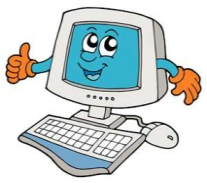
1 Introduction to Multimedia



Communication is an integral part of our life. We use various means of communication like radio, newspaper, television, theatre, movies, internet and others. All these medium help us gain knowledge or educate us. A single medium of information is just not enough to convey meaningful messages to variety of audiences. For example while talking on telephone to a friend, we can hear his voice but cannot see his facial expressions. When you write letter to a friend describing him about your trip to Kashmir, only the text can be read. You cannot hear the voice of the person. If you send him a picture along with the letter, he can imagine the fun you had during your trip. However, if you send a video clip, he could visualize more about the fun you had. As you can see, the more mediums of information you use the impact of the communication increases. Multimedia is all about adding various effects to make communication effective. In this chapter we will learn about multimedia, basic elements of multimedia and applications of multimedia.

Multimedia

The term multimedia has been coined from two terms : multiple and media. Hence multimedia means usage of multiple medias to communicate. In other words, multimedia is a combination of different media elements like text, audio, graphics, video and animation. The combination of all the media elements makes the communication more structured and understandable to the user. Multimedia is now-a-days used in every field like education, theatre, advertising, fashion, gaming to name a few. Figure 1.1 shows different components of multimedia.

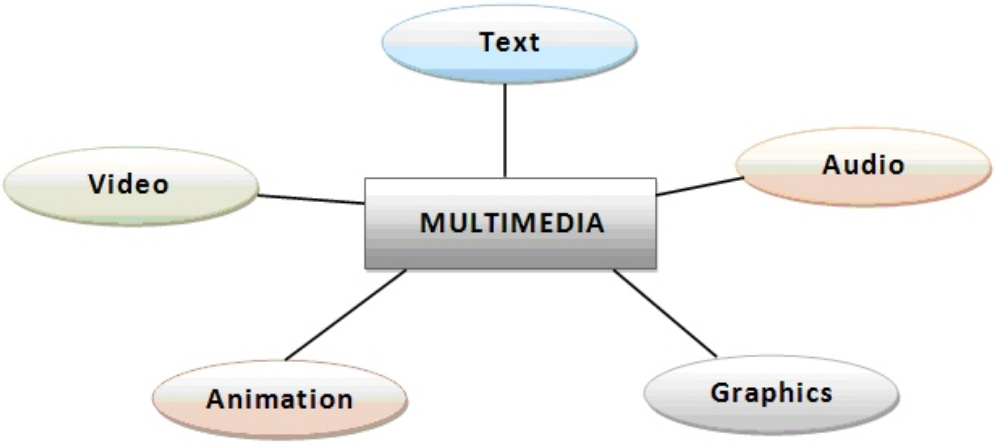


Figure 1.1 : Components of Multimedia

Computers play a vital role in the development of these media elements. A computer capable of handling text, graphics, audio, video and animation is sometimes called multimedia computer. Figure 1.2 shows use of the various elements of multimedia.

Figure 1.2 : Use of elements of Multimedia

Elements of multimedia

We defined multimedia as combination of various media elements like text, audio, graphics, video and animation. Let us now describe each element.

Text

Including text in multimedia is the basic step towards development of multimedia presentation. Text is used to communicate information to the user. Proper use of text and words in multimedia presentation will help to communicate the idea and message to the user. Text can be of any type, a word, a single line, or a paragraph. The textual data for multimedia can be developed using any text editor. However to give special effects we need graphics software. We can even use word processing software like OpenOffice Writer or MS-Word to create textual data. The text can have different type, size, color and style to suit the professional requirement of the multimedia software.

Observe that the sample shown in figure 1.3 does not look the same. This is because they have a different typeface, font and size.

GUJARAT

GUJARAT

GUJARAT

Figure 1.3 : Sample Text

A typeface is family of characters or letters which have similar look. For example : Times, Arial, Courier and others. Typefaces have different style and size known as Font. Styles are Italic, Bold, Underline and others. Size is the distance between the top of the letter to the bottom point. It is expressed in points for example 12 point, 20 point and so on. For example, if we have a font of 'Times new roman 14 point', then Times new roman is style and 14 point is size.

Typeface is categorized into : Serif and Sans Serif. Serif is a little decoration at the end of the character. Times, Century, Bookman are some examples of serif fonts. Serif fonts are easy to read on a printed page as they guide the eye along the line of text. So they are usually used when there is a lot of text to be read. On the other hand, as the name suggests, Sans Serif (sans in French means 'without') are without the decoration. Arial, Verdana and Helvetica are some examples of Sans Serif. They are usually used for headlines and titles. But on computer screen due to low resolution, serif fonts are difficult to read than the sans serif. Figure 1.4 shows the sample of typeface.

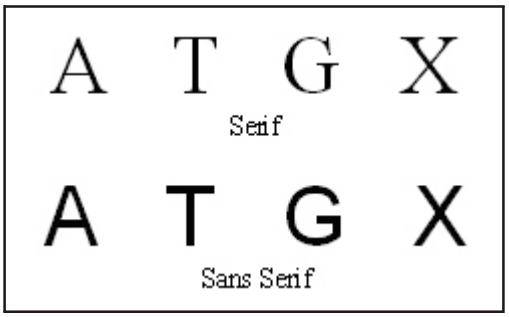


Figure 1.4 : Sample Typeface

Text in multimedia is different from the text used in traditional pen and paper method. In traditional method we convey the information using only text while in multimedia we have other elements along with text. And these elements work together to convey meaningful information. Thus we can say that the information is in the form of text, sound, pictures etc. It should be presented to the user in such a way that he/she is not confused. Thus the text in multimedia should be short, to the point and attractive to get the attention of the user.

Assume that, we want to make a presentation on "Gujarat Tourism" using OpenOffice Impress. First, we need to create a main page with the title "Gujarat Tourism". We can simply type the text but to make it more attractive we can use Fontwork. The steps to create the text are as mentioned :

- Open a blank presentation in OpenOffice Impress.
- Click on View → Toolbars → Drawing. This will open the drawing toolbox.
- On the *Drawing* toolbar click on the *Fontwork Gallery* icon  . A *Fonwork Gallery* dialog box as shown in the figure 1.5 will open.

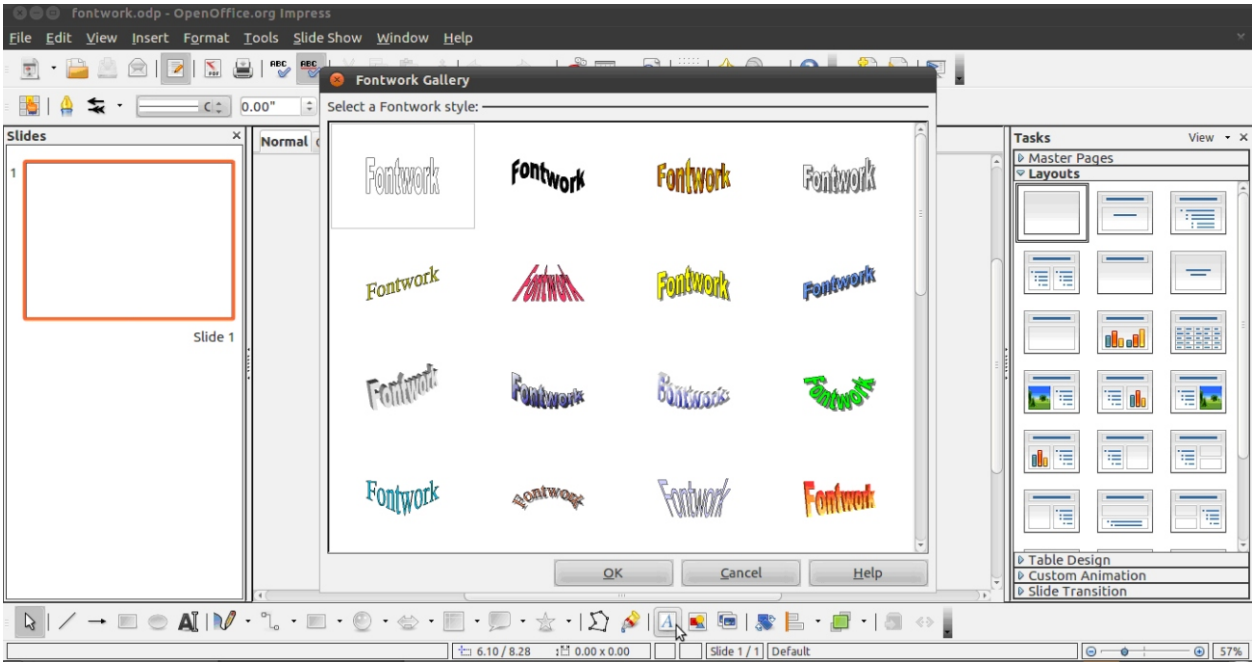


Figure 1.5 : Fontwork Gallery dialog box

- In the *Fontwork Gallery* dialog box, select any style that you like and click on the OK button. The Fontwork object is inserted into the document as shown in figure 1.6.
- Double click on the object to enter into the text edit mode.

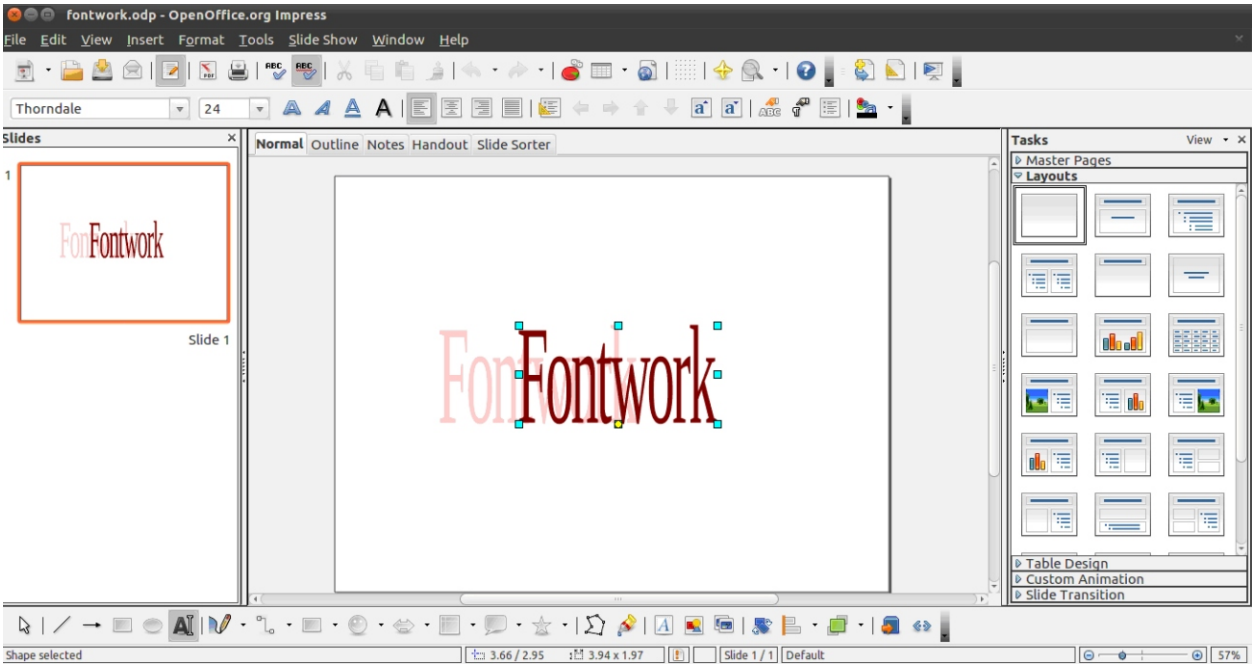


Figure 1.6 : Edit the fontwork text dialog box

- Replace the default “Fontwork” text with text “Gujarat Tourism”.
- Press ESC key to exit the text edit mode.

- You can now see that the text “Gujarat Tourism” appears on the slide as shown in the figure 1.7.
- Save the file for further use.

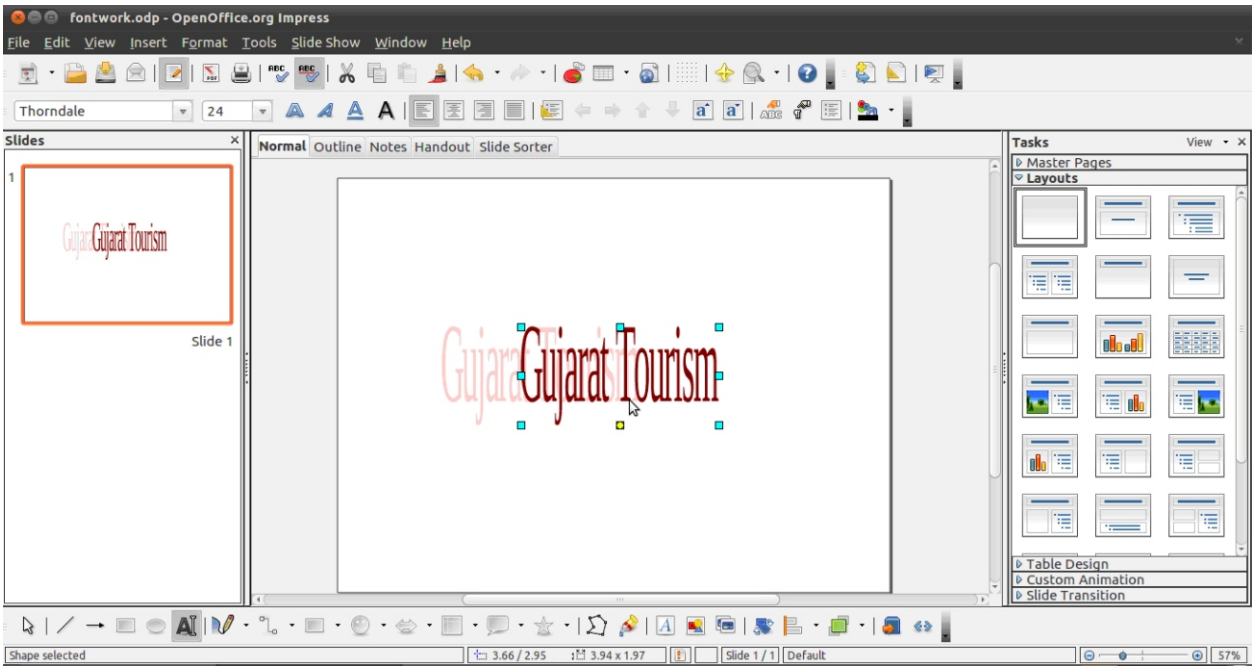


Figure 1.7 : Final slide with the text

Audio

Sound is the most important element of multimedia. We can define sound as a meaningful speech in any language. The term sound is used in the analog form, and the digitized form of the sound is called audio.

Text and images without any sound are helpful when we are presenting in front of the audience. But in the absence of the presenter, sound plays an important role. The best example is when we are viewing an educational CD. The user can enable or disable the sound option. But the learning process is more enjoyable when it is played with sound. To make such a kind of multimedia presentation, we need to first record the voice and play it according to the animation in the presentation. Thus when a user sees the presentation he/she is able to understand it easily by seeing the animation along with the voice.

Now-a-days, computers support multimedia applications. They come along with required hardware and software needed for multimedia applications. We get inbuilt sound card, speaker, microphone, and web camera which are required for multimedia applications. The operating system provides application that can be directly used for capturing audio and video.

Let us have a look at an audio recording application provided in Ubuntu Linux. Be sure you have microphone and speaker connected to the computer. Let us record our voice using the application by following the steps given :

- Select Applications → Sound and video → Sound recorder. This opens a *Sound Recorder* application as shown in figure 1.8.
- Choose File → New.
- Use the Record as drop-down list to select one of the following recording options :
  - CD quality, Lossless
  - CD quality, Lossy
  - Voice

Figure 1.8 : Sound Recorder

- To start recording, choose Control → Record or click on record button  as in shown figure 1.8.
- Now start recording the voice. For example, describe a tourist place of Gujarat for our multimedia presentation on "Gujarat Tourism". Figure 1.9 shows the audio recording process.

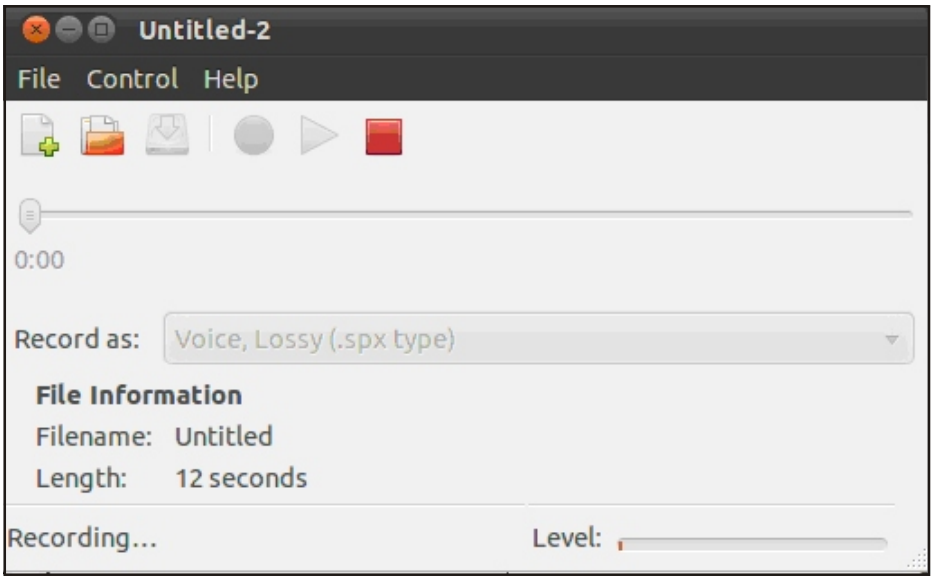


Figure 1.9 : Audio Recording

- To stop recording, choose Control → Stop or click on Stop button ( ).
- To play back the recording, choose Control → Play or click on Play button ( ).
- To run the audio mixer, choose File → Open Volume Control.
- To save the recording, choose File → Save As, and type a name for the sound file.

We can also make changes to this sound file like, delete a part of it, change the playback speed, change the playback volume and add echo etc. Multimedia elements like sounds or videos are stored in media files. To discover the type of media file we should look at the file extension. The commonly used audio formats are described in table 1.1.

File Extension	Type of File	Description
.mid, .midi	MIDI File	MIDI (Musical instrument digital interface) files contain music data.
.rm, .ram	Real Audio File	.ram (real audio metadata) is combination of audio and video.
.wav	Wave File	Waveform audio file.
.wma	Windows Media Audio File	Audio file compressed with windows media compression.
.mp3, .mpga	MP3 Audio File	Compressed audio format.

Table 1.1 : Commonly used Audio File Extension

.wav is the most popular uncompressed sound format on the Internet, and it is supported by all popular browsers. The .mp3 is the new compressed format for recorded music. So if you want to use the recorded music, .mp3 is the best choice.

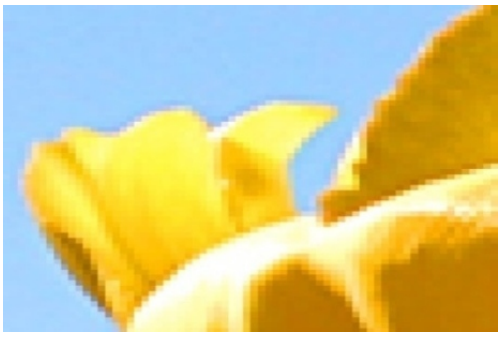
Image

Generally multimedia presentations are graphics/image based. Information communicated through images is easier to remember and understand. Images used in a multimedia application can be photographs converted into digital form with the help of scanners or generated on the computer. Computers store the pictures in the form of pixels maps also known as bitmap or raster images. A Pixel (short for picture element) is the small dot on the screen. A map is a two dimensional matrix of these dots. Thus, a bitmap is a simple matrix of tiny dots which forms an image on the computer screen. Each pixel contains values representing a color. When an image is sent to be displayed on the screen, the picture data is converted to pixels.

Another form of image generated by computers is vector graphics. They store the images in the form of mathematical equations. On the screen both bitmap and vector graphics looks the same. But when you enlarge the bitmap image, it will blur and the pixels will get enlarged as shown in figure 1.10. The vector images on the other hand looks the same when enlarged. This is because,

the data is stored in the mathematical form and the values are recalculated when displayed on the screen.

Bitmap image



Enlarged bitmap image showing pixels

Figure 1.10 : Bitmap Image

Both the types of images are stored in different file formats as mentioned in table 1.2. Typically, these files are compressed to save memory space. Bitmap image file formats like gif, jpeg and png use compression within the file itself. The commonly used image formats are described in table 1.2.

File Extension	Type of File	Description
.bmp	Bitmap Image	Uncompressed image file used to store bitmap digital images.
.gif	Graphical Interchange Format File	Common for web graphics with small images and images with text. Uses limited number of colors.
.png	Portable Network Graphic	Used to store graphics for web images and supports upto 32-bit colors. It was an improvement over gif.
.jpeg / .jpg	Joint Photographic Expert Group Image File	Common image format used by digital cameras. Supports upto 24-bit colors.
.psd	Photoshop Document	Image file created by Adobe Photoshop.
.tif	Tagged Image File Format	Highly flexible and platform independent format which is widely used today.

Table 1.2 : Commonly used Image File Extension

Using inbuilt images is a common practice while preparing a presentation. For example, in Open office Writer, we can insert a picture by going to Insert → Picture. The pictures used can be a

file already present in the computer or we can scan the picture using a scanner and convert it into digital format to be used further by the computer. Figure 1.11 shows a document with an image inserted using OpenOffice Writer.

The image used in figure 1.11 was already available to us. We may use any other image of our liking. We can also make changes to our images by using programs like Adobe Photoshop, GIMP, MS-Paint and others.

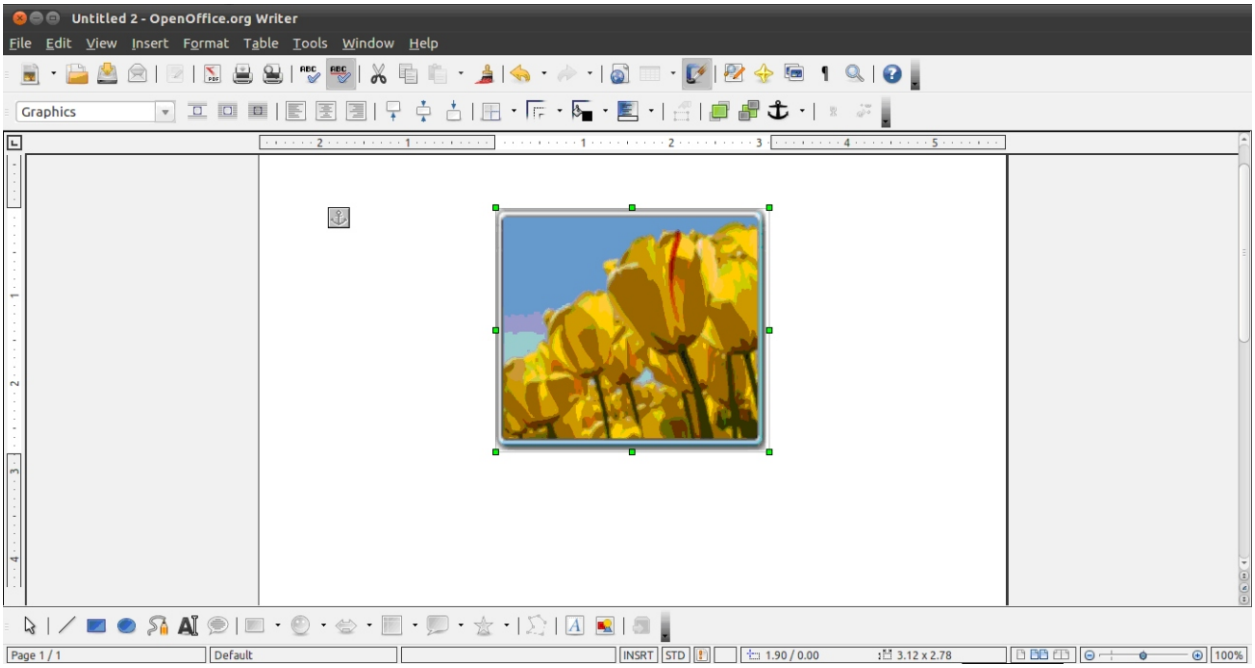


Figure 1.11 : Document with Image

Video and Animation

Animation can add great power to any multimedia application. Any static presentation becomes lively by adding a video or animation. Let us first differentiate between animation and video. The term video refers to the sequence of natural scenes captured using analog or digital video capturing device. This device can be a web camera, digital camera or even mobile phones.

Animation is a visual change over time. The digital images are played one after the other to create a moving effect. We can say that, animation is created from drawn pictures and video is created using real time visuals. Carefully planned and well-executed video clips or animations can make a great difference in a multimedia application. Some examples of animation are movies like Kung Fu Panda and Smurfs.

Animations can be classified as two-dimensional (2D) or three dimensional (3D). In 2D animation the visual change occurs on the x and y axis of the screen. This type of animation is simple. Some examples of 2D animation software are Macromedia Flash, Synfig studio and Pencil. In 3D animation the visual change occurs along three axis namely x, y and z. This type of animation gives almost

a realistic view of the image as can be seen by the human eye. Some examples of 3D animation software are Maya, Blender and 3D Max. Figure 1.12 shows the view of an object in 2D animation software and figure 1.13 shows the view of an object in 3D animation software. We will learn how to create animation in later chapters.

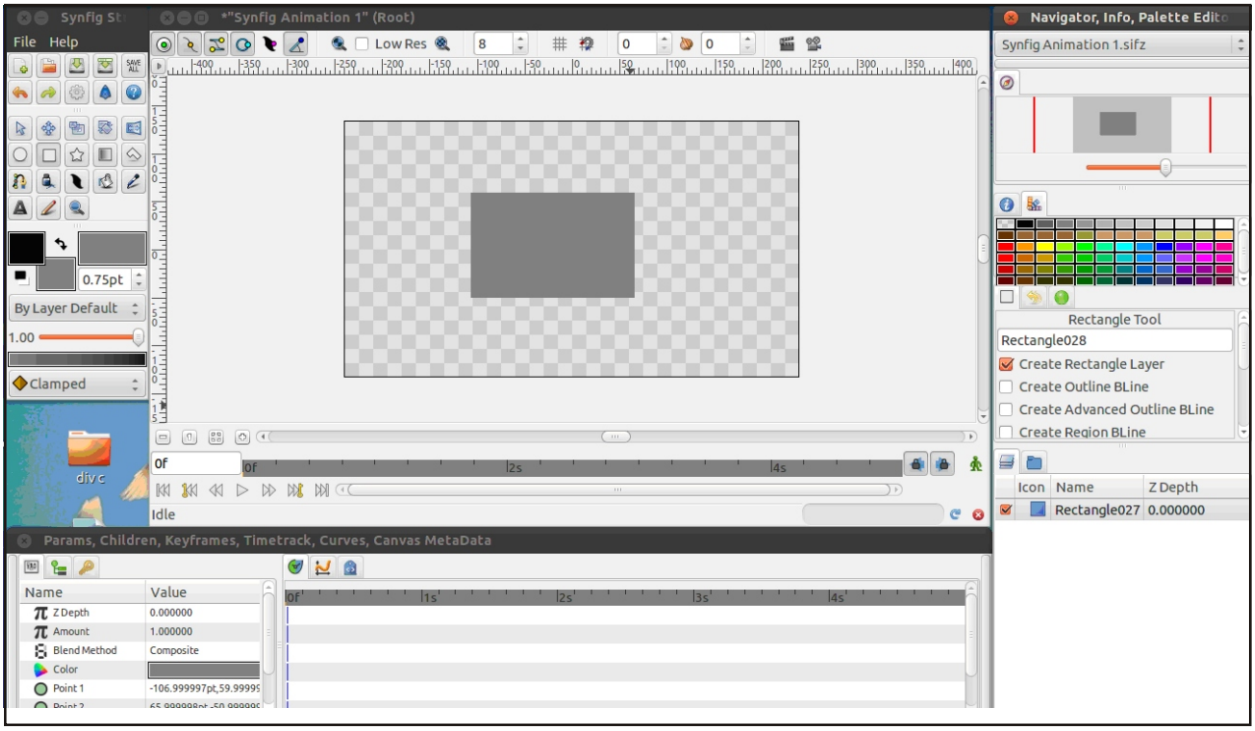


Figure 1.12 : 2D view of an object

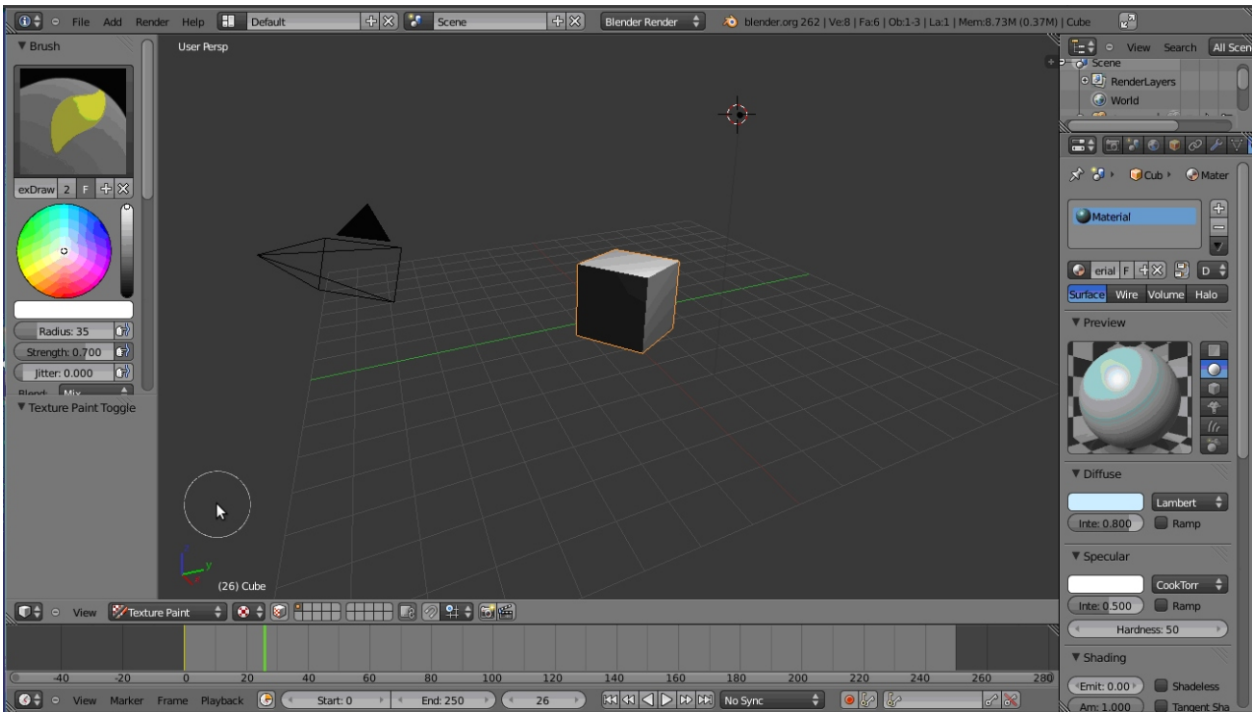


Figure 1.13 : 3D view of an object

Let us now see how to record a video using VLC media player. It is essential that you have VLC Media Player installed in your computer, if not then download it from Ubuntu Software Center. It is a free open source multimedia player. Be sure you have webcam connected to the computer. Let us start recording a video by following the steps given :

- Open VLC media player.
- Select Media → Open Capturing Device. This will take you to the Open Media dialog as shown in figure 1.14. Select the video device name and audio device name. Figure 1.14 shows the selected options.

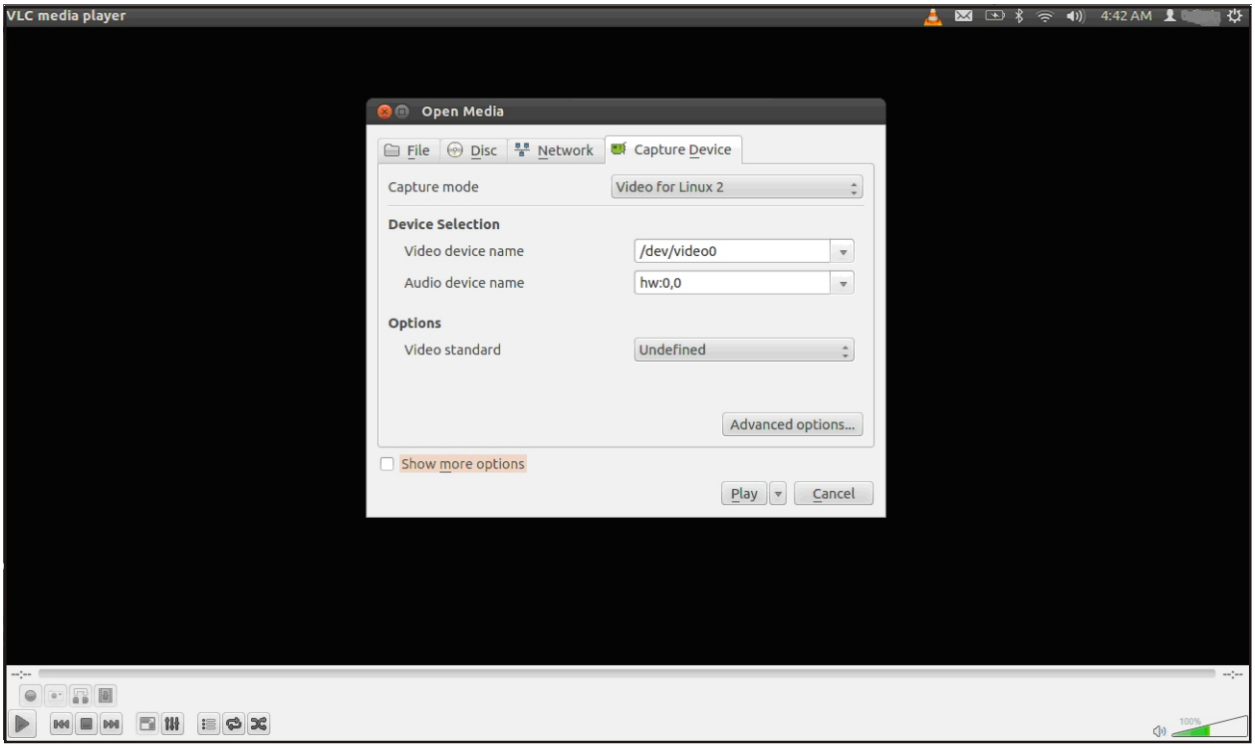


Figure 1.14 : Open Media dialog box

Note :

The device name and the audio device name may vary as per the settings of reader's machine. In case you have multiple devices you can choose the one that you would like to use.

- From the Play drop down menu visible in the *Open Media* dialog box of figure 1.14, select Convert option. This will open the *Convert* dialog box as shown in figure 1.15. In the textbox after *Destination file* label, select the destination and filename. Check 'Display the output' checkbox to see what you are recording.
- Click on the Start button.

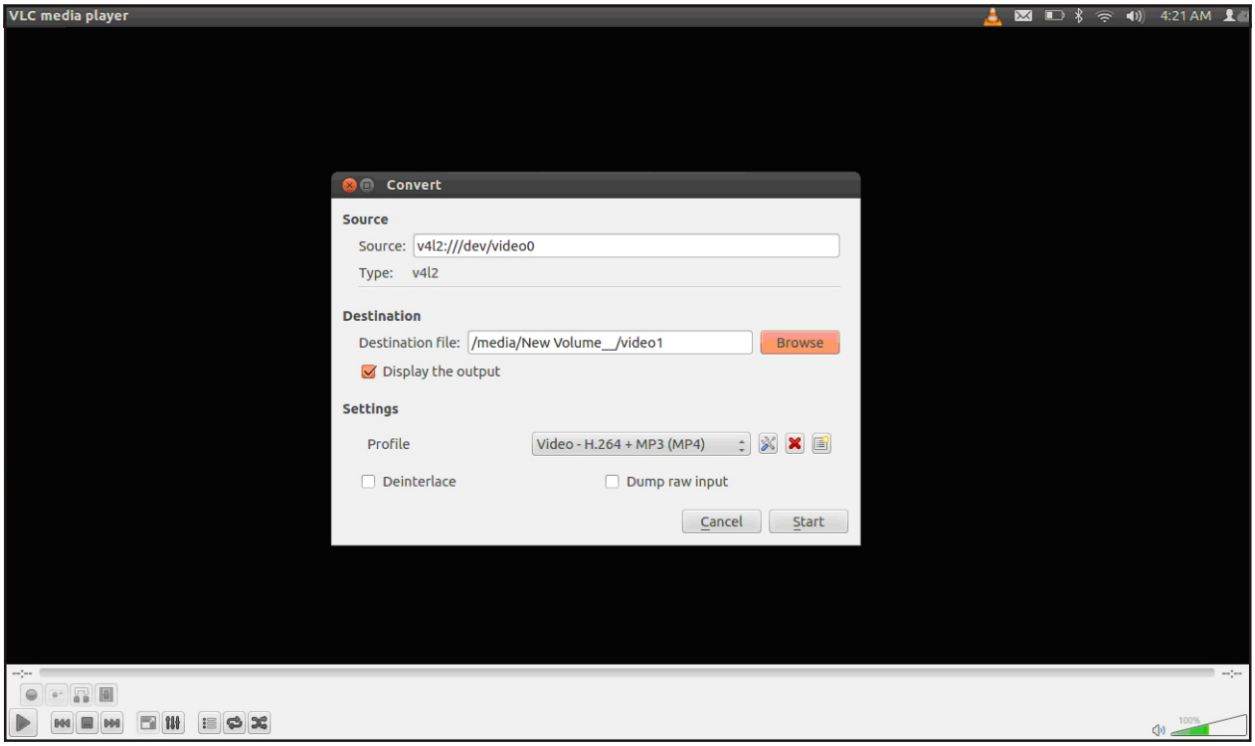


Figure 1.15 : Save the Video file

Figure 1.16 shows the video recording in progress. Click on the Stop button  to stop the recording.

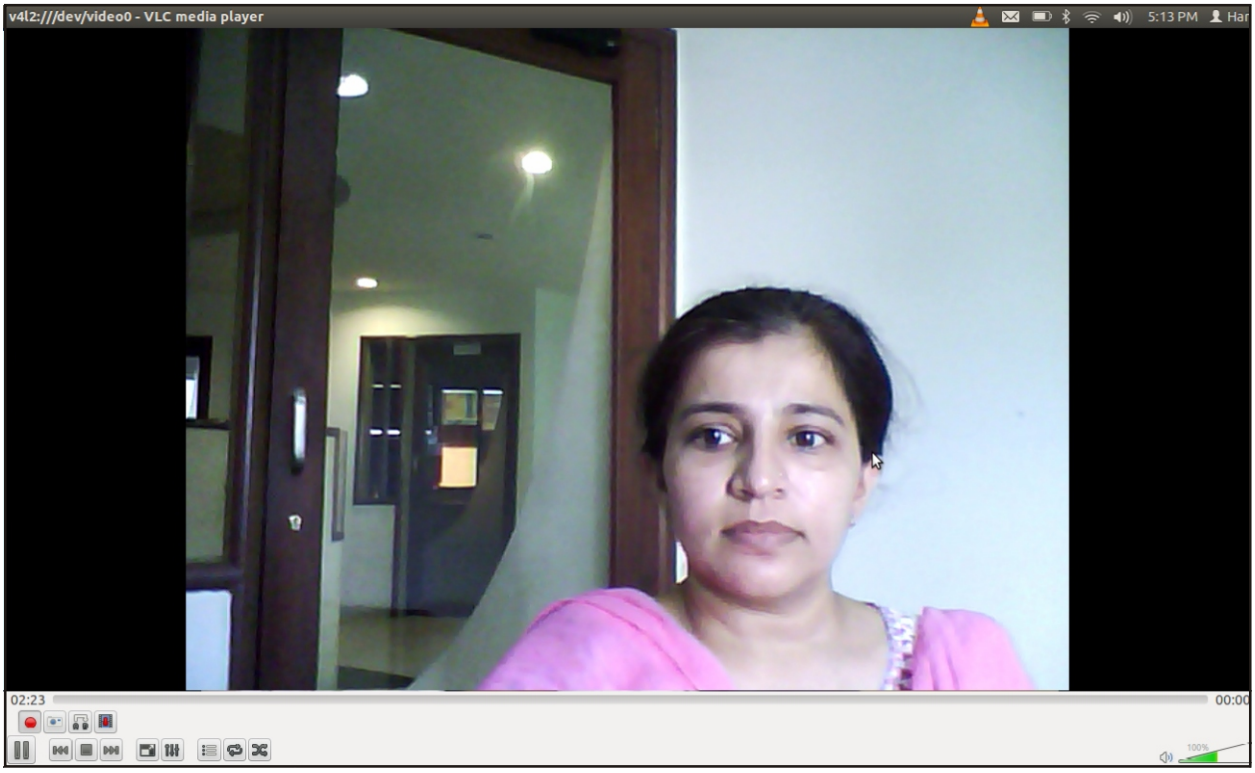


Figure 1.16 : Video recording in progress

Later the recorded video can be attached to the multimedia application. You can also try out another open source video recording software called "Cheese Webcam Booth" available in Ubuntu Software Center. The commonly used video formats are shown in table 1.3.

File Extension	Type of File	Description
.avi	Audio Video Interleave File	Developed by Microsoft to play videos in windows environment.
.wmv	Windows Media Format File	.wmv (windows media video) is a compressed video format developed by Microsoft for internet streaming applications.
.mpg, .mpeg	Moving Pictures Expert Group File	Popular video format used for creating movies distributed over internet.
.mov	Quick Time Format File	Developed by Apple. Files are compressed and are easier to download from internet.
.rm, .ram	Real Video Format File	.ram (real audio metadata) are combination of audio and video.
.swf, .flv	Adobe Flash Shockwave File	Animated file containing text and images. Created by using Adobe Flash software.
.mp4	MPEG4 Video File	Commonly used for sharing video files on the internet.

Table 1.3 : Commonly used Video File Extension

Today mp4 is most widely used format for the Internet video. It is supported by Flash players, YouTube as well as HTML5.

Interactive objects

For a multimedia presentation to be effective it should have maximum interactivity. At times the user may want to skip a portion of the presentation or want to again go through that same portion. The user is given buttons or hyperlinks for navigation in such cases. When these interactive objects are clicked, the flow of the presentation changes as per the user's choice.

Earlier the Internet browsers supported only one media element : text. Text was also limited to single font and color. All the media elements described earlier are now supported by latest Internet browsers in different ways. Some media elements can be handled inline and some require plug-in. Inline media objects are specified inside the program using a specific <inlinemediaobject> tag. Plug-in are extra helper programs that can be easily installed and used as a part of the web browser. The extent to which a particular media element is employed is determined by the nature

and scope of the project. For example, multimedia project on "Gujarat Tourism" may use more images, video clips and text about various places of Gujarat. We will learn more about these elements in later chapters.

Classification of Multimedia

Generally multimedia is classified into two namely : Interactive and Non-Interactive multimedia.

In Interactive multimedia, the sequence and timing of media elements can be controlled by the user. For example, a multimedia CD on "Learn Musical Instruments", the user can select on the different musical instruments he/she wants to play. User can also select his favourite song which he wants to play using that instrument. Most of the CD-ROM titles and games available in the market are interactive in nature. Generally, interactivity increases the user participation and he/she enjoys it more. The degree of interactivity depends upon the field of the multimedia project.

In traditional mass media like television, radio or newspaper the communication is one-way. In other words we can say that the process originates from the source and is delivered to the mass audience. For example, a movie has a beginning and an end irrespective of the user watching it on the television or not. Though these technologies also use video, audio, text and graphics but in an inflexible way. While in multimedia the user does not remain passive but can control the elements. Thus, the difference between mass media and multimedia is that there is a shift from audience to user and the communication becomes two-way instead of one-way.

In Non-Interactive multimedia the user simply watches the media as it plays from beginning to the end. He/she has no control over the flow. For example : a corporate presentation or a multimedia demo.

Another classification of multimedia is based on its applications : Entertainment or Edutainment.

All types of games, movies are examples of Entertainment multimedia wherein the purpose is to entertain the user. Whereas the multimedia titles that educate the user are classified under edutainment multimedia. All types of educational CD's are example of edutainment multimedia.

Usage of Multimedia

Multimedia has become an integral part of our life. Multimedia finds its application in various areas including, but not limited to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business and scientific research. Let us discuss some of the usage of multimedia in various fields :

Education and Training

In the area of education, multimedia has a great importance. We have been using presentations consisting of charts, tables and other objects to impart knowledge since a long time. But now-a-days the classroom education is not limited to the earlier conventional method rather it needs audio and visual media. Multimedia is used to produce computer based training courses commonly known as CBT. A CBT lets the user go through a series of presentations, animations, text about a particular

topic along with examples. Today CBT are used for almost all the age groups right from kindergarten to post graduates. For example, edutainment CD like Nursery Rhymes or Learn Computers. Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment.

Multimedia is used extensively in training programs. Medical trainers and doctors can practice surgery methods via simulation before the actual surgery. Mechanics can learn to repair the engines or a salesperson can learn about the product details.

Some of the uses of multimedia in education and training are as mentioned below :

- Recording or broadcasting lectures.
- Using video conferencing we can hear an expert speaker from a distant location.
- Demonstrating surgeries or other techniques that learners may not otherwise have the opportunity to see and later put them in practice.
- Record student's performance to enable feedback.

Advertisements

In the field of advertising multimedia plays a vital role. Today, advertising is the major source of launching and promoting a product by the manufacturing companies in the market. Exciting animations, effects and slogans can make an advertisement popular. This can lead to promotion of the product. We see so many advertisements today and some of them catch our attention and we ultimately end up buying that product. For example, Jujus and pug dog in Vodafone advertisement were used to promote the various plans and packages of the company.

Entertainment

Multimedia is heavily used in the entertainment industry to develop special effects in animations and movies. Movies like Ice age, Jurassic park, Avatar will always be remembered for their special effects and animations.

Multimedia games are very popular among children and a variety of these games are available either as CD-ROM's or online. With availability of lot of gaming software programs for individuals or groups, virtual gaming has become a reality today. With usage of such software two players in different countries can play a game sitting on their computers.

Journalism

Multimedia is used a lot in the field of journalism. There are many magazines and newspaper that are published periodically. Today not only we see the text in the newspaper, but can also see the photographs. E-newspaper and E-magazines are also available online where we can see the videos related to particular news.

Stages in Multimedia Production

Any multimedia presentation must be carefully planned and designed. As we studied that multimedia is applicable to almost all the areas, a plan should be according to the field selected. For example,

an application made for entertainment may not work with an educational application and vice versa. Irrespective of the field, the stages in multimedia production remain the same. Let us discuss the stages in multimedia production.

Research and Analysis

During this stage we need to find out about the audience, their skills, needs and qualification. We should also gather as much information as possible about the content to be presented.

Scripting (or Flowcharting)

Scripting or flowcharting means deciding the flow of the multimedia project. This is done by making a flowchart to show the main menu and the branching when a user selects a particular option. For example, if we were designing educational multimedia project on Science for Standard XI, the home page would display all the chapter names. Selecting a particular chapter would display the explanation, exercises, test and other aspects related to the chapter. Thus we can draw a flowchart starting with our main menu and then the subpages that are linked with each other.

Note : The term scripting here does not refer to action scripting or java scripting.

Storyboarding

During this stage the actual visualization of the project takes place. The designer decides how each screen should look like, which media elements are to be used and where to place them on the screen. The storyboard in our earlier example, will contain the design of the home page, where we will place the buttons, how will they look like, what happens when we click this button and other such required elements.

Collection of media elements and construction

After the storyboarding, the designer is ready with the prototype and starts creating the graphics and other media elements to be used in the project. For example, characters to be used are created, sounds and videos are recorded and animations are created.

Programming

After the collection and construction of media elements, they are combined together into a final product using software packages like Macromedia Flash, Synfig, Hypercard to name a few.

Testing

This is the final stage of any multimedia project. In this stage we check if all the media elements are working as per the requirements or not. Also, whether the audience targeted will find the design and the content attractive or not.

If we work as per the stages mentioned here then most of the applications that we may develop will turn out to be good.

Summary

In this chapter we discussed multimedia and its components text, audio, graphics, video and animation. Each of the components plays a vital role in the development of the multimedia project. We introduced each component and discussed it in detail. Multimedia is classified into Interactive, Non-Interactive, Entertainment and Edutainment multimedia. Today the usage of multimedia can be found in almost all the fields like education and training, advertisements, entertainment, journalism to name a few. In the systematic and fruitful development of a multimedia application the stages play an important role.

EXERCISE

1. What is multimedia? List the elements of multimedia.

2. What is typeface and font?

3. What are interactive objects?

4. Explain the classification of multimedia giving suitable example for each.

5. Explain how multimedia is used in various fields.

6. List the stages in multimedia production. Write about each in brief.

7. List various file formats used for the following files :

(a) Audio (b) Video (c) Image

8. **Choose the most appropriate option from those given below :**

(1) The term multimedia has been coined from which of the following terms :

(a) mix, media (b) mid, mediate

(c) multi, mediator (d) multiple, media

(2) How many maximum media elements are combined in Multimedia?

(a) three (b) four

(c) five (d) eight

(3) Which of the following terms defines a meaningful speech in any language?

(a) video (b) sound

(c) text (d) animation

(4) Times, Century, Bookman are some examples of which of the following font?

(a) arial (b) typeface

(c) serif (d) sans serif

(5) Which of the following is an audio file compressed with windows media compression?

(a) .mid (b) .wav

(c) .mp3 (d) .wma

(6) Which of the following terms represent the distance between the top of the letter to the bottom point?

(a) size (b) style

(c) length (d) width

(7) Which of the following terms represent typefaces that have different styles and sizes?

(a) font (b) text

(c) letter (d) character

(8) Macromedia Flash, Synfig studio and Pencil are examples of which of the following animation types?

(a) 3D (b) 2D

(c) 4D (d) 5D

(9) Which of the following terms represent a small dot on the computer screen?

(a) pixel (b) point

(c) cursor (d) cell

(10) Which of the following terms represent a classification of images?

(a) vector, raster (b) bitmap, raster

(c) picture, clipart (d) graphics, picture

(11) Which of the following terms represent a visual change over time?

(a) text (b) audio

(c) animation (d) graphics

(12) Which of the following terms represent a two dimensional matrix of dots?

(a) screen (b) map

(c) cell (d) array

(13) Which of the following terms is full form of MIDI?

(a) musical instrument data interface (b) musical instrument digital interface

(c) musical image digital interface (d) musical instrument digital image

(14) Which of the following terms represent the most common image format used by digital cameras?

(a) .gif (b) .jpeg

(c) .tif (d) .bmp

(15) Which of the following is used to store the images are stored in form of mathematical equations?

(a) vector (b) raster

(c) bitmap (d) picture

(16) Which of the following devices help us to convert photographs into a digital format?

(a) scanners (b) modem

(c) printer (d) monitor

(17) Which of the following terms represent PNG?

(a) programmable network graphic (b) photo network graphic

(c) portable new graph (d) portable network graphic

(18) Which of the following terms represent a helper programs that can be easily installed and used as a part of the web browser?

(a) plug-in (b) text

(c) video (d) audio

(19) In which of the following terms can Multimedia be classified?

(a) intelligent and non-intelligent (b) interactive and non-Interactive multimedia.

(c) intuitive and non-intuitive (d) informative and non-informative

(20) In which of the following animation types does the visual change occur in the x and y axis?

(a) 2D (b) 3D

(c) 4D (d) 5D

LABORATORY EXERCISES

1. Create a title text using OpenOffice Impress or Writer for the text "Gujarat".
2. Record your voice using sound recorder describing about "Adalaj ni Vav".
3. Record a video describing "What is Multimedia".