Background sketch is collected and developed by the Background painting artists. They are also called *Background Matte Painters*. They are called so because background paintings are done layer wise which can be changed at any time as required in the scene.

Animation:

Animation is planned using an X-sheet called the *Exposure sheet*. Here comes the main action of the animators where they use their knowledge to present the characters in form of movement. It is a very hard working job which requires lots of concentration and working hours.

Exposure Sheet:

Exposure sheet is like a treasure map where the direction of creating an animation is outlined. It is also called *dope sheet or x-sheet*. It is the traditional tool which is used by the animator to plan and organize his work. The X-sheet is a longer paper than A4.

Pencil Test:

After drawing for animation, the line drawings are passed through a pencil test which will display the line of action or animation. If any rectification is required, it is done at this stage itself.

Clean-up& In-between:

The first drawn drawings are conceptual hence rough with lots of outlines and shades. When the drawing passes the pencil test and gets approved, it is passed on for clean-ups. Here the drawings are traced with the perfect outlines which can be coloured through computer software's. Lots of junior artists perform the in-between drawings from the extreme drawings created by Senior Animator.

Scanning:

This is the section or a bridge which connects the manual with the digital. All the hand drawings are scanned and converted to digital image format. Scanners have the capability to straighten the images if even they are in a slanted angle. This is done by reading the peg holes in paper.

Light board:

Light board is the board which is specially prepared for Animators. It contains a light, a dish and a scale. The passing light acts as a reference to draw new frames in comparison to old frames to maintain the size and form of the drawings.

Ink and Paint:

The digital drawings are redrawn through computer software's and then coloured as per the pre-production style. This is done in a quite comfortable way using computers in comparison to olden day hand paintings.

Compositing:

This is a place where all the components which are created separately by different artists and animators are mixed to form an output. The background, the character's Animation, Sound mixing, Special effects, Camera movement etc. are exchanged from the reference images and rough drawings used in animatics.

Export:

After the composition, the final step is to render and export the scene. Rendering takes very long time to process all the information and create the output.

Post-Production**Music &Fx:**

Music is the most essential part of an Animation film. Music includes Background music, dialogues, funny effect tracks and all the elements which are required for a scene. For example, Tom and Jerry Animation, the sound effects accompanied by the character's motion gives a complete feel of the situation.

Editing:

Editing is the mixture of A to Z output of processes involved in the three stages of Animation. It is the creation of sync of audio, video and the effects in a ready format to create the output.

Final Output:

Final output can be created in various formats as desired i.e., for Cinemascope film, for Television, for DVD, for Blue-Ray, for Youtube and so on.

First 2D Animation Film

“Snow White and the Seven Drawfs” was the first full length

colour feature film created by Disney Studios in the year 1937.

This film involved hundreds of artists working for the film in the studio.

First full length (CGI) -3D Animation Film

“Toy Story” was the first full length 3D Animation film completely done using CGI (Computer Generated Imagery). In the year 1995, it was produced by Pixar Animation studios directed by John Lasseter.

Widely Popular Animation Studios in world

- Walt Disney Animation Studios
- Pixar Animation Studio
- Warner Brothers
- MGM
- Dreamworks Animation
- Industrial Light and Magic
- Bluesky studios
- Cartoon Network Studios

Introduction to 3D Animation

3D means **THREE DIMENSIONAL**.

Today we have 3D software's like **Blender, Max, Maya**, etc. in which we can building a totally 3D structural design of both organic and in-organic object. The whole universe can be built in 3D and give them the look of natural existence.

3D objects use transformation i.e. Move (Position), Rotation and Scale & Shape deformations to create objects. Animating in 3D is used in a technical way where the look and feel of the object remains unchanged till the end. In 2D, the different frames of the same character have got the possibility to differ depending upon the talent of the artist. But, in 3D, once the object is modelled, it can be viewed from any camera angle without affecting the body proportions due to perspective.

Heritage of 3D Animation

In the early 60's, people created 3D Animation in form of *clay animation* using *stop motion techniques*. 3D puppets or models were created using clay and plasticises. Strings were attached to them which functioned as bones. Each and every move was staged and photographed frame by frame to create an animation. Films like “**Gumby**”, “**Wallace and Gromit**”, “**Shawn the sheep**” etc. were created by an animation studio named Aardaman Studios.

Stop motion animation is a very time consuming process and takes hours and days of hard work to create a perfect output of few seconds only. Stop motion animation was used in

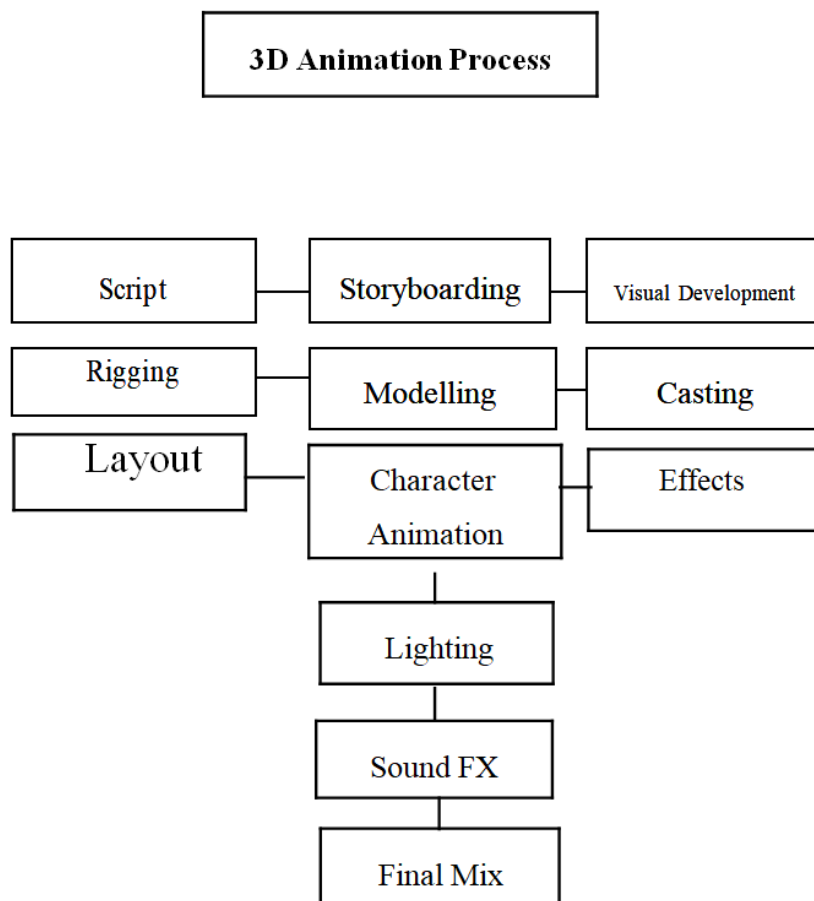
bollywood film “TaareZameen Par”. It is the feeling which makes the kind of work exciting and passionate.

Computer generated 3D Animation came into existence with **Pixar Animation Studios**. The studio was founded in 1985. It took them 10 years to create “Toy Story” which was the first full length 3D CGI film. 3D film or 3D content required high end computer machineries. From Workstation to rendering frames, the technical aspect consists of 60% of the whole project.

3D Animation is not limited to fully generated animation films. Animation is used in live action films, in Advertisements, in Television, documentaries, educational contents etc. Animation makes the content more informative and interesting to watch.

Process of 3D Animation

The process of 3D Animation is involved through Computer software’s. The process is very long and complex for the artist. The artist has to have the knowledge of creative design with the blend of learning of advanced tools and techniques in the software’s. Without the in-depth knowledge of software, the artist cannot bring his imagination into reality.



Title: Fig 2.8 Flowchart of 3D Animation Process

Attribution: Drawn by Author

Concept & Storyboards:

In the 3D Pipeline, the first and the foremost step required is the *concept* and *storyboarding*. Here, the storyboard artist has got lots of freedom as compared to a 2D storyboard artist. The 3D storyboard artist can give numerous camera angles of a same shot and elaborate the scene to understand in a focused way. The storyboard looks like a comic book page where a sequence of event happens one after the other.

3D Modelling:

3D Modelling is the process of bringing the concept drawing and sketches into a structural form with measurements of X, Y and Z dimensions. The artist's work is divided into **Character Modelling, Background Modelling and Props Modelling.**

Character Modelling is called *Organic Modelling* where the object has to be modelled taking into consideration the animations of the character. The animations include body movement, facial animation and dress interaction with the body of the character.

Background Modelling and Props Modelling is called *Inorganic Modelling*. These models do not change in physical structure and are still components. The only changes that can be made to inorganic models are moving, rotation and scale.

Texturing:

Colouring in 2D is replaced by texturing in 3D. After the character or object is modelled, it has to be textured with colour, maps accompanied by creating its UVW structure. It is also called *UVW Mapping*. UVW mapping is the process of displaying the texture in the specified area of the object in a particular manner as desired. The texture maps are either photographed or created using image processing software like Krita, Photoshop etc.

Rigging & Skinning:

Rigging is the process of applying artificial bones to the modelled character. *Skinning* is the process of applying the bones to the vertices of the character. This is a very important department as the perfect rigging and skinning enables the animator to move the joints of the body as required by providing a natural blend to the viewer. The joint sections of the body is very difficult and time taking to be rigged as the jointed move with multiple bones connected to each other in a proportion.

Animation:

Animation is providing movement to the modelled character and objects as per the story. Here the animator has to only take into view the movements. The animator need not bother about the model or the texture. Keyframe animation, motion capture animation etc. are techniques used in 3D Animation to bring realistic type of movement in the model. Physics and Dynamics are also used in animation to create special effects like blasting, collapsing, liquid flow, car animation etc. Here in Dynamics, the animation is controlled by programs which create a smooth and natural effect in motion.

Lighting:

Lighting is the process which brings the scene from darkness to light. Light is a special department in 3D. The lighters light the scene with all kinds of natural to fantasy feeling. Lights effect is a combination of light setting in the program with the texture and material

applied to the object. Objects can be given opacity, glossiness, bump etc. which reflect onto light of the software and create a realistic effect.

Camera Techniques:

Camera in 3D software has created endless choices to visualize a scene. Even mini to micro space can be seen through the movement of camera. It has added detail as well as increased output of a specified subject. If we want to increase the time of overall output, then we can create a new camera angle out of the same scene, hence benefitting both the animator and the viewer.

Rendering:

Rendering is a very time taking process. It required heavy configuration systems to render and create the output of the works done using 3D software's. It is the final output processing of all the working done in modelling, texturing, lighting, camera, animation etc. It is a very important process and especially people are appointed for rendering who have the knowledge of systems, software and Graphic cards.

Compositing & Special Fx:

Compositing in 3D is similar to compositing in 2D. After render the animation in 3D, the output is taken to the editing table, where the visuals are synced with sound and special effects are added. In Compositing it is not only the animation, live action feeds can also be taken and blended with animation. Films like **Narnia, King Kong** etc. are best examples of composition of Real life, 3D Animation and Visual Effects.

Music & Foley:

Music effects are added in the visual output to make a real time feel. In Animation movies, lots of sound effects has to be added to make the scene real like sounds of flowing water, closing of door, humming of birds etc. Smaller to smaller details of sound is required to be fed to make the scene lively.

Editing & Final Output:

After all the preliminary output elements are joined, now comes the time of final output. This is the time of bearing the fruit of all the hard work done during the process. The final output is exported to various formats so that it can be viewed in all platforms i.e. Television, Internet, Mobile Cinema Hall etc.

Introduction to Special Effects

Special Effects have become an important part in each and every film. Animation has overcome the boundaries of cartoons and is now a genre of both children and adults. Animation is done with such perfection that it is difficult to judge it as artificial motion. With the composition of real time and animation even the fantasy scene look like very real and lively.

Computer software's have played a great role in establishment of the Special Effects industry. Software's like **Blender, 3dsMax, Maya, Nuke, Fusion** etc. provide all the technical capabilities with ease to generate effects. Apart from the manmade keyframe animation which was used earlier is combined with physics simulation, dynamic effects and particle

systems which generate animation perfectly and automatically out of the programs. The speed, direction, collision etc. are all specified in the program due to which huge scenes involving hundreds of animated objects is performed in a systematic manner to provide excellent visual results.

Out of the Special Effects or Visual Effects, a whole virtual world is created out of nothing. Scene of **Pandora Planet in the Avatar film**, the **Skull Island of King Kong** and the **battle field of Baahubali** are all combination of Live action and Visual Effects. The shooting of the raw material of the film is very critical and requires lots of pre-production planning i.e. placement of green screen, placement of markers, placement of cameras etc. A whole visual FX team works on all stages till the complete output.

Special Effect is divided in two categories i.e. *optical effects* and *mechanical effects*. Special Effects involved the effects used during the live action shootings, whereas *Visual FX* is the effects created in CGI (Computer Generated Imagery) using various software's.

Mechanical Effects are used during live action shooting such as utilizing high speed fan for wind effects, spraying of water for rain effects, spraying of smoke for fog effect etc. The flying effect of actors in action sequence is used by tying ropes or wires to them. In Visual FX, the ropes or wires are removed frame by frame which is called *roto (rotoscopy)*.

Optical effects are the photographic effects which are created using different kinds of camera lens.

The use of Visual FX has increased due to the availability of high end workstations and rendering farms in affordable cost. This has enabled even the low budget film makers to use Visual FX in their films. Fantasy has always ruled the human mind and the taste of visual effects will keep the Industry alive for the FX thirsty audience.

History of Special Effects

In the year 1857, "*Trick Photograph*" was created by combining a sequence of 30 numbers of negatives. This was the worlds first ever created Special Effect by **Oscar Rejlander**.

The first and foremost motion film special effect was created by **Alfred Clark** which was accepted commonly by the Industry and the audience in the year 1895. In this film, there was a sequence of beheading of Mary through a sword by an Actor. The shot was done till the sword neared Mary's head. The camera was stopped and all the actors were told to freeze in the same position. The actress Mary was replaced by a dummy body and a dummy head with the same dress resemblance of Mary. The camera started and the sword beheaded the dummy head which looked like a real shot although artificially done.

This was the first every kind of Photographic trick done in a cinema. Much such kind of effects came into existence during this period like – *multiple exposures*, where two shots were combined with transparent lens technique. Transitions such as dissolves, wipes, zoom in and out were used to separate one scene from the other.

Sculptures, Miniatures, background matte paintings etc. were used to create special effects during that period.

In the year 1910, Norman Dawn invented the matte shot which was a great achievement in special effects. Matte shots enabled artists to fill the blank section with hand drawn paintings. Glass was used in short and the single frame was exposed onto easel. In the easel, the matte

was drawn by the artist. Natural images were created using this effect; hence these effects were very successful.

In the period of 1950's and 1960's various new effects were created which added reality to the scene. Science fiction films were made and lots of fantasy was created. People used to see which they ever visualized in their dreams. This brought the happiness and dragged them to the cinema halls.

Manual effects slowly move towards CGI (Computer Generated Imagery). Using Computer software's and programs photo realistic output of images began to form a trend in 3D animation. Any character or object, background etc. can be modelled using 3D, rendered Photo realistically and can be brought into life with animation.

Steven Spielberg's "Jurassic Park" started the trend of advanced Visual effects using Mechanical Equipment, stop motion technique and computer techniques. By 1995, Toy Story emerged as the full length 3D Animation. Now the VFX films are countless and endless with Fast and Furious, Baahubali, Robot, Hulk and the names will never end.

People are required in the above industries and many more and also in various categories as mentioned in the process of 2D and 3D animation. Career opportunities are available both the government sector as well as the private sector. Digitisation has given growth to creation of lots of digital content using Animation.

Hence, the Industry is growing at pace with the population. But, the thumb rule is the person who is creative, hardworking and sincere in creating the output is only rewarded and awarded.

Unit summary

In this Unit you have learned about the emergence of Animation and Special Effects. It explained the process of creating an

Animation film both 2D and 3D. It also clarified the difference between the animation and special effects.

Assessment

1. Name the first full length colour 2d animation film.
2. Which was the first 3d CGI animation film?
3. Name 6 2D animation films.
4. Mention 6 3D animation films.
5. Name 6 VFX Films.
6. Define Animation.
7. Name the basic elements of Multimedia.
8. Mention the Full form of: 2D, 3D, , VFX
9. Write a detailed note on the three major steps in the process of animation.

Resources

- www.col.org
- www.wikieducator.org
- www.slideshare.net
- www.ebookbou.edu.bd
- www.knowledge

Unit 3 Social Networking and publishing

Introduction

In a society, everything is interlinked in one way or the other. Even though we are not directly linked to a factory, we utilize the products which are manufactured in a factory undergone by the labours of many professionals in their own category. So, when the resources can be interlinked, then why cannot the minds and thoughts of the people of various categories cannot be interlinked. Why should our feelings, thoughts and experiences be limited to our friends and relative circle only?

This thought gave birth to an Industry called **Social Networking**.

Outcomes

Upon completion of this unit you will be able to:

- Describe Social Networking services.
- Use Internet for Social communication.
- Create your own Blog.
- Create Facebook, Twitter, and Instagram accounts.
- Setup a Google group.
- Select videos from YouTube

Terminology

Networking:	Interact with others to exchange information and develop professional or social contacts.
Blog:	As a noun, it is any article which is written and published on the internet. As a verb, it is an act of writing for internet.
Blogger:	A person who writes articles regarding the subject of his choice and posts it on the Social Networking Blogging Sites.
Social:	An informal social gathering, especially one organized by the members of a particular club or group.
Search Engine:	A website which gives links to a set of words searched on Internet. For e.g. searching a word “India” in the string will provide all the name of websites containing the word “India”.
Template:	A readymade pattern which is already set. You have to replace the text of the demo with your text; you have to replace the demo photo with your photo. It is very easy as you don’t have to make the basic settings and design.

Social Networking can be done by any person who has even a bit of knowledge of operating a computer or Smartphone. He/she can register themselves and share their information the social networking websites. It is not only about sharing and exchanging contents; it is about the value and knowledge created out of this content which makes it a resourceful platform.

Social Media Networking is a platform which gives you information about the happening around the world at a fingertip. Whenever a person learns about new knowledge, he spreads it and discusses it with his friends, colleagues, relatives etc.

This new activity keeps him alert and away from the outdated past. So, Study and learn to socialize and keep yourself updated as well as help others to be updated and live a healthy and happy life.

There are various modes of sharing information from text to pictures, from video to audio, from hand drawn images to Graphical presentation. Messages are shared in all types of digital formats possible on the Internet. In most of the cases, Internet connection is a necessary requirement for utilizing the social networking websites. Internet providing companies have grown leaps and bounds and in today's world, we have access to the huge world of Internet at a very economic and affordable price. The success of Social Networking largely lies in the hands of Internet service providers. Without the economic and faster Internet connectivity it would not have been possible.

There was a period when Internet was charged per hour and people had to wait at cyber cafes for their turn to have a glimpse of internet to check their mails and gather information from sites like Wikipedia and Google etc. But now Internet is at the finger tip of every human being via Smartphone's, Tabs, PC's and Laptops.

Information is the source or solution to every need of the day. From film ticket booking to train ticket booking, from sharing text jokes to sharing music videos, everything is done via Internet. We need Information in every sector i.e. education, agriculture, weather, entertainment etc.

Social Networking sites are the bridges which connect one world with the other. It is not the destination or the source; it is the connective pathway which connects two or more users to share their contents & comments. Facebook is one of the largest content distribution companies without a single content of its own. All the contents of the Facebook belong to the users. Facebook connects the links of the contents. In the same way "whatsapp" has lots of information stored in the memory of the device of the users without any major server of its own.

Chatting on internet is also a form of Social Networking. Exchanging text messages, audio messages and video message also form a major part of the day activities of the users. People love to meet new people and make friends. This possibility was limited in the olden days where friendship develops only after a few meets. A glimpse of a real foreigner gives the feeling of extreme pleasure in our minds and was treated as a fantasy. With the help of internet and social networking, this fantasy dream has crossed all the barriers & limitations and we can develop friendship with people from foreign countries as well as share our common personal and professional activities.

Social networking is a boon to the society and it brings transparency in flowing of information either from a good occasion like winning a game or from a bad occasion like "tsunami" in a country. The information spreads like wild fire via social networking and helps and suggestion flows at a tremendous rate to solve a problem. Democracy has also spread via Social Networking. Majority opinion of public about any issue is easily popped up using surveys and votes conducted by Social Networking Companies.

Advantages of using Social Media Services

A small child has curiosity to listen to the stories told by their grand-parents. It is about the happiness of learning something new which is inherited in each and every human being. Whenever we see a gathering anywhere, we stop to have a look at that event and want to

know the cause of the event. This is the simple tendency which has forced billions of people to use Social media networking. It is the thirst of knowledge which drags them to the well of Social Networking websites and apps.

People use internet and social networking on personal level and feel happy at every message or video. It is the same feeling which we get when we see an aeroplane passing over our heads. It is just entertainment; it may not be knowledge every time which fascinates people towards something.

Students and people utilize information as a source of their education. Whether they are making a new project on some subject or other, they seek information about social networking sites. And the best part of social networking sites is, it is totally free to view the information asked for by the user. Social Networking sites can be referred to as robotic teachers or counsellors of the new generation. These are people who provide free educational resources on every subject and guide users to achieve their goals for free. They have a positive assumption of knowledge grows while spreading.

Working level professionals also need help of Social Networking sites related to information of their genre. For e.g. a salesman is transferred to a new territory to which he has never been before. So he requires lots of information regarding places and people of that area. All the information of these categories can also be obtained through various Social Networking websites. There are lots of people of helping nature who provide information without any greed of their own and just to help others.

A film has been made on “facebook” named “The Social Network”. This film shows the thought behind the maker or concept creator of “facebook”. People use the services Reading for free and the revenue is generated elsewhere i.e. Advertisements etc.

You should watch this film to have a practical idea on Social Networking.

Introduction to social Networking Interfaces Using Google

What is Google?

We have heard Stories of “Genie” out of a magic lamp that asks for people’s wish and fulfils them in a matter of seconds. *Google* can be regarded as the same information “Genie” which provides links to all the worldwide information at a click. It serves as a connectivity link to the worldwide websites. It is technically called as “*SEO*” i.e. *Search Engine Optimisation*. The founders of Google are **Larry Page** and **Sergey Brin** from America. There is interesting information about the founders that they were students studying Ph.D. in the Stanford University of California. It states that techniques and ideas are not depended upon qualifications and age. Anyone who has a better solution to a problem can rule the world.

Steps of Using Google

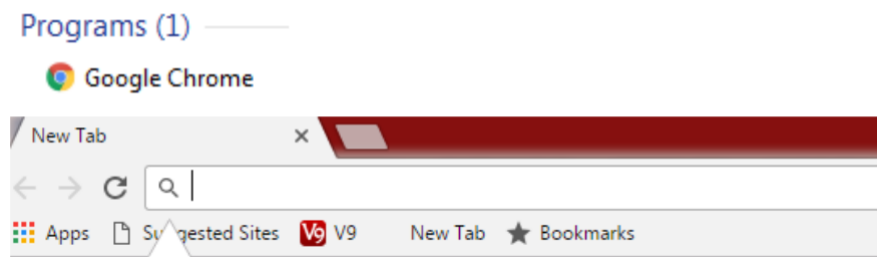
Define the Purpose:

Need of an information i.e., I want to know the birth date of Ratan Tata.

Steps:

Open the computer or Smartphone with access to Internet.

Go to (Left Click) Google Chrome or any other internet browser



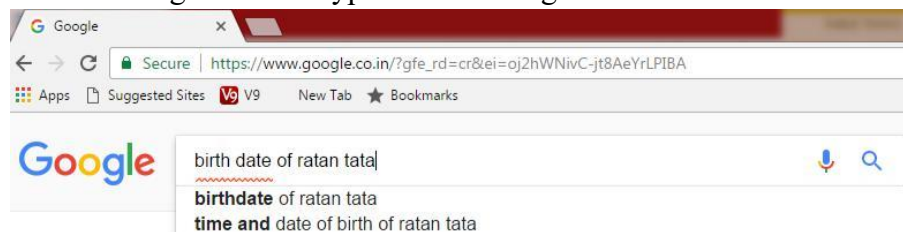
Screenshot

Go to address tab of the Chrome and type :www.google.co.in



Screenshot

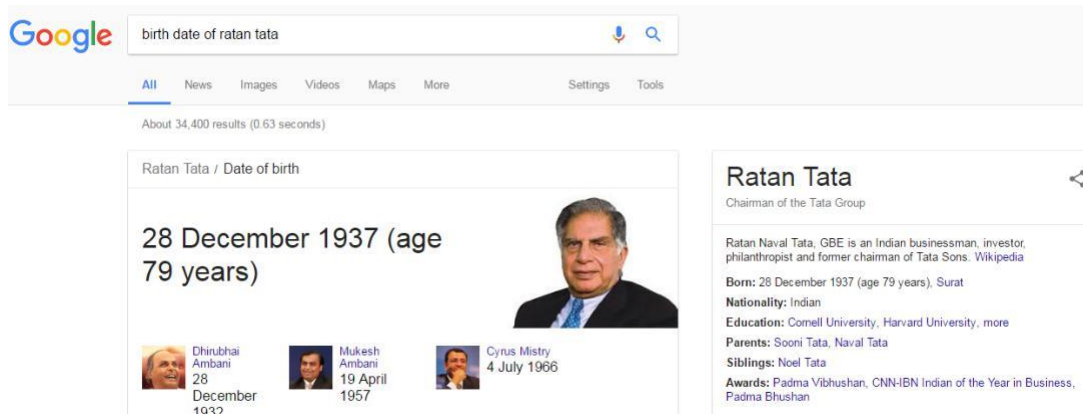
On the search tab of the Google website type the following “birth date of RatanTata”



Screenshot

Press Enter

You will get websites which contains information about the queried subject.



You will get the information about your queried subject as well as Google will suggest you about information are which are similar to your query.

Computer websites are now being programmed with an additional ability called *logical thinking*, with the help of which is can think like a human about similar possibilities.

Here are a few questions which you need to answer by gathering the information from google.co.in

Question	Answer
Who was the First President of Germany?	
What was the full name of Hitler? When was Hitler Born?	
What is full name of the current Prime Minister of India? Where was he born? [Note: This is a question whose answer is variable according to time]	
Who founded Reliance? What are the name of his sons?	
Who is the current Chief Minister of Tripura?	

Using Gmail

What is Gmail?

Pigeons were the source of communication in olden days as read in the history articles. The professionally and systematically organized Postal Services came. Now it is *Gmail* which transfers our message beyond all limitations, boundaries and borders of countries at the click of a second. This service is totally free and anyone can utilize internet and create their Account/Id in Gmail.

Gmail not only sends information but it also keeps a list of all the messages sent and received in a very systematic manner. People can view files sent years before at a glance. Gmail provides a fixed space for messages, images and videos via Google drive. Gmail acts an efficient Office Administrator who perfectly documents the official/personal communications.

Uses of Gmail

- Sending Mails
- Chatting
- Managing your Emails
- Managing your Contacts
- Used as Identification Id in the Web (Cyber) World

Steps for creating an E-mail account using Gmail

Opening Gmail in the Browser

Open the computer or smartphone with access to Internet.
Go to (Left Click) Google Chrome or any other internet

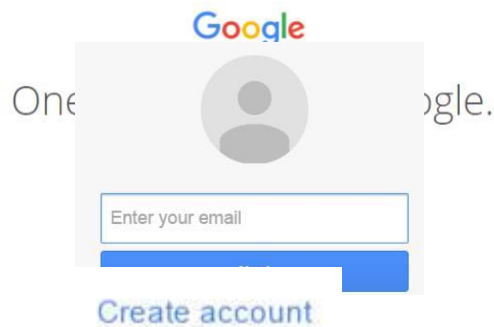


browser. **Screenshot**

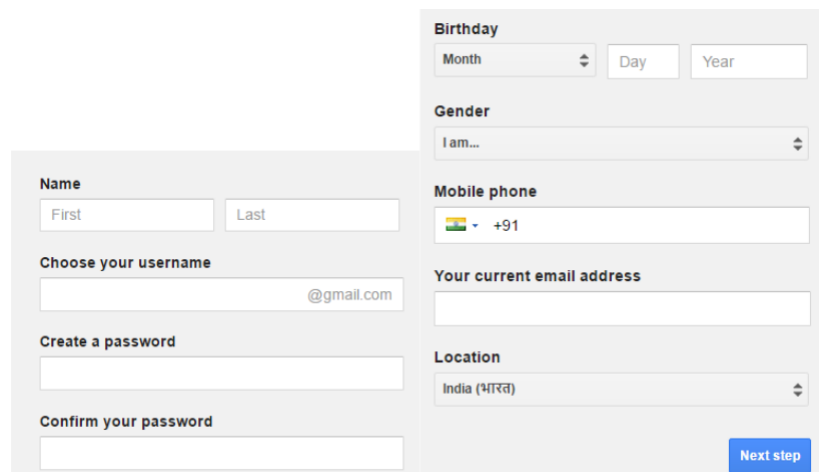
Go to address tab of the Chrome and type :www.gmail.com



Screenshot

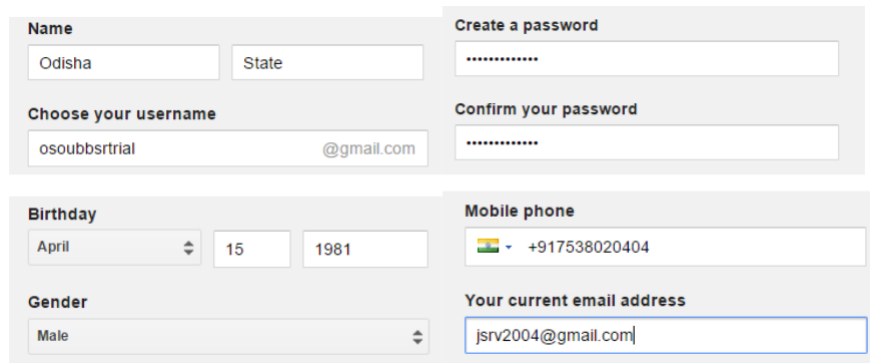


Left Click on Create Account Link
Filling in the Registration details.

A screenshot of the Gmail registration form. It includes fields for Name (First and Last), Choose your username, Create a password, Confirm your password, Birthday (Month, Day, Year), Gender, Mobile phone, Your current email address, and Location. A 'Next step' button is visible at the bottom right.

Screenshot

After filling the above details: Left Click on Next Step



The screenshot shows a registration form with the following fields:

- Name:** Two input fields containing "Odisha" and "State".
- Create a password:** A password input field with masked characters ".....".
- Choose your username:** An input field containing "osoubbsrtrial@gmail.com".
- Confirm your password:** A password input field with masked characters ".....".
- Birthday:** Three input fields for month ("April"), day ("15"), and year ("1981").
- Mobile phone:** An input field containing "+917538020404" with a country code dropdown set to India.
- Gender:** A dropdown menu set to "Male".
- Your current email address:** An input field containing "jsrv2004@gmail.com".

Screenshot

Privacy Policy; You have to read the policy of the company and then press “I Agree” to continue.

Successful notification of Email creation by the company.

Welcome!

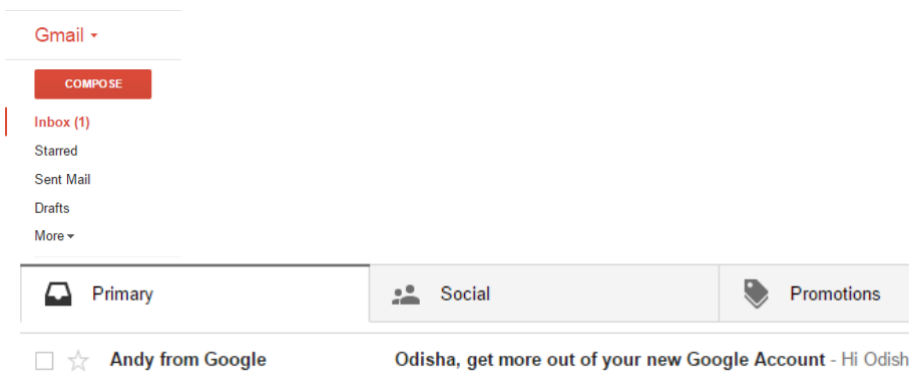
Your new email address is osoubbsrtrial@gmail.com

Thanks for creating a Google Account. Use it to subscribe to channels on YouTube, video chat for free, save favorite places on Maps, and lots more.

Left click on continue to Gmail.

[Continue to Gmail](#)

The Primary Inbox of Gmail



The screenshot shows the Gmail interface with the following elements:

- Navigation:** "Gmail" with a dropdown arrow, "COMPOSE" button, and a list of folders: "Inbox (1)", "Starred", "Sent Mail", "Drafts", and "More".
- Primary Tab:** The "Primary" tab is selected, showing a list of emails.
- Email List:** The first email is from "Andy from Google" with a star icon. The subject is "Odisha, get more out of your new Google Account - Hi Odish".

Screenshot

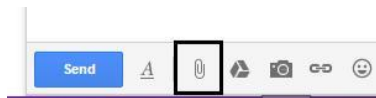
How to send an e-mail with an attachment of a photo?

Left Click on Compose under the Email.
Type the Matter.



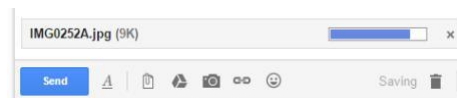
Screenshot

LC on the attachment symbol from under.



Screenshot

Choose your Photo to be attached.



Left click on Send

And DONE. You have successfully sent an email with a Photograph.

Using Google groups

What is a Google group?

A group indicates to individuals who have a common interest. For i.e. people who are interested in carom game like to share information regarding carom shots and techniques, competitions organized in specific locality related to carom etc. Likewise there are lots of common interest groups.

These group concepts have been put by Google on the internet/web in form of *Google groups*. People register into the groups they are interested on via their Gmail account user name and password. A person can join as many groups of his desired interest or requirement.

Commonly shared information reduces the memory and size which would have been consumed by individually mailing the contents. For i.e. a notice regarding carom competition is posted on the Google Group site in a PDF file format. The file is placed in a fixed location and all the people of the group access it from a single destination. If the PDF file had been mailed to each and every individual, then the memory consumed on the server would have been duplicated by the number of members in use. Hence, this concept of Google Groups is technically and socially a useful contribution to the people.

Advantages of Google Groups

Suppose there is a class of 24 students and 1 teacher. The teacher wants to give some reference tutorial file to all the students of the class. Now, if the teacher collects the e-mail id of each and every student to mail the material, it would be a bit lengthy process. In this case, if a common Google group is created where each student can individually log into and share the content. Simply speaking, it is a notice board where there matter is written and the interested students can go and see it.

It is very easy and helpful in long run information of Alumni also. It is not required to collect phone numbers or addresses as done before to form an Alumni.

New members can join and share the common information provided earlier also.

Steps of Googlegroups

1. Registration

The person who creates the Googlegroups is called the “Administrator”. He/she can set the rights of the group whether it has to be public or limited to the members of the group only.

The Administrator can do the following:

- Create the Googlegroups in a name as he specifies.
- Can set the group to be limited or public.
- Can have the rights to join members only on verification.
- Can have the rights to check the matter of information before posting.
- Can remove any member if there is any violation in rules of the group.

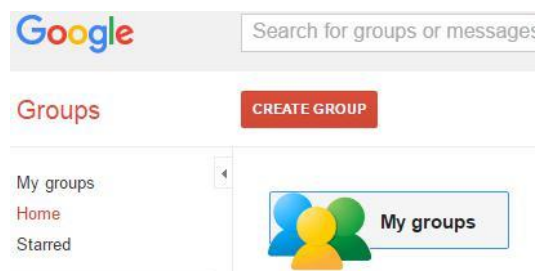
Process of creating a Google groups

Open the computer or smartphone with access to Internet.

Go to (Left Click) Google Chrome or any other internet browser



Go to address tab of the Chrome and type : www.groups.google.com

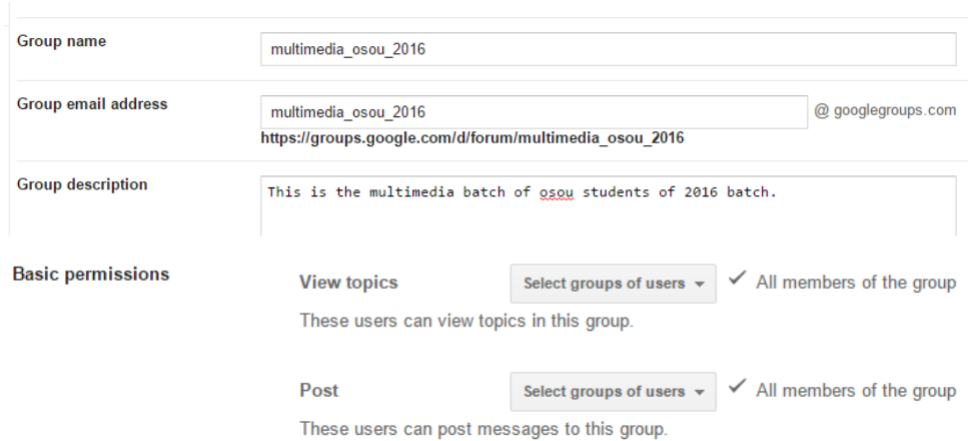


creenshot

Left Click on “Create Group”

Filling information about the group

Left click on “Create” Button

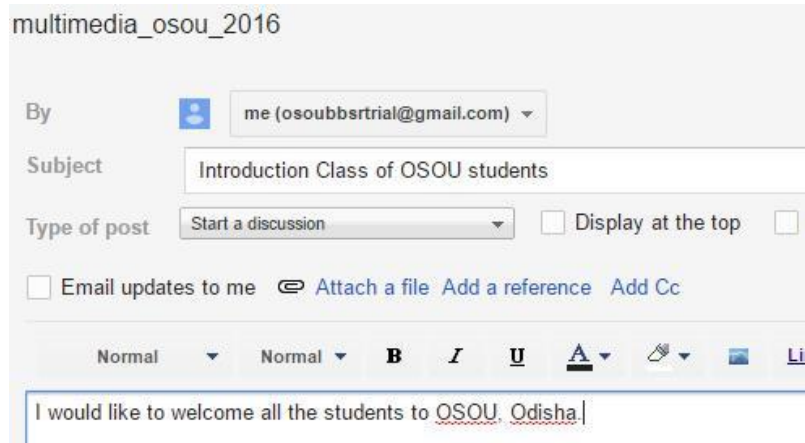
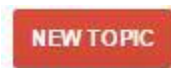


The screenshot shows the 'Create Group' form in Google Groups. The 'Group name' field contains 'multimedia_osou_2016'. The 'Group email address' field contains 'multimedia_osou_2016@googlegroups.com' and the URL 'https://groups.google.com/d/forum/multimedia_osou_2016'. The 'Group description' field contains 'This is the multimedia batch of osou students of 2016 batch.' Under 'Basic permissions', the 'View topics' and 'Post' permissions are both set to 'All members of the group'.

Screenshot

Creating a New Topic

Left Click on “New topic”



The screenshot shows the 'New Topic' form in Google Groups. The 'By' field is 'me (osoubbsrtrial@gmail.com)'. The 'Subject' field contains 'Introduction Class of OSOU students'. The 'Type of post' is 'Start a discussion'. There are checkboxes for 'Display at the top' and 'Email updates to me'. The text area contains 'I would like to welcome all the students to OSOU, Odisha.' The text area has a rich text editor toolbar above it.

Type the Information

Left Click on



Joining the Group

Note down the name of the group. Open your Email id in the computer.

Go to groups and Search for the group by entering the Group name.

Once your Group is Displayed. Click on the Group and Click Join



DONE.

You are now a member of the group.

Now you can also POST messages in the group.

Any new message posted by any member can be viewed and commented by the other members.

All the students of the batch are advised to sit together and finalise the name of their group.

Everyone should note down the common name which has been finalized.

Any one student can be chosen as Administrator [i.e. Class Monitor] and given the duty of creating the maintaining the group activities.

Every student should login to their Gmail Id and add themselves to the group so that they can get access to the notices posted in the Group.

Using YouTube

What is YouTube?

There was a time when videos were limited to Television & Cinema Halls. There is much curiosity among people for video related contents. *YouTube* is the solution to all the video lovers of their own category. It is like a Vide search engine which gives the link to video related to our search string. It not only gives a particular link, but also gives links of videos related to other strings also. For i.e. if we search for World cup India, it will give links to all video events related to the World Cup.

In YouTube, people can also upload their own created content and share it among the users of the internet.

Benefits of YouTube

- You can watch videos of Film Trailers, Music Videos etc.
- You can upload your own created video.
- You can watch Films.
- You can subscribe to YouTube channels of your favourite genre.
- You can create your own YouTube channel for free of cost.

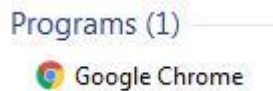
Steps of YouTube

Registration

There is no need of Registration for viewing videos on YouTube. However there are some videos which need your Gmail id and password for viewing.

Opening YouTube webpage

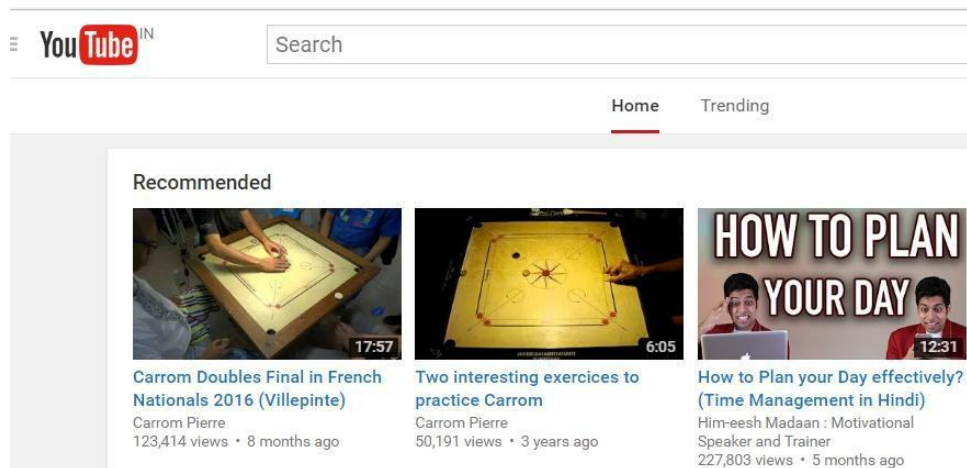
Open the computer or Smartphone with access to Internet.
Go to (Left Click) Google Chrome or any other internet browser



Screenshot

Go to address tab of the Chrome and type :www.youtube.com

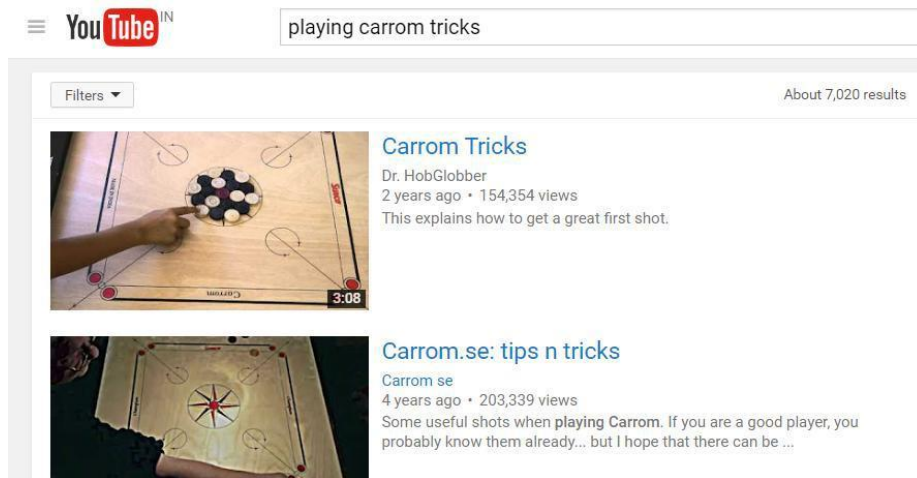
YouTube Interface



earching a video

In the Search option of Youtube type “playing carrom tricks” and press Enter

Youtube will show you a number of videos which are uploaded by people about Playing Carrom.



You can see that there are about 7,020 results i.e., around 7,020 videos on Carrom tricks. This is equivalent to a huge course from various people who charge you no cost for viewing their lectures.

This is the future of sharing knowledge. Anyone can learn anything from youtube and get benefited.

Using Facebook

What is Facebook?

Facebook is in the hands of every Smartphone users today. The purpose of Facebook is sharing information. Imagine a friend meeting after a long time. We would discuss with him about all the good and bad happenings in our life. Facebook connects the friend instantly over their network. It keeps them connected unlimitedly till they are connected to the Internet. They can share their photos, videos, audios and text information instantly and it is on their timeline. All the friends related to him on Facebook can view the post on the timeline. They can like the post, share the post and can even add comments on the post.

Apart from personal information, people also share new educational information, news related information, and health related information etc. on the internet. It is totally free to use this Facebook website and anyone can register using Email Id.

The founder of Facebook is **Mark Zuckerberg**. Facebook is a network which is growing at a pace with the population. It is not only a website or app; it is a solution to the human world with the knowledge distribution capabilities.

Benefits of Facebook

- Facebook is a free website and anyone can register.
- It is a free app for Smartphone users who use it for no charges.

- It forms a links of friends with friends and a network automatically forms between common friends. It creates a big chain naturally and we are socializing on the net with people and forming friendships with new people of similar thoughts and beliefs.

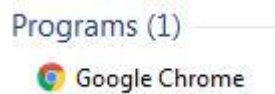
We are able to use all the benefits of Facebook just sitting in front of a Pc or a Smartphone.

Steps to open a Face book Account

Opening Facebook

Open the computer or smartphone with access to Internet.

Go to (Left Click) Google Chrome or any other internet browser



Screenshot

Go to address tab of the Chrome and type :www.facebook.com

Creating a New Facebook Account

In the start-up screen enter your details.

 A screenshot of the Facebook "Create a new account" form. The title is "Create a new account" and the subtitle is "It's free and always will be." The form contains several input fields: a name field with "OSOU" and a "Trial" dropdown, an email field with "osoubbsrtrial@gmail.com", a confirmation email field with "osoubbsrtrial@gmail.com", and a password field with ".....". Below these is a "Birthday" section with dropdowns for "15", "Apr", and "1981", and a link "Why do I need to provide my date of birth?". There are radio buttons for "Female" and "Male", with "Male" selected. At the bottom, there is a "Create Account" button and a small disclaimer: "By clicking Create Account, you agree to our Terms and confirm that you have read our Data Policy, including our Cookie Use Policy. You may receive SMS message notifications from Facebook and can opt out at any time."

Left Click on Create Account after filling in your details.

Steps of Facebook Process

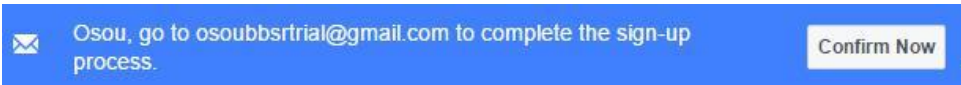


Screenshot

Left Click on Next

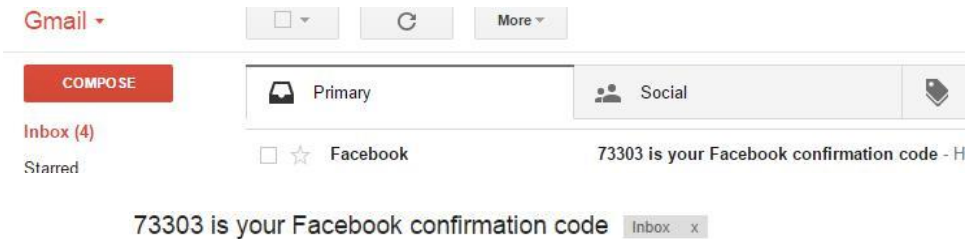
Note: The Process changes time by time, but the overall concept is same.

Confirmation of Facebook Account



Screenshot

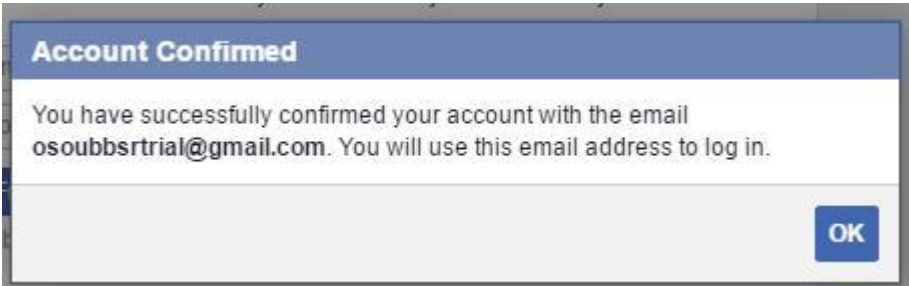
Open Your Gmail Account
Open the Mail Sent by facebook in the Inbox



Screenshot



Left Click on Confirm your Account.



The Account confirmation information will be displayed on the screen as above.

Your Facebook Account is Ready.

Adding Friends to your Facebook Account

In the find friends tab, type the name of your friend.



Screenshot

Choose the name of your friend

Left Click on Add Friend

A request will be sent to your Friend.

If your friend Accepts your request, he will be added in your Friends List.



Screenshot

You will be able to see common friends of your friends and you have the option to Send them a Request to Add Friend. This called SOCIAL NETWORKING

Posting a Message on the Timeline

The Area where you want to share your message in the facebook is called "TIMELINE".

The Message which you share is called "POST"



Type your message in the message box.

You Can attach any Photo or Video by clicking the “Photo/Video” button

Then click on “Post”

Chatting with your friends

In the right side bottom corner of the facebook you will get the Chat box where you will find the list of your friends.

By the side of their name, there will be a green button or grey button. Green button symbolises that the user is online and he can instantly see the message which you send. Grey button symbolises that the user is offline. Once you send the message, he can see the message once he comes online.

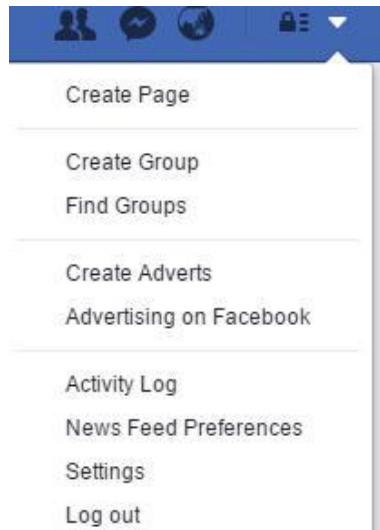


Left Click on the name of your friend to chat.
A Chat message box will open



Logging out of Facebook

Go to the right side top corner of the facebook.



Screenshot

Left Click on Log Out

Logging in to Facebook

Open the computer or Smartphone with access to Internet.
Go to (Left Click) Google Chrome or any other internet browser
Go to address tab of the Chrome and type :www.facebook.com



Screenshot

Enter your Email Id and Password and Left Click on “Log In”

Likes and Sharing

Any Post which you are interested or informative can be “Liked” or “ Shared”



Screenshot

Setting and Adding Profile Photo and information.

Go the settings in the right side top corner and Fill up the Blanks as you need to be displayed on your Profile.

Using Instagram

What is Instagram?

The Smartphone's of today has the capability of a Digital Camera with resolution as far as up to 10 to 20 megapixels. People click images every now and then and post them on internet social networking sites. *Instagram* is one of the sites where people can instantly share their photographs. It is a site exclusively for photograph lovers. This site can be accessed through PC, Laptops as well as Smartphone's.

Benefits of Instagram

It is mostly used for sharing our memories on the Internet.

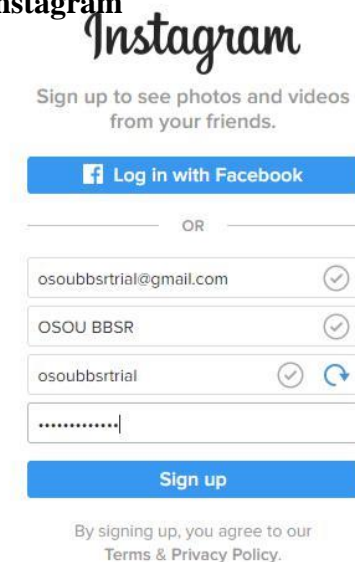
Photographs really speak much more than the words. It is fascinating to watch a new photograph with a variety of content.

Steps to open an Instagram Account

Opening Instagram

Open the computer or Smartphone with access to Internet.
Go to (Left Click) Google Chrome or any other internet browser
Go to address tab of the Chrome and type :www.instagram.com

Creating a New Account in Instagram



Enter the details of your information and Left Click on “Sign Up”

Adding a Profile Photo

Left Click on Adding a Profile Photo
Now you are ready to Add Photographs and Share Photographs.

Using Twitter

What is Twitter?

Twitter is a short messaging site where people post their views about any particular happenings. It is basically used as a Public Relation tool for celebrity fame personalities. People follow their favourite personalities on twitter on daily basis. Fan letters of previous days are replaced by tweets today. Tweets have the capability to display the mind frame of any person. It has brought praises to positive people and created troubles for negative minded people.

Benefits of Twitter

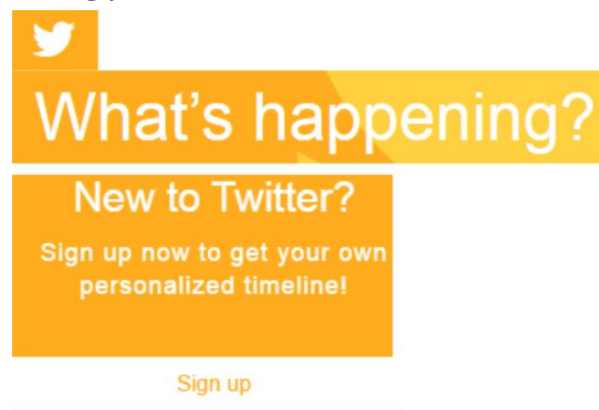
- It is mostly used for sharing experiences on the Internet.
- Mostly people share their ideas on the views of different people.
- It create a scope of an open group discussion even when are alone at home. These kinds of group discussion create a positive attitude in the people and make them capable of public speaking.

Steps to open a Twitter Account

Opening Twitter

Open the computer or smartphone with access to Internet.
Go to (Left Click) Google Chrome or any other internet browser
Go to address tab of the Chrome and type :www.twitter.com

Registering yourself in Twitter



Find the “Sign Up” button and Left Click on it.

Join Twitter today.

✓

✓

✓

Tailor Twitter based on my recent website visits. [Learn more.](#)

Enter your information in the box and Click “Sign Up”

Enter your phone.

Your phone number keeps your account secure, connects you to friends and makes login easier.

Twitter will send a verification code to verify your Mobile Number.

Read the SMS which will be immediately sent to you and enter the Code.

Verify your phone.

We sent a code to +91 75380 20404. Enter it below so we know you're a real person.

[Re-send SMS](#) | [Edit phone number](#)

Then Left Click on Verify
Then choose an user name

Choose a username.

Don't worry, you can always change it later.

 ✓

Suggestions: osoubbsrtrial1 | osoubbsrtrial2 | osoubbsrtrial3 |
osoubbsrtrial4 | osoubbsrtrial

Screenshot

Next

We're glad you're here,
OSOU Trial.

Twitter is a constantly updating
stream of the coolest, most
important news, media, sports,
TV, conversations and more—all
tailored just for you.

Tell us about all the stuff you love
and we'll help you get set up.

Let's go!

Left click on “Let’s go”

Now you can Post Messages as you did in the Facebook.

Creating your own Blog

What is Blogging?

Magazines and newspapers are a part of life of every human being. Everyone have their favourite monthly magazine and a daily newspaper. People feel proud when their written article gets published on any one of the above. Secondly, everyone does not get a chance to make into an article of a magazine. Social Networking sites have opened gateway to all kinds of people interested in writing Articles. People can make their own sites and publish articles on it without any investment. These free form articles which we write and publish o the net is called *Blogging* and the sites are called *Blogging websites*.

Blogging websites invite people to publish their blogs in their web space. Some blogging sites even pay for blogs if they get sufficient traffic.

People get a chance to share their ideas and creations through Blogging and spread their name in their specific area of expertise. Blogging ranges from essays, article about particular happenings, tutorials of any particular subjects, memorable incidents etc. Any article can be written and posted on blogging sites. It gives the writer to gain experience which will be useful if they want to turn professional in writing.

What kind of people Blog?

People who have the passion to enter into the huge world to display their capabilities used Blogging as a platform. It is not limited only to professional writers. Any amateur with tons of spelling and grammatical mistakes can also blog and post on the Internet. It is about sharing the personal views regarding any event occurring in the world. These people come from all corners of the Universe.

There are professional website blogging companies who have created very easy and user friendly interface of the websites which enable all types of users to post their Blogs.

Benefits of Blogging

It opens the hearts in form of text and displays it to the whole world.

Ability to reach the global audience all over the Universe.

Our passion is not only shared by us, but also shared by common thoughts of other people also. We teach from our blog as well as learn from others blog. It is a win and win situation to the reader as well as the writer of the blog.

Blogging is done in categories of personal interest. For i.e. learning computer tutorials, cooking recipes, health related tips, sports and events, films and T.V. serials etc. Every person has a hobby and every hobby has a community all over the world. By entering into blogging, we form a community and also are a part of it.

Characteristics of a Blog

- A blog is equivalent to a website.
- It is created in categories of a particular interest.
- It is a free source of information published on the net.
- A blog may contain text, images, videos etc.
- A blog shall contain links to reference websites of the similar topic.
- A blog may contain the details of the writer of the blog with a link of comment button or a reply button.
- Blogs are arranged either day wise of receipt or category wise.
- A Blog site consists of a header, footer and contents in between them.

Blog and Communication

Bloggng is a form of communication on Internet. It is not only about the social part, but after a certain period it gets converted into commercial expectations. People begin with writing and sharing as a hobby. But when their writings or information is well appreciated and

viewed in huge numbers then there is possibility of commercialization of the content which in turn can also earn a very good amount to the blogger.

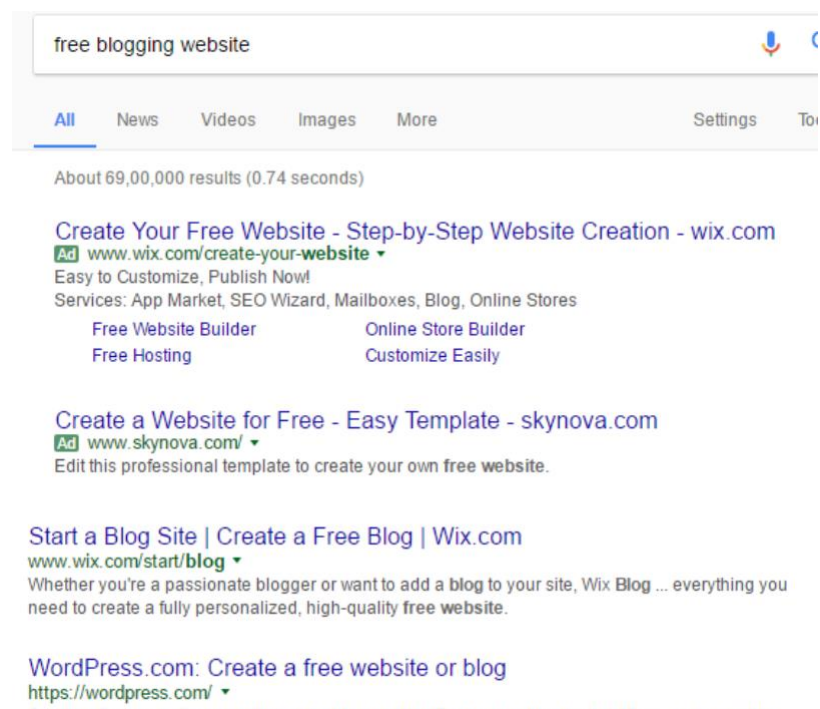
There are systems on Internet which can track the number of hits/visits to a particular website. Through this numbers we can know that whether our written blog has garnered substantial interest or not. Any communication tool of today is accepted whole heartedly, whether it may be Facebook or Watsapp. Any media which enhances communication has become successful due to bloggers who invest their precious time on internet to share their valuable contents.

Steps to start Blogging

Searching for a free Blog site

- Open the computer or smartphone with access to Internet.
- Go to (Left Click) Google Chrome or any other internet browser
- Go to address tab of the Chrome and type :www.google.co.in
- Left click on the Search Bar and type “free blogging websites”

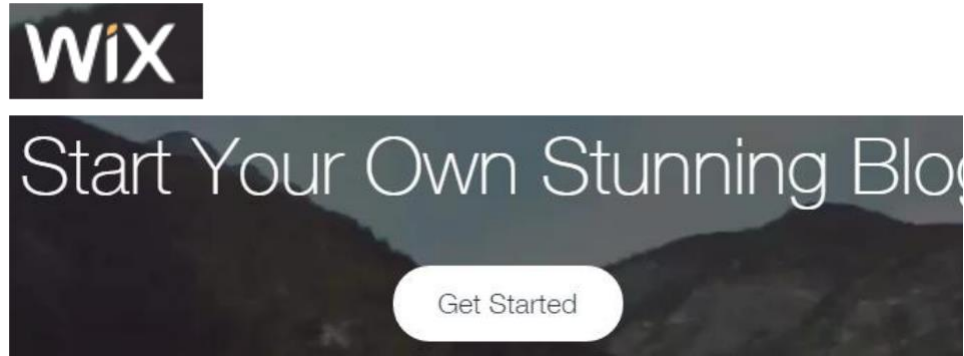
Screenshot



Here you will get a list of sites of free blogging. Let us start from the site mentioned in google i.e., www.wix.com/start/blog

Registration in the Blog website

- You can choose any site of your own.



Screenshot

Left Click on “Get Started”

Entering your information

Email
osoubbsrtrial@gmail.com

Type your email again
osoubbsrtrial@gmail.com

Password
●●●●●●●●●●

Type your password again
●●●●●●●●●●

[Sign Up](#)

Screenshot

After enterin the information Left Click on “Sign Up”

Choosing the type of website

Create Your Website with Wix ADI

Use Wix Artificial Design Intelligence to help you create your stunning website.

Start with Wix ADI

Screenshot

OR

Create Your Website with the Wix Editor

Easy drag and drop, advanced design features, specialized Apps and more.

Start with Wix Editor

Let Us Start with “Wix Editor”

Pick the Blog website template you love



Traveler Blog

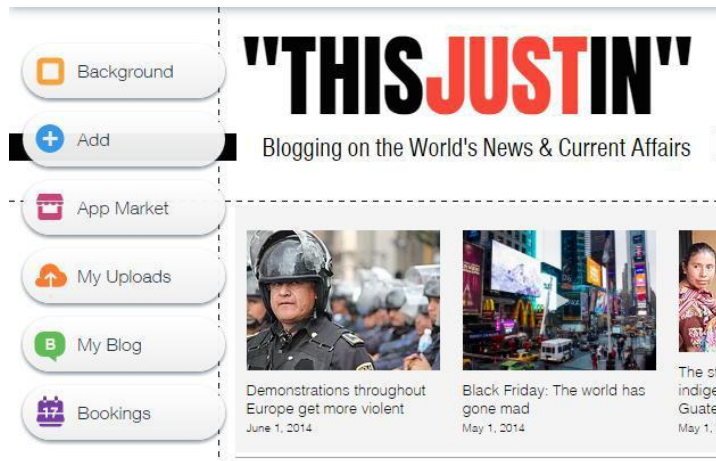


Personal Style Blog

Screenshot

You can Pick your Blog Template.

Entering your information and photographs



eScreenshot

From this stage onwards you have to follow the instructions as shown on the Blog screen.

You can have your photos and text already ready before starting a Blog site.

Components of a Blog

There are five significant sections of the blog:

- The Background
- Header
- The Content Area
- Footer
- The Side Bar

The Background

The *Background* is the backdrop of a design website. It may be:

- A Flat Colour
- A Gradient Shade of Colour
- A Faded Photograph
- A Tile of a Small Part of an Image

Header

Header is the top most portion of a website which contains the title of the blog. It also contains some quotation lines or taglines which relates to the contents of the blog. The design and look of the blog depends on the content writer. The content writer can use simple text as well as use attractive animated banners and images.

However, the contents with text and minimal images are easy for downloading on internet. Utilisation of larger size images take longer for the webpage to load.

The Content Area

Content section is the main part where the blogger writes his article which may comprise of text, images, graphs as well as animated flash banners and videos. It covers the maximum space in the blog website which enables the readers to read with clarity. Contents may be in precise or it may also be in complete detail. It depends upon the availability of the web space. Now-a-days there are ample of free space provided by the blogging site companies. Hence, space is no more a barrier for bloggers. It is the content which decides the fate of the blog. If the content is wonderful and useful and well marketed it will attract lots of visitors and add more clicks to the site.

Footer

Footer contains the information about the user and any copyrights if done by the user. In some sites, it shows the number of visitors who have visited the site. This automatically updated live using Java programming's while creating the website.

The Side Bar

Some bloggers use varieties of links for different articles. In the side bars, we can see the link to more articles from the author or links of various articles of different authors and related to the same subject. Sub division makes the content to be better understood step by step. The user can pin pointedly pickup his matter of interest from the links.

The Choice of the Audience and your Role as a Blogger

Apart from lots of benefits to the blogger and the use, there is a lots of traffic and competition in this segment. As the matter of source is free, there are millions of people who use this service to portray themselves as a valuable and resourceful person in the internet community.

As the matter of availability is plenty, it is the audience choice which decides the fate of the blogger. This creative field is like a one way traffic, either you are a huge success if your content is appreciated by the public or you are a huge failure if the content is not like by the public. There is less possibility of a midway in this profession.

So, the blogger has to strive and work hard to present a better content to make them appreciated. It is not only about content creation and blogging. We have to place our content on right websites and use online digital marketing techniques like advertising, flash animated banners etc. to pull traffic to our websites.

Popular Social Networking Sites

Apart from the Social networking sites described above in this unit, there are also several other popular sites and Apps which are used for social networking. It depends upon the convenience and choice of the user to choose a social network for communications.

Whatsapp

Whatsapp is a platform used to exchange chat related information which includes text, video, audio etc. It is an instant messenger which transfers data immediately for free of cost. However, the data charges of internet provider are applicable. The main advantage of

Whatsapp Company is that they don't have huge servers of their own. They use our memory chip of our Mobile as a server on behalf of Whatsapp.

Messenger (Facebook)

Messenger is a service provided by the parent company of Facebook. The chat service of Facebook use messenger to make text chats, audio calls and video calls. People all around the world can interact with each other only at the cost of data charged by internet service provider.

Hangout (Google)

All the users of Gmail have been provided with a platform of *Hangout* where they can chat between each other; It similar to other chat messengers. It has all the latest facilities of communication in form of text, audio and video.

LinkedIn

LinkedIn is a website which connects people in various professions. We have to create our profile in LinkedIn & it is publicized on Internet. People of common interest in the profession can contact each other and share their queries or doubt regarding work related to their business.

Tumblr

It is specially a blogging site where people share their articles. It is owned by Yahoo Group. People can post their articles with photographs and videos. It is very user friendly and anyone with basic computer knowledge and Internet connection can prepare a blog of their own.

Unit summary

In this Unit you have learnt about various types of **Social Networking websites**. We have also created our own profiles and blogging sites using the techniques taught in this unit. This experience will help you in creating a valuable content of your own. This will open the door of possibilities in your mind. This knowledge of the unit will not only help you, also will be useful to your family members also if you share this knowledge with them.

It is your choice to be a leader in the Social Networking sites. You have the power in your own hands to enter into the internet networking working world and earn name and fame using your knowledge.

However, lots of references, practice and external guidance will be needed to become an expert in this subject.

Assessment

1. Write down the user id of all the activities done above:
2. You're User Id of Gmail.
3. User Id of Google group.

4. User Id of Facebook.
5. User Id of Instagram
6. User Id of Twitter
7. Your link of your Blog website:

Write down the process to upload and share an album of 10 photographs on your Facebook account.

Describe the process to upload an article on your blog.

Resources

- www.col.org
- www.wikieducator.org
- www.slideshare.net
- www.ebookbou.edu.bd
- www.knowledge

Unit 4 Content Distribution Systems

Introduction

Content Distribution medium is very vast and widely spread whereas Content Distribution systems are the bridge between the content provider and the end user.

Content distribution systems act as a platform for Creative Persons and Content development companies to showcase their talent to the whole world and earn name and fame for themselves. Content Distribution Companies are professional and abundant with resources which are required for Distribution.

Before gaining knowledge about Content Distribution, you have to know about the requirement of the existence of this medium. In old days, people used to grow vegetables and take them to the market to sell on their own. Thus, the scope of sale is limited to a particular region. But as time progressed, vegetables are exported as well as imported from various continents in different corners. The same is the case of Content creators like musicians, artists, programmers etc. Their content has the capability to be showcased all around the universe with the help of Content Distribution process.

In this unit, we are going to describe and discuss about the various medium of Distribution systems.

Outcomes

Upon completion of this unit you will be able to:

- Describe the benefits of using Content Distribution Systems.
- State the role of satellite in Distribution System.
- Identify various Image Formats.
- Examine various Digital Text Formats.
- Differentiate between Television, Radio and Internet formats.

Terminology

HD	High Definition is an increase in display or visual resolution over a previously used standard.
NTSC	National Television Standard Committee. This standard is basically used in western countries which fit their Television specifications which is 16:9.
PAL	Phase Alternating Line. This standard is basically used Asian countries which fit their Television specifications which is basically 4:3.
FPS	Frames Per Second. A video of real time shoot has 24 frames or 24 images in a second. While in Animation, we can choose “n” number of frames per second.
CDN	Content Delivery Network. The network on which we deliver our content i.e. Television, Radio, Internet etc
HD	High Definition is an increase in display or visual resolution over a previously used standard.

Benefits of using Content Distribution Systems

Content Distribution System (CDS) especially Digital System has created stories of Rags to Riches. When we think about Bill Gates, Sabeer Bhatia and similar people, it is the content distribution systems which made them successful as well as contribute to the society. It is not only about the idea or dreams; it is about how to bring it to the world. Here is the sub division of some varieties of people who require the services of Content Distribution systems:

- Categorical people i.e., Singers, Dancers, Talented people who were once limited to their localities are now making it to the Televisions, Internet Shows etc. and earning name and fame without big investments. Hence, the distribution system is a boon for the creative people.
- There are also other categorical peoples like Artists, Fashion Designers who are also benefited from the Distribution System. Today, a client can have access to Designers worldwide and utilize their services and even pay them without any problem.
- And again there are creative people with business ideas. For people with ideas, now-a-days there is no hurdle for finances. There are hungry venture capitalists all around hunting for fresh and new ideas.
- Content Distribution is the process of transferring your work to the hands of your viewers or customers. There are lots of works which are brilliantly done but are not properly channelized to be showcased to the world.
- Make sure at the end of this course that you know at least a few ways i.e., through T.V., Radio, Internet through which you can display your work in this mass media.
- Imagine that you have a complete product which you have prepared creatively. It may be anything i.e., Poetry, a short story, an Art, a Music, a Short video film, a Photography work etc. Now study this content material and visualize yourself of distributing the content as mentioned in this course material.

Budget limitation has always been a barrier for content developers. They create the contents and are bound to sit on it till they receive the medium to transfer it to the world. But with the help of latest technologies like internet, television etc. even a small developer can attempt to enter into the market with economical budget and limited resources and then bank upon his merit.

Consumers play a big role in acceptance of the contents. Today, the consumer has unlimited choices at a particular time. If a consumer wants to watch a movie, he has internet in his PC, laptop or Smartphone with unlimited contents. He has the choice to choose and select on his own. The same process goes for any contents from cooking receipt to stitching sweaters; all the tutorials are available via content distribution systems on the internet.

Due to various formats of the platforms, the developer has make the content in the formats suited on the platforms i.e. operating systems. There are various operating systems like Windows, Linux, Mac, Android etc. So the person has to have access to technical people who can modify their content to be compatible with the operating system of all platforms.

Above all, the ultimate aim is benefit to the user and profitability to the developer. The more is the reach of the content, the higher is the possibility of success. Hence, it is important for the developer to provide his contents in the maximum platforms as possible.

Role of Satellite in Distribution System

Whenever we see something on a television or internet, we may wonder that where these contents come from. They all come from satellites which are placed on the top in the Universe by talented scientists all over the world. Science has made tremendous progress through which we are able to get the benefits of these which we have ever imagined as a dream or a fairy tale.



Title-Fig 4.1 A Satellite

Attribution- [Thegreenj](#)

Source- [en.wikipedia](https://en.wikipedia.org)

Link- https://en.wikipedia.org/wiki/File:Soyuz_TMA-7_spacecraft2edit1.jpg

A GEO satellite has the capability to cover an entire continent of the earth. The base signal of the satellite is received by the servers on the earth and the data is then distributed through cable or wireless network.

Image Formats

An image speaks more than words. This was an old saying which is now-a-days used all over in a practical way. Today, you share lots of images everyday of your day to day activities on Social Media and other Networking sites. You need to know the process of storing information on a digital device.

Storing an Image in a Digital Medium

Storing of Image is an important concept. In the olden days the medium of storage of image was *Analog*, but today the medium is *Digital*. So, nowadays a photograph get stored in Digital medium i.e., Memory Chip, CD, DVD, Pen Drive etc.

An image is made up of *Pixels* [Square Dots]. Each pixel contains a graphical coordinate of x and y axis. So every position of an image is named by its x and y coordinates which is in a Digit format i.e., 20, 10 where 20 represents the x axis and 10 represents the y axis in a graph paper.

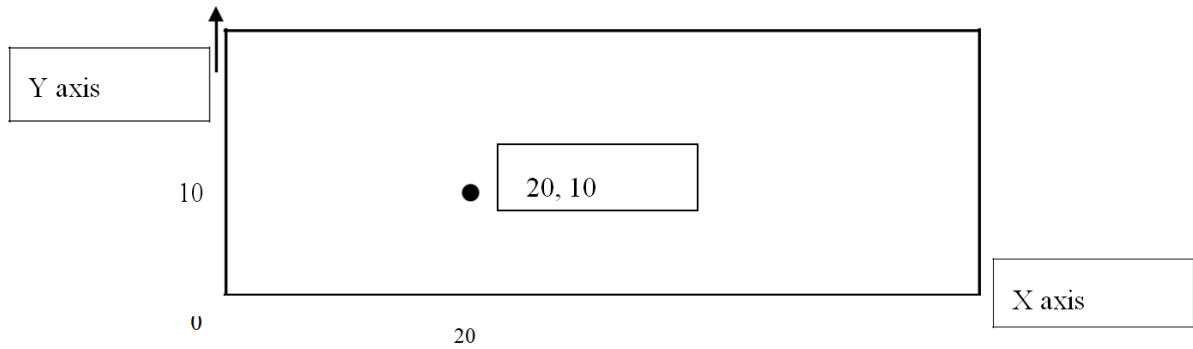


Fig 4.2 Model of a Graph Sheet

Now, an image consists of colour also. So, how can a colour are represented in Numbers? It is done through the *RGB* and *CMYK* colour modes which have been developed for the Digital System.

RGB mode is mostly used for onscreen presentation images and **CMYK** mode is used for printing purpose.

Each and every colour in the RGB coordinate system is identified by numbers and in CMYK mode system the colours are identified by percentages.

RGB Colour Mode				CMYK Colour Mode				
Red	Green	Blue	Output	Cyan	Magenta	Yellow	Black	Output
0	0	0	Black	0	0	0	0	White
255	0	0	Red	100	0	0	0	Cyan
255	255	255	White	0	0	0	100	Black

Fig 4.3 Table showing Colour modes with their numerical specification Drawn by Author

PRACTICAL:

Open Paint from Windows

Left Click on Edit Colours

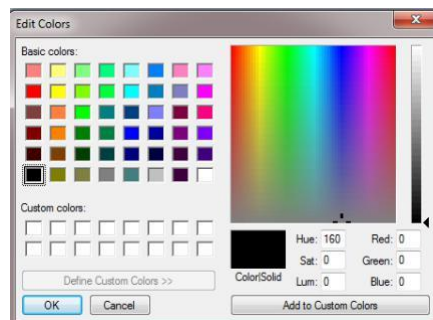


Fig. 4.3 Colour Selector Panel

Click on any colour

Watch the numbers of Red, Green and Blue.

It Changes with every colour. Every colour has got a number coordinates.

The above table demonstrates a few colour combinations.

With the help of this numbers, we can note down the colour coordinates and apply the same coordinates in a different PC to get the same accurate colour.

Digital Image Formats

Every image contains a digital data when it is stored on any digital device. It remains in a compressed digital form and is displayed when it is processed in a digital software using PC, Laptop, smart phone or any similar digital device. The data is stored in very systematic and organized way so that is ready to create the output whenever desired.

The aim of Digital format caters the need of Digital output display and for print medium also. The image uses two different colour modes for different kinds of output. RGB (Red, Green, and Blue) colour mode is used for an image which needs to be displayed on any digital device only. CMYK (Cyan, Magenta, Yellow, and Black) colour mode is used when the image data needs to be processed for creating a printout on the printer.

A digital image comprises of Raster and Vector calculation techniques. Any image is processed using *Raster* techniques contains each and every information of position and colour of a pixel. *Vector* technique is process through mathematical calculations. Here only the end points data is acquired and processed into a complete output. The data of each and every pixel is not required in vector format. Colour depths like 8 bits, 16 bits etc. are used now-a-days to enhance the colour depth quality of the images. The more is the depth, the more is the clarity and quality of the image.

Colour Algorithms are used to process images. This is complete scientific information of software creation which is not comfortable to be understood by a normal person. However, we can have the base calculation method through which the image file size of any photo can be calculated. The calculation varies from content to content, an image size which is equal for two photographs do not guarantee the equal data consumed. An image with more colour combinations will have a big file size as compared to images with fewer colours utilized in a file.

Compression and *Decompression* techniques are used by various Image processing software providers to have control on the quality of the image as well as the memory consumed by the image. They are stored in various extensions formats which are compressed or uncompressed. However, a user of today is least bothered about the image size due to availability of high configuration systems at an economic and affordable price.

In the table shown in Fig. 4.4 we can see the commonly used Formats for saving files on Digital software. They are also called extensions.

Raster Formats	Vector Formats	Compound Formats which are both raster and vector
JPEG, JPEG 2000	AI (illustrator files)	EPS
BMP	CDR (Coreldraw files)	PDF
TIFF	INDD (InDesign files)	SWF
TGA	FLA (Flash files)	PICT
PSD	DWG (AutoCAD	
GIF	Drawing files)	
PNG	DXF (AutoCAD 3D Files)	

Fig. 4.4 Table showing Formats of a Digital Graphic Content Created by Author

The above mentioned are only a few types of formats which are mostly used by Graphic Designers. There were lots of other formats which are not used now-a-days.

For example, an 800 x600 pixel photograph with 24-bit colour depth would consume –
 $800 * 600 * 24 = 11,520,000\text{bits} = (11,520,000 / 8) 1,440,000\text{bytes} = 1.44 \text{ MB approx.}$

Digital Video Formats

Digital Video formats have been prepared by various companies for the convenience of the users. Video files comprise of millions images arranged one after another in a systematic sequence. Hence, these files consume more data and files become heavier. These files are kept in compressed form so that the file size is less and can easily be viewed by the user.

Several *codecs* have been made by companies to prepare the video files. A code is formed using the audio and video container file which is called *essence*. The program which is used to decode the video and audio file is termed as *codec*. Whenever we need to play a video file then the codec in which it has been compressed must be installed in the PC, Laptop or Smartphone.

The most formats which are commonly used are “Avi” and “Mov”. In olden days these two formats have ruled the digital video world. But the latest trend of video format is “mp4”. This format supports PC, Laptop, Television as well as Smart phones. These files consume very less memory and give a good and fine picture quality. There are formats like “mkv” also which has an excellent additional feature to store multiple language audio. We have a single video file in it with options for listening to multiple languages as desired by the user.

Some mostly used formats are shown in Fig. 4.5.

Format	Description
AVI	It is the mostly popular format which is used from the olden days to play video files. It can be played on any media player.
MPG, MPEG	It is a compressed form of Video which consumes less space as compared to the avi files.
MP4	It is an MPEG-2 format of compression which further compresses without loss of quality of video.
MKV	It is a video and audio format which has the capability of keeping multiple audio track in different languages i.e., one can view the video and has the option of choosing the languages stored in it.
VOB	It is the video format used in DVDs for playing the file in Computer DVD ROMs as well as DVD Players in a Television.
FLV	It is a Format created by flash which can include text, video and audio and is in a compressed format for linking in DVD Authoring software's.
MOV	It is a format of Quick Time Movie application.
WMV	It is a format supported by Windows Media Player without compression.
3GP	It is a format which is compressed and used for playing in Mobile players. It consumes very less memory.

Fig. 4.5 Table showing commonly used formats for video Created by Author

Digital Audio Formats

An audio uses frequency data for storing the files in digital format. A digital format of audio has opened gateways for lots of people in the music industry to spread their music worldwide without much expense. An audio format is made up of Audio codecs. The data is presented in a compressed form to reduce the size of the file. Compression comes in various varieties for i.e., “mp3” or “aac” or “3gp” etc. There are uncompressed forms of audio like wav. At the time of editing an audio content, “wav” format is preferred and the time of output for distribution, a compressed format like “mp3” is preferred. The raw bit stream of the audio file is embedded in form of a container in a defined layer of storage. Some popularly used Audio formats are shown in Fig. 4.6.

Format	Description
Uncompressed Audio Formats:	These formats are used to play audio on a windows operations system based PCs and laptops. It is the uncompressed format which is recorded and used at the time of editing in Audio editing software's like Sound Forge etc.
WAV	
AIFF	
AU	These files are of big size which uses RIFF structure. These types of files are of very high quality without any distortion or loss.

Lossless Compressed Audio Formats:

These are the file formats which compress the file size, but maintain the same quality.

FLAC
WAVPACK

We know about compressing files in “zip” and “rar” format. It compresses any computer file & when it is restored in uncompressed format, the data remains the same. The same kind of technology is used in lossless compressed Audio formats.

When we compress a PCM file converted to “flac”, the file size gets reduced. But when we restore it back to PCM it is the same duplicate of the original. The cost of loss is that the compression ratio is not always the same.

Compressed Audio Formats with a few quality loss:

MP3 files are the most commonly used files to listen to songs on any device. It consumes very less memory and provides high quality output. It used MPEG III Audio format. It is almost 10% of the compressed file size. Now-a-days we get mp3 files in everyone’s digital equipment.

MP3
AAC

Fig. 4.6 Table showing Commonly used Audio Formats Created by Author

There are software’s which directly record in mp3 format. Other similar format is “aac”. It also uses the similar structure as of “mp3” files. The encoding procedure of certain Digital audio files are as follows:

MP3- MPEG Layer 3 Codec,

WAV and DCT - PCM, GSM 6.10, MPEG 3 Codec

These codec determines the content and compresses it according to their specifications and try to create a best output with minimal loss of quality.

Digital Text Formats

Some commonly used Text Formats are shown in the table in Fig. 4.7.

Format Description

TXT *Text format* of file is generated when a file is created using a Notepad or WordPad in a Windows Operating System.

PDF *Portable Document Format (PDF)* is the most reliable and available source of compressed text documentation content. It is used to compress a project documentation file which can be displayed in various cross platforms. Adobe PDF reader is the most used and installed package in our Digital equipment’s. The file size is very less and faster to download from internet sources. It is a non-editable format which is a boon for the publishing companies. It protects the data to be easily copied with prescribed formatting.

Whoever wants to display their content without being manipulated and edited choose “PDF” format to publish their document.

DOCX It is the file format of the latest version of Microsoft Word. It is a combination of word as well as XML file. The document has the capability to convert itself into a page of a website. It has the capacity to compress the text and images used in the file and convert it into a compact file size document without using any third party compression software.

The version of 2007 and above of Microsoft Word use the “docx” format. Previously the “doc” extension format was used. It is the updating quality of Microsoft type of companies which make them the leader in their business expertise.

XLSX XLSX is a file format used to save Microsoft Excel files. People who work on files similar to table content use Microsoft Excel.

It has the capabilities of a XML file as well as the excel file. It enjoys all the benefits which an XML files enjoys in internet like compression, link ability etc.

PPTX PPTX is a file format which is used to display PowerPoint files using Microsoft PowerPoint. People use this kind of files to display their presentations in a systematic and exciting format on a projector.

The addition of XML qualities in a Microsoft Office files have added much benefits to the user of Microsoft Word, Excel and PowerPoint users. They get extra benefits as well the files are much compact to be transferred on the media network for distribution.

Fig. 4.7 Table showing commonly used Text formats Created by Author

Television Formats

Television is a medium of mass communication. Television is a combination of video and audio giving us an excellent treat to our eyes and ears. It captures real events & portrays it in front of us as if it is going “LIVE”. Television comprises of programs such as News which gives us information about the happenings all over the world. Television serials are the reflections of varieties of drama going around in different families. A film in a Television is a complete life story in 2 to 3 hours.

Television is a form where any subject can be displayed with a minimal expense. Now-a-days due to availability of easier and economical digital devices available for creation of Digital Videos, the content is not limited to high end professionals only. Amateur people can also prepare programs for television using mobile video cameras also.

Educational programs are formed for all categories of studies. There are ultimate choices of educational programs available on Television channels. It is not only the education of school, college and tuitions which matter today. Programs related to learning on Television channels also form a major source of education industry where there is shortage or lack of trained professionals.

The raw source is transmitted through signals and broadband to satellites above the Earth. From there, it is distributed to various Television Channel providers. Again, they distribute it to the common public either through cable network or wireless network using 2G, 3G, 4G, 5G, etc. Our Television set has to be connected to set top boxes to receive the signals and the

picture tube in the Television converts the signal into audio and video content which is enjoyed by the viewer.

Technical formats of Television Video Output

There are various formats which are used for Television output in different countries. Technology is being developed parallel from all over the world. It is not that technology is manufactured in a single place. The procedure of China will not be equal to the procedure of America, but the output may be same. We see picture in PAL format and also in NTSC format. But the process of creation is different. The descriptions of the formats are as follows:

PAL – Phase Alternating Line

The pixel size of PAL is **720 x 576** pixels. The video is encoded with colours for television of analogue as well as digital medium in Phase Alternative Line format.

Developer: Walter Brunch, Telefunken, Hannover, Germany	Inputs: Dr. Druse & Gerad Mahler (de)	Patents: Telefunken, 1962
Inventor: Walter Brunch	Unveiled: European Broadcasting Union (EBU), 3 rd January 1963	Frame Rate: 25 frames per second

Fig. 4.8 Table showing Developer Details of PAL

NTSC – National Television Standard Committee

The pixel size of NTSC is **720 pixels x 480** pixels. This kind of format is mostly used in Western Countries, island nations of Pacific and other territories. The frame rate of NTSC is 30 frames per second. This kind of size gives a cinematic resolution look where the length is in a high proportion to width.

HD – High Definition

HD means *High Definition*, is the current trend which is an increase in display or visual resolution over a previously used standard.

The pixel size of HD – **1920 pixels x 1080** pixels

1280 pixels x 720 pixels

The quality is very much clearer and larger as compared to PAL or NTSC.

A Sample specification sheet of a Television Format

The following table in Fig. 4.9 demonstrates the specifications and settings which are required for a Television format to be broadcasted.

Fig. 4.9 Table showing Sample specification sheet for Television format

Hard Drive Windows PC formatted as NTFS or MAC formatted as HFS+, with transfer and power cables

Field Dominance	Upper field First
Closed Captions	Separate EIA-608/708B .scc file delivered on the same hard drive, "popon" style, with Drop Frame time code to match video file.
NLE Export Formats	ProRes 4:2:2, @ 147 mb/s or ProRes 4:2:2 HQ @ 220 mb/s or DNxHD.mov @ 145mb/s or @220 mb/s
Image Format	1080i (Interlaced) 1920 x 1080
Field Rate	59.94 (Frame rate of 29.97)
Time Code	Drop Frame
Luminance (Y)	Waveform (0-100 IRE)
Chroma (UV)	Waveform (0-105 IRE)
Audio Phasing	In phase, stereo audio must be fully mono capable.
Audio Bit Depth	24 bits
Sample Rate	48 Khz
Audio Channels	CH 1. left and CH 2. right full mix stereo
Audio Stems	Delivered as separate files, audio stems will include at a minimum; stereo music and effects tracks and a dialogue track
Headroom	Program audio peaks no more than minus 10 dBFS
Loudness	Minus 24 LKFS (+/- 2dBFS) as per BS.1770-3 Dialog

Radio Formats

Radio plays a very vital role to the people living in mostly the remote parts of a country. Even though there are lots of better remedies available in form of Television, Computer, Smart phone etc. Radio has its own importance and dominance. It is an important source for the underdeveloped areas of a country.

For the people of today, Radio has been given a new identity as FM Radio. It is the latest trend which is going on today. Radio jockeys have transformed themselves to suit the needs of the modern people. Programs on radios are brand new and do not portray repeated songs only.

Specified programs are made for radios to attract people and give them important information as well as entertainment. Radio talks with famous personalities, Knowledgeable programs, Quiz shows etc. are now a part of modern radio.

In case of power cuts or any natural calamities happenings in an area, Radio is the only means of communication which operates on battery. People of remote areas of various countries of today also enjoy cricket commentaries on radio forming a group. It is a stage or

stepping stone of growth to the modern age. Even though we have risen to the above steps of the ladder, Radio remains a memorable and useful part of our journey.

Lots of Radio FM's channel have come into emergence in every state and is spreading its wings all over the nation.

Technical formats of Radio Audio output

The following table in Fig. 4.10 displays the settings which are required for a radio output.

File Format		Compression Rate (kbps/channel)	Resolution (bits)	Frequency Sampling (kHz)
Linear PCM	.wav	Uncompressed	24	48
Broadcast Wave MPEG1 Layer II	.wav	192 kbps/ch.	16	48
Linear PCM	.wav	Uncompressed	16	48, 44.1
MPEG1 Layer III	.mp3	160-320 kbps/ch.	16	48, 44.1

Fig. 4.10 Specification of Radio output

Technically, recording the audio content required for Radio is far easier than in the previous days. Now-a-days any one can record audio content with the help of their mobile phones and edit it in a studio. The quality of audio recorded in a Mobile phone today is very good and can be of broadcast quality also is recorded in a silence location.

So, distribution of Advertising and Music content on Radio is a very powerful and less expensive source for any company or individual.

Internet Formats

Internet is a platform which supports almost each and every format to upload and download. People can download programs, software's, videos, songs, text books, articles etc. from the Internet. It is a connection between the device of the user and the Server. The data hub is termed as World Wide Web. Each website has got a name called *domainname* & the process of uploading data into your registered website space is called *hosting*.

There is lots of sale of online services and products which can be downloaded directly from Internet. Products like e-books, audios, videos, project report analysis data's etc. can all be collected from websites. There is minimal limitation on formats of file available on the Internet.

Internet serves as a medium of Advertising. Advertisements can be displayed through text, images used to create banners and posters on internet, video Advertisements, Animated flash banners and audio advertisement etc. Hence, all the modes of advertising can be applied on Internet.

The motive of Internet is to provide information and products required by the people from all corners of the world. The similarity and portability of products from one operating system to other has enabled all kind of product developers to develop in one platform and then convert it to be in useable format in other platforms.

The speed of Internet is increasing day by day. From 2G to broadband, now from 3G to 4G has enabled to transfer even files of higher size to be transferred. Even now 5G is on the way to enter into the market. The print media has been partially converted into Internet Media. The messages which were required to be printed and distributed are now distributed online for a very low cost and high reach to millions of people. A data created by a person has the possibility to spread worldwide with minimum investment on Internet websites.

Technical formats of Internet contents output

The following table in Fig. 4.11 displays the formats for an Internet output.

Format	Platform
Text Format	Text format files are mostly displayed in WebPages in HTML format.
Video Format	Video format files are displayed in internet sites like YouTube etc. We can insert a video format file in an html page also.
Audio Format	Audio format files of Film songs, album songs, etc. can also be embedded in a website and can be played from a webpage file.

Fig. 4.11 Formats for Internet output

Overall, the content of text, audio and video remains the same, but there are specified formats which reduces the file size so that they can be easily viewed and downloaded from the internet.

CD/DVD/Hard Disk/Pen drive/External Hard Disk

The major source of Digital Content distribution is CD (Compact Discs), DVD (Digital Video Disc or Digital Versatile Disc). Optical

Media technology is used in storing of digital data's on the Disk.

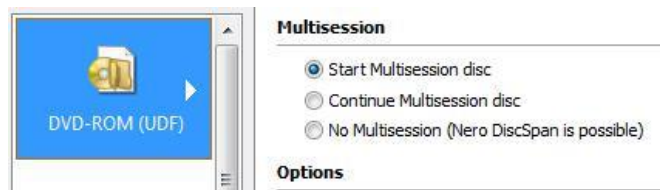
As day to day there are developments, the latest trend of data distribution is a Pen drive or an External Hard Disk.

The difference between a CD/DVD and a Pen Drive is the process of Data Transfer. In case of CD/DVD one has to write the CD/DVD using writing software's like Nero Burning Rom etc. Where as in a Pen Drive, we need to just copy the file from our Hard Drive and Paste it in the Pen Drive. It is a matter of two or three clicks only. Hence Pen drives are mostly popular today. External Hard Disk is also used in cases when the amount of data files is of higher capacity.

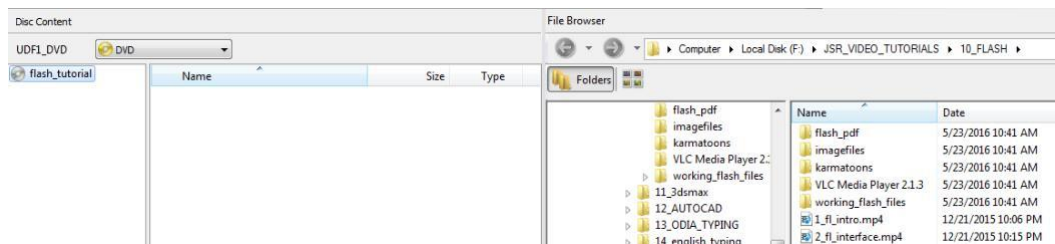
Steps of writing a CD/DVD using Nero

Insert the Blank DVD in the DVD writer

Open Nero Burning ROM



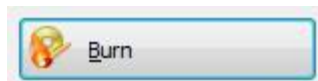
Choose – Start Multisession disc – New



Screenshot

Choose the files from the folder.

Set the Burning speed setting i.e., 8x, 12x, 16x etc. The lower the speed, the writing quality would be better. But the time taken for burning in low speed will be a bit longer than higher speed.



Choose – Burn

Screenshot

Unit summary

In this Unit you learnt about the Content distribution system which will enable you to display outputs in various mediums. You learnt the various Image formats, Digital Text Formats and Satellite Distribution systems.

The unit also described the steps involved to write a CD/DVD using Nero software.

Assignment

Write/Burn a DVD using Nero with some photographs and video

Assessment

1. Write the three formats of a Video.
2. List three formats of an Audio.
3. Write the pixel size of NTSC format.
4. Find the pixel size of PAL format.
5. State the maximum pixel size of HD format.
6. Describe the various visual and audio formats.
7. Write a detailed on the importance of content distribution.

Resources

- www.col.org
- www.wikieducator.org
- www.slideshare.net
- www.ebookbou.edu.bd
- www.knowledge

Block –III
Art & Science of Multimedia

Unit-1 Audio Fundamentals

Introduction

With the expansion of multimedia in all aspects of our life, inclusion of audio in that equation is increasingly important. Audio technology has expanded dramatically over the last few years. In our daily life, we use all components of multimedia presentation i.e. Sound, video, animation, text and images etc. One can easily say that speech is often the most preferred and used tool of interaction. That is why; in multimedia presentation sound is one of the most important elements of communication. A presentation can be based on sound alone or sound may be used in supporting role in the form of music and sound effects. In the form of speech, the sound becomes the main tool of communication but its supporting role is equally important as it influences the emotions of the audience. In order to utilise sound to its maximum potential in our multimedia presentations, it is very important to understand the very nature of the sound itself and the devices used to create, process and record the sound. In this unit, we will explore the basics of audio and sound, as well as some of its fundamental frequency, format, equipments, other tools, etc.

Outcomes

Upon completion of this unit you will be able to:

- Describe how sound is produced.
- Identify factors influencing quality of sound.
- Judiciously use recording devices for quality recording.
- State techniques of noise suppression and utilisation.
- Evaluate and select right kind of microphones.
- Explain studio system
- Differentiate between mono, stereo and surround sound systems

Terminology

Sound:	Disturbance in the air that can be heard.
Audio:	Generally refers to the sound in electrical form.
Frequency:	Cycles/vibrations per second.
Amplitude:	Height of Sound wave.
Hertz:	Unit of frequency measurement.
Polar:	Related to direction of sound
Reverberation:	Persistence of sound in space.
Equalisation:	Adjusting relative levels of different frequencies.

What is Audio?

Audio means "of sound" or "of the reproduction of sound". Specifically, it refers to the range of frequencies detectable by the human ear — approximately 20Hz to 20 kHz. It's not

a bad idea to memorise those numbers — 20Hz is the lowest-pitched (bassist) sound we can hear, 20 kHz is the highest pitch we can hear.

Audio work involves the production, recording, manipulation and reproduction of sound waves. To understand audio you must have a grasp of two things:

Sound Waves: What they are, how they are produced and how we hear them.

Sound Equipment: What the different components are, what they do, how to choose the correct equipment and use it properly. Fortunately it's not particularly difficult. Audio theory is simpler than video theory and once you understand the basic path from the sound source through the sound equipment to the ear, it all starts to make sense.

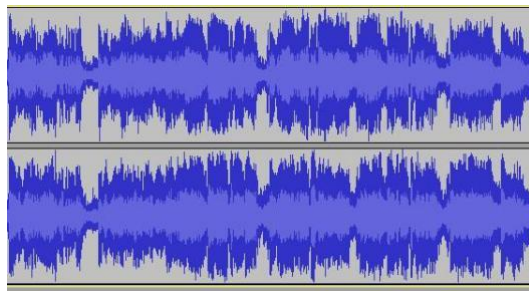
Note: In physics, sound is a form of energy known as *acoustical energy*.

What is Sound?

Sound is any disturbance that travels through an elastic medium such as air and it is heard by the human ear. We are saying that sound is a disturbance not because it is useless, but actually it refers to the mechanism of sound production/generation. Anything that vibrates would disturb the air around it and it is this disturbance which travels in the air and reaches our ears. The disturbance in air produces a sensation of hearing in us by vibrating our ear drum. You may observe the phenomenon of sound generation by placing your fingers on your throat when you are speaking. Same way, when you hit a table or any other solid object, it vibrates and generates the sound.

Nature of sound

A vibrating (oscillating) body causes a periodic (rhythmic) disturbance in the surrounding air and generates sound waves (also called pressure wave) which on reaching us produce a sensation of hearing. In real life, the vibrating objects could be of any shape and sizes vibrating in a very complex manner, therefore the sound generated are very complex. A typical sound wave represented graphically, as shown below.



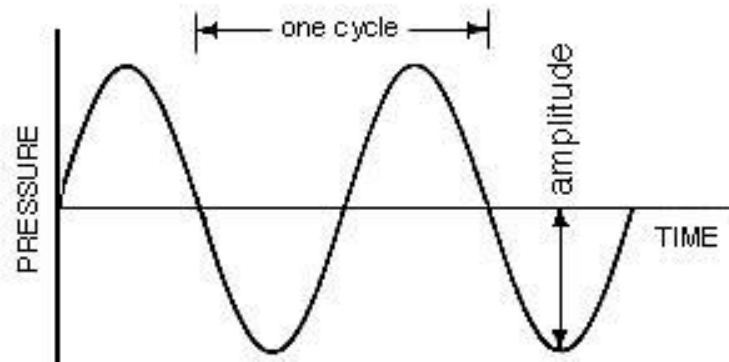
Title- Fig. 1.1 Graphical Representation of Sound Wave

This kind of waves you would be able to see while working on audio workstation. For the sake of understanding, the wave is usually shown as simple wave, in the form of sinusoidal wave (sine wave), as depicted below



Title- Fig. 1.2 Simple / Sinusoidal Sound Wave

Let us understand how a vibration converts into a waveform. In the diagram below, the body is vibrating along the vertical axis. The body starts from its initial position at the centre and goes to one side of the centre (say above) and after reaching an extreme position comes back to the centre. Continuing its journey, it moves to another extreme point on the other side (lower side) and then come back to the centre. This completes one cycle of the vibration. You may see that the wave is simply imitating this movement but expanded along X-axis with time. The image below indicates how a single vibration is translated into waveform.



Title- Fig. 1.3 Diagram showing a vibration converting into a waveform

Attribution-

Source- www.sfu.ca

Link-https://www.sfu.ca/sonic-studio/handbook/Sine_Wave.html

The number of vibrations occurring per a second is the *frequency* of the vibration and therefore of the sound being generated due to this vibration. The frequency is measured in *Hertz*, named after the scientist Heinrich Hertz and is denoted as Hz. The human ear can listen to the sounds only in the frequency range from 20Hz to 20 kilo hertz (KHz.). All the sounds of frequency below 20Hz are called *subsonic* and the sounds above 20 KHz. are called *ultrasonic*.

The word “*Sonic*” refers to sounds within the audible range. The frequency range from 20 Hz. to 20 kHz is called the *audiblerange*.

The graph is merely a representation of the sound wave and it helps us in understanding the quality of sound being generated, processed and recorded by various audio devices. In the image above, the amplitude of the wave represents the strength of the wave which in the case

of sound represents the power/, intensity of that sound wave. More is the sound amplitude (level), louder is the sound.

The terms “sound” and “audio” may be used interchangeably but the convention is to use word “sound” in the physical space while “audio” is more often used to represent sound travelling through the devices in the form of electric current. How sound is converted into electrical current we shall understand later in this unit.

The intensity/level of the sound is measured in “*decibels*” denoted as “db”.



Title-Fig. 1.4 A VU Metre

Attribution- [iainf](#)

Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:VU_Meter.jpg

The audio level in audio devices is usually measured by a metering device known as VU metre, as shown above.

Perceiving Sound & Listening

Our brain separates the desired sounds from the unwanted sounds through a very complex psycho acoustical process. When we are listening to a conversation or a piece of music, our ears keep adjusting to small changes in the sound levels.

The quality of sound that our ear will accept and prefer shall depend on what we are used to listening in our daily life. If we listen to good quality sounds in routine e.g. sounds of good quality TV and music systems, then we are not satisfied with an inferior quality sound as we are able to differentiate between good quality sound and the bad one. At the same time, any person deprived of good quality sound may remain happy with an inferior quality. It means quality of sound may become a subjective issue. Different quality may be acceptable to the same person listening to different types of programmes e.g. telephonic sound is much inferior to the sound in a cinema hall. Another thing to keep in mind is that our ear sensitivity is highest at 1 KHz. and the loudness of sound is a subjective quality.

The Audio Quality

As you know the basic taste of food depends upon factors like its saltiness, sweetness, sourness or the bitterness. The additional parameters which are colour flavour, hardness, temperature and its crispness (sound in food!!!) also influence the taste. Therefore an expert

in food tasting would consider all above parameters while evaluating food. Similarly, the major factors which need utmost attention to decide the quality of the sound are:

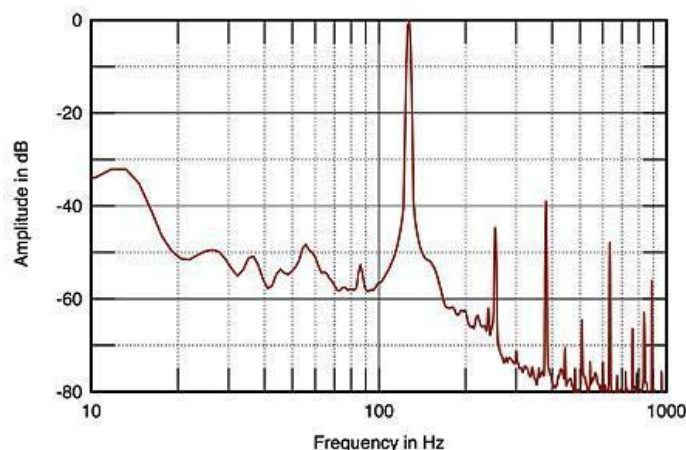
- Frequency response
- Distortion
- Noise
- Reverberation

These four factors influence the quality of the sound to a great extent therefore we need to understand them in detail as discussed below.

Frequency response

You know that human ear can listen to sounds ranging from 20Hz. to 20 kHz but all the sources of sound do not produce or receive the sound in full audio range.

The *frequencyrange* a device is capable to generate, process, record or playback is known as frequency range of that device. A device having a 'flat' frequency response would mean it will not change the weighting i.e., intensity of the audio signal across the specified frequency range while processing. A typical frequency response is shown graphically in the diagram



below.

Title-Fig. 1.5 A typical frequency response shown graphically

Attribution- John Atkinson

Source- stereophile.com

Link- <https://www.stereophile.com/content/audioengine-2-powered-loudspeaker-measurements>

You may observe that in graph the signal from 20 Hz to 20 KHz is at the same level of about 0 db. If the gain (Level control) of the system is turned down, the graph would also come to a lower level but maintaining the horizontal line across the frequency range.

Any sound in nature is usually not generated as a single frequency. The lowest frequency in a sound is called *fundamentalfrequency*. Along with fundamental frequency some high frequencies are also produced called *overtones*. These overtones add special character and richness to the sound. The low frequency sounds are called “*Bass*” and they attribute

heaviness and richness to the sound e.g. Sound of a drum has a heavy bass. On the other side, the high frequencies give brilliance to the sound and are generally known as “*treble*”. The chirping sound of the birds belongs to high frequency.

In music, the range of frequencies generated by a musical instrument is known as the range of that musical instrument. The range may be understood as the distance between the lowest pitch (frequency) and the highest pitch produced by the instrument.

A single frequency sound, in the music reference, is known as “*note*”. For example, Sa, Re, Ga, Ma, Pa, Dha, Ni sounds are called notes where Sa is the lowest frequency and Ni is the highest frequency (double of Sa) in an octave. The octave is the range of sounds in which frequency doubles i.e. the frequency of the last note is two times of the frequency of starting note. Range from “Sa” to “Ni” is one octave.

A musical composition comprises of combinations of these notes at different intervals and intensities. Therefore to preserve the originality of the music any sound recording device should neither alter the frequency of the notes and their relative intensities. If the device is unable to record different frequencies at their relative levels then such deviation would mean that the device has poor frequency response (non-flat or limited frequency response). The concept of frequency response can be understood by listening to a piece of music on a portable device e.g. mobile phone through its speaker and then listening to the same piece of music on a home theatre system or a cinema hall. You will notice that the music on two situations gives you different experience. It sounds quite differently in cinema hall as compared to mobile phone. It is so because of difference in frequency response of the sound systems in mobile phone and cinema hall.

In the same way, the deficiency in the frequency response of a device would also affect the speech quality. Therefore you may conclude that good frequency response is one the essential features of good quality audio device. Closer is the frequency response to 20-20KHz., better is the device.

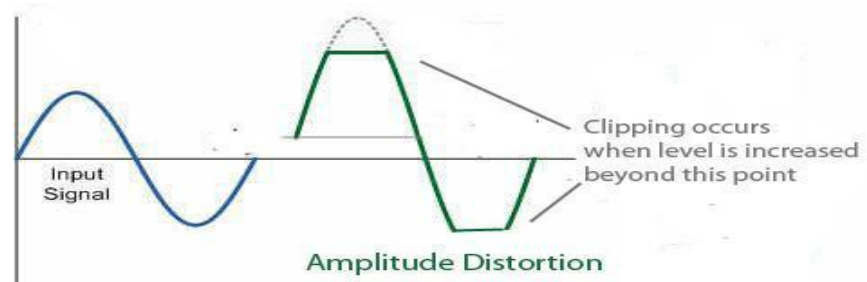
In a marriage or other party, you might have observed that parties having, each speaker box/enclosure of the music system comprises of two or more speakers. It is because; no single speaker can reproduce full audio range from 20 Hz. to 20 KHz. The largest speaker, known as woofer, handles low frequency spectrum whereas the smallest speaker, known as Tweeter, playback all the middle and high frequencies. In superior speaker systems a third speaker is also added, known as Mid-Range/Squawker, which exclusively handles the mid-range of the audio spectrum.

Distortion

The distortion in simple understanding is the deformity in the shape or character of an object. Usually a distortion occurs because of overloading of a system. For example, a sheet metal table capable of taking a 50 kg is loaded with more than 50 kg then it would bend under the excess weight. The table’s shape would distort, which is a deviation from the original shape. Similarly, the electronic devices such as microphones, recorders, amplifier etc, can handle audio signal up to certain level (threshold) but if the signal level exceeds this limit then the audio signal being recorded/playback would get deformed i.e. distorted.

The “VU metre” as discussed before, is used to control the audio level to avoid any distortion in the sound being recorded. If, the pointer (needle) moves into the red zone i.e. beyond 0 dB level, then signal would start distorting. Therefore, VU metre is a very useful device to control the quality of an audio recording. At the time of recording one needs to adjust the recording level so that the pointer only occasionally enters into the red zone. The two kinds of distortions are introduced by the audio devices known as “*amplitudedistortion*” and “*frequencydistortion*”.

The **amplitude distortion** occurs due to overloading of the electronics because of high level of input signal as described above.



Title-Fig. 1.6 Tko;phe Amplitude Distortion

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Link- <http://www.qooljaq.com/AmplifierDistortion.htm>

A typical amplitude distortion can be seen as a clipping (cutting/chopping) of the peaks of the sound waves as depicted above. Beyond a certain threshold level, the audio device is unable to handle (amplify) the input signal and therefore distorts its shape.

The **frequency distortion** happens due to imperfect/limited frequency response of the audio device. Different frequencies in an audio signal are amplified unequally thus leading to change in the tonal quality of the sound (also known as colouring of sound).

In professional quality audio recordings, the distortion level is maintained below 1%. Though quite often subtle distortions may not be easily comprehensible to general listener but high level distortions may make communication unclear and unpleasant. Therefore, to have an effective communication through multimedia content, the distortion in audio must be kept to the minimum possible.

Noise

Any unwanted sound may be categorised as *noise*. It means, irrespective of the quality of the sound, the question is whether a sound is desired or not. For example, if two persons are in conversation and some other sounds are also present in area disturbing their conversation, then these disturbing sounds may be referred to as noise. One would like to keep the noise at

minimum by adopting different mechanisms to do so. For example, one may simply move away from the source of noise.

In another case, if a presenter standing in the market is describing a story related to the market then the noise around him in the market is desired to have a feeling of the location being shown. In this case, this noise in the market becomes a desired one and this sound effect is known as *ambience*. However you need to avoid too much of ambient sound that may disturb the main voice making it difficult to comprehend.

The electronic devices used for recording and playback of the sound exhibit an inherent electronic noise are known as “*mush*”. This noise is usually represented as “*noisefigure*” or “*signaltonoiseratio*” (S/N). The unit of noise measurement is *decibel* (db.). Higher the signal to noise ratio better is the equipment.

Similarly, the magnetic tape/cassette recording systems generate a noise known as “*hiss*”. This noise originates from the tape material. With the introduction of the digital recording systems, this kind of noise from recording media (tape, CD etc.) has been nearly eliminated.

At the time of recording, the noise is kept to minimum by keeping the recording level around 0 decibels. If the recording level is quite low then the noise of the system would become audible and interfere with the communication capability of the recorded sound. Best noise rejection should be achieved at the time of recording else it would be very difficult to deal with during post-production.

The louder sound tends to suppress weaker sound and this phenomenon is called *masking*. The masking technique is often used during post-production to suppress the noise. For example, if there is some noise in the recording then, as a rescue measure, it may be masked by mixing background music at a level higher than noise.

Reverberation

The *reverberation*, also called “*reverb*” in short, is the quality of the space in which a sound is being produced, captured or playback. It is basically the persistence of sound after the sound source has ceased to generate. Reverberation occurs due to multiple reflections of sound in a closed space (e.g. room, hall). To understand it better let us take an example of clapping in a large size hall. If you clap once and listen to the sound of the clap, you will notice that the sound does not vanish (fade away) immediately. It is because the sound keeps reflecting from the hard surfaces of the walls and it takes some definite time to completely fade away.

The time period that sound takes to completely fade out is known as *reverberation time (RT)*. The **reverberation time** is defined as the *length of time* required for sound to decay 60 decibels from its initial level. Larger the room size higher is the reverberation time. You might have noticed that it is difficult to hold a conversation in a big empty hall. The large reverberation time of hall makes the speech difficult to understand. It implies that a short reverberation time is desired for the speech and generally a RT of around 0.4 seconds is preferred.

Another phenomenon we observe in our daily life is our tendency to sing in a bathroom. Even though the size of the bathroom is quite small but because of the hard tiles (highly reflective surface) on the walls of the bathroom, the sound keep reflecting without getting absorbed by the walls. Longer reflection sustenance results in longer reservation time which

is most desired for singing and music. Quite often, reverberation times of longer than 0.5 seconds are preferred for song and music recording.

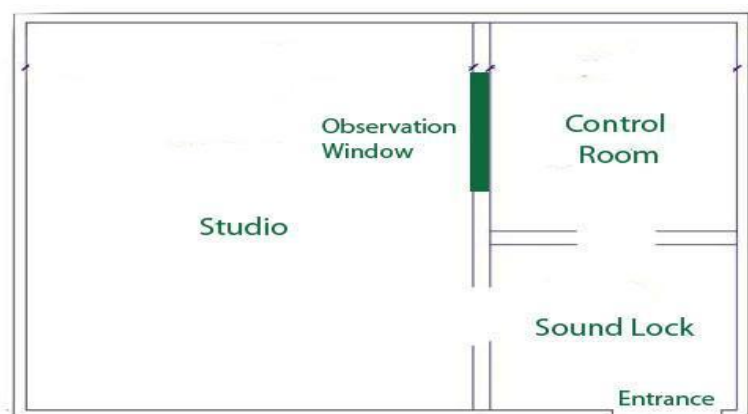
Therefore it may be concluded that to have clear verbal communication a short reverberation time is preferred while a longer reverberation is more suitable for song and music recording. The reverberation quality of a space can be controlled to certain extent by introducing soft materials in the recording space for higher absorption of sound. For example, the curtains, carpets, sofas, furniture and the humans help in reducing the reverberation time by way of more sound absorption. The sound studios are generally designed keeping in mind the intended purpose of the studio i.e. whether studio would be used more often for the speech recording or the music recording

In case of reverberation the reflected waves reach our ears so quickly that we are mostly not able to hear it as a separate sound from the direct sound. The reflected sound mixes well with the original (direct) sound. But, if the sound takes very long time to reflect due to large distance it has to travel e.g. sound in a valley of hills, then the reflected sound can be heard as a separate sound. If you shout hello then valley would reflect the same hello after some time. This effect of space on sound is called “*echo*”.

Note: During post production/editing the reverberation time can be increased or echo can be added electronically.

The Audio Studio

Audio studio not only offers a space suitable for the performers but it is also equipped with lot of audio equipment used for sound capturing, processing, monitoring and recording. A typical sound studio would comprise of at least two major areas where one area called “*studio*” is an acoustically treated area created for the artists to perform and the other area, adjacent to the studio, is known as the “*control room*”. Both areas are generally acoustically treated for controlling the reverberation time. The common brick wall between the two rooms usually has an observation window from where the audio professionals and the performers can see and signal each other. The diagram below shows a simple audio Studio setup.



Title-Fig. 1.7 A Typical Sound Studio Layout Diagram

The Audio Equipment

The studio area is well isolated from the outside world and the control room through sound proof doors and observation window to keep it noise free. The control room is installed with a range of audio equipment as listed below. Generally Control room is the place where most of the equipment along with the technical and production professionals is accommodated

- Microphones
- Audio mixer
- Audio processors
- Audio recorders and Audio workstations

These are the basic building units of an audio studio. The list is not exhaustive and varies from studio to studio. In order to make use of the equipment to our advantage an understanding of them would help us in making their optimum use. Let us understand them one by one.

Microphone

In the simplest form, the *microphone* is a device that converts the sound into electrical signal known as *audiosignal*. Even though some of you may not have visited an audio studio or a video studio but still you might have used the microphone fitted into your mobile phone. Whatever you speak into the mobile is converted into electrical signals by the microphone and after required processing it is sent to the receiving phone of the distant person where the audio signal is converted back into the sound through a speaker or an earphone. Similarly, in the sound studio, an artist/performer speaks in front of a microphone and his voice is converted into audio signal and recorded.

All microphones are not the same. They come in different shapes and sizes for different kind of applications. They can be classified into different categories as below

- The technology used i.e. their electrical characteristics,
- The way they pick sound around them i.e. Polar characteristics and
- According to their application i.e. the way they are used.
- The same microphone may get different names in different situations and applications.

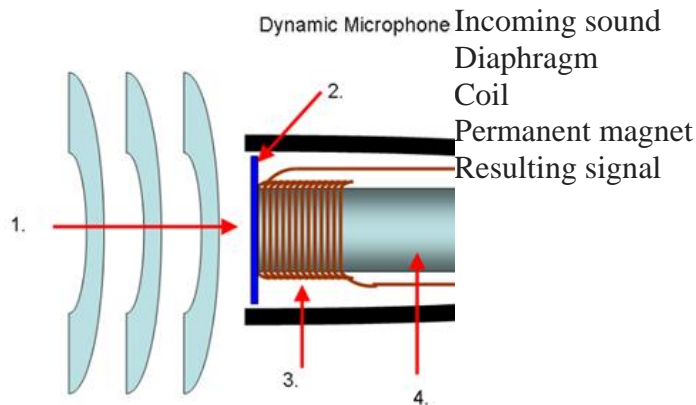
Microphones - Electrical Characteristics

There are many microphone design technologies but for professional applications primarily two types of microphones would find use in our multimedia productions. These microphones are – the *Dynamicmicrophone* and the *Condensermicrophone*.

Dynamic Microphone

Any microphone would have a diaphragm which vibrates when sound waves fall on it. Microphones differ from each other in the way the movement of the diaphragm is converted into electrical signal. Dynamic microphone uses the same dynamic principle as in a loudspeaker, only reversed. A small movable coil made of thin conducting wire positioned in

the magnetic field of a permanent magnet, is attached to the diaphragm. When sound enters the microphone, the sound waves move/vibrate the diaphragm.



Title-Fig. 1.8 A Dynamic Microphone

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Source- [wikimedia.org](#)

Link- <https://commons.wikimedia.org/wiki/File:Mic-dynamic.PNG>

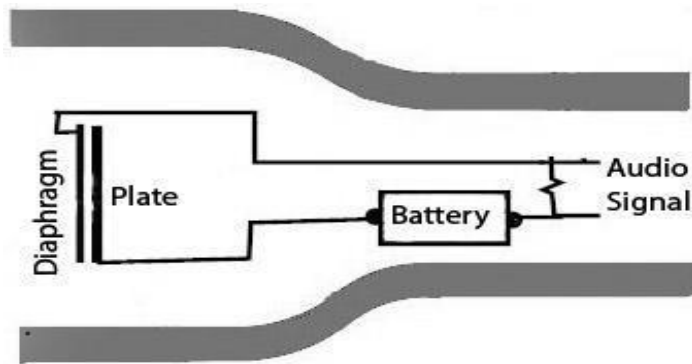
When the diaphragm vibrates, the coil moves in the magnetic field, producing a varying current in the coil through electromagnetic induction.

The current generated varies in strength in accordance to the wave shape of the sound falling on the microphone diaphragm. You might have noticed that this kind of microphone generates audio signal without requiring any power supply or the batteries. The dynamic microphone has the following primary features:

- It is quite robust in operation.
- Does not require any power supply to operate
- Low sensitivity – captures loud sounds without distortion.
- The output level ranges from - 60 dB to -70 dB.

Condenser Microphone

While the dynamic microphone is preferred for the stage performances due to its ruggedness, the condenser microphone is preferred in the studio due to higher sensitivity and audio quality. The condenser microphone is also called a *capacitormicrophone* or the *electrostaticmicrophone*. The name condenser or capacitor comes from a component called condenser/capacitor which comprises of two parallel metallic plates separated by a medium e.g. air to store electric charge. The capacitance of these plates is inversely proportional to the distance between them.



Title- Fig. 1.9 A Condenser Microphone

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Link- https://commons.wikimedia.org/wiki/File:AKG_C451B.jpg

In case of condenser microphone, when sound waves strike the diaphragm they change the distance between the diaphragm and the plate causing a current to flow through a battery powered circuit in proportion to the sound signal. The current variations become an audio signal. Some of the primary features of a condenser microphone are:

- Superior audio quality
- Higher sensitivity
- Low noise
- Must be handled carefully
- Need power supply to operate

As you know the condenser microphone needs a power supply for it to function, there are two possibilities of powering it. A good number of condenser microphones have a provision for installing small battery in the microphone body itself. The battery is usually an AA size cell also known as *pencilcell*. This kind of internal battery is quite useful when the microphone has to be used in external environment directly connecting to the camera or recorder. There is a possibility for connecting an external power source to the microphone. Such a power supply is known as “*Phantom power*”. In the case of studio recording, the microphone is usually connected to an audio mixer which may have a provision for powering the microphone. Audio mixers with provision for phantom power obviate the need for battery replacement of the condenser microphone. The phantom power supply is usually of +48 volts.

In addition to the dynamic and the condenser microphones described above there are number of other kind of microphones using different technologies in their design. Since these microphones may not be often used for our purpose, we only list them here for reference.

Ribbon Microphone – It usually has a corrugated metal ribbon suspended in a magnetic field. Ribbon microphone doesn’t require power supply but is quite fragile.

Carbon Microphone- It uses a capsule or button containing carbon granules pressed between two metal plates. Have extremely low-quality sound reproduction and a very limited frequency response range but is very robust.

Piezoelectric Microphone - Uses the phenomenon of Piezoelectricity, which is the ability of some materials. This Microphone utilises the sound pressure waves to produce an audio signal.

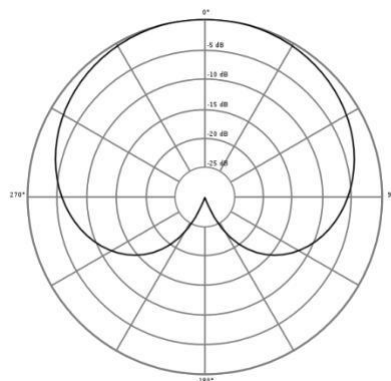
Fibre optic Microphone - A Fibre optic microphone converts acoustic waves into electrical signals by sensing changes in light intensity. Fibre optic microphones are robust, resistant to environmental changes in heat and moisture,

MEMS – Micro Electrical-Mechanical System (MEMS) microphone is also called a microphone chip or silicon microphone. Most MEMS microphones are variants of the condenser microphone design.

Loud Speaker as a microphone - Since a conventional loud speaker is constructed much like a dynamic microphone (with a diaphragm, coil and a magnet), the speaker can actually be used as microphone if instead of sending current to it, it picks sound and current is taken from it. Speakers are sometimes used as microphones in applications where high quality and sensitivity are not needed such as stage shows in villages.

Microphones - Polar Characteristics

So far we have studied that microphones are classified on the basis of technology employed in their design. The technology greatly influences the quality of the microphone but the design also takes care of the way a microphone would capture the sound from its surrounding. A microphone may be able to pick up sounds only from a particular direction and reject other sounds coming from other directions. The microphone directionality helps in achieving a good quality sound recording by rejecting the undesired sound coming from other directions. It helps in controlling the ambient noise and at the same time the revelation that adds to the voice.



Title- Fig. 1.10 A Cardioid Microphone

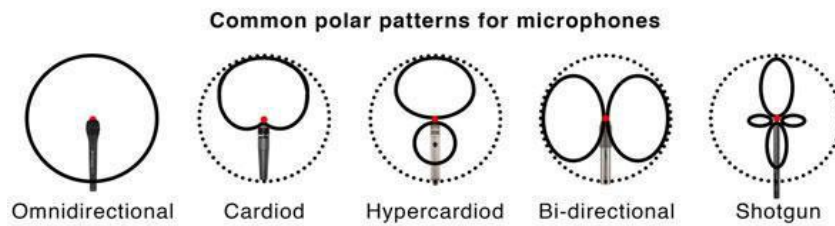
Attribution- [Nicoguardo](#)

Source- [wikimedia.org](#)

Link-https://commons.wikimedia.org/wiki/File:Polar_pattern_cardioid.svg

The microphone directionality is also known as its *polar pattern*. The polar pattern of a microphone shows the sensitivity of the microphone relative to the direction or angle from which the sound arrives.

The most common types of directionality are omni directional, bidirectional and Unidirectional. The diagram below illustrates a number of polar patterns. The microphone faces upwards in each diagram.



Title- Fig. 1.11 Microphone Polar Patterns

Attribution- jay goodman

Source- adorama.com

Link- <https://www.adorama.com/alc/8502/article/recording-interview-audio-all-budgets>

Omni Directional Microphone

An *omnidirectional* (or non-directional) microphone's response is generally considered to be a perfect sphere in three dimensions as shown. But in the real world, this is not the case as the body of microphone obstructs sound from rear side from reaching its diaphragm.

Bi-directional Microphone

"Figure of 8 (eight)" or *bi-directional* microphone receives sound equally from both the front and back of the element. Most ribbon microphones are of this pattern.

Unidirectional microphone

Unidirectional microphones can further be subdivided into

- Cardioid microphone.
- Hyper cardioid microphone.
- Super cardioid microphone.

All these microphones have highly directional characteristics with a difference in their area of coverage in a particular direction. The Super cardioid microphones, also called *gunmicrophones*, are mainly used for picking up the sound from the distance. Such microphones find good application in television program production where the microphone is used with a boom rod and kept out of the camera frame.

Microphones - as per application

Irrespective of the technology used in the making of microphone and its directional pattern, the microphones are also named according to their use. The microphone held by hand is known as *handheldmicrophone* and the same microphone can be fitted on a stand, through a microphone adaptor, to make it a stand mike. Same microphone when attached to a boom rod is called a *boommike*.

There are some small microphones which can be clipped on to the clothing near the neck for good pickup of sound and even giving the freedom of face movement. Such microphone is called *liveliermicrophone* or *lapelmicrophone*.



Title-Fig. 1.12 A Livelier / Lapel Microphone

Attribution- jay goodman

Source- adorama.com

Link- <https://www.adorama.com/alc/8502/article/recording-interview-audio-all-budgets>

Any microphone which has the capability to connect through a radio frequency link instead of a cable/wire is known as *wireless* or *RF* microphone. Such microphones usually have a small transmitter attached to the microphone. In some cases the transmitter is built in the body of the microphone. A distant receiver receives the radio signal that carries sound and after separating audio from radio signal, sends audio signal to the recorder. These microphones are very suitable in the situations where cable is either to be avoided or cannot be laid. RF microphones provide complete mobility to the person carrying it and particularly the lapel microphones are easy to hide.

How to use microphone?

In our discussion, it is apparent that condenser microphones are highly sensitive and superior in quality of sound as compared to dynamic microphone. That is why condenser microphones are expensive and mostly used in the studios. You may be tempted to use condenser mike for good quality sound but actually the choice of the microphone is dictated by the situation in which a recording is to be performed.

Due to their robustness and relatively low sensitivity, the dynamic microphones are preferred in the situations where harsh environmental conditions exist. These microphones can be easily placed close to the sound sources without the fear of overloading or failure.

Dynamic microphones are good at feedback rejection in the public address applications. The feedback usually occurs when sound from nearby loudspeakers reach back to the microphone and generate a whistling sound. The feedback can be eliminated either by turning down the volume control or by increasing the distance between loudspeakers and the microphone. Another technique to keep the feedback low is by holding microphone too close to the lips so that volume control need not be turned up too much.

You might have witnessed singing competition TV shows having large studio audience and the judges using public address system for monitoring. The singers keeping the microphone too close to their lips to avoid feedback but this is possible only if the microphone has a low sensitivity. In such a situation, the dynamic microphone becomes the first choice. If condenser mike is to be used then enough damping (cutting sound level) needs to be added. Dynamic microphones are more frequently used for audio only programs where there is no need to hide the microphone and it can be used conveniently in close proximities.

Generally, dynamic microphone will not be the right choice if it cannot be placed within 12 inches from the sound source. Then condenser microphone becomes the choice as it is capable of picking up sounds from a distance due to its high sensitivity. The shotgun microphone, because of their narrow pickup pattern (high directivity), is a good choice for noise rejection. Condenser microphone (Shotgun) quite frequently finds application as a boom microphone.

In outdoor recording, the wind noise becomes an issue in sound recording. When the blowing wind strikes the diaphragm of the microphone, it creates a low frequency noise. In such situations the windscreen, a piece of moulded foam, is placed on the microphone.



Title-Fig. 1.13 A Windshield Microphone

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Source- adorama.com

Link- <https://www.adorama.com/alc/8502/article/recording-interview-audio-all-budgets>

The windshield breaks the speed of the air reaching the diaphragm but at the same time, due to its perforations, it permits the sound to reach the diaphragm without much resistance.

If you don't find a windshield available at the location then you may wrap a handkerchief over the microphone for similar effect.

The wind noise can also be minimised by changing the microphone direction to avoid facing the direct air.

The wind screen also helps in reducing the “pop sound” generating due to the air gushing out of the mouth of the presenter when a microphone is placed too close to the lips.

Multi microphone recording

When many people are to be recorded together, in some situations, an omni directional microphone may become the choice as it receives sounds from all the directions. Inside a studio the persons can be placed around and near to the Omni microphone and a reasonably good audio can be recorded. If the

Omni microphone have to be placed at a large distance from the persons it may start sounding hollow, The hollowness is the degradation in the sound quality due to excessive reverberation (high reflected sound) reaching the microphone in comparison to the direct sound from the source. The richness in the audio is lost due to hollowness and it sounds to be coming from a distance.

A bi-directional microphone would allow dividing all the persons into two groups on both sides of the microphone. The dead sides of the microphone would not pick up any reflected sound thus reducing the hollowness.

An alternative choice would be to use many unidirectional microphones and provide separate microphone for each individual. The situation would allow each microphone to be placed near to the resource person avoiding the hollowness in sound. However, it is not as simple as it appears to be. For example, if all the persons are on one side of the table and sitting close to each other. Then each microphone would also receive the sound from the adjacent resource persons. This delayed sound coming from a distant person would again introduce hollowness. The best technique would be to arrange the seating arrangement so that each microphone would receive only the sound from its main source and all other persons are either away from it or they are on the dead side (behind the mike) of the microphone. Use of shotgun mike is another possibility.

Audio mixer

The simplest kind of audio recording system would consist of a microphone connected directly to a recorder. This kind of system works best for simple outdoor recordings when either single presenter is speaking or two persons are in conversation. In the studio, usually the system is so arrange that several persons can participate together in a performance. You need to have several microphones for different persons and instruments. Also you may like to take some piece of music or speech from previously recorded source. An audio device known as *audiomixer* accepts inputs from all the microphones and audio devices and mixes them down for feeding to a recorder. The mixer has several controls on its surface as shown in the



image.

Title- Fig. 1.14 An Audio Mixer

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Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:Audio_mixer_faders.jpg

The audio mixers are capable of receiving mainly three types of input signals namely Line, Mic (Microphone) and Aux (Auxiliary). The input signal handling capacity of a typical mixer may be as:

Mic : -40 db. to -70 db.

Line : 0 db. And +4 db.

Aux : -10 db. to -30 db.

The professional audio devices provide line output signal and consumer grade audio devices more often are able to offer an Aux audio output. The microphones are connected to the mixer through the XLR connectors marked as mic inputs. The number of inputs an audio mixer can handle will depend upon the number of channels available on the mixer. Each channel consists of at least one input connector, gain control and the channel fader for controlling the audio level of that channel. In the image you can see there are 8 white faders which mean it is an 8 channel audio mixer. The output of all the channels goes to the master faders who control the final mixed audio level of the program and this mixed output of the mixer is connected to a recorder through the XLR or RCA output connectors.

Generally, the mixers are also equipped with equalizers for changing the frequency response of the mixer for that particular channel and hence the tonal quality of the sound being mixed.

Generally three controls termed as “Bass”, “Mid” and “Treble” allow cutting down or boosting the related frequencies by about 10db to 15 db.

Some mixers may also have a Phantom power supply provisions at the inputs for powering the condenser microphones. The supply is marked as +48V and is often associated with a corresponding on/off switch.

Audio processors

Audio signal processing or *audio processing* is the intentional alteration of audio signals often through an audio effect unit. The processors are used to introduce echo in recording. Echo is used to simulate the effect of reverberation in a large hall. In this process, one or several delayed signals are added to the original signal. To be perceived as echo, the delay has to be of the order of 35 milliseconds or above.

In equalisers, different frequency bands are attenuated or boosted to produce desired frequency response. Moderate use of equalization (often abbreviated as "EQ") can be used to fine-tune the tone quality of a recording; extreme use of equalization, such as heavily cutting certain frequency can create more unusual effects.

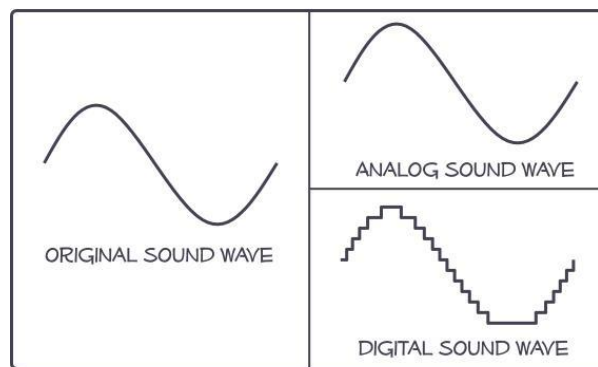
Some of other roles performed by the processes are chorus, phaser, flanger, compressors, filtering, overdrive, robotic voice, pitch shift, time stretching and modulation etc.

Audio Recording Device

Audio recording Technology has evolved greatly. It has made a transition from earlier magnetic tape/cassette recorders to today's Flash Memory based portable recorders. For more Complex audio works the computer based audio workstations are being used. Even today's smart phones have the capability to make a quality audio recording if attached to a good quality external microphone. The modern devices are based on digital technology and the earlier recorders used to be of analogue technology. In the case of analogue technology, the quality of the sound heavily depends upon the medium of recording e.g. Magnetic tape.

Digital Audio

Analogue (Analog) sound is the sound we hear and these sound waves are continuous in time and are analogous to another time varying signal. The digital signals are abruptly/sharply changing signals. In the case of digital technology, an analogue signal is taken as input and is converted into digital through a process of sampling and quantization. The digital signal is basically a kind of mathematical number which any computer can understand where the numbers are made up of only 0 and 1 digits. These mathematical numbers are unaffected by the medium of recording and can be easily manipulated using the computers which are good at processing the digital signals.



Title- Fig. 1.15 Analog Sound Wave

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Link- <http://www.centerpointaudio.com/Analog-VS-Digital.aspx>

We are accustomed to do mathematics using “decimal number system” comprising of 10 digits from 0 to 9. The prefix “deci” comes from the Latin decimus, meaning "tenth". With these 10 digits we are able to count any number and also do all sorts of mathematical computations. Similarly the digital electronics uses “Binary number system” consisting of only two digits i.e. 0 and 1. As we do with decimal system, the mathematical calculations can be done using only 0 and 1 using Boolean (scientist's name) algebra.

Most digital recorders accept analog audio signal and do the conversion to digital internally before recording in digital audio file format. The analogue to digital conversion (A/D conversion) is done through a process of “sampling” and “quantization”. Instead of taking the whole waveform a number of samples are taken from the audio wave and at the time of playback these samples; (through approximation) form the basis for recreating the audio signal back to analogue signal.

The number of samples obtained per second is known as *sampling frequency*. Higher the frequency better would be the signal quality. These samples are then converted into binary numbers (Quantisation) using a set of binary digits/numbers. The set of digits could be 8 bit or more. Higher the bit size better is the quality of audio. However, recording higher quality audio either by raising the sampling frequency or by using more bits, results in larger file size requiring more storage space to record.

Digital Audio File Formats

The digital audio is stored in various file formats which includes WAV and MP3 file formats.

Wav File Format

This format was developed to reduce the file sizes by compromising quality but in an efficient manner. *Wav* is the extension used for files containing digitized sound recorded in a professional sound recording system. Wav files are normally large in size depending on length, whether it's recorded in stereo or mono and the sampling rate used. Most of good quality recordings are done at sampling rate of 44.1 kHz or 48 KHz. using 16 bit or higher. Wave file name has a three digit extension represented as .wav.

MP3 file format

It is an open compression standard, designed for storing digital sound's suitable for the Internet. The *MP3* compression algorithm (formulas) analyses the digital file to eliminate sounds inaudible to the human ear. This reduces the file size by up to 90%. The filters can be adjusted to increase the compression with a decrease in both file size and quality. A good quality MP3 should be recorded at a bit rate of 192 Kbits/second or more. Most internet compatible audio content in mp3 format is available at 128 Kbps or less and is not really suitable for good quality music jobs. MP3 file name carries a three digit extension represented as .mp3.

Mono, Stereo and Surround Sound

Monaural or *monophonic* sound reproduction also called *monosound* is intended to be heard as if it were a single channel of sound coming from one direction. Any music system with single speaker may be termed as mono sound system. In the case of Mono sound, the sound reaches listener from a single direction.

In real life, we find sounds coming from all different directions, and to achieve that effect stereo system was developed. The stereo system comprises of two speakers as left and right source of sound. Stereo uses two channels to convey the impression of sound coming from different places i.e. from left, middle, and right.

The stereo system was unable to offer sounds coming from all directions i.e. from the front as well as the rear. To achieve more realism, the surround sound system was developed.

The *Surround System* comprises of minimum 4 sound sources (speakers), out of which 2 are placed in front and two at the rear position in comparison to the sitting position of the listener. Since two front speakers placed at two corners of the room leave a sound gap in the middle, a speaker was added in the centre making a total speakers count of 5. Because the

channel speakers are of small to medium dimensions and are not able to handle very low frequency sounds in the range of 20 to 100 Hertz, a special speaker known as *subwoofer* was added to the system.

The sub-woofer does not carry any individual channel information but is used to provide the very low frequency content of all channels combined. The Sub-woofer is termed as 0.1 of the system thus upgrading a 5 channel surround to 5.1 surround sound system. Further development in the technologies introduced more channel surround systems to bring higher level of realism in the sound reproduction. Various technologies like “*Dolby*” were developed to record multi-channel surround sounds on audio recorders capable of recording only two channels/tracks.

The recording techniques of stereo and surround sound are quite complex. In today's film industry, the sound recording technique has evolved to the level of sound designing where the films are made keeping in mind the special theatres (e.g. Dolby/DTS audio based theatres) capable of reproducing surround sound.

Unit summary

In this unit you learn about the basic nature of sound in terms of frequency and amplitude. The audio ingredients like frequency response, distortion, noise and reverberation primarily influence the quality of sound. Moreover the quality becomes a subjective matter because it depends on the quality of sound that a person is accustomed to hear in his routine life. Different methods of attaining the good audio quality recording are discussed. Understanding the technologies behind the microphone design helps in making a right selection of microphone in different recording situations. Various microphone placement techniques are also learnt. An overview of audio mixer and studio is also discussed. A basic knowledge about mono, stereo and surround system is obtained for generating interest in further learning.

Assignment

Can you use a sound recorded over a telephone call for your multimedia content? Find out the issues involved and methods to tackle them.

The audio can be recorded using the microphone mounted on a video camera but is that recorded sound suitable for professional works like your multimedia presentation? Find the reasons for the quality issues and how to overcome them?

Make a recording using sound coming from a loud speaker. What are the quality concerns?

Assessment

1. What is Audio?
2. What is Sound?
3. What is the importance of audio / sound quality in a multimedia work?
4. Explain the various types of microphones.
5. What is noise & distortion?
6. When and how you can use the “Proximity Effect” to your advantage?

7. You are recording in a big empty hall. Describe the expected problems and write how you will overcome these problems?

References and Further Readings

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Unit 2 Understanding Image & Video

Introduction

This unit will expand the knowledge about image and video. It will demonstrate the process of creating images and videos. Also describe the different type resolution and type of formats mostly used in both image & video. This knowledge is necessary for both photographer and videographer.

Outcomes

Upon completion of this unit you will be able to:

- Demonstrate the knowledge of image and video.
- Differentiate the various kinds of image and video on the basis of their resolution and formats.
- Create images and videos.

Terminology

Image: An image is a picture that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.

Video: Visual multimedia source that combines a sequence of images to form a moving picture.

Resolution: A measure of the sharpness of an image or of the fineness with which a device (such as a video display, printer, or scanner) can produce or record such an image usually expressed as the total number or density of pixels in the image.

What is an Image?

The term image means physical resemblance or representation of a person, animal, or thing that is photographed, painted, sculptured or made otherwise made visible.

In other words it can be referred as an optical counterpart or appearance of an object as is produced by reflection from a mirror or refraction by a lens on a surface.

Overview of Image

As discussed above an image is the representation of someone or something. We need to capture a person or animal or a particular moment then we record it as a painting or photograph.

Images may be two-dimensional, such as a photograph or screen display, or three-dimensional, such as a statue or hologram.

They may be captured by optical devices such as cameras, mirrors, lenses, telescopes, microscopes, etc. or through natural phenomena, such as the human eye or water.

The word 'image' is also used in the broader sense for two-dimensional figures such as a map, a graph, a pie chart, or a painting. In wider sense, images can also be rendered manually, such as by drawing, the art of painting, carving, rendered automatically by printing or computer graphics technology.

A volatile image is one that exists only for a short period of time. This may be a reflection of an object by a mirror, a projection of a camera obscura, or a scene displayed on a cathode ray tube. A fixed image, also called a hard copy, is one that has been recorded on a material object, such as paper or textile by photography or any other digital process.

Another type of image is graphical image which are generated by computer softwares.

A still image is a single static image. This phrase is used in photography, visual media and the computer industry to emphasize that one is not talking about movies, or in very precise or pedantic technical writing such as a standard.

A *film still* is a photograph taken on the set of a movie or television program during production, used for promotional purposes.

The images can be categorized as *analogue* and *digital* depending upon the equipment used to create them.

Mostly the images created on films or canvas are called as analogue images. The images those which are generated through computer or digital modes are called digital images.

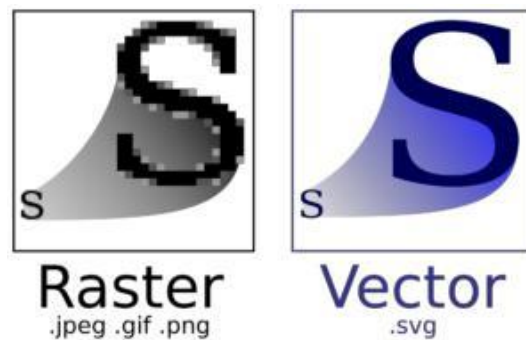
Considering images as photographs, the camera which used films or celluloid created analogue images. These type of images are much fine in quality than digital images as it allows the magnification of the images to any level without much distortion. Mostly light sensitive films and papers are used to capture and reproduce analogue images, whereas digital images are made up of pixels which depend on the sensor of the recording or filming device. These images can be magnified or edited to a certain extent as they tend to distort.

The digital images are further divided into two types called raster and vector.

Raster (or bitmap) images are generally what you think about when thinking of images. These are the types of images that are produced by scanning or photographing an object. Raster images are compiled using pixels, or tiny dots containing unique colour and tonal information that come together to create the image.

Since raster images are pixel based, they are resolution dependent. The numbers of pixels that make up an image as well as how many of those pixels are displayed per inch, both determine the quality of an image. The more pixels in the image and the higher the resolution is, and the higher quality the image, the larger will be the file size.

For example, if we scale a raster image to enlarge it, without changing resolution, it will lose quality and look blurred or pixelated. This is because we are stretching the pixels over a larger area, thus making them look less sharp. This is a common problem, but can be remedied by using raster image editing programs such as Adobe Photoshop to change resolution and properly scale images.



Title- Fig 2.1 Pixilated raster image

Attribution-

Source- iimagedesign.com

Link- <https://iimagedesign.com/vector-vs-raster-for-logo-design/>

Vector Images:

Instead of trying to keep track of the millions of tiny pixels in a raster image, *vector images*, or *lineart*, keep track of points and the equations for the lines that connect them. Generally speaking, vector images are made up of paths or line art that can infinitely scalable because they work based on algorithms rather than pixels.

One of the greatest things about vector images is that you can re-size them infinitely larger or smaller, and they will still print out just as clearly, with no increase (or decrease) in file size, instead of having to keep track of tons of pixels, the computer just has to keep track of a different number. That takes almost no file space at all.

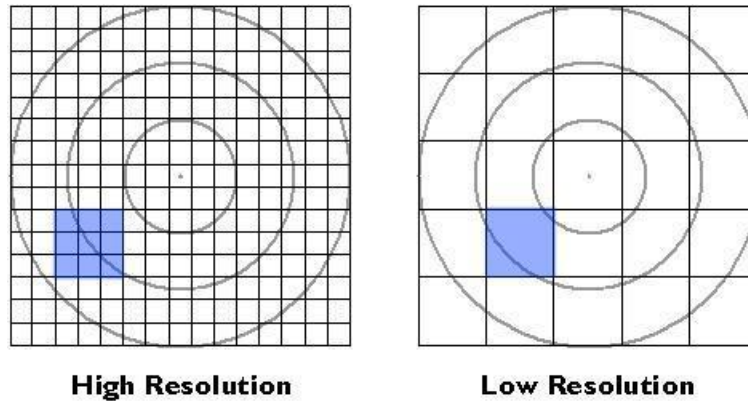
So, what types of graphics would typically be vector? Well, almost all computer font files are based on vector images of the letters - that's why it's possible to scale them WAY up or WAY down and still have the letters be clear.

Resolution of Images

Resolution refers to the quality of image, more technically the amount of pixels the image holds decide its resolution. Resolution is basically referred for digital images.

Before knowing about resolution lets understand the concept of pixels first.

If we take a digital image and look it into it very closely then we can find that there are many small dots. These small dots can be called as pixels. In other words the information about light and colour is recorded as pixel. As in case of film image, the part which is exposed by light creates the image the pixel in digital imagery performs the same role. The amount of pixels decides the resolution or quality of images. The more or less density of pixels results into low or high resolution picture. Resolution can also be related to the clarity of the image. The more amount of pixel in a frame could capture more detail about the subject.



Title- Fig 2.3 Quality of image / Resolution

Attribution-

Source- *google.com*

In an image the pixels are arranged in horizontal and vertical pattern. So the resolution can be calculated as the total pixels in one horizontal line x total pixels in one vertical line. So if it is written as 640 x 480, it can be considered as the file size of the image. Similarly other file size is 1028 x 720.

Formats of image

Image file formats are standardized means of organizing and storing digital images. Image files are composed of digital data in one of these formats that can be rasterized for use on a computer display or printer. An image file format may store data in uncompressed, compressed, or vector formats. Once rasterized, an image becomes a grid of pixels, each of which has a number of bits to designate its colour equal to the colour depth of the device displaying it. Formats are necessary for working upon in different timelines and also for storage.

Some of the most commonly used image formats are jpeg, bmp, tiff, png, gif, exif, etc.

JPEG

JPEG (Joint Photographic Experts Group) is a loss compression method; JPEG-compressed images are usually stored in the **JFIF** (JPEG File Interchange Format) file format. The JPEG/JFIF filename extension is **JPG** or **JPEG**. Nearly every digital camera can save images in the JPEG/JFIF format, which supports eight-bit greyscale images and 24-bit colour images (eight bits each for red, green, and blue).

JPEG applies *lossycompression* to images, which can result in a significant reduction of the file size. Applications can determine the degree of compression to apply, and the amount of compression affects the visual quality of the result. When not too great, the compression does not noticeably affect or detract from the image's quality, but JPEG files suffer generational degradation when repeatedly edited and saved. (JPEG also provides lossless image storage, but the lossless version is not widely supported.)

EXIF

The *EXIF* (Exchangeable image file format) format is a file standard similar to the JFIF format with TIFF extensions; it is incorporated in the JPEG-writing software used in most cameras. Its purpose is to record and to standardize the exchange of images with image

metadata between digital cameras and editing and viewing software. The metadata are recorded for individual images and include such things as camera settings, time and date, shutter speed, exposure, image size, compression, name of camera, colour information. When images are viewed or edited by image editing software, all of this image information can be displayed.

TIFF

The *TIFF* (Tagged Image File Format) format is a flexible format that normally saves eight bits or sixteen bits per colour (red, green, blue) for 24-bit and 48-bit totals, respectively, usually using either the **TIFF** or **TIF** filename extension. The tagged structure was designed to be easily extendible, and many vendors have introduced proprietary special-purpose tags. TIFFs can be lossy or lossless, depending on the technique chosen for storing the pixel data. Some offer relatively good lossless compression for bi-level (black & white) images. Some digital cameras can save images in TIFF format, using the *LZW* compression algorithm for lossless storage. TIFF image format is not widely supported by web browsers. TIFF remains widely accepted as a photograph file standard in the printing business. TIFF can handle device-specific colour spaces, such as the *CMYK* defined by a particular set of printing press inks. *OCR* (Optical Character Recognition) software packages commonly generate some form of TIFF image (often monochromatic) for scanned text pages.

GIF

GIF (Graphics Interchange Format) is in normal use limited to an 8-bit palette, or 256 colours (while 24-bit colour depth is technically possible). GIF is most suitable for storing graphics with few colours, such as simple diagrams, shapes, logos, and cartoon style images, as it uses *LZW* lossless compression, which is more effective when large areas have a single colour, and less effective for photographic or dithered images. Due to GIF's simplicity and age, it has achieved almost universal software support. Due to its animation capabilities, it is still widely used to provide image animation effects, despite its low compression ratio compared to modern video formats.

BMP

The *BMP* file format (Windows bitmap) handles graphic files within the Microsoft Windows OS. Typically, BMP files are uncompressed, and therefore large and lossless; their advantage is their simple structure and wide acceptance in Windows programs.

PNG

The *PNG* (Portable Network Graphics) file format was created as a free, open-source alternative to GIF. The PNG file format supports eight-bit palette images (with optional transparency for all palette colours) and 24-bit true colour (16 million colours) or 48-bit true colour with and without alpha channel - while GIF supports only 256 colours and a single transparent colour.

Compared to JPEG, PNG excels when the image has large, uniformly coloured areas. Even for photographs – where JPEG is often the choice for final distribution since its compression technique typically yields smaller file sizes – PNG is still well-suited to storing images during the editing process because of its lossless compression.

PNG provides a patent-free replacement for GIF (though GIF is itself now patent-free), and can also replace many common uses of TIFF. Indexed-colour, greyscale, and true colour

images are supported, plus an optional alpha channel. PNG can store gamma and chromaticity data for improved colour matching on heterogeneous platforms.

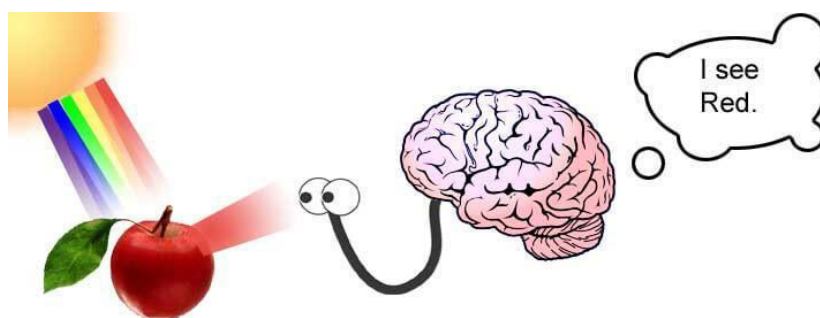
PNG is designed to work well in online viewing applications like web browsers and can be fully streamed with a progressive display option. PNG is robust, providing both full file integrity checking and simple detection of common transmission errors.

What is “colour”?

Colour is the aspect of things that is caused by differing qualities of light being reflected or emitted by them.

To see colour, you have to have light. When light shines on an object some colours bounce off the object and others are absorbed by it. Our eyes only see the colours that are bounced off or reflected.

The sun’s rays contain all the colours of the rainbow mixed together. This mixture is known as *white light*. When white light strikes a white crayon or marker barrel, it appears white to us because it absorbs no colour and reflects all colours equally. A black crayon or marker cap absorbs all colours equally and reflects none, so it looks black to us. While artists consider black a colour, scientists do not because black is the absence of all colour.



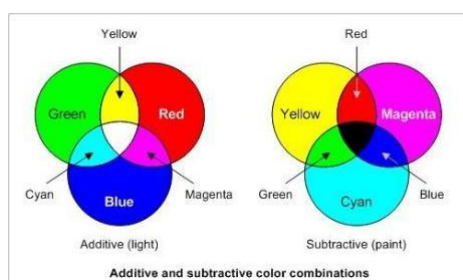
Title- Fig 2.4 How do we see colour?

Attribution- Ranjan Gupta & Rahul jindal

Source- pixabay.com

Link-<http://www.funscience.in/studyzone/Physics/OpticalInstruments/HowDoWeSeeColours.php>

Briefly knowing about photography or image formation one should have a clear idea about colours. Whenever an image is captured, the light falling on the subject reflects onto the image field carrying the information about light and colour. For example if a person is wearing red shirt then only the red colour will be reflected back and other spectrum of light will be absorbed by the shirt.



Title- Fig 2.5 RGB & CMYK color

Attribution- [Bara Darya](#)

Source- quora.com

Link- <https://www.quora.com/Can-you-combine-two-other-colors-to-make-red-If-so-what-two-colors-do-you-use>

An image can be categorized as *colour* image or *black & white* or *monochrome* image. The colour image can further be divided into *RGB* and *CMYK*. The RGB represents **Red, Green, and Blue** spectrum of light which also called as *primarycolour*. The CMYK represents **Cyan, Magenta, Yellow, and Black** spectrum of light which are known as *secondarycolours*.

What is a “video”?

Video is a **Visual multimedia source** that combines a sequence of images to form a moving picture. The video transmits a signal to a screen and processes the order in which the screen captures should be shown. Videos usually have audio components that correspond with the pictures being shown.

History of video

Video technology was first developed for mechanical television systems, which were quickly replaced by *cathode ray tube* (CRT) television systems, but several new technologies for video display devices have since been invented. Video was originally exclusively a live technology.

Charles Ginsburg led an Apex research team developing one of the first practical *video tape recorders* (VTR). In **1951** the first video tape recorder captured live images from television cameras by converting the camera's electrical impulses and saving the information onto magnetic video tape.

Video recorders were sold for \$50,000 in 1956, and videotapes cost \$300 per one-hour reel. However, prices gradually dropped over the years; in 1971, Sony began selling videocassette recorder (VCR) decks and tapes into the consumer market.

The use of digital techniques in video created *digitalvideo*, which allowed higher quality and, eventually, much lower cost than earlier analog technology. After the invention of the *DVD* in **1997** and *Blu-ray Disc* in **2006**, sales of videotape and recording equipment plummeted. Advances in computer technology allowed even inexpensive personal computers to capture, store, edit and transmit digital video, further reducing the cost of video production, allowing program-makers and broadcasters to move to tapeless production.

As of **2015**, with the increasing use of high-resolution video cameras with improved dynamic range and colour sensors, and high-dynamic-range digital intermediate data formats with improved colour depth, modern digital video technology is slowly converging with digital film technology.

Characteristic of video

Every video signal is a collection of number of still frames with movement. What is frame? A *frame* is the amount of space covered by a lens. If we cut a rectangular piece of paper and try to look through it then we can make out the difference between the amount of area which

we can see through bare eyes and the area seen through the piece of paper. This rectangular piece of paper can be related to a frame of a camera. So a video signal is created when a fixed amount of frames captured during a second. The video signals are electricity dependant hence all over the world the video signals are categorized as same.

The three commonly used video signals are **PAL**, **NTSC** and **SECAM**. These are known as standard definition videos.

PAL (Phase Alternating Lines), is a colour encoding system for analogue television used in broadcast television systems in most countries broadcasting at 625-line / 50 fields (25 frames) per second.

NTSC, named after the **National Television System Committee**, the analog television system used in Philippines, and until digital conversion it was used in most of the Americas, Burma, South Korea, Taiwan, Japan, and some Pacific island nations and territories.

NTSC colour encoding uses approximately 29.97 interlaced frames of video per second. Each frame is composed of two fields, each consisting of 262.5 scan lines, for a total of 525 scan lines.

483 scan lines make up the visible raster. The remaining (the vertical blanking interval) allow for vertical synchronization and retrace. This blanking interval was originally designed to simply blank the receiver's CRT to allow for the simple analog circuits and slow vertical retrace of early TV receivers. However, some of these lines may now contain other data such as closed captioning and vertical interval time code (VITC). In the complete raster (disregarding half lines due to interlacing) the even-numbered scan lines (every other line that would be even if counted in the video signal, e.g. {2, 4, 6, ..., 524}) are drawn in the first field, and the odd-numbered (every other line that would be odd if counted in the video signal, e.g. {1, 3, 5, ..., 525}) are drawn in the second field, to yield a flicker-free image at the field refresh frequency of 60/1.001 Hz (approximately 59.94 Hz). For comparison, 576i systems such as PAL-B/G and SECAM use 625 lines (576 visible), and so have a higher vertical resolution, but a lower temporal resolution of 25 frames or 50 fields per second.

SECAM(Sequential colour with memory), is an analogue colour television system first used in France. It was one of three major colour television standards.

Just as with the other colour standards adopted for broadcast usage over the world, SECAM is a standard which permits existing monochrome television receivers predating its introduction to continue to be operated as monochrome televisions. Because of this compatibility requirement, colour standards added a second signal to the basic monochrome signal, which carries the colour information. The colour information is called chrominance or C for short, while the black-and-white information is called the luminance or Y for short. Monochrome television receivers only display the luminance, while colour receivers process both signals.

Video can be interlaced or progressive. Interlacing was invented as a way to reduce flicker in early mechanical and CRT video displays without increasing the number of complete frames per second, which would have sacrificed image detail to remain within the limitations of a narrow bandwidth. The horizontal scan lines of each complete frame are treated as if numbered consecutively, and captured as two fields: an odd field (upper field) consisting of the odd-numbered lines and an even field (lower field) consisting of the even-numbered lines.

Analog display devices reproduce each frame in the same way, effectively doubling the frame rate as far as perceptible overall flicker is concerned. When the image capture device acquires the fields one at a time, rather than dividing up a complete frame after it is captured, the frame rate for motion is effectively doubled as well, resulting in smoother, more lifelike reproduction (although with halved detail) of rapidly moving parts of the image when viewed on an interlaced CRT display, but the display of such a signal on a progressive scan device is problematic.

NTSC, PAL and SECAM are interlaced formats. Abbreviated video resolution specifications often include an “i” to indicate interlacing. For example, PAL video format is often specified as 576i50, where 576 indicates the total number of horizontal scan lines, i indicate interlacing, and 50 indicate 50 fields (half-frames) per second.

In progressive scan systems, each refresh period updates all scan lines in each frame in sequence. When displaying a natively progressive broadcast or recorded signal, the result is optimum spatial resolution of both the stationary and moving parts of the image. When displaying a natively interlaced signal, however, overall spatial resolution is degraded by simple line doubling— artefacts such as flickering or "comb" effects in moving parts of the image appear unless special signal processing eliminates them.

Procedure known as *de-interlacing* can optimize the display of an interlaced video signal from an analog, DVD or satellite source on a progressive scan device such as an LCD Television, digital video projector or plasma panel. De-interlacing cannot, however, produce video quality that is equivalent to true progressive scan source material.

Aspect ratio

Aspectratio describes the dimensions of video screens and video picture elements. All popular video formats are rectilinear, and so can be described by a ratio between width and height. The screen aspect ratio of a traditional television screen is 4:3, or about 1.33:1. High definition televisions use an aspect ratio of 16:9, or about 1.78:1.

Pixels on computer monitors are usually square, but pixels used in digital video often have non-square aspect ratios, such as those used in the PAL and NTSC variants of the CCIR 601 digital video standard, and the corresponding anamorphic widescreen formats. Therefore, a 720 by 480 pixel NTSC DV image displays with the 4:3 aspect ratio (the traditional television standard) if the pixels are thin, and displays at the 16:9 aspect ratio (the anamorphic widescreen format) if the pixels are fat.

Formats of Video

Like still images, video is also divided as *analogue* and *digital*.

Analog video is a video signal transferred by an analog signal. An analog colour video signal contains *luminance*, *brightness* (Y) and *chrominance* (C) of an analog television image. When combined into one channel, it is called *compositevideo* as is the case, among others with NTSC, PAL and SECAM.

Analog video may be carried in separate channels, as in two channel *S-Video* (YC) and multi-channel *componentvideo* formats.

Analog video is used in both consumer and professional television production applications.

Analogue video are divided into sub categories depending on the transmission of signal such as component, composite, s-video.

Component Video (one channel) is an analog video transmission (without audio) that carries standard definition video typically at 480i or 576i resolution. Video information is encoded on one channel, unlike the higher-quality S-video (two channels) and the even higher-quality component video (three or more channels).

Composite video is usually in standard formats such as NTSC, PAL, and SECAM and is often designated by the **CVBS** initialise, for colour, video, blanking and sync, or simply as **video**. Mostly composite video signals are carried through by RCA cables.

S-Video (also known as **separate video** and **Y/C**) is a signalling standard for standard definition video, typically 480i or 576i. By separating the black-and-white and colouring signals, it achieves better image quality than composite video, but has lower colour resolution than component video. The S-video cable carries video using two synchronized signal and ground pairs, termed **Y** and **C**.

Y is the *luma* signal, which carries the *luminance* – or black-and-white – of the picture, including synchronization pulses.

C is the *chroma* signal, which carries the *chrominance* – or colouring-in – of the picture. This signal contains both the saturation and the hue of the video.

The luminance signal carries horizontal and vertical sync pulses in the same way as a composite video signal. Luma is a signal carrying luminance after gamma correction, and is therefore termed "Y".

In composite video, the signals co-exist on different frequencies. To achieve this, the luminance signal must be low-pass filtered, dulling the image. As S-Video maintains the two as separate signals, such detrimental low-pass filtering for luminance is unnecessary, although the chrominance signal still has limited bandwidth relative to component video.

Component video is a video signal that has been split into two or more component channels. In popular use, it refers to a type of component analog video (CAV) information that is transmitted or stored as three separate signals. Component video can be contrasted with *composite video* (NTSC, PAL or SECAM) in which all the video information is combined into a single line level signal that is used in analog television. Like composite, component-video cables do not carry audio and are often paired with audio cables.

When used without any other qualifications the term *component video* usually refers to analog YPBPR component video with sync on luma.

Digital video is a representation of moving visual images in the form of encoded digital data. Digital video comprises a series digital images displayed in rapid succession.

Digital video was first introduced commercially in **1986** with the **Sony D1 format**, which recorded an uncompressed standard definition component video signal in digital form instead of the high-band analog forms that had been commonplace until then.

Digital video can be copied with no degradation in quality. In contrast, when analog sources are copied, they experience generation loss. Digital video can also be stored on hard disks or streamed over the Internet to end users who watch content on a desktop computer screen

or a digital smart TV. In everyday practice, digital video content such as TV shows and movies also includes a digital audio soundtrack.

Digital videos are classified depending upon the pixel rate. Full HD and half HD are the most common used terms in digital video field.

Full HD pixel rate is 1080 pixels per inch whereas half HD pixel rate is 720pixels per inch.

Like the digital image system, digital videos are also stored or encoded into different formats. Some of these formats are mpeg4, H.264, CCIR etc. Each encoding format resembles the compression rate of the video signal.

Unit summary

This unit introduced the image and its types. Described the various resolutions of image and also discussed what an image is made up of.

It also gave brief knowledge about Colour and its type.

Along with images it also introduced videos; its different types of signals and format. Also explained how video signals are carried or transmitted.

Assessment

1. What is an image?
2. What are different types of images?
3. Differentiate between raster and vector images.
4. What is a pixel?
5. Name some of the image formats.
6. What is colour?
7. What is aspect ratio?
8. What is a video? Discuss the various format of video.
9. What are the different types of analogue videos?

Unit 3 Film and Digital Photography

Introduction

In this unit you will learn the art & science of photography. It will introduce the basic knowledge and fundamental techniques of photography with both film/analogue & digital cameras. It will elaborate all techniques, camera function/parts, composition rules, lighting and other important aspects of photography which are prerequisite to taking a better photograph. Based on these techniques, you will learn how to apply them to various situations. While you go through the unit step by step, you will be able to acquire basic understanding of how to take better photos. You will also learn about the difference of analogue and digital photography medium.

Outcomes

Upon completion of this unit you will be able to:

- Exhibit knowledge about is photography.
- Utilize the various composition & lighting techniques for better photography.
- Differentiate between film and digital photography.
- Understand different lighting patterns.

Terminology

Photography: It is the art or process of producing images by the help of any radiant energy and especially light on a sensitive surface (as Terminology film or an optical sensor).

Composition: Composition is the presentation of visual elements in an image, especially the placement of the subject in relation to other objects.

Lighting: This is the deliberate use of light to achieve a practical or aesthetic effect to create an image as per requirement.

What is “Photography”?

The term *photography* means the science and practice of creating long lasting images by recording light or other electromagnetic radiation. This could be done electronically with help of an image sensor, or chemically by means of a light-sensitive material such as photographic film.

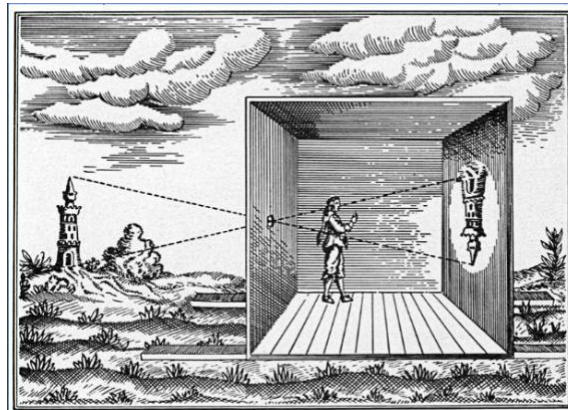
Basically, a *lens* is used to focus the light reflected or emitted from objects onto a light-sensitive surface inside a camera with a timed exposure. When an *electronic imagesensor* is used, it produces an electrical charge, which is electronically processed and stored in a digital image file for subsequent display or processing. In case of *lightsensitivefilms* the image is captured as hidden image which is then further developed by chemical process to get the visible image. A negative image on film is traditionally used to photographically create a

positive image on a paper base, known as a *print*, either by using an enlarger or by contact printing.

Overview of photography

The discovery of photography started with the principle of camera *obscura*. The camera obscura was first used in ancient China. Leonardo da Vinci discovered that natural camera obscura is formed by dark caves on the edge of a sunlit valley. A hole in the cave wall acts as a *pinhole camera* which allows light to project a laterally reversed, upside down image on a piece of paper. So means of photography then evolved with inventing means to capture and keep the image produced by the camera, mirrors, lenses, telescopes, microscopes, etc. and natural objects and phenomena, such as the human eye or water.

Around the year **1800**, the *first attempt to capture image on any light sensitive substance* was made by **British inventor Thomas Wedgwood** with a camera obscura. He used paper or white leather treated with silver nitrate. Around **1802** it was found that "*the images formed by means of a camera obscura have been found too faint to produce, in any moderate time, an effect upon the nitrate of silver.*" The shadow images eventually darkened all over.



Title-Fig 3.1 Camera Obscura/Pin-hole Camera

Attribution- King James

Source- prezi.com

Link- https://prezi.com/1fluj_abvwsv/camera-obscura-pinhole-cameras/

Technology of Photography

The most widely used photographic process is the *black-and-white negative-positive system*. When light is projected with the help of camera, the lens projects an image of the scene being photographed onto a film coated which is covered with light-sensitive silver salts, such as silver bromide. The camera *shutter* allows light reflected from the scene for a given time to produce an invisible but developable image in the sensitized layer, thus exposing the film.

While the development process (in a darkroom) the *silver salt crystals* that have been struck by the light are converted into *metallic silver*, forming a visible deposit or density. The more light that reaches a given area of the film, the more silver salt is converted into black portion which marks the exposed area and the denser the silver deposit that is formed there. An

image of various brightness levels thus yields a picture in which this brightness are tonally reversed—a negative. The brighter the subject its details will be recorded as dark or dense areas in the developed film and the portions which are not so bright or don't reflect much light will be marked as light portion.

Once the film is developed the film is treated with a *fixing bath* that dissolves away all undeveloped silver salt and so prevents subsequent darkening of such unexposed areas. After these process when all the silver salts are washed away the invisible image becomes visible as a permanent negative silver image within the *gelatine* layer.

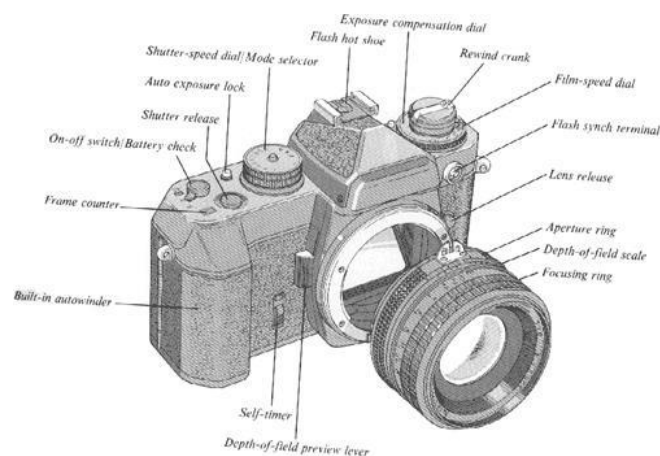
A *positive picture* is obtained when this negative image is again exposed through light by the help of a device called *Enlarger* onto a light sensitive paper. As in case of exposure of films the paper also when gets exposed creates a latent image. This image can be further developed through chemical process to achieve the final image. In contact printing the negative film and the paper are placed face to face in intimate contact and exposed by diffused light shining through the negative. The dense (black) portions of the negative image result in little exposure of the paper and, so, yield light image areas; thin portions of the negative let through more light and yield dark areas in the print, thus re-creating the light values of the original scene.

Whereas in *digital photography* the principle is almost the same but the light sensitive film is replaced by light sensitive electronic sensors also called *CCD* (charge coupled device). The light rays fall on these *CCD* and the *CCD* creates an electronic signal which is recorded on a storing device as image.

Camera and lenses

To gain the knowledge about photography we have to firstly be familiar with the main device needed for photography i.e. the camera.

In its simplest form, the camera is a light-tight container carrying a *lens*, a *shutter*, a *diaphragm*, a *device for holding* (and changing) the *film in the correct image plane*, and a *viewfinder* to allow the camera to be aimed at the desired scene.



Title- Fig 3.2 Parts of a Camera

Attribution-

Source-

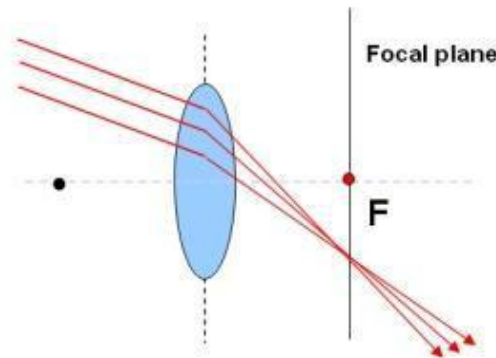
Link-<https://sites.google.com/site/tyshonharrisphoto/photography-basics/camera-parts-functions>

The **lens** projects an inverted image of the scene in front of the camera onto the film in the image plane. The image is sharp only if the film is located at a specific distance behind the lens. This distance depends on the *focal length* of the lens and the distance of the object in front of the lens. All the cameras have a mechanism to adjust the distance between the lens and focal plane to capture near and far away objects to create sharp images. In some cameras focusing adjustment is achieved by moving only the front element or internal elements of the lens, in effect modifying the focal length.

The **shutter** consists of a set of metallic leaves mounted in or behind the lens or a system of blinds positioned in front of the film. The shutter is made to be open and close for a desired time to expose the film to the image formed by the lens according to the availability of light. The amount of light can be controlled by two things that are the *timing* and *speed of shutter* and second is the *aperture* which is the amount of opening of the lens diaphragm. The diameter of the aperture is adjustable. The combination of the diaphragm opening and exposure time is the photographic exposure. To obtain a film image that faithfully records all the tone gradation of the object, this exposure must be matched to the brightness (luminance) of the subject and to the sensitivity or speed of the film. Light meters built into most modern cameras measure the subject luminance and set the shutter or the lens diaphragm to yield a correctly exposed image.

Focal plane

The *focal plane* of a camera is the region inside the camera where the lens converge the entire light ray to create an image. The point where a sharp image is created is called the *focal point*. It is the point where the film roll or the ccd is located.



Title- Fig 3.4 Focal Plane

Attribution-

Source-

Link- <http://astronomy.swin.edu.au/cosmos/F/Focal+Plane>

Viewfinder

The *viewfinder* is a small lens located above the focal point. It helps the photographer to see through and compose the frame. Whatever is seen through the viewfinder will be captured on the film.



Title- Fig 3.5 Viewfinder of a Camera

Attribution- [Bladeor](#)

Source- [wikimedia.org](https://commons.wikimedia.org/wiki/File:Nikon_D90_Viewfinder.JPG)

Link- https://commons.wikimedia.org/wiki/File:Nikon_D90_Viewfinder.JPG

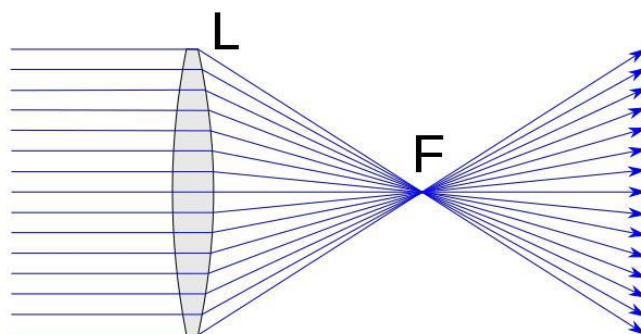
Lens

The *lens* is the main and inseparable part of a camera. The lens is a transparent piece of glass which has the ability to bend light ray to create an image on a plane.

There are two types of lens; *convex and concave lens*.

Convex lens

A convex lens is a converging lens. When parallel rays of light pass through a convex lens the refracted rays converge at one point called the *principal focus*. The distance between the principal focus and the centre of the lens is called the *focallength*.



Title- Fig 3.6 Convex Lens

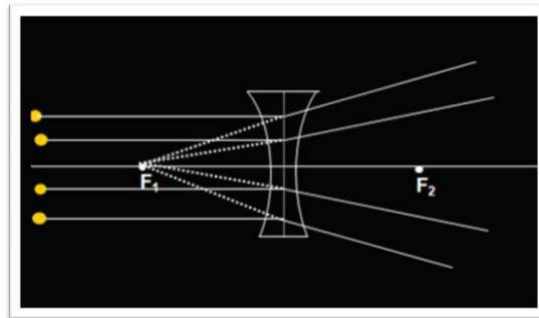
Attribution- [Chetvorno](#)

Source- wikimedia.org

Link- https://commons.wikimedia.org/wiki/File:Convex_lens_-_perfect.svg

Concave lens

Concave lenses are thinner at the middle. Rays of light that pass through the lens are spread out (they diverge). A concave lens is a diverging lens. When parallel rays of light pass through a concave lens the refracted rays diverge so that they appear to come from one point called the principal focus.



Title- Fig 3.7 Concave Lens

Attribution- [Kvr.lohith](#)

Source- wikimedia.org

Link- https://commons.wikimedia.org/wiki/File:Concave_lens-diverging_rays.png

Camera lenses are made with a wide range of focal lengths. They range from extreme wide angle to extreme close magnification. Each lens is designed to suit a certain type of photography. The extreme wide angle may be preferred for architecture because it has the capacity to capture a wide view of a building. The normal lens which mostly has a wide aperture is often used for street and documentary photography. The telephoto lens is useful for sports and wildlife but it is more susceptible to camera shake. The camera lens serves a dual purpose of *focussing* and *zooming/ magnification* of a subject.

A camera lens can be made up of one or more lenses according to the need. The lens which are made up of only type of lens either convex or concave are called block lens. The lens which contains more than one lens is called telephoto lens. It mostly contains two or more convex and concave lenses.



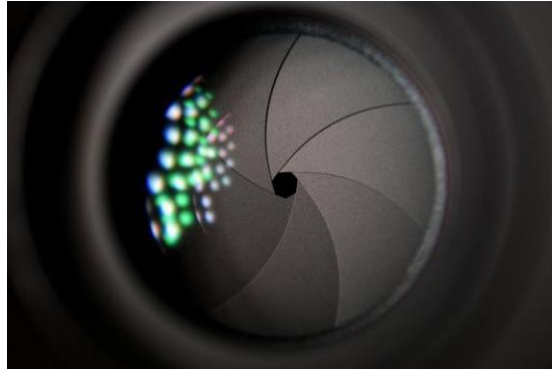
Title- Fig 3.8 Camera Lens

Attribution- [Multimoty1](#)

Source- [wikimedia.org](#)

Link- <https://commons.wikimedia.org/wiki/File:24mm-Fixed-focal-SLR-lens.jpg>

A camera lens also contains a mechanism to control the amount of light entering through the lens and falling on the film plane. This mechanism or opening is called *aperture*. The aperture is denoted as “f” and it is counted in stops. Every stop is a next multiple of the previous. The aperture opening starts from f/1.4 then f/2 likewise f/2.8, f/4 and up to f/22. The smaller the stop the bigger the opening and the more the amount of light will be passed through.



Title- Fig 3.9 Aperture in a camera

Attribution-

Source- [pixabay.com](#)

Link- <https://www.pexels.com/photo/aperture-art-blur-camera-414781/>

Shutter

In camera, a *shutter* is a device that allows light to pass for a determined period for exposing photographic film or a light-sensitive electronic sensor in order to capture a permanent image of a scene. But in case of projector, shutter can also be used to allow rays of light to pass outwards to project images. A shutter of variable speed is used to control exposure time of the film. The shutter is so constructed that it automatically closes after a certain required time interval. The speed of the shutter is controlled by a ring outside the camera, on which various timings are marked.

The shutter speed determines the time for which the amount of light will pass through lens and fall on the film plane. The shutter speed varies according to what amount of one second they open and close.

The shutter speeds are denoted as 1/250, 1/500, 1/1000. These indicate that the shutter plate opens and close within 1000th of a second and else wise.

If one wants that the shutter should be remain open for as much time he wants he can click and hold the shutter button as long he wants. Nowadays self-click cameras are also available which are timed for the desired timing and the camera will do the rest.

Techniques of photography

Photography is not just point and shoots. There are many principles and techniques which should be followed and included through regular experimentation to achieve a breathtaking and perfect photograph.

High Speed Photography

High speed photography is the technique of capturing highly speed moving object so that it could be seen by the human eye. Mostly subjects like bullet or a speed moving vehicle can be captured using this technique. For this the highest possible shutter speed available in a camera is used. It could vary from 1/1000 to 1/4000.



Title- Fig 3.10 High speed photography

Attribution-

Source- elakiri.com

Link- <http://www.elakiri.com/forum/showthread.php?t=1594950>

Motion-blur Photography

Motion blur is the art of capturing a moving subject. This technique is often used in *sports photography*, but can also be used to create interesting images with light or fast moving objects. The background gets blurred but the main subject looks like frozen in time. To create motion blur effect, slowing down the shutter speed and holding the camera still while panning the camera from the opposite direction of the subject motion would result perfectly timed picture.



Title- Fig 3.11 Motion-blur photography

Attribution- [E01](#)

Source- [wikimedia.org](#)

Link-https://commons.wikimedia.org/wiki/File:London_bus_and_telephone_box_on_Haymarket.jpg

Macro Photography

When we photograph something very small we call it *macro photography*. Shooting small things poses great challenges and comes with high rewards. When we talk about macro photography we tend to think about small things that we shoot from a close distance.

Macro photography is extreme close-up photography, usually of very small subjects and living organisms like insects, in which the size of the subject in the photograph is greater than life size according to some definitions, a macro photograph is one in which the size of the subject on the negative or image sensor is life size or greater. However, in other uses it refers to a finished photograph of a subject at greater than life size.



Title- Fig 3.12 Macro Photography

Attribution- [Endervale](#)

Source- [pixabay.com](#)

Link-https://commons.wikimedia.org/wiki/Category:Macro_photography#/media/File:Aphaenogaster_spinosa_testa.jpg

Long exposure photography

Long exposure photography as the name suggests is technique of photography by using longer exposure times than needed to obtain a correctly exposed photograph, either during daytime deliberate intent to create an effect on any moving object that is typical for long exposure photographs. Effects like blurred skies

with streaks of clouds, smoothed out water like if it was frozen, blurred ghostlike people, star trails, moon trails and light trails can be achieved by this technique.

Not only the duration of the exposure that qualifies it as a long exposure photograph, but also when intentionally capturing moving objects with longer exposure times than necessary that makes it a long exposure photograph.



Title- Fig 3.13 Long Exposure Photography

Attribution- [Diego Delso](#)

Source- [pixabay.com](#)

Link-https://commons.wikimedia.org/wiki/File:R%C3%ADo_Moscova,_Mosc%C3%B4,_Rusia,_2016-10-03,_DD_16-17_HDR.jpg

Composition

Composition, the act of composing the image through viewfinder, is a visual process of organizing the elements and individual details of a scene into a balanced and pleasing arrangement. Because what one person finds pleasing, someone else will not, composition is largely a matter of personal taste.

In simple words, composition is including what and how much of the elements in a frame so that the photograph appears attractive or meaningful.

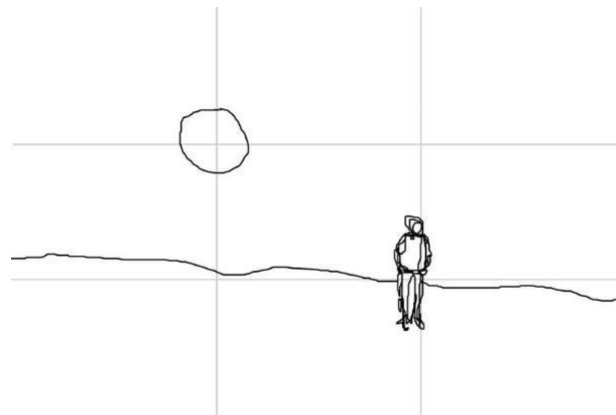
A photograph is mostly rectangular in shape in the ratio of 4:3 as it is believed that the area covered by our naked eye is rectangular. So the frame in the camera is also meant to be rectangular. So when composing a subject we have to include what we want to shoot and how much we want to shoot within that frame. While shooting we can just compose whatever is in front of us with just looking at the viewfinder and making the desired frame or else we can arrange other elements if it is a staged photography in the way we want to create the composition we want.

There are some basic rules of composition which we have to keep in mind which can help us creating good photographs.

Rule of thirds

The *rule of thirds* is one of the most useful composition techniques in photography. It's an important concept to learn as it can be used in all types of photography to produce images which are more engaging and better balanced.

The rule of thirds involves mentally dividing up your image *using 2 horizontal lines and 2 vertical lines*, as shown below. You then position the important elements in your scene along those lines, or at the points where they meet.



Title- Fig 3.14 Composition Rule: Rule of Third

Attribution- [CIngre~commons/wiki](#)

Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:Rule_of_thirds.jpg

When framing a photo, imagine the scene divided up as above. Think about what elements of the photo are most important, and try to position them at or near the lines and intersections of the grid. They don't have to be perfectly lined up as long as they're close.

You may need to move around to get the best composition. This forces you to think more carefully about the shot, and is a good habit to get into whether you're using the rule of thirds or not. But it is advisable to keep the main part of the composition in the centre of the grid which is called the golden rectangle. The human eye tends to look at the centre first.

To help you out, some cameras have a setting which overlays a rule of thirds grid onto your photo. This removes all guesswork and helps you get you're positioning even more accurate.

Balancing of elements

Placing your main subject off-centre, as with the rule of thirds, creates a more interesting photo, but it can leave a void in the scene which can make it feel empty. You should balance the "weight" of your subject by including another object of lesser importance to fill the space.

Symmetry and patterns

We are surrounded by *symmetry* and *patterns*, both natural and man-made. They can make for very eye-catching compositions, particularly in situations where they are not expected. Another great way to use them is to break the symmetry or pattern in some way, introducing tension and a focal point to the scene. Keeping proper balance in the pattern is very necessary.

Depth

Because photography is a two-dimensional medium, we have to choose our composition carefully to convey the *sense of depth* that was present in the actual scene. You can create depth in a photo by including objects in the foreground, middle ground and background. Another useful composition technique is overlapping, where you deliberately partially obscure one object with another. The human eye naturally recognises these layers and mentally separates them out, creating an image with more depth.

Types of shots

Every photograph or photographic composition is called *a shot*. But each shot cannot be same all the time. It would vary depending upon the mood of the photographer and the availability of the subject.

So the composition or framings are divided into various types of shots which deliver different kind of mood and information.

Extreme long shot

An *extreme long shot (ELS)* is also known as extreme wide shot. It covers a very wide area which shows the whole figure of the subject as well as its surroundings. It also provides a context for the scene, which means the viewer could locate where the subject is placed. Very less detail about the subject is available in this type of shot.



Title- Fig 3.19 Extreme long shot photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Long shot

A *long shot (LS)* also known as full shot is closer to the subject than the ELS. It frames the whole figure of the subject. A smaller portion of the surrounding is seen in context to the subject. The

point of focus is the main subject. This type of shot catches the action rather than the emotion.



Title- Fig 3.20 Long Shot Photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Medium long shot

Medium Long Shot (MLS) is also known as a three-quarters shot. While shooting a person it frames the subject from head to knee. It is just in between composition of long shot and medium shot.



Title- Fig 3.21 Medium Long Shot Photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Medium shot

Medium shot (MS) also known as mid shot is a camera shot in which the subject is in the middle distance, permitting some of the background to be seen. In this shot both emotion and action of the subject can be captured.



Title- Fig 3.22 Medium Shot Photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Medium close shot

Medium close covers the subject from head and cuts off around mid-chest. The focus is on the subject. It reveals only little of the surroundings. It focuses the facial expressions of the subject.



Title- Fig 3.23 Medium Close Shot Photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Close Shot

Close shot (CS) frames a subject's face and cuts off mid-neck, showing the face and entire head. The subject fills almost the entire frame. It captures facial expressions and emotions.



Title- Fig 3.24 Close Shot Photograph

Attribution- [Justin Dise](#)

Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Extreme Close Shot

Extreme close shot frames only some part of the subject which photographer wants to shoot very closely. In case of person or animal it maybe only the eyes, ears or lips etc. mostly only the strong emotions are captured in this shot.



Title- Fig 3.25 Extreme Close Shot Photograph

Attribution- [Justin Dise](#)

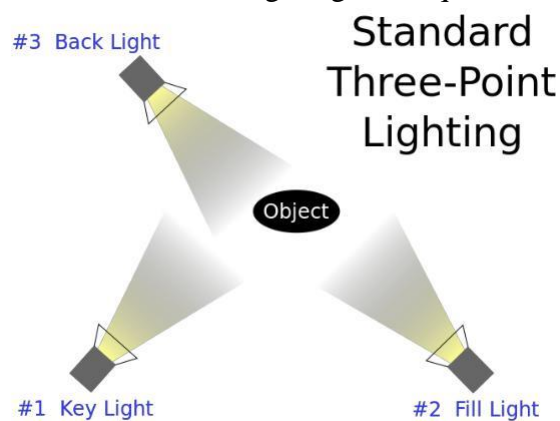
Source- bhphotovideo.com

Link-<https://www.bhphotovideo.com/explora/video/tips-and-solutions/filmmaking-101-camera-shot-types>

Lighting

Lighting is an essential tool for enhancing the video image. The subtle use of light creates atmosphere and mood, dimension, and texture. It can help to convey a plot line, enhance key elements such as set color or skin tone, and signals the difference between comedy and drama, reality and fantasy.

The subject in a planned shoot can be lit up using various lighting techniques to achieve desirable result. In this section we will discuss about these lighting techniques.



Title- Fig 3.26 Types of Lighting

Attribution- [Theonlysilentbob](#).

Source- wikimedia.org

Link- https://commons.wikimedia.org/wiki/File:3_point_lighting.svg

Lighting, as with nearly every other aspect of Film & TV, is an essential part of the filmmaking process. Light can sculpt and describe a scene or character, it can hide or reveal key areas of your frame, and it can enhance suspense & evoke emotion. It is as critical in directing the audiences' attention or influencing their emotions as camera movement, acting, music and editing. Ignore it at your own loss.

Key light

The *key light* is considered as the foremost important light that a photographer, cinematographer, lighting cameraman, or other scene composer will use in a lighting setup. The purpose of the key light is to highlight the form and dimension of the subject. The key light is always not a necessary; without the key light we can get a silhouette effect. Many key lights may be placed in a scene to illuminate a moving subject at opportune moments.

The key light can be "hard" (focused) or "soft" (diffused), and depending on the desired setup can be placed at different angles relative to the subject. When part of the most common setup— three-point lighting—the key light is placed at a 30–60° angle (with the camera marking 0 degrees). In addition to the horizontal angle, the key light can be placed high or low producing different effects. The most common vertical position for the key light is at a 30° angle (i.e. slightly above the eye line; the nose should not cast a shadow on the lips).

A key light positioned low appears to distort the actor's features, since most natural or ambient light is normally overhead. A dramatic effect used in horror or comedy cinematography is a key light illuminating the face from below. A high key light will result in more prominent cheek bones and long nose shadows.

In many cases, the key light is a stage light for indoor scenes, or sunlight for outdoors. A lighting instrument may also be used outdoors to supplement sunlight or as the primary light source with sunlight or skylight serving as fill lighting. Actual lamps, lighting fixtures, can serve as key lights, provided they are of sufficient brightness. They may also appear within the scene as props in which case they are called "*practical's*." Similarly, fire, candles and other natural sources of light can be used.

The key light can be divided into various categories as discussed below.

Flat lighting: The first key (or primary/main) common lighting pattern that you should be familiar with is flat lighting. Flat lighting faces directly into the subject from the angle of the lens. Flat lighting is the least dramatic lighting pattern because it casts the least amount of shadows on the subject's face.



Title- Types of Lighting: Flat Key Light

Attribution- Darlene Hildebrandt

Source-

Link- <https://digital-photography-school.com/6-portrait-lighting-patterns-every-photographer-should-know/>

Butterfly lighting: Butterfly Lighting (or Paramount Lighting) comes directly in front and above the subject's face. This creates shadows that are directly below the subject's facial features. The most notable shadow, and where this lighting pattern gets its name, is a butterfly shaped shadow just under the nose. It is also called "*ParamountLighting*" because this lighting pattern was used heavily in the Paramount movie studio of old Hollywood.

The only difference between flat lighting and butterfly lighting is the height and angle of the Key Light. This creates the same flattering features as flat lighting but includes shadows underneath the nose and chin.



Title- Types of Lighting: Butterfly Lighting

Attribution- Darlene Hildebrandt

Source-

Link- <https://digital-photography-school.com/6-portrait-lighting-patterns-every-photographer-should-know/>

Loop lighting: Loop lighting is probably one of the most common key lighting patterns. We see that it falls right in the middle between flattering flat light to dramatic split light. Loop Light is such a condition, where most of the face is still in light but you still have enough shadows to bring in some definition. It brings out a three dimensional effect of the subject.



Title- Types of Lighting: Loop Lighting

Attribution- Darlene Hildebrandt

Source-

Link- <https://digital-photography-school.com/6-portrait-lighting-patterns-every-photographer-should-know/>

Split lighting: Split lighting simply “splits” the subject’s face, lighting half of your subject’s face while leaving the other half in shadow. Because of the angle of light, there is no Rembrandt triangle, only shadow.

When the key light is set up 90° directly, to the right or left side of the subject’s face. The line separating light and shadow will be down the middle of the nose and chin. This creates the most dramatic light and the least flattering light to use.

Half-light: half-light is a condition of portrait photography when the subject is *half illuminated* and *half in shadow*. The light is held in such a manner that only half of the subject is lighted. This creates a very magical effect.

Fill Light: As per the name it is used *to fill a gap of light and darkness*. If there is a contrast of dark and over exposed portions on the subject, then a soft light can be used to supply a little amount of exposure on the subject. It thus fills the gap and subject looks normal to the eye. The amount of fill light can be used as per the resolution of recording medium.

The most common source of natural omnidirectional fill light is the sunlight. It is mostly used while shooting outdoor. A fill light is used against the axis of the direct light. Hence it cuts off any hard shadows created by the direct light upon the subject. The positioning of the fill affects the overall appearance of the lighting pattern. When a centred fill strategy is used the ratio is created by overlapping the key light over the foundation of fill. A key source of equal

incident intensity to the fill, overlapping the even fill, will create a 2:1 reflected ratio (1 key + 1 fill over 1 Fill) = 2:1.

Back Light: while studying about the lighting design, *backlighting* is the process of illuminating the subject from the back. In other words, the lighting instrument and the viewer face each other, with the subject in between. The viewer can see the source of light from behind the subject. This creates a glowing effect on the edges of the subject, while other areas are darker. The backlight can be a natural or artificial source of light. While using artificial source, the back light is usually placed directly behind the subject in a 4-point lighting setup.

The back light is sometimes called *hair or shoulder light*, as it helps make the edges the subject's hair glow if the hair is fuzzy. This can create an angelic halo type effect around the head. Television productions often use this effect in soap operas.

Ambient Lighting: Ambient light means the light that is already present in a scene, before any additional lighting is added. It usually refers to natural light, either outdoors or coming through windows etc. It can also mean artificial lights such as normal room lights.

Ambient light can be the photographer's friend and/or enemy. Clearly ambient light is important in photography and video work, as most shots rely largely or wholly on ambient lighting.

Unfortunately ambient light can be a real nuisance if it conflicts with what the photographer wants to achieve. For example, ambient light may be the wrong colour temperature, intensity or direction for the desired effect. In this case the photographer may choose to block out the ambient light completely and replace it with artificial light. Of course this isn't always practical and sometime compromises must be made.

On the other hand, many of history's greatest photographs and film shots have relied on interesting ambient light. Unusual lighting can turn an otherwise ordinary shot into something very powerful.

Motivated Lighting: The light in a scene which appears to have a source such as a window, a lamp, a fireplace, so on. In some cases the light will come from a source visible in the scene and in some cases, it will only appear to come from a source that is visible in the scene.

Unit summary

In this unit you learned the Basic of photography, composition and lighting. We discussed about the necessary things for shooting a picture. We also learnt the rules for a better photographic composition and the lighting conditions that are used for photography.

Assessment

1. What is a lens?
2. Difference between convex and concave lens.
3. What is a composition?
4. Discuss different rules of composition?

5. What is mid long shot?
6. Define extreme long shot.
7. How close shot is different from extreme close shot?
8. What is lighting?
9. What are different types of lighting?
10. Discuss three point lighting.

Resources

- www.merriam-webster.com
- www.wikipedia.org
- www.slrlounge.com
- www.asu.edu

Unit 4 Introduction to Printing Technology

Introduction

Printing is a process for reproducing text and images using a master form or template. This unit will introduce the different types of printing processes and developing technologies used and adapted in various fields including photography. It will discuss about the materials and equipment required for printing, as well as about other aspects of printing in different fields.

Outcomes

Upon completion of this unit you will be able to:

- Get acquainted to various kinds of printing process and its equipment.
- Know how to print and develop a photograph.
- Recognize the fields where printing is required.

Terminology

Printing: It is a process for reproducing text and images using a master form or template.

Etching: This is a process of printing on metallic objects by help of acids by the open and covered area design.

Lithography: This is the printing process using stones on the basis of oil water repelling system.

What is “printing”?

Printing is a process for reproducing text and images using a master form or template. Sometimes it may not be possible to preserve or circulate the original template among mass. So it will be wiser and easier to make printed copies of the actual template. This process of making same copies out of the original template on surface like paper, cloth or synthetic material is called *printing*.

History of printing

The history of printing dates back from the **T'ang Dynasty** when the Chinese developed *woodblock printing*. The principle of woodblock printing was that the matter which was to be printed was carved on a wooden block and it was dip in an ink and that was pressed on a piece of paper to create an impression of the carving. The invention of the printing press depended on the invention and refinement of paper in China over several centuries. The Chinese had developed "rag" paper, a cheap cloth-scrap and plant-fibre substitute for cumbersome bark and bamboo strips and for precious silk paper, by A.D. 105. Chinese prisoners passed a mature technology on to their Arab captors in the eighth century.

The Europeans felt the importance of press printing for printing books, newspaper and magazines etc. in massive amount. Although the European innovations came much later, European culture certainly felt the impact of print more dramatically than the Chinese did, as their alphabet employs thousands of visually specific ideograms. The Europeans further developed *movablepress* prints. The Europeans developed standard characters for the press and it used movable components to reproduce the elements of a document (usually individual letters or punctuation) usually on the medium of paper.



Title- Fig 3.1 Woodblock Printing

Attribution- [John Hill](#)

Source- [wikimedia.org](#)

Link-https://commons.wikimedia.org/wiki/File:Woodblock_printing,_Sera,_1_993.JPG

The world's first movable type printing press technology for printing paper books was made of ceramic porcelain

china materials and invented in ancient China around **1040 AD** by the Han Chinese innovator Bi Sheng (990–1051) during the Northern Song Dynasty (960–1127). In 1377, currently the oldest extant movable metal print book, Jikji, was printed using Chinese characters in the Goryeo dynasty of Korea.

Around **1450**, in Europe, **Johannes Gutenberg** made another version of a *metal movable-type printing press*, along with innovations in casting the type based on a matrix and hand mould. The important factor was how much number of characters was needed for European languages. Gutenberg was the first to create his type pieces from an alloy of **lead, tin, and antimony**—and these materials remained standard for 550 years.



Title- Fig 3.2 Gutenberg's Metal Movable Type

Attribution- Gutenberg, Johann

Source- wikimedia.org

Link-https://commons.wikimedia.org/wiki/File:Gutenberg_Bible_WDL7782.jpg

Movable-type page setting was quicker than woodblock printing in case of alphabetic scripts. The metal type pieces that were used were more durable and the lettering was more uniform which led to the creation of typography and fonts. The high quality and relatively low price of the Gutenberg Bible (1455) established the superiority of movable type press in Europe. This was thus established by Gutenberg's Bible (1455) which was high in quality and low in price, and the use of printing presses spread rapidly. The printing press may be regarded as one of the key factors fostering the Renaissance and due to its effectiveness, its use spread around the globe.



Title- Fig 3.3 Metal Movable Types

Attribution- Willi Heidelbach

Source- <http://www.sxc.hu/photo/238776>

Link- https://commons.wikimedia.org/wiki/File:Metal_movable_type.jpg

Relief printing is a process where protruding surface faces of the printing plate or block are inked; recessed areas are ink free. Printing the image is therefore a relatively simple matter of inking the face of the matrix and bringing it in firm contact with the paper. A printing-press

may not be needed as the back of the paper can be rubbed or pressed by hand with a simple tool such as a brayer or roller.

The *matrix* in relief printing is classically created by starting with a flat original surface and then removing (e.g., by carving) away areas intended to print white. The remaining areas of the original surface receive the ink.

The relief family of techniques includes **woodcut, metal cut, wood engraving, relief etching, linocut, rubber stamp, foam printing, potato printing, and some types of collagraph.**

Traditional text printing with movable type is also a relief technique. This meant that woodcuts were much easier to use as book illustrations, as they could be printed together with the text. Intaglio illustrations, such as engravings, had to be printed separately.

Relief printing is the oldest form of printmaking. The most common form of relief printing is woodcut. An ink drawing is made on a wood block. The artist cuts away uninked areas, leaving inked areas raised. Printing ink is applied to the raised surface and a sheet of paper is laid on the block to take an impression by hand or a press.



Title- Fig 3.4 Woodblock Printing/Relief Printing

Attribution- [E1E2L3](#)

Source- [wikimedia.org](#)

Link-https://commons.wikimedia.org/wiki/File:Endi_Poskovic_inking_a_color_wood-relief_block.jpg

Woodcut printing on paper was first adopted in the seventh century China, where drawing and text were reproduced on the same block. A hundred years after paper reached Europe, the use of woodcut in the development of printing was established in the late fourteenth century Germany. Albrecht Durer explored the technique of the medium of woodcut, elevating it as an independent form of art, not only a way of printing text. Hundreds

years later in 1905 a handful of German painters formed themselves into a revolutionary group, The Bridge. One of the group's most successful ventures was the revitalization of woodcut. They produced a great deal of woodcut of originality, from which modern relief printing began.

Another printing process which have not yet discussed is the photographic printing. This process is different from all other processes because in this the master template or the thing which is to be printed does not come into direct contact with the material on which it is to be printed. Only the ray of light does its work.

Etching is a method of printing from a metal plate, usually *copper*. The design is incised by acid. The copperplate is first coated with an acid-resistant substance, called the *etchingground*, through which the design is drawn with a sharp tool. The ground is usually a compound of beeswax, bitumen, and resin. The plate is then exposed to nitric acid or Dutch mordant, which eats away those areas of the plate unprotected by the ground, forming a pattern of recessed lines. These lines hold the ink, and, when the plate is applied to moist paper, the design transfers to the paper, making a finished print.

Etching is used since old days as a method of engraved printing to create master prints which is still widely used today. In a number

of modern variants such as *micro-fabrication etching* and *photochemical milling* it is a crucial technique in much modern technology, including circuit boards.

Lithography is an ancient Greek method of printing using stones. The main formula which was used for printing was the property of immiscibility of oil and water. The technique was invented in 1796 by German author and actor **Alois Senefelder** as a cheap method of publishing theatrical works. Lithography can be used to print text or artwork onto paper or other suitable **material**.

Originally Lithographic prints used an image drawn with oil, fat, or wax onto the surface of a smooth, level lithographic limestone plate. The stone was first treated with a mixture of acid and gum. After that the portions of the stone that were not protected by the grease-based image were etched. After the stone was subsequently moistened, these etched areas retained water; an oil-based ink could then be applied and would be repelled by the water, sticking only to the original drawing. The ink would finally be transferred to a blank paper sheet, hence producing a printed page. This traditional technique is still used in some fine art printmaking applications.

Lithography uses simple chemical processes to create an image. For instance, the positive part of an image is a water-repelling substance, while the negative image would be water-retaining. Thus, when the plate is introduced to a compatible printing ink and water mixture, the ink will adhere to the positive image and the water will clean the negative image. This allows a flat print plate to be used, enabling much longer and more detailed print runs than the older physical methods of printing.

In modern lithography, the image is made of a polymer coating applied to a flexible plastic or metal plate. The image can be printed directly from the plate, or it can be offset, by transferring the image onto a flexible sheet (rubber) for printing and publication.

Rotary press is a printing press that prints on paper passing between a supporting cylinder and a cylinder containing the

printing plates. It may be contrasted to the flatbed press, which has a flat printing surface. It is primarily used in high-speed, web-fed operations, in which the press takes paper from a roll, as in newspaper printing. Many of these large presses not only print as many as four colours but cut and fold and even bind in a cover—in one continuous automatic process. Paper passes through some presses at nearly 20 miles (30 km) per hour, the speed limited partly by the tensile strength of the paper; large presses can print up to 60,000 copies of 128 standard-size pages in an hour.

In its simplest form a rotary press consists of two cylinders turning in opposite directions, with the plate cylinder having curved printing plates attached to its surface and the impression cylinder working to press the paper to the inked plates as the paper passes between the cylinders. A simple two-colour rotary press uses two plate cylinders in succession, each bearing a different type form and each having its own inking system. The same side of the same sheet of paper receives two successive impressions of two different colours as it passes through the press. Printing on both sides of a sheet of paper and printing in three, four, or even five colours can be achieved in a rotary press by using different combinations and successions of plate and impression cylinders.

Extremely high rates of production can be achieved in very large, highly automated roll-fed rotary presses. These machines have cylinders with a circumference large enough to accommodate two or more plates, so that with each revolution the cylinder prints two or more copies of the same page. Similar arrangements enable a cylinder to print eight copies of the same page in a single revolution.

Offset Printing

Offset printing is a commonly used printing technique in which the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a water-based film (called "fountain solution"), keeping the non-printing areas ink-free. The modern "web" process feeds a large reel of paper through a large press machine in several parts, typically for several metres, which then prints continuously as the paper is fed through.

The first rotary offset lithographic printing press was created in England and patented in **1875** by **Robert Barclay**. This development combined mid-19th century transfer printing technologies and **Richard March Hoe's 1843 rotary printing presses**—a press that used a metal cylinder instead of a flat stone. The offset cylinder was covered with specially treated cardboard that transferred the printed image from the stone to the surface of the metal. Later, the cardboard covering of the offset cylinder was changed to rubber, which is still the most commonly used material.

One of the most important functions in the printing process is *prepress production*. This stage makes sure that all files are correctly processed in preparation for printing. This includes converting to the proper *CMYK* colour model, finalizing the files, and creating plates for each colour of the job to be run on the press.

Offset lithography is one of the most common ways of creating printed materials. A few of its common applications include: **newspapers, magazines, brochures, stationery, and books**. Compared to other printing methods, offset printing is best suited for economically producing large volumes of high quality prints in a manner that requires little maintenance. Many

modern offset presses use computer-to-plate systems as opposed to the older computer-to-film work flows, which further increases their quality.

Screen printing

Screen printing is a printing technique which uses a mesh to transfer ink onto a substrate, leaving clean those parts which are made impermeable to the ink by a blocking stencil. A blade or squeegee is moved across the screen to fill the open mesh apertures with ink, and a reverse stroke then causes the screen to touch the substrate momentarily along a line of contact. In this process the ink wets the substrate and is pulled out of the mesh apertures as the screen springs back after the blade has passed.

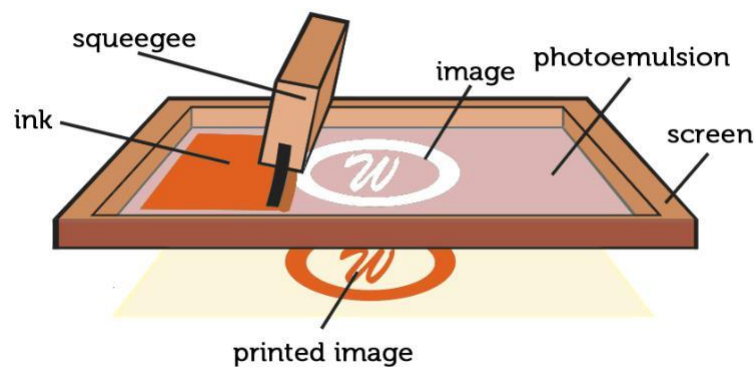


Fig 3.11 Screen Printing (Picture source: whizzprints.com)

Screen printing is also a *stencil method* of print making in which a design is imposed on a screen of polyester or other fine mesh, with blank areas coated with an impermeable substance. Ink is forced into the mesh openings by the fill blade or squeegee and by wetting the substrate, transferred onto the printing surface during the squeegee stroke. As the screen rebounds away from the substrate, the ink remains on the substrate. It is also known as **silk-screen**, **screen**, **serigraphy**, and **serigraph printing**. One colour is printed at a time, so several screens can be used to produce a multicoloured image or design.

Nowadays, synthetic threads are commonly used in the screen printing process. The most popular mesh in general use is made of polyester. There are special-use mesh materials of nylon and stainless steel available to the screen printer. There are also different types of mesh size which will determine the outcome and look of the finished design on the material.

Screen printing first appeared in a recognizable form in China during the **Song Dynasty (960–1279 AD)**. It was then adapted by other Asian countries like Japan, and was furthered by creating newer methods.

Screen printing was largely introduced to Western Europe from Asia sometime in the late 18th century, but did not gain large acceptance or use in Europe until silk mesh was more available for trade from the east.

Dot matrix printing

Dot matrix printing is type of printer that produces characters and illustrations by striking pins against an ink ribbon to print closely spaced dots in the appropriate shape. Dot-matrix

printers are relatively expensive and do not produce high-quality output. However, they can print to multi-page forms (that is, carbon copies), something laser and ink-jet printers cannot do.

It is a type of computer printing which uses a print head that moves back-and-forth, or in an up-and-down motion, on the page and prints by impact, striking an ink-soaked cloth ribbon against the paper, much like the print mechanism on a typewriter. However, unlike a typewriter or daisy wheel printer, letters are drawn out of a dot matrix, and thus, varied fonts and arbitrary graphics can be produced.

Each dot is produced by a tiny metal rod, also called a "wire" or "pin", which is driven forward by the power of a tiny electromagnet either directly or through small levers (pawls). Facing the ribbon and the paper is a small guide plate named ribbon mask holder or protector, sometimes also called *butterfly* for its typical shape. It is pierced with holes to serve as guides for the pins. This plate may be made of hard plastic or an artificial jewel such as sapphire or ruby.

The portion of the printer containing the pins is called the *printhead*. When running the printer, it generally prints one line of text at a time.



Fig 3.12 Dot Matrix Printing (Picture source: youtube.com)

The common serial dot matrix printers use a horizontally moving print head. The print head can be thought of featuring a single vertical column of seven or more pins approximately the height of a character box. In reality, the pins are arranged in up to four vertically or/and horizontally slightly displaced columns in order to increase the dot density and print speed through interleaving without causing the pins to jam. Thereby, up to 48 pins can be used to form the characters of a line while the print head moves horizontally.

Inkjet printing

Inkjet printing is a type of computer printing that recreates a digital image by propelling droplets of ink onto paper, plastic, or other substrates. Inkjet printers are the most commonly used type of printer, and range from small inexpensive consumer models to expensive professional machines.

The concept of inkjet printing originated in the 20th century, and the technology was first extensively developed in the early **1950s**. Starting in the late 1970s inkjet printers that could reproduce digital images generated by computers were developed, mainly by Epson, Hewlett-

Packard (HP), and Canon. In the worldwide consumer market, four manufacturers account for the majority of inkjet printer sales: Canon, HP, Epson, and Brother.

The emerging ink jet material deposition market also uses inkjet technologies, typically print heads using piezoelectric crystals, to deposit materials directly on substrates.

The technology has been developed and the "ink" can now also comprise living cells, for creating biosensors and for tissue engineering. There are two main technologies in use in contemporary inkjet printers: *continuous (CIJ)* and *Drop-on-demand (DOD)*.

The continuous inkjet (CIJ) method is used commercially for marking and coding of products and packages. In **1867 Lord Kelvin** patented the syphon recorder, which recorded telegraph signals as a continuous trace on paper using an ink jet nozzle deflected by a magnetic coil. The first commercial devices (medical strip chart recorders) were introduced in **1951 by Siemens**.

In CIJ technology, a high-pressure pump pumps liquid ink from a reservoir through a microscopic nozzle, creating a continuous stream of ink droplets. A piezoelectric crystal creates an acoustic wave as it vibrates within the nozzle and causes the stream of liquid to break into droplets at regular intervals: 64,000 to 165,000 droplets per second may be achieved. The ink droplets are subjected to an electrostatic field created by a charging electrode as they form; the field varies according to the degree of drop deflection desired. This results in a controlled, variable electrostatic charge on each droplet. Charged droplets are separated by one or more uncharged "guard droplets" to minimize electrostatic repulsion between neighbouring droplets.

The charged droplets pass through another electrostatic field and are deflected by electrostatic deflection plates to print on the receptor material or allowed to continue on without deflection to a collection gutter for re-use.

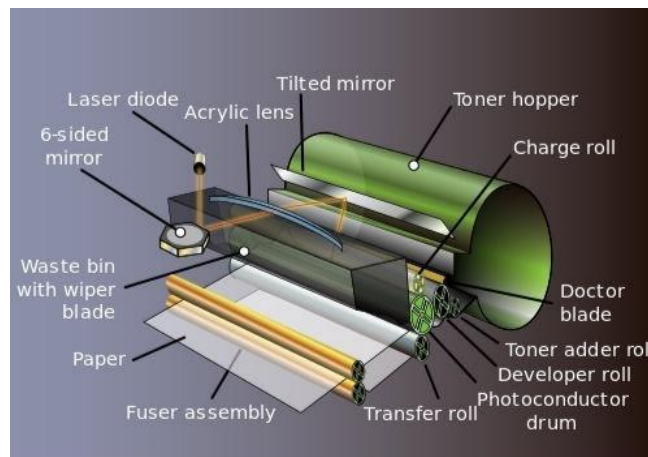
Thermal DOD In the thermal inkjet process, the print cartridges consist of a series of tiny chambers, each containing a heater, all of which are constructed by photolithography. From each chamber the droplets are released when a pulse of current is passed through the heating element causing a rapid vaporization of the ink in the chamber and forming a bubble, which causes a large pressure increase, propelling a droplet of ink onto the paper. The ink's surface tension, as well as the condensation and resultant contraction of the vapour bubble, pulls a further charge of ink into the chamber through a narrow channel attached to an ink reservoir. The inks involved are usually water-based and use either pigments or dyes as the colorant. As no special materials are required, the print head is generally cheaper to produce than in other inkjet technologies.

Laser printing

Laser printing is an *electrostatic digitalprinting* process. High quality text and graphics are produced by repeatedly passing a laser beam back and forth over a negatively charged cylinder called a "*drum*" to define a differentially charged image. The drum then selectively collects electrically charged powdered ink (toner), and transfers the image to paper, which is then heated in order to permanently fuse the text and/or imagery. However, laser printing differs from analog photocopiers in that the image is produced by the direct scanning of the medium across the printer's photoreceptor. This enables laser printing to copy images more quickly than most photocopiers.

Invented at Xerox PARC in the 1970s, laser printers were introduced for the office and then home markets in subsequent years by IBM, Canon, Xerox, Apple, Hewlett-Packard and many others.

The *first commercial implementation of a laser printer was the IBM 3800 in 1976*. It was designed for data centres, where it replaced line printers attached to mainframe computers. The IBM 3800 was used for high-volume printing on continuous stationery, and achieved speeds of 215 pages per minute (ppm), at a resolution of 240 dots per inch (dpi). Over 8,000 of these printers were sold. The Xerox 9700 was brought to market in 1977. Unlike the IBM 3800, the Xerox 9700 was not targeted to replace any particular existing printers; but, it did have limited support for the loading of fonts. The Xerox 9700 excelled at printing high-value documents on cut-sheet paper with varying content.



Title- Fig 3.15 Laser Printing

Attribution- [KDS4444](#)

Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:Laser_toner_cartridge.svg

All the above printing process are forms of two dimensional prints but now technology has evolved so much that we are now able to print in three dimension also. Which means the matter what we are printing can really be felt by one as it is real in the front of us. This is called *3D printing*.

3D printing

3D printing, also known as **additive manufacturing (AM)**, refers to processes used to create a three-dimensional object in which

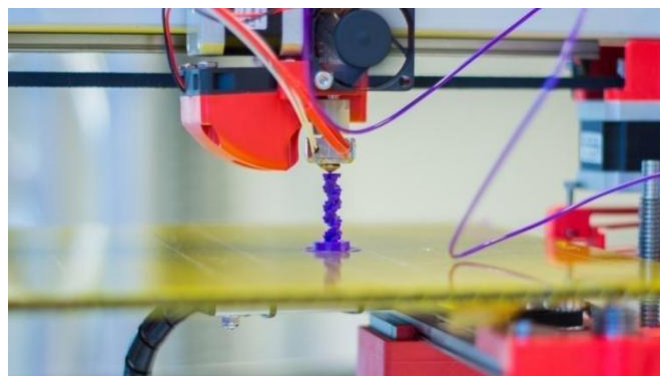
layers of material are formed under computer control to create an object. Objects can be of almost any shape or geometry and are produced using digital model data from a 3D model or another electronic data source such as an Additive Manufacturing File (AMF) file.

The technology was first invented in the **1980s**, and since that time has been used for *rapid prototyping (RP)*. However, in the last few years, 3D printing has additionally started to

evolve into a next-generation manufacturing technology that has the potential to allow the local, on-demand production of final products or parts thereof.

Already it is possible to 3D print in a wide range of materials that include thermoplastics, thermoplastic composites, pure metals, metal alloys, ceramics and various forms of food. Right now, 3D printing as an end-use manufacturing technology is still in its infancy. But in the coming decades, and in combination with synthetic biology and nanotechnology, it has the potential to radically transform many design, production and logistics processes.

3D printing encompasses a wide range of additive manufacturing technologies. Each of these builds objects in successive layers that are typically about 0.1 mm thin. The methods used vary significantly, but all start with a computer aided design (CAD) model or a digital scan. This is then processed by 'slicing software' that divides the object into thin cross sections that are printed out one on top of the other.



Title- Fig 3.16 3D Printing

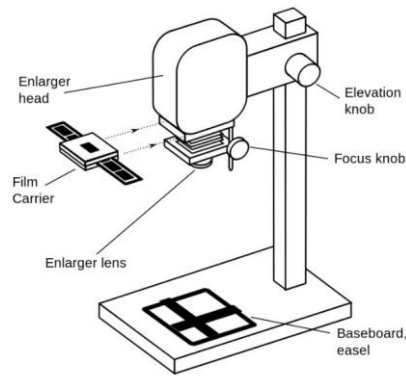
Attribution- [Jonathan Juursema](#)

Source- [wikimedia.org](#)

Link-https://commons.wikimedia.org/wiki/File:Felix_3D_Printer_-_Printing_Head.JPG

Photographic printing

Photographic printing is the process of producing a *final image* on paper for viewing through *light*, using *chemically sensitized paper*. When this paper is exposed to a *photographic negative*, through an *enlarger* or *digital exposure unit* such as a *LightJet printer* it creates an opposite print. That means the negative when exposed to light during photography creates black spot at those points but remains transparent at those places where it is not exposed to light. So when this negative is further used for printing, when the light through enlarger is allowed the light passes through the transparent areas to expose the paper and create the image which is opposite to the negative impressions. Alternatively, the negative or transparency may be placed atop the paper and directly exposed, creating a contact print. Photographs are more commonly printed on plain paper, for example by a colour printer, but this is not considered "photographic printing".



Title- Fig 3.17 Photographic Printing

Attribution- [Darkroom enlarger.svg](#)

Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:Darkroom_enlarger_en.svg

Unit summary

In this unit you learned about the various printing process. It introduced the invention of printing and also discussed about various types of printing processes starting from woodblock to photographic printing. It also discussed about the principles of the different processes and their usage in the day to day life.

Assignment

1. Define Printing. What are the advantages of printing?
2. What is woodblock printing and where did it originate?
3. What is a printer?
4. What is movable type printer?
5. Define etching.
6. Describe lithographic printing?
7. What are two type of inkjet printing?
8. How does dot matrix printer work?
9. Write a short note on laser printing.
10. What is 3D printing?
11. How photographic printing process works?

Resources

- [Wikipedia.org](#)
- [Britannica.com](#)

Block –IV:
Program Production Techniques

Unit- 1 Media Industry: Structure and Strategies

Introduction

Media houses commission and plan broadcasting programmes, publish newspapers or magazines to earn profit. Mass media such as television and newspapers have different level of operations, audiences and staffing. There is a difference between the operations and general staffing structure of news desks of different media organizations.

Outcomes

Upon completion of this unit you will be able to:

- Differences between the media organizations;
- Difference between operations of news desk; and
- The general staffing structure of media organizations

Terminology

News Desk	News comes to this desk and editing is done here.
Assignment Desk	A desk where assignments are given to reporters.
Executive Editor	S/he contributes information for the major stories.
API	Associated Press of India.
PTI	Press trust of India

Organisational Structure of Media

Newspapers provide information at a relatively lower cost as compared to other forms of media. Until the recent developments and expansion in the field of Internet, newspapers are the primary source for in-depth news. Even after the advent of 24/7 news channels, most television news lacks in-depth coverage as is carried in the print media. For sustenance the print media has to gasp some important functions, as pointed out by Professor Herbert Lee Williams,

- Decision-making
- Organizing
- Staffing
- Planning
- Controlling
- Communicating and coordinating
- Directing
- Innovating

In a moderately equipped daily newspaper, the structure of the organisation can be divided into five distinct wings, such as

- Editorial department for news and views

- Printing and production department
- Business section, for advertisements, classifieds, circulation, billing and collection
- IT department for technological support, maintaining digital equipments
- Public relation managers and sales promotion personnel.

Basic Editorial setup of Print Media

Editorial department is the nerve centre of the newspaper organisation. Editor-in-Chief or Editor or Chief Editor is in charge of the whole content that goes in the newspaper. In some newspapers the CEO hold the position.

a. Assignment Desk

The assignment desk is busy in allotting tasks in the newsroom.

This desk directs the newsroom and often takes rapid decisions on ground leads. It also decides on the deadline of a story. Assignment desk keeps track of the beat reporters and their stories. Reporters and photojournalists get their assignment from this desk. Other responsibilities of this desk are deciding on the importance of a story and it's positioning in the final draft, changes in the layout of the newspaper, dropping a story or saving it for another day, managing other subordinate desks and copy editors. Another critical functions of this desk is to assure the release of all the pages for publication in due time.

b. Editorial Desk

The editorial team takes the decisions about the stories that has to be covered and also about the contents direction in the newspaper It likewise leads everyday task of reality checking, editing for lucidity, composing headlines, developing page design and coordinating reporting activities with its mentioned due dates. The letters to the editors by the readers are addressed to this desk. Editorial desk also decides on giving bylines to reporters and writers and giving photo credits to photographers.

c. Information Graphics

Stories and articles often carry informational graphics to help the readers to understand the deep aspects of a story. These graphics appear in print and online medium of the media house. The graphical presentation may be in the form of charts and data visualizations, maps, photographs or even audio and video files. There may be some graphic designers in a newspaper set up or the sub editors do the designing work.

d. News Gathering and Reporting

Reporting is primary to any news organization. Reporting involves building rapport with the sources along with collecting news. This sometimes involves developing story ideas for the editorial staffs as well. Reporters, correspondents and bureau chiefs are the people who report on various news items for the newspapers.

e. Online Community Development

Web technologies help a newspaper to widen its base and cater to larger audiences. It provides a platform for the newspaper to actively interact with its readers and online followers. Instant comment facilities under each stories carried in the website facilitate

feedback to the journalists. It provides a platform to interact with the journalists as well as among the readers. This discourages any kind of harsh comments or attacks on any section of the community. It also attracts online traffic.

f. Photography

Technological advancements in the photojournalism segment have been a mainstay of newspapers. Photo editing software is now easily available. The graphic or page designers are editing the photo as per the requirement of the story with these software.

g. Content Editing

Content editing is done by the copy editors or sub editors. These days, newspapers barely employ proof-readers. Often this task is performed by sub-editors or chief editors. They edit stories, reports and articles sent by reporters. They even keep a vigil on content of other newspapers so that an important piece of news should not be missed.

Table 1.1		
	Desks	Common job titles
1	Assignment Desk	Editor, Producer, Assignment Editor
2	Editorial	Editor-in-Chief, Editor, Deputy Editor, Editorial Director, Editorial Project Manager, Associate Editor
3	Information Graphics	Visual Information Specialist, Graphic Designer, Graphic Editor
4	News Gathering and Reporting	Journalist, Correspondent, Feature writer, Reporter
5	Online Community Development	Multimedia Specialist, Media Assistant, Digital Journalist
6	Photography	Photographer, Image Specialist, Print Production Manager, Image Specialist, Photojournalist
7	Content Editing	Copy Writer, Copy Editor, Sub Editor Editorial Writer, Technical Writer, Technical Editor, Assistant Editor

Functionaries

Each department has a specific set of responsibilities. The editorial department has to mobilize all resources to produce a complete and satisfying newspaper issue. The functionaries are as follows:

- Editor/Chief Editor/Managing Editor
- Associate Editor/s
- Deputy Editor/s
- Senior Assistant Editor/s
- Assistant Editor/s

- Chief/ News Editor/s
- Deputy/ Chief/ News Editor/s
- Chief Sub-Editor/s
- Chief of Political News Bureau
- Deputy Chief, Political News Bureau
- Diplomatic/Political Correspondent
- Special Representative/s
- Special Correspondent/s
- State Bureau Chief/s
- City Editor/Chief Reporter/s
- Staff Reporters
- Stringers

Life on a Copy Desk

Stories come to the copy desk from various sources after preliminary editing. For any news daily, the copy is first edited by a city editor or one of the assistants. Even national and international copy also follows this process at larger organizations. But at smaller papers most of the copies are taken from the agency copies.

Some major desk functions can be categorised as:

Tasting/Slot Editing - A "taster" or "slot editor" performs the function of traffic control. He or she assesses an incoming copy, prioritizing on urgency of a news item, assigning stories to copy editors according to the news plan or copy editor's specialization and ensuring consistency in the handling of the story. The slot editor decides which stories can be published quickly with less editing and which needs more attention from a copy editor. A slot editor needs to be good at receiving stories from news agencies. As required she/he should check slugs, coding and story formats before assigning the story to a copy editor. Alerts and newsbreaks are checked for accuracy, fairness, typos, grammar and format. In India, this task is basically performed by the copy editors themselves.

Sub-editing or Copy Editing - Copy editing process is also known as subbing. Basically there are three stages found in the subbing process. The sub editor reads the story at first. He ensures that the basic journalistic standards (i.e. the inverted pyramid or others) are met or not. The sub editor should keep certain factors in mind such as cross checking major facts and numbers, the representation of relevant comparisons to maintain a balance, sorting out any kind of contradictions etc. Sometimes the copy editor has to rewrite the headlines if the situation requires so. Then at the second stage, the copy editor should make sure that the story is well sourced. He also has to check whether the story is supported by data, quotes and reasonable statements.

In the last stage, the sub editor checks the story for any kind of error in typography and grammar. In the age of online updates, every minute is a deadline for the sub editor. Therefore the copy editor has to check the online page every minute and to update it regularly. If there is any fault or error from the reporter side, the copy editor has to inform him then and there only.

Publishing - In most of the cases the copy editor is the publisher. Therefore he should ensure that the story reaches all readers in their required format. Sometimes the copy editor has to rewrite a story if it is not suitable for publication. Before publishing a story, it is always advisable that a second person from the copy desk should recheck the copy and provide his or her comments. The desk editor ensures at the end that the story actually lands on the relevant platforms or not.

Bureau support – In general, copy editors play a major role in the news planning process. They contact the reporters before deadline if the situation demands for stories. They also offer ideas or suggestions to the reporters to improve their stories.

Pressures of the Desk

Desk job varies from one media house to another depending on the size of the newspapers. Copy editors in small newspapers might be asked to edit local copies and write headlines as well as design pages and handle wire services. The number of tasks performed by the copy editor and sometimes reporter is directly related to the circulation of the newspaper. Reporters working for a large set-up might write two or three stories a week, whereas small-town reporters could lose their jobs if they do not provide that many in one single day.

Deadline is the most crucial factor that keeps the desk on toes. If quality copies are not produced in stipulated time period, the paper will be late getting into production and thus will have a cascading effect by running late for loading-unloading into delivery trucks and will reach the readers late.

Magazines and its organisational structure

Magazines have a long and distinguished history. They also continue to make significant contributions to mass communication. Their contribution to journalism, includes

- Investigative reporting
- Photojournalism
- Personality profiles
- Narrative journalistic writing (in newsmagazine style)

Magazine contains articles, features, columns that are long and in-depth. The articles also carry more photos and graphics. The writing style of the magazine is more creative. Creating content for magazines is difficult than that of the newspapers. Most of the magazines depend upon freelance writers. Freelance writers are the writers who are paid on the basis of the single article. They are not the employee of the magazine.

Basic Editorial set up of Magazine

a. Editor-in-Chief

An Editor-in-Chief looks after the entire content of the magazine and ensures smooth operation in the magazine. They are the people who along with executive directors, managing editors and creative directors take the final decision on the content and design of the magazine.

b. Managing Editors

Managing editors are generally works under the Editor-in Chief. They are the people who look into the day to day editorial operations. Managing editor also ensures that the deadlines are met or not. The functions of a managing editor may change from publication to publication.

c. Creative Director

The creative director looks after the visual aspects of the magazine. A creative director is responsible for various photo shoots required for the cover pages and inside stories of the magazine. He or she works along with the art director.

d. Executive Editor

S/He is the person responsible for selecting the writers on various issues for the magazine. If situation demands, then an executive editor contributes information for the major stories. Sometimes he edits and gives headlines for the stories. In some of the larger publishing houses, a team of editors work under an executive editor.

e. Copy Editor

The job of the copy editor is to read a copy thoroughly and ensure that there are no errors and grammatical mistakes.

f. Fact Checker

After researching on a topic, the fact checker confirms that the facts covered in the magazines are correct.

g. Contributors

Contributors or freelancers are hired by the magazine publishing houses for articles and photographs.

h. Assistants

The job of editorial assistants is to answer calls on behalf of the editors and write small sections.

Difference in Operation in Magazines and Newspapers

The major difference between magazines and newspapers is frequency of publication. Magazines cover news with more analysis.

Both the newspaper and magazine writing need accuracy and good writing. But magazine writing does not meet all the requirements needed for newspapers writing like inverted pyramid.

In case of newspapers, stringers contribute news items and get payment on the basis of news. Freelancers or contributors are working for magazines on the basis of assignments and get payments. Both these categories of writers are not permanent employees.

There are special categories of audiences for magazines. They are interested in the opinion based features. The advertisers who are interested to sell their product to these categories of audience sell their advertisements through these magazines.

Magazines are specially designed to cater to audiences that might be widely scattered but may have a common interest.

Features of a News agency

A news agency is different than that of a newspaper in its organizational and financial pattern and its way of operation. But first let us understand what a news agency is. A news agency is an organisation which collects or gathers news and supplies them to different newspapers, magazines, radio stations and television stations subscribing to its service. The media houses in turn, pay a monthly subscription for the news services they receive. The agency office is always in a hustle, since it has to cater to the print media houses, radio stations and television channels both inside and outside the country. It works round the clock as there may be a newspaper somewhere in the world going to meet its deadline for the press or some radio or TV bulletin about to go on air.

Editorial desk of News Agencies

The news desk is under the charge of a News Editor, while the reporting section is under the charge of a Chief of Bureau. The reporting staffs are divided into two groups: the Reporters who deal with day-to-day reporting are under a Chief Reporter. The Correspondents who deal with Ministerial or Legislative reporting are under the Chief of Bureau.

The agencies have offices in all the state capitals where reporters and correspondents are working there. They have also full time reporters in other countries and stringers in all the districts.

Growth of the News Agencies in India

In this section, we will learn about the history and growth and present status of the news agencies in India. United News of India and Press Trust of India are the two major news agencies operating in India. They have also established their language wings.

State of Agencies during Independence

News agencies were remnants of British rule in India. The news agencies working at that time in India were either foreign agencies with offices in India or British-owned Indian agencies. Some of these agencies which still operate in India are Reuters, United Press International and Agence France Presse among others. The Associated Press came sometime later. In addition there were India-based news agencies like the United Press of India and the Associated Press of India, whose owners were keen to return to their country during India's struggle for independence. They soon began winding up operations.

Formation of various Indian News Agencies

The government of independent India has encouraged news agencies. Some newspapers formed a trust to set-up independent India's first news agency, the Press Trust of India (PTI)

in 1949. At that time, the Associated Press of India (API) which is a subsidiary wing of Reuters was winding up operations. PTI took over the business of API.

PTI remained the only player in India. Although PTI and UNI are professional rivals, the UNI owns it inception to PTI. PTI had no competition during that time and the standard of PTI was not considered good enough to be a news agency. The Board of Directors of PTI felt the immediate solution to pump it up by setting up a competing news agency. Thus, UNI was formed in 1961 and registered under the Societies Act. Like PTI, UNI took over the United Press of India, which was also in the process of winding up. PTI had its head office in Bombay and UNI's in Delhi.

Earlier in 1948, a Hindi news agency called Hindustan Samachar had come into being. Later, in 1966, another Hindi news agency, the Samachar Bharti came into being. The Hindi news agencies had limited subscribers during the time. They were confined to certain regions in the country and they functioned more or less like PTI and UNI. Asia News International (ANI) came up in the late eighties.

Growth of Language wings

With the existing two English agencies unable to meet the demands of the newspapers, the UNI in 1982 launched UNIVARTA, its Hindi wing. Being a wing of UNI, it only translated stories from English to Hindi. However it gradually built its own staff for reporting and editing. A couple of years later, the PTI started its Hindi wing, PTI Bhasha. These HINDI wings are serving majority of the language newspapers in India. The Hindustan Samachar and Samachar Bharti were virtually shut down because of increase in competition, financial shortcomings and most of its staffs taken away by UNIVARTA and PTI Bhasha. In May 1992, UNI introduced the world's first Urdu News Service. For the first time Urdu news were being transmitted by teleprinters and computers using Arabic script.

Foreign News Agencies in India

The foreign news agencies still operating in India are:

- Reuters- Founded in 1848, it is a private British news agency named after its founder Paul Julius Von Reuter.
- Associated Press (AP) - It was founded in 1848 in New York.
- Agence France Presse (AFP)-it was established in Paris in 1944.
- United Press International (UPI) - It was founded in United States in 1907. It has been facing financial problems and so has restricted its operations.
- TASS- It is a Russian news agency.
- DPA- It is a German news agency.
- ANSA- It is an Italian news agency.

Basic Editorial setup of a Radio Station

Running a radio station is a difficult task. The structure and nomenclature of radio station departments may vary for each station but a typical radio station will have some basic departments in common like the production department. It consists of production staff, operations staff and on-air personalities like hosts, co-host, anchors, disc jockeys or radio jockeys.

While the department of production guarantees that all program substance and ads are produced and delivered timely and arranged for timely broadcast. The operation office administers the smooth operations of the radio station.

The creative department provides content to the production department. This department consists of a host of copy writers whose aim is to write well designed quality scripts for the commercials and for the programs.

Functionaries:

While allocating the duties in a radio station you must have a back-up plan. If one fails there should be more than one name connected with any essential daily function. The functionaries are as follows:

Radio News Editor

A news editor oversees the work of the reporters and others to prepare news content. He prepares the news agenda other than exercising editorial control over news output. He is the man who looks after news output and stories selection. He should make sure that the news script should match with the approach and style of the station. The news editor also ensures that the content conforms to the law, regulation of broadcast and in accord to the organizational policy. They are the principlesource of contact for editorial or legal queries. There are number of news editors seen in a typical radio station.

Copy Writers

They make every attempt to generate original ideas and approaches for stories and narratives. News editor assigns work to the copy writers. They may write suggestive narratives for reporters. They also write commercial copy for the advertisers.

Announcers

They are the voice of the radio station and are the representatives, someone the listener identifies with. The announcer is the person who brings liveliness to the radio programmes. They provide an introduction of programs, announcement of commercial copy and also do announcements that belongs to public service. They are additionally engaged with the overall presentation of the station.

Music Director

He or she manages and administers the music library of the station and work with the program director. He selects new songs that is to be played. Various songs are submitted and provided by the record companies to the radio stations.

News Director

The news director is the head of the news department. News director monitors the wire service and makes sure that the important news item should not be missed.

Promotions Director

The promotion director basically looks into the promotional part of the station. He makes sure that how the image of the station should be improved. He works with the programming team to broadcast on-air promotions. He functions with the coordination of the sales and marketing team.

Program Director

He is the man behind every successful program broadcast. He is also responsible for the entire on-air product. Production, talent, work schedules and program schedules are to be looked by the program director.

Sports Director

Sports director looks after the coverage of every kind of sports. He makes sure that important sports event should not be missed. He also takes care about the running commentary programmes for live matches and recorded one.

Television News room and it's Editorial setup

News broadcasting is a fast-paced and dynamic industry that is continuously changing. Television stations are operating in a digital platform. Every television channels has its own unique style of structure and functioning. The size of a station and the audience it serves is often dictated by its identity as a regional or national medium.

Functionaries:

The functionaries are an overview of certain editorial positions and positions which coordinate with the editorial team and add up to the editorial content. Let's have a look at different functionaries.

Assignment Editor

Though news programmes are a team effort, but assignment editors set news coverage priorities, organise the logistics of camera crews and reporters. They are also in charge of satellite feeds and live on-scene coverage.

Community Relations Director

It is very important to keep track of the requirement of the community to which a radio station is serving. This person looks after that.

Continuity Writer

The continuity writer basically writes the commercial and promotional copy catering to the local audiences. Their job demands then to be detail-orientated and with excellent computer skills.

Director

His responsibility lies in the execution of a program in online. They are the producers for entire programs.

Electronic News Gathering (ENG)

It is a type of news gathering technique used by the television crew members. The ENG crew includes reporters, producers and editors who use electronic audio and video technologies to gather information and present it to the viewers.

ENG Editor

ENG Editor is in charge of editing the content captured by the ENG crew. He also prepares the news packages with the help of the crew members for broadcasting.

Executive Producer

Executive producer is the one who coordinates with managing editor and news director regarding broadcasting of programmes and news.

Graphic Artist

A graphic artist is the one who designs and prepares all the graphs going on in the television programmes. He should have knowledge on computer and multimedia.

Master Control/Videotape Engineer

In the broadcasting, master control room is the repository of video tapes. The concerned person does the recording and playback of television programs as and when required.

News Anchor

News anchor is the face of any television channel. Present day news anchors are equipped with journalistic skills. They can interview guests, moderate live discussions and can produce packages.

News Director

A news director must be a multi talented person. He should have sound knowledge on the technical aspects of television broadcasting. Along with this he should know how to handle a team, deep news sense and understand the requirements of the viewers.

News Reporters

Reporters are the eyes and ears of a news organisation. They are the people who collect information and maintain contact with the sources. They should have nose for news and news writing skill.

News Writer

These are the men behind the scene. They write the anchor script, give voice over, do research on stories, invite studio guests and monitor news feed also.

Unit summary

In this unit you learned about the basic organizational hierarchy of different media, i.e. newspaper, magazines, news agencies, radio and television. You also learned about the nature of news agencies, difference in their way of operation from that of the newspapers. This unit covered the structure which defines the flow of media content and the treatment of the content at different organizational levels. It gives a basic understanding of organizational structure of media organizations and how one is different from the other.

Assessment

1. What are the functionalities of editorial department of a newspaper?
2. List the differences between a newspaper and a news agency.
3. Name three foreign news agencies operating in India.
4. Enlist editorial functionalities in a radio station.
5. Write a brief note on Television broadcasting and its editorial.

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Unit 2 Audio Video Program Production

Introduction

In this unit you will learn the basics of audio-video production techniques. It is a preface to the skills that are essential to know the operations of audio and video equipment in studio settings and a foundation an establishment to enhance the development of visual and aural education. You will learn how to operate camera, audio control, basic directing, lighting, and editing, and more and will get opportunity for hands-on experience.

Outcomes

Upon completion of this unit you will be able to:

- Get acquainted with the basics of audio and video production.
- Exhibit knowledge of audio video production process.
- Utilize the steps of production process in creating audio-visual files.

Terminology

Ambient Sound	A kind of sound recorded on location while shooting.
POV	Meant to show the character's perspective.
Panning	Camera movement from left to right or vice versa.
Key Light	Main source of Light

Video Production

Video production is the process of creating video by capturing moving images (videography), and creating combinations and reductions of parts of this video in live production and post-production (video editing). In most cases the captured video is recorded on the most current electronic media such as SD cards. Earlier the footage was captured on *video tape*, *hard disk*, or *solid state storage*. Video tape capture is now obsolete and solid state storage is reserved for just storage. It is now distributed in digital formats such as the **Moving Picture Experts Group format (.mpeg, .mpg, .m4p)**, **QuickTime (.mov)**, **Audio Video Interleave (.avi)**, **Windows Media Video (.wmv)**, and **DivX (.avi, .divx)**. It is the equivalent of filmmaking, but the images recorded digitally instead of on film stock.

Practically, video production is the art and service of creating content and delivering a finished video product. This can include production of television programs, television commercials, corporate videos, event videos, wedding videos and special-interest home videos. A video production can range in size. Examples include:

- A family making home movies with a prosumer camcorder,
- A solo camera operator with a professional video camera in
- a single-camera setup (aka a "one-man band"),
- A videographer with a sound person,
- A multiple-camera setup shoot in a television studio

- A production truck requiring a television crew for an electronic field production (EFP) with a production company using set construction on the backlog of a movie studio.

Audio Production

Audio production is the general term used for all stages of production happening between the actual recording in a studio and the completion of a master recording. It involves, sound design, sound editing, audio mixing, and the addition of effects.



Title- Fig 3.1 The Audio Visual Production Process

Attribution- U. S. Fish and Wildlife Service - Northeast Region

Source- <https://www.flickr.com/photos/usfwsnortheast/9444972202/>

Link-

[https://commons.wikimedia.org/wiki/File:Working_in_audiovisual_and_broadcast_production_for_the_U.S._Fish_and_Wildlife_Service_\(94449_72202\).jpg](https://commons.wikimedia.org/wiki/File:Working_in_audiovisual_and_broadcast_production_for_the_U.S._Fish_and_Wildlife_Service_(94449_72202).jpg)

What is the Production Process?

The *process of production is basically concerned with the stages (phases) needed to finish the production of a media product, beginning from the idea till the finalization of the master copy.*

This process can be applied to any kind of the media production incorporating movie, featured film, video, television and audio recording.

The phases in every medium change; for instance, there is clearly no storyboard in an audio recording. However a similar general ideas work for any medium.

The phases of production

Pre-production – Planning, Scripting & Storyboarding, etc.

Production – The actual shooting/recording.

Post-Production – Every aspect amongst production and making the final master copy.

Basics of Audio-Video Production

Shots

The simplest element in video and film

Is an image resulting from a single continuous running of a camera.

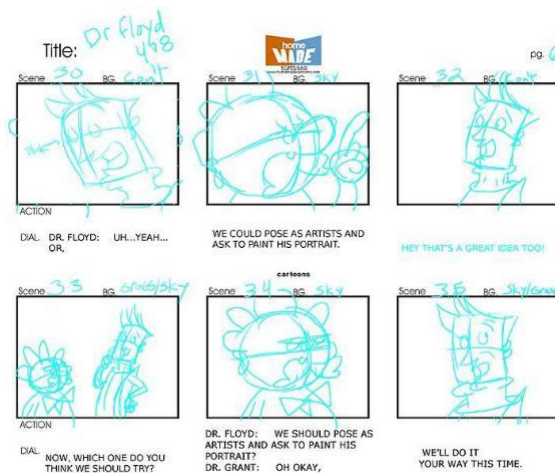
A continuous piece of video or film footage.

It's everything you get between pressing “record” and “stop”

Scene

Scene comprises of all the *action/shots* which takes place at a certain time and location and consist of a segment of a program.

Storyboard



Title- Fig 3.2 A Storyboard

Attribution- <http://www.flickr.com/photos/tmray02/>

Source- <http://www.flickr.com/photos/tmray02/1440415101/>

Link

https://commons.wikimedia.org/wiki/File:Storyboard_for_The_Radio_Adventures_of_Dr._Floyd.jpg

A movie maker draws simple schematics of frames.

They use the frames to plan how they want to tell a story.

The frames show the correct order of significant objects or actors and the camera's position.

Camera



Title- Fig 3.3 Video Camera

Attribution- [Jeremy C. Schultz](#)

Source- [wikimedia.org](#)

Link- https://commons.wikimedia.org/wiki/File:JVC_KYD291.JPG

The production stage requires producing a video utilizing a video camera. The Video may vary from video to video. It will depend on the style and content of the video being made and the amount of time, effort and money that is being put into production but... However large or small your video may be... This is the proven production process that successful video producers use...It works out into three main phases.

Camera Shots

Different types of shots are captured according to the requirement of the storyboard/demand of the director. These are

- Close-ups
- Wide shots
- High angle
- Low angle
- Point-of-view

The pre-production phase:

The first step of the video production process is planning. Before starting a new project you first conduct research, identify the problems & also the solutions and perform other organizational duties.

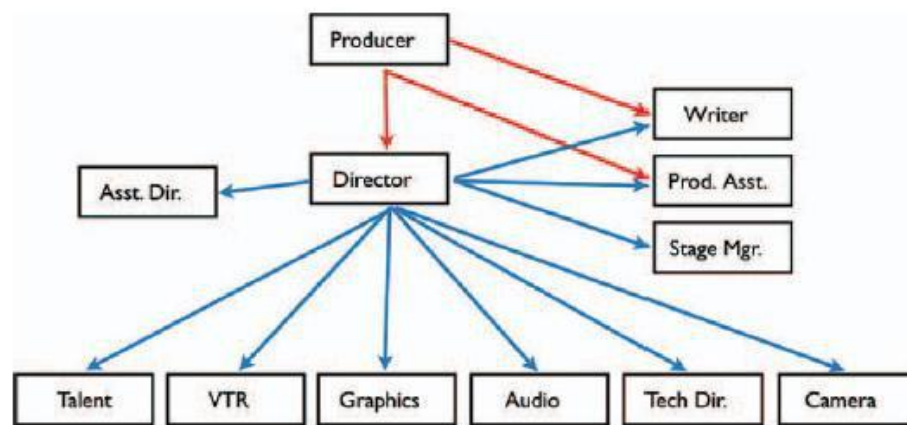
By this stage the team has been formulated including *Producer, Director, Production Designer, Director of Photography (DOP), Sound and Editor* (in this production the roles of sound and editor were taken on by the same person).

The **Producer** is responsible for the overall organisation of the production including working with the Director and Production Designer to come up with locations and co-ordinating with the actors which would enact in the film and convey the story as written down in the script.

The **Director** is responsible for the creative visualisation of the script or event. He would take on overall 'creative' responsibility of the production, the style of shooting, types of shots, selection of location and final editing. He directs the actors how to act to convey the emotions to its best. He brings out the essence of the characters and adds life to the story. The DOP in conjunction with the Director is responsible for the look of the film, the style of the filming; again achieving what would have been suggested by the writer in the script.

It's the job of the **Camera operator** to set up their cameras and after that using the camera for capturing the video as desired or directed by the director.

Audio mixer/sound mixer will be in charge of provision of quality sound and they manage the sound balance and also responsible for the technical and artistic quality of the sound.



Title- Fig 3.4 The Structure of a Video Production Crew

Attribution- Gerald Millerson

Source- *Video Production Handbook-4th edition*

Link-

<http://home.fa.utl.pt/~cfg/Anima%20E7%20E3o%20e%20Cinema/Realiza%20E7%20E3o%20Cinematogr%20E1fica/Video%20Production%20Handbook,%20Fourth%20Edition.pdf>

Production Methods

Having brilliant ideas are not sufficient. Ideas generated have to be turned into action to convert it in to out in realistic, practical terms. They can be viewed or heard as images and sounds. At the last it will be the decision of the director about the camera that is to be used to shoot and what will be the liking of the audience to view and hear.

There are two very unique techniques for moving toward video production:

The *empirical* technique is the place where intuition and opportunity are guides.

The *planned* technique, which composes and assembles a program in pre-cautiously, arranged steps.

The director has to opt for one method before getting started.

The video's concept

In the planning stage director should map out what exactly he wants. This helps him in accomplishing his aim while recording, editing, sound mixing, captioning, etc.

Script

The script forms the basis for the planning of any film project. For certain types of production, such as drama, the script generally begins the production process. The director reads the draft script, which contains general information on characters, location, stage directions, and dialog. He/she then visualizes the script or envisions the scenes and assesses possible treatment. The director must anticipate the script's possibilities and potential problems. At this stage, changes may be made to improve the script or make it more practical. The next director prepares the camera treatment. Scripts do the following:

- Help the director to classify ideas and to develop a project that works.
- Help to coordinate the production team.
- Help the director to assess the resources needed for the production.

Storyboard

Directors need to think through each scene in their minds so that they can capture the images and turn them into a storyboard. The storyboard is simply a series of rough sketches; these sketches help the director to visualise and organise the camera treatment. It is the visual map of how to arrange the key shots for each scene or action sequence.

Talent Contract

At this stage director secures a signed Talent Release form from anyone involved in his audio, video, or slideshow projects. Customize the form for your own project(s).

Copyright

It is illegal to reuse copyrighted content that you do not have explicit, written permission to reuse. This means that you cannot reuse music, television clips, voiceovers, photos or other multimedia that you have not produced and do not have permission to use. Fair use does not typically allow the reuse of original or derivatives of creative, copyrighted works for public distribution.

The Production Phase

The *production phase* is the actual production (making) of the video. It's at this stage of the video production process that you are actually shooting the video.

Production techniques are the features used to make the text(s) interesting and unique. Techniques may include: music, dialogue, lighting, graphics, colour, special effects, soundtrack, camera work, layout, use of space, oral and visual production techniques, or use of links. By looking at the production techniques closely you will gain a better understanding

of how the text has been produced in order to present the themes, characters, settings, and plot. The attitude of the director towards the character helps to set the mood or feeling of the text. Think about how the techniques and the mood of text work together to make the production convincing.

Key points to study

Structure – how the text and the ideas have been put together. Look at the overall structure of the text(s), the order of scenes, sequencing, and transitions.

Narrative point of view – who is telling the story and how this influence what the audience experiences and feels towards the text, does. The director will choose and/or change the point of view to control the relationship between the audience and the character to support their purpose. Changes in perspective can be shown by techniques such as voice-over and camera shots, like the point of view shot.

Narrative style refers to how the subject matter is presented to the audience.

Dialogue – identify repeated language patterns in a character's speech. Look at the types of words used and how they speak. What does this show you about their personality and background? Think about how the voice is used to show subtle changes in emotion, accent used to show social status and background, and gesture to show response to other characters.

Required for the project

Equipment

- Camera (video/film camera, Smartphone, tablet, digital camera).
- Tripod (to steady your shots and minimize camera movement).
- High quality microphone (for audio-only).

Lapel microphone (better quality than a camera's built-in microphone).

Lights.

You can also record audio directly at your desk via your computer. Audacity is a free program that you can download to record and edit sound.

Location

The locations of the video/films are selected according to the script keeping in mind the budget of the producer.

Audio

Audio is recorded in a quiet environment, free from any interruptions or ambient background noise (including: cell phones, pagers, co-workers, etc.).

Video

Videos are recorded in a well-lit environment. Be careful of reflections and glare from eyeglasses, windows, computer screens, etc.

Tips for Recording Audio:

- Read from a prepared script.
- Speak slowly and clearly; carefully pronounce words
- Pause frequently for the benefit of your listening audience — before starting your recording and between long sentences and paragraphs.
- Practice and review a short test recording.
- Preview your final recording before delivering.

Tips for Recording Video:

- Plan your recording session carefully; recordings often take longer than expected.
- Prepare your audio script ahead of time.
- Record with a specific purpose in mind to avoid recording excess footage.
- Record the shots that you've outlined on your storyboard.
- Ask subjects to wear solid, neutral colours.
- Practice and review a short test recording.
- Keep subjects within frame of view — record more of the subject matter and less of the surroundings.
- Preview your final recording before delivering to your intended audience.

While recording the video

- Set up your equipment before the shoot.
- Use a lapel microphone to cut down on background noise.
- Ask the person speaking to.
- Pronounce words carefully and to speak slowly and clearly. Practice saying any technical or scientific terms before recording.
- Be careful about using 'umm,' 'uhuh,' and other similar "filler words."
- Explain/describe what they are doing and why. This verbal description of activity will better clarify what is happening in the video. Intentional narrative helps people reading a transcript or listening to the audio to understand what is happening.
- Do not interrupt the person(s) you are interviewing; wait until they finish speaking to ask for clarification.
- Do retake if.
- The person coughs unless it is part of the video.

The Post-Production

Post-production literally is where the director bring together all of the different elements and material created in the production phase to form a finished product as envisioned in the pre-production stage.



Title- Fig 3.5 The Post Production Studio

Attribution- Autobahn Two

Source- pixabay.com

Link-https://commons.wikimedia.org/wiki/File:STEP_studio_pict2.JPG

Post Production includes editing, but it is much more than that. Post begins with the script and continues in the Pre-Production phase with the planning, scheduling and budgeting of finishing processes.

During Post-production the *Editor* is syncing dailies and assembling a rough cut for the Director to view as the shooting progresses. Finally, there are the **sound design, scoring, titles, visual effects, mix, colour correction** and **delivery** that comprise the finishing process.

Students usually experience little difficulty with the Pre-Production and Production phase of filmmaking, but once principle photography is complete their projects tend to lose momentum and unravel. The primary reason for this is a failure to think holistically about all of the work involved in making a film. A movie is like a cake – you add the flour, the eggs, the sugar, but until it's baked it's not a cake. Efficient Post Production requires serious multi-tasking.

Most importantly, Post Production has to be seen as an integrated part of the whole and approached with the same attention to planning and scheduling that is given to Production. No one plans to fail, but failure to plan can lead to disaster. Goals and deadlines have to be set and progress must be monitored continually if the film is to be finished – and after having

spent crores of rupees in Production – what a waste not to have a finished film to show for all that effort. The areas include in post production are:

- Film Processing
- Adr And Foley
- EditinRoom
- Sound Mixing
- Equipment
- Playback
- Telecine Transfer
- Visual Effects
- Titling And Optical
- Negative Cutting
- Sound Editorial And
- Delivery Elements
- Design

The Lab

In addition to processing a film, printing film dailies and prepping your dailies for transfer to videotape, the lab is also where you go to procure bags, cans and cores which go to the production set. When picking up these items, the lab needs to know the film's gauge and what size "loads" you'll be using. The production manager can answer these and other questions. Be sure to meet with the laboratory contact prior to the start of production. This will help in avoiding expensive mistakes down the road. It will also insure that the lab is prepared to process your dailies when you need them.

The lab contact will need to know the details of your shoot. This will include the amount of film you expect shot on a daily basis, if you have any night shoots or weekend shoots scheduled, and if you are cutting on film or videotape (or both). Arrange a film lab tour for prior to starting the postproduction process. This will give a leg up on how film is processed and what information the lab needs to do the job correct and on time.

Have someone to show what to look for on a camera report. There is vital information the lab needs from those reports to even begin your job. Understanding this information will allow you to properly communicate should information be missing. Most film laboratories offer a variety of services. They develop film and prepare it for transfer to videotape, create prints, and repair damaged film. Some have optical departments where they create film effects and titles, blow-ups and repositions. To fully understand and appreciate the work that goes on at the film lab, take a tour.

Dailies and Telecine

In a film shoot, dailies, as the name implies, is the footage that is shot each day and rushed to the lab for processing. It then moves on to telecine or printing so that one can view them, usually the next morning. The dailies from a tape shoot are still the footage that is shot each day; it just does not require processing.

If you are having your film dailies transferred to videotape (telecine), you will need to speak with the transfer facility prior to the beginning of your job. As with the film lab, they will have a list of questions for you to answer before they can schedule your job. The information

they will need includes details about what type of film and sound you are shooting, how you plan to complete your project once shooting is finished, and what your time schedule is for your project. How much film is budgeted for each day, and how many days you will be shooting will also be important.

Some information must be taken directly from film during the transfer process. Whether you plan to do a film and/or videotape finish will tell the facility what information they need to gather at the time of telecine. Not planning ahead and having to go back to get this information is extremely costly and time consuming.

Off-line editing

Off-line editing indicates an electronic cut. This means that processed negative shot each day will be transferred to videotape or to a hard drive. This videotape is then provided to the off-line editor to be recorded into electronic editing equipment for (non-linear) editing. It can also mean you have taken your digital raw files and compressed them to create smaller, more manageable file sizes for your editing workflow.

On-line editing

The *on-line* is where the final assembly of the project or the conforming of project by linking to highest definition or raw digital files after the edit is complete.

You may have to change your sequence settings and relink to highest resolution footage (2K or 4K for example) to conform the locked cut to the highest resolution files before you send them to colour correction.

Just like each earlier process (film processing and telecine dailies transfer), the on-line facility will have a list of details they will need from you before they can book your on-line session and complete this process. This will include questions about what videotape format your dailies are on, where the tapes will be coming from, what off-line system was used to create the *editing list* (called the edit decision list-EDL), and any instructions involving special effects. Sometimes the same facility that did your film processing and telecine will also be doing your on-line, sometimes not. Other steps that will take place as part of this process may be creation of special effects, titling and colour correcting your picture.

Sound

Sound for a project actually starts in dailies with the “*production sound*.” This is sound recorded right on the set at the same time when the picture dailies are recorded. Whether shooting on film or videotape, you will probably have some production sound. The exception will be a project that relies solely on voiceovers or sound and effects that are recorded later.

Production sound elements are delivered to sound editors to be used to help “*sweeten*” the sound that was combined to the picture either in the film editing room or the off-line editing room. Once all of the sound edits have been agreed upon, production sound, along with any ancillary sound effects and music are mixed together. This is called *mixing* or “*dubbing*” (it is also called “audio sweetening in commercials and television). Mixing takes your production audio and finalizes it with enhancements, ADR, music, sound effects, and various clean-up procedures.

Completion

Once you have the picture and sound elements nailed down, your delivery requirements will determine how you complete your project.

A film finish means that all of your work toward delivery has been done on film. This does not preclude making a file-based or videotape master from your film elements, but the file-based or videotape master will only be struck once the film's picture and sound elements are completed. A completely finished film element must be created to satisfy your delivery requirements. The negative is cut once the show has been locked (final edits are approved) and optical (fades, dissolves and titles) are ordered. The film lab creates the colour-corrected print. The movie is colour-corrected prior to striking release prints and can also be colour-corrected for use as a telecine print master.

For a feature or movie-of-the-week, allow at least 10 days for a negative to be cut and spliced into a finished piece. Allow another week (or more) to arrive at the right colour-corrected film element.

If the file or videotape is to be the only delivery format, and then it will not require cutting negative prior to delivery, you have chosen what is referred to as a tape finish. A file or tape finish can also take place on a project that will ultimately be finished on film if materials for preview or advertising are required prior to the film finish being completed. A two-hour show can take at least one day to several days to complete. One-hour TV shows usually spend one to two days in colour correction.

The master is electronically colour-corrected scene-by-scene. Depending on the complexity of the look of the project and the evenness of the negative exposures, it can take from hours to days to colour correct a master. If finishing on videotape, formatting will either be incorporated into the EDL or done "tape-to-tape" near the end of the process. Formatting can include adding logos, bars and tone (videotape) and commercial blacks (videotape), and closed captioning (again, videotape).

When finishing on **film, titles, credits, locales, legends**, etc. are created optically. They are shot on film using the plain "*textless*" backgrounds. These backgrounds are matted together with titles creating a new piece of "texted" film which is then cut into the final-cut film negative. On videotape, these are done after the entire picture alterations are accomplished (such as special effects and colour correcting). As with film, the "textless" pictures are mixed with text, making a new "texted" picture.

Delivery

Delivery is completed successfully only when the film has fulfilled all of the delivery requirements and the distributor has accepted the elements. The only way to safeguard against missing delivery materials is to get, read and understand the delivery requirements. Delivery elements are best made along the way, at the steps where they are the easiest and most cost-effective to create. They often require paperwork and contracts drawn and signed. Collect delivery requirements at the start of your project. Make a checklist and keep it updated so you are not caught short and costing the producer unnecessary expenses.

Project Workflow

Workflow refers to the management of steps required to produce a program.

The First Step: Gather

Gathering: This may take place with one or more tools, and the primary tool is the video camera.

The Second Step: Capture

You must capture or transfer your video (or audio) from its source to a computer work.

The Third Step: Edit

Editing your video with a nonlinear editing program

The Fourth Step: Compress and Code

You must determine what target platform your video is to perform, and you must optimize or compress that video to play efficiently on that platform. It may be CD-ROM or DVD. In any event, your computer's software and hardware have the tools to accomplish this task. You may save as a QuickTime file or a Real Media file.

The Fifth Step: Encode to CD-ROM

If you intend to archive or distribute your project to CD-ROM, you must learn the optimal compression strategy for the piece you have produced. This strategy's objective is to produce the highest quality and best performing video yet it must fit on a CD-ROM disk and play properly (without hesitation or distracting breaks in performance) on your computer platform.

The Sixth Step: Archive

It's important that you save an uncompressed version of your work for full-broadcast play at full screen resolution. This archive can reside on DV tape (least expensive) or it can be archived to a hard drive or disk array for easy retrieval. This is most expensive, but time is money, and many production houses are archiving entire projects this way so that they are handy. In certain cable operations, videos are archived in a disk array data base for retrieval for broadcast.

Unit summary

The focus of this Unit lies in the three central areas of video production: pre production, production, and post production. Students will develop a comprehensive idea about, shoot video, and edit both audio and video to produce a finished project.

Assessment

1. Identify video production equipment/components.
2. Explain the components of video production.
3. Identify and explain the operation, components and function of all major video equipment.
4. Define terminology related to video production.
5. Explain basic trouble shooting and safety procedures for video production.

6. List the various positions in a video production.
7. Use video camera functions such as zoom, pan and fade.
8. Describe in detail the process of editing.
9. Identify the basic requirement in video production i.e. equipment and software.
10. Evaluate the effectiveness and the process of a video production.
11. What are the three elements of a story?
12. What is the visual diary of your video?
13. When should all or most of your production decisions be made?
14. What should always be considered while framing a shot?
15. Define editing and describe the types of editing?
16. What does AVI stands for?
17. What does MPEG stands for?
18. Primary light that shines directly on subject is called?
19. Moving the camera side to side is called?
20. The narrator talking off screen is called?

Resources

- Wikipedia.com
- Video Production Handbook-4th edition
- <https://en.wikipedia.org/wiki?curid=1553972>
- <http://communionmarketing.com/index.php/web-applications-other/introduction-to-web-applications>
- www.medialit.org
- <http://www.medialit.org/reading-room/video-basics-and-production-projects-classroom>
- www.mediastudentbook.com
- www.docplayer.net
- <http://www.moviemaker.com/archives/moviemaking/directing/articles-directing/post-perfect-in-10-easy-steps-3341/>
- <http://docplayer.net/23069879-Post-production-handbook.html>
- <http://caes2.caes.uga.edu/unit/occs/resources/multimedia/record.html>
- <http://www.garyolsen.com/GoClarke/Videoaudio/>

Unit 3 Compositing and Audio-Video Editing

Introduction

Once the production process i.e. the shooting is over the material comes for *post-production*. The post-production is the most important and delicate part of the whole production process, it demands much time and patience. The post production process is mainly about the audio visual editing. On the editing table, the editor gives a structure to the output according to the script. Whatever the director shoots is totally raw which needs proper continuity, smoothness within story flow, laying proper music according to the mood of the story or script as well as colour correction etc. to attract the audience. *Compositing* also plays an important role in the post-production process. Compositing can add magic to the output. It not only adds up some practically impossible audio and visual elements other than shooting, but it also adds a grace to the output.

This unit introduces the section of audio & video editing and compositing of different mediums to bring out a finished audio visual output. In this unit we will come across the process of audio & video editing and various compositing mediums required to create an audio visual file. We will know what the necessity of editing and compositing is. We will learn about the role of an editor and compositor.

Outcomes

Upon completion of this unit you will be able to:

- Edit audio visual files.
- Utilize the equipments required for audio and visual editing.
- Compose images and video files.
- Use compositing software.

Terminology

Ingest	Ingest is the process of capturing and marking the raw footages for editing.
Rough Cut	The process of combining all the audio visual files and selecting the best part and keep them in a chronological manner.
Compositing	The process of combining different visual layers or files to make a single visual layer so that they don't look different from each other.

Audio Visual Editing

Audio visual editing is the basic as well as the final stage of the post production stage of any video or film production process. Once the visual is shot on camera and audio is recorded it needs to come to the editing table for proper and systematic story flow without any jerk. On the editing table the unwanted shots and audio portions are edited and only those portions are kept which are necessary. Sometimes the mood of the story is decided on the editing table. The editing needs much time and patience. Many a time's experiments are carried out on the editing table. Sometimes what the director has conceived in the script may differ in the actual output depending on the flow according to the edit.

Process of editing

The process of editing is categorized as *linear* and *non-linear* editing depending upon the technology used. Mostly the film or celluloid based editing process is known as non-linear process as it is not restricted to the arrangement of shots. Whereas the tape based video editing is regarded as linear editing as the shots has to be arranged one after another.

The linear process of editing is simple shot to shot joining. The editor has to place one shot after another shot. But this does not give the freedom of experimenting with the placement of shots. If the editor places shot A after shot B then one cannot place shot C in between them. The shot B has to be deleted.

In earlier days when visuals were captured on film or celluloid, the positive prints of the rushes were played on heavy machines which were called editing tables specially designed to edit those. Visual and audio tracks were rolled through different rollers. The shots were recorded as series of single frames so the editor can mark the particular frame which has to be edited. Here the editor has the freedom to take any part of the rush and insert it between any other consecutive visuals or shots. There was no fixed rule hence it was called non-linear editing as nothing is in a proper line. Shot A can be used in between shot U and V.

Nowadays in the digital era everything is done through computers. So whatever be the medium we are shooting whether film or tape it has to be converted to the digital format. It is done so that the computer can recognize everything in its own language. This process is called capturing/ingesting of the rushes. Sometimes this process of capturing the audio visuals take much time as it is done in real time speed. To cut that time we are now using digital recording formats such as hard drives and memory chips through which the transfer of data takes less time. Also there is no loss of quality.

With the development of technology visual and audio were started recording on magnetic tapes. Hence various kinds of magnetic tapes evolved over the span of time depending upon their quality. These recorded images and audio can be transferred or re-recorded on another magnetic tape to make various copies. This led to the process of linear video editing process. Basically the editing of tapes is just marking the starting and ending point of a shot from the source tape and recording it on the edit tape. With every development in the tapes their process of editing also developed. Every tape editing system used a tape player and a tape recorder. As well as there was a remote to control both.

Firstly VHS tapes were used. The VHS tapes were analogue tapes. These were meant just for home viewing purpose, so the recording and editing was also very basic.

After the VHS tapes, came the u-matic tapes or $\frac{3}{4}$ inch tapes. U-matic is an analogue recording video cassette format was introduced to the market in September 1971. Unlike most other cassette-based tape formats, the supply and take-up reels in the cassette turn in opposite directions during playback, fast-forward, and rewind: one reel would run clockwise while the other would run counter-clockwise. A locking mechanism was started using which secures the tape hubs during transportation to keep the tape wound tightly on the hubs. Once the cassette is taken off the case, the hubs are free to spin. A red button is also provided which acts as a switch that allows recording of visual and audio. If this red button is removed it does not record anything.



Title- Fig 1.1 VHS editing setup with player, recorder and remote

Attribution-

Source- pixabay.com

Link- <http://www.mediacollege.com/video/illustrations/edit/home-suite.html>

The u-matic editing system also comprises of a player, recorder and a remote too. It also comes with character generator which also helped add texts and visual effects and transitions.

The betacam tapes were the next advanced series in analogue tapes. These recording formats were better in quality than u-matic. The editing systems were also more advanced than u-matic systems as they carried video signals in form of component signal.

After introduction of digital technology dvcam and digital betacam tapes came in the market. These tape systems allowed to work in non-linear process as the visuals could directly be captured onto hard drives through computers. The specially designed editing softwares helped editors to edit the tape footages in the same manner as they were able to edit film footages.

Now, if we discuss the process of modern day non-linear editing which is done through computer softwares, then we have to come across the various steps carried throughout.

Ingest

Once the tape or hard disk comes to editing table from shooting, the first thing done is *capturing* or *ingesting*. In this process the tape material is converted into digital format through graphics card. This process is also called as *digitisation* of tapes. These visual are stored as various visual and audio files. While digitisation the editor can capture in a single go from starting to end or by choosing the portion depending on the time code marked. While capturing the editor can provide description to the shots, which will be helpful in editing process.

First Assembly

Once the ingesting is done and all the necessary visual and audio are imported into the editing workspace. Then it is assembled according to the clapboard marking. Once the assembling is done, the editor sorts out the negative footages and unwanted audio and visuals for proper editing.

Rough Cut

In this phase the editors take the assembled blocks and make some choices. They cut the project into a rough form, often with some variations to consider. This is the first draft of the video or film. The shots are placed such that one can see how the program is taking shape. *Rough Cuts* may also contain fades and dissolves or other transitions to give the idea of how the scenes flow from one shot to the next. This is usually the stage where the client gets to review the program and get a pretty good idea of where the video is heading.

Fine Cut

The *fine cut* is the next version of the program that has taken into account all the changes, modifications and instructions by all parties, including the Editor, Director and Producers, and the end client. The fine cut focuses on the details of each and every scene in the First Cut. This is the second and near finished version of the video. At this point, the editors and producers need to receive "*Picture Lock*" approval which means that there are no more substantial changes that can be made to the video. Picture Lock means that the timing of the show from start to finish will not change.

The only changes at this point possible cannot change the length in either direction - shorter or longer - without incurring additional editing and mastering expenses. Upon approval of the Fine Cut, additional sound mixing, closed captioning, and disc authoring can take place to make the program complete.

Final Cut

Once the fine cut has been approved by all parties and finalized, the project is handed over to the sound department for sound effects and final audio mix. The final colour correction is also done. Closed *captioning* and *formatting* of the final video happens in conjunction with the sound mix. Then the project is final and ready for telecast.

The professional editing software used for editing nowadays is **Filmora**, **Showbox**, **Lightworks** and **Blender**.

There are many other types of software like **Audacity**, **Ardour** and **Traverso** etc. which are also used to professionally edit only audio files. Editors can precisely edit and modify audio files through these platforms. Various audio effects can also be added.

Mostly editing is classified as *online* and *offline editing*. The editing which is carried out on editing table after the shoot is over is called offline edit whereas when the edit is carried out simultaneously while shooting is called as online editing. In T.V channels mostly online edit is done.

The equipments for online editing are also different from offline edit. It includes **switcher**, **fader**, **mixer**, etc.

Compositing

Compositing is the process of compiling various visual sources to make a single visual file. Compositing is the term used for *post- production field*. It can be considered as another process which is similar to editing. Compositing is as similar to editing process as it is different from it. In compositing process different visual elements from different sources are taken and compiled in such a manner that the final image is seen as a single frame. One cannot differentiate between the layers of the images. Compositing is used in both *moving* and *still images*.

The most commonly used softwares used for compositing is **Natron**.

Compositing creates a visual magic on the screen. The compositor can either add or delete or mix up various visual elements in a single frame.

What is the need of compositing? Sometimes when the script revolves around fiction specially science fiction or the director creates a story in his own imaginal space it is impossible to create such fictional character or realm for shooting. In earlier days, such fictional characters were created mechanically or through costumes, but that was not so effective. The *special visual effects* such as lightning or explosion etc. were also to be shot which took much of the footage which was costly. Hence in such cases art of compositing comes at rescue. With the development in computer technology in animation sector, the scope of compositing also spread widely and rapidly.



Title-Fig 1.2 An image created by compositing more than two different images.

Attribution- [Martin St-Amant](#). &Canoe1967

Source- pixabay.com

Link-https://upload.wikimedia.org/wikipedia/commons/0/08/Altmer_High_Elves_trapped_and_outnumbered_but_we_won%27t_die_today.jpg

With the help of computer animation we could easily create characters and surroundings as one desire or imagines. Now, one can also create a visual output without even shooting anything with help of compositing. One can add all the computer generated files to create one composite output.

In the picture we can see that the compositor has used two different visual sources to build up a new picture which contains both the pictures.

Most of the time during shooting, a *green background* is used and the subject is placed in front of it. This is called *chroma background*. After shooting, this green background can be removed digitally to get a clean transparent background with only the subject. This is called the *alpha layer*. Now this subject can be placed on any background.

During compositing process, one can also add various visual effects such as **fire, explosion and lightning, smoke**, etc. which is known as *VFX*. The compositing softwares are also used for *colour correction* and *text layer* generation too.

Unit summary

In this unit we learnt about the post production processes like audio visual editing and compositing. Proper post production methods can bring out the best of the production. Tight edit, appropriate music and proper audio mixing create a better impact on audience. Likewise imaginative compositing can add magic to the output.

Assessment

Create a video mash up that includes at least one video resource and a different or additional audio track than what is in the original video. You're free to tell a story, create a music video, add a voice-over track, record your own video, create some gimmick, or even try something experimental as long as you adhere to the following requirements:

- Include a title for your video at or near the beginning
- Include credits at the end of your video for image, audio, and video resources you use in creating this project. Be sure to adhere to any stipulations of the resource licenses.
- Add an audio track other than the original audio in the video.
- The total length of the video should be 2-5 minutes.

Assignment

Create a video mash up that includes at least one video resource and a different or additional audio track than what is in the original video. You're free to tell a story, create a music video, add a voice-over track, record your own video, create some gimmick, or even try something experimental as long as you adhere to the following requirements:

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- The total length of the video should be 2-5 minutes.

Unit 4 Web Design and Publishing

Introduction

This unit is designed to train students in website building. Students will learn HTML, CSS, jQuery, web design development programs like Adobe Photoshop, flash, as well as the multimedia program iMovie. This chapter will cover the usage of graphics, sound and video and discuss the appropriateness of multimedia on websites for journalism, advertising, public relations and e-commerce. Students will work on numerous small web projects that will lead to one final multimedia project. The goal is to highlight more than just the skills related with individual programs, but the addition of several programs into designing effective and good-looking websites.

Outcomes

Upon completion of this unit you will be able to:

- Understanding of basic structure of HTML
- Learning of various container and empty tags
- Learn various html tags and their syntax.
- Differentiate the different types of lists created in HTML.
- Link web pages using <A> tag.
- Insert audio & Video in a web page to make it more interactive.
- Insert images in a web page.
- Use images and Email addresses as hyperlinks.
- Creating websites & hosting it

Terminology

HTML	HTML stands for Hyper Text Markup Language. It is a markup language utilized for creating HTML documents.
Tag:	It is a type of command that guides the person who is browsing the web, to how can be text, audio, graphics or video can be displayed on a web page.
Web Browser	It is application software that allows us to view and explore information on the web
Container Elements:	A container element is specified by a pair of tags - Start tag and End tag.
Empty Elements	Empty elements have only a start tag and no end tag.
Web Server	It is a computer where the web content is stored. Basically web server is used to host the web sites.

Web publishing, or "online publishing," is the process of broadcasting content on the Internet. It includes making and uploading websites, updating webpages, and posting blogs online. The published content may include text, images, videos, and other types of media. In order to publish content on the web, you need three things:

- Web development software.
- An Internet connection.
- A web server.

The software may be a professional web design program like Dreamweaver or a simple web-based interface like Word Press. The Internet connection serves as the medium for uploading the content to the web server. Large sites may use a dedicated web host, but many smaller sites often reside on shared servers, which host multiple websites. Most blogs are published on public web servers through a free service like Blogger.

Since web publishing doesn't require physical materials such as paper and ink, it costs almost nothing to publish content on the web. So, anyone with the above three requirements can be a web publisher.

Web Design Programming

HTML is a language for creating Web pages. HTML stands for *HyperTextMarkupLanguage*. It is not a programming language, it is a markup language. A markup language is a collection of markup tags or elements.

PHP stands for Hypertext**Preprocessor (PHP)** are a type of programming language whose main job is to allow the web developers to make a dynamic and vibrant content that reacts with the available databases. Generally PHP is utilized for generating applications that are web based.

CSS stands for **Cascading Style Sheets**. These sheets refer to the presentation of HTML elements as a distinct file known as CSS file with an **.css** extension. CSS helps to change formatting of any HTML element by simply rolling out improvements at one place. All progressions made would be reflected naturally to the greater part of the pages of the website in which that component showed up.

Bootstrap – It is a “powerful mobile first front-end framework for faster and easier web development.” It is a collection of tools to help you rapidly deploy websites and Web application on internet.

JavaScript- JavaScript is a lightweight, deciphered programming dialect with object-oriented capacities that enables you to incorporate intelligence with generally static HTML pages.

Introduction to HTML

HTML is a unique language. It is a simple and text - based language. It is used for creating web page. HTML document is created in a simple Text Editor (as a notepad) A Website is a collection of webpages. Websites are unique sources of online information. These can be available on internet. Hypertext is the basic of all information available on the website. The expanded name of HTML is Hyper Text Markup Language. It is a simple web language. It is text based and is used for creating web page, Website is the combination of many web - documents. Web page has many elements as page style, Paragraph, list, table and picture etc.

Each Section is written in the form of tag. The tags indicate that the element viz. heading, list, paragraph etc. to which the section of web page relates. Picture, Sound and movie can be included in addition to the text in a web page.

TYPES OF HTML TAGS

Tags are a special type of instructions. They are used in HTML documents. Tags provide instruction to browser for specific action. Tags start with open angle bracket (<) and end with closed angle bracket (>). The starting and closing tags of a HTML document are <HTML> and </HTML> respectively. They instruct the web browser to start and close a document. Tags are of two types described as follows

Container Tag : It is used twice in a document. Text is written in between the two tags. These are also called pair tag or companion tag.

Example :

<Body>

.....

.....

</Body>

Here two tags are used <Body> is the initial tag while </Body> is final tag. The symbol slash (/) separates the opening and closing tags. Some more examples of container tags are

<HTML></HTML>

<TITLE></TITLE>

<I></I>

<U></U>

Empty Tag: Empty tag is a single tag. It is also named as singular tag. It does not have any companion tag. Closing or finishing tag is never used in it.

Example :

.....

.....

The tag
 is used in above example. The tag
 represents "Break". The closing tag is not used in it. Some more examples are :

 (Listitem) <DD>(Definition data)

<DT>(Definition Term)

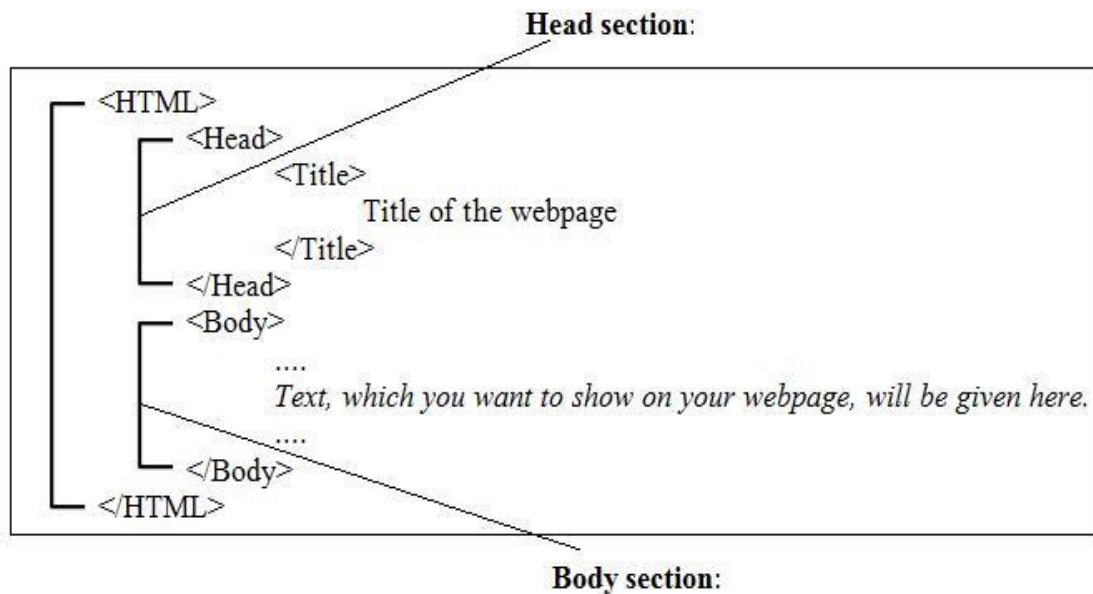
Note : HTML tags can be expressed by small or capital letters of English Alphabet.

STRUCTURE OF HTML TAGS

The general structure of HTML document has two sections: **Head** section and **Body** section.

Head: The Head section contains the Title that identifies the first part of your HTML coded document.

Body: The body section is where you do most of the works that includes text, graphics, and other HTML elements that provide control and formatting of a page like: fonts, paragraph, list and other elements. The general syntax of HTML document



STEPS OF CREATE WEBPAGE

In this section, we will be working with the notepad as editor. Now we are writing a HTML program to display a message “This is my First webpage” on the Browser.

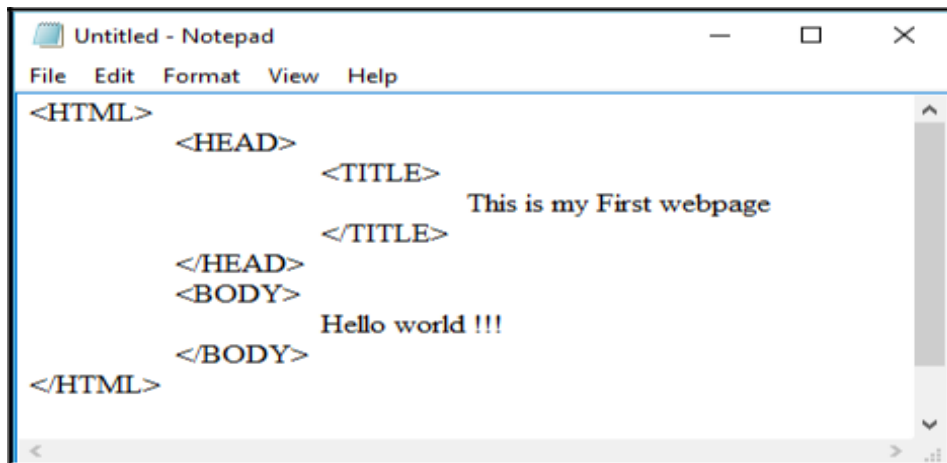
Let us begin:

In windows, click START Button.
Navigate to PROGRAMS and then click on ACCESSORIES.
Click on NOTEPAD

A NOTEPAD window will appear. Now, you are ready to type the HTML code.

Type the HTML code in your Notepad window as shown in the figure below.
Save the File

After you have typed the HTML code, you have to save it as a HTML file. Click on the File menu (in Notepad). Select Save

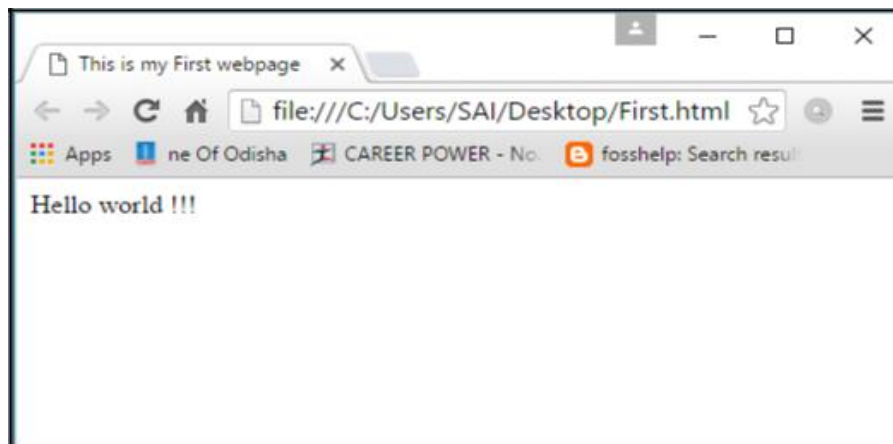


As. Notepad will show a dialog box asking for a file name.

In the File name textbox, type “First.html or First.htm”. Click on save button. Then you opened the browser Internet explorer. (Start → All programs→Internet Explorer) or Double clicked on Internet explorer Icon on the Desktop or taskbar.

Once the browser window is opened, then you opened the file from the particular location that you will recall it “First.html”. (File→open→browse→Select the file (First.html) →open→ok)

The output is shown as per the following figure.



Screenshot

BASIC TAGS OF HTML

Let us know about different tags to be used in HTML

Head Tag

Head tag provides Header information. The document title is written in Head Tag. It always occurs in pair. Head Tag is considered very important for a web page. This is a container tag. e.g. <head>.....</head>

Title Tag

The title of the web page is written with the help of title tag. Title starts with <TITLE> tag and ends with </TITLE> tag. It is used between Head tag.

e.g. <title>.....</title>

Body Tag

It is a container tag. It is used to represent the body of document. The whole text matter of the page is written between <BODY> and </BODY> tags.

e.g. <body>.....</body>

Each Body tag has different characteristics. These characteristics (properties) are termed as attributes. We can select Background colour, text colour, font size etc. with these attributes.

e.g. <BODYBGCOLOR = "Red">

.....

</BODY>

BG color is an attribute in the above example, which depicts that colour of the background is fixed as red.

Heading Tag

The heading tag is used to fix the heading. These are 6 levels of heading in all. The levels are numbered as heading 1 to heading 6. All the letters of the heading in a given level have same font. The font size goes on decreasing as we move from heading 1 to heading 6. The heading in level 1 is expressed by tags <H1> and </H1>. Similarly in the heading in level 2 we use the tags <H2> and </H2>. <H6> is lowest level. The font size in it is the smallest. e.g. <H1> Computer Education </H1>

Paragraph Tag

Paragraph is the basic composition of HTML, Paragraph is started with <P> tag and closes with </P> tag. The tags <P> leave a space equivalent to one line between previous line and the following line.

e.g. <p>This is a paragraph </p>

Line Break

The line Break tag is used to start the text from the new line. This tag does not leave a blank line space as the paragraph tag does. The text jumps to new line on using line break tag. The tag
 is a symbol for line break.

FONT TAGS OF HTML

Font is pre-defined style and size of the text. Font has three main properties. First style second - size and third colour. Font style can be changed in three ways - Bold, Italic and Underline. Font size changes size of text matter. Font colour gives different colors to the text. Font is a container tag. The and tags are used for changing fonts.

Attributes : Font has many attributes :-

Face : To set the name of font

Size: To set Font size. Font Size 3 is commonly used we can change it from 1 to 7.

Color: To change the colour of the font

e.g.

```
<body>
```

```
<fontface = "Arial" Size=6 Color = Red>OSOU
```

```
</font>
```

```
</Body>
```

Font Style :

BOLD: The Bold tag specifies that the text should be displayed in bold face. *Syntax:* ` `

ITALIC: The Italic tag specifies that the text should be displayed using the italic font.
Syntax: `<I> </I>`

UNDERLINE: The Underline tag states that the enclosed text should be underlined.

Syntax: `<U> </U>`

BIG: The Big tag specifies that the enclosed text should be displayed using a bigger font (compared with the current font).

Syntax: `<BIG> </BIG>`

SMALL: The Small tag specifies that the enclosed text should be displayed using a smaller font (compared with the current font).

Syntax: `<SMALL> </SMALL>`

BLINK: Surrounding any text with this element will cause the selected text to blink on the viewing page.

Syntax: <BLINK></BLINK>

The <BLINK>< /BLINK> element is currently only supported by the Netscape Navigator browser. In the internet explorer <marquee> is used to get the same effect.

STRIKE: The Strike tag states that the enclosed text should be displayed with a horizontal line striking through the text.

Syntax: <STRIKE> . . . </STRIKE>

SUBSCRIPT: The Subscript tag specifies that the enclosed text should be displayed as a subscript using a smaller font (compared to the rest of the text).

Syntax: _{...}

SUPERSCRIPT: The Superscript tag specifies that the enclosed text should be display as a superscript using a smaller font (compared to the rest of the text).

Syntax: <SUP> ...

</SUP>

TYPEWRITER: This tag specifies that the text should be rendered in fixed-width typewriter font.

Syntax: <TT> ... </TT>

MARQUEES TAGS

Marquee is a container tag. It is used to make the text dynamic. Syntax : A simple syntax to use HTML <marquee> tag is as follows:-

<marquee attribute_name="attribute_value"...more attributes> lines or text message or image </marquee>

The <marquee> Tag Attributes

Following is the list of important attributes which can be used with

Type	Description
Width	This specifies the width of the marquee. This can be a value like 10 or 20% etc.
Height	This specifies the height of the marquee. This can be a value like 10 or 20% etc.
Direction	This specifies the direction in which marquee should scroll. This can be a value like up, down, left or right.
Behaviour	This specifies the type of scrolling of the marquee. This can have a value like scroll, slide and alternate.
Scroll Delay	This specifies how long to delay between each jump. This will have a value like 10 etc.
Scroll	This specifies the speed of marquee text. This can have a value like 10 etc.

Amount

Loop This specifies how many times to loop. The default value is INFINITE, which means that the marquee loops endlessly.

Bg color This specifies background color in terms of color name or color hex value.

H space This specifies horizontal space around the marquee. This can be a value like 10 or 20% etc.

V space This specifies vertical space around the marquee. This can be a value like 10 or 20% etc.

IMAGE TAGS

In HTML, images tags are defined with the tag. The img tag is empty, which means that it contains attributes only and it has no closing tag. To display an image on a page, you need to use the src attribute. **src** stands for “**source**”. The value of the src attribute is the URL of the image you want to display on your page. The syntax of defining an image:

```
<imgsrc="url" />
```

The URL points to the location or address where the image is stored. An image file named "Shreyash.gif" located in the directory "images" on "C:/Dhruba" has the URL:

```
C:/Dhruba/Image/Shreyash.JPG
```

Example:

```
<!DOCTYPE html>

<html>

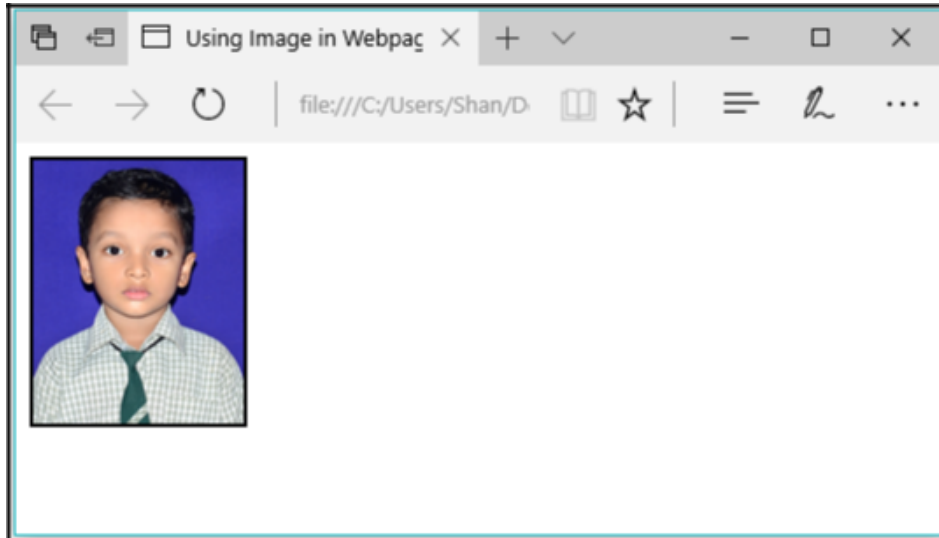
<head>

<title>Using Image in Webpage</title></head> <body>

<imgsrc=" C:/Dhruba/Image/Shreyash.jpg " alt = "This a Test Image"
height="150"width="120" Border=2 >

</body>

</html>
```



LIST & TABLE TAGS

HTML supports ordered, unordered, and definition lists.

`` - An unordered list. This will list items using plain bullets.

`` - An ordered list. This will use different schemes of numbers to list your items.

`<dl>` - A definition list. This arranges your items in the same way as they are arranged in a dictionary.

HTML Unordered Lists

An unordered list is a collection of related items that have no special order or sequence. This list is created by using HTML `` tag. Each item in the list is marked with a bullet. An unordered list starts with the `` tag. Each list item starts with the `` tag. You can use type attribute for `` tag to specify the type of bullet you like. By default it is a disc. Following are the possible options:

```
<ul type="square">
```

```
<ul type="disc">
```

```
<ul type="circle">
```

HTML Ordered Lists

If you are required to put your items in a numbered list instead of bulleted list then HTML ordered list will be used. This list is created by using `` tag. The numbering starts at one and is incremented by one for each successive ordered list element tagged with ``. You can display different kinds of ordered lists by using the type attribute. By default it is a number. Following are the possible options:

<ol type="1"> - Default-Case Numerals.

<ol type="I"> - Upper-Case Roman Numerals.

<ol type="i"> - Lower-Case Roman Numerals.

<ol type="a"> - Lower-Case Letters.

<ol type="A"> - Upper-Case Letters.

You can use start attribute for tag to specify the starting point of numbering you need. Following are the possible options:

<ol type="1" start="5"> → Numerals starts with 5.

<ol type="I" start="5"> → Numerals starts with V.

<ol type="i" start="5"> → Numerals starts with v.

<ol type="a" start="5"> → Numerals starts with e.

<ol type="A" start="5"> → Numerals starts with E.

HTML Definition Lists

HTML and XHTML support a list style which is called definition lists where entries are listed like in a dictionary or encyclopedia. The definition list is the ideal way to present a glossary, list of terms, or other name/value list.

Definition List makes use of following three tags.

<dl> - Defines the start of the list

<dt> - A term

<dd> - Term definition

</dl> - Defines the end of the list

Tables Tags

Tags	Description
<table>	Defines a table
<th>	Defines a table header
<tr>	Defines a table row
<td>	Defines a table cell data(or table data)
<caption>	Defines a table caption
<thead>	Defines a table head

<tbody>	Defines a table body
<tfoot>	Defines a table footer

LINK TAGS

A webpage can contain many links that take you directly to other pages and even specific parts of a given page. These links are known as **hyperlinks**. Hyperlinks allow visitors to navigate between Web sites by clicking on words, phrases, and images. Thus you can create hyperlinks using text or images available on a webpage.

Linking Documents

A link is specified using HTML tag <a>. This tag is called anchor tag and anything between the opening <a> tag and the closing tag becomes part of the link and a user can click that part to reach to the linked document. Following is the simple syntax to use <a> tag.

```
<a href="Document URL" ... attributes-list>Link Text</a>
```

Linking to a Page Section

You can create a link to a particular section of a given webpage by using name attribute. This is a two-step process. First create a link to the place where you want to reach within a webpage and name it using <a...> tag as follows:

```
<h1>HTML Text Links <a name="top"></a></h1>
```

Second step is to create a hyperlink to link the document and place where you want to reach:

```
<a href="/html/html_text_links.htm#top">Go to the Top</a>.This will produce following link, where you can click on the link generated Go to the Top to reach to the top of the HTML Text Link.
```

Linking to email address

You can link with an e-mail address by using an Anchor Tag with this a user can send e-mail to you by clicking on the link.

The code used for linking to an e-mail address is as follows:

```
<AHREF = mail to: abc@rediffmail.com> mail me </A>.
```

Here abc@rediffmail.com is mail address and **mail me** is the hyperlink.

Linking to Image

With this you can link the other document through an image (diagram). In this case image file name and its proper format is written. Let us try to understand the code given below:

```
<AHREF=link.html><imgsrc = "pc.jpg"></ A>.
```

Here link.html is the name of the document to be linked.

Similarly in `imgsrc="pc.jpg"` ,`pc.img` is the name of image which is used as a hyperlink.

MULTIMEDIA TAGS

You can open any external image in your webpage. Similarly external sound and movie (film) etc. can also be viewed. Anchor tag is used for viewing image or movie. HREF attribute can be used in Anchor tag let us understand the method of opening an external image in a different document:

```
<A HREF = "D:/GuruNanak .gif"> "Link anchor"</ A>
```

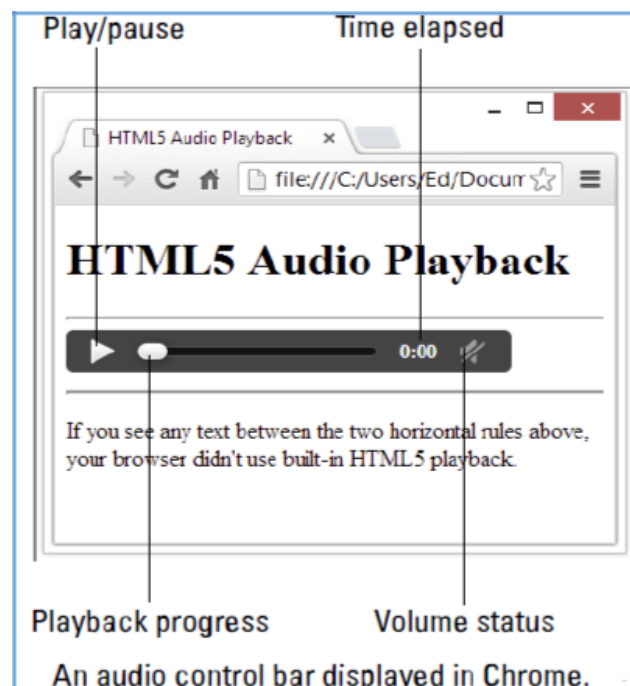
Here `<A>` and `` are anchor tags, HREF is attribute, Guru Nanak .gif is the image name and Link anchor is the name of Link. Similarly the method to open any external movie in a different document is as:

```
<A HREF = "D:/ harry potter.mov"> view the movie Harry Potter</ A>
```

With this command the movie of Harry Potter will start playing. But it is to be kept in mind that file of movie must be in the same folder in which your HTML document has been saved. We have to remember following file extensions for text, movie or sound:-

1. For wave sound file .wav
2. for quick time movie file .mov
3. for plain text .txt
4. for HTML document .html

Moving media with video



Screenshot

Unlike audio, which doesn't actually require much (or any) space on the screen, video requires an onscreen frame, as well as more sophisticated and more numerous controls. That's why although the two markup elements are similar, video comes with considerably more baggage, even though the basic structure of the element remains the same as before:

```
<video src="video.ogg" controls>Alternatives</video>
```

Here the src attribute points to the video file you'd like to have played back. It specifies the name of the video object file for playback and must be a valid URI. Example: src="video.ogg".

Supported Video Types

We can use various media types like Flash movies (.swf), AVI's (.avi), and MOV's (.mov) file types inside embed tag.

- .swf files - the file types created by Macromedia's Flash program.
- .wmv files - Microsoft's Windows Media Video file types.
- .mov files - Apple's Quick Time Movie format.
- .mpeg files - movie files created by the Moving Pictures Expert Group

Web Site Development & Publishing

Website is a place on web and is hosted on a web server. It is a set of related web pages. It is accessed using Internet address known as Uniform Resource Locator (URL).

WEBSITE TYPES

There are two type of web site:

Static Websites

Static websites are also known as flat or stationary websites.

They are loaded on the client's browser as exactly they are stored on the web server. Such websites contain only static information. User can only read the information but can't do any modification or interact with the information.

Static websites are created using only HTML. Static websites are only used when the information is no more required to be modified.

Dynamic Websites

Dynamic websites shows different information at different point of time. It is possible to change a portion of a web page without loading the entire web page. It has been made possible using **Ajax** technology.

Server-side dynamic web page

It is created by using server-side scripting. There are server-side scripting parameters that determine how to assemble a new web page which also includes setting up of more client-side processing.

Client-side dynamic web page

It is processed using client side scripting such as JavaScript. And then passed in to **Document Object Model (DOM)**.

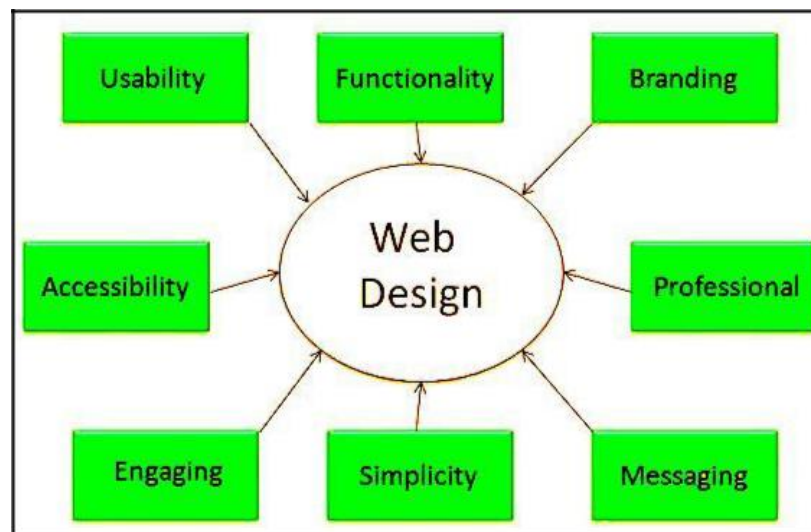
Website Designing

Web designing is linked directly to the visual part of a web site. Active web design is essential to convey thoughts adequately. Web designing is subset of web development. Anyway, these terms are utilized reciprocally. Web Design Plan ought to incorporate the accompanying:

A site map of pages.

Details about information architecture.

Planned structure of site.



Wireframe

Wireframe refers to a visual guide to entrance of web pages. It helps to define structure of web site, linking between web pages and layout of visual elements.

The things that are included in a wireframe are as follows:

- Placement of headlines and sub headings.
- Calls to action.
- Boxes of primary graphical elements.
- Text blocks.
- Simple layout structure.

Wireframe can be made utilizing program like Visio however you can likewise utilize a pen and paper.

Web Designing Tools

Here is the rundown of toolsthat can be utilized to make efficient website design:

S. N.	Description
1	Photoshop CC This is a great web designing tool provided by Adobe. The latest Photoshop CC 2014 supports many new features such as smart objects, layer comps, smart guides, Type kit integration, font search, and workflow enhancements.
2	Illustrator CC Illustrator CC is also a web designing tool comes with powerful features like AutoCad libraries, white overprint, fill and stroke proxy swap for text, automatic corner generation, unembed images and touch type tools etc.
3	Sublime Text Sublime Text is a source code editor with Python application programming interface. It can be extended using plugins.
4	Imageoptim It is basically used for optimizing images on a website in order to load them faster by finding best compression parameters and by removing unnecessary comments.
5	Sketch 3 Sketch 3 is a web designing tool developed specifically for designing interfaces, websites, icons etc.
6	Heroku It is also a great web development tool which supports Ruby, Node.js, Python, java and PHP
7	Axure It supports prototyping, documentation, and wire framing tools for making interactive website design.
8	Hype 2 The Hype 2 offers: Easiest way to Animate & add interactivity, Hardness the power of HTML5, Mobile responsiveness, and WYSIWYG features.
9	Image Alpha This tool helps to reduce file sizes of 24-bit PNG files. It does so by applying lossy compression and converts it to PNG8+alpha format which more efficient.
10	Hammer This tool is suitable for non-programmers and good only for small projects.
11	JPEG mini Lite It is an image optimizing tool and supports photos in any resolution up to 28 Megapixels.
12	Bug Herd This tool helps to see how the projects is going and what everyone is working on. It also helps to identify issues in development.

Web Page Anatomy

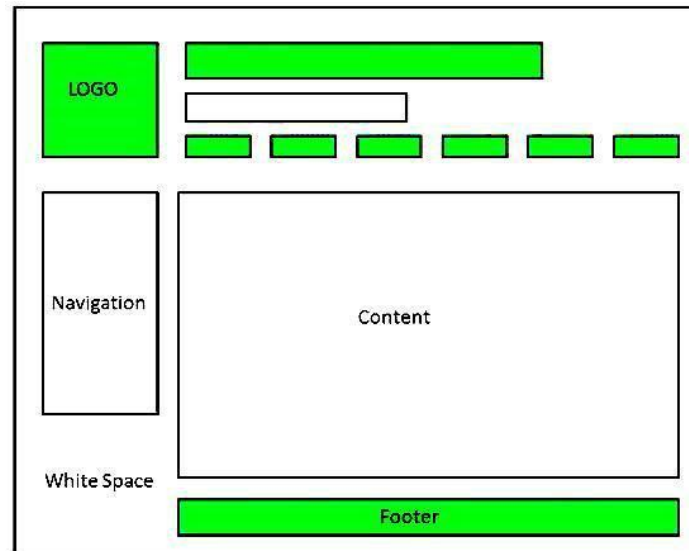
A website consists of the accompanying segments:

1. Containing Block

Container can be as page's body tag, an all containing div tag. In the absence of container there wont be any place to put the contents of page.

2. Logo

Logo alludes to identity of a website and is utilized over an organization's different types of advertising, for example, business cards, letterhead, brochures et cetera.



Screenshot

3. Navigation

The important criteria of the site's navigation system should be such that it should be convenient to find and use. Often the navigation is just placed at the top of the page on the extreme right.

4. Content

The content on a web site ought to be significant to the goal of the web site.

5. Footer

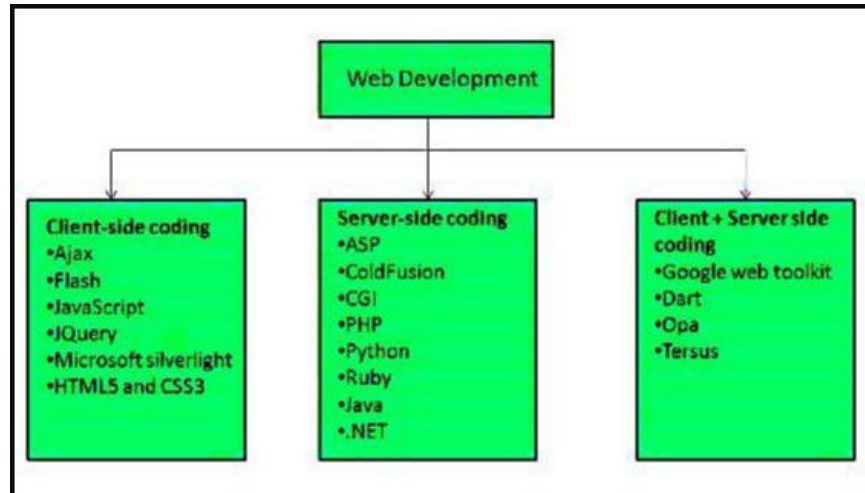
Footer is situated at the base of the page. It for the most part contains copyright, contract and legal information and in addition few links to the primary sections of the site.

6. Whitespace

It is also known as **negative space** and refers to any area of page that where there is no coverage of any type or illustrations.

WEBSITE DEVELOPMENT

Web development alludes to construction website and sending on the web or internet. Web development needs the utilization of scripting languages not only at the server end and but also at customer end.



Before building up a website once should remember a few perspectives like:

What are the things to put on the web site?
 How to make it interactive?
 Who is going to host it?

How to create a website that should be search engine friendly?
 How to do its coding?

How to secure the source code frequently?

Whether the navigation menus be convenient to use?

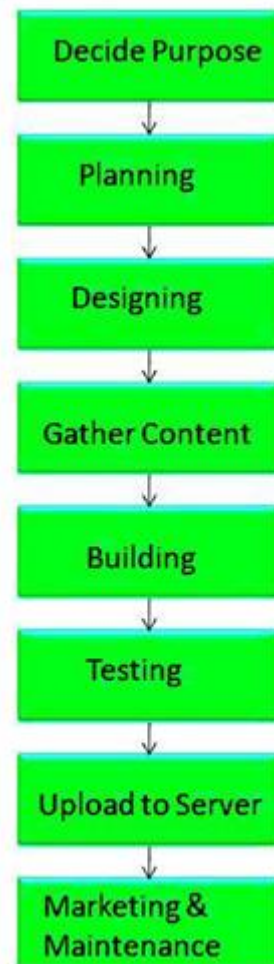
Whether the web site will be loaded quickly?

Whether the web site design in various browsers can be displayed perfectly?

How effortlessly will the site pages print?

How effortlessly will guests discover vital subtle elements particular to the site?

How successfully the style sheets be utilized on your web sites?



Web Development Process

Web development process incorporates all the phases that are fair to take to create an attractive, compelling and responsive website. These phases are appeared in the accompanying diagram:

Web development tools

A web development tool helps the developer to test and debug the web sites. Now a day the web development tool comes with the web browsers as add-ons. All web browsers have built in tools for this purpose.

These tools allow the web developer to use HTML, CSS and JavaScript etc.. These are accessed by hovering over an item on a web page and selecting the “Inspect Element” from the context menu.

Features

Given below are the regular characteristics that every web development tool displays:

- **Web Page Assests, Resources, and Network Information**
 - development tools likewise help to review the resources that are stacked and accessible on the web page.
- **HTML AND DOM**
 - HTML and DOM viewer enables you to comprehend the DOM as it was rendered. It additionally enables rolling out improvements to HTML and DOM and seeing the progressions reflected in the page after the change is made.
- **PROFIING AND AUDITING**
 - **Profiling** alludes to get data about the execution of a web page or web application and Auditing gives developers proposals,
 - subsequent to investigating a page, for enhancements to diminish page load time and enhancing responsiveness.

For being a fruitful web developer, one ought to hold the accompanying abilities:

- Understanding of client and server side scripting.
- Testing cross browser inconsistencies.
- Creating, editing and modifying patterns for a CMS or web development background.
- Testing for consistence to determined measures, for example, availability standards in the client region.
- Programming coordinated effort with java Script, PHP, and JQuery and so on.
- Conducting observational user testing.

Website Publishing

Website publishing is the process of uploading files or content on the internet. It includes:

- Uploading files.
- Updating web pages.
- Posting blogs.

Website is published by uploading files on the remote server which is provided by the hosting company.

Prerequisites for Website Publishing

In order to publish your site, you need the following things:

- Web development software
- Internet Connection
- Web Server
- **Web development software**
 - It is used for building web pages for your web site. Dreamweaver and WordPress are example of web development software.
- **Internet Connection**
 - Internet connection is required to connect to a remotely located web server.
- **Web Server**
 - Web server is the actual location where your website resides on. A web server may host single or multiple sites depending on what hosting service you have paid for.

Website URL Registration

A domain name is the part of your Internet address that comes after "**www**". For example, in **www.google.com** the domain name is **google.com**. A domain name becomes your Business Address so care should be taken to select a domain name. Your domain name should be easy to remember and easy

Domain Extensions

The final letter at end of internet address is known as top level domain names. They are called top level because they are read from right to left, and the part after the dot is the highest in a hierarchy. The table shows the Generic Top-Level Domain names:

Domain	Meaning
.com	Commercial Business
.edu	Education
.gov	Government agency
.int	International Entity
.mil	Military
.net	Networking organization
.org	Non-profit organization

Registering a Domain Name is very simple. You can take following step to get your desired domain name registered:

Think of a name that justifies your business need. To find out the available names you can enter a name at commercial domain name registrar such as GoDaddy.

If the domain name entered by you is available, then select that particular domain name. Now it will ask you for other additional services such as Email inbox, hosting etc. that host also provides. You may choose what's best for you.

Now they will ask you for your personal information which is stored in WHOIS database.

It will then ask for payment information. Pay for the purchase you have made. Make sure you enter the correct payment information.

Once you are done with all above steps, you are ready to use their tools to upload your stuff to your site.

S.N.	Domain Name Registrar
1	Address Creation, LLC
2	Addressonthe web, LLC
3	101domains, INC
4	Atomicdomainnames, LLC
5	BigRock Solutions Ltd
6	Black Ice Domain, Inc
7	Block Host LLC
8	Domain Monkeys, LLC
9	Domain Mantra, Inc.
10	Domain Name, Inc.
11	Dot Holding Inc.
12	Dot Media Ltd
13	Extend Names, Inc.
14	Extremely Wild
15	Fast Domain Inc.
16	Google Inc

Domain Name Registrar

There are a number of domain name registrars available in the market.

The above table contains some of popular domain name registrars:

Website Hosting

Web hosting refers to a service that provides space for the storage of web pages that too online. Through World Wide Web these web pages are made accessible to the user. The organizations that offer the service of web hosting are called as Web Hosts. These servers of the web hosting website 24*7 remain switched on. The organizations or the web hosting companies run these servers. Each and every server is demarcated with a specific IP Address. As the IP addresses are not easy to memorize thus, so the domain name of the server is pointed to the IP address of the server by the webmaster.

Why do we need a web hosting company?

We need a web hosting company because to provide web hosting on your local computer is very difficult, if we want to do web hosting in the local computer the PC have to be leave upon for 24 hours. Practically this is not possible and will be very expensive as well.

Types of Hosting

The accompanying table portrays distinctive sorts of web hosting that can be benefited according to the need:

S.N.	Hosting Description
1	Shared Hosting Shared hosting, means many number of websites are put on the same server by the hosting company. Every client is allocated with their own web space and a specified limit of bandwidth. A same kind of physical memory is shared by nearly each and all websites, e.g.: MYSQL server and Apache server. If on the server one website experiences high traffic load it may affect the performance of all websites present on the server.
2	Virtual Private Server VPS Virtual Dedicated Server is the other name of VPS. This server is further fractioned into smaller servers. Here the client is provided with an own space of partition, which is installed with its own operating system. Dissimilar to shared hosting, VPS doesn't share memory or processor time apart from this it assigns certain amount of memory and CPU to utilize which implies that any issue on a VPS partition n a similar drive won't influence different VPS clients.
3	Dedicated Server In this sort of hosting, single dedicated server is setup for only one client. It is normally utilized by the organizations who require the power, control and security that is offered by a dedicated server.
4	Reseller Hosting A reseller goes about as a centre man and offers hosting space of another person's server.
5	Grid Hosting Rather than using one server, Grid Hosting spreads assets over countless servers. It is very steady and adaptable. The servers can be included or detracted from the network without smashing the framework.

Web Hosting Companies

Following are the several companies offering web hosting service

S.N.	Hosting Company
1	Go Daddy
2	Host Gator
3	Laughing Squid
4	just Host
5	liquid Web
6	Hivelocity
7	Wired Tree
8	Media TempleServInt

9	Big Rock
10	Wild West Domains
11	WIPL
12	Blue Host
13	Wix

Unit summary

The full name of HTML is Hyper Text Markup Language. It instructs web browser how to display web page on screen

The basic structure of the HTML document is divided into two sections namely, the head and the body.

- A container tag has both the start and the end tag.
- Empty tag is a solo tag. No different tag is used for closing.
- These are two main parts of a HTML document - Head and Body.
- The Head Section is written between <HEAD> and </HEAD> tags.
- The Body section is written between <BODY> and </BODY> tags.
- Heading tag is used to display the heading or the main topic on the web page. This tag varies from H1 to H6.
- A paragraph can be written on the web document using the <p> tag.
- Bold, Italic and Underline are those tags that help in changing the style of the font.
- Lists provide the information in a structured and easy to read format. There are three types of lists : OL,UL & DL.
- UL tag classifies the data items that have equal importance i.e. none of the data items are ranked. They are identified by a symbol. It may be a □ square, a ○ circle or a ● disc.
- OL tag classifies the data items that do not have equal importance. The data items in a list are represented using numbers, the roman letter or alphabets. The default symbol is number.
- An <a> (anchor) tag is used to create a hyperlink in a webpage. An anchor element consists of three parts : (1) href (mandatory),
- The SRC attribute is used in IMG tag to insert an Image in a webpage.
- An e-mail link can be created in a web page using mailto: attribute.
- Before deciding about the server we should register the domain name.
- The needs of viewers should be kept in mind while designing a website.
- You can establish your own server or can hire a space for it from any company or organization.
- After designing all pages they are tested off line.
- Site is uploaded with the help of FTP (File Transfer Protocol).
- After successful uploading, site is tested online.
- First page of a site is the home page; all other pages of site are linked with home page.

Assignment

1.
 - a. Create four web pages at under.
 - b. Save these pages as home.html, page I .html, page2.html, page3 .html
 - c. Show three links on homepage
 - d. Connect the link of remaining 3 pages with homepage
2.
 - a. Create two different images on a webpage.
 - b. Right Align the first image and Top Align the second image.
 - c. Set the width and height of the images with the help of width & Height attributes.
 - d. Save the document as "img.html" and view the output.
3. Create a website for Travel & Tourism Company, which should include 3 to 4 web pages.

Assessment

1. Fill in the blanks
 - a) _____ types of tag are used in HTML.
 - b) Opening and closing tags are used in _____ .
 - c) There is no closing tag is _____ tag.
 - d) The text editor named _____ .is used for creating HTML document.
 - e) _____ list represents numbers.
 - f) Tables store the information and are made of rows and _____.
 - g) _____ is used to write the heading of a table.
 - h) _____ extension is used to save HTML document.
2. Answer the followings
 - a) What are Head tags?
 - b) Write types of tags used is HTML
 - c) Write names of various attributes of Font.
 - d) For what purpose marquee tag is used?
 - e) Distinguish between container and Empty tag.
 - f) Write structure of a HTML document. Explain meaning of <HEAD> and <BODY> tags used in it.
 - g) Distinguish between ordered list and unordered list.
 - h) What is SRC attribute?

Resources

- www.google.com
- www.wpdfd.com
- www.w3.org
- www.webstandards.org/
- <http://caes2.caes.uga.edu/unit/occs/resources/multimedia/record.html>

- <http://www.garyolsen.com/GoClarke/Videoaudio/>
- <https://citsf221.community.uaf.edu/category/assignments/>
- http://www.tutorialspoint.com/html/html_tutorial.pdf
- <https://en.wikipedia.org/wiki/U-matic>
- <http://thevideosolution.com/blog/109-the-5-stages-of->
- <https://citsf221.community.uaf.edu/category/assignments/>
- http://www.tutorialspoint.com/internet_technologies/internet_quick_guide.htm
- <https://www.scribd.com/document/318441078/It-sivapadidapu-PDF>
- <http://www.daniellee.biz/define.php?E=Web-Publishing>
- http://www.tutorialspoint.com/html/html_tutorial.pdf
- <https://archive.org/about/>
- <https://webdesigntutorialz.blogspot.in/2017/12/javascript-html.html>
- <https://smallbusiness.yahoo.com/>

Block –V:
Media Management and Marketing

Unit-1 Ownership of Media

Introduction

Like any business houses, media companies too are keen to make profit. That helps them to sustain and survive as an industry. They often commission their work or outsource, plan programmes or sponsor and also decide on the content of their newspaper or magazine. These media companies sometimes refrain from presenting extreme opinions by playing safe, excluding anything that might upset readers or viewers. This border-line technique helps avoid a probable loss of revenue and readership.

Outcomes

Upon completion of this unit you will be able to:

- Describe the concept of Ownership pattern
- Understand the political and economic scenario around the world
- Evaluate the trends and patterns in ownership
- Understand the relationship between ownership and control over media

Terminology

Ownership	A kind of proprietorship;
Communist	Supporting or believing the concept of communism;
Conglomerate	A large corporation formed by the merging of separate and diverse firms or factories or companies.

The pluralist theory of media ownership

Media content is primarily shaped by consumer demand in the marketplace, so pluralists reason out that media owners are responsible for their ways of handling information. They therefore only give the public what they want. They can manipulate the masses. Due to this reason, a system of checks and balances is required for which editors, journalists and broadcasters are expected to have impregnable set of professional ethics. Let us study some characteristics of media as pointed out in the Pluralist theory:

Mass media acts as a catalyst towards proper functioning of democracy. Electorates get most of their knowledge about political campaigns from newspapers and television shows. They entrust the publishers, editors and journalists with the news.

Consumers of the news content have the genuine power as they can exercise the right to buy or not to buy the news-content, i.e. buying the newspapers or magazines to read them or to prefer a news channel over another. If audience do not like what a media house has to provide, they might refrain from buying the media product. The media, therefore, mostly supplies what the audience wants rather than what a media house owner always decides.

At times a section of the media may support certain viewpoints or ideologies, but that does not necessarily mean that the particular opinion is a media bias. It only reflects what the audience wants or the views that are important. Sometimes in the grand scheme of things, it appropriates the duty of being a watchdog of the society.

Concentration of media ownership is not always scary or political in nature. It is rather rational. It focuses to keep costs of production (publication or broadcasting) low and also to increase the profits. Globalisation demands to tap new audiences across the shores. Media owners are under scrutiny of a state. Their power has reasonable limitations e.g. in some societies, owners are not allowed to own different types of media. There are countries which have barred cross ownership, thus preventing people from running more than one type of media. For example, Britain exercises legal control on television, newspapers and radio by the Press Council and the Office for Communications.

Theories of media ownership and control

Doyle (2002) suggests that examination of ownership and control pattern is important for two reasons; first it helps to understand various opinions across the table in a democracy. And free media will thrive as it will keep the abuses of power and influence by elites under check.

Factors that affect the nature of media ownership

To acknowledge the factors that affect the nature of media ownership, let us first understand about the normative theories of mass media (1956). Each theory is connected with the kind of political system in which the society has to conduct its socio-economic political affairs.

In 1980s, Dennis Mc Quail added two more theories to the existing set of four theories by Sibert et al.

- Authoritarian Theory
- Free press theory
- Social responsibility theory
- Communist media theory
- Development communication theory
- Democratic participant media theory

Now, we will understand the theories in details, these will help us understand what affects the ownership patterns of media conglomerates in different countries in a better way.

Authoritarian Theory- Here the press is under the state power or ruling class. The chief function is to propagate what the owner wants to establish and sustain his rule. The message disseminated to the audience is suitable according to the owner; other opinions can barely reach the people at large.

Free press theory- It is otherwise known as the “Libertarian theory”. Here the press is owned by both private and public organisation. The major function is to let many voices and views

find their ways for public consumption. The fundamental rights of each and every citizen are safeguarded.

Social responsibility theory- It started around the mid-20th century. The developing and underdeveloped countries started to rely on social responsibility theory. Though this model was formally designed by Siebert, Peterson and Schramm in 1956 in their book, this theory is relatively a new concept. This theory first came up in Europe and then it tabled for the Freedom of Press in United States in 1949. Social responsibility theory encourages total freedom to press and dictates no censorship. Yet it is kept under as incidental remark for social responsibilities and external controls. Contents are also filtered through public interference.

The government does not own the press. Press is supposed to be privately owned. These owners should publish responsibly following the standard guidelines.

It helps democracy prosper as it does not encourage authoritarianism or communism. The chief function is to be pluralist so that all national voices, views and interests find ways for accurate expression. Alternative views get equal regards and thus society as a whole benefits.

The Communist media theory- It is also known as Soviet media theory. Russian media was reorganised around this theory. This theory is derived from the basic tenets of Marx and Engels. The media as per this theory are not subject to arbitrary interferences as in case of authoritarian theory. The chief functions are to safeguard and propagate the interests of the proletariat. The society moves in one direction to achieve certain set of values.

Development communication theory- As per this theory, the state is usually the owner of the press. Major functions are to support the policies of development by the government. The limited resources are better utilised for nation building. The freedom of press and the freedom of journalists are curbed to an extent.

Democratic participant media theory- Here the press is owned by the state and private organisation. There is multiplicity of media communication at all levels. It encourages small scale operation of media. People may have a better chance to interact more and on relevant issues. The theorists can substantiate how this theory may weaken the national fabric.

Types of media ownership

There are four major types of ownership of mass media. Chain, cross media, conglomerate and vertical integration. These types of media ownership can be described as follows:

Types of media ownership

1- Chain Ownership

In chain ownership, one company can hold numerous media outlets under a single unit. It might be a chain of newspaper publishing house, radio stations, a string of television broadcasting units or book publishing companies. In India, chain ownership can be mostly seen in newspaper business. Publishing houses like The Hindu, Times of India, Hindustan Times, Indian Express, Statesman, Ananda Bazar Patrika, The Telegraph and Living Media Foundation have chain ownership.

2- Cross Media Ownership

When a single company owns several media houses such as newspapers, magazines, radio stations, musical labels and publishing houses among others is a clear model of cross media ownership. Cross-media ownership across television, radio or print, includes vertical integration of media companies. Vertical integration carries content or distributes it within a media segment.

3- Conglomerate Ownership

Simultaneously owning of several business operations is the conglomerate ownership. This may also include media business. For example, when a publishing company owns a newspaper, fertilizer, textile or plastic factories, it may imply that it has controlling shares in media related business; this pattern of ownership is conglomerate. The dictatorships are interwoven in a conglomerate that implies one individual can be director of a media group, a logistics or a financial corporation.

Owners and CEOs of corporations and industries are directing everything other than what they originally started with. They are running newspaper, television or film production companies these days. Where the primary concern is to run an industry on high profit, sometimes they tend to run a media house for prestige or just to exercise influence on social and political circles.

4- Horizontal and vertical integration

Vertical integration means a media company playing absolute monopoly in the production of content in making of media products. If a newspaper publisher owns a patch of forest land which produces a major component for the publishing business i.e. source for the print from the wood or a factory that produces the bulk of the printing ink. Economic control over all aspects of production process can prove an ideal aspect for media businesses. These companies may be industrial units or film producers with a chain of theatres where the films are exhibited or even they own studios. Vertical integration implies that a film corporation makes movies and may distribute them to their own cinema chains.

These trends of ownership, i.e. cross media, conglomerate and vertical integration are what seems to be unhealthy for a developing society. As this promotes the practice of monopoly and thus result in the phenomenon of suppression. Not only the freedom of media is compromised, it sheds doubts on the unbiased representation of various points of view. Ownership of the mass media is a complex process. Let us understand this through some examples. Some companies are characterized by cross media ownership.

Marxist critique of media ownership and control

The capitalist economic system of Britain is characterized by Marxists as the breeding ground of inequalities in wealth and income. They argue that this inequality stems from exploitation of the working classes. Marxists believe that in order to make this system persist i.e. breeding inequality, as the capitalists use their cultural supremacy to dominate institutions of education and mass media, thereby transmitting the ideology of the ruling class. These institutes further socialises the working class into accepting the concept of the capitalist

system and capitalist ideas. When the children and teenagers learn from books that subtly promote the capitalist culture and adults read news articles, blogs and come under regular and consistent capitalist environment, they tend to accept it with ease. Capitalist system easily breeds in individuals and also their surroundings. Consequently, for Marxists, working class experiences a false class-consciousness – they come to accept that capitalism is just a system that benefits all social groups equally. And thus they do not see their situation as exploitation at the hands of a selected few, i.e. a powerful minority.

The media and ideology

The capitalist system of approach in an economy is rarely challenged. Marxists opine that media owners shape and build the content which can be widely accepted and conformist views are heard and propagated further. Miliband (1973) argues that the role of the media is to shape how we look at the world and suggests that audiences are kept aloof about important issues such as inequalities in wealth or the reason why poverty persists.

Governments no longer control media owners because they need the support to either gain power or hang onto it, suggests Tunstall and Palmer (1991).

Ideological nature of ownership and control

Marxists feel that media owners, wealth holders and the political elite are hand-in-hand and ideologically sail in one boat. The common intent behind this convenient arrangement is to brainwash the commoners. However, this theory lacks empirical evidence in support of its hypothesis. Though Sociologists' usually have anecdotal evidence against concentration of media ownership that is damaging to the society.

However, Curran (2003) examines the social history of the British press in detail, gathering proof of interference of media conglomerates in British newspapers content. During 1920–50, press barons took pride in running publishing houses to exercise their power at propaganda in support of political ideology. Even when the newspapers were engaged in investigative reporting, the majority of newspapers in Britain have supported the Conservative Party.

Curran also notes that the period 1974–92 saw the emergence of Rupert Murdoch. However, Curran rejects the idea that Murdoch is part of unified capitalist elite but acknowledges that Murdoch's newspapers are conservative in content and strongly supportive of capitalist interests. He felt Murdoch's motives were economic in nature rather than being ideological, Murdoch believed right wing economic policies to be the key to enormous profits.

Curran's analysis suggests that both pluralist and Marxist theories may be mistaken in the way they look at media ownership of the British newspapers. The pluralist view that media owners do not intervene in media content has proven to be false evidentially. Since 2000 there has been even greater intervention by owners such as Murdoch. However, Curran does not buy the motives as suggested by Marxists. The media does not act uniformly; rather they pursue their bigger market shares.

Diversification, synergy and technological convergence

Some media corporations are not content to focus on media products alone and they diversified into other fields. When a company spreads its' wings we can say it diversifies. 'Virgin' which began as a music label and record shop chain, expanded into a wide range of products and services including cola, vodka, banking, insurance, transport, digital television, cinema and wedding dresses. This accounts to diversification.

Media companies often use their diverse interests to package their products in several ways, e.g. a film is often accompanied by a soundtrack album, computer game, mobile ringtone or toy action figures. A company may use its global interests to market one of its own films through its television channels, magazines and newspapers in dozens of countries at the same time.

Companies that normally work in quite separate media technology fields are converging in order to give customers access to a greater range of media services across technologies such as interactive television, lap-tops, MP3 players and mobile phones. Technological convergence is a recent trend which involves putting several technologies into one media product.

Global Trends in ownership and control

Trends in media ownership suggest that the number of companies controlling global mass media have shrunk to a significant number in recent years. Bagdikian (2004) notes that in 1983, around 50 corporations controlled the vast majority of all news media in the USA, that somehow receded to just seven by 2004.

Curran (2003) notes, that the ownership of British newspapers has always been concentrated in the hands of a few powerful 'press barons', e.g. in 1937 only four men owned nearly one in every two national and local daily newspapers sold in Britain.

British national daily and Sunday newspapers are owned by seven powerful individuals who dominate the ownership even today.

Newspaper Ownership in India

The Indian media differs from those of developed countries in several ways. India being a developing country and in its uniqueness, all segments of the media industry (including print and radio) have much to see in terms of growth. The media in India remains fragmented, due to the presence of many vernacular languages and the size of the country.

The Ownership Pattern of Newspaper in India

There are many media organizations in India that are owned and controlled by entities like corporate bodies, societies and trusts, other than individuals.

- Media organisations and outlets often conceal the dominance of market interests, control of specific markets and market segments by a few players – in other words there are a few key players who control the market segment.

- Media outlets are used by promoters and controllers as they have traditionally held interests in many other business interests.
- As corporatization scales up in Indian media, it has deepened its root. Large industrial conglomerates are acquiring direct and indirect interest in media groups. The line between creators/producers of media content and those who distribute/disseminate the content is slowly receding. This has opened the doors for convergence of media.
- When there are no limitations to cross-media ownership, it only leads to certain companies or groups or conglomerates to dominate markets both vertically and horizontally (that is, across different media such as print, radio, television and the internet).
- Political interests or individuals with political affiliation exercise control over increasing sections of the media in many countries.

Unit summary

In this unit, you learned the ownership, types of ownership and its impact on media. Besides that, you have learnt, how the global trends in ownership have affected the media world and how it put its impact on media.

Assessment

- What are media companies?
- What is media ownership & what are the factors that affect its nature?
- What are the types of media ownership?
- What is Marxist take on media ownership?
- Why is it necessary for media companies to diversify?
- What is the scenario of newspaper ownership in India?

Resources

- McQuail, Denis, 'McQuail's Mass Communication Theory', SAGE Publications Ltd., London, 2005.
- Shoemaker, Pamela J., 'Mediating the Message: Theories of Influences on Mass Media Content', Longman, University of Michigan, 1996.
- www.osou.ac.in

Unit 2 Media as Business

Introduction

The manufacturing oriented business focuses on production and tries to sell products. The customer oriented business focuses on the need of the customer and produces accordingly being aware of the marketability of the services or product sold.

Outcomes

Upon completion of this unit you will be able to:

- Describe the growth of media as a business;
- Learn few media based business model plans and their distinctive features; and
- Evaluate the product selling path for media based industries.

Terminology

Industrialisation	The growth of industries in a country
Personalisation	Customising a product or service accommodate specific individual to
Advertising	The profession of producing and advertisements

The basic concept of business and marketing is to reach out to the customers with the product he might be interested in. Mass manufacturing is an important aspect of this concept. Historically, the concept of marketing either implicitly or explicitly was not in existence. When goods were barely produced by machineries, people were dependent on agricultural production, domestic animals and understood barter system. However the growth of civilization and discovery of sea routes in search of newer lands and markets followed by the machine era change this scenario. The discovery of new lands by sailors made people aware of new products and things. After using these products, they developed special interest in these products and the demand rose.

However with the machines becoming sophisticated, production went up and there was surplus of goods. The basic problem shifted from that of production to distribution. Hence the business developed a new channel of distribution to reach-out the people with their goods. This happened during the period of early 20th century. It was the era of distribution.

Due to mass production, mass distribution took place. And the problem slowly shifted to convince people to buy products, i.e. to create a market. This problem aroused as more and more products started flooding the market due to heavy production. But the distribution mechanism was non-existent and the onus was to convince people to buy a product. Thus, the world entered the era of selling. Here, demand was created. To augment this, the producers also resorted to advertising.

By the middle of the 20th century, when mass production and mass selling were in place, the consumers were the centre of attraction. Buyers like market evolved and became start as they

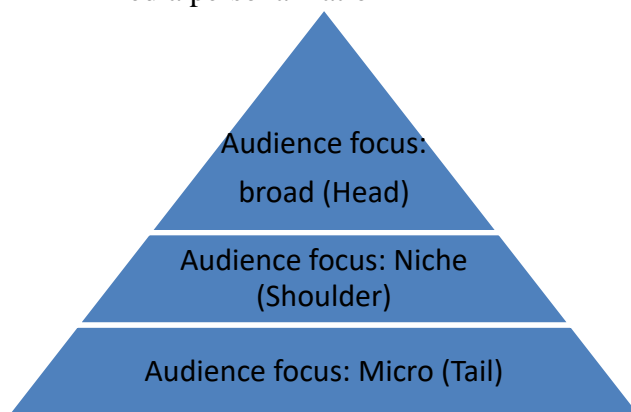
started to weigh their choices and were asking for goods of their choice and not what the manufacturer wanted to sell. This created “marketers” and slowly led the path for manufacturers to reach their target market with their products.

With the advent of marketing, media too grew by multifold. Media is the carrier of advertising and communicating the target market. When industrialisation and modernisation spread all across the globe the media industry also grew, and thus many other businesses came under the umbrella of media business which was traditionally, press, then radio and then TV broadcasting.

Peter Drucker, author of ‘The Practice of Management,’ considered as the father of modern Management suggested business purpose is to “create customer.”

Let us first understand the distinctive features of four elements of the media business model framework. They are as follows:-

- Scaling of business models
- Value in content production and distribution
- Value of advertising
- Media personalization



Scaling of Business Models

In order to understand the complete spectrum of media at different scales, you can refer to the above figure. Mass media at the top represents “head,” at the medium level, professional publishing house works as the “shoulder,” holding the head at the place and maintaining a channel with the “tail” i.e. micro-media outlets with their small audiences. Approaches to scale up business have not left even the media industries out of race. Media houses have tried their hand in a variety of business models and this has been characterized as their approaches to scale businesses. The characteristics that differ include:

- Audience focus- Mass media by nature accesses broad base of audiences. Somehow the tail breaks the stereotype and is highly selective of its audience, thus cherry picking and providing its services to a niche audience classified according to their geographical location or interest.
- Advertising models- Different models are followed by the media businesses as per their interest. At various levels of the scale, dedicated, aggregated or combined advertising

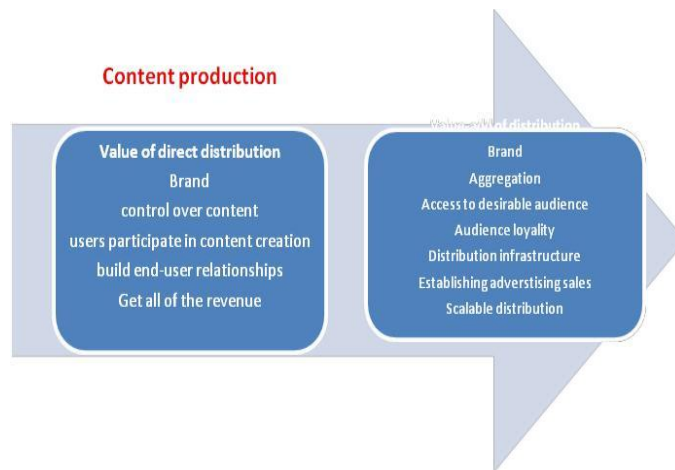
sales models are appropriate. Different shares of total advertising revenue are associated with these models.

- **Cost of content creation-** The cost of creating media products goes through its fair share of challenges like any other business. Thus content creation becomes an expensive process. There is a gradual reduction in the cost of production but retention of the premium placed on creative work keeps it tilted towards the higher side. However production costs for most other forms of content have been low, the kind of content that is sourced from agencies (news agencies or stringers). This is primarily due to outsourcing of labor rather than technological inputs costs, which can be low due to lifestyle advantages for content creators.

This framework does not justify any right and wrong, this trend in the media industry has been shaped over time. The sequential order thus becomes logical or generic after a prolonged duration. This means nothing is more or less advantageous than each other. It only denotes that the advertising or other revenue models and content creation mechanisms need to be aligned with the audience base, i.e. specific content for specific audience i.e. catering to the target audience. As the other frameworks show, attracting niche audiences can result in stronger revenue relative to costs. A “multi-niche” model which when effectively monetized can be of more use than traditional mass media approaches, as it allows sharing of overheads among other units or departments within a media house. Managing the scaling costs and overheads by extraction of premium revenue is a viable strategy. It is as important as the traditional approach for revenue generation, i.e. focusing on increasing the audience size.

Value in Content Production and Distribution

The cost of content production has dramatically fallen due to the trend of outsourcing the creation of content. Content distribution has led to the receding of digital channels. This means that content creators like film producers, writers and researchers can readily distribute their content directly to their audience, if they prefer it that way. Many content producers these days are into direct distribution. They exercise a control over content distribution by building end-user relationships. Thus they skip the middle-men or channels that help them in distribution by reaching out to their target audience. This is advantageous in ways as they do not have to share their revenue. And when user-generated content grows as a factor, users are engaged directly in the content creation process.

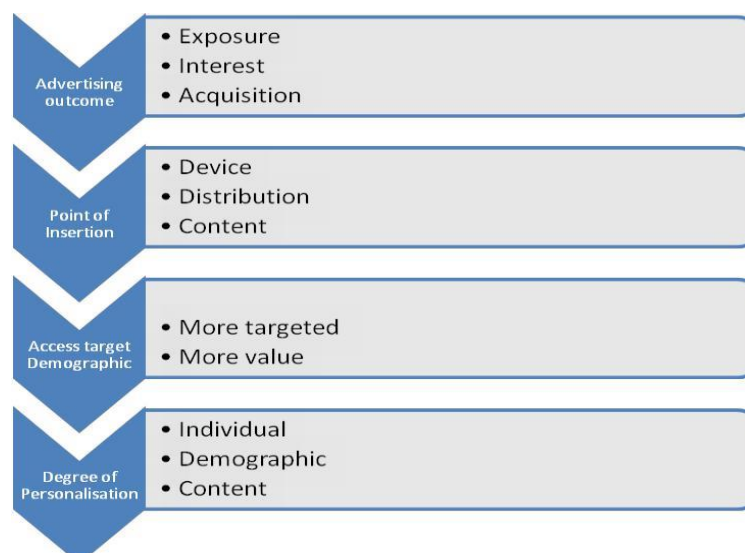


These trends however cannot rule out the importance of the key players who have always been primarily an integral part of the distribution process. Distributors such as broadcasters, publishers and agents will continue to play an important role in the media landscape, as long as they can effectively establish their importance. This is shown in the ways by value-addition, which includes branding, aggregation, scalable infrastructure and by attracting desirable audience and retaining the old ones.

Value creation in content production and distribution continues to evolve. It helps content producers and distributors to take strategic decisions and weigh their choices in the process. E.g. it helps them choose their work and business partners, who will contribute to their revenue or investments and even future expansions.

Value of Advertising

Paid content is visibly irreplaceable; it is in demand through subscriptions, pay-per-view and other mechanisms. This is however a trend shaped up by consumer demands and is supported by advertisers as it catches the broad outlook of target audience (cause it aligns with the world view, beliefs and humour of the audience). This is becoming more prominent, due to the visible differentiation in the value and pricing of advertising. The increase in sponsors or advertisers for a media house is largely dependent on its circulation or audience size. This drives the advertisers towards a media house. Other than this traditional way of preferring one media house over the other, an advertiser may look into four additional keys to opt for a certain channel of media. As the ability to refine these factors increases, substantial revenues



will become possible, even from a relatively smaller target audience.

Let us discuss the key factors that drive or slate the value of advertising.

The outcome of advertising- The original concept of advertising made audience more aware to the hidden messages underlying it. It exposed audience to the raw thought of being manipulated or influenced to take buying decisions. However this barely proves detrimental to reach out to the consumers who are direct consumers or have potential to be one. The active consumers still take their buying decisions based on the generic advertising they come across.

Access demographic targets- Accessing generic demographics that are highly desirable are usually the low hanging fruits for advertising pundits. E.g. the portrayal of positive image of a CEO brings credibility to a company or the products the company produces. It contributes to the goodwill of the company as well as improves its brand value. However some advertisers are looking to access very specific profiles to lure the target market. As it becomes possible to target a niche, the value of advertising increases and proves beneficial to the company.

Point of insertion- Advertisements were cleverly placed or inserted in distribution channels, i.e. in newspapers or between TV programs. Gradually this process evolved and multiple approaches of planting advertisements emerged, including the end-user device, such as the mobile phone or inside content itself, as in for example product placement.

Personalization- Personalization adds the most to the advertisement value, as it wraps up an ad (to be screened or to be published) in a detailed manner. Personalization has impact value as it works on framing customized and detailed advertisement content for the target market.

Media Personalization

There are multiple requirements for this process. It includes compilation of data, i.e. gathering statistics about audience. It also gathers data regarding the content serving platforms (channels or media) that allow content and ads to be altered on the fly. Here the same product can be packaged or presented differently to different demographics of consumers. This leads to personalization of contents on media platforms. There are four types of personalization in terms of its media content and advertising. They are as follows.

No categorization- Most ad contents are untouched. They are immune against micro-classifications. As it is difficult for that product in the segment to personalize the ad content. It is not feasible to personalize content on mass distribution channels of television and newspapers.

Content-Personalization is possible by being associated with audience-specific content. If the ad pundits streamline by picking up specific genre of magazines (e.g. automobiles, IT,

fashion, culture, trade, stock market specific magazines or channels) or targeted cable TV channels, attract a target audience. This helps equipping personalized ad content.

Demographic- Advertising and content can be personalized for a particular demographic area by sub-categorizing demography as per gender, age or location. After assessment of viewers profile, via. data gathered by cookies or Internet Protocol addresses or polls.

Customization for individuals-This process requires access to audience profiles mostly the identification of an individual. This type of data extraction is generated through a registration process, online and mobile content delivery or interactive TV channels that enable individual personalization. These days, social networking sites or search engines ask users if they are not happy or interested in the ad they see appearing on their page, this helps in providing for personalized ads.

Media Personalisation (Figure)

Value of advertising

Degree of Personalisation

NIL	Content	Demographic	Individual
Requirements : None	Requirements: Targeted content	Requirements: Content serving Platform Demographic data (e.g. IP Address)	Requirement s: Audience profiling Audience identification Registration
<ul style="list-style-type: none"> • Broadcast TV Metropolitan • Newspapers • Radio • Cable TV • Trade specialist magazines • Podcasts • Internet • Interactive • TV/IPTV • Mobile Delivery 			

Evolution of Media industry

As the media industry evolves, the business model becomes the message. Business plans like magazine publishing, advertising agency, photography, publisher and other media communications businesses can be counted as some of the branches accounted under media. Media slowly evolved as a business, what started as a medium of communication, needed funds to keep running and thus the revenue started flowing through circulation money and advertisement. These processes took time and slowly advertising units, PR units started

flourishing. Now brand and image management is added as a new branch of media. Here are some businesses which entered the market as media businesses:-

- Newsagent - Newsstand Business Plan
- People's News
- Magazine Publisher Business
- Wi-Fi Kiosks Business
- Newsletter Publishing Business
- Video Television Production Business
- Wireless DataCommunication Business
- Integrated Communications Business
- Online Booking Business
- Music Recording Producer Business
- Data Recovery Services Business
- Magazine Journalist Business
- Display Case Marketing Business
- Video Production Business

Unit summary

In this unit you learned about ownership, types of ownership and its impact on media. Besides that you have learnt, how the global trends in ownership have affected the media world and its impact on media.

Assignment

- What do you understand by scaling of business models? Describe.
- Why is content production and distribution important?
- What drives the value of advertising?
- What is media personalization?
- Discuss the evolution of media industry.
- Name the various businesses that entered the media business market.

Resources

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- Agarwala, VirBala., Gupta, VS., 'Media Policy and Nation Building selected issues and themes', Concept Publishing Company, New Delhi, 1996.

Unit 3 Media Economics

Introduction

This unit provides an overview of the main features of media economics and a typical system of regulation (governance). Both show distinctive features compared with other sectors. The difference in both cases is the dual character of media, i.e. being a commercial entity and being an important element of political, cultural and social life of society. They cannot be left free in the market or be closely regulated. Neither media forms nor governments have a free hand to imply policies.

Mass media can be regulated by governments in indirect ways. The forms of governance in different countries are extremely varied. Different regulations are applied to different forms of distribution. The history and political culture of each society shape the governments that they are today.

Outcomes

Upon completion of this unit you will be able to:

- Learn about the media structure and its various economic scenarios;
- Discover the media ownership and its effects on media market;
- Know about the features of media economics; and
- Elaborate the mass media governance's impact on mass media.

Terminology

Ownership: The kind of proprietorship

Governance: The action of ruling a state or organization

Policy: A strategy adopted by an institution or individual

Some economic principles of media structure

a) Different media markets and sources of income

According to Picard (1989:17), 'A market consists of sellers that provide the same good or service, or closely suitable goods or services, to the same group of consumers'. In general, the typography of a market place is set according to place, people and the kind of revenue and the nature of the product or service. Primarily, a division of revenue in media business is between the consumer market of media products and the advertising market. A service is sold to advertisers in the form of access to the audience in an advertising market. This feature of media economics relies on two different sources of revenue.

b) Implications: Advertising versus Consumer Revenue

The difference between the two main sources of revenue – direct product sales and advertising is an important tool for comparative analysis and for explaining media features

and trends. The distinction cuts across the difference between media types, although some media are rather unsuitable for advertising (especially the 'one off' media), while others can operate equally in both markets (especially television, radio newspapers, magazines and the internet) there are some 'advertising revenue only' media with no consumer revenue, for instance, free newspapers, promotional magazines and a few television channels.

Advertising based media are accessed according to the number and type of consumers (who they are, where they live) reached by particular messages (e.g. circulation, readership and reach/ratings). The market performance of media content that is paid for directly by consumer is assessed by the income received from sales and subscription to services. Ratings of (quantitative) satisfaction and popularity may be relevant to both markets, but they count for relatively more in the consumer income market. Performance in one market can affect the performance in another, where a medium operates in both. For instance, an increase in newspaper sales (producing more consumer revenue) can lead to higher advertising rates, provided that the increase does not lead to lower than an average level of socio-economic composition, with a reverse effect on unit advertising rates. It is also clear that the difference of revenue base can lead to different kinds of opportunity or vulnerability to wider economic circumstances. Media that are highly dependent on advertising are likely to be more sensitive to the negative impact of general economic downturns than media that sell (usually low-cost) products to individual consumers. The later may also be in a better position to cut costs in the face of fall in demand (but this depends on the cost structure of production).

The effects of Ownership

The publication decision is what matters the most for mass communication theory. Liberal theory assumes that ownership (administration and production) can be effectively separated from editorial decisions. Decisions pertaining to optimum use of resources and other business strategies are formulated by owners or board members. Editors and their teams are given chances to take professional decisions on content on which they have expertise. In some situations and countries, there are intermediary institutional arrangements (such as editorial statutes) designed to safeguard editorial policies and the freedom of journalists. Otherwise, professionalism, code of conduct, public reputation (since media are always in public eye) and common (business) sense are supposed to take care of the seeming problem of undue owner's influence.

However, the existence of checks and balances cannot completely make media operations secretive in their daily operation. Media units largely depend on in order to survive and this often involves taking decisions which directly influence content (such as cutting costs, closing down, shedding staff, investing or not and merging operations). Publicly owned media do not escape the cutting costs as well. Most private media have a vested interest in the capitalist system and are inclined to their political or economic interests alone.

Market Media Reach

The social composition or the heterogeneous nature of the audience is important as they show different statistics. Advertising favours a convergence of media tastes and consumption

patterns with less diversity and accordingly makes advertisements for the segment. This is because of homogenous audiences are often more cost-effective for advertisers than heterogeneous and dispersed markets, unless there are very large markets for mass products. This is the one reason as suggested by Bakker (2002), that the viability of the free newspaper that provides complete coverage of a particular area with relatively high homogeneity. However, occasionally there can be premium attracted by diversity, when a medium can accurately deliver to small but profitable niche markets. This is one of the potential of the internet and of other specialist (non-mass) channels.

It is important for some advertisers such as local traders to reach to a higher proportion of their potential customers. One result is that the newspapers with a dispersed set of readers are often at more risk economically than those with a locally concentrated circulation. This is partly because of higher distribution costs, but it also stems from the relative capacity to cover a particular market of consumers, especially the relevant so called 'retail trading zone'. The general effect is to reward media concentration, almost by definition, the more newspapers or other media which compete, the more dispersed their separate set of readers are likely to be.

Distinctive features of Media Economics

Let us understand some typical features of the economics of media which sets them apart from other kinds of business. First, we can say that the media is typically 'hybrid' or dynamic in character. They have to operate in a dual market, selling a product to consumers while selling a service to advertisers. They are also extremely diversified in terms of the type of product sold and the range of technologies and organisational means for distribution. Secondly, media cost structures are characterised by high labour intensives and high fixed costs.

Media shows high degree of uncertainty and also the uniqueness of the product they sell forth. Uncertainty refers to consumer evaluation (it is still difficult to predict audience taste for music, films or books, however much manipulation through publicity is tried). Despite standardisation, many media products can be easily differentiated on a day to day basis. It can rarely be repeatedly sold in exactly same form. The media has a tendency of concentration. This may happen because of the advantages of monopoly of advertising. The markets are so evident and perhaps because of the appeal of power and social prestige to the would-be media 'tycoons'. Many media businesses at least those which have distribution channels are unusually hard to enter without large capital resources, mainly because of high fixed costs and high launch costs. To start up a significant newspaper or a television channel one requires good investments to back it through initial business adversaries. The availability of niche markets is not conducive for "mass media". Finally, the media are different simply because they are affected by public interest, as suggested by Melody (1990). And thus, they are not just 'any other business', and tend to be burdened with a considerable responsibility.

Distinctive features of media economics

Media are hybrid in respect of markets, product and technology;

- Media have high fixed costs;
- It involves creativity and uncertainty;
- Products can be multiply used/recycled;
- Media tend naturally to concentration;
- Media business is difficult to enter; and
- Media are not just any other business, because of the public interest aspect.

Mass Media Governance

The manner in which the media are controlled in democratic societies reflects their business acumen, political stands and everyday social and cultural life and also their relative immunity to government regulations. Some controls, limitations and monitoring are necessary, but principles of freedom (of free speech and markets) require a cautious approach. It makes sense to use the term ‘governance’ in this context to describe overall set of laws, regulations, rules and conventions which controls general interest, including media industries. Despite the ‘bias against control’, there are potential forms of control on media.

Purposes and forms of governance

The many kinds of governance that apply to the media reflect the diversity of the purposes driving the reason as to why media needs to be regulated. Some of these interest areas include:-

- The protection of interests of the state and of public order, including the prevention of public harm;
- To safeguard individual rights and interests;
- Meeting the needs of media industry for a stable and supportive operating environment;
- Promotion of freedom and other communication and cultural values;
- Encouragement of technological innovation and economic enterprise;
- Setting technical and infrastructural standards;
- Meeting international obligations, including observance of human rights; and
- Encouraging media accountability.

It is clear that these goals call for a diverse set of mechanisms and procedures, limiting direct government action. The outline of four media frameworks (law, market, public responsibility and professionalism) has given an overview of the main alternatives available.

Governance applies at various levels. We can distinguish between the international, national, regional and local levels, according to the way a media operates.

Media regulation and self-regulation

Regulations are the checks and balances to systematically control any unit. In media industry, these are formal instructions about the structure or content. These include, control on monopoly ownership or even media cross-ownership. This may be also exercised by

regulating the amount of advertising on television (found in many European media systems); or the basic requirements to have an operating or receiving license for television or radio.

In many countries, media is free but in some countries the legal system has formal regulation for media. These regulations if formal in nature does not formulate communication policies like the laws that govern wireless, broadcasting, telephonic and other electronic communication.

Legal requirements that help to regulate the media include, prohibitions against libel and defamation, laws protecting privacy, laws concerning intellectual property rights, prohibitions against incitement to violence or racial hatred and pornography or obscenity are some of the most important and frequently abused rights. Sometimes the media in a bid to excel and compete among their counterparts, moves past its duties and might infringe basic rights of commoners. The justice system is fairly capable of protecting itself against media activities that might obstruct course of justice, e.g. the publication of information about an under trial case. In some countries, election times demands restraint and regulation in order to maintain fairness.

The kind of regulation required on a media depends upon their areas of their application (mentioned above). This typical mechanism for media regulation can be described in terms of greater to lesser formality accordingly. The three major aspects in putting a regulation into force can be summed up as:

- Whether or not it is established in law;
- Whether provisions carry enforceable penalties (financial or otherwise); and
- Whether it is permanent or temporary.

Generally informal mechanisms to regulate rely on agreement and compliance, which may be customary or voluntary in nature. And then there are peer pressures towards compliance aside from the law (e.g. from colleagues, industry clients, audience, advertisers, sources, etc).

Power determines the relative importance of compliance. Accordingly, the degree of formality keeps changing. Even when a state (the form of government) is the most powerful entity, clashes, intervention and disputes with media is usually avoided. There are also a specific set of laws to regulate the media (Media or Broadcasting Laws), other than the general laws of the country to which the media are also a subject. Apart from this certain administrative, technical and economic regulations affect the media. Supervisory and advisory bodies for the media also have power- e.g. the CSA (Conseil Supérieur de l'Audiovisuel) in France, Ofcom (Office of Communications) in the UK or the FCC (Federal Communications Commission) in the USA. Other than the above mentioned regulatory bodies, industry or public bodies exist to monitor standards of performance in specific areas like advertising, privacy, subsidy on press, voluntary codes of practice and ethics laid down by media organisations (self-regulation), pressure groups are among other self-regulatory bodies.

On ethical grounds self-regulation requires media to practice the virtue in monitoring ones' own conduct. The media organization is expected to follow high standards of ethics in

delivering their service while following the best professional standards of the media industry worldwide. Such formal rules lay down desirable goals, affirmative guidelines or principles, rather than a static and rigid set of goals. These policies are part of ‘self-policing’ measures either within the media organisation or by some intermediate body representing public and industry interests.

Self-regulation is more likely the press following the journalistic codes of practice for accuracy and fairness and earnestly implementing it. In broadcasting, guidelines for reporting on terrorism, riots or violence are some of the controversial issues media needs to exercise caution. Self-regulation also deals with privacy issues, the protection of sources (journalist’s informant) and standards in advertising.

A plethora of non-binding and informal regulations lead media which might be technical, legal and administrative in nature. These help in smooth operation of markets nationally and internationally which may include technical standards and copyright rules.

Media policy and policy making

Media policies vary from one country to the other. These policies are formulated to be applied to their own media systems. Communication policies are by large influenced by populist public opinions.

Media organise goals and plans in order to act upon it in times of handling crisis or some problematic issue (e.g. media concentration or transnational media flow). The process of ‘policing’ the communication channels faces the following problems:-

- Public versus private interests;
- Economic versus social or cultural interests; and
- International versus national or local interests.

Transnational (i.e. within nations), the national and the regional interests are driving factors of communication policies. UNESCO, the International Telecommunications Union (ITU), and the European Commission (EC), are major policy framers. While at the national level there are many interested clusters including many political bodies, labour unions and media industry interests who want their interests to be put forth while framing policies. At the local level, decisions about access (e.g. to a city cable system) is in the hands of local government as they have a lesser sample space to work on and can have their grounds covered due to this. Political and cultural bodies may also sponsor media provision for special needs. Policy making may get influenced for good or bad by any of the aforesaid drivers.

Policy-making on modes of communication can appeal to various interests or logic. “Logic,” here refers to the “perception of the situation and the structure of goals and means, in a given situation” (McQuail and Siune). Logic (of policy) can also be considered as a consistent rationale of thinking and action related to specific goals. The most relevant ones for media policy and regulation are as follows:-

- Political (based upon partisanship);
- Administrative (reflecting organisational efficiency);
- Commercial (refers to drawing profit);

- Industrial (related to broader national economic strategies);
- Cultural (depending on language, nation, ethnicity, community, gender); and
- Technical (operating efficiency and technology innovation).

These terms reflect the heterogeneous nature of issues that needs to be addressed on a regular basis, assuming responsibility to bear and carry forward plans as lay down by the policies.

Alternative mechanisms of media accountability and regulation

Accountability can be described as “all voluntary or involuntary processes by which the media answers directly or indirectly to their society for the quality and/or consequences of publication” (McQuail). Whom do people held accountable for holding up their interests in formulating policies or maintain the accuracy of checks and balances? Accountability is important as it covers a wide range. Accountability is based on standards and responsibilities.

Any regulation cannot be expected to maintain the check gates for everything at all the time. When media takes the accountability towards their audience or the society at large, there is less need for any sort of monitoring. However, checks to contain issues of content and effect, is often necessary because the media do not choose to be accountable. The two theories are brought under one umbrella as mechanisms and regulatory measures for taking responsibility and accountability tend to cross or overlap.

There are four kinds of accountability mechanism: one by the media market, which balances the demands and evaluates audience (and advertisers). In an open and competitive media market, the media should be rewarded for good conduct and content.

Another kind of this mechanism is also of an informal character and is pushed up by pressure groups and from populist public opinion. Even an opposition political party can be considered as a pressure group which can demand or drive public opinion.

The type of mechanism can be devised when media is formally expected certain (limited) standards or regulations.

In the fourth type, there are industries who expressed to self-regulate or practice true ethical standards of their profession. Here, accountability becomes a matter of ethical stand-point. As true accountability in this context generates from within or voluntarily but carried out according to standardized procedures. It does not usually lead to any material penalty.

Unit summary

In this unit you learned some economic principles of media structure, the effects of ownership, market media reach, distinctive features of media economics, mass media governance, purposes and forms of governance, media regulation and self-regulation, media policy and policy making and alternative mechanisms of media accountability and regulation.

Assessment

- What are the different media markets and the sources of their income?
- What do you understand by market media reach?
- Note down some distinctive features of media economics.

- Write a brief note on mass media governance.
- What are the purposes and forms of governance?

Resources

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Unit 4 Income sources of Different Media

Introduction

Corporations and industries reach out to their target audience through marketing. Advertising is an integral part of marketing. If customers are not aware of the products manufactured for them, they cannot buy them. If they are not aware of the substitutes of a category of one product, they will not be able to compare the prices and take a better economic decision according to their budget. As well as the manufacturers of product line up which has more such substitutes has to compete with the other company for the customers' attention.

So, we can say that the focus of marketing oriented departments is directed towards consumer satisfaction and maintenance of that level of satisfaction with that company for a longer time. The customers stay loyal as long as they are satisfied. These two prerequisites of marketing oriented organizations yield rich dividends in terms of profits for the organization.

An important aspect for successful marketing is to direct a successful ad campaign. You must have seen how advertisements with certain jingles and tag lines are creatively put in order to appeal the customers. It is the advertising that quantifies the efforts of marketing by reaching the targeted customers.

Let us understand how advertising is beneficial for an organization:

- It generates the appetite for the product amongst new consumers.
- It provides new reasons to the potential customers to buy a certain product.
- It is an integral element of the marketing process like sales, distribution, promotion and product development.

Outcomes

Upon completion of this unit you will be able to:

- Understand the various ways to making money from media organization
- Discover the role of advertising industry in media sector
- Able to understand the basics of media selling
- Elaborate the ways to manage media organization

Terminology

Organisation: A group of people with a specific purpose

Circulation: The act of circulating

Subscription: Receiving a publication regularly by paying in advance.

The role of Media in boosting Advertising

The reach of media is substantial. When people talk about the media, they are referring to the distributors of news and entertainment contents. The different types of media are part of **advertising delivery** business.

Media is largely dependent on advertising for its survival. Media gets major chunk of its expenses and profits from the advertising revenue. On the other hand, the advertising industry is equally dependent on the media to reach out to the wider mass.

It is not that advertisers have no option than going to media for publication of their advertisement. They can advertise their product by moving from door to door or resorting to conventional methods in reaching out the people. But most important point is what makes all the difference is the reach and influence of media on peoples' decision making.

Media is popular and has a wider reach and people generally believe what the media shows. Media acts as a channel between the product and the target market. This is the revenue generating process that takes care of the cost of publication or to stay afloat. Today, some of the highest profitable enterprises in the world are run by the media organisations.

Be it the 'The Times of India' or the 'DainikBhaskar', with good circulation figures in the country, may be costing the producer about Rs.20 a piece. And when the agent commission and distribution cost of a paper is added the copy's cost soars up. However, the paper reaches to the reader at a much lower rate at about Rs. 5. This implies that the publication houses are losing a lot per copy. The question is how and why publishing business flourishes after all these odds on cost of production and distribution after selling a copy of newspaper below a rate that does not cover its production cost. Here, we have to understand that the revenue that comes from selling the newspaper is not all that a publication house is dependent on. For them the larger source of income that takes care of their cost of production and distribution are due to the advertisements.

The quality of contents of a newspaper or a magazine's is directly proportional to its brand appeal and consecutively affects the circulation. Higher circulation brings in more number of advertisements. More advertisement implies higher the price of advertisement space. Higher the advertisement price, more the revenue. More the revenue, better the spending on quality of paper, staff, circulation initiatives and brand building.

With the convergence of media i.e. the traditional publication house and digitisation say internet- media houses have spread their base. A newspaper house may be into broadcasting business as well as internet blogging and vice versa. Due to these reasons, media salespersons simply cannot limit their work operating from within a box i.e. segregate themselves as print, broadcast, electronic, internet sales persons. They are media marketing sales professionals.

Thus even a media professional should be aware of the five Ps of marketing, i.e. Product, Price, Promotion, Place and Post-purchase-service, feel Tim Larson and Ken Foster in the book 'Media Selling: Broadcast, Cable, Print and Interactive'.

Income Sources of Media

Advertising has been the main source of revenue for most of the media organizations be it the print, television or internet. They all do space selling. Even trailers of movies and ads before

or after a screening of a movie at the theatre generate revenue. Movies or cinema being a mass media also generates revenue through playing advertisements rather than just distribution of their film and screening. While Newspapers advertising depends on its circulation and readership, television's advertising revenue rests with TRP and internet with that of "hits."

Newspapers and their sources of income

The two main source of revenue for a newspaper organization are,

- Circulation
- Advertisement

In fact, both these revenue generating components are mutually dependent on each other.

(a) Revenue through Circulation:

The revenue that generates from direct or indirect sales of newspaper copies is the revenue via circulation. This comes from the sale of the newspaper copies to the readers. It could be through home delivery to the regular subscribers, single issue sale through vendors and through news outlets or through bulk purchases at hotels and business establishments. Besides there is a marketing gimmick used by the news houses i.e. "sample copies" which are distributed to potential subscribers, advertisers and business establishments. Circulation money is not surplus for a publication but 'copy' sales helps in retaining old advertisers and attracting new ones.

(b) Revenue Collection through Advertisements

Newspapers advertisements can be categorised under,

- Classified
- Display
- Classified display advertising, and
- Newspaper Inserts

Now let us study them in detail,

Classified advertisements are small messages grouped under a specific heading (classification) in a separate section of the newspaper or magazine. These are relatively small advertisements and are usually placed in column and do not include any graphic. These advertisements generally deals with offers or requests for jobs, houses on sale or rent, drivers, vehicles on rent, car rentals, tutorials, hostel vacancies among others. Classified advertisements are generally sold on per-line basis or number of word basis to the clients. Though small in size and inexpensive, the classified section filled with a large number of small advertisements on almost daily basis. These are a regular source of income for newspapers and magazines. There is generally a fixed page where classified advertisement appears regularly.

Display Advertisements are the bold advertisements found in different pages of a newspaper. These advertisements have a generous share of newspaper space and their size is measured in the column centimeter or square centimeter basis. Besides, the standard measurement scale these may also be counted in terms of quarter page, half page or on full page basis. Display advertisements are placed in any page of the newspaper and earn good revenue. Display advertisements are divided into two categories namely local (retail) and national (general). Local advertisements are booked by the sales people of the newspaper in their local market and are the main source of revenue. Advertisements by local vendors starting from car show room to restaurants, boutiques, educational institutions, food joints and opening, discount sales in super malls make this section of advertisements. Whereas national advertisements are booked by the representatives of the organization and consist of brand promotion, image promotion or sale of company manufactured goods like television sets, ACs, Cars, and Bikes etc.

Classified Display Advertisements are different from classified advertisements in several ways. In this case, the copy occupies more space and in several instances carries graphics. It is generally surrounded by bold border and also carries bold headlines and logo of the company. Generally automobile dealers, recruitment agencies and real-estate agents use this space.

Besides these ads procured from commercial establishments and service providing firms, another kind of advertisement which is popular as well as seasonal is Political advertisement, which usually covers the display section and predominantly appear during political events, rallies and before elections.

Newspaper Inserts are not part of the newspaper but are inserted in the newspaper before distribution. Advertisers like big grocery stores, shopping malls, restaurants, food festivals in hotels, food joint promotions prefer the kind of advertisement. While the advertiser gets mileage by distributing its message to a huge number of people through the newspaper inserts, the newspaper gets revenue for facilitating the distribution of the insert advertisement via their distribution chain.

Television and their sources of income

The major sources of revenue for the visual broadcasting medium are

- Paid subscription
- Advertisements, and
- Cable distribution

Revenue through Subscription

Almost all news channels including the public broadcaster Doordarshan now run on the paid subscription mode. Like newspapers, the subscription revenue is very less as compared to

that of the cost involved in the production of various programmes aired by the television channels. The shortfall of the cost is filled up by advertising that generates profit.

b) Revenue through Advertisements

Television advertising could be classified into several segments like,

- Television Commercials
- Direct selling advertising
- Political Advertising

Television Commercials

Television commercials are short films that vary from 15 to 120 seconds and in some cases even more. Unlike newspapers where advertising ‘space’ is measured by square centimeter or column centimeter, in television, the ‘space’ is measured by seconds. There is another factor though considered for pricing slot like the timing of the commercial i.e. prime time, news hour, morning space, evening space etc. Rate of the commercial advertisement varies on the basis of timing as well as the length of the commercial. These advertisements are termed as “commercials” as they generally intend to promote a product or service so that its commercial interest is fulfilled.

Direct Selling Advertising

This is a new concept of advertising on television. Through this companies do direct selling by advertising their products over television. They generally book spots on specific television channel for a particular time and for a particular duration. The difference between television commercials and direct selling advertisement is that the later did not have a middle agent in their business. The content advertised directly reaches the customer.

Political Advertisements

Broadcast mediums earn through political advertising like any commercial advertising. It is difficult to categorize this under commercials because they are basically promotional and no real buying or selling of product takes place. But image building and publicity takes place on behest of ads.

Sources of income for a Radio station

The major source of revenue for a radio station is advertisements. Almost all radio programmes in India are free on-air, the listener need not have to pay any fees/subscription charge for radio station services. However, radio stations recover their cost of production of various programmes through advertisements. Like television, Radio commercials are also measured in seconds and the price varies from time to time like price of a 15 min radio advertisement may cost more during morning or evening hours than that of during the day. Listening to a radio does not require any special attention like engaging with other forms of mass media might demand. One can hear radio while at work or while on drive.

Sources of income for a Magazine

Like newspapers, major source of income for magazines comes from circulation and advertisements. A fraction of the cost is recovered by Magazines from the subscription and single-copy sales or news-stand sales. However the major revenue is generated via advertisement space. Magazines sale their 'space' in terms of pages or fraction of it, in the form of full page or half page or quarter page advertisements. Since magazines are periodicals and are meant to stay with the reader for a longer duration its quality of production, print is better than that of the newspapers. Magazine advertisements are comparatively expensive in terms of newspaper ad space.

Outdoor Medium

Outdoor media is one of the oldest media. The use of outdoor media is to declare something or to attract attention. This is done through large banners or hoardings. It has gone through several transformations with time. Posters or Flex banners have been replaced by electronic LED display, paintings have acquired 3D painting shape and cloth banners have been replaced by more colourful and glossy vinyl sheets etc.

Several advertisers solely rely on outdoor advertisements like posters, billboards and wall paintings where as several others use this medium along with Newspaper/TV/Radio for improving their product's reach and impact.

Yellow Pages

Yellow Pages are directories containing information about a particular segment like telephone numbers of all the telephone subscribers of a city or details of important vendors, shops, malls, hospitals and other places of public utilities, including addresses of individuals and other professional service providers in a town or city. This unique feature made yellow pages a good advertising tool. Given the fact that yellow pages are published once in a year, advertising space is purchased for a year at a time. As yellow pages are referred during the year and beyond, pricing of yellow pages are generally competitive and advertisers strive for a better space and font size.

Sources of income through the medium of Internet

This is the new medium which has become a major trend in the recent times. Thanks to the spread of on-line marketing concepts and 'smart phones', internet advertising has grown by multifold. In fact, company like Google, the behemoth online search engine is the topmost grosser of online advertising revenue. Today Google offers a wide variety of services like online search engine, email, weather forecast, navigation services, news and tons of other online services for various platforms. As people are increasingly glued to these services, Google is earning huge advertising revenue by placing advertisements in its content and applications. What appears true for Google is true for other internet players also. But the differentiating factor is the number of users. It is a number game where more the number of users a particular website has, the better is the advertisement revenue. A website offering

user-friendly features would certainly attract more users and thereby generate more revenue. By 2019 the market size is estimated to be worth \$220 billion globally.

Unit summary

In this unit you learned the role of media in boosting advertising, other income sources of media, television and their sources of income, sources of income for a radio station, sources of income for magazines, outdoor medium, yellow pages and last but not the least is the sources of income of Internet medium.

Assignment

- How do media help in boosting advertising?
- What is classified display advertising?
- What are newspaper inserts?
- What are the sources of income for a newspaper?
- What are two ways in which television generate income?
- How does television generate revenue through subscription?
- How does television sell its advertisement slot?
- What are the sources of income for magazines?

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युनिवर्सिटी गीत

स्वाध्यायः परमं तपः

स्वाध्यायः परमं तपः

स्वाध्यायः परमं तपः

शिक्षण, संस्कृति, सद्भाव, दिव्यबोधनुं धाम
डॉ. बाबासाहेब आंबेडकर ओपन युनिवर्सिटी नाम;
सौने सौनी पांज मणे, ने सौने सौनुं आत्म,
दशे दिशामां स्मित वहे छो दशे दिशे शुभ-लात्म.

अत्मज्ञ रही अज्ञानना शाने, अंधकारने पीवो ?
कहे बुद्ध आंबेडकर कहे, तुं था तारो दीवो;
शारदीय अजवाणा पछोंच्यां गुर्जर गामे गाम
ध्रुव तारकनी जेम जणहणे अकलव्यनी शान.

सरस्वतीना मयूर तमारे इणिये आवी गहेके
अंधकारने हडसेलीने उजसना इल महेके;
बंधन नही को स्थान समयना जवुं न घरथी दूर
घर आवी मा हरे शारदा दैन्य तिमिरना पूर.

संस्कारोनी सुगंध महेके, मन मंदिरने धामे
सुषुप्ती टपाल पछोंये सौने पोताने सरनामे;
समाज केरे दरिये हांकी शिक्षण केरुं वहाण,
आवो करीये आपण सौ
भव्य राष्ट्र निर्माण...
दिव्य राष्ट्र निर्माण...
भव्य राष्ट्र निर्माण

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