INFORMATION AND COMMUNICATIONS TECHNOLOGY

STANDARD - X

Government of Kerala
Department of General Education

State Council of Educational
Research and Training (SCERT)
2016

The National Anthem

Jana-gana-mana adhinayaka jaya he
Bharatha-bhagya-vidhata,
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga
Tava subha name jage,
Tava subha asisa mage,
Gahe tava jaya gatha.
Jana-gana-mangala-dayaka jaya he
Bharatha-bhagya-vidhata,
Jaya he, jaya he, jaya he,
Jaya jaya jaya jaya he!

Pledge

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage. I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders respect, and treat everyone with courtesy.

To my country and my people, I pledge my devotion. In their well-being and prosperity alone lies my happiness.

Information and Communications Technology-X

Prepared by :

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Poojappura, Thiruvananthapuram-12, Kerala
for **State Council of Educational Research and Training (SCERT)**
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Preface

Dear children,

Information and Communications Technology does not have much history to claim compared to other subjects. However, in terms of features and applications, it has become widespread. It has brought extensive and fascinating changes in the field of Science and in all walks of our lives. We make use of ICT almost in all subjects we study - be it Mathematics, Science or Social Science.

You have to analyse and interpret the exercises given in these chapters. It is a must that we should develop new insights on the multiple application of ICT in different fields. This textbook has been prepared keeping in mind the above need and taking into consideration the scope of this branch of Science in enriching the quality of curricular and co-curricular activities.

Try out all the activities mentioned here using the facilities in your school laboratory to the maximum. It will help you get familiar with the basic concepts of ICT and make your own contribution towards it.

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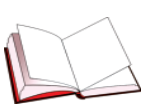
CONTENTS

1	The World of Designing	07
2	Publishing	19
3	Attractive Web Designing	32
4	Python Graphics	44
5	Networking	57
6	Map Reading	70
7	The Working of Internet	88
8	Database - An Introduction	101
9	Moving Images	115
10	Operating Systems	130

Certain icons are used in this textbook for convenience



For further reading
(Evaluation not required)

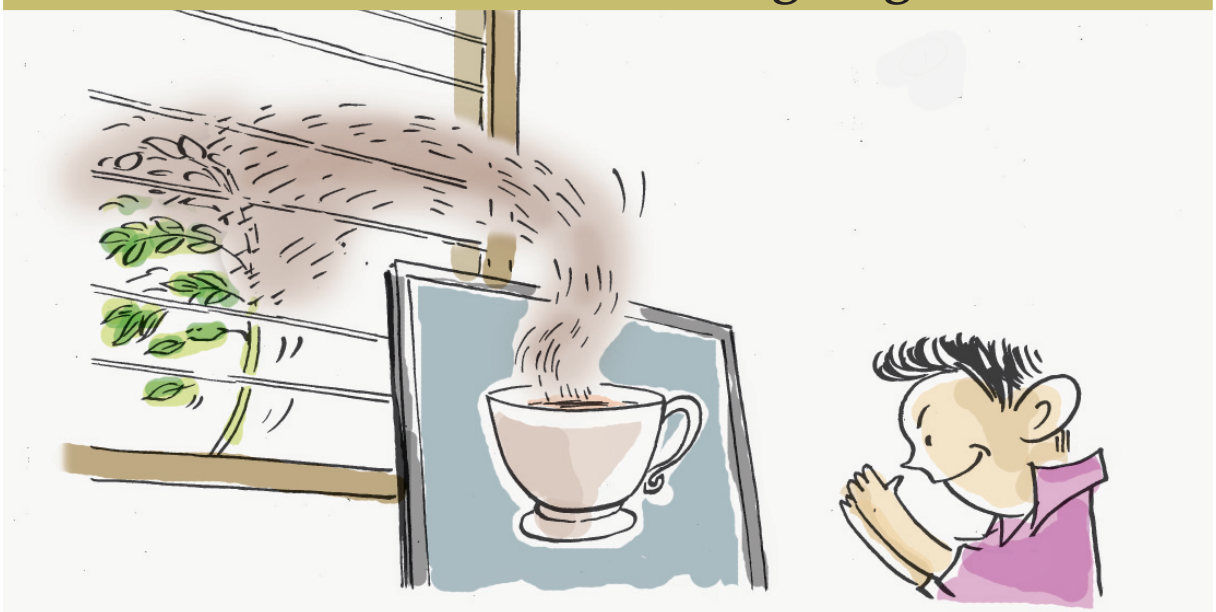
Significant learning outcomes

Let's evaluate

Follow-up activities

Chapter 1

The World of Designing



Inviting logos

Logos are invited to be added to the banner of a new coffee shop soon to be opened by Kudumbasree. Images in ***svg*** format should be send before July 15 to the following email.

kdmbsrcfshop@gmail.com

Did you see the notice?

Why is it specified here that only ***svg*** images should be send? What is the advantage of an ***svg*** image has over the image files we are familiar with, like ***jpg*** and ***png***? Let us take a look at the activities given here.

Activity 1.1 - On scaling *png* and *svg*

In the folder of the tenth class in the ***School_Resources*** of your computer, open the files ***honey.png*** and ***honey.svg*** using GIMP (***Right Click → Open with***). In what image size did the picture ***honey.png*** open?

Scale it into a large canvas (width: 2400, height: 1800). You can do this using ***Image → Scale Image***. Observe the changes in the image.

Similarly, open ***honey.svg*** in GIMP. A small window appears. Give the same dimensions as above, namely, width: 2400 and height: 1800 to this window and add the picture. Is there any change in the image?

Repeat the activity with different canvas sizes and compare your findings with those given in the table (1.1) below:

When *png* image is opened in GIMP	**When *svg* image is opened in GIMP**
png image opens in the actual size of the picture	The picture can be imported to different image sizes and opened.
The clarity of the image reduces when moved to a larger canvas.	The clarity of the picture is not lost even if it is a big canvas

Table 1.1: Comparison of *png* and *svg* images

Now, you could guess why the notice mentioned above insists that ***svg*** images should be send.

People working in the field of graphics often have to use images for different media. In such situations, it is possible to use Scalable Vector Graphic (SVG) images without loosing clarity. However, limitations are there in maintaining the quality of bitmap images like ***png***, ***jpg***, etc.

Bitmap pictures are raster images and ***svg*** pictures are vector images. GIMP is an important raster image editing software. Inkscape, LibreOffice Draw, Karbon, Adobe Illustrator, Corel Draw, etc. are different types of vector image editing software. Of these, Inkscape and LibreOffice Draw are Free Software packages.

Raster and Vector

The images on a computer are formed by many colourful tiny squares (pixels). For an image size of 800x600, there will be 800 pixels along the X-axis and 600 pixels along the Y-axis. That is 4,80,000 pixels in total. For creating raster images, the colour and size of each pixel will be mentioned in the program. These are called Bitmap images. The excess pixels thus formed on scaling the images are created based on the properties of the neighbouring pixels.

But, a vector image is constructed by means of the defining path between the two points (start point and end point). This path could be part of any geometric shape like a straight line, square, triangle or a curve. (As the features including the direction are defined by equations, the required features are added according to the equations at the time of scaling).

Now let us see how a logo is created.

Activity 1.2: Preparations for creating a logo

The logo is supposed to be added to the banner for the publicity of the coffee shop. What are the things to be included in the logo of the coffee shop? Discuss with your friends and make a list.

- A picture of a cup and saucer with tea
- Background image
- Some text
- .....

Now let us start drawing. It is better to draw each of the items listed above separately and put together, rather than draw all of them together. Which parts are needed to complete the logo? Make a list.

- Drawing the saucer
- Drawing the cup
- .....
- .....
- .....

From the parts listed above, which one will you draw first? We are making *svg* images. So which software will you use?

Let us use the vector graphic editing software, Inkscape that is inbuilt in our computer.

Activity 1.3 - Understanding Inkscape

Shown below is the window that appears when you open Inkscape. Open the software in the computer and get familiarised with it in detail. (Fig. 1.1)

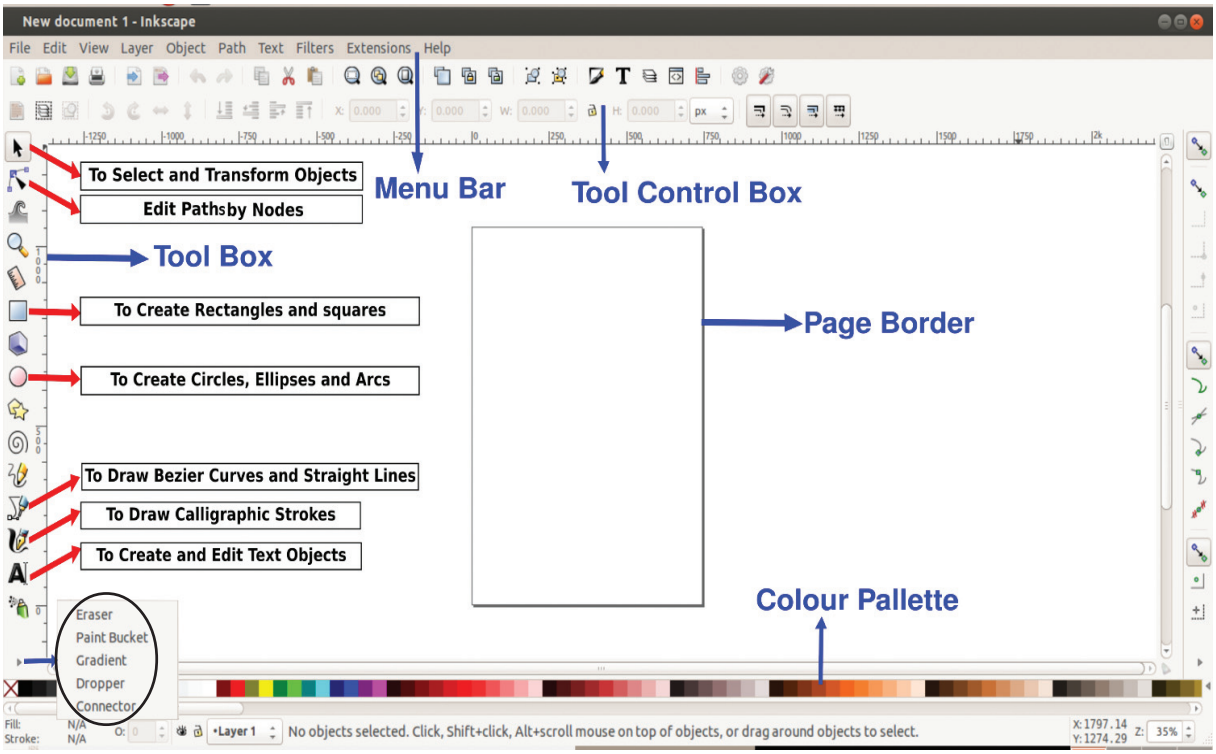


Fig. 1.1 Inkscape window

Inkscape

Inkscape is a Free graphic editing software. It is used for creating and editing mainly *svg* images. It can import bitmap images and edit them. It can also convert vector images into raster.

Place the mouse pointer against each tool on the left side of the window and learn its use.

We can start drawing parts of the logo in the order in which we have listed them.

Activity 1.4 - Drawing the saucer

To draw the saucer, we can use the tool for drawing circles. Then we can use different tools in the Inkscape to improve the picture. Using a variety of tools on the Inkscape software, light and shade can be skillfully blended to give a 3D effect to 2D images.

Draw a saucer with the help of the activities in the Inkscape software and save it.

- Draw an oval horizontally using ***Create circles*** tool [Fig. 1.2(a)].
- Select the oval using ***Selection*** tool.

To give it a gradient colour, click on the ***Radial Gradient*** option in the ***Fill*** tab from the menu ***Object→ Fill and Stroke***.

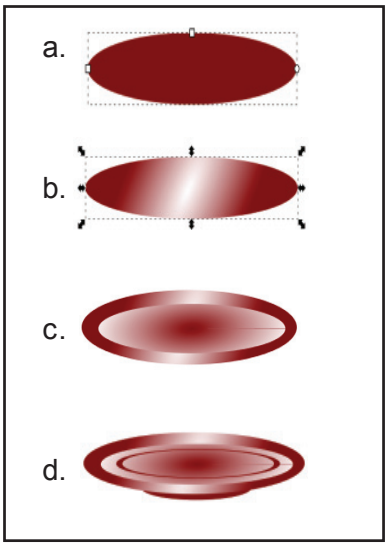


Fig. 1.2
Different steps to draw saucer

Tools in this window can be used to give colour to the objects drawn in Inkscape. Tools to remove colour, give colour, linear gradient, radial gradiant, opacity and blur are available in the ***Fill and Stroke*** window. You can use the tools in the ***Stroke Paint*** tab to give colour to the outline of an object.

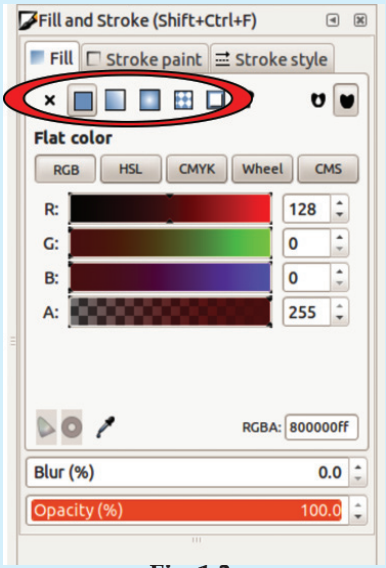


Fig. 1.3
Fill and Stroke window

Now it has to be made attractive by giving light and shade to the colours. For this,

- Click on the ***Gradient*** tool in the Toolbox.
- You can give suitable colours to the object by clicking each node that appears and then the colours in a sequence. (For example, give dark colour to the outline by clicking the node at the boundary of the circle and lighter colour inside.) To select colour you can use ***Colour Palette.***
- Now create duplicate of the oval by selecting the picture and clicking ***Duplicate*** in the ***Edit*** menu.
- A copy must have appeared on the top of the original. To make it proportionately smaller, press the ***Ctrl*** and ***Shift*** keys together.
- Arrange the second one in the middle of the first oval.
- Create more ovals and arrange as shown in the model [Fig. 1.2(d)]

Activity 1.5 - Grouping pictures

You must have drawn a few ovals for the saucer. Now you can select them separately. If you wish to move them together any where, you have to group them. For this,

- Click the ***Selection*** tool. Now click at a point and drag the mouse in such a way that it covers all the ovals. (You can also select different objects by pressing the Shift key while clicking them separately).
- Click ***Group*** in the ***Object*** Menu.

Now try to select the picture and move it any where else on the canvas. Are you able to move the entire picture?

Colour palette is convenient

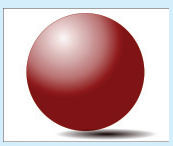
Just as you can give colour to an object using colour palette, it is possible to remove the colour using the same tool. For this, you can use the x sign on the left side. Similarly, you can give colour to the stroke by clicking while keeping the ***Shift*** key pressed.

Opacity

You can change the depth of a colour by changing the opacity of the colour in the ***Fill and Stroke*** window.

More Activities

Draw cylinders, spheres, etc. with the tools for drawing circles and squares and also use tools for Gradient, Difference, Union, and so on and save in your folder.



Save the picture in your folder. Did you notice the extension *.svg* in the file name?

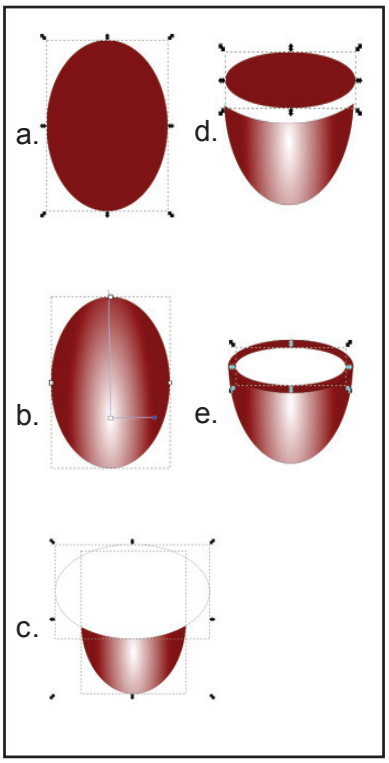


Fig. 1.4
Drawing the saucer

Activity 1.6 - Drawing the tea cup

We will now draw a tea cup in another part of the canvas. You can create the image of a tea cup by removing a part of the oval. Try the following activities (Fig. 1.4).

- Use the ***Create circles*** tool to draw an oval in the vertical direction (a).
- Give colours with light and shade as shown in the example (b).
- In order to get the shape of a cup, it is sufficient to remove a portion of the picture to get the appropriate shape. To do this, draw another circle and arrange as shown in (c).
- Select both.
- Now Select ***Difference*** from the ***Path*** menu. This will remove the area that is common to both and the first oval will get the shape of a cup.
- In order to draw the edge of the cup, draw a suitable oval and keep it at a proper place as shown (d, e).
- Group the images.
- The different stages for drawing the handle of the cup are shown in the figure (Fig. 1.5). List the activities done for drawing it.
- .....
- .....

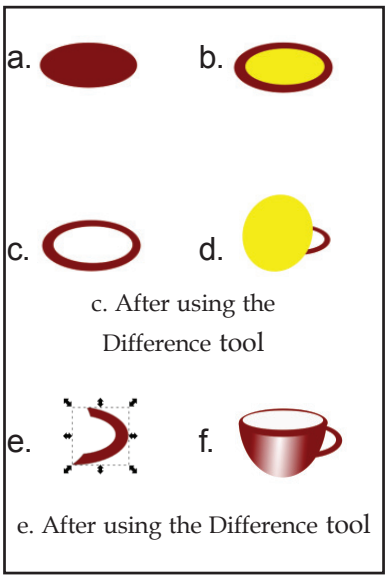


Fig. 1.5
Stages for drawing the handle of a cup

Activity 1.7 - Filling with tea

We have to give colour in such a way as to make it look like a cup filled with tea. To do that, draw an oval just below the top of the cup and fill it with the colour of tea.

Arrange this oval along with others in its proper place and group them.

Fig. 1.6
Cup and Saucer

Activity 1.8 - Grouping Cup and the Saucer

Place the grouped images of the cup appropriately on the top of the grouped images of the saucer and group them together (Fig. 1.6).

Activity 1.9 - Steaming tea

The picture of the cup with hot tea will appear more natural if the steam rising from the cup is also shown. For that, you can do the following activities.

- Draw two or three vertical lines a little above the cup using the ***Calligraphic brush*** tool.
- Select all of them together.
- Give them a suitable colour.
- Modify the drawing suitably using the ***blur*** tool in the ***Fill and Stroke*** window.
- Group the images (Fig. 1.7).

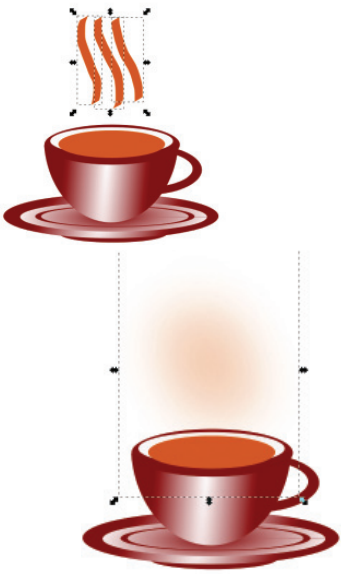


Fig. 1.7
Picture of steaming tea

In order to give this drawing in the form of a logo, we need to do some more activities. Most logos have the name of organisation or some marketing slogan written in it. Now we will do the required activities to include a slogan in the logo.

Fig. 1.8 Steps for including the letters

While adding Malayalam text

While adding Malayalam text in Inkscape, you should take care to change the font to Rachana, Meera, etc.

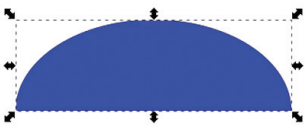
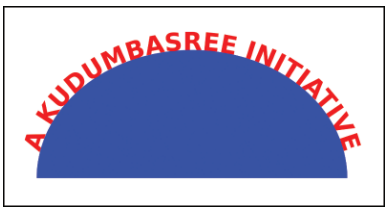


Fig. 1.9 To draw semi-circle

A KUDUMBASREE INITIATIVE



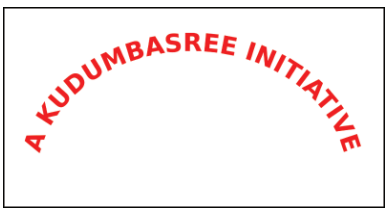


Fig. 1.10 Giving letters more attractive form

Adjusting space in text

While adding text, if you want to adjust the spacing between the characters, you can use the ***arrow*** keys with the ***Alt*** key pressed.

Activity 1.10 - Adding text

Inkscape has the tools to edit text in different forms. Now let us do the activities to add suitable text to the logo.

- Type the required text using the tool ***Create and edit text objects***.
- Give suitable size and colour to the text.

Now we can make the text more attractive. For this,

- Create a duplicate copy of the text, give it a different colour and move it in such a manner, as shown in the sample (Fig. 1.8) (such as both can be seen).
- Group the text.

Activity 1.11 - Text in a curve

You may have seen the text written in a curve in rubber stamps and logos. Let us see how this can be done. For this, you have to first draw a semicircle. Try the following activities.

- Draw a circle
- When you draw it, look at the Start field at the top. Change it from 0.000 to 180, and see what happens (Fig. 1.9).
- The size of the semicircle can be changed, if needed.

The text has to be aligned with the semicircle drawn. For that, complete the following activities also.

- Type the required text using the tool ***Create and edit text objects***.
- Select the text and the curve together.
- Now select the item ***Put on path*** from the ***Text*** menu.

- The text will then be aligned along with the object thus selected. You can move the text alone by selecting the ***Text*** tool, clicking on the text and aligning the text at the centre by pressing the ***space bar***.
- Select the semicircle and eliminate its colour using the ***Fill and Stroke*** tool (Fig. 1.10).
- Arrange the text along the curve in a suitable manner in the logo (Fig. 1.11).

  More text can be added if required.

Fig. 1.11 Logo Model

Activity 1.12 - Logo in *png* format

We saw that the logo will be saved in the ***svg*** format. If needed, it can be saved in ***png*** format too. You can use the ***Export PNG*** option from the ***File*** menu. If there are several pictures on the canvas, it is also possible to export the selected ones alone. (Observe the ***Page*** and ***Selection*** tabs in the ***Export window***.)

Before exporting ensure that the extension ***.png*** appears in the file name.

Activity 1.13 - Adding logo to the banner

The logo of an organisation may be used for different purposes. Here the need is to add it to a banner. So let us try creating a banner with the logo we thus made. You should make it attractive by using colours and pictures in the background.

Inkscape has the facilities to edit bitmap images also. Add a picture to the canvas through the activities given below.

- Import a picture from your computer into Inkscape using the menu ***File*** → ***Import***.

Object to Path

It is possible to convert any picture drawn in Inkscape into Path, which makes it easy to edit.

Adjust page size

The default page size in Inkscape is A4 (210 x 297 mm). Page size can be changed at any stage of the work. It can be done by making changes in the window that appears when you click ***File*** → ***Document Properties***. Inkscape also has the facility to adjust the page size according to the content created through the option ***Resize page to the content*** in the window. The same window allows you to remove the page border.

Transparent canvas

The default canvas in Inkscape is transparent. In order to give background colour to the objects we draw, we need to create a background using rectangle tool and give colour to it.

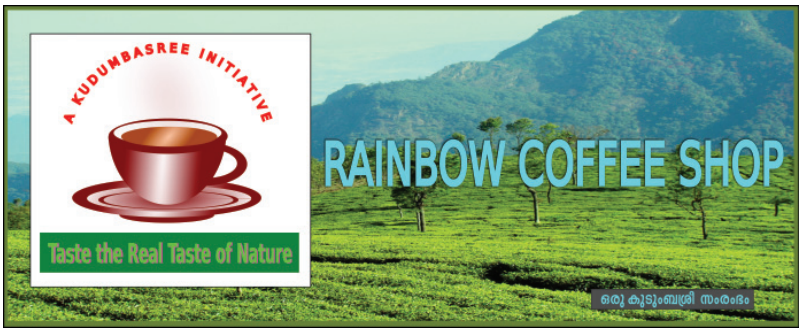


Fig. 1.12 Banner Model

- In the window that appears, select ***Embed*** as the image type.
- Adjust the size and create suitable background (Fig. 1.12).

If the imported image appears above the picture, then it is possible to use the ***Lower/Raise*** option in the ***Object*** menu to move it behind.

Make the banner attractive by including necessary images.

We have learned some of the immense possibilities of Inkscape vector editing application. You should try to learn more about it.

Significant learning outcomes

The learner:

- finds out the features of raster and vector images and prepares a note.
- prepares the images on canvases of different sizes.
- draws different objects in Inkscape like circle, square, etc. and creates different shapes.
- incorporates the text in images created in Inkscape.
- arranges the text according to the shape of the object using Inkscape.
- gives light and shade to the objects using Inkscape to make them three dimensional.
- imports bitmap images into Inkscape.
- exports vector images as raster.

Let's evaluate

1. Mark each of the following as correct or wrong

	Right/Wrong
Raster images are made of pixels	
Vector images lose their clarity while scaling	
Vector images have smaller file sizes compared to raster	

2. Prepare a banner containing the name of your school using Inkscape.
3. Draw the 's' subshell shown in the chapter 'Periodic table and Electron Configuration' of your Chemistry textbook.
4. Which of the following images can be made using Inkscape?

   a) square.png b) square.jpg

   c) square.svg d) square.bmp

5. Which of the following options will you use to arrange one of the four objects you have drawn in Inkscape below all others?

   - Raise
   - Lower
   - Raise to Top
   - Lower to Bottom

6. Given below is the logo of IT@School. Draw this in Inkscape

Follow-up activities

- Draw the 'p' subshell shown in the chapter "Periodic table and Electron Configuration" of your Chemistry textbook. (You can change the shape of the circle using the node editing tool.)
- Illustrate symbolically the reactions discussed in the chapter "Mole Hypothesis" of your Chemistry textbook.
- Draw the neuron cell discussed in the first chapter of your Biology textbook.
- Prepare a note on raster and vector images including more details.

Chapter 2

Publishing

The invention of the movable type printing brought about drastic changes in the arena of publishing industry. Further, the changes became manifold as a result of new desktop techniques.

Today we have so many publications such as children's magazines, science magazines and so on. You may have noticed that the contents of such publications are beautifully arranged. Each newspaper and magazine has its own page design. Look at our textbooks. The contents are given in an attractive manner. What are the features of the layout of each page?

- Same type of font, size and colour for headings.
- Another type of fonts, colour and size for subheadings.
- Uniform font, size and colour for the text.

- Logical arrangement of paragraphs
- .....
- .....

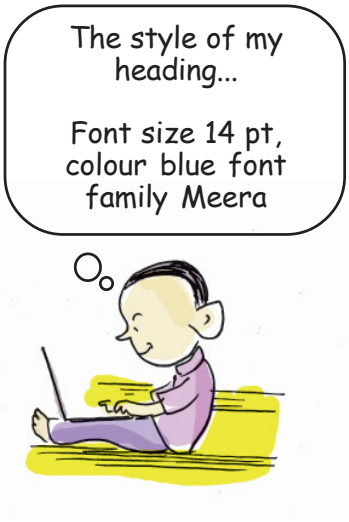
What should be kept in mind while preparing articles, reports, etc. for publication to make them look striking? How about preparing a report using LibreOffice Writer on the curricular and extra-curricular activities of your school last year? You can make an appealing report by maintaining a uniform page layout and formating heading and paragraphs.

You have studied how an impressive document can be made using different types of fonts and aligning the paragraphs correctly. Let us see how a document can be formatted after it is typed.

- Select words or paragraphs one by one.
- Specify the size, colour and background of the text using the tools in the formatting tool bar.

How can you give the same format for other words, sentences or paragraphs?

The report prepared by the students of Charamangalam D.V. High School is given in the Resource folder with the filename ***school_report.ott***. We shall learn how to give the main headings of this report same size, colour and font.



Activity 2.1 - Making headings attractive

Open the file ***school_report.ott*** and decide what changes have to be made to the main headings.

Clone Formatting

Clone Formatting tool is used for applying the format of a given text or an object to another one. If there are several attributes as in the paragraph format, they can be copied by double clicking on the tool and applied to another text or object by holding the ***Ctrl*** key while selecting the other text or object.

Select the first heading and make the changes one by one. Try to copy the changes to other headings using the hints given below.

- Select the formatted heading.
- Click ***Clone Formatting*** tool in the toolbar.
- Click and drag other headings.

Observe the changes in the headings. Can you apply the format of a given text or image to other texts?

This method can be used for making changes in a small document of few pages. But if you have a document like a book or a report, it will be cumbersome to copy the format of the entire text one after the other. Also, if you want to make further changes to the formatting already done (font colour or size, etc.) you will have to repeat the entire process once again.

Let us see how we can make this simpler while preparing a lengthy report for publication.

Activity 2.2 - Styles for defining headings

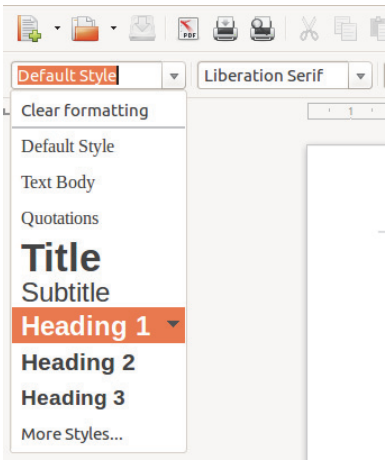


Fig. 2.1
Apply Style Box window

We have learned about the features of LibreOffice Writer to format the headings and subheadings of our school report uniformly. Writer has the features to define words as headings and give them a suitable format. These are available in the ***Apply Style Box*** on the left extreme of the format tool bar.

Let us open the file ***school_report.ott*** and format the headings in it as mentioned below.

- Select the first heading.
- Click ***Heading 1*** in ***Apply Style Box*** (Fig. 2.1).

- Select other headings one by one and click ***Heading 1*** in ***Apply Style Box***.

Observe the changes. You can understand them if you select each heading and examine the formatting tool bar. Generally, ***Heading 1*** is a style created by incorporating certain features of a heading.

When this style is used, the software recognises the words that have been selected as title and gives a built-in format for the title.

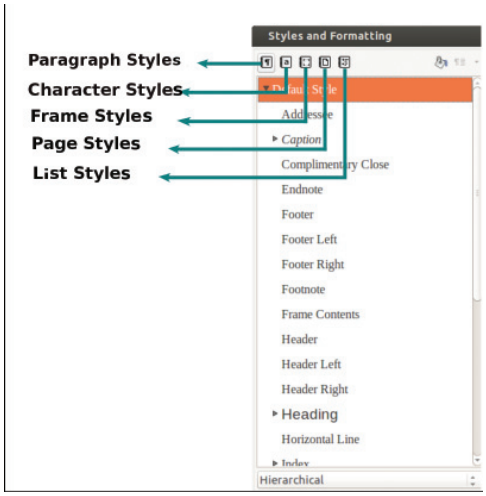


Fig. 2.2
Style Window

There are several styles available in LibreOffice Writer to make a document attractive. You should become more familiar with the window (***Styles and Formatting***) that opens when you click ***More Styles*** in the ***Apply Style Box*** (Fig. 2.2).

Different styles are made available in this window. Find out and list down those styles we use commonly use from the section ***Paragraph Styles***.

- Heading
- Header
- .....
- .....

Styles

We can identify the headings of a book based on certain features such as the font, character size, colour, alignment, etc. LibreOffice Writer recognises headings only if they are defined as such. We can also decide how headings should appear? We can define headings, subheadings and paragraphs separately. These are called Styles.

Activity 2.3 - Modifying the Styles

So you have applied the style ***Heading 1*** to all the headings of the file ***school_report.ott***. Now let us see how we can modify the style. Try making changes based on the following tips.

- Open the ***Styles and Formatting*** window.
- Right click on style ***Heading 1*** and select ***Modify***.

- From the window that opens choose appropriate font family, font size, colour, distance from the margin, etc. (When you modify the style, you should modify the ***CTL font*** for Malayalam/non-English languages and ***Western text font*** for English).

- Click OK.

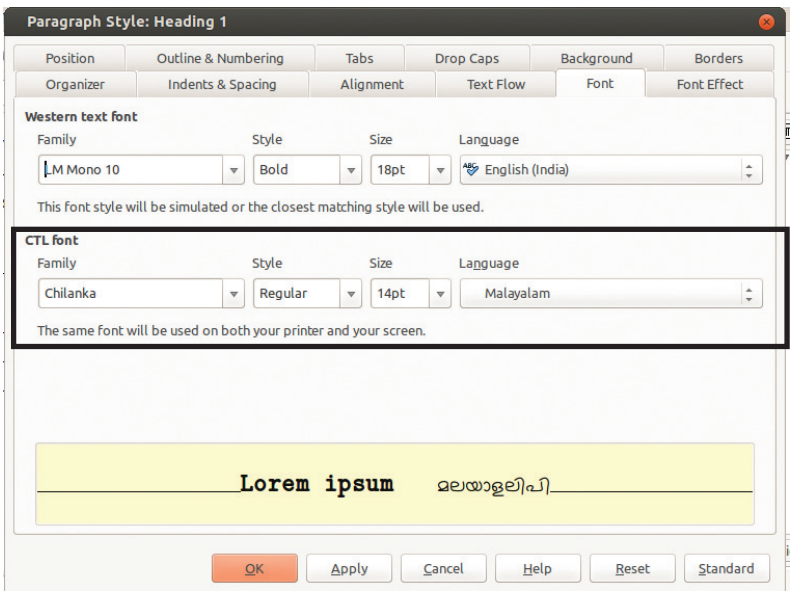


Fig. 2.3 Style Formatting window

Find out the changes that had happened to the headings in the report. These changes will be effected for all the headings to which style ***Heading 1*** was applied.

Similarly, once we format all the headings or paragraphs using styles, we can also modify their appearance by making changes in the styles. The changes will be seen at all places, where the style has been used. It is thus convenient to modify the appearance of the text and headings while preparing documents like reports or books.

Activity 2.4 - Creating a new Style

Shall we prepare some new styles for our school report? This will us make the school report attractive in its own ways. How do we create a new style?

Scribus

Scribus is a Desktop Publishing application. Pagemaker and Publisher also fall in the same category. These applications have many features for preparing books, magazines and newspapers for publication. Publishing software gives importance for doing layout and design. Scribus is a Free Software. It has an advantage that it supports Unicode.

Just as we have made changes to the existing styles, we can also create new styles. Let us first decide what styles are required for our report and what should be the features. What about creating the styles 'MainHeading' and 'Subheading' for our main headings and subheadings and ***Paragraph 1*** for our paragraphs?

Let us tabulate the features of styles and create a new ones as per the listed formats and tips given below.

Style	Font				Distance from the margin	Alignment	Distance to the margin from the first line
	Size	Colour	Family	Style			
Main Heading			Chilanka			Font	
Sub Heading							
Paragraph 1							

Table 2.1 Style formats

- Open ***school_report.ott*** and open the window ***Styles and Formatting*** in it.
- Right click ***Heading*** in the ***Paragraph*** section and select ***New*** (We are creating the style for headings, after all).
- In the window for creating new style, select the ***Organizer*** tab and give the name 'Main Heading' for the new style.
- Make the desired changes to the 'Main Heading' style and save.
- Save the style.

When creating a new style

When we create a new style for the main headings and sub headings, we should open the ***Organiser*** tab and select the type of style needed from the ***Inherit*** option. (***Heading 1***, ***Heading 2***, ***Heading 3*** etc.) from the ***Inherit*** option. This will be useful when we prepare the contents.

- Create and save styles for Sub Headings and paragraphs in the same manner.

After preparing the styles, select main headings one by one, apply the ***MainHeading*** style, select sub headings one by one, apply the ***SubHeading*** style and select each paragraph and apply the ***Paragraph1*** style to format the report.

As you studied earlier, you should make the report captivating with the help of suitable headers, footers and page borders.

Activity 2.5 - Table of Contents (Index table)

You might have seen "Table of Contents" given at the beginning of your textbook and in other books too. This table helps to understand what the book contains, and on which page each chapter begins and so on. Let us see how this table can be created without typing it and what are the advantages. Build the table of contents of the school report using the following tips.

- Open the school report that we prepared.
- Take the cursor to the place where the table of contents appear.
- Select ***Index and Tables*** from the ***Insert*** menu.
- In the window that appears, give suitable heading and background colour for the table of contents and click OK.

The software will automatically create the table of contents with the main headings and sub headings accordingly without typing it. It does this by recognising the styles given for the main and sub headings.

LaTeX

Today there are many applications for Desktop Publishing. LaTeX is one such software that is very helpful for creating scientific articles and research reports. It has several features for typesetting symbols and equations used in scientific reports.

In Writer or other such applications, you can first type the text and then format it as required. But we can create the document using LaTeX language which that is a markup language similar to the HTML language used for creating web pages. There are editors like Texmaker, Texstudio and Texworks that help you to create documents using the LaTeX language.

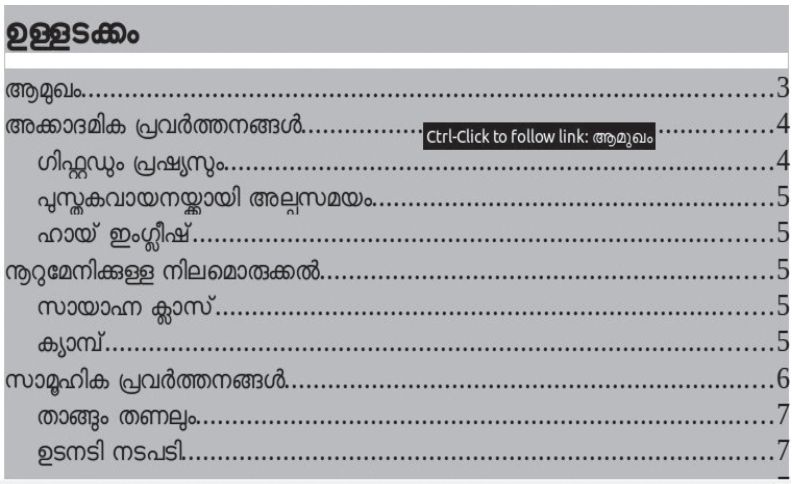


Fig. 2.4 Table of contents

From the 'table of contents' to the contents

Move the cursor to one of the headings in the table of contents that we have created. What message appears?

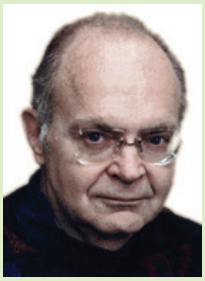
The message tells us that it we click at any line on the contents page with the ***Ctrl*** key pressed, the link gets activated and takes us to the corresponding page. For example, if we click at the word 'Preface' on the contents page, it will take us to the **Preface.** Try clicking, with the ***Ctrl*** key pressed, on different lines in the Contents page and understand how it works.

Try to understand the changes that came over the methods adopted for locating the different parts of the report using the table of contents after converting the report to ***pdf*** format.

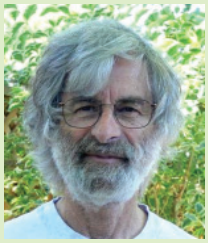
Activity 2.6 - Different styles for the 'table of contents'

It is possible to give different styles to the table of contents. The software normally formats the headings and subheadings in the table of contents according to some defined styles. By finding these styles and modifying them, we can give a style to the table of contents as we desire. Let's find them and tabulate the styles.

Behind LaTeX



Donald Knuth



Leslie Lamport

The computer scientist Donald Knuth developed a program called TeX in 1977 for typesetting technical documents. LaTeX is a program based on this that was developed by Leslie Lamport.

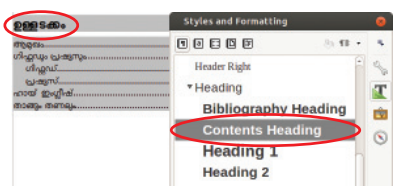


Fig. 2.5 Styles for the table of contents

- Open the school report that we prepared
- Open the ***Style*** window (Fig. 2.5)
- Click on a title given in the table of contents. Find the required details from the style window and note them in the table (Table 2.2).
- Similarly find the details of the other sub headings and note them in the table.

You have studied how to modify styles. Right click on the ***Contents Heading*** in the ***Heading*** section of the ***Styles and Formatting*** window and select ***Modify***. Now you can make desired changes in the window that opens. In a similar manner, improve the appearance of the table of contents by modifying the styles of main headings and subheadings.

Type	Section	Style
Title of the table of contents	Heading	Contents Heading
Main headings		
Sub headings		

Table 2.2 Styles for the table of contents

Preparations for the Youth Festival

The school report is ready. Assume that an activity which the IT club has to do this year is something related to the organising of the school youth festival. We can start the preparations now itself. What should be done?

- Preparing the letter for the parents about the festival
- Preparing the participant's card
- Preparing the certificate

Activity 2.7 - Preparing the letter for parents

The first thing is to prepare the letter for the parents. It will be lovely if the letter has the name and address of the parent printed in it? But editing the letter separately for each parent is a tremendous task. In such situations, we can make use of the feature known as Mail Merge to include the name and address one by one in a table in the letter. Let us see how the Mail Merge works. What preparations should we make for this?

- Preparing letters for the parents
- Making a list of addresses in LibreOffice Calc

Open and examine the letter (***letter.odt***) and the list of addresses (***address.ods***) prepared by the students of Government High School, Haripad saved in ***School_Resources***. Modify them if needed.

Now let us see how we can include the addresses one by one. First we have to link the letter with the list of addresses in ***address.ods***. Complete the activity with the help of the hints given below.

- Open the file ***letter.odt***.
- Click ***Fields*** from ***Insert*** menu and then ***More Fields***.
- From the window that opens, select ***Mail merge fields*** from the ***Database*** menu (Fig. 2.6).

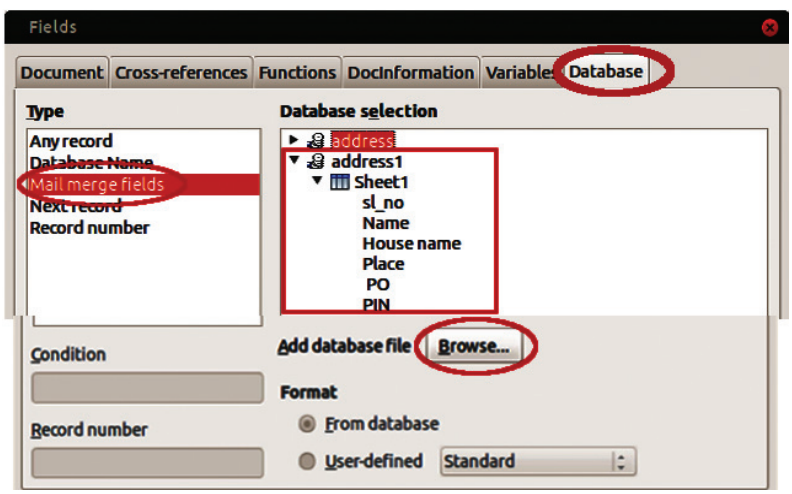


Fig. 2.6 Field Insert window

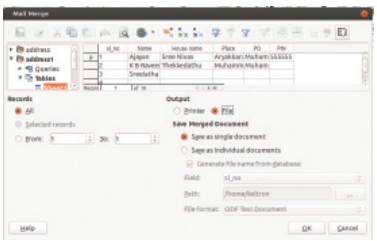


Fig. 2.7 Print window

- Browse and include the file in which the addresses are listed.
- Select the fields in the address file.
- After taking the cursor to the place where the address is to be included, you can include the necessary fields by double clicking the ***Fields*** window and close it.
- Click ***Print*** in the ***File*** menu, select the option for getting the output as a single file and click ***OK*** (Fig. 2.7)
- Save the file.
- Open the saved file and see. You will find separate letters for all the parents.

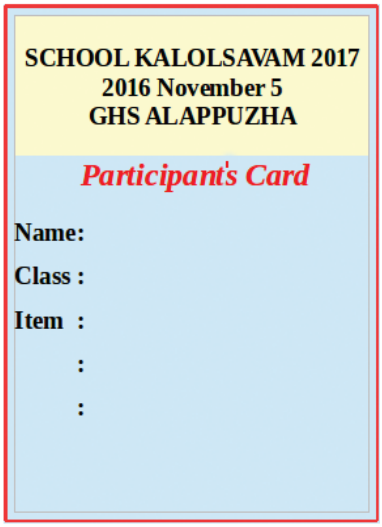


Fig. 2.8 Model of a participant's card

Activity 2.8 - Preparing participant's cards

You must have seen the participant's cards given during district youth festivals, science fairs, etc.

What about giving such a card to the participants of the school festival? We can use the mail merge facility for that. You have to prepare something like the card shown in the Figure 2.8. What should be kept in mind while doing this?

- The card should be attractive.
- It should contain all the necessary information about the student.
- One sheet should be able to hold at least four cards.
- .....
- .....

The mail merge method can include only the details of one person per page. In order to include the details of several people in one page, we will have to follow another method. Complete the activity with the help of the following hints.

Prepare a table in LibreOffice Calc giving the details of the students (name, class, participating events) (don't forget to save).

- In Writer, use the ***Frame*** facility to prepare a sample card.
- Take copies of this and arrange them in a page.
- Include the ***Mail merge fields*** in the first card.
- Move the cursor to the second card and double click ***Next Record*** in the ***Database*** window.
- Again select ***Mail merge fields*** and include the fields in the second card.
- Similarly, include the fields in the other cards also.
- Now you can select ***Print*** from the ***File*** menu. Select the option to get the output as a single file and save.

Activity 2.9 - Preparing a certificate

The details of the winners are available in the file ***result.ods*** and a model of the certificate in the file ***Certificate.odt*** in the Resource folder. List the activities needed for creating certificates for children using the mail merge technique.

- Open the file ***Certificate.odt***.
- .....
- .....
- .....

You should be able to prepare certificates for all children through these activities.

Frames

Frames are used to place text or images within a document in such a way that they can be placed anywhere in the document separated from the main contents. A ***Frame*** can be placed anywhere in the page according to our convenience.

Fig. 2.9 Model of a certificate

Significant learning outcomes

The learner:

- formats a document using styles in LibreOffice.
- uses styles in LibreOffice after making necessary modifications.
- creates new styles in LibreOffice for improving a document.
- prepares letters to several people using the Mail Merge facility in LibreOffice.
- make use of the Mail Merge facility in LibreOffice for different purposes.

Let's evaluate

1. The resource folder contains a report on the population of Kerala based on the 2011 census report. Open it and do the following.
   - Create suitable styles for headings and subheadings.
   - Create a suitable style and apply it to the paragraphs.
   - Prepare the table of contents of the report.
2. The data collected by the staff of an electricity office for preparing power bills is given in the file ***bill.ods*** in the resource folder. Prepare bills for each family using Mail Merge.
3. The invention of vaccination played an important role in reducing the diseases and improving human lives. A file on vaccines is saved in the resource folder with the name ***vaccine.ott***. Open the file and select a suitable style for the paragraphs. Apply this style to every paragraph.

Follow-up activities

1. Prepare an article about the tourist centres of Kerala using information from the Wikipedia. Create attractive styles for headings, subheadings and paragraphs and format the article.
2. Prepare a report on the activities conducted by the IT club in your school. Use attractive styles for headings, subheadings and paragraphs of the report.

Chapter 3

Attractive Web Designing

You have studied in Class IX how to prepare a web page for sharing news about the School Kalolsavam. We have understood that the web pages we see are also built using HTML. A web page built by Anu as part of her study activities in Class IX is given with the filename ***schoolkalolsavam.html*** in the ***School_Resources*** folder. Open this in your browser. Then right click that page, find its source code and fill up Table 3.1 given below.

html tag / attribute	**Use**	**No. of times used**
font		
face		
color	changes text colour	
size		
img	includes image	
height		
width		
audio	includes audio	
video		
p		

Table 3.1: Reused html tags

Styles and Cascading Style Sheets

For a web page, styles refer to the manner of defining of the margins, fonts, colours etc. to make the web page attractive. Stylesheets are files that define these things separately from the contents. The same stylesheet can be used for several documents. Stylesheets are also known as templates. The function of cascading stylesheets is to direct how the contents prepared using a markup language should be displayed. Cascading stylesheets help to eliminate repetitive use of HTML tags while designing web pages.

What are the tags and attributes used to make the content attractive in this web page?

- font
- color
- .....
- .....

The tags, attributes and page layout used to make the contents of the web page attractive can altogether be called its Style. For one web page itself, they have to be used several times. If we can keep them at one place and reuse them, can't we avoid their repetitive use? Won't it be helpful when several web pages are to be built?

How did we create and use new styles in a word processor?

- Opened the ***Styles and Formatting*** window and created a new style.
- Used these styles wherever needed.

Similarly, whether it is possible to save the styles created for the contents of a web page for using later as and when required?

Web pages and Cascading Style Sheets

As part of web designing, when several web pages and the properties of the tags to be used in them are to be created, Cascading Style Sheet (CSS) is the technology developed to avoid repetition of the code effectively.

Fig. 3.1 shows two different pages of Wikipedia. What are their features?

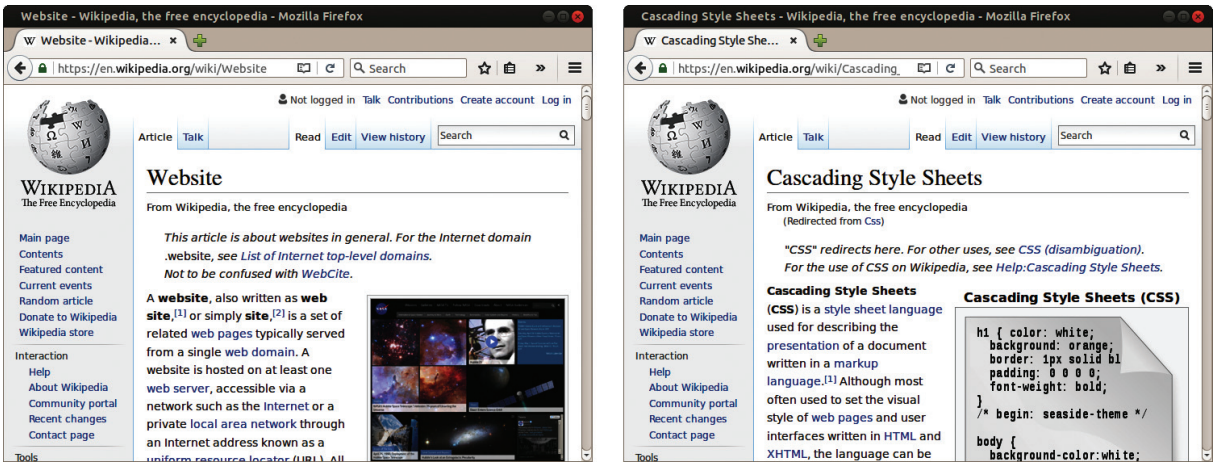


Fig. 3.1 Two different Web pages from Wikipedia

- The contents are given in the same layout.
- .....

We can see that the two pages shown in the Fig. 3.1 and the other pages in the Wikipedia have the same style. How can we build web pages with the same style?

Including Cascading Styles

We were able to give same style for several pages in a word processor using ***Styles and Formatting***. For making a web page, we prepared ***html*** scripts in a text editor. In order to include cascading styles within this, we can make use of the same text editor.

Fig. 3.2 shows how to include cascading style for a paragraph tag while making a web page.

Activity 3.1 - Adding cascading style for a paragraph tag

Open a text editor and prepare HTML code as shown in the Fig. 3.2. Save this file in your folder with the name ***kalolsavam.html***. Then open it in the browser.

We have mentioned the properties required for the

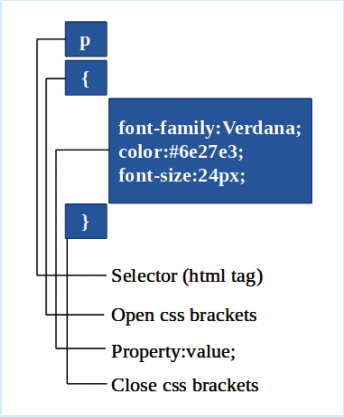
kalolsavam.html

```
<!Doctype HTML>
<html>
<head>
<title>School Kalolsavam</title>
<style>
p
{
    font-family:Liberation Sans;
    color:#401d9a;
    font-size:20px;
}
</style>
</head>
<body>
<h3>Single Items</h3>
<p>
    Mohiniyattam<br>
    Bharathanatyam
</p>
<h3>Group Items</h3>
<p>
    Oppana<br>
    Thiruvathira
</p>
</body>
</html>
```

Fig. 3.2 Cascading style for paragraph tag.

CSS Syntax

In cascading style, the attributes of a tag can be given within {} braces after its name. Examine the figure below.



<p> tag using cascading style in the activity 3.1. Make the changes as specified in the Table 3.2, save and open the browser.

Activity 3.2 Familiarising different styles

Existing	Changes	Observed changes
font-family:Liberation Sans;	font-family:Verdana;	
color:#401d9a;	color:#ff00ff;	
font-size:20px;	font-size:24px;	

Table 3.2 Changes applying to cascading style

What changes did you make in the HTML statement in order to give cascading style for the above two activities?

- Included <style> tag within the <head> tag.
- Included the name of the tag to be used for the content (eg. p) inside the <style> tag.
- Included the properties of the tag within the {} braces.
- Used the colon (:) sign in order to separate property and value.
- Used the semi colon sign (;) after every property.

Shall we give different features to the heading (<h>) tag for the web page, using cascading style in similar way?

Activity 3.3 - Applying cascading style to the heading tag

Open the ***kalolsavam.html*** file you have prepared, in a text editor. Give cascading style for the tag <h3> as in the Fig. 3.3. Save this file and open it in a browser and notice the changes.

```
h3
{
    font-family:URW Bookman L;
    color:#00ff00;
    font-size:30px;
}
```

Fig. 3.3 Cascading style applied to h3 tag

Different features for the same tag

What were the methods adopted to give properties to the paragraph tag and the heading tag for the above activities?

- We typed the paragraph tag `p` inside the `<style>` tag and specified their properties within braces `{}`.
- We typed the heading tag `h3` and specified its properties within braces `{}`.

In this manner, when the name of the tag for including the content itself is used for specifying the display properties of the tag, it is called Element Selector. When the web pages are developed, the required properties of any of the tags used for including the content can be specified using Element Selectors. What are the tags used for including the content in the web pages that you have studied earlier?

- `<p>`
- `<body>`
- .....
- .....

You can use Element Selector to define display features for all these tags.

Suppose you want to display single items like Mohiniyattam and Bharathanatyam and group items like Oppana and Thiruvathira in different colours in the web page you have created. You have already included them using separate paragraph tags. Examine the Fig. 3.4.

So you have to give different properties to these paragraph tags. This is not possible if we use Element Selector. Therefore, we can give different names (class) to the paragraphs and transform them into Class Selectors. See Fig. 3.5.

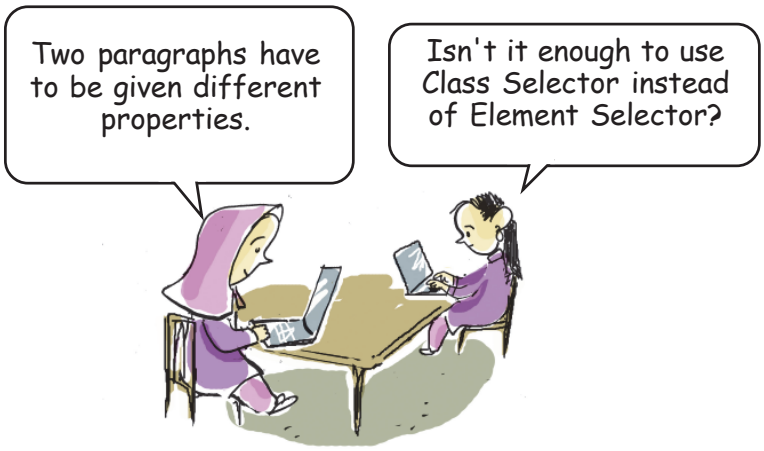
Element Selector: In one web page, when a tag is to be used several times with the same properties, then within the `<head>` tag, the properties of that tag can be included in the `<style>` tag. It is called Element Selector, when the name of the tag is itself used for specifying the styles of the tag.

```
<body>
<h3>Single Items</h3>
<p>
    Mohiniyattam<br>
    Bharathanatyam
</p>
<h3>Group Items</h3>
<p>
    Oppana<br>
    Thiruvathira
</p>
</body>
```

Fig. 3.4 Paragraph tags to differnt contents

```
p.blue
{
    font-family:Verdana;
    color:#0000ff;
    font-size:20px;
}
p.red
{
    font-family:Verdana;
    color:#ff0000;
    font-size:20px;
}
```

Fig. 3.5 Definition of class selector



When you prepare a page, it is sufficient to indicate the name of the class along with the <p> tag.

Class Selector: Class selectors can be used to give distinct properties to different contents that are included in the same page using the same tag. For this, an additional name has to be given to the tag apart from the tag name. This is known as Class and the manner of defining such properties is done by Class Selector. For example,

```
p.blue
{
color:#00ffff;
}
```

Here blue is the class. In order to add this property to the content, the tag

```
<p class="blue">
```

can be used.

```
<h3>Single Items</h3>
<p class="blue">
    Mohiniyattam<br>
    Bharathanatyam
</p>
<h3>Group Items</h3>
<p class="red">
    Oppana<br>
    Thiruvathira
</p>
```

Fig. 3.6 How a class selector is specified.

Activity 3.4 - Giving different formatting to paragraph tags

Open the ***kalolsavam.html*** file you have prepared, in a text editor. Give cascading style for displaying Mohiniyattam and Bharathanatyam in blue colour and Oppana and Thiruvathira in red colour using Class Selector. Save this file and open it in a browser and notice the changes.

Changing background colour using Cascading Style

How can you give an attractive background colour to the web page you have created?

- Use ***bgcolor*** as attribute for `<body>`.

For example, `<body bgcolor="#cfd2d6">`

Instead of giving attributes like this, how can we use cascading styles? See how the `<body>` tag has been given a style using Element Selector in Fig. 3.7.

```
<style>
body
{
    background:#d0f2f8;
}
p.blue
{
    font-family:Verdana;
    color:#0000ff
```

Fig. 3.7 Cascading style of body tag

Activity 3.5 - Modifying page background

Open the ***kalolsavam.html*** file you have prepared, in the text editor. Add cascading style to the body tag using Element Selector as shown in the Fig. 3.7. Save it, open in a browser and observe the changes.

You were able to change the background colour of the web page in Activity 3.5. Now, what should be done if you want to change the background colour of the heading also? Isn't it enough to add the property to change the background colour to the place where other properties of the heading tag are defined? Notice Fig. 3.8.

```
h3
{
  font-family:URW Bookman L;
  color:#00ff00;
  font-size:30px;
  background:#ff0000;
}
```

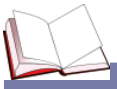
Fig. 3.8 Background colour for the heading

Activity 3.6 - Modifying the background of the heading

Open the ***kalolsavam.html*** file you have prepared, in a text editor. Add the cascading style to the tag `<h3>` as shown in Fig. 3.8, save and open in a browser to verify the changes.

Same style for different web pages

You gave different cascading styles to the web page ***kalolsavam.html*** for the above activities. How can you give the same style to another web page you have created? You can give the same cascading styles to the `<style>`



Background properties

Normally web pages alone are given a background colour. But you can include a background property along with every tag in the content when you use CSS. Visit the web page http://www.w3schools.com/css/css_background.asp and find out more about this.

CSS files

The short form of cascading style sheet is CSS. We can collect all the cascading styles that we use in our web pages in a single file and give it a suitable file name and a file extension ***.css*** and keep it in a folder. The greatest advantage is that we can make use of the cascading styles of this file with a single line of code when we create a web page.

History of CSS

HTML has had many versions at the beginning of www. In these versions font, colour, etc. were introduced in HTML 3.2. The World Wide Web Consortium (W3C) introduced the cascading style sheet in order to eliminate the repetition of code for this purpose. The idea was suggested by Hakon Wium Lie and Bert Bos.

tag when you create different web pages. But then you will be duplicating the code. How can that be avoided? Let us try the method given below.

- Open the file ***kalolsavam.html*** that you have created in a text editor.
- Select all the cascading styles given to the `<style>` tag and cut them.
- Click ***File*** → ***New***, and paste it there.
- Save this new file giving the name style.css to your folder.

The file ***kalolsavam.html*** that you have opened now has no cascading style, isn't it? Use ***Save As*** to save this file in your folder giving it a new name (say, ***kalolsavam_new.html***). Fig. 3.9 shows the difference between the web page ***kalolsavam.html*** that you have prepared earlier and the new page ***kalolsavam_new.html*** opened in the web browser.

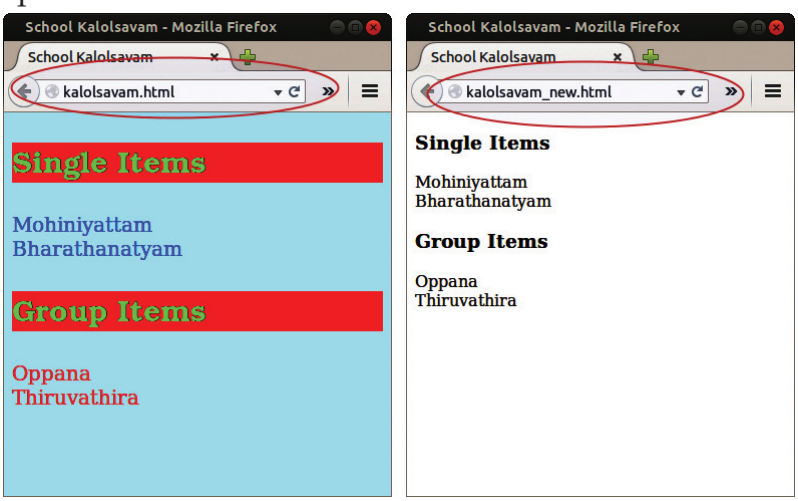


Fig. 3.9. Two web pages with the same content.

Activity 3.7 - Differences while using cascading style

Tabulate the differences between ***kalolsavam.html***, and ***kalolsavam_new.html*** when viewed in a browser.

kalolsavam.html	*kalolsavam_new.html*
.....	Headings have no colour
The page has a background colour	.....
.....	.....
.....	.....

Table 3.3 Differences after including CSS

What could be the reason for this difference? To solve this problem, isn't it enough to add the file ***style.css*** containing the cascading styles of ***kalolsavam.html*** to the files ***kalolsavam_new.html***?. How can you add the ***style.css*** file you have created, to ***kalolsavam_new.html***? Look at the Fig. 3.10.

kalolsavam_new.html ×

```
<!Doctype HTML>
<html>
<head>
<title>School Kalolsavam</title>
<link rel="stylesheet" type="text/css" href="style.css">
</head>
<body>
<h3>Single Items</h3>
```

Fig. 3.10 Including external cascading style.

Here the cascading style sheet, ***style.css*** is included using the `<link>` tag within the `<head>` tag. When you do this, ensure that your web page and the style sheet file are in the same folder. Observe the folder given in Fig. 3.11 in which Anu used to save the web pages.

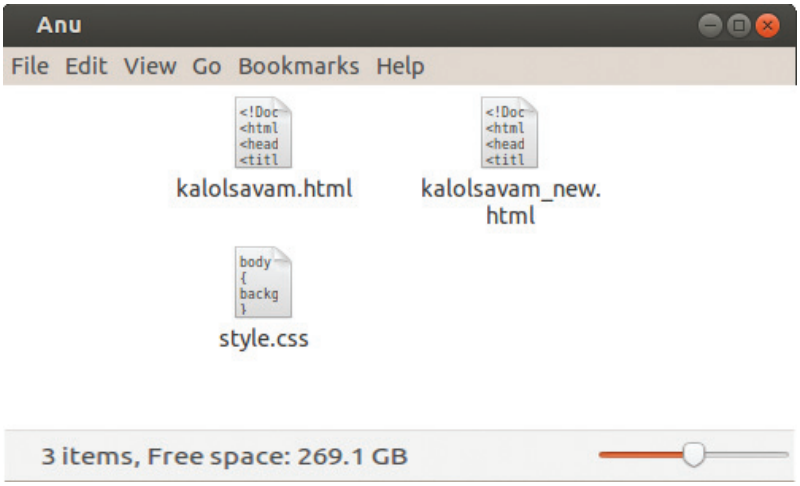


Fig. 3.11 Anu's folder

DOCTYPE Declarations

This line helps the browser to identify the HTML version of the web page. This need not be considered as HTML tag. If we include this line in the web page, it helps the browser to present the corresponding tags according to their versions. Nowadays, the web pages are created using HTML version 5. In order to give information to the browser about this, the line `<!Doctype HTML>` is used before the HTML script. The browser software considers all HTML files as web pages, so even if we don't use this line in our script, almost all HTML tags will be displayed in the web page.

How to add cascading style

Cascading style can be added in three different ways on building a web page.

1. Inline: Add the properties of each tag along with the tag itself.

   For example,

   ```
   <body
   style="background-
   color;">
   ```

2. Internal: Here the properties are defined using Element Selector or Class Selector inside the `<style>` tag.

3. External: Cascading styles required for one or more web pages are included in a separate file with ***.css*** extension. The indications about this file is given in `<link>` tag within `<head>` tag.

Activity 3.8 - Add *CSS* file in the web page

Open the ***kalolsavam.html*** file you have prepared, in a text editor, add the `<link>` tag as shown in Fig. 3.10, save and open with a browser. What changes can you see? Did you notice that the display properties that have been added to the ***style.css*** can be seen in this web page also?

It is for your school kalolsavam that you have prepared a web page. Your school also conducts sports meet, science fair, work experience fair, mathematics fair, IT Mela, etc. Prepare separate web pages for them by adding cascading style and save them in your folder. Don't forget to include images, audio/video of these events in your web pages.

What type of web pages did you prepare? List them.

- ***kalolsavam.html***
- ***itmela.html***
- .....
- .....

Activity 3.9 - Let's prepare more external style sheets

Include all the styles you have used in your web pages in a file called ***mystyles.css*** and save it in your folder. Add these styles to your web pages using the external stylesheet tool, open with a browser and confirm it.

HTML editors to prepare HTML pages

We have learned how to build web pages using HTML and CSS. All web pages cannot be build like this by typing instructions in a text editor. There are applications that help you to create web pages more easily. In these editors, we can prepare web pages as

easily as we can prepare attractive documents using word processors. For example, prepare a document in a word processor and open it using ***Preview in Web Browser*** in ***File*** menu. It opens with a browser. Now right click on the page and select ***View Page Source***. Now you can see the HTML script of that file.

The editors that allow you to create web pages like this are known as WYSIWYG editors. They work on the principle "What You See Is What You Get". Many such editors with free licences are available today - Quanta Plus, BlueGriffon, TextMate etc. are examples. Visit the website https://en.wikipedia.org/wiki/Comparison_of_HTML_editors and prepare a note on HTML editors.

WYSIWYG Editor

WYSIWYG editor has windows and tolls similar to a word processor. It is the best software for web designing as the text and images that you have added will be seen exactly in the same manner on the web page. When you use them you don't have to remember the HTMLtags.

Web Content Management System(WCMS)

As the use of Internet has became widespread, everyone started thinking of a website. In order to build a website, there is no need to learn scripting language. We have WCMS or Web Content Management Systems to help us with this. They are mainly of three types. Online, offline and hybrid. Visit the page https://en.wikipedia.org/wiki Web_content_management_system and prepare a note on the advantages of different Web Content Management Systems.

Significant learning outcomes

The learner:

- adds cascading style to the web page.
- makes web page more attractive by adding cascading styles to html tags.
- avoids code repetition in the web pages by using cascading style sheet.
- creates web page using cascading style sheet and HTML.

Let's evaluate

1. The HTML tag used for adding paragraph content when creating a web page

   a. `<ul><li>...</li></ul>` b. `<p>...</p>`
   c. `<img>...</img>` d. `<body>..</body>`

2. To which HTML tag should we add internal cascading style?

   a. `<body>....</body>` b. `<style>...</style>`
   c. `<p>.....</p>` d. `<a>.....</a>`

3. Using which tag should we add external cascading style sheet?

   a. `<rel>` b.`<head>` c.`<i>` d.`<link>`

4. Create a web page for the sports meet of your school. Give headings for athletics and games and paragraph tags to add items. Complete the following activities using external cascading styles.
   - Give the colour ***#dcdcdc*** as background
   - Give font size ***24px***, font family Helvetica and colour ***#0000ff*** with background colour ***#ffa500***.

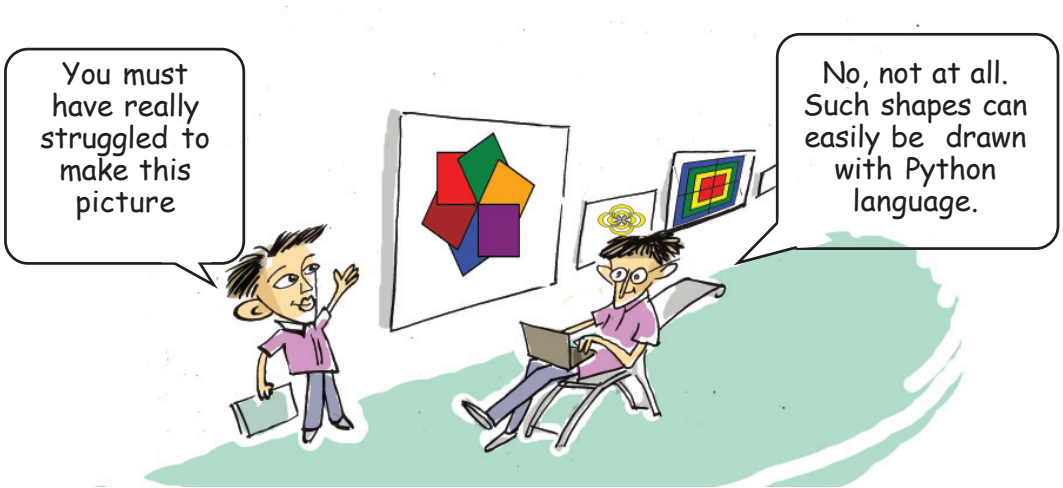
Follow-up activities

1. Open a text editor, enter the following source code, save it in your folder and open with a browser.

```
<!DOCTYPE html>
<html><head><style>
body{margin:0;}
ul{ list-style-type:none;
    margin:0; padding: 0;
    width:25%; background-color:#f1f1f1;
    position:fixed; height:100%; overflow:auto;}
li a{display:block; color:#000000; padding: 8px 0 8px
16px;
    text-decoration:none;}
li a:hover{background-color:#555555; color:white;}
div{margin-left:25%; padding:1px 16px;
     height:1000px;}
</style></head>
<body><ul><li><a href="home.html">Home</a></li>
  <li><a href="news.html">News</a></li>
  <li><a href="contact.html">Contact</a></li>
  <li><a href="about.html">About</a></li></ul>
<div><h2>Samooham High School, N Paravur</h2>
<h3>Avtivities of IT Club</h3>
<p>Training on Computer Games to Primary Children</p>
<p>Maintenance of Computer Lab</p>
<p>Installation of IT@School Customized UBUNTU</p>
<p>Hardware Clinic to Public on Saturdays</p>
<p>Seminars on Software Freedom, Cyber Crimes etc</p>
</div></body>
</html>
```

Chapter 4

Python Graphics



You must be familiar with the programming language called Python. We use this language to do computations and to print information. But programming languages are used not just for creating programs that do computations. They can also be used to create geometric shapes, patterns and animations. Let us look at some of the features of Python language.

We often use different types of application software. We have already used writer for preparing documents, GeoGebra for drawing geometric shapes and GIMP for painting and editing images. How you ever thought about how these applications were created? They were built using different programming languages. Python, CPP and Java are examples of programming languages.

Geometric shapes using Python

We have already used application GeoGebra to create geometric shapes. It is possible to create such shapes using programming languages. Let us examine

IDLE

Computer programs are usually prepared using text editors. The programs thus compiled can be run using terminals. But, editors which can write almost all programming languages and run them are also available. They are called Integrated Development Environments (IDEs). IDLE, Geany, etc. are IDEs used for typing and running the programs in Python Language. Both are available in the ***Programming*** menu of your computer.

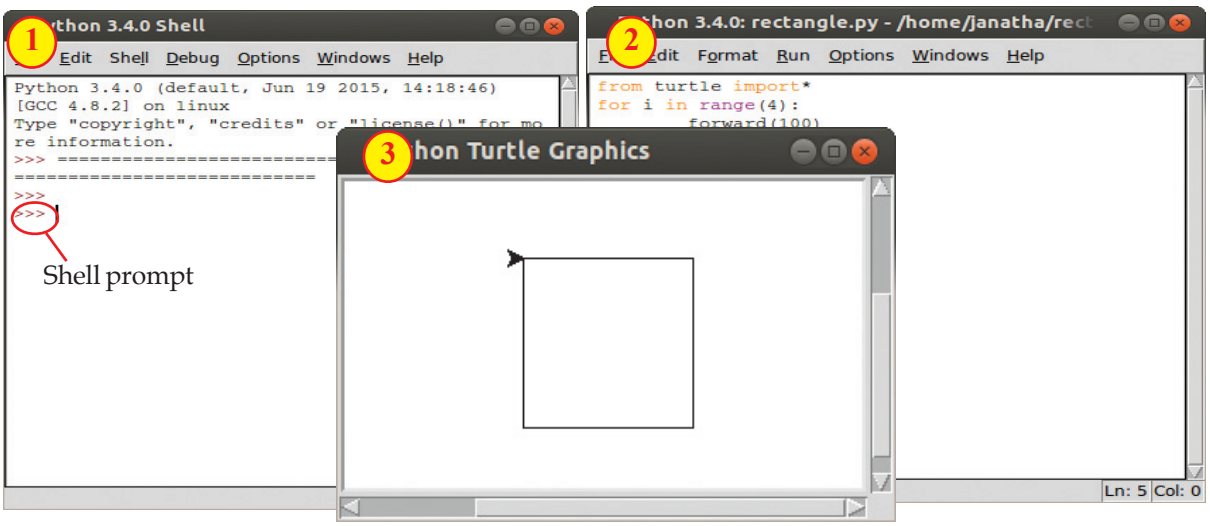


Fig. 4.1 (1) Shell window (2) Editor window (3) Turtle Graphics window

Python Graphics window

Normally when you run python programs in IDLE, the output will be seen in the python shell window. But if the output of the program is graphical, it appears in a different window. This window is the Python Graphics window.

how we can make use of Python to create geometric shapes. For this, some special commands are incorporated in the Python. These are generally called Python Graphics commands.

Open IDLE, type the following commands in the Python Shell prompt, run the program and see what happens.

Turtle Graphics

Some additional software are needed to create geometric shapes using python. Turtle is one such software. Graphic commands will work in python if you add ***from turtle import**** at the beginning of the program.

```
from turtle import*
forward(100)
dot(40)
right(60)
forward(50)
```

The output of python graphic commands will be seen in the Python Graphics window.

Activity 4.1 - Creating geometric shapes

Geometric shapes can be easily created using loop commands and graphic commands in the python. The commands for drawing a square are given below. Open IDLE, enter the program in the editor window, run and see.

Program 4.1

```
from turtle import*
for i in range(4):
  forward(100)
  right(90)
```

Observe the commands `forward(100)` and `right(90)`. The command `forward(100)` creates a line of length 100 units in the Python Graphics window. After that, the command `right(90)` instructs it to turn to right by 90 degrees. Since these two commands are given under the command `for i in range(4)`, they get repeated four times and a square is drawn.

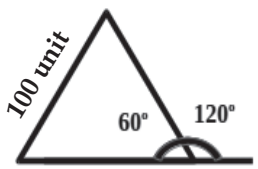
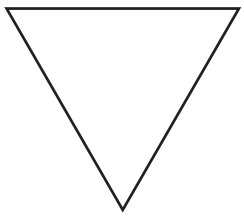
Activity 4.2 - More geometric shapes

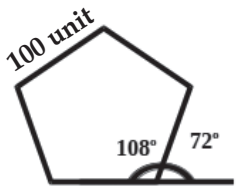
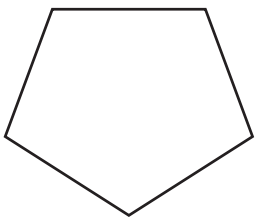
The Python programs for creating different geometric shapes and the shapes thus created are given below. Enter them in IDLE, run and see what happens.

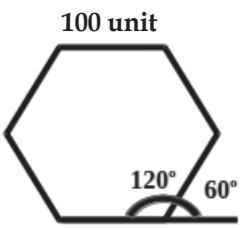
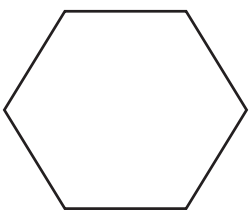
Short forms

Some Python Graphic commands can be written in short form. For example, `forward(100)` can be written as `fd(100)` and `right(90)` can be written as `rt(90)`.

Program	Instruction	Output

Python 3.4.0: program2.py - /home
File Edit Format Run Options Windows Help
`from turtle import*`
`for i in range(3):`
`  forward(100)`
`  right(120)`
Ln: 6 Col: 0
Program 4.2 (a)
		
		Triangle

Python 3.4.0: program3.py - /home
File Edit Format Run Options Windows Help
`from turtle import*`
`for i in range(5):`
`  forward(100)`
`  right(72)`
Ln: 7 Col: 0
Program 4.2 (b)
		
		Pentagon

		 **Hexagon**

When you ran the programs, did you get an equilateral triangle and a regular pentagon? Now try writing a program to draw a regular hexagon.

Nested loop

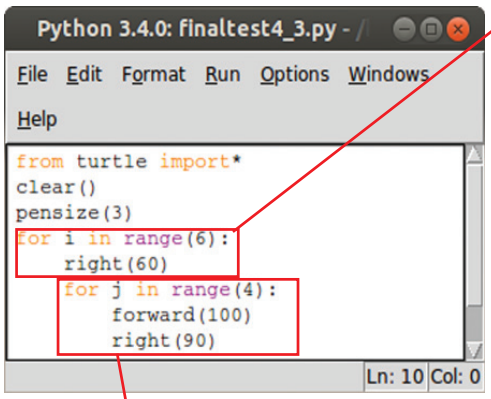
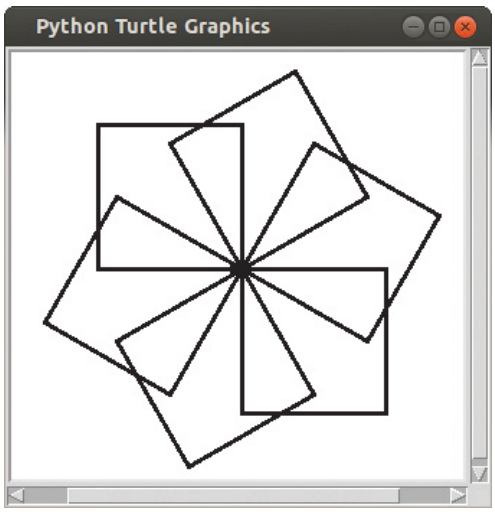
On certain occasions, we may have to execute certain commands repeatedly in a program. For this, we use 'for loop' statements. Sometimes we may have to give another loop statement within a loop. These are called nested loops.

Pattern using geometric figures

We saw how to create different geometrical shapes using python graphics. It is possible to create different patterns containing these shapes with the help of the loop statements.

Activity 4.3 - Creating a pattern

Given below is a program for creating a pattern using squares. The pattern is to be formed by rotating a geometric shape at a certain angle and printing it repeatedly.

Program	Pattern obtained
	

Program 4.3

Codes for drawing square

Codes for printing the square 6 times and for rotating the square by 60 degrees each time it prints.

Observe that the `for` statement is used as nested loops in the program. We have learnt earlier that a `for` statement is required for drawing a square. The first `for` loop is used to rotate the square thus prepared by 60 degrees and print 6 times. Enter the program and run it. Then write down the purpose of each line of the program and complete the following table.

Instruction	Purpose
`from turtle import*`	
`clear()`	
`for i in range(6):`	To draw the square 6 times repeatedly
`right(60)`	To rotate by 60 degrees before drawing the square. Else the squares will be printed one over the other.

`for j in range(4):`
`forward(100)`
`rt(90)`
	Code (program) for drawing a square.

color ()

Figures drawn with python graphics normally are black in colour. To get another colour it is sufficient to use the `color()` command. For example, if you add the command `color("blue")` to the program, everything drawn afterwards will be in blue colour.

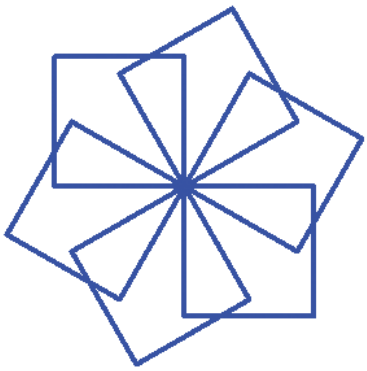
Activity 4.4 - Python code for giving colour

The shapes that appear in the Python Graphics window normally get black colour. But Python Turtle Graphics also has commands to create shapes and patterns in different colours. This can make the patterns more attractive. You have to make use of the instruction `color()` for this. Given below is the program for printing the pattern given in Program 4.3 in blue colour. Enter the program and run it.

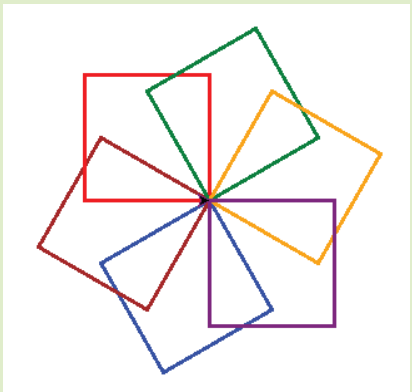
Program 4.4

```
from turtle import*
clear()
pensize(3)
for i in range(6):
    right(60)
    color("blue")
    for j in range(4):
        forward(100)
        right(90)
```

The pattern is printed in blue colour because of the instruction that is newly added.



All squares are printed in the same colour in Activity 4.4. They can be printed in different colours. A slightly modified program to do this is given below. The instruction `color()` can be used in two ways. Once you give the command `color("blue")`, then all the drawings will be blue in colour. You can also give the instruction `i="blue"` for the first line and `color(i)` for any subsequent line to get the same result. The second method is used for the program given below.



```
from turtle import*
clear()
pensize(3)
clr=["blue","brown","red","green","orange","purple"]
for i in clr:
    right(60)
    color(i)
    for j in range(4):
        forward(100)
        rt(90)
```

In the program, the line `clr= ["blue", "brown", "red", "green", "orange", "purple"]` is newly added. It is a command for collecting six colours in the variable `clr`. Thereafter, when the loop instruction `for i in clr:` is executed, it selects all the six colours one by one as the value of the variable `i` (note the change in the `for` statement made for this purpose). Later, when the command `color(i)` is given, the square gets a different colour depending on the value of `i`.

Activity 4.5 - Colour filling in python

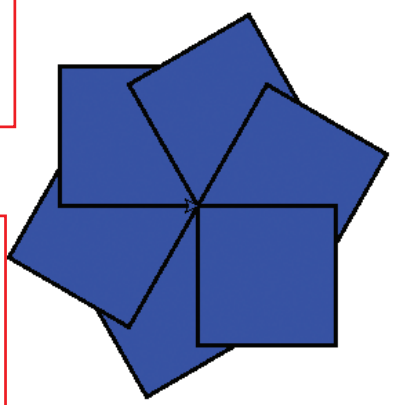
In addition to the commands for drawing using different colours, turtle graphics also has instructions to fill the figures with colour. Given below is a program that fills the spaces in the figures created in activity 4.4. For this, the program includes the instructions `begin_fill()` and `end_fill()`. Enter the program, run and see what you get.

Program 4.5

```
from turtle import*
clear()
pensize(3)
for i in range(6):
    right(60)
    color("black","blue")
    begin_fill()
    for j in range(4):
        forward(100)
        rt(90)
    end_fill()
```

The instruction is to fill the spaces in the pattern with blue colour and to draw the border in black

The instructions `begin_fill()` and `end_fill()` should be written in the same tab position

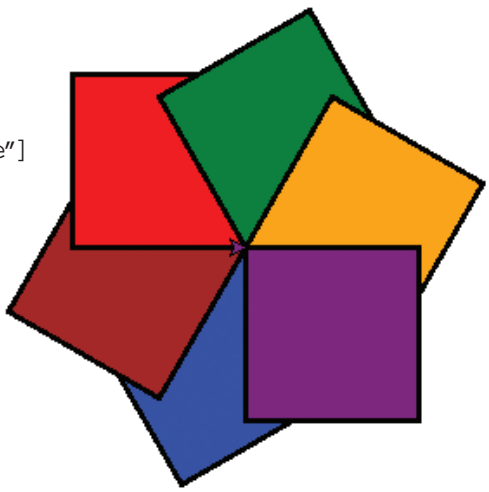


The instructions `begin_fill()` and `end_fill()` should be at the same tag position, otherwise you may not find the colours properly filled. Note that these two instructions are given in the same tab position in Program 4.5.

The instruction `color()` is given in a different manner in Program 4.5. Lines will be drawn in blue colour if we write `color("blue")`. But if we write `color("black","blue")` with two colours, then the lines will be drawn in the first colour and the space inside will be filled with the second colour. Note that the instructions `begin_fill()` and `end_fill()` are also given in the program.

It is possible to get different colours for different spaces if some changes are made in Program 4.5. See below the program that has been modified for the purpose.

```
from turtle import*
clear()
pensize(3)
clr=["blue","brown","red","green","orange","purple"]
for i in clr:
    right(60)
    color("black",i)
    begin_fill()
    for j in range(4):
        forward(100)
        rt(90)
    end_fill()
```

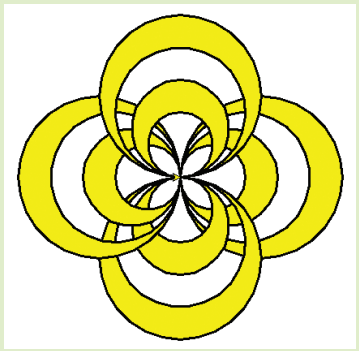


The line `clr=["blue","brown","red","green","orange","purple"]` in the program is an instruction to collect six colours in the variable `clr`. When the loop instruction `for i in clr:` is executed after that, each collected colour is obtained as the value of the variable `i`. Afterwards, when the instruction `color("black", i)` is given, the colour to be filled in each space changes with the value of `i`. Along with that, the colour of the border becomes black.

Colour Magic

Program - 1

It is possible to create beautiful animations using python instructions. The advantage is that it can be done with a few lines of code. Given below are some python programs for creating certain patterns with circles.

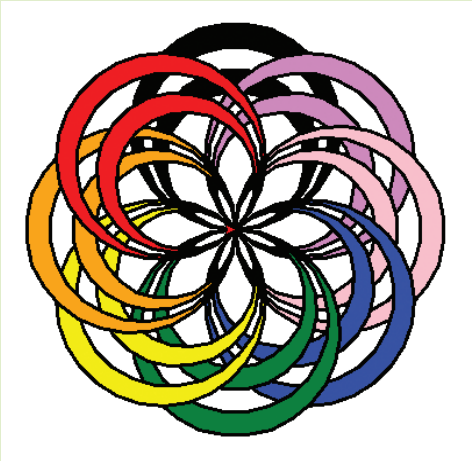


```
from turtle import*
pensize(3)
color("black","yellow")
for r in range(4):
    rt(90)
    begin_fill()
    for i in range(40,101,20):
        circle(i)
    end_fill()
```

You can see in the picture how alternate shapes get coloured, when more shapes are created and coloured together.

Program - 2

```
from turtle import*
clr=["black","violet","pink","blue","green","yellow","orange","red"]
pensize(3)
for n in clr:
    color("black",n)
    begin_fill()
    circle(60)
    circle(70)
    circle(80)
    circle(90)
    end_fill()
    rt(45)
```

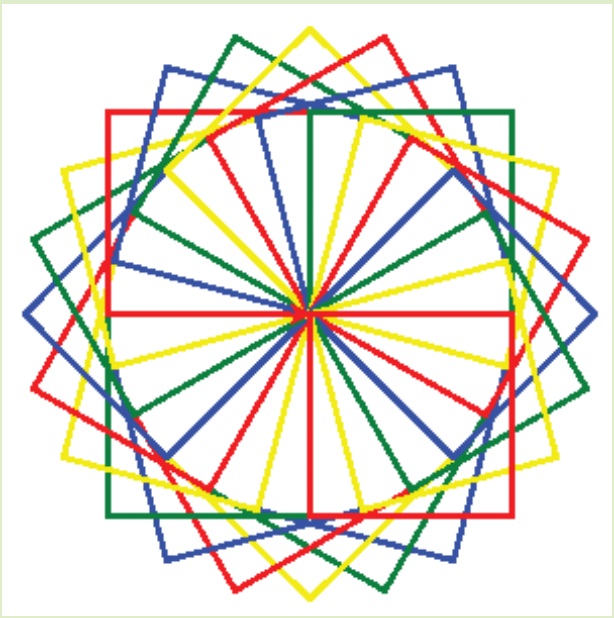


The number of circles increases compared to the earlier program (Program - 1). A different colour is given to each set.

Some python programs and the resultant patterns thus obtained when you run them are given. Run these programs when you get free time. Try to make better patterns with the help of these programs.

Program - 3

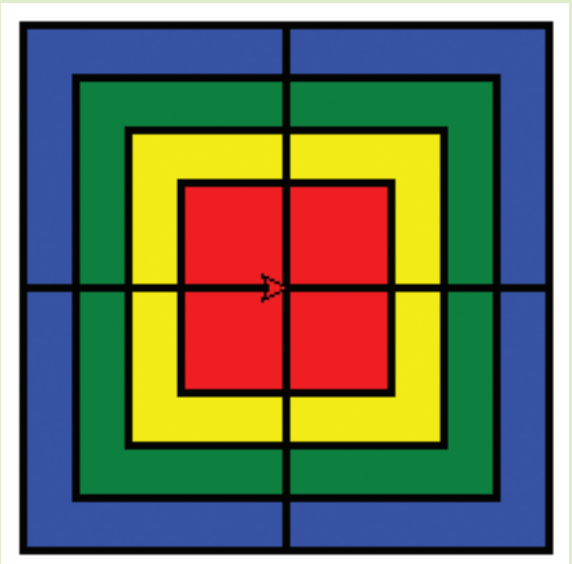
```
from turtle import*
clr=["blue","green","yellow","red"]
pensize(3)
for r in range(6):
    for n in clr:
        color(n)
        rt(15)
        for j in range(4):
            fd(100)
            rt(90)
```



The picture has only squares, but it does give the impression that it has also other shapes.

Program - 4

```
from turtle import*
clr=["blue","green","yellow","red"]
pensize(3)
for r in range(4):
    rt(90)
    size=100
    for n in clr:
       color("black",n)
       begin_fill()
       for j in range(4):
           fd(size)
           rt(90)
       end_fill()
       size=size-20
```



The Python instructions that we came across and their uses are tabulated below with examples.

Instruction	Use	Example
`forward()`	Move the turtle to the right	`forward(50)` or `fd(50)`
`circle()`	Move the turtle in a circle	`circle(100)`
`dot()`	Mark a point on the graphic screen	`dot (20, "blue")`
`pencolor()`	Specify the colour of the line to be drawn on the screen	`pencolor("blue")`
`pensize()`	Specify the thickness of the line to be drawn on the screen	`pensize(5)`
`right()`	Turn the turtle to the right as per the angle specified. `right(90)` turns the turtle to the right by 90 degrees.	`rt(120)` or `right(120)`
`left()`	Turn the turtle to the left by the angle specified. `right(90)` turns the turtle to the left by 90 degrees.	`lt(120)` or `left(120)`
`color(a)`	Specify the colour of the shapes to be drawn in the Python Graphics window	`color("blue")`
`color(a,b)`	Instructs python to give different colours to the border and the body of shapes drawn.	`color("black","blue")`
`clear()`	Remove all the lines and colours in the graphic screen	`clear()`
`from turtle import*`	This instruction is to be given at the beginning of the program to activate turtle graphics in the computer	`from turtle import*`

You must have understood that programming languages are not just used for making computations alone. We have seen only some of the uses of the programming languages. The fact is that in the manufacture of all software, from the Ubuntu operating system that we use, to all the other computer related software, different programming languages are used. You will learn more about programming languages in higher classes.

Significant learning outcomes

The learner:

- prepares geometric shapes using Python Graphics instructions.
- prepares patterns containing geometric shapes using Python Graphics instructions.
- prepares patterns in different colours using Python Graphics instructions.
- fills geometric shapes with colours using Python Graphics instructions.

Let's evaluate

1. Which among the following is a loop statement?

   a. `for` b. `print` c. `home()` d. `iterate`

2. Which of the following instructions is to be necessarily included in a Python program to make a Turtle Graphics statement?

   a. `import turtle` b. `turtle import`

   c. `import* turtle` d. `from turtle import*`

3. Which of the following is a valid program segment?

   a.
   ```
   for i in range(4):
   forward(100)
   rt(90)
   ```

   b.
   ```
   for i in range(4):
       forward(100)
       rt(90)
   ```

   c.
   ```
   for i in range(4):
   forward(100)
         rt(90)
   ```

   d.
   ```
   for i in range(4):
       forward(100)
   rt(90)
   ```

4. What is the instruction used for removing everything from the Turtle Graphics window?

   a. `write()` b. `clear()` c. `home()` d. `iterate`

5. What is the purpose of the following instruction?

   `color("black","blue")`

   a. For drawing geometric shape in blue colour and filling it with black colour.

   b. For drawing geometric shape in black colour and filling it with blue colour.

   c. To fill a geometric shape with black and blue colour.

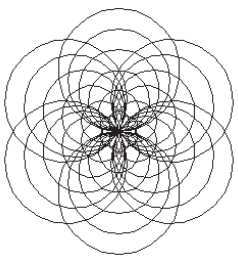
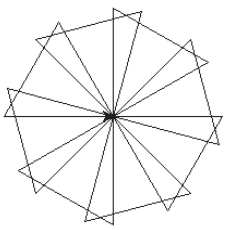
   d. The instruction is invalid.

6. Match the following.

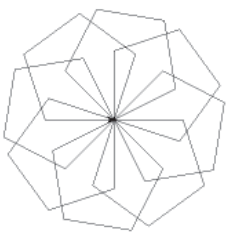
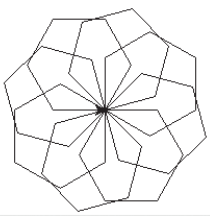
`color()`	To turn the turtle to the right according to the given angle
`pensize()`	To give colour to the drawing
`right()`	To specify the thickness of the lines that appear on the graphic screen.

Follow-up activities

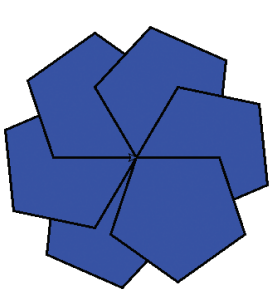
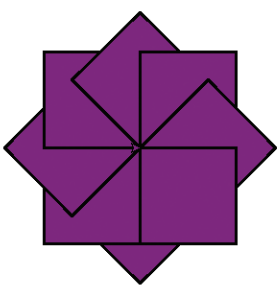
1. Draw patterns as given below using circles and triangles.

2. Draw patterns as given below using pentagons and hexagons.

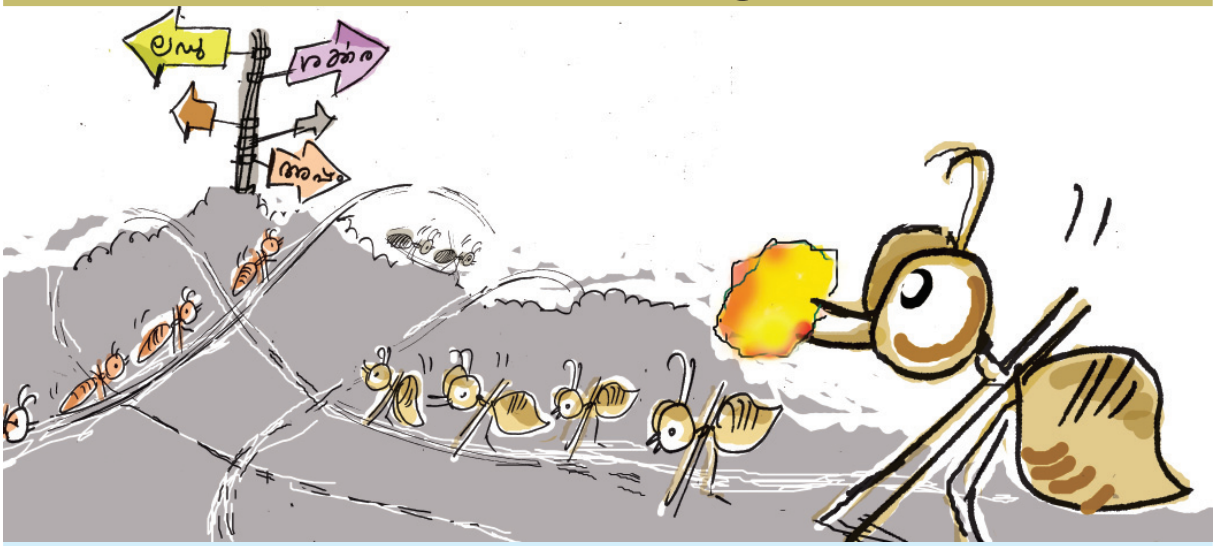



3. Create different patterns using colours as given below.

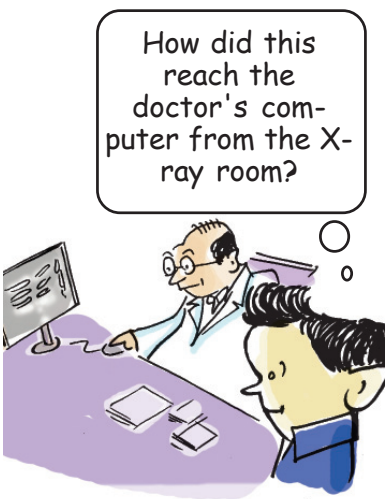



Chapter 5

Networking



Vipin had gone to the hospital with his mother. They are waiting to see the doctor after taking an X-ray photograph of his mother's foot. Vipin wondered why they didn't get the X-ray film. He asked the doctor about it when they met him. The doctor showed him the X-ray photograph on the monitor of his computer.



Do you know how this was done? It was made possible by connecting the computer on the doctor's table to the one in the X-ray room. Files can be easily exchanged between the computers connected in this manner. The process of connecting computers so that they can exchange information is called computer networking.

It is possible to exchange a file from one of the computers in your school computer lab to another through such networking. Examine whether the computers in your school lab are networked like this.

Activity 5.1 - Examining a computer network

Examine the diagram given in Fig. 5.1 and find answers to the following questions.

- How many interconnected computers are there in this network?
- What are the other devices connected to the computers in this network?

Printer

.....

.....

.....

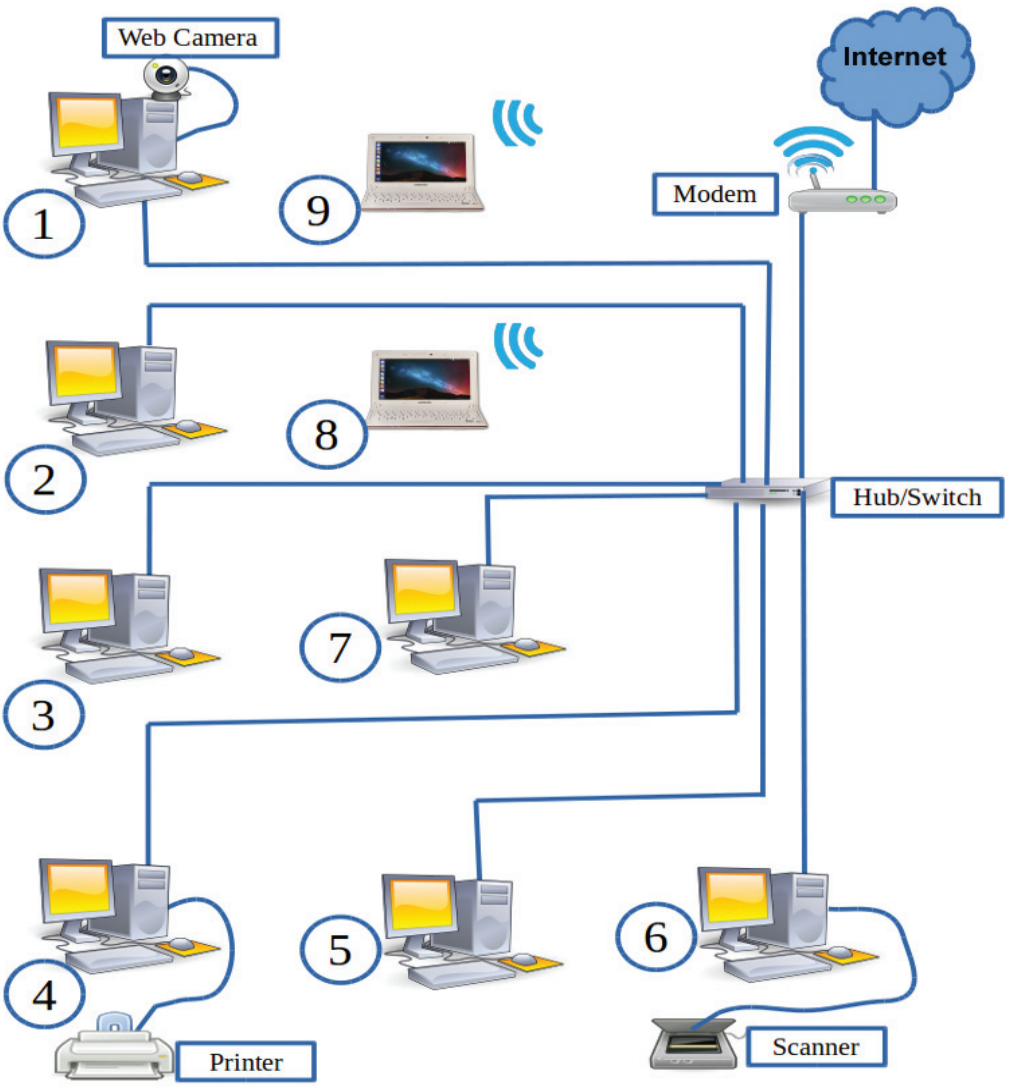


Fig. 5.1 Diagram of a computer network

Do you know what are the devices required for computer networking?

- Cables are required for interconnecting computers.
- Connectors to connect cable to the computers.
- If there are more than two computers, then an instrument is required to control the exchange of data between the computers.

Let us examine each of them in detail.

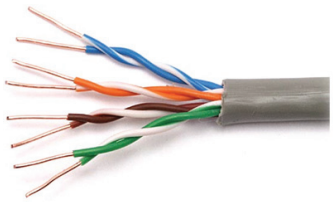


Fig. 5.2 UTP cable

Activity 5.2 - Examining the devices

Unshielded Twisted Pair Cable (UTP cable)

Observe the cables shown in Fig. 5.2 which connect the computers in a network. These are called Unshielded Twisted Pair (UTP) cables. Do you know the features of UTP cables? Examine one such cable.

- There are 8 cables.
- They are arranged in four pairs.
- Their colours are

Orange ....

White orange ....

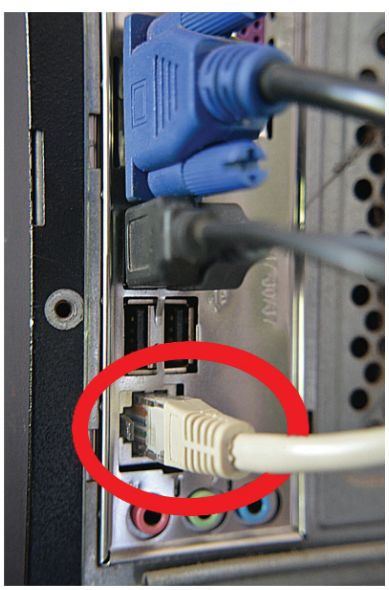


Fig. 5.3 A UTP cable is connected to a computer.

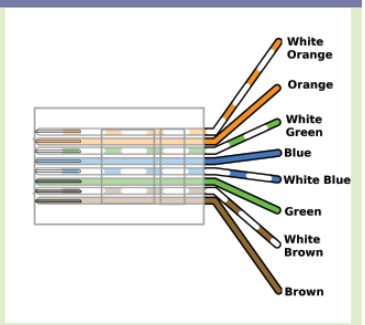
RJ45 Connector (Registered Jack 45)

Notice how the UTP cable is connected to the computer. The connector used is known as RJ45 (Fig. 4.5).

Fig. 5.4 RJ 45 Connector

Crimping Network Cables

RJ45 connectors are attached to the end of the network cables using a tool called crimping tool. Connectors can be easily attached to the cable using the tool. The wires in the cable are passed inside the connector in a particular manner and fixed using the tool.



HUB

Do you see an instrument to which all the computers are directly connected? This is known as Hub. It helps to send information from any one computer in the network to other computers. Hubs are available based on the number of computers to be networked. Fig. 5.5 shows a hub with 8 ports. Switches are widely used today in the place of hubs.

Fig. 5.5 Hub

We learned how computers are networked and the devices needed for it. You know that the files can be easily exchanged through networks. Apart from that, what are the other uses of a network? List them.

- Share the printer
- Share Internet
- .....

RJ 11 Connector

Did you observe the connector

which is used to link the modem with the telephone network? This is known as RJ11 connector.

Hub and switch

Hubs and switches are used to control the exchange of information between computers in a network.But they don't work in similar ways. What a hub does is to transfer copies of information it gets to all the computers in the network. You can guess what the result will be. The network will became congested.

But a switch sends the data only to the particular computer to which it should be send. As a result, the congestion in the network is significantly reduced.

Modem (MOdulator and DEModulator)

Computers save and process data in digital form.When these digital signals travel through a telephone line, they become weak. Therefore, information is send by converting these digital signals to analog. A modem is a piece of equipment that can convert digital signals to analog and vice versa. Modem is the combination of a Modulator and Demodulator. It helps to make available the Internet over a telephone line or other cable lines. Examine if such an equipment is used in your computer lab to connect the computers to the Internet.

Local Area Network (LAN)

LAN is a system that interconnects computers inside a room or a building. The computer network in your school is an example for this.

Wide Area Network (WAN)

You must have heard about the computer networks of railways and banks. They are spread over the entire country. Such wide networks are WANs.

Wireless Network

We have learned that computers are normally connected using cables. But it is possible to connect computers without using cables. This method is called wireless networking.

In such cases, Radio Frequency (RF) waves are used in the place of cables. Electromagnetic waves of high wavelength, but causing less harm, are used for this purpose.

Activity 5.3 - Devices that can be connected without cables

Find out what are the devices that can be connected without a wire and list them.

- Laptops
- Smartphones
- .....

How to recognise?

We have become familiar with various kinds of devices used for networking computers. Now let us see how a computer in a network can communicate with another . Since there are several computers, how can each be identified?

How do we recognise houses in an area? Won't there be two or more houses having the same house name? Can they have the same house number?

Computers in a network will have unique numbers like house numbers. This number is called IP address. There are some general rules, or protocols, for giving such numbers.

Protocols

When computers and networks became widely used, it became necessary to have norms for computer addresses and methods for exchanging information between computers. The equipment connected to a network need to follow certain norms with regard to naming and exchanging information. Such norms are called protocols. TCP/IP, SSH, SMB, POP, etc. are such protocols.

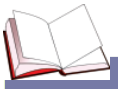
IP Address

IP address is given to a computer in a network based on the TCP/IP protocol (Transmission Control Protocol/Internet Protocol). ***IPv4*** and ***IPv6*** are the protocols currently in use. An address of length 32 bit is given to the computer as per ***IPv4.*** It has 4 parts of the size of 8 bits each separated by a dot (for example, 192.168.1.120). But the address given as per ***IPv6*** is of the size of 128 bits.

Hope you have understood that each computer in a network needs to have an IP address. Let us see how this can be determined.

Activity 5.4 - Determining IP address

You can find an icon related to networking on the upper panel of your computer screen. It is known as the



WiFi and Bluetooth

WiFi and Bluetooth are technologies used for exchanging information between gadgets. Radio waves of different wavelengths are used for these purposes. Protocol standards, wavelengths, speed and range are different in these two technologies. WiFi is the short form of Wireless Fidelity.

An advantage of bluetooth is that it uses only less power as it has a very limited range.

When selecting network cables

Cables used for networking are usually known as the standards Cat 1 to Cat 7. (Cat 7 is the short form for Category 7.) The data transmission speed of Cat 7 cable can be upto 10 Gbps (10 Giga bytes per second.

nm-applet (Network Manager Applet). Let us see how we can find out the IP address of your computer using this applet.

Click ***nm-applet*** and select ***Connection Information***.

What information do you get in the window shown in the Figure 5.6?

Did you notice the line that gives the IP address?

Note down your IP address below.

.....

Similarly note down the IP addresses of the computers in your lab in the column (IP address on first switching) of Table 5.1.

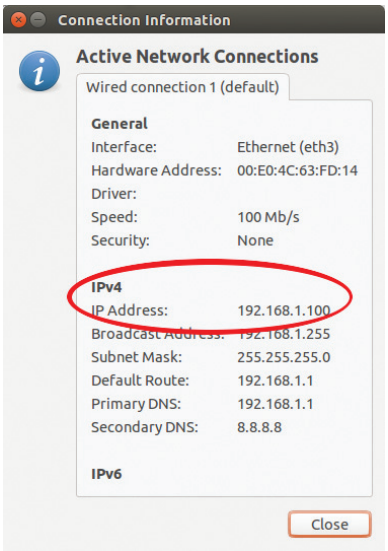


Fig. 5.6 Connection Information Window

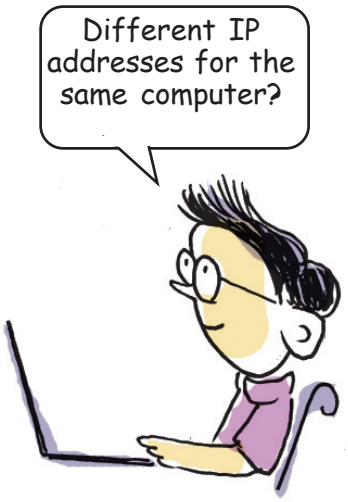
System No.	IP address obtained on first switching	IP address obtained on second switching
1		
2		
3		
4		
5		
6		

Table 5.1 Table of IP addresses

Activity 5.5 - Finding out the change in IP address

You have found the IP addresses of all the computers and noted them. Now switch off all the computers and the network. Afterthat, switch on the computers in a different order. Now find out the IP addresses of all the computers once again and note them down in the

column (IP address on second switching). Observe the differences in the IP addresses of each computer and note down their features.



- .....
- .....
- .....

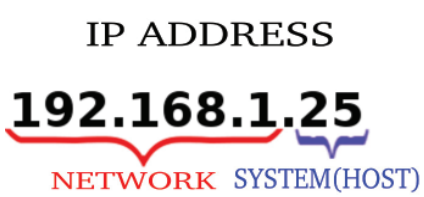
Did you notice that the IP address of some computers have changed? What could be the reason? How did the same computer get different IP addresses on two different occasions? This means that a computer doesn't have a constant IP address in the network.

That is, each time when a system is connected to a network, it gets an IP address. The technology that gives an IP address automatically is known as Dynamic Host Configuration Protocol (***DHCP)***. Each computer that enters the network is given an IP address in that order by ***DHCP.***

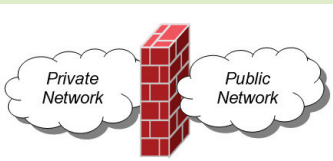
Structure of the IP address

Are there any similarities in the addresses that you have found now?

You know that IP addresses under ***IPv4*** have four parts. The first three parts are the same in all addresses. Suppose the IP address of a computer is 192.168.1.25. The common part (192.168.1) refers to the network and the changing part (25) refers to the computer.



Firewall for network security



Firewall is a system that prevents other people from entering a computer through a free medium like Internet without the permission of the owner. This can be built using either a software or hardware.

LiFi

LiFi is a wireless networking system that makes use of light. As in WiFi it makes use of visible light or of closer wavelengths like infrared or ultraviolet. The time when we can use the same lamp for getting light and for networking is not very far.

IP addresses in the range 192.168.0.0 - 192.168.255.255, 10.0.0.0. - 10.255.255.266 and 172.16.0.0 to 172.31.255.255 are used in networks.

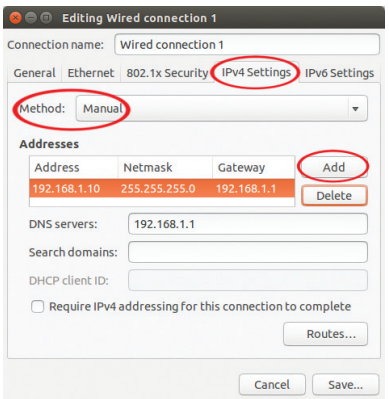


Fig. 5.7 Edit Connection window

You must have understood that the IP address which a computer gets automatically is not constant. Don't you think any changes in the IP addresss of computers affect the exchange of information between them? Also, wouldn't the sharing of information with printers and scanners connected to the network be affected?

Activity 5.6 - Giving a permanent IP address

Let us see how we can give a permanent IP address to a computer functioning in a network.

- Click ***nm-applet*** and select ***Edit Connections***.
- Do you see the name of your connection in the window that opens?
- Select this (***Wired Connection 1*** in the figure) and click the Edit button.
- Click the ***IPv4 Settings*** tab in the window that opens.
- In the window that appears, select ***Manual*** in the ***Method*** option and click ***Add.***
- Enter the following data in the window that appears (Fig. 5.7).

Address: 192.168.1.10

(Here you can give any number from 2 to 254 instead of 10. Numbers 0, 1 and 255 are reserved for some specific technological purpose)

Netmask : 255.255.255.0

Gateway : 192.168.1.1

DNS servers : 192.168.1.1

Now click *Save* button. When it asks for a password, give the administrator password. Thus all the computers can be given permanent IP addresses by retaining the first three parts (here **192.168.1**) and changing only the last part (here **.10**). Also give the same values as above for ***netmask, gateway*** and ***dns server***.

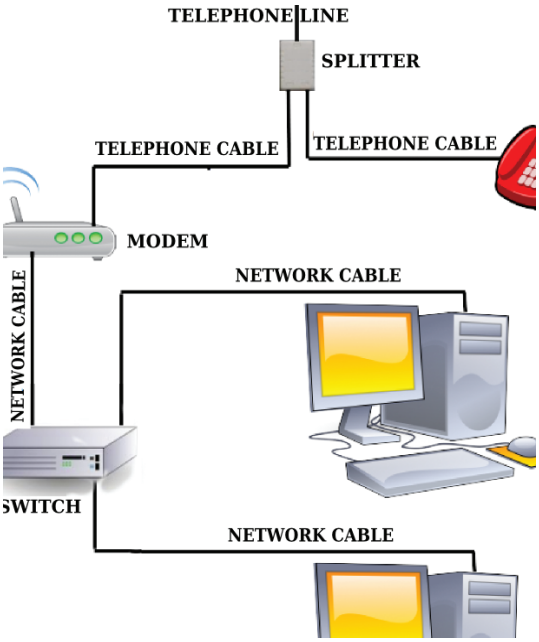


Fig. 5.8 Modem arrangement

Internet in every computer

Have you given permanent IP addresses for all the computers? Is it possible to share Internet with all the computers? What has to be done for that?

Give a connection from your modem/router to the switch using a network cable (Fig. 5.8). Then check whether the computers connected to the switch are also connected to the Internet.

Now you have shared internet with all the computers. Let us see how you can transfer files from one computer to the other.

Activity 5.7 - Exchanging files

Suppose you want to copy a file to the computer of the school lab from another computer. What are the details required?

- File name.
- The place where the file is kept.
- The IP address (for example, 192.168.1.15) of the computer in which the file is kept, its username and password.

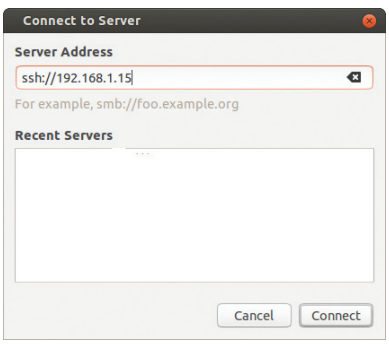


Fig 5.9 Connect to Server window

Did you collect all the information? Now try doing the activities as given below.

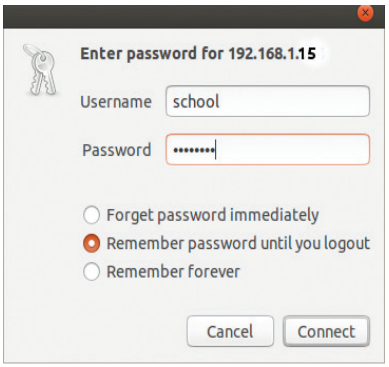


Fig. 5.10 Window for giving user name and password

- Click ***Places*** → ***Connect to Server***.
- Enter the IP address of the computer in which the file is kept in the window that opens like this: ssh://192.168.1.15 (Fig. 5.9).
- Click the ***Connect*** button
- When asked, enter the username and password of the computer to which connection has to be made (Fig. 5.10).

Did the file system of the other computer appear in your monitor? Now you can find the required file from the ***Home*** page and copy it.

You have learned how to exchange files between computers in a network. Now let us see how we can share related devices like printers and scanners. Is it possible to print a file in your computer using a printer that is connected to another computer in the network?

Activity 5.8 - Printing over the network

In order to print over the network, the printer has to be configured first accordingly.

- Activate the network.
- From the ***System Tools*** in the computer that is connected to the printer, open ***System Settings*** → ***Printers***.
- Click ***Server*** → ***Settings***. In the window that appears, select ***Publish shared printers connected to this system*** and click ***OK*** (Fig. 5.11).

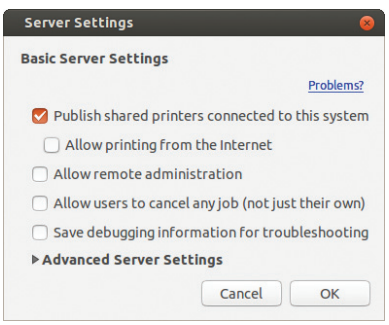


Fig. 5.11 Server Visiting Window

After restarting the computers, open the ***Printers*** window. The shared printer could be seen in all the computers. Now you can print from any computer in the network. How easy has printing become, isn't? Other devices can also be shared over the network similarly.

We are now familiar with some of the network facilities. Find out how networking makes it more convenient to use the devices attached to the computer and prepare a note on it.

Grid computing and Cloud computing

Grid computing and cloud computing are the two technologies that emerged with the expansion of networks.

Grid computing

A grid is a collection of computer resources from multiple locations working for a common objective. This kind of computing is called grid computing. Usually, high performance servers are used for activities that require high computing speeds. Grid computing does this job using computers across the globe that are connected to the Internet. Have you ever wondered what fraction of power of our computers do we normally use? It is less than 10%. A big advantage of such computing is that the power that is being wasted is thus put to good use. Ian Foster, Carl Kesselman, and Steve Tuecke are considered to be the people who started grid computing.

Cloud computing

Have you ever thought of the possibility of doing something that you do at home in your computer elsewhere? Then that too is possible today. Cloud computing is a means of using the applications you use at home along with your files, online from any part of the world. The basic objective of this is to share the resources, basic facilities and software needed by a user. Private and hybrid clouds are also available now. There is no doubt that clouds will be a big relief for those entrepreneurs who find it hard to arrange the infrastructure all by themselves. Many multinational companies depend on clouds for many of their projects.

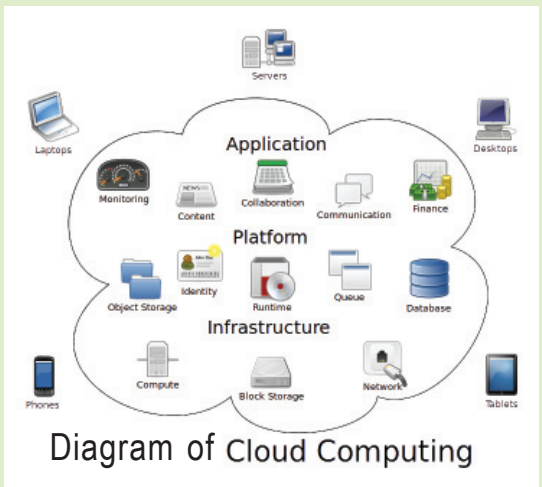


Diagram of Cloud Computing

Significant learning outcomes

The learner :

- prepares a note on the devices required for networking a laboratory.
- discusses different kinds of networks.
- observes the IP address of different computers and note down their features.
- configures the temporary IP address of a computer network as the permanent IP address.
- shares files through network.
- shares printer through network.

Let's evaluate

- The new computer lab of a school has to be networked. What else other than the computers are needed for this?
- Which among the following cannot be an IP address?

  (a) 192.168.324.12 (b) 1.1.1.1

  (c) 127.0.0.0 (d) 162.145.120

- Which among the following are protocols related to networking?

  (a) TCP (b) DHCP

  (c) Firewall (d) html

- How many pairs of wires are present in a UTP cable?

  (a) 4 (b) 8

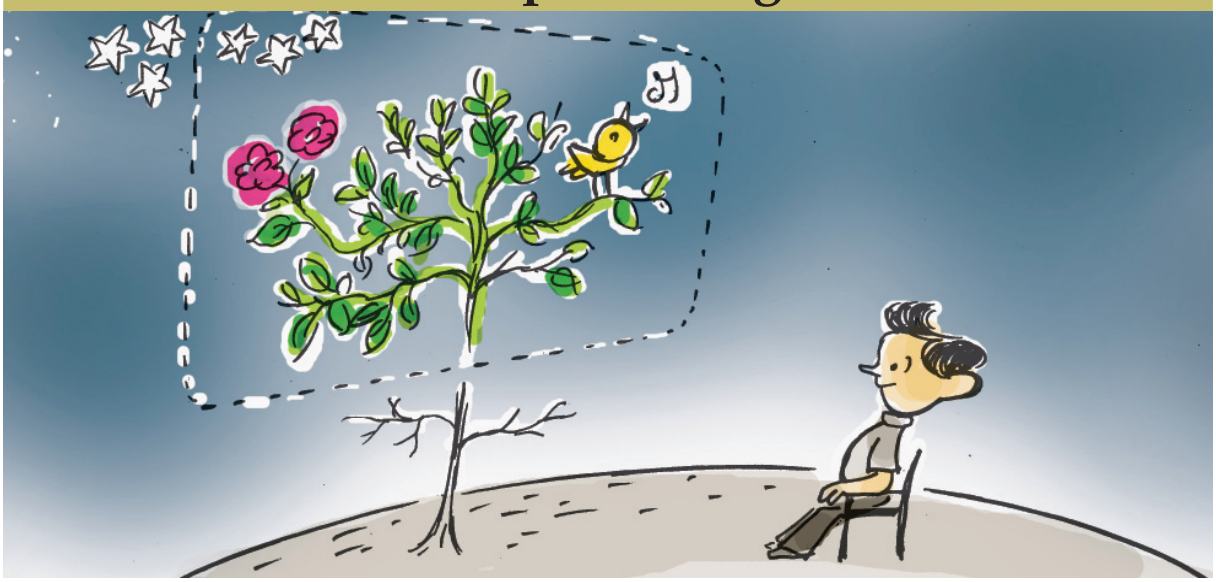
  (c) 12 (d) 2

Follow-up activities

1. What are the equipment used for networking computers? Write a short note about each of them?
2. Collect words related to networking and write a detailed note on each.
3. What are the different kinds of computer networks you know? Explain.
4. Find out the benefits of computer networks in banks, newspaper companies, railways, etc.

Chapter 6

Map Reading



We saw in classes 8 and 9 how much helpful Information and Communications Technology is for studies, experiments and observation. We became familiar with several software that are supportive for studying Science. Applications are also available for understanding the concept of time zones and the features of the Earth's surface. Let us see some of them.

Time zones through software

Think about the season of mangoes, the winter winds and the monsoon rains! What kinds of phenomenon do we see in this universe! On one side, it is day light while it is dark on the other!

You have learned in your Social Science classes that such things happen due to the rotation of the Earth and its movement around the Sun. There are several applications that explain these phenomena. Sunclock in IT@School GNU/Linux is an example.

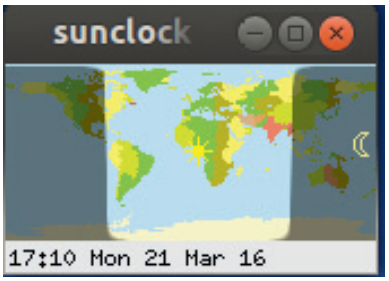


Fig. 6.1 Sun Clock window

It is possible to analyse in detail the time zones of the earth and the movements of the Sun with the help of this application.

Open the Sunclock application and make the ***menu bar*** visible. What all facilities are there in the software? Examine (Fig. 6.1, 6.2, Table 6.1).

Sunclock Menubar

You can make the ***menu bar*** appear in the Sunclock by clicking anywhere in the window after maximising it.

Fig. 6.2 Sun Clock menu bar

S	Solar time mode	Displays the time based on the position of the Sun
L	Legal time mode	Displays the standard time
A	Time forward	To move the time forward
B	Time backward	To move time backward
G	Adjust process value	To change the speed at which time or animation happens
N	Toggle Night	To show or hide the separation between night and day
Y	Toggle Sun/Moon	To display or hide the Sun and the Moon
M	Toggle Meridian	To show or hide longitudinal lines
T	Toggle Tropic/Equator/Arctic	To show or hide the main latitudinal lines
!	Clock and Map Window	To display or hide the map of the world showing time zones

Table 6.1 Sunclock menu details

Activity 6.1 - Time zones

It is a known fact that the time anywhere in the world is fixed with respect to the Greenwich Meridian of zero degree longitude. How does the time change when you move East or West of the Greenwich line? Let us find out from the Sunclock. Do the following activities.

Display Time Zone

You can display the world map along with the time zones by clicking the ***Clock and Map*** Window Menu.

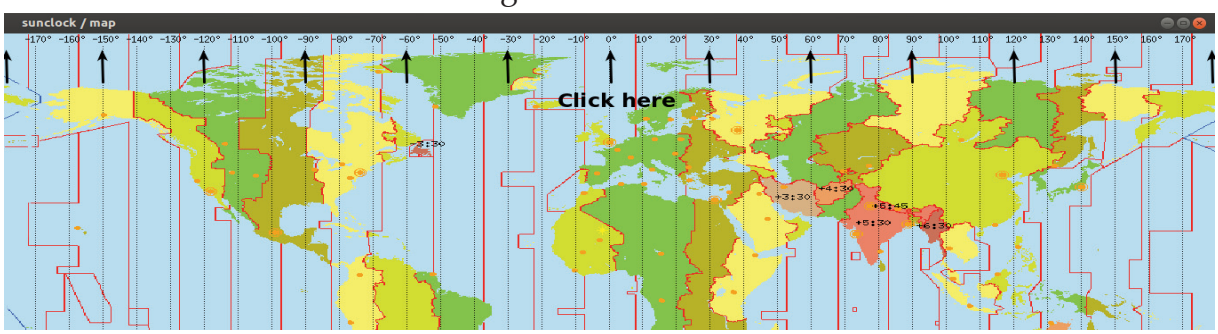


Fig. 6.3 Time zones and longitudes display in Sun clock map

- Open Sunclock and display the map showing time zones (***Clock and Map tool (!)***).
- Click ***Toggle night tool (N)*** to hide day and night
- Click ***Toggle meridian tool (M)*** to display longitudes and click the zero degree meridian. The solar time will appear at the bottom of the window.
- Click on the 30°, 60°, 90°, 120° and 180° meridians to the East and West of the Greenwich line (Fig. 6.3), note the date and time and tabulate (Table 6.2).

Study table 6.2 and find out how time changes when we move 30° to the East or West of the Greenwich meridian.

Display latitudes and longitudes

In order to display the main latitudes in the time zone map of Sunclock, it is sufficient to click the ***Toggle tropic tool T*** and for displaying the longitudes, you can click on the ***Toggle meridian tool M***. When you click M first, the longitudes will become visible. If you click again, the degrees will become visible at the bottom. If you click a third time, the degrees will be seen at the top.

Activity 6.2 - Night and Day

As you know, the reason for day and night is the west to east rotation of the Earth. Does the Sun always rise at the same time everywhere? And what about the sunset?

To the west of Greenwich			To the east of Greenwich		
Longitude	Date	Time	Longitude	Date	Time
0°					
30°					
60°					
90°					
120°					
150°					
180°					

Table 6.2 Time at different longitudes

Display the Sun and the Moon

You can display the position of the Sun and the Moon in Sunclock by clicking ***Sun/Moon toggle (Y)***. If you click twice, they will appear along with their position in latitude and longitude.

Shall we find out the difference in the time of sunrise and sunset in Chennai during different months using the application?

- Display the main latitudes in the time zone map (***Toggle tropic tool, T***).
- Adjust the time in Sunclock to the month of March and specify progress value as 1 minute. (***Adjust progress value tool - G, Forward tool - A, Backward tool - B***).
- Select Chennai in the map and activate ***Animation tool (*** tool). Ensure that legal time is shown below.

Time adjustment in Sunclock

Sunclock will display the time according to the time of your computer. If you click on a city marked in Sunclock, it will show the name of the city and time below. In order to adjust the progress of time, you can use the ***Adjust progress value tool (G)*** in the menu (example 1 minute). After that you can use ***forward (A)*** or ***backward (B)*** tool to move the time forward or backward by 1 minute. If you make the progress value of 1 hour, then you can change the time 1 hour forward or backward. Similarly, progress values like 1 day, 7 days, and 30 days can also be made use of.

Animation in Sunclock

When Sunclock starts, it runs at the normal speed of our time, that is 1 second = 1 second. But this can be changed using the ***Adjust progress value tool (G)***. If the progress value is made 1 minute and the ***apostrophe*** or ***single quotation mark (')*** in the keyboard is pressed, the map will change at the rate of 1 second = 60 minutes. Similarly, if we make the progress value as 1 hour, the map will change at the rate of 1 second = 60 hours, and so on. Thus we can change the rate to 1 day, 7 days or 30 days per second.

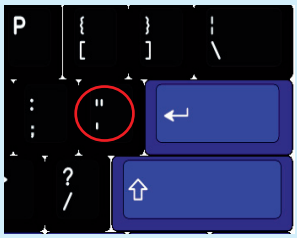


Fig. 6.4
Animation tool

- Select Chennai city from the map. Start the animation. Make sure that the legal time appears.
- When the line, where the day starts reaches Chennai, stop the animation and note down the time shown at the bottom (Fig. 6.5). Click **Y** and note the position of the Sun.
- Similarly, stop the animation and note down the time when the line where the night starts reaches Chennai. Compare the time you have noted with the time of sunrise and sunset given at the bottom of the window. Are they the same?

Seasonal movement of the Sun

After adjusting the progress value as 1 day, press the animation tool. You can see the movement of the Sun as a result of the revolution of the Earth.

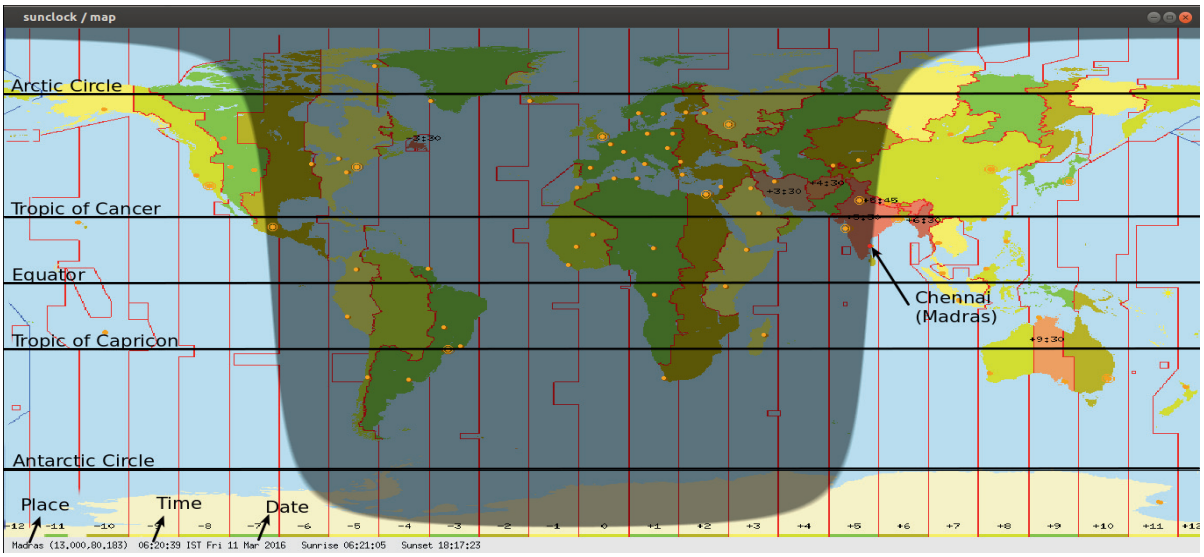


Fig. 6.5 Latitudes display in Sun Clock window

- In a similar manner find out the time of sunrise and sunset in June and December. Tabulate your findings (Table 6.3).

Month	Sunrise	Sunset	Length of day	Position of the Sun
March	6.22	18.17		D
June				
December				

Table 6.3 Sunrise and sunset timings

Solar time and legal time

The solar time at a place is the time based on the position of the Sun. The standard time at a place is the time based on the Greenwich time and the longitude of the place. Standard time is also known as legal time. When Sunclock starts, it shows the legal time. It is enough to click **S** in the menu to see the solar time.

Significant learning outcomes

The learner :

- determines the length of day and night in the different parts of the world using Sunclock and tabulates them.
- determines the time difference between longitudes using Sunclock and tabulates.
- configures Sunclock according to the Earth's rotation and finds out its features.
- sets different dates in the software and finds their features.

Let's evaluate

- Calculate the time of sunrise on December 21st in Moscow and Sydney using Sunclock software.
- Find out the months of shortest day and shortest night in Sydney using Sunclock.

Follow-up activities

1. How is the length of day and night related to the direction of seasonal movement of the Sun? Find out using Sunclock and give an explanation.
2. Find out the features of the length of day and night in the Northern and Southern hemispheres and prepare a note.

Earth's surface on maps

How can we reach a place in a region we are not familiar with? What facilities are available today to find out the correct route?

Online maps such as OpenStreetmap, Wikimapia and Google maps are digital maps that have main places and roads marked. They also have the facility to show the routes of different places.

We can make use of communication gadgets including smart phones in such situations. Let us look at some of these digital systems that can help us with or without Internet connection.

Activity 6.3 - Reading digital maps

Do the following in order to see digital maps in the Internet.

- Open *wikimapia.org* in your browser.
- Examine different kinds of maps in the menu on the right hand side (Fig. 6.6).

What type of maps do you see? What are the details marked on them?

- Places
- Roads
- .....
- .....

Can you mark places on this map?

Activity 6.4 - My home also on the map

Your Social Studies textbook contains the instructions to open Wikimapia and find out the latitude and

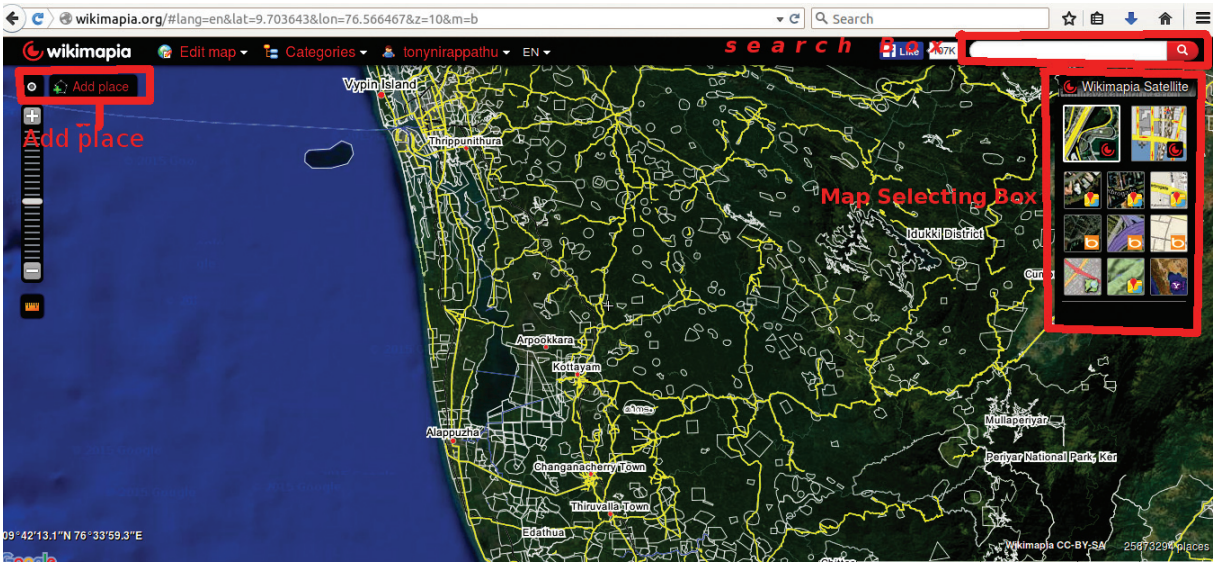


Fig. 6.6 Wikimapia window

Collaborative mapping

Collaborative mapping is the method of mapping an area using the data given by users. The content can be edited by anyone. Only an outline map will be prepared at first. Places and things are later added as objects to this map. Subsequently, a map containing several information gets shaped, due to the voluntary effort of lakhs of people OpenStreet Map, Wikimapia and Google maps are collaborative maps.

longitude of your house. How can you find out these details? Try the following steps.

- Open Wikimapia and find your place.
- Enlarge the map as far as possible to locate clearly your house.
- When you have located your house, right click on it and find the latitude and longitude.
- In order to mark the house, click on the ***Add place*** button.
- Draw the boundary of the house by clicking the mouse.
- A window will appear when you click on the ***Save*** button. Enter the data and save.

The information you added must have been saved. Examine the map and see if the data you added is visible or not. Like this, what you see on the Wikipedia map is the information given by thousands of volunteers.

Are maps used only to find roads, places and institutions?

You have learned in your Social Science class for what other purposes maps can be used. Complete the following list.

- Land use
- Population analysis
- Watershed analysis
- .....
- .....

Have you seen the map of your panchayat? What if the maps giving the total area of cultivated and the barren land are available?

Maps with such data are very helpful for the planning and implementation of projects in the panchayat. However, there are limitations in recording such data. Geographical Information System (GIS) software becomes useful here.

Geographical Information System is a software that can record land surface information and positional information in different layers. They can collect, store digitally and analyse a lot of information. Quantum GIS (QGIS), GRASS and ArcGIS are wellknown GIS applications. Of these, Quantum GIS and GRASS are Free Software. Let us examine Quantum GIS in detail.

Activity 6.5 - Acquainting with tools

Given below is the window you see when you open QGIS. Start QGIS in your computer and get familiar with the tools and other facilities.

Digital Maps

Map-making is an area that has benefitted a lot as a result of the development of Information and Communications Technology. Maps prepared using very complicated techniques can now be prepared more accurately and precisely using an appropriate software. They have many uses such as including data from different areas at different layers in the same map, displaying facts related to several thematic maps on the same digital map, displaying changes happening on the land surface and so on.

Geographical Information System

The surface features of the earth and locational information are collected in a server in the form of maps and data.A Geographical Information System is a technique developed to make necessary changes to this database, analyse them, classify them and so on. In short, it collects data related to geography in a computer and make use of them as required. In this way, the analytics found after a long search becomes available within minutes.

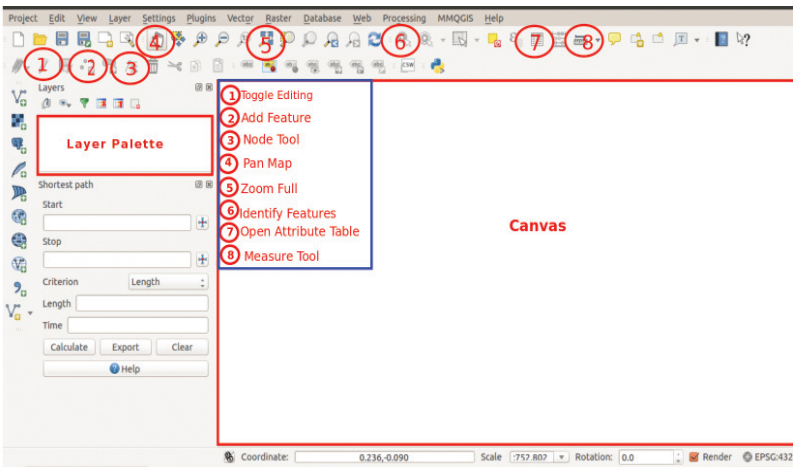


Fig. 6.7 Quantum G.I.S. window

How can we include the map of a panchayat in QGIS?

In order to prepare a comprehensive map of a panchayat in QGIS, we have to first add an outline map to the application. Later, we have to convert the outline into a proper map with the help of geo-referencing and add various data about the land to prepare a comprehensive map. A resource map prepared in this manner is available in the ***Qgis Projects*** folder inside the Home folder of your computer. Open this folder through ***Project*** → ***Open***.

You can see different layers containing positional information about the panchayat in the ***Layer box*** of the map that appears on the screen. Click on the ***Check box*** against each name of the layer and watch the changes in the map. Select one layer from the box, right click on it and select ***Open Attribute Table***. Can you see the data (attributes) of that layer given as a table?

Open the attribute table from the layer ***House*** and find how many houses are included in it and their details (Fig.6.8). What are the details given about each house? Here, a house represents the location data while the details are its attributes. Now, what should be done to add a new layer of information?

Attribute table - house :: 0 / 30 feature(s) selected

	id	house no	name	Address
0	1	1	aby	a1b1
1	1	2	babu	a1b2
2	2	3	sasi	a1b3
3	2	4	ismail	abc
4	3	6	wahid	abcd
5	1	4	joy	abc1
6	3	6	siju	abc
7	1	7	tony	a1b4
8	3	8	raju	a house
9	2	9	anil	b house
10	1	10	rajeesh	c home
11	1	11	hassanar	dhome
12	4	12	hakkim	mlp
13	4	13	ravi	pkd
14	4	14	sankar	pala
15	4	15	vasudevan	tsr
16	4	16	shibu	muthuvila

Fig. 6.8 Attributes table window

Activity 6.6 - Adding new information

Imagine the Panchayat of your village has made one well in each ward. How can you include this information in the map of QGIS? Here the well stands for location information. What could be its attributes? Let us tabulate them.

- Ownership
- Depth
- Construction expenses
- Availability of water
- .....

Layers

A lot of information related to a particular region can be included in the geo information software. Depending on the features of the data, several layers are included, each containing similar information.

For example, there could be one layer for houses, another for wells, and so on.

The project files of QGIS will have the extension ***qgs*** and the layers will have the extension ***shp***.

Quantum GIS

A Free Software application, the Quantum GIS, first came out in 2009. Later, many versions were released. The aim of this application is not to make maps alone. This software helps us to do many things such as to display maps, modify maps, create new ones, analyse the data available in the geographic domain, display the analysis results in the form of tables or maps as required and so on.

The details of each well has to be collected. Assume that the table below has all this information.

Attribute	Value		
	Well 1	**Well 2**	**Well 3**
Ownership	**Panchayat**	**Panchayat**	**Panchayat**
Depth (m)	6	15	4
Expense (Rs)	45000	88500	35000
Water availability	1	1	2
Water availability - throughout the year: 1 Seasonal: 2			

Table 6.4 Attribute table

Let us build a new layer to add the data on wells. For this, do the following in the given order.

- From the menu open ***Layer → Create Layer → New Shapefile Layer***.
- In the window that opens, select ***Layer Type - Point*** (Fig. 6.9).
- In the place ***New Attributes***, add the attributes one by one. Here, we can add the attributes we have listed.
- Define what type each attribute is (text, number, etc.)
- Further add each attribute by clicking the button ***Add to attributes list***.

Save this layer in your folder giving a suitable name. The details of each well can be added to the newly created layer. For this,

- Select the layer with its name in the layer box
- Press the ***Toggle Editing*** button for activating the editing tool.

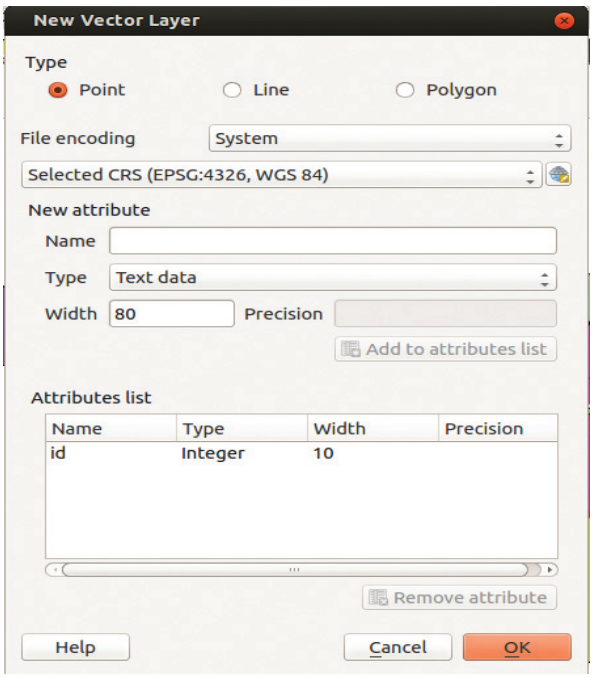


Fig. 6.9 New Vector Layer window

- Press ***Add Feature*** button, click at the location where the well is to be marked and include the attributes from the table.

- Save the data. Don't forget to press the ***Toggle Editing*** button and disable the ***Editing*** tool.

The wells get marked in the new layer. If needed, the colour, size and label of the points can be changed. To do that, select the layer, right click on it, select the ***Properties window*** and change the properties (Fig. 6.10).

Similarly, to add the untarred roads of the Panchayat, create a new layer called Roads Class 4 and save. What Layer Type will you select for this?

In order to remove one layer, it is enough to right click on it and select ***Remove***.

Activity 6.7 - Buffering (Spatial Analysis)

Imagine that a road has to be widened by 5 m on

Markings

The markings in the vector layer can be seen mainly as points (house, well, etc.), lines (roads, rivers, streams, etc.) and polygons (border, pond, lake, survey plots, etc.).

Attributes

These are the features and specialities of spatial information.

Example: House

Details of a house : House number, owner's name, number of family members, kind of roof, etc.

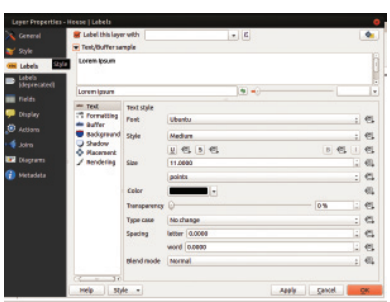


Fig. 6.10 Layer properties

either side. How much of land has to be acquired totally? How many houses and other structures have to be destroyed? How much of it can be saved if the widening is limited to 3 m? Such things which would normally require a lot of manpower and time could easily be determined using a Geographic Information system. The Buffer technology available in QGIS can be used for this.

- Select the layer that has to undergo spatial analysis from the layer box (here Road).
- Select the road that has to undergo buffer analysis using the Select ***Single Feature tool***.
- Open the ***buffer*** window from the menu through ***Vector → Geoprocessing Tools → Buffer(s)***
- Select the layer to be buffered in the window that opens (Fig. 6.11).
- Enter the ***length of buffering***.
- Enter the name of the new layer and the folder where it has to be saved.
- Press ***OK*** and close the window.

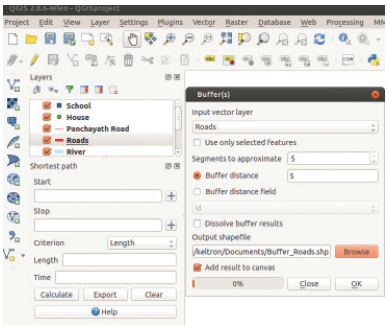


Fig. 6.11 Buffer window

The existing roads are not visible now. This is because that layer gets embedded below the layer that contains buffered roads. This can be changed by rearranging those layers. Move the buffered layer which is below the old layer and you could see the existing roads again (Fig. 6.12).

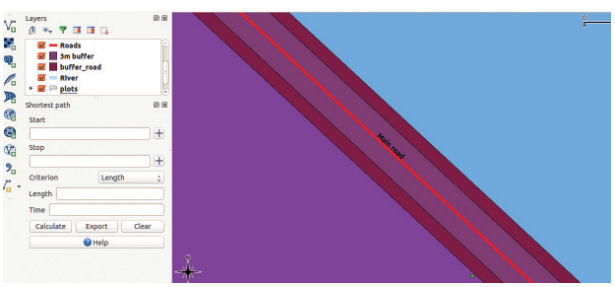


Fig. 6.12 Buffer road

In a similar manner create another layer with 3 m buffering. Place that layer between the road and the 5 m buffered layer.

Observe the buffered layer using the ***zoom in tool***. What can you find from this?

The land that is being used for the road (use ***Measure Tool***).

The buildings that will get affected (use ***Identify Features Tool***).

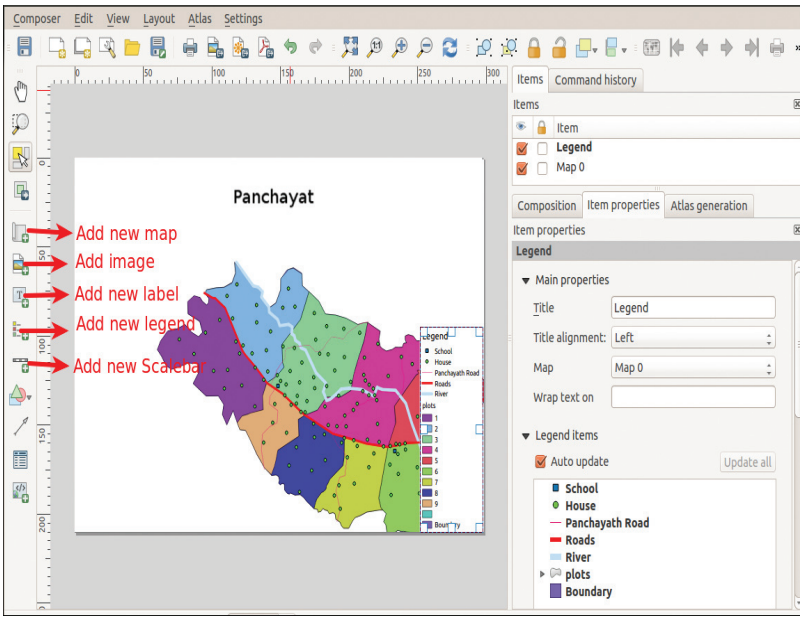


Fig. 6.13 Print composer

Activity 6.8 - Preparing map

We have marked the roads and wells and done the buffering on separate layers. Now, how do we print a map that contains all this information? Quantum GIS has the facility for this too.

In order to do that, select ***New Print Composer*** from the ***Project menu***.

- In the window that opens, press the ***Add new map*** button and click and drag the mouse along the diagonal of an imaginary rectangle (Fig. 6.13).
- Add the information required in the map using tools like ***Add New Label, Add New Legend***, etc.
- It is possible to create the map in ***svg, pdf, png*** formats using ***Export as*** in the Composer menu.

Three Dimensional Maps

In your Social Studies textbook you must have studied about the contour lines that connect points of equal altitude in a map. You must also have done activities to find out the three-dimensional shape of places

using contour lines. Those tough tasks can be done easily with the help of QGIS. For this,

- Open Quantum GIS and open the file contour.shp that contains contour lines through ***Layer → Add Layer → Add Vector Layer***. (This is saved in the folder Qgis Projects/contour in the Home folder).
- From the ***Properties*** window of the layer, under the head ***Labels***, select ***Elevation*** from ***Label in this layer with***. The height marked in the contour lines becomes visible (Fig. 6.14).
- Open ***DEM (Terrain models)*** in ***Raster → Analysis*** and include contour.asc as the input file-(DEM raster).
- Give suitable filename in the ***Output Box*** and click ***OK*** to close the window.
- A map must have appeared on the canvas in accordance with the contour lines.
- Add necessary information, take a printout, of this map with the help of print composer and display in your classroom.

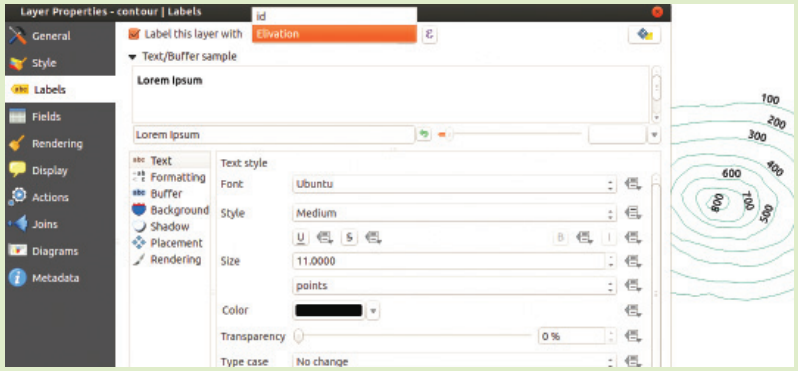


Fig. 6.14 Contour label

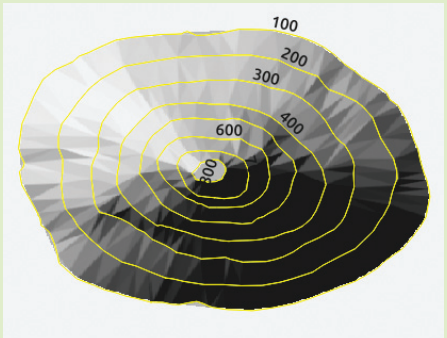


Fig. 6.15 Contour dimensional shape

Significant learning outcomes

The learner :

- finds out places in Wikimapia and marks specific locations in the map.
- prepares tables of attributes required of location data.
- adds layers that are suitable for location information in a GIS.
- collects the specific information, analyses and tabulates them using buffering technique.
- takes printouts of the prepared map in the specific format.

Let's evaluate

- What layer type will you select from Quantum GIS if you want to create a layer containing the information about houses?

  a) Line b) Polygon c) Point d) Circle

- Buffer 50 m around the LP School in the given map in Qgis Projects folder and find out the houses to be included in it. How many additional houses will be included if you buffer 100 m?
- What technique in Quantum GIS is used to find out the houses that will be affected if a road that passes through a crowded area is to be widened by 10 m?

  a) Buffer b) New Print Composer c) Elevation d) Toggle Editing

Follow-up activities

- Add a new layer to the ward map of the ***Qgis Projects*** folder and draw a railway line in the north-south direction close to ***GHSS***.
- Prepare a map having only the roads and houses in the map of the ***Qgis Projects*** folder in ***jpg*** format using ***New Print Composer***. Include title, legend, scale and direction also.

- Determine the terrain model using the contour lines given in the QGIS folder of your ***Home*** folder.

- Open the ***India.qgs*** project in the ***qgis*** folder, display only the state and cotton layers and find out in which states cotton is cultivated. Prepare the map in pdf format including title, direction, etc.

Chapter 7

The Working of Internet

In the future, we won't even feel the existence of the Internet. It will permanently be a part of our lives like air and water. *- Eric Schmidt, Executive Chairman, Google.*

Your Social Studies textbook has dealt with the topic ***electronic banking***. Ami and Anu are searching the Internet for more information on this topic. They have assigned the search engine to search for it and they could see thousands of links providing technical and nontechnical information before them! Really astonishing! The medium of Internet has grown so much that we can get answers to any queries on any topic.

How did all such information reach the Internet? How do we get them? In which computer are all this information stored?

Putting up a global network...!

We have understood the ways of networking computers and the benefits derived from it. But our understanding was based on a few computers inside the lab.

Imagine a larger form of this network! A network that includes all the computers across the world! Anyone can join this network at any time and come out of that too.

There exists such a global network as mentioned above. This huge network having infinite potential for communication is called the Internet. What are the advantages of this? Some of them are given below. Find out more and note them down.

- Files can be copied from one computer to another. (What if this file is a letter?)
- People living in far off places could see and talk to each other. (In that case, won't it be possible for a teacher in Kerala to teach a student in America?)
- We can purchase things by giving orders to the sellers through Internet. (It is enough to send the ordered materials by post.)
- We can easily share information with others. (A person or a company can to share information with others by collecting and using that information from a computer linked to the Internet.)
- .....
- .....

```
<!DOCTYPE html>
<html><meta charset="UTF-8" />
<head><title>ജി.എച്ച്.എസ്. പൂക്കോട്ടുപാടം </title>
<style>
h1 {
    color: blue;
    font-family: verdana;
    font-size: 300%;
}
p  {
    color: red;
    font-family: courier;
    font-size: 160%;
}
</style>
</head>
<body>

<h1>എന്റെ സ്കൂൾ</h1>
<p>പാരമ്പര്യത്തിന്റെ പ്രൗഢഗാംഭീര്യമായി, കിഴക്കൻ ഏറനാടിന്റെ ഹൃദയോദ്ഗത്ത്
നിലകൊള്ളുന്ന നിലമ്പൂരിന് 12 കി.മീ. കിഴക്കായി, സൈലന്റ് വാലിയുടെ
കന്തൽ മേഖലയായി പ്രഖ്യാപിച്ച നൂ അമരമ്പലം സംരക്ഷിത വനത്തിനടുത്ത്,
```

Fig. 7.1 - HTML Page

Almost everything has been put into practice now. However, some technicalities remain to make it more practical. Let us find out in detail about this.

Server computers

You must have heard about Kerala Kalamandalam. Kerala Kalamandalam in Thrissur is a place, where a lot

of people, including foreigners, come to learn about the art forms of India. Those who wish to study here have to get information about the kind of courses conducted here, the time of commencement of the courses, their duration, and so on. And people from all parts of the world need to know these things.

Imagine, all this information are provided by the authorities of Kalamandalam in HTML files and stored in a computer connected to the Internet as we discussed earlier. That computer was given an IP address too. It is enough to publish the IP address so that it will reach everyone. But there are some problems!

1. Don't you have to run the computer all the time if everyone in the world should have access to it?

2. Will it affect the performance of the computer if a lot of people try to access it simultaneously?

3. Does everyone needs to remember this IP address? Is it practical to remember the IP addresses of all the computers?

IP Address and Hostname

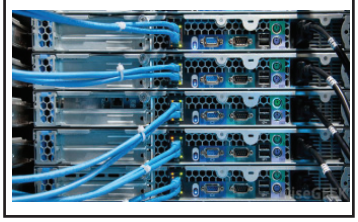
Websites are normally installed in servers like this around the network. This is technically known as hosting a website. Unlike normal computers that we see, server computers can be given more than one IP address. They can host different websites too.

Activity 7.1 - IP address of a website

Open a web browser and type the address 216.58.197.35 in the address bar. Which website opens?

Server computers

Each of these computers has networking systems that permits setting up of more than one IP address.



Similarly, we have to deal with many such IP addresses while browsing websites. Type the following IP address in a browser.

IP address	Which website did you get?
216.58.197.73	

Table 7.1 - IP address and the corresponding website

Now you realise that it is not easy to remember an IP address. A method is there to overcome this. How about connecting these IP addresses with names that we can easily remember (and vice versa). These names are called hostnames.

Some such hostnames are given below.

1. www.itschool.gov.in 2. www.gimp.org

3. ..... 4. .....

Activity 7.2 - Finding out the IP address from a hostname

We can find the IP address of a website if we know the hostname. Open a ***Terminal*** in your computer and give the following command.

host www.google.co.in (Fig. 7.2)

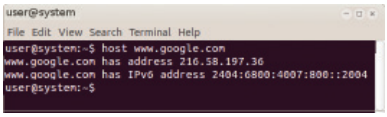


Fig. 7.2 To determine IP address

Given below are some hostnames. Find their IP addresses.

	Hostname	IP Address
1	irctc.com	
2	bsnl.in	
3	kalamandalam.org	

Table 7.2 - Websites and the IP addresses of their hosts

Domain Name Server (DNS)

DNS is a system in the Internet that helps computers to convert web addresses like www.google.com to IP addresses like 216.58.197.73 and vice versa.

Web pages and their exchange norms

What we call web pages are pages created in HTML. This indicates that the pages are meant to be published on the Internet (web). What is stored in the server will be a folder containing the necessary files including web pages, images, sound files, animations, videos, software, etc. This is known as a website. You know that every network needs a protocol which specifies how the files can be exchanged. HTTP (Hyper Text Transfer Protocol) is the protocol used for transfering html files. This is installed in server computers.

One IP address can host only one website at any time. But is it true that one website can have only one IP address? Very busy Internet Service Providers sometimes host their website in different servers at different places to improve the speed and the efficiency of their service. They have different IP addresses. The user will get service from the most convenient server. That is, one website can also have different IP addresses.

Information in the Internet

We have seen why institutions like Kalamandalam build and maintain websites. Similarly many institutions and individuals have websites of their own. All of them give information on different subjects. We can get those information if we know the addresses of those sites or else from the search engines.

Activity 7.3 - Inside a website

Visit the website of Kerala Kalamandalam and see how the website is configured. Right click on the page at a point where there is no image and save the page in your computer. Examine the files that are saved and tabulate the following.

What kind of data (images, video, etc.) is used in this website?

Fig. 7.3 Webpage

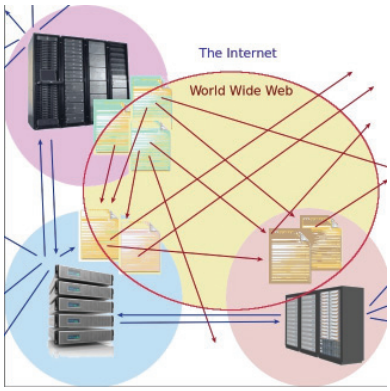


Fig. 7.4 Diagram of World Wide Web

Is this website built using stylesheets?

World Wide Web

Suppose someone learns about Mohiniyattam only after seeing the website of Kalamandalam. What if that person becomes interested in knowing more about it? Won't it be good if it is possible to go from one page to the other that contains the details of Mohiniyattam?

This can be done if a hyperlink is given from this word to another page that contains detailed information. You can see that an information network having many pages with hyperlinks to more pages is there on the Internet. We can call this the World Wide Web. This is operated using the http protocol that enables exchange of html files.

Activity 7.4 - Different types of web services

Anyone can build and maintain a website. Many are making use of this technology for different purposes. Find out with the help of search engines the websites given below for various purposes (Table 7.3).

Resource Index

Each file exchanged though ***http*** has its own address other than the hostname of the website. This is called Uniform Resource Locator (URL). The uniform resource locator contains the protocol for exchanging the file, name of the website and the place where it is saved. Look at the example below.

http://www.plainenglish.co.uk/files/email.swf			
Exchange protocol	Name of the site	Place saved	Name of the file
http	www.plainenglish.co.uk	/files	email.swf

This means the animation file 'email.swf' is saved in the folder /files of the site www.plainenglish.co.uk.

Field	Website
Online Malayalam newspapers	.....
Online publications	.....
Websites to publish research journals	.....
Online dictionaries and encyclopedias	https://en.wiktionary.org
Websites for publishing information about companies and institutions	http://www.kalamandalam.org
Websites of individuals to publish their creations and activities	.....

Table 7.3 - Different types of websites

Plethora of websites, information galore !

At present there are websites that discuss about anything in the Universe. We have learned how we can share information and images given in such websites if we are permitted. Given below are the two ways of sharing information.

1. To share videos that we created

YouTube, Vimeo, etc. are sites for sharing videos that we create. These sites have thousands of videos shared by different people. If permitted, we can download and reuse them.

2. To publish our writings

There are people among us who have desire to write and publish stories, poems and articles. Blogs are websites where such works could be published.

Fig. 7.5 Tim Berners-Lee The Founder of World Wide Web

- www.wordpress.com
- www.blogger.com
- .....
- .....

These are some of the sites that allow you to start blogs free of cost.

Who owns the Internet?

Based on the discussion we had so far, could you say who owns the Internet? It does not belong to anyone in particular. We can also say that it belongs to everyone who creates websites and adds information to them. Can something like this exists for long? If there are no directives, will it result in utter chaos? The answer is there are some organisations, though not very formal for a systemic supervision of all these things.

The Internet Society: The overall supervision of the structure of the Internet policies and other common matters.

The Internet Engineering Task Force (IETF): This committee manages the technical structure of the Internet, make arrangements for the stability and safety of the Internet, etc. It is this committee that examines the revision of Internet protocols.

The Internet Corporation for Assigned Names and Numbers (ICANN): The Domain Name System (DNS) we discussed earlier works under the supervision of this committee. It is ICANN that ensures that all Internet addresses reach their proper IP addresses.

E-Mail

We have seen that letters can be exchanged using the global computer network. Such letters are called email. When email became a possibility in the Internet, many service providers came forward to provide email to the people. For example,

1. www.gmail.com
2. www.yahoo.co.in
3. ..... are email service providers.

New social media

When Chennai had floods, many people in our state having relatives there were anxious about their safety. Several members of the Internet social media like Facebook, formed groups and helped the people troubled by the floods.

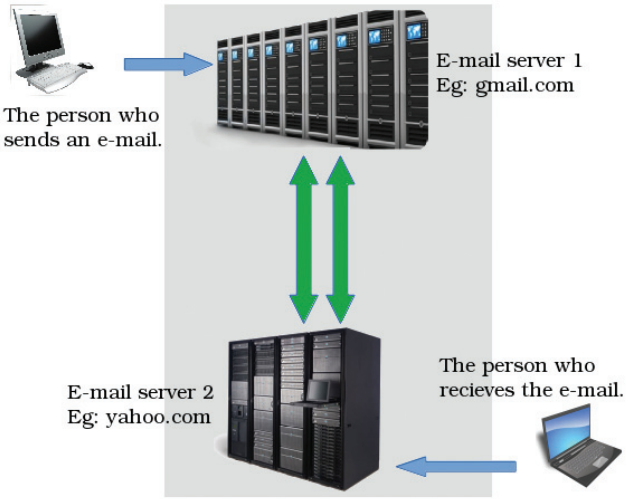


Fig. 7.6 Diagram of E-mail service

The concept of a medium to exchange news, information, ideas and jokes around us and to share pictures and videos emerged with the growth of Internet. These media are called social media in general.

Some of the well known social media are

1. Facebook
2. Twitter
3. Diaspora
4. Whatsapp

Of these, Diaspora is a medium for open source communication system.

The new social media have become part of our lives now. Sometimes a well constructed page in the social media, its design and contents are even used to assess the cultural status of a person.

Social media also help to maintain friendships irrespective of time and place. At times, beyond friendships and jokes, social groups can even became influential in framing the policies of a nation or correct the ruling class. The flow of relief, support and assistance at the time of natural disasters in Nepal and Chennai are examples of such interventions.

Even when we are making use of technological excellence for our progress, the tendency for misusing

technology is also on the increase. Because of that, we need to stick to certain restrictions and stipulations while using them.

While using social media

- What have been posted once cannot be taken back later on a second thought. Even before that can be withdrawn, many people would have downloaded them or shared them with a number of other people.
- Keep your personal details to yourself. If any one compels you to give these details, don't yield to them as they can destroy your future.
- If anyone makes a post that is not proper or defames someone, remember to inform your teachers or elders. Move away from those people who misuse the Internet friendship circle.
- Making vulgar messages and bullying are legally criminal. Don't get into such friendships.
- Remember those who commit cyber crimes cannot remain hidden for ever. It is only that they don't get noticed in this huge network for a brief period. If anyone reports such activity, the cyber police can easily track them down.
- Profiles that are put up in social media may sometimes be stolen. Someone else may use your profile to hide his/her identity. It could also be used to defame someone. If something like this comes to your notice, you can inform the police through your teacher and get them removed.

What arrangements can be made for the safe use of social media?

- Make maximum use of the safety systems in them and definitely configure privacy measures.
- Do not add as friends anyone you don't know personally or trust with. Remember what they reveal through the social media may not be their real self or character.

Decent and Obscene

We have seen that Internet is a medium that works independently. We also know that a number of people are using its facilities for communication. A vast majority of them give correct and decent information. But it has misleading and obscene information too.

Some countries, like India, restrict or ban such websites. All these controls have technological limitations. Therefore,

- Decide what our needs are before connecting to the Internet. Think about the keywords that you want to search. Do not search Internet without any specific needs.
- Websites containing obscene information have many traps to attract and cheat us. Take care not to open such sites.

E-banking

E-banking means conducting the transactions of a bank account through a website specifically built for the purpose.

To obtain online transaction facility for a bank account, we have to submit a filled-up form to the bank. After that, we have to get the user name, password, etc. for the account before starting to use it.

Once the system is enabled,

- We can find out the details of the account from any place at any time (without going to the branch).
- We can examine our recent transactions in a similar manner.
- We can transfer money to another account.

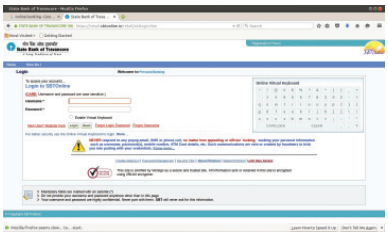


Fig. 7.7 An e-banking site

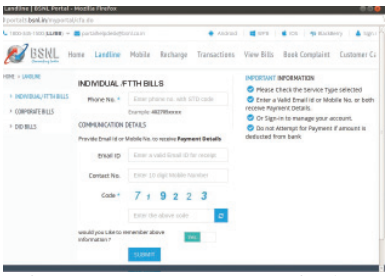


Fig. 7.8 An e-payment window

- Pay for things or services that we have bought. For example,
  - Telephone bills
  - Electricity bills

E-Governance

To serve different purposes, we often have to go to many offices.

If we have a bank account with online facility, we can pay electricity bills, telephone bills, etc. Shown in figure 7.8 is the online site of BSNL to pay the telephone bills.

You know that the procedure for getting admission for higher studies in a University after class X is carried out through the online system. Fig. 7.9 shows the online site, hscap (http://www.hscap.kerala.gov.in) for conducting admissions for higher secondary education.

Security system called OTP

How can we ensure that our online transactions are secure? OTP (One Time Password) is a system for this. When our bank accounts are configured for online transactions, we have to give our mobile phone number also. Each time an online transaction is carried out, a password that can be used only for that transaction is send to our mobile phone. The transaction can be completed only with this password.

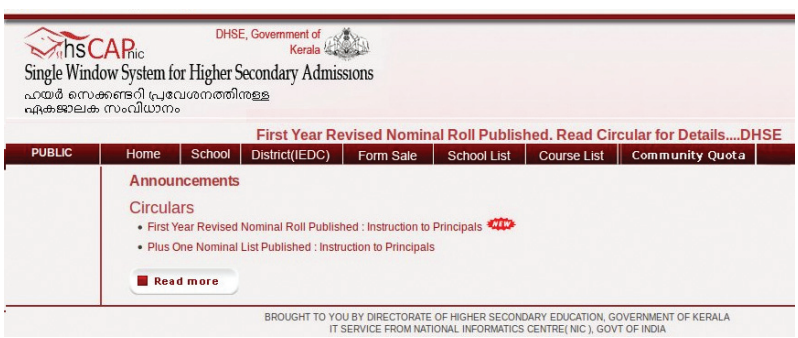


Fig. 7.9 hscap home page

Significant learning outcomes

The learner:

- understands the technology of the Internet as a global network.
- explains the concept of the World Wide Web.
- discusses different kinds of websites and their uses.
- uses technologies such as email, e-banking, e-commerce, e-governance, etc. when needed.
- develops awareness about the safe use of Internet and adheres to the values that a good user should have in practice.

Let's evaluate

1. Which among the following is an email service provider?

   a) Wikipedia b) Twitter c) Gmail d) Diaspora

Follow-up activities

1. Given below is a story related to how the excessive use of new social media results in the distancing of individuals and breakups in relationships.

   "My smart phone developed some problem the other day. Since there was no other work, I sat and talked to my family members. Nice people.

   I didn't recognise my sister initially. My mother introduced her. She has changed a lot. It seems my younger brother has gone abroad. Wonder when he had left.

   .....

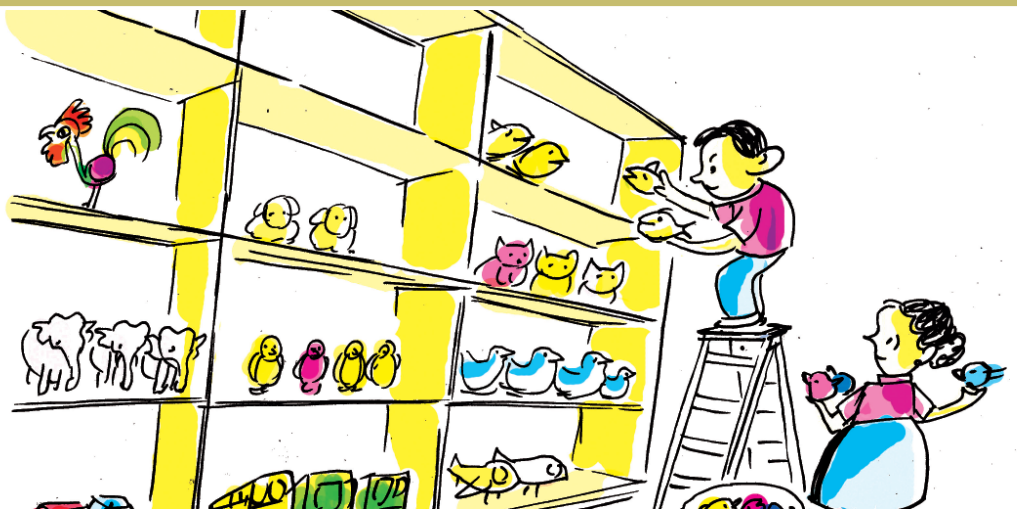
   Anyway, it was a good experience.

   I will get my phone repaired tomorrow."

   What should we do in order to avoid such a situation like this?

Chapter 8

Database - An Introduction



Thomas, the teacher in charge of the school library is searching for the books which Mini required. The issue register and the book shelves have been checked. Now he has to find out if they are in the stack.

"When I went to the district library with my father, they could quickly locate the books that we asked for."

Mini's voice disturbed Thomas from his thoughts.

"District Library? That is computerised, child. There it can be done easily."

"In that case, why not computerise this library also?"

You must have understood the condition of the library of the school where Mini studied. Does your school library look like that? Now imagine your school library is getting computerised. What will be the benefits? Discuss with your friends and expand the list given.

- we can quickly find out if a book is available.
- Tables of different kinds of books like fictions, poetry, history, etc. can be created.

- A table of books that have been issued can be prepared.
- Find out the members who haven't taken any books.
- .....

To computerise your school library like this, what are the preparations to be made?

- Collect the data of books.
- Collect data of library members.
- Set a computer and related devices.
- Prepare a suitable software.
- .....

Suppose the data of all the books in the library are collected for this purpose. What data can we obtain of each book?

- Title of the book
- Author
- Year of publication
- Price
- .....
- .....

There will be several bits of information about any book. The library will have a stock register in which all the data will be recorded. Instead of keeping them in the stock register, how could it be if we make tables of this data and store them in the computer? The details about

Database

You may have heard about a sytem called "Sampoorna" that contains all the information about the students in our public schools. The data regarding lakhs of students have been compiled systematically. Such systematic collection of data is called databases. The data is recorded in one or more tables in databases.

- ♦ Store data securely
- ♦ Add new data
- ♦ Remove unrequired data
- ♦ Take and use as needed
- ♦ Make suitable changes

It is possible to do all these in databases.

the books in the library can be shown in a table. This is called the database of the school library. Similarly, if the table contains data regarding the students of your school, then it will be a database of your school. What other data can you prepare about the school?

- Data of teachers
- Data of furniture
- Data of laboratory equipment
- Data of students who get scholarships
- .....

A school database becomes complete when all these get added. What happens if all these data are entered in a single table? Won't that be difficult to handle? Instead, will it be convenient if we include the data of teachers in one table, and the data of lab equipment in the other? Like this, it is possible to enter data into several tables within a single database.

Visit your school library and find out the other possible tables that can be made in connection with the library database and complete the list.

- Data of books
- Data of library members
- .....

Data Base Management System (DBMS)

Don't we have to add the details of the new books purchased into the database of the library? Similarly, we will have to remove the books that are too old to circulate. Find out what we have to do with the database and

tabulate.

- Adding new data
- Removing unnecessary data
- Analysis of the data as required
- Preparing reports
- .....
- .....

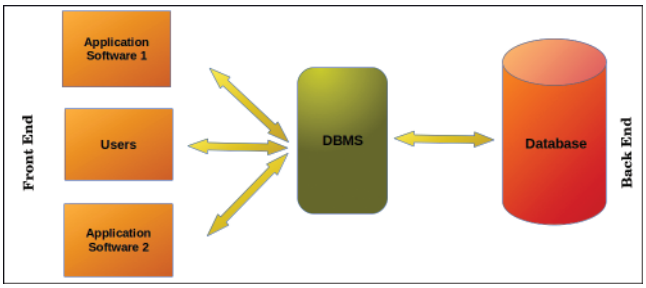


Fig. 8.1 Data Base Management System - Structure

A software that makes it convenient to do such activities with a database is called a Data Base Management System (DBMS). DBMS helps us create databases and use them securely. Here, the user does not directly handle the database, but uses it through an application software (Fig. 8.1). That is, DBMS acts as a link between the user and the database. MySQL, Microsoft SQL Server, Oracle, etc. are wellknown database management systems. There are DBMS applications that come as part of office packages, such as LibreOffice Base, Microsoft Access, etc.

January 25, Monday

Reached school early today. Discussed the possibility of computerising the library with Rabiya teacher who is in charge of IT. She was very much interested when she heard the idea. I got clear about it only when the teacher explained the preparations needed for getting the software ready. We have to study in detail the field of computerisation and learn about the on-going work in it. This is apparently known as System Analysis. The teacher also told me that it is based on this that the new system is designed. The teacher also indicated the need of a database management system that can handle all data in the present library. So I decided then and there to go to the library tomorrow itself and learn about all the activities going on there.

Try to read the diary of Mini who is going ahead with the challenges of preparing a library software.

Database and application software

We use different application software for painting, listening music, etc. Similarly, we need a specifically designed application to prepare reports on a database and add data to it. It is possible to obtain data from a single database for other application software. The data from the database of the school containing the details of all the students are often used in the applications prepared for the school youth festival and for the distribution of scholarships for the students.

Activity 8.1 - Building the database

Hope you have listened to what Mini said about the different stages of software building. As mentioned in the note, a DBMS that can store data and use them as required is an integral part of any software. We can make use of the application LibreOffice Base for this activity. See how one can open LibreOffice Base, create a new file and save it.

- Click the ***Select Database*** option you see when Libre Office Base opens.

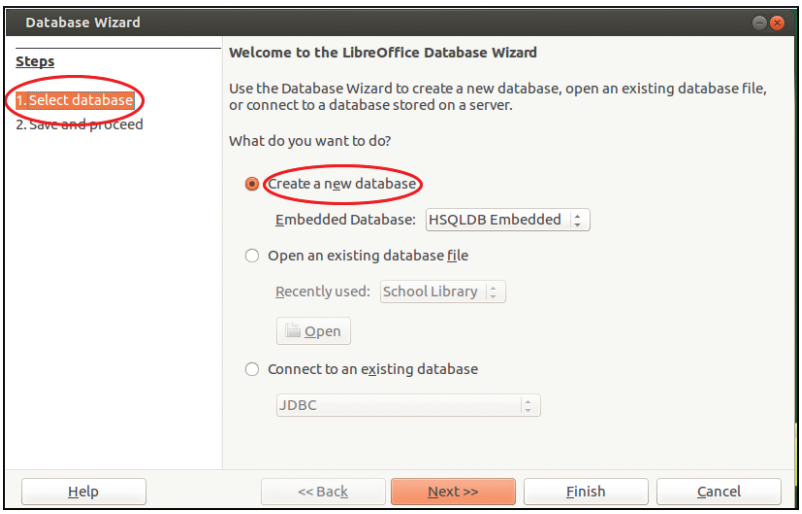


Fig. 8.2 Create database file

- When you click the ***Finish*** button of the window that opens, the window to save file will appear.
- Save the file with a proper name in your folder.

Activity 8.2 - Building table of books in the library

You know that data is included in a database in the form of tables. Let us see how we can add data in the form of tables to the database we have just created. What Mini is trying to make a table containing data of all the

books in the library. As indicated in the note of her diary, the number of the book, title, author, price and date of purchase should be included as part of systems analysis. You should discuss what other data should be included in the table that you prepare.

When you open the database file that you have created, you will see a window with three panels (Fig. 8.3). They are 1) the ***Database panel*** for selecting table, query, form or report, 2) ***Task panel*** and 3) ***Work area*** - the panel where the table or query that we create will appear.

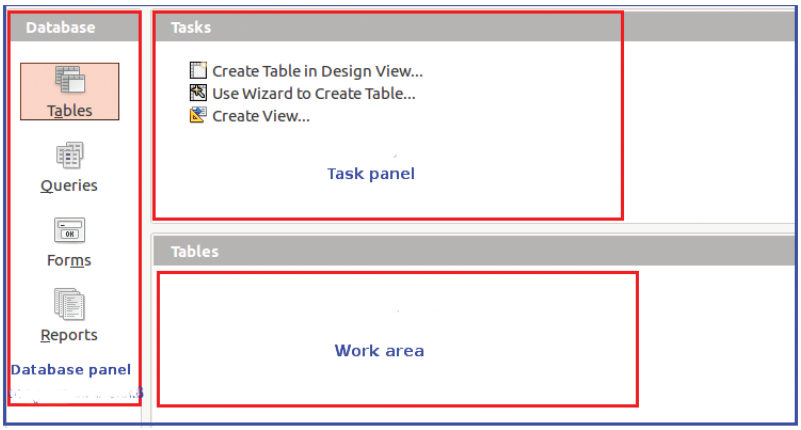


Fig. 8.3 LibreOffice Base Main window

In order to create a table,

- Select ***Tables*** from the ***Database panel***
- Select ***Create Table in Design View*** from the ***Task panel***

A window will open where you can define the field name and field type of the data to be added (Fig. 8.4). Now you can add necessary fields.

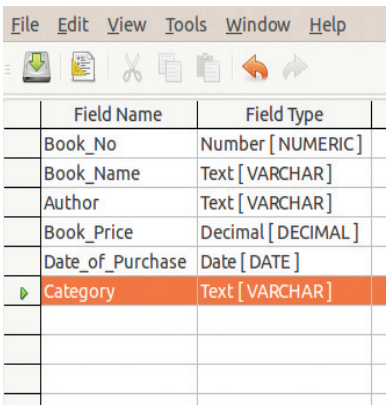


Fig. 8.4 Windows for define fields

The term 'Book_No.' entered here is a field in the table. 'Book_Name' and 'Author' are the other fields. We can say that what recorded in columns in the database

table are fields. As you know, 'Book_No.' is data in numerical format and 'Book_Name' in text format. Defining the type of data of each field in a table is very helpful in the analysis of data. Complete the table after finding out how the field type is defined when you record fields in LibreOffice Base.

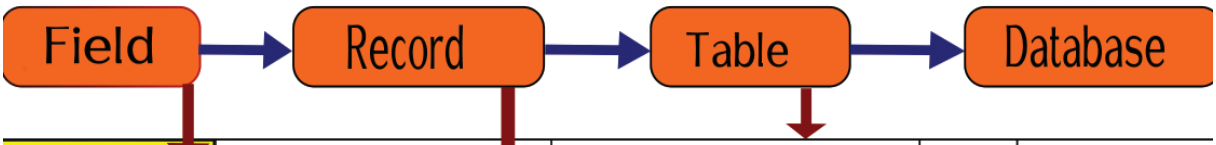
Fields	Data Type	Field Type to choose
Book_No	Numeric	Number [NUMERIC]
Book_Name	Text	Text[VARCHAR]
Author		
Book_Price	Currency	Decimal[DECIMAL]
Date_of_Purchase	Date	
Category		Text[VARCHAR]
Cover_Image	Image	

Table 8.1 Field types in the database

Apart from numbers and text, we can include different kinds of data such as date, images, video etc. in the database. You have only to select the appropriate field type.

See the book ***Ramanan*** by Changampuzha in the table 8.2 which contains the data of library books. The database considers this as a record. Each row of the table represents a record. In this manner, the table will have as many records as the number of books.

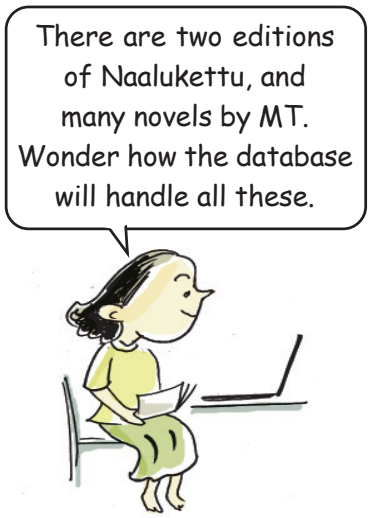
The library may have purchased the same book during different years. There may be several books by the same author too. How can the DBMS distinguish them? The problem can be solved by giving values for one field in such a manner that it doesn't get repeated. For this, one field is defined as the primary key. Once it is defined, we can give only unique values to that field



Book No	Name of Books	Author	Price	Date of purchase
134	Naalukettu	M T Vasudevan Nair	150	25/01/1999
235	Ramanan	Changampuzha	160	10/05/2000
326	Sarada	O Chandu Menon	140	10/05/2000
352	Indulekha	O Chandu Menon	170	25/11/2001
411	Oliver Twist	Charles Dickens	120	31/01/2003
456	Naalukettu	M T Vasudevan Nair	245	15/05/2005
531	Balyakalasakhi	Vaikom Muhammad Basheer	120	18/07/2007
842	Aadujeevitham	Benyamin	180	28/02/2014

Table 8.2 The details of books

for different records. In other words, the value of the primary key in a record will be unique. The database recognises the records based on the primary key.



Which field in the database of the library is to be defined as the primary key? Fields like 'Book_Name', 'Author', 'Book_Price', and 'Date_of_Purchase' may have to be repeated. But 'Book_No.' is one field that can be given a value that is unique. So, isn't it logical to define 'Book_No.' as the ***Primary key***? For this, right click on the left hand side of the 'Book_No.' field in the window where fields are defined and select ***Primary Key*** (Fig. 8.5). Now a tiny image of a key appears there. This helps us to identify the ***Primary key*** in the table. Now save the table.

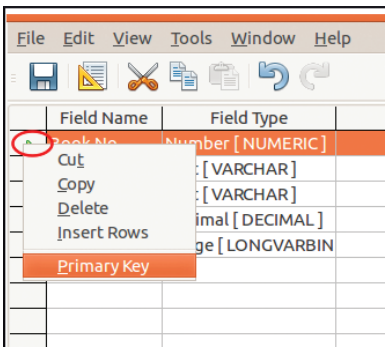


Fig. 8.5 To define primary key

We have defined the table to record the data of library books. What other tables will have to be included in a library database? Distribution of books is an important activity of a library. What fields will be required in a table that contain this information? Similarly, there should be a table of the members of the library. Expand your database by adding such tables.

Activity 8.3 - Data into tables

One method is to directly enter the data into the table. Is it safe to do so? While entering, the chances of errors in the database are comparatively high. Using an appropriate application software to enter data into the tables is better than directly entering them, which can be quite unsafe and incorrect. There is also the method of entering data using ***Form*** technology incorporated in the data base management systems. Let us see how we can create forms and enter data in LibreOffice Base.

- Open the Database file that you saved in your folder.
- Click on ***Forms*** in the Database panel of the window that opens.
- Select ***Use Wizard to create Form*** from the ***Task panel***.
- Select the table that has been created from the ***Tables or queries*** combo box (Fig. 8.6).

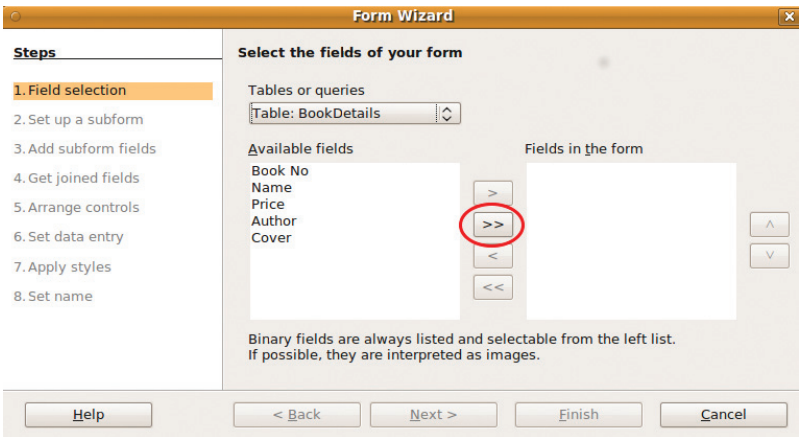


Fig. 8.6 Window to select form fields

- You can see under ***Available fields*** the fields we have selected.

- Use the arrow button to include the required fields under ***Fields in the form*** in the form that we are creating (Fig. 8.6).
- You can move to the next stage using the ***Next*** button.
- If you want to give the form a different layout, you can do so by selecting a suitable layout from ***Arrange controls*** (Fig. 8.7).
- Select a suitable style from ***Apply styles***.
- Give a suitable name for the form from ***Set name*** and click the ***Finish*** button.

The form we created appears now in the ***Work area***.

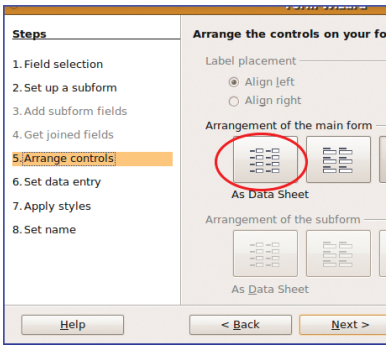


Fig. 8.7 Windows for selecting form layout

Activity 8.4 - Data Entry

You can open from the ***Work area*** the form that you have created and enter the data. You can move from one field to the other by pressing the ***Tab key***. Does the cursor reach the box where the cover page of the book has to be entered? How can we add the image to the ***form***? Images saved in the computer can be added to the database by double-clicking on the image field or by right-clicking it (Fig. 8.8). Mini has plans to add data of all the books in the library with the help of her friends. Similarly, add data of all the books in your library to the database.

What should be taken care of while entering the data?

- Accuracy of data
- Speed
- .....

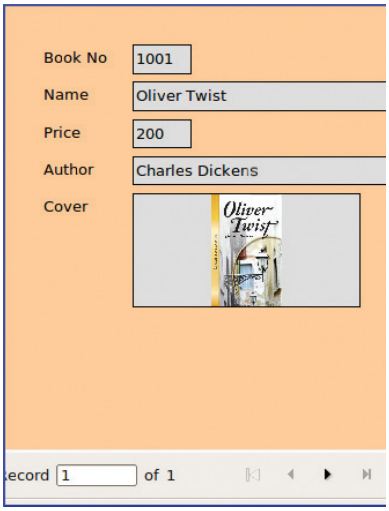


Fig. 8.8 Model of a form

Activity 8.5 - Queries to Communicate with the database

Several occasions are there, when we want to get some specific data from a large database. Such data can be obtained from the database only by specifying the conditions of the data. Queries are the means of making available such data that complies with certain conditions. Queries can also be used to make basic changes in the database such as combining records, removing data, modifying records, etc. Languages used to communicate with the databases are called Query Languages. Structured Query Language (SQL) and My Structured Query Language (MySQL) are examples.

Let us see how queries are configured in LibreOffice Base.

- Suppose we want a list of books by Charles Dickens only. To get this, click Queries in the database panel.
- Select ***Use Wizard to Create Query*** from the ***Task panel.***
- In the window that appears, select the fields to be included in the query and specify the order in which the records are to be sorted (Fig. 8.9).
- In the next window, specify the search conditions to obtain the data we require and save (Fig. 8.10).
- When you open the new query from the ***Work area***, LibreOffice Base will display a table of books by Charles Dickens alone.

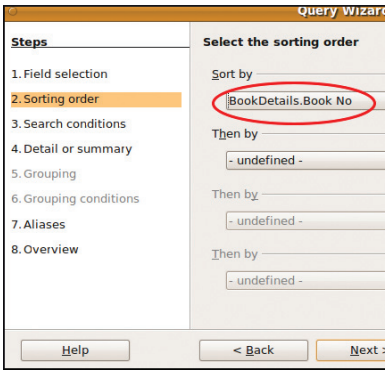


Fig. 8.9 Query Wizard window

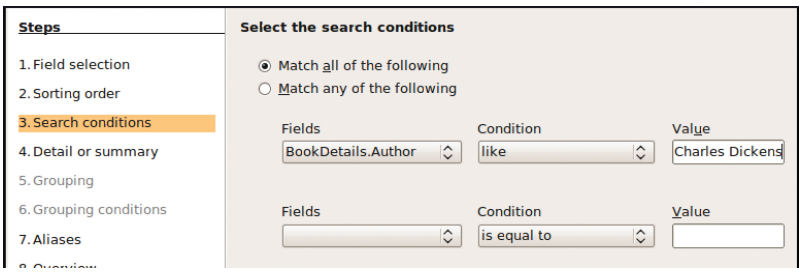


Fig. 8.10 Window to add conditions to a query

Such queries can be used for preparing reports or in application software.

Activity 8.6 - Preparing Reports

The biggest advantage of database management systems is that we can make reports of the kind we want. Let us see how we can create reports in LibreOffice Base. For this,

- Click on the ***Report*** button in the ***Database panel***.
- Click on the ***Use Wizard to Create Report*** seen in the ***Task panel***.
- In the window that opens, select table or query from the combo box depending on what you would like the report to be based upon.
- Include the fields you want in the report in ***Fields in report*** (Fig. 8.11).

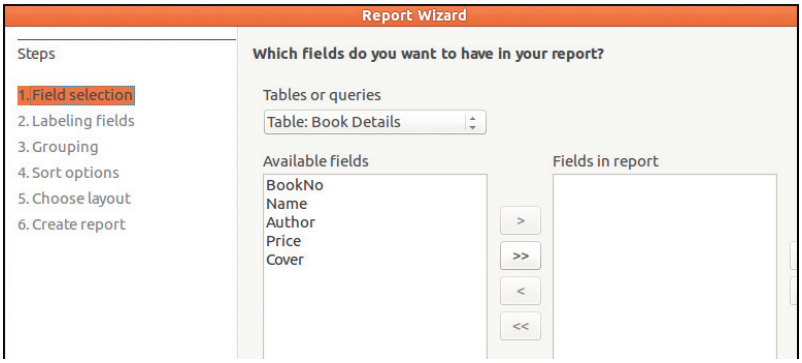


Fig. 8.11 Window to include necessary fields in the report.

- Go to succeeding windows by clicking ***Next*** button.
- Select suitable layout (Fig. 8.12).
- Give a name in ***Title of Report*** and click ***Finish*** button.

You can open the newly created report from the ***Work area***. In this manner, practice by making more

Library Management System (LMS)

Several Library Management Systems are available now that can handle everything from buying books for the library to the members selecting the books online. Koha, OPALS, L4U, Evergreen, Alexandria etc. are examples. When we use such applications, we have to customise them for our needs. There are also LMS applications like Insignia Software, Libramatic, WorldShare, OCLC and Alma that make use of cloud technology.

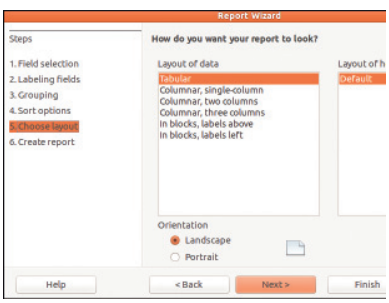


Fig. 8.12 Window for selecting report layout.

reports that are suitable for the tables and queries you have created.

Three tables are mainly included in a Library Management System. They contain

- Basic data on books
- Data about library members
- Data on book circulation

Needed queries and reports are generated based on this. Now you too can prepare a Library Management System.

Big Data

You must have received your Aadhaar card. What kind of data do you find in it? It has your name, date of birth, photograph, biometrical information and so on. How big will be the database of all the people of India! Such a database is called Big Data. They are much more bigger and complex than the database that we handle using normal data processing technology. Collecting, sharing, analysing, exchanging, etc. are all challenging tasks. It is said that the text and images stored in Wikipedia come to several terrabytes. If all the images and videos handled by Whatsapp used by crores of people are put together, how huge it will be! Hadoop, SPARK, etc. are examples of software used for handling big data.

Specificant learning outcomes

The learner :

- recognises that a database is a collection of different tables and create tables of familiar databases.
- finds out the uses of database management systems and tabulate.
- prepares tables in LibreOffice Base.
- prepares forms using LibreOffice Base.
- enters data correctly using prepared forms.
- prepares queries and reports in LibreOffice Base.

Let's evaluate

1. Given below is a report containing the details of policy holders in an insurance company.

Policy No.	Name	Age	Male/ Female	Date of start of policy	Premium amount
3456134676	Avtar Singh	55	Male	28/10/1993	2331.00
7843211234	Pramila C. Mitra	43	Male	10/05/2000	3548.00
2678906756	Pranav Mukherjee	28	Male	23/12/2009	567.00
4256674542	Avtar Singh	37	Male	25/11/2001	1232.00
7834512398	Malini Bhattacharya	43	Female	28/10/1993	567.00

- What fields in the company's database have been included in this report?
- Can the field Premium amount of this database be defined as the primary key? Why?
- Which field of this database could be defined as the primary key? Justify your answer.
- Can you guess data of how many records are included in this report?

Follow-up activities

1. Collect the following data from the students of your class.

   Roll No., Name, Date of birth, address, Digital photograph, Height (in metres), Weight (in kilograms).

   Now build a database in LibreOffice and

   - Design a table with Roll No. as the primary key.
   - Prepare a form and add the data to the table.
   - Prepare a query to find out the children with height above 1.5 m.
   - Prepare a report based on the query you have made.

Chapter 9

Moving Images

Summary of Vipin's story

"Mother had left early in the morning. She used to get back to the nest before noon. The sun has reached the western horizon and will soon vanish into the sea. The baby bird started worrying.

"If father were here.."

.....

.....

The baby bird remembered as if in a dream the time when she would wake up to her mother and father's loving embrace. As she listened to the brave story of how her mother rescued father from the rocks of the valley, her eyes fell on a big star moving to and fro among all others in the sky."

"Teacher, this notebook is full of stories written by Vipin" - Jomon told the class teacher handing over the notebook.

"Clever boy! The story is good. This short story can be made into an animation film."

Vipin's face became bright when he heard the teacher's comment after reading his story.

Did you read the synopsis of Vipin's story?

What about developing the story into an animation film? How can we create an animation film?

We know the different stages of making a movie. Making an animation film also goes through more or less the same stages. The only thing is that a computer is to be used. Just as for a movie, animation film also needs considerable preparation.

Activity 9.1 - Producing an animation film: Stages

What are the different stages of producing an animation film? Discuss with your friends and complete the following list.

- Finding a story
- Designing characters
- Preparing a storyboard
- .....
- .....

Did you complete tabulating the different stages of making an animation movie?

Animation

Animation is an illusion created by displaying still images in a fast and continuous manner. This is a technology that depends on the persistence of vision. Anything that we see persists in our vision for a short time (1/16th of a second) even after it is removed. Because of this, when some images appear one after the other continuously in front of our eyes, the images appear to move. Normally, a movie has about 24 images appearing per second in front of our eyes.

In the early days, animation films used to be made using plastic films on which the images were painted. With the arrival of computers and animation software, it became much easier. Synfig Studio, Tupi: Open 2D Magic, Pencil (Free Software) Adobe Flash, ToonBoom, AnimStudio (Proprietary software) are some of the important applications of animation.

Design of characters

Character designing is an important stage in the making of an animation film. It means bringing characters to life with humanity and personality. This has a huge role in giving life to the story.

Characters have to be designed very carefully. It would be good to take into consideration the following things also.

- The appearance of the characters.
- Selecting suitable colours to the images.
- A drawing style that could be easliy modified.

Which characters should be included in the animation film of the baby bird's story? Based on the note, discuss how characters should be framed with your friends.

You have finalised the characters needed for the animation film and their traits. The next stage is to prepare the story board.

We have learned many ways of preparing storyboards when we made multimedia presentations. A detailed storyboard like this is important for the preparation or making of an animation film also.

See table 9.1. Using the hints given, complete the storyboard containing the details of animation that you are going to do.

Activity 9.2 Let's complete the storyboard

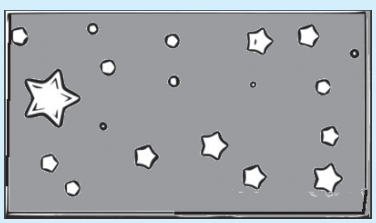
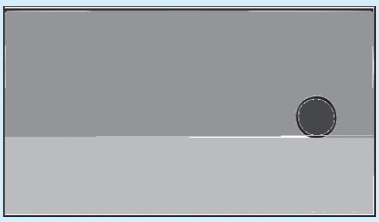
Title: Sanathan		Page:...
Scene.1-Stellar movements  Characters: Sky, small and big stars Action: A big star moves towards both sides. Sound: Background music Time: 5 seconds Remarks:	Scene. 2 -..... ..... Characters:..... Action:..... Sound:..... Time: ..... Remarks:.....	Scene 8: Sunrise  Characters: Sun, Sky Action: The Sun rises Sound: Background music Time: 5 sec Remarks:.....

Table 9.1 Sample storyboard

The storyboard is ready. We have shown the happiness of the little bird through the stars and the movement of one of them. The storyboard here has been written in such a way that the story starts with the happiness of the bird indicated by the movement of the stars.

The next stage is to prepare the animation based on this storyboard. Let us try doing this using the Synfig Studio included in IT@School GNU/Linux.

Let's understand the application

Open Synfig Studio in your computer. Get acquainted with the main window, tools and other facilities of the application with the help of Figs. 9.1 and 9.2.

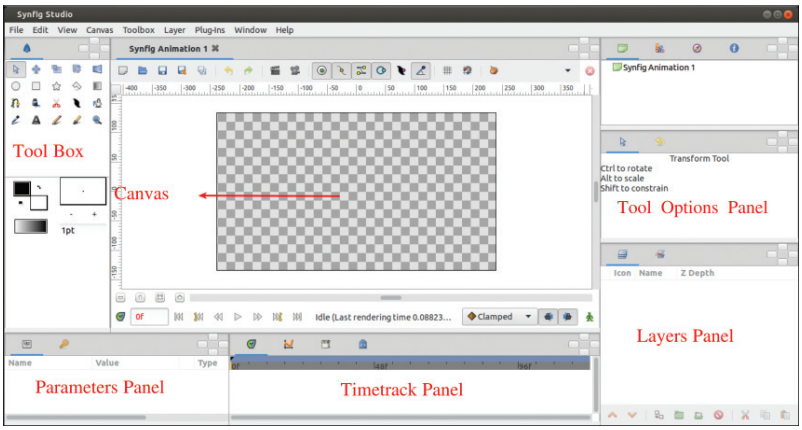


Fig. 9.1 Synfig Studio window

Observe the Synfig Studio tool window. Move the cursor on the top of each tool and learn its name.

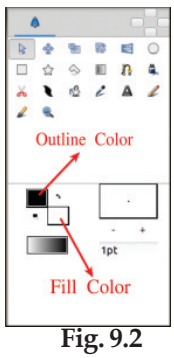


Fig. 9.2
Synfig Tool window

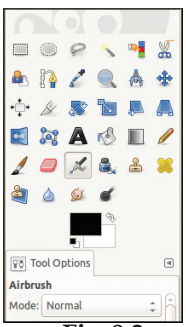


Fig. 9.3
Gimp Tool window

Synfig Studio

Synfig Studio is a Free 2-dimensional animation application. This software is created by Robert B. Quattlebaum. This application is used to create animations by giving movement to the cartoon images in a 2D canvas. It has versions that can run in GNU/Linux, Microsoft Windows and Apple Mac OSX.

Activity 9.3 Let's see the tools in Synfig Studio

Some of the important tools in Synfig Studio are given in the table below. Find out their names and usage and complete the table. Remember the use of the tools in the GIMP software that we studied.

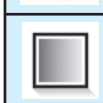
Tool	Name	Use
	Transform	To select an object and to control its handles
	.....	To create a square object
	Circle	
	Fill	.....
	.....	.....
	Star	To mix two or more colours
	Smooth move	.....

Table 9.2 Some of the tools in Synfig and their uses

We have understood that animation is created by displaying images in a continuous and fast manner. These still images are known technically as frames. We can create an impression of motion by changing the position, shape and expression of the characters in each frame. The naturality of the movements is determined by the number of frames exhibited per second (Frames Per Second, FPS).

We can decide in advance the FPS of our movie and the duration of each scene. What should be the FPS of the movie you make? Discuss with your friends.

The default settings in Synfig Studio is to create a video that lasts for 5 seconds at the rate of 24 frames per

second. If you want to change this setting, you can open ***Canvas → Properties → Time*** and change the time and ***fps*** as desired (Fig. 9.4).

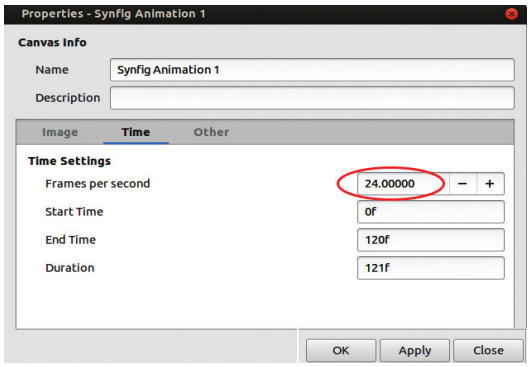


Fig. 9.4 Time settings in the Canvas properties window

Animation: Scene 1

Examine once again the animation we have to do in the first scene as per our storyboard. Isn't it the animation of a big star moving to and fro among the stars in the sky?

We have to draw many stars to prepare this animation. Simple things like stars can be drawn using the tools in Synfig itself. If you need more complex images, you have to use some other piece of software. Since it is possible to use vector images directly in Synfig, it is possible to create such images in applications like Inkscape that we are familiar with and import them into Synfig.

Draw the images required for animation and save them with the help of the following activities.

Activity 9.4 Let's draw the sky and stars

Draw a night sky and stars in it with suitable colours. For this,

- Open Synfig Studio software.
- In order to prepare the night sky in the background, use the ***Rectangle*** Tool, drag and draw a rectangle that fills the entire canvas.
- Give a suitable colour to the rectangle using the ***Fill*** Tool.

The ***Star*** Tool can be used to draw stars. The ***Fill*** Tool will be having the colour given to the sky, which won't be suitable for the stars. So don't forget to change the colour (Fig. 9.5).

Fig. 9.5 Sky and Stars

Each picture created in Synfig is called an ***Object***. Each object that we draw will be included in a separate layer. What is the advantage of each object being included in a separate layer like this? Discuss with your friends and make a list. Remember we have learned about the layer system in GIMP.

- Each object can be given a separate animation.
- If any object is to be discarded, it is possible to remove that layer alone without affecting other objects.
- .....
- .....

Layers Panel

We have seen what layers are, when we studied the application GIMP. These are displayed in the ***Layers Panel***. Each object appears in this panel in the order in which it is built (Fig. 9.6). It is possible through this panel to change the order of the layers, group them, copy them or delete them.

Note that as you draw the rectangle layer that contains the sky, separate layers for the stars appear in the layers panel (Fig. 9.6).

- Shouldn't the stars be scattered all over the sky? For this, click on the ***Transform*** Tool ( ).
- With the ***handle*** you get now ( ), you can change the position, size and shape of the star.

Hope you have saved. The next stage is to make the big star move.

Activity 9.5 - Moving the star

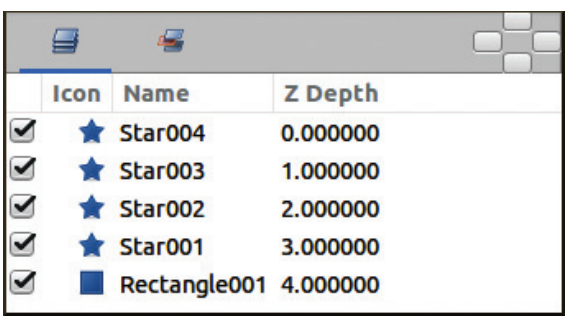


Fig. 9.6 Layers of Sky and Stars

Suppose we are going to prepare an animation for a duration of 5 seconds at 24 FPS. The total number of frames required for this animation is 120 (24 x 5).

- The star should move from one side of the sky to the other and return in 5 seconds.

- The image we have prepared will be in the first frame (***0f*** - zero frame). After half time (60 frames ***60f***) the star has to move and reach the other side.

The movement of the star to one side has to be completed in 60 frames. In order to create this animation, 60 images have to be drawn. That is 60 pictures of the same movement have to be drawn. Instead, if we fix the first frame where the movement starts and the 60th frame where the movement ends and if the software fills up the frames in-between, won't that be much easier? This is possible in the Synfig software that we are using. This technology is known as Tweening. This is made possible by means of the mathematical process of interpolation.

When we do tweening like this, shouldn't the software be able to judge the movement of the object? That is, we have to show some of the important positions related to the movement of the object. The frames that represent important positions are called key frames. Here, we can consider the first frame where the movement starts (***0f***), the frame where the direction changes (***60f***) and the last frame where the movement ends (***120f***) as the key frames.

Prepare the animation of the star with the help of the given activities.

- For the animation to start from the first frame, ensure that Current Time is

0f. This is our first key frame.

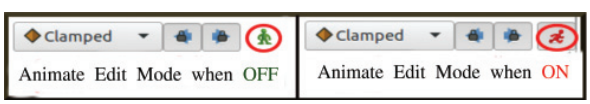


Fig. 9.8 Animate Edit window

- Now we can start editing the animation.
- For that, activate ***animate editing mode***(Fig. 9.8).

Let's save

We have completed drawing the sky and the shining stars. Animations like this often take a lot of time to complete. Therefore, we don't get the final form of our work very quickly. Instead, let us save our daily work as project files. Save this project in your folder with a suitable name. Notice that the work done in Synfig is saved as project files with the extension ***.sifz***.

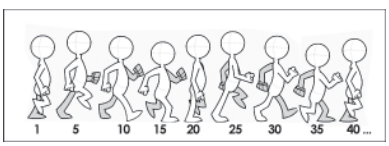


Fig. 9.7 Keyframes

Now, we have to fix the 60th frame as the next key frame. For that,

- Enter ***60f*** in Current Time. Then we can see the play-back head in Time track move to the 60th frame.
- Click on ***Keyframes*** in the ***Parameters panel*** and make it active.

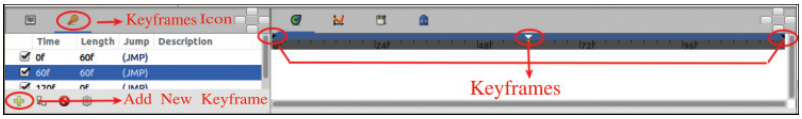


Fig. 9.9 Keyframe making

- Next, click ***Add New Keyframe*** in the same panel and configure the 60th frame as a key frame (Fig. 9.9).
- Now move the position of the star to the right end of the canvas.
- Click ***animate editing mode*** button and end editing.
- Press the ***Play*** button and examine the animation we have created. If it is not satisfactory, modify it.
- Save the animation.

Activity 9.6 - Movement in the opposite direction

In Activity 9.5 we completed the movement of the star in one direction taking only half the time. Now what remains is to take the star back to the original position. Let us make arrangements for that.

- Activate ***animate editing mode***.
- Enter ***120f*** in ***Current time***.
- .....
- .....

With this, the small animation work is complete. Now what we need is the final product, the video. Based on the note given, export the scene we created as a video file. Save the video in your folder.

Animation: Scene 8, Sunrise

The scene in which the star moves is ready. Sunrise and sunset are the scenes that we have to create like this. Imagine that scene 8 shows sunrise. Let us create it.

Here the first frame should have the image just before sunrise and the last frame should have the image after sunrise. The first frame will always be the Keyframe. If the last frame is to be the Keyframe, we have to mark it as such.

Activity 9.7 - Let's create sunrise

Open a new project in Synfig and build the sky at the time of sunrise. For that, select suitable ***Fill*** and ***Outline*** colours and drag from top to bottom with the ***Gradient*** tool.

- Draw the Sun with a suitable colour using the ***Circle*** tool.
- Move the Sun to an appropriate place with the ***Smooth Move*** tool.

This is what our first frame is.

Now let us create the next keyframe. For that, activate the ***animate edit mode***. This key frame has to be at ***120f***.

How should this frame be? Where the Sun should have reached after it has risen, it should be set there with suitable size and colours. The Sun should surely have become much brighter, right? The sunrise and sunset become beautiful because of the colours in the sky.

To convert into video file

Fig. 9.10 Render settings window

In order to save an animation file created in Synfig as a video file, it is enough to select ***Render*** option from the ***File*** menu and specify the location and format (Fig. 9.10). You know that, ***flv, mpeg, mp4,*** etc. are video formats. We can export our project into any of these formats. Small animations can be exported in ***gif*** format also.

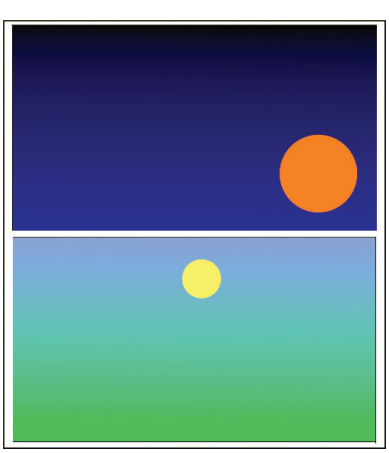


Fig. 9.11 Sunrise - first and last frames - a sample

Opportunities

There are lakhs of job opportunities related to animation in India and abroad. There are chances in advertising agencies, cinema production, television, computer games, cartoon channels and so on. Even freelance animators have lots of opportunity.

Therefore, the gradient layer representing the sky also need changes (Fig. 9.11).

To bring about those changes, try the following activities in a sequence.

- At ***120f***, select the gradient layer from the ***Layers panel***.
- Click on the colour value against the ***Gradient*** in the ***Parameters panel***.
- Change the colour suitably.
- Arrange the position of the Sun and its colour suitably in the prepared sky. Select colours from the ***RGB*** option in the ***Gradient Editor***, you can configure the colours at the top and thereafter, by clicking on the small black mark in the red circle in the figure (Fig. 9.13), the colours at the top also.
- Click on the ***animate edit mode*** button to end editing.

Run the animation and if it is satisfactory, save it in the folder. Finally you can ***Render*** the video and save that also in the same folder.

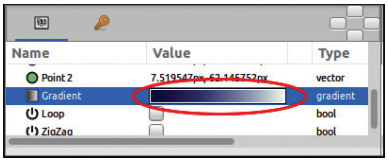


Fig. 9.12 Value arrangements of Gradients in the Parameters panel

Animation: Scene 16, The bird flying towards the branch of a tree.

We have completed the animation scene showing sunrise. Our next attempt will be to create the scene showing the bird flying to its nest. For this, we have to draw the background and the bird's still image. Some drawings like this are stored in the folder for tenth class inside ***School_Resources***. We can import them into Synfig and use.

Fig. 9.13 Gradient Editor window

Activity 9.8 Bird flying towards the branch of a tree..!

It won't be difficult to complete the following activities and build the animation.

- Open a new project and bring the background image onto the canvas (***File*** → ***Import***).
- Click on the image.
- Drag the ***handles*** on the rectangle you get and resize the background (See marked with red circle in Fig. 9.14.).

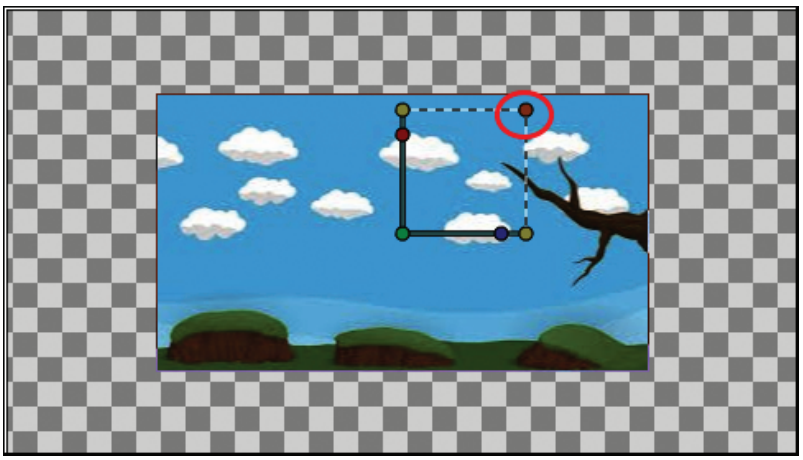


Fig. 9.14 Selection Handles

Find out with your friends the purposes of other buttons with different colours in the handles.

- Import the bird's image into the same canvas.
- Adjust its size and position.

The first frame is ready. Now let us make the bird move. The animation techniques that we have learned in the earlier activities are quite sufficient, are they not?

In the last frame, before moving the bird to the branch of the tree, don't forget to activate ***animate editing mode***.....!

Synfig Wiki

Synfig Studio has many features that help us create animations according to our imagination. You will find much to learn if you visit the Synfig Wiki page (http://wiki.synfig.org/). If you are interested, you can learn the activities mentioned there and create better animations.

Making the bird flap its wings

How to make the bird flap its wings? We can draw its body, wings, etc. separately, import them and put them together in the canvas. We can group layers when needed. We can select the layer with the wings or body alone, rotate them, change their position and size and create the feeling of flying. It will be sufficient to take a copy of the first wing to create the second one. The flapping of the wings can be repeated by adding ***time loop layer***.

In order to give the illusion of the bird coming closer, its size can be increased in the last frame. Along with that, the background layer can be selected and made bigger in the last frame.

What we have done is only to get familiar with some of the techniques needed for creating animation films. You should create each scene in your storyboard like this and save them in your folder.

The next step is to build a movie from several bits of animation that we have created at different stages. If the animation movie needs background music and dialogues, they should be created and edited using **Audacity**. You have already learned in earlier classes how to combine video and audio using **OpenShot Video Editor,** give titles and make it into a movie.

You can exhibit the movie you have made, your own movie, in the school with the help of your teacher. An animation film festival can be organised under the initiative of the school IT club.

Significant learning outcomes

The learner:

- creates a storyboard based on the basics of animation technology.
- creates key frames required for animation.
- draws images in Synfig and animates them.
- includes bitmap images in Synfig and gives animation.
- exports animations prepared in Synfig to different video formats.

Let's evaluate

1. Which among the following is different from others?

   a) Toon Boom b) Adobe Flash c) Blender d) Anim Studio

2. Which term among the following is related to the process in which the software generates the frames between the key frames all by itself?

   a) FPS b) Tweening c) Interpolation d) Import

3. Prepare the animation of sunset using Synfig Studio. Export this as ***gif*** file and save it in your folder.

4. Check if the uses of the tools listed below are correct and correct them if they are not.

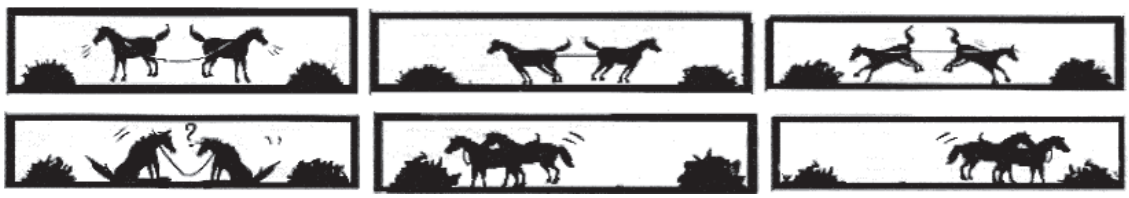
	To select an object and manipulate handles
	To draw squares
	To mix two or more colours
	Give colour to objects

Follow-up activities

1. Animate a leaf swinging from the branch of the tree on which the birds are sitting.

2. Prepare the animation of a bird, flying with its wings flapping from the animation you have prepared earlier.

3. Prepare a storyboard of the cartoon given in your English textbook and build an animation (see figure).



4. Remember the collision theory that you have studied in Chemistry? Prepare an animation showing the collision of the particles and present it in your Chemistry class.

Chapter 10

Operating Systems

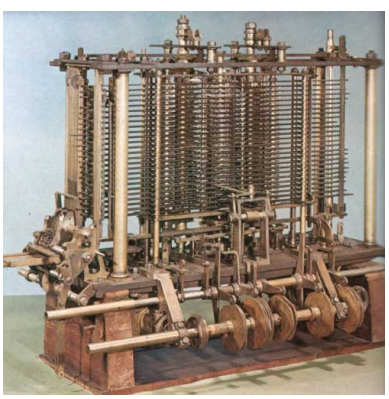


Fig. 10.1 The Analytical Engine

The figure shows the main part of the first computer called the Analytical Engine which, Charles Babbage (1791-1871) who is regarded as the father of computer tried to build. It was meant to be operated using steam. How different is it from the computers we use today? In spite of being very different from today's computers, why is it called the first computer?

It is because those basic concepts related to a modern computer were envisaged for this machine too. It even had a program. The famous mathematician, Ada Byron, had agreed to prepare it. But Babbage was not able to build a practical version of this. A computer (ENIAC) with these ideas were built only 120 years later! The science of computers developed further. Computers came to be built for many purposes. Later on, it became a possible that the same computer could be made use of to do whatever is required.

For what all purposes do we use computers today? There are a number of software for doing all such things. Such software used for specific purposes are called application software.

Activity 10.1 - Different uses of computer

Complete the table showing different activities that can be done using computers and their related applications.

Activity on the computer	Software to be used
Process text	Abiword, OpenOffice Writer
Edit images	
Edit sound	
Create animations	
Handle databases	

Table 10.1 Uses of application software

What we have listed are the uses of some of the application software. All of them can be found in the same computer. When the same computer is used for different purposes, we need to have some additional facilities listed below.

1. These applications should be arranged in such a way that is easy for the user to find and use.

2. The products created by an application may be stored as different files. A file system will be needed to save them and retrieve them as required.

3. If we want to prepare a text with the data given through the keyboard as we desire, using a text processing application, the keyboard and the application will have to work synchronously. Now if we want to get it printed, then also the two machines have to work together. That means, the different hardware and software components connected to the system should have to be monitored by some interconnecting software.

4. .....

.....

Different kinds of operating systems

What we use is the GNU/Linux operating system. But the computers in shops and other places may not have this operating system. You may have noticed that the computers used by some people have more than one operating system installed.

Unix Operating System

Unix is an operating system that was built by Dennis Ritchie and Ken Thompson of Bell Laboratories in the United States of America. The work related to the production of it was started in 1969. They later transferred the ownership to many other companies. These versions came to be used later with a lot of modifications and additions in other operating systems made by Apple Corporation (Mac OSX), California University, Berkeley (BSD) and others. Many other operating systems that are in existence today have been built based on Unix or designed like it.

Operating System

All the computers we use today have a general mode of operation as discussed above. GNU/Linux that is installed in the computers is one such software. Such software are called operating systems.

Activity 10.2 - Let's look at the different operating systems

Complete the table of different operating systems (Table 10.2). Visiting the website https://en.wikipedia.org/wiki/List_of_operating_systems may be helpful.

Operating System	First Developers
Unix	
BSD (Berkeley Software Distribution)	
Mac OSX	Apple Inc.

Table 10.2 Different operating systems

What are the operating systems? Let us examine in detail those we have listed above.

1. Co-ordination of different application software

When there are several applications, they have to be properly co-ordinated. The mechanism of the operating system for this purpose is what we call *menu*.

Activity 10.3 - Operation using the command line

Examine the main menu of your computer's ***Desktop***. In what way is it organised?

Drag one item from it onto the ***Desktop***.

We can see that an icon of that software is created on the ***Desktop***. ***Right click*** on the icon and select ***Properties***. What is shown in Fig. 10.3 pertains to the application called Scratch.

Menu is not essential for operating an application in our computer. It is enough to know the command to start the software. Find out from the figure the command for starting Scratch. What happens if we give that command to a ***Terminal***?

Many modern operating systems don't have any menu. Look at the mobile phone screen in Fig. 10.4. Here, there are only icons instead of a menu. In some others, applications are activated by giving commands to a ***Terminal***.

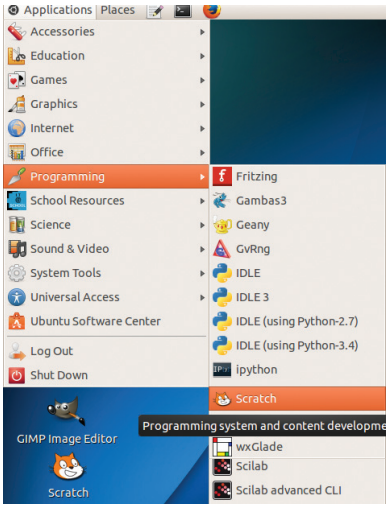


Fig. 10.2 Applications in IT@School GNU/Linux

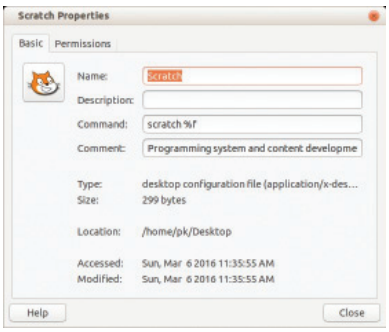


Fig. 10.3 Scratch properties window

2. Co-ordination of hardware parts

Suppose we buy a printer to be used with our computer. Can we start using the printer as soon as it is connected to the computer? The answer is No.

If any hardware part of a computer has to work, it also requires a program (software) that specifies how it should work. This program is called the driver of that equipment. Normally, when you buy a printer, its manufacturers give a driver along with the printer. The printer becomes operational when this driver is added to the operating system. After that, it is the operating system that controls the printer.

Fig. 10.4 Mobile phone screen

3. System for storing files

When we save a file in the computer, the following information is also saved.

- Name of the file
- Location where it is saved
- Format of the file
- Size of the file
- .....

It is the operating system that sorts and saves the file. How does the operating system do that?

Files are normally saved in the hard disk of the computer. An operating system requires an address system to save files in the computer.

In order to know where the files are stored, the disk has to be divided into blocks, and these blocks also have to be given addresses. This process is called formatting. Creating blocks like this and giving them addresses is done by each operating system in its own manner.

File systems

The manner in which each operating system formats the hard disk is known as its file system. Some important file systems are shown in the table

Operating System	The file system used
GNU/Linux	Ext3, Ext4
Microsoft Windows	Fat 32, NTFS
Apple Mac OSX	HPFS, HPFS+

Table 10.3 Different file systems

Activity 10.4 - What are hard disk partitions?

When you want to install different operating systems in one computer, you will have to create different kinds of file systems too. In those situations, you have to divide the hard disk into different parts. Dividing the hard disk into different parts is called partitioning. (The hard disk is sometimes partitioned to store files in an organised way) Find out the details of the partitions of your computer and complete the Table 10.4. You can use the application ***Disks*** (gnome-disks) for this.

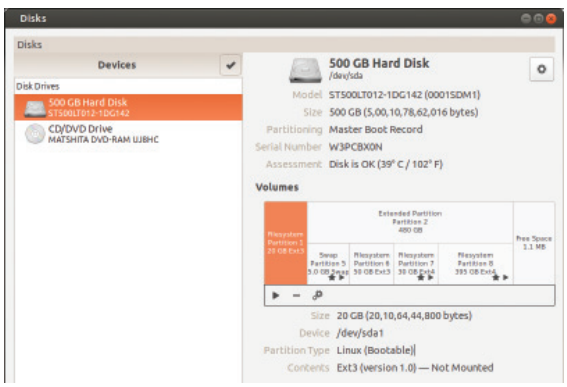


Fig. 10.5 Disks window

Partition	Address	File System (Ext3/Ext4/ NTFS/Others)	Partition size
1			
2			
3			
4			
5			

Table 10.4 Details about hard disk partitions.

You have found out the details of the partitions in the hard disk of your computer. You must have found more than one partition in the computer you use (GNU/ Linux). Normally, a GNU/Linux file system requires three types of partitions, namely,

- ***Root (/)*** - for storing the programs of the operating system

- ***Home (/home)*** - for storing the files created by the user

- ***Swap*** - fast file system for temporary storage

But a GNU/Linux system can also function with just ***Root*** and ***Swap*** file systems.

Computer users

Many gadgets like smart phones are built normally for a single user. But computers are normally configured for use for more than one person. GNU/Linux operating system also has the facility to register more than one person. Each person who uses the computer is called a ***user***.

What are the benefits of registering as a user in a computer?

- We have stated that the place in the hard disk where the files of the users are stored is called ***Home***. When a ***user*** is registered, a folder is created in ***Home*** for this ***user***.

- The operating system creates a ***Desktop*** for each user in the home folder of the ***user***. Each ***user*** can configure the appearance of the computer as (s)he likes.

- Each user is able to keep his/her files separately from that of others.

- Users can protect their files, configurations and other data using a password.

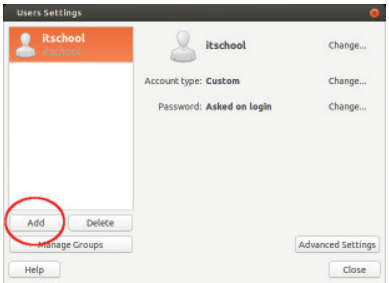


Fig. 10.6 Window for creating a user

Activity 10.5 - Create a *user*

Create a user with your name in your computer. Protect this user with a good password. The following procedure can be used for this.

- Open the window (Fig. 10.6) to create a new user through ***Applications→ System Tools→ Administration→ Users and Groups/User Accounts***.
- Click the ***Add*** button in the window and create a new user.
- Give the user a password.
- Log out from the computer and login as the new user.

We saw that a new ***home*** folder is created for the new user who has just registered. A **Desktop** also is created for the new ***user***. ***Right click*** on the ***Desktop*** and change the wall paper to something that you like.

The general structure of an operating system

Generally, an operating system will have two parts in practice. One is the ***kernel*** which interacts with the hardware directly or through ***drivers***. And the other consists of ***Shell*** and Systems to display software windows (Graphical User Interface - GUI). Given below are some of the wellknown operating systems and their kernels.

Location of a file

Imagine that a ***user***, named binu, created a folder called ***My_Works*** on his ***Desktop***. Also imagine that he has saved a file called ***OS.odt*** in that folder. In that case, the file should be in the folder ***My_Works*** in the ***Desktop*** folder inside the home folder that was created for him in the computer's ***Home*** folder. Correct? So, we can write this in this way: ***/home/binu/Desktop/My_Works/OS.odt***

Operating System	Kernel program
GNU/Linux	Linux
Microsoft Windows	Windows NT
Apple Mac OSX	XNU

Table 10.5 Operating system and their kernels

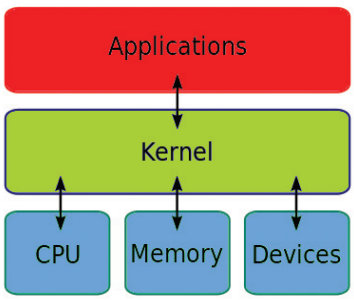


Fig. 10.7 Basic structure of an operating system

GNU - GNU is Not Unix

We know that Richard Stallman called upon the programming community of the world to build a new operating system. Hundreds of programmers came forward to contribute. Many of them were employed in different organisations. It was not possible to get all of them together or explain the project to them. So he directed that Unix be chosen as a model to build the new operating system. Whatever was there in Unix should be there in the new one also. In other words, it should be just like Unix, but it should not have any code of Unix. Thus those who came forward to help had rewritten Unix without taking any code from it. This is what the name GNU signifies.

Free software and Proprietary software

Most of the computer programs during the early days were made free to copy and share. But, as software industry grew, we also saw the growth of competition among the monopoly practitioners that restricted the freedom to study and share. The competition became really tough when the software was brought under copyright laws in the 1980s. With that the use of software became restricted so much so that they couldn't be examined even for academic purposes. Such software is called proprietary software.

In order to find a solution to this problem, a computer programmer named Richard Mathew Stallman started the GNU project in 1983. The aim of the GNU project was to prepare an operating system that could be studied by anyone, modified and shared without any restriction. Almost all the software for this project has been prepared by thousands of programmers around the world.

Linux - The operating system 'Kernel' written by Linus Torvalds

We saw that an operating system has different parts. Kernel is one of the basic parts. The GNU project named the kernel that they built as GNU HURD. But it did not get ready even by 1992 when most of the other parts were ready.

Linus Torvalds, a student of Helsinki University in Finland had started writing an operating system kernel in 1991. People started using this kernel along with GNU components in 1992. From that time onwards, the operating system having these parts is known as GNU/ Linux.

Activity 10.6 - Get familiar with free software

GNU/Linux is a Free operating system that works with the Linux kernel. What are the other free software operating systems? Complete the Table 10.6.

We saw that there are Free and Proprietary software. When does software become free? Examine this based on the note given below.

Operating System	Proprietary/Free	Kernel used
GNU/Linux		
Microsoft Windows		Windows NT
FreeBSD	Free	BSD
Mac OSX		

Table 10.6 Licences of different kernels

- We have learned to write programs in Python language. We know that software is a collection of such programs. Program instructions in the written form is called "source code". Software works by converting this into a form that the computer can handle (object code). If something has to be added to a computer program or make some changes to it, the source code should be available.
- Free software makes its source code available to others, thus giving an opportunity to use it freely, study the program, make changes if needed and take copies. Everyone has the opportunity to revise it and make new ones.
- Proprietary software makes available only object code to its users. It rejects the users' right to read the source code or study it.

GNU/Linux distributions

All the main software included in GNU/Linux are Free. Many people make use of this freedom to modify and redistribute the software. Some of these distributions are listed below:

- Slackware Linux
- Debian - from Debian is made Ubuntu, from Ubuntu we have made the distribution IT@School GNU/Linux that we use.
- From Redhat, came Mandrake (Mandriva now).

Operating System for other appliances

We are familiar with devices that work based on given instructions. Complete the following list.

- Mobile phones
- Automated Teller Machines (ATMs)
- Motor cars
- .....
- .....

Activity 10.7 - Let's look at the mobile operating systems

We know that mobile phones and tablets have operating systems. Table 10.7 given below lists such mobile operating systems.

Operating systems for wearable devices also

We have seen that the operating systems that are used in computers have reached smart phones and tablets. But today these are not the only devices that have operating systems and software. Look at the following.

Operating System	Company that brings it	Basic program
Android	Google	Linux
iOS	Apple Corp. Inc.	Unix
Windows 10 Mobile	Microsoft	Microsoft Windows
Tizon	Linux Foundation	Linux
Blackberry 10	Blackberry Ltd.	QNX

Table 10.7 Mobile operating systems and their basic programs.

Fig. 10.8 Wearable devices - spectacles and watches

- Smart watches having the facility to listen to music and make phone calls.
- Spectacles (glasses) that create life-like images and sounds.
- Wrist bands that constantly measure blood pressure and heart rate.
- Lockets that contain camera and sensors.
- Gadgets that control the flow of insulin for diabetics.
- Chips that are installed under the skin.
- .....

Such things have started appearing in the market. Such gadgets are generally called wearable devices.

Significant learning outcomes

The learner:

- explains the need and role of operating systems.
- tabulates different types of operating systems and their fundamental kernel programs.
- tabulates the names of different kinds of file systems. Finds out the hard disk partitions and file systems in a computer with the help of a software and lists them.

- creates users in a GNU/Linux system.
- writes correctly the location of a file saved in a computer.
- explains free software and proprietary software..
- lists the operating systems in mobile phones and other gadgets.

Let's evaluate

1. Which among the following is a Free operating system?

   1. Microsoft Windows
   2. Apple Mac OS X
   3. GNU/Linux
   4. Blackberry 10

2. Which among the following is absolutely correct?

   1. GNU is the kernel program in GNU/Linux system.
   2. GNU is the shell program in GNU/Linux system.
   3. Linux is the kernel program in GNU/Linux system.
   4. Linux is the shell program in GNU/Linux system.

3. Which of the following is the most correct statement?

   1. GNU program was written by Richard Stallman.
   2. Linux program was written by Linus Torvalds.
   3. GNU program was written by Ken Thompson.
   4. GNU program was written by Dennis Ritchie.

Follow-up activities

1. Operating systems and applications are installed in computers, smart phones, smart watches, etc. However, it is essential to install an operating system and its applications in a computer which is connected to the Internet. If the operating system and all these applications are installed in an Internet server, won't it be sufficient for the users to use them? Such operating systems are known as cloud operating systems. Given below are some cloud operating systems. Find out more about it and list them. For more information, visit https://en.wikipedia.org/wiki/Cloud_computing.

   - Chrome OS
   - EasyPC
   - .....