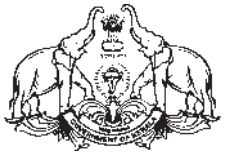
INFORMATION AND COMMUNICATIONS TECHNOLOGY

STANDARD - X

Part 1 1/2



Government of Kerala
Department of General Education

State Council of Educational
Research and Training (SCERT)
2019

NT-499-1-ICT-10-E-VOL.1

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

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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.

Dr. J. Prasad
Director
SCERT, Kerala

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements;

(k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between age of six and fourteen years.

CONTENTS

Certain icons are used in this textbook for convenience

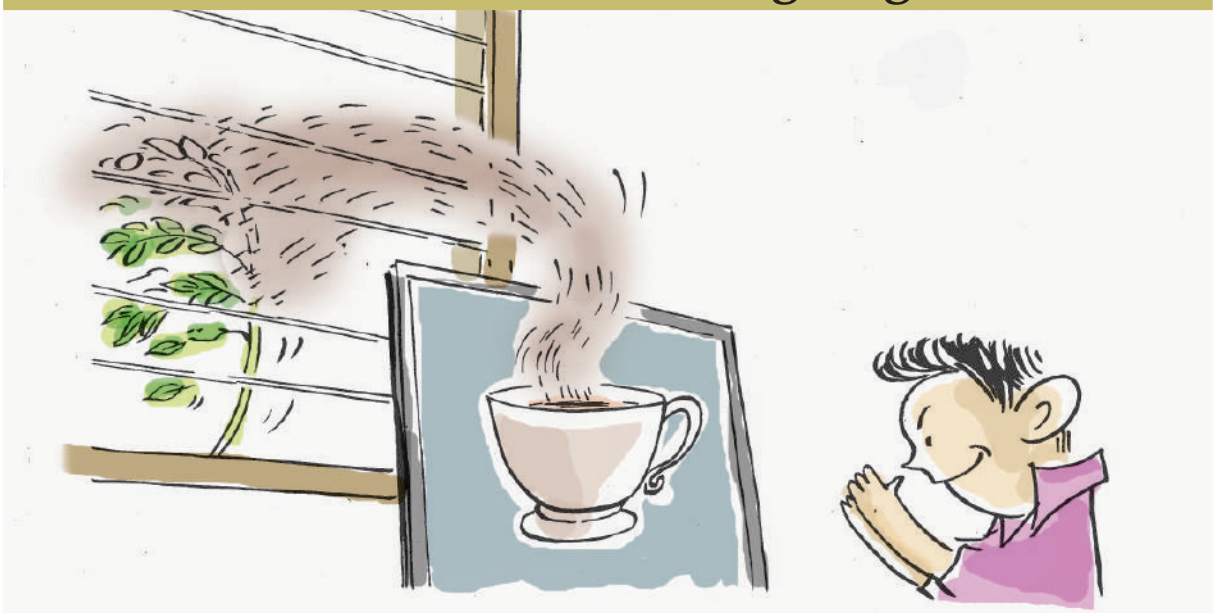
For further reading
(Evaluation not required)

Let's evaluate

Extended activities

Chapter 1

The World of Designing

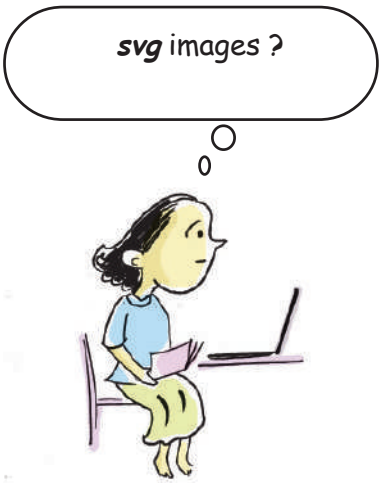


Inviting logos

We solicit logos to be used in the banner of a new coffee shop to be opened by Kudumbasree soon. Images in ***svg*** format should be sent 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 sent? We are familiar with images like ***jpg*** and ***png*** and so, what are the advantages an ***svg*** image has over the image files? Let's take a look at the activities given below.

Activity 1.1 - Comparing *png* and *svg*

Using Image Viewer application open the files ***honey.png*** and ***honey.svg*** given in School Resources folder for Std X in your computer and zoom them in different sizes (you may change the zoom level either by clicking the  placed in the open window or by scrolling the mouse). Identify the changes and note down the findings.

- PNG pictures, lose their clarity when zoomed in.
- Clarity of SVG pictures is not affected when is zoomed in.

Now, you may have deduced why they instisted on SVG pictures in the above notification.

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 losing clarity. However, limitations are there in maintaining the quality of bitmap images like ***png*** and ***jpg***.

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.

Now let's 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.

Job prospects in Graphic Designing

Desktop publishing that enables the digital data storage, set resolution and editing pictures using software has become a major job sector. Publishing agencies, marketing agencies, advertising agencies, designing studios, educational institutions and construction companies, provide job opportunities to graphic designers.

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 which amounts to 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).

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

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

- Drawing of a saucer
- Drawing of a cup
- .....
- .....
- .....

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

Let's 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)

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 one by one in the order in which we have listed them.

Activity 1.4 - Drawing the saucer

To draw the saucer, we can use the tool meant for drawing circles. Then we can use different tools in the

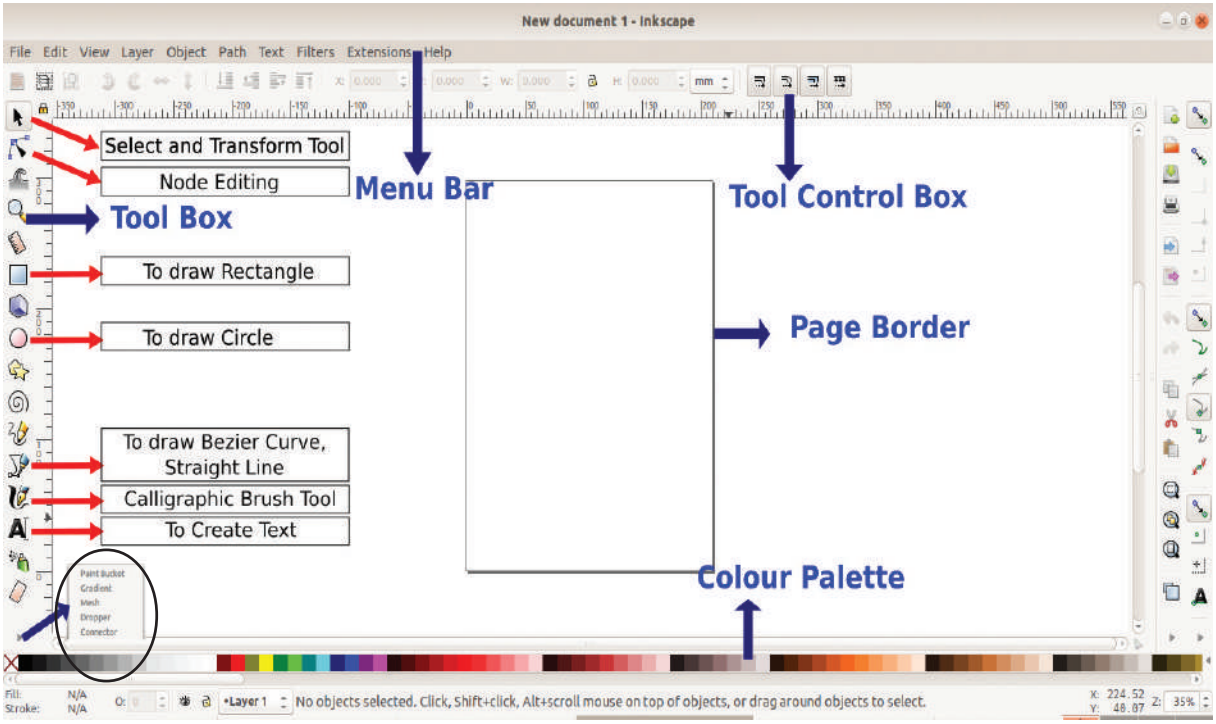


Fig. 1.1 Inkscape window

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.

Inkscape to improve the picture. Using a variety of tools on the Inkscape software, light and shade can be skilfully 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***.

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

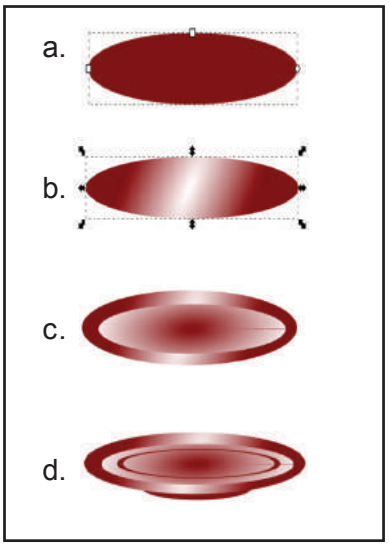


Fig. 1.2
Different steps to draw saucer

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.

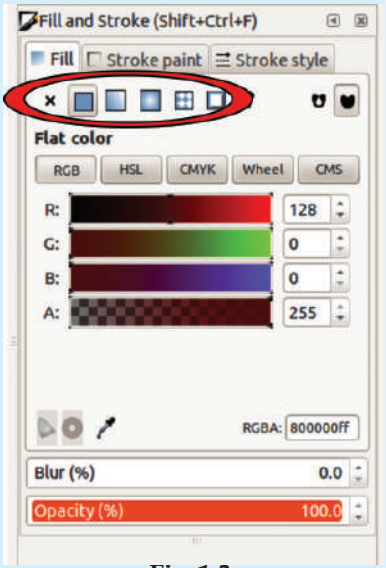


Fig. 1.3
Fill and Stroke window

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 anywhere, 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 on them separately).
- Click ***Group*** in the ***Object*** Menu.

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

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

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).

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. We can add or remove color from stroke by pressing the shift key while doing these activities.

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.

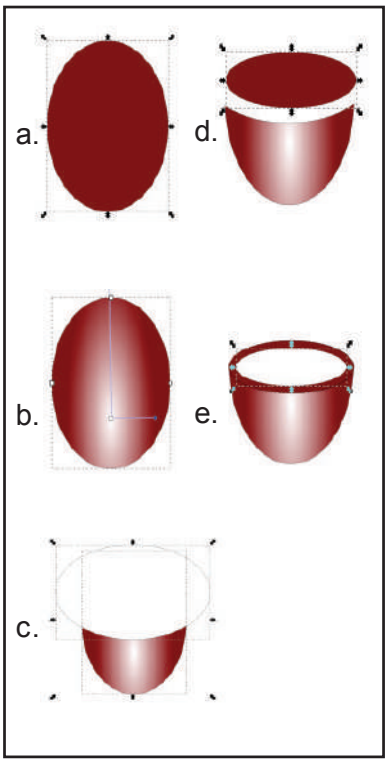


Fig. 1.4
Step by step drawing of the saucer

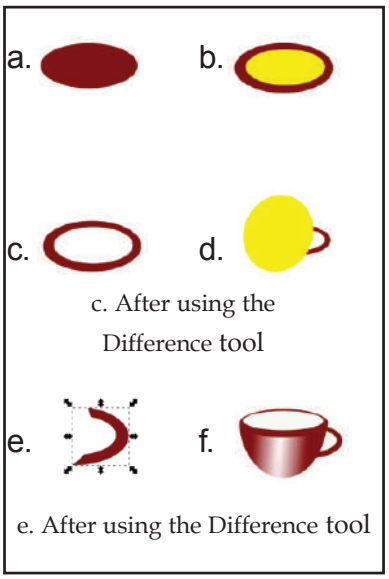


Fig. 1.5
Stages in drawing the handle of a cup

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

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.

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).

Fig. 1.6
Cup and Saucer

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).

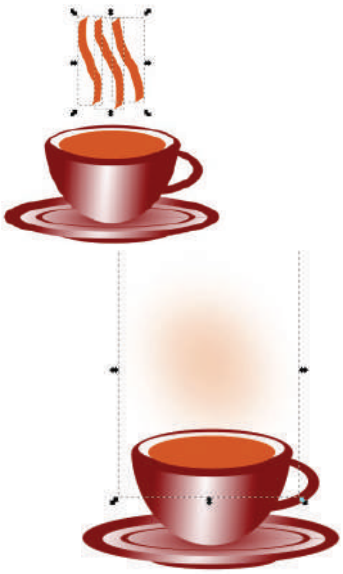


Fig. 1.7
Picture of steaming tea

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.

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.

Fig. 1.8 Steps for including the letters

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.

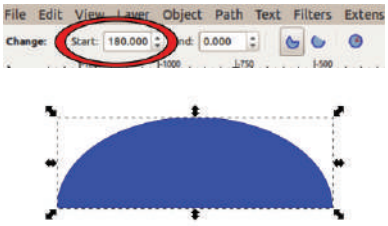


Fig. 1.9 To draw a semi-circle

- 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.

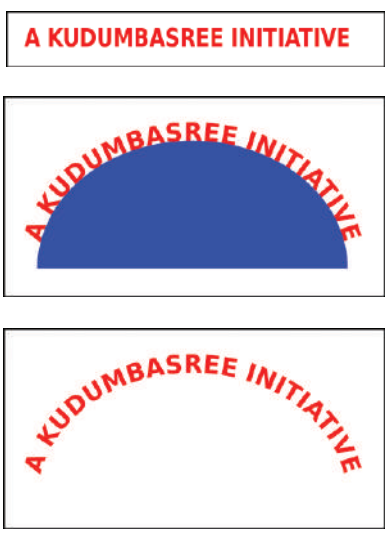


Fig. 1.10 Converting the letters into a curve shape

- 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).

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.

- 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***.
- 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.

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.

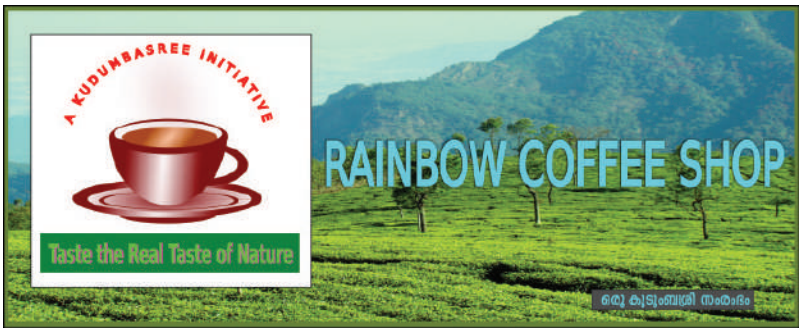


Fig. 1.12 Banner Model

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.

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?

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

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

Extended 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 ($H_2 + Cl_2 \rightarrow 2HCl$) discussed in the chapter "Mole Hypothesis" of your Chemistry textbook.
- Prepare a note on raster and vector image editing software.

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

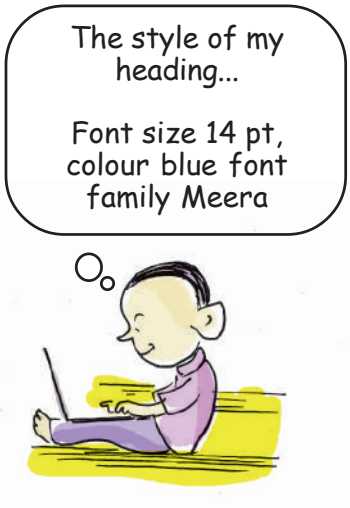
What should be kept in mind while preparing articles, reports, etc. for publication to make them look striking? How about preparing a report using ***LibreOffice Writer*** on the curricular and extra-curricular activities of your school last year? You can make an appealing report by maintaining a uniform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

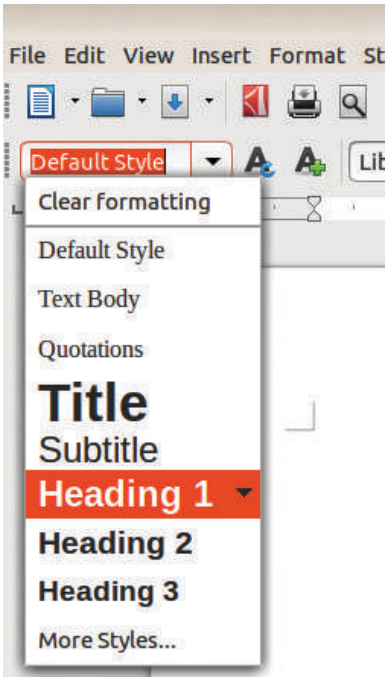


Fig. 2.1
Style Box window

Activity 2.2 - Styles for defining headings

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 ***Style Box*** on the left extreme of the Formating toolbar.

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

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

- Select the other titles one by one and click ***Heading 1*** from ***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.

There are several styles available in ***LibreOffice Writer*** to make a document attractive. Let's familiarize with ***Styles*** window by clicking ***More Styles*** from ***Style Box*** (Fig.2.2).

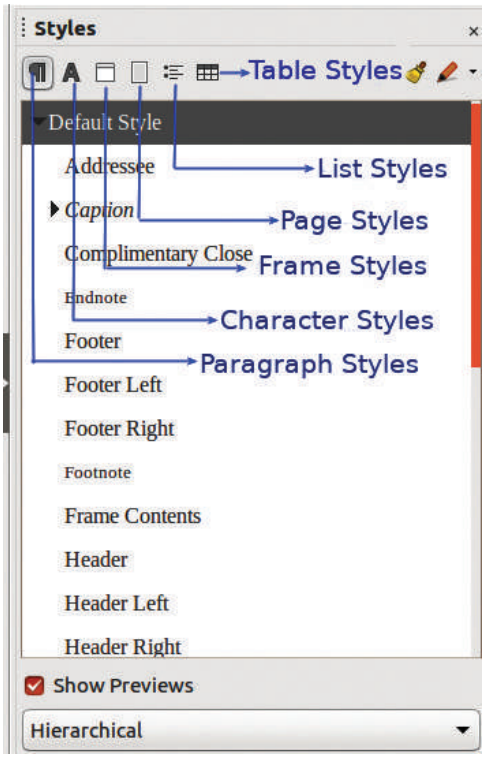


Fig. 2.2
Style Window

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

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*** window.
- Right click on style ***Heading 1*** and select ***Modify***.

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.

- 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***.

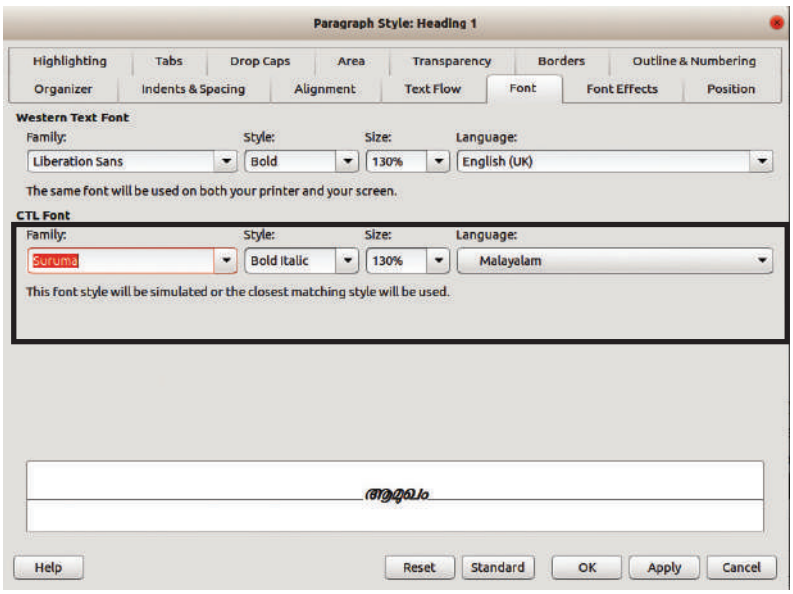


Fig. 2.3 Style Formatting window

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 our own way. 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*** 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.

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.

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

After preparing the styles, select main headings one by one and apply the ***Main Heading*** style; select sub headings one by one and apply the ***Sub Heading*** 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 ***Table of Contents and Index*** → ***Table of Contents, Index*** or ***Bibliography*** from ***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.

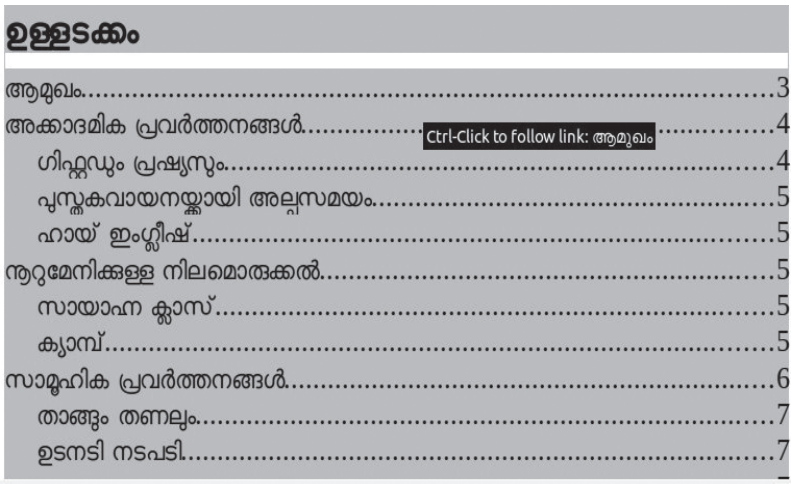


Fig. 2.4 Table of contents

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. Based on this, Leslie Lamport later developed the software called ***LaTeX.***

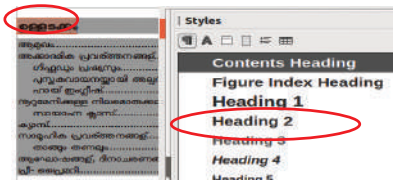


Fig. 2.5 Styles for the table of contents

- 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*** 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

How can we make a stylish certificate for the youth festival ?

Preparations for the Youth Festival

The school report is ready. Assume that an activity which the LittleKITEs 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, Charamangalam 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***.

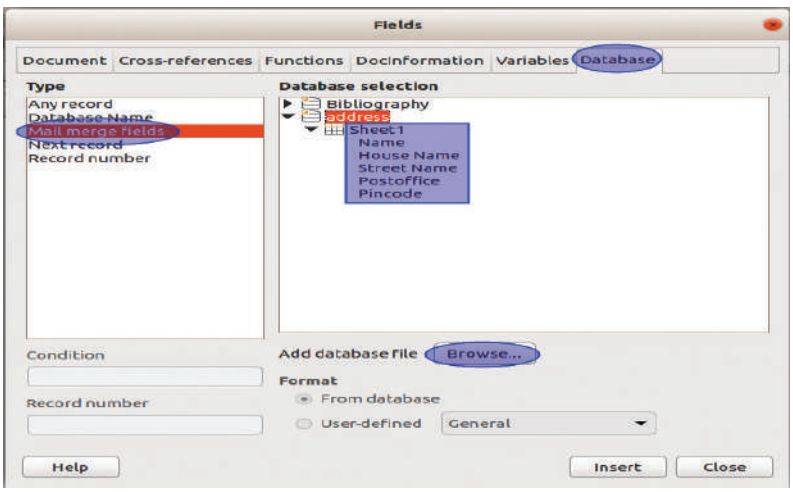


Fig. 2.6 Field Insert window

- From the window that opens, select ***Mail merge fields*** from the ***Database*** menu (Fig. 2.6).
- Browse and include the file in which the addresses are listed (Add Database file).
- 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 'Yes' for the question, ***Do you want to print a form letter***? Provide instruction for getting the output as a separate file in the open window and then click '***OK***' (Fig. 2.7)

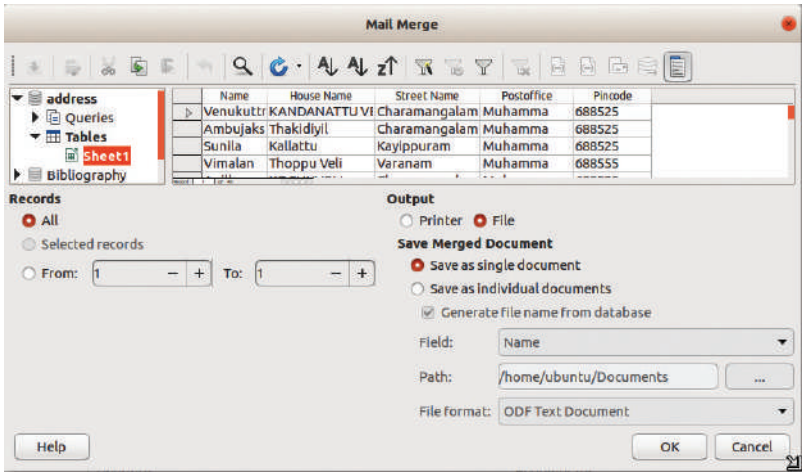


Fig. 2.7 Print window

- Name the file and save it.
- Open and check the saved file. You can see that individual letters are drafted for all the parents.

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?

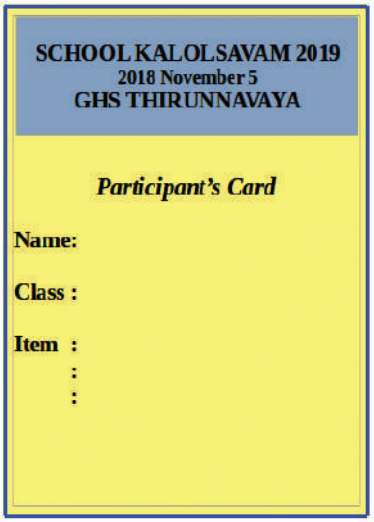


Fig. 2.8 Sample of a participant's card

- 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***.

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.

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

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

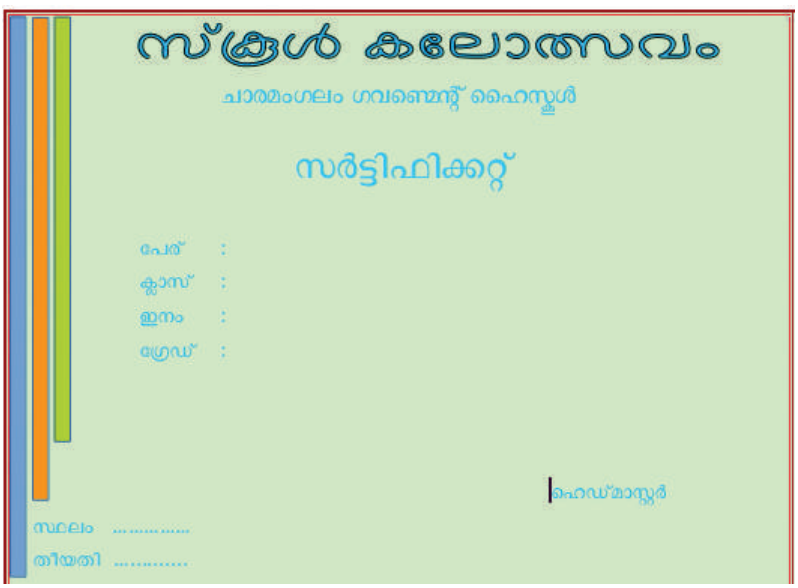


Fig. 2.9 Model of a certificate

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.

Extended 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 LittleKITEs 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 created by Anu as part of her study activities in Class IX is given with the filename ***schoolkalolsavam.html*** in the ***Web_designing folder*** in ***School_ Resources*** for Class X. Open this in a 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

NT-499-3-ICT-10-E-VOL.1

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?

- Created new Style by opening ***Style*** window.
- 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.

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 preparing a lot of 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.

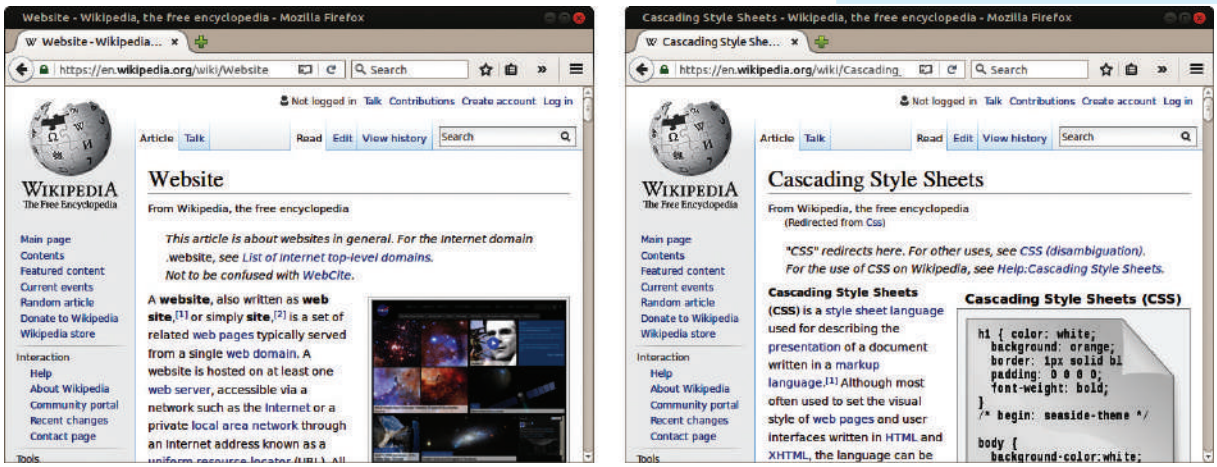


Fig. 3.1 Two different Web pages in Wikipedia

What are their features?

- 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 could give the same style to different pages using Styles in Word Processor. But for making a webpage, we had prepared ***html*** scripts in text editor. We can make use of the same text editor for including cascading styles within this.

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

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.

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 <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.

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

Activity 3.2 Familiarising different styles

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 of 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 headings as in Fig. 3.3. Save this file and open it in a browser and notice the changes.

Different features for the same html element

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

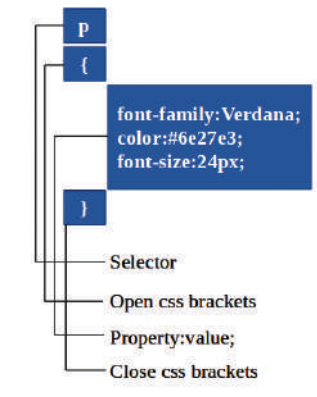
- We typed the paragraph tag `p` inside the `<style>` tag and specified their properties within braces `{}`.
- We typed the heading tag `h3` and specified its properties within braces `{}`.

When we give cascading style using tags in this way, we call it ***Type Selector***. When the web pages are developed, the required properties of any of the tags used for including the content can be specified using ***Type Selectors***. What are the tags used for including the content in the web pages that you have studied earlier?

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

CSS Syntax

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




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

Fig. 3.3 Cascading style applied to h3 tag

Type 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 ***Type Selector***, when the name of the tag is itself used for specifying the styles of the tag.

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

Type Selector can be used for all these tags to provide presentation features of their own.

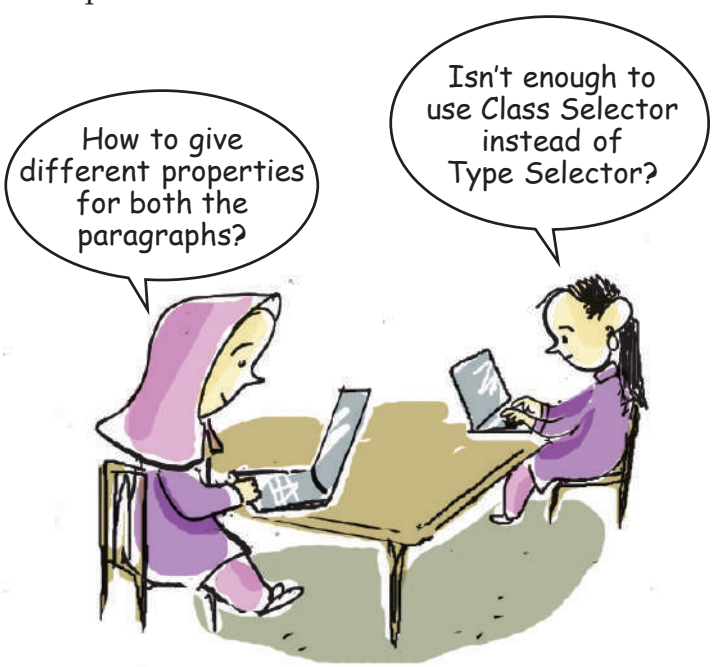
Suppose you want to display single items like Mohiniyattam and Bharathanatyam and group items like Oppana and Thiruvathira in different colours in the web page you have created. You have already included them using separate paragraph tags. Examine Fig. 3.4.

Now you have to give different properties to these two paragraphs. This is not possible if we use ***Type Selector***. Hence different names (class) have to be given to the paragraphs to transform them into ***Class Selectors***. See Fig. 3.5.

```
<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

Class Selector instead of ***Type Selector***, we should give different styles to these two paragraphs. But this cannot be done using ***Type Selector***. For this, we gave to give different names and change them to ***Class Selectors***. Look at picture 3.5




```
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

Indicate class name with <p> tag when you create a page. Look at picture 3.6.

```
<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

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 the background colour using Cascading Style

How did you give an attractive background colour to the web page you created earlier?

- Using ***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 ***Type Selector*** in Fig. 3.7.

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

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, we have to give a suitable name along with the name of the tag. Tag and class should be separated using a dot (.) 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.

Similarly, Class Selector can be used to give the same style to different tag alignments.

For example,

After defining the style as,

```
.blue
{
Color:#0000ff;
{
```

this tag can be used with any tag that has color attribute.

For example,

`<p class = "blue">`

style can be used with paragraph and `<h3 class = "blue">` style for heading.

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

Fig. 3.7 Cascading style of body tag

using ***Type 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 are defined? Look at Fig. 3.8.

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 heading as shown in Fig. 3.8, save and open in a browser to verify the changes.

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

Fig. 3.8 Background colour for the heading

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>` 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 from the `<style>` tag and then ***Cut***.
- Click ***File*** → ***New***, and paste it there.
- Save this new file in your folder giving the name style.css.

The file ***kalolsavam.html*** that you have opened now has no cascading style, has 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.

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.

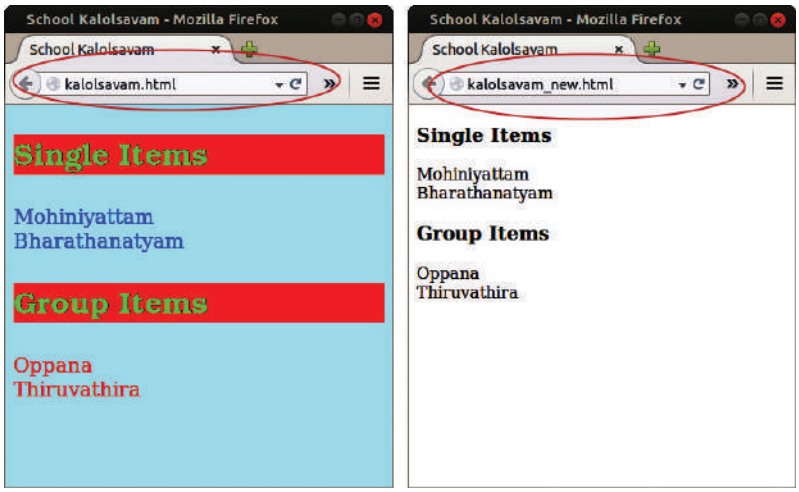


Fig. 3.9. Two webpages with the same content.

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, it is 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 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 When external cascading style was included

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.

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.

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.

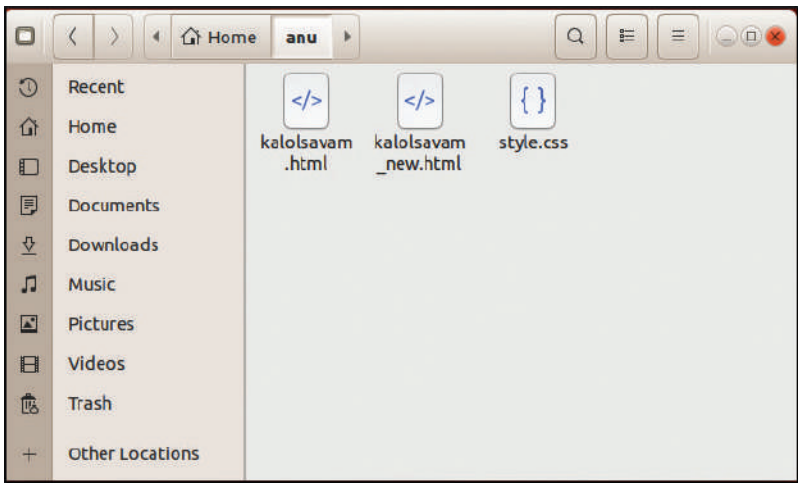


Fig. 3.11 Anu's folder

Activity 3.8 - Adding *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*** are 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 them in your folder. Add these styles to your web pages using the external stylesheet tool, open with a browser and examine.

HTML editors to prepare HTML pages

We have learned how to prepare web pages using HTML and CSS. All web pages cannot be built like this by typing instructions in the 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 Word Processor and open the ***preview in web browser*** in the ***file*** menu,

The document you prepared will open in the browser. Right click on the page, select ***view page source*** you will now see the html script of the 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.

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://Web Content Management Systems.

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 html element along with the tag itself.

   For example,

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

2. Internal: Here the properties are defined using either ***Type 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.

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 there is no need for you to memorize the HTML tags.

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. In which tag in HTML should we include internal cascading style?

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

3. While using external cascading style sheet, which tag should be used to include cascading stylesheet.

   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***.

Extended activities

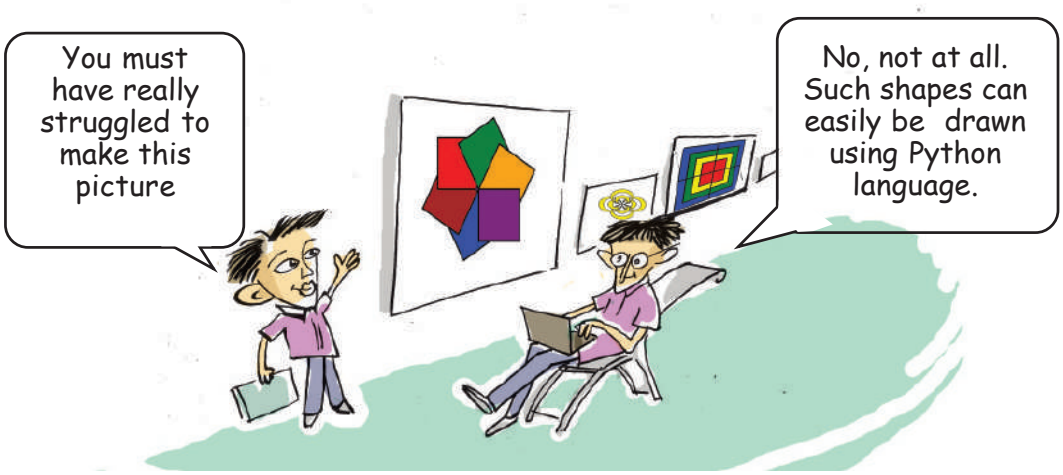
1. Open a text editor, enter the following source code, save it in your folder and open with a browser.

```
<!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. Have you ever thought about how these applications were created? They were built using different programming languages. Python, C++ 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.

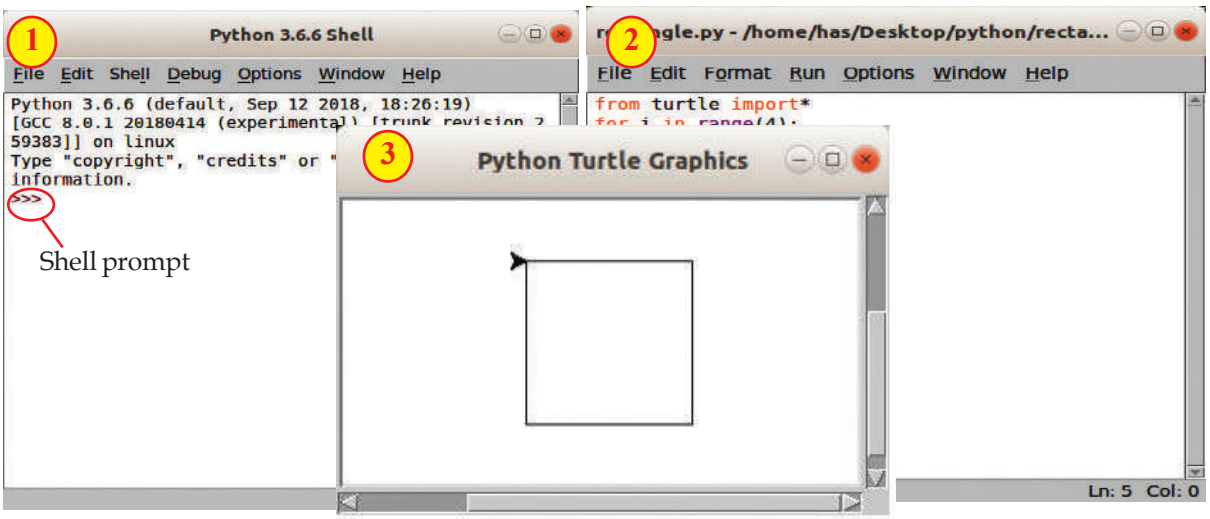


Fig. 4.1 Windows obtained when IDLE works (1) window obtained when IDLE opens (Python shell) (2) Editor window to prepare Python program (3) Turtle Graphics window that appears if the output of the program is graphics.

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.

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.

```
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. (For turning left, give the instruction `left(90)`). Since these two commands are given under the command `for i in range(4)`, they get repeated four times and a square is drawn.

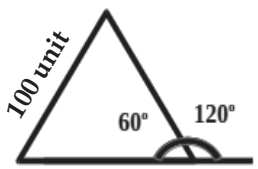
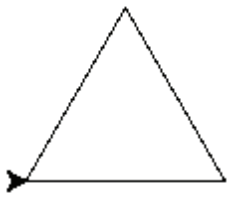
Activity 4.2 - More geometric shapes

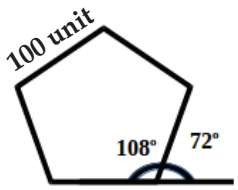
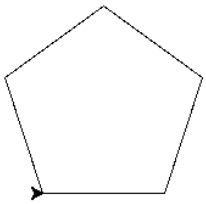
The Python programs for creating different geometric shapes and the shapes thus created are given below. Enter them in IDLE, run and see what happens.

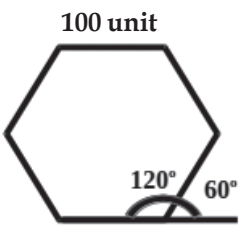
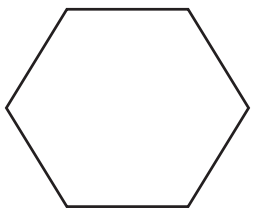
Short forms

Some Python Graphic commands can be written in short form. For example, `forward(100)` can be written as `fd(100)` and the instruction `left(90)`, as `lt(90)`.

Program	Instruction	Output

File Edit Format Run Options Window Help
`from turtle import*`
`for i in range(3):`
`  forward(100)`
`  left(120)`
Ln: 5 Col: 0
Program 4.2 (a)
		
		Triangle

File Edit Format Run Options Window Help
`from turtle import*`
`for i in range(5):`
`  forward(100)`
`  left(72)`
Ln: 4 Col: 11
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.

Pattern using geometric figures

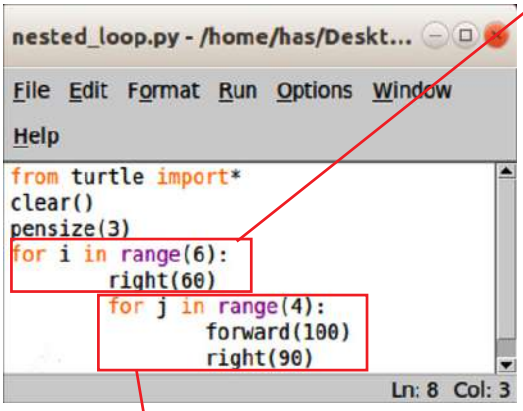
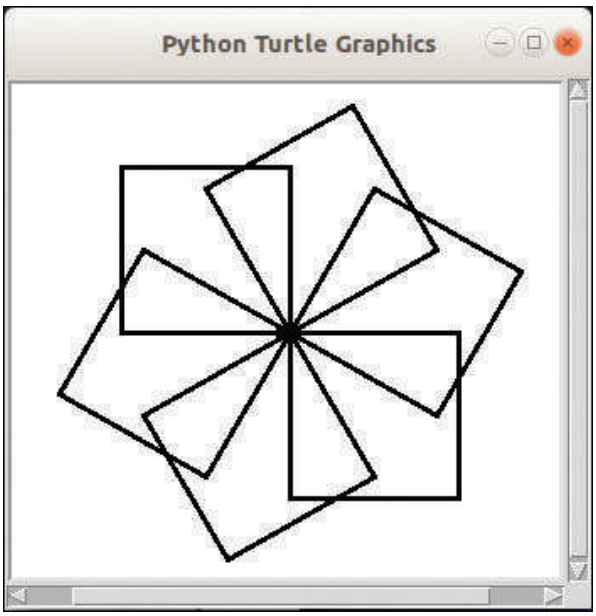
We saw how to create different geometrical shapes using python graphics. It is also possible to create different patterns containing these shapes with the help of the loop statements.

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.

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.

Program	Pattern obtained
	

Program 4.3

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

Codes for drawing a square

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.

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. Type out the program and run it.

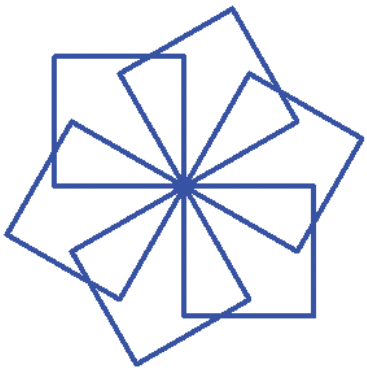
color ()

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.

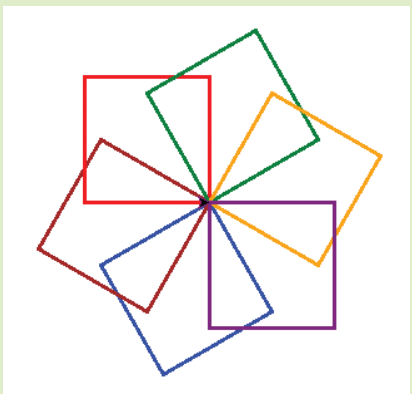
Program 4.4

```
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

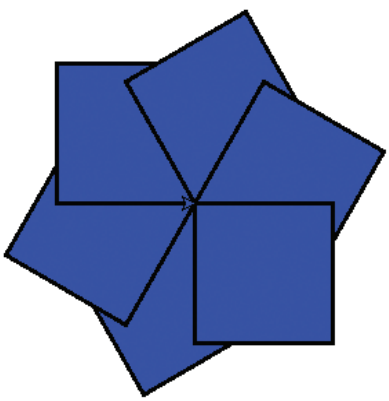
In addition to the commands for drawing using different colours, turtle graphics also has instructions to fill the figures with colour. Given below is a program that fills the spaces in the figures created in activity 4.4. For this, the program includes the instructions `begin_fill()` and `end_fill()`.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

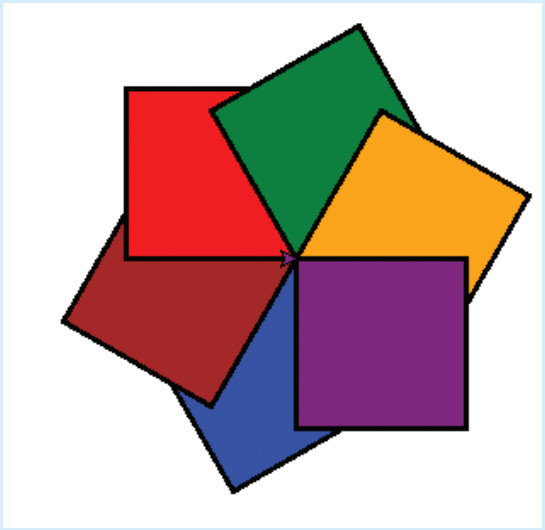


The instructions `begin_fill()` and `end_fill()` should be at the same tag position, otherwise you may not find the colours properly filled. Note that these two instructions are given in the same tab position in Program 4.5.

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()
```

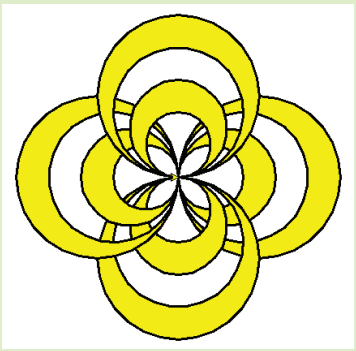


The line `clr=["blue","brown","red","green","orange","purple"]` in the program is an instruction to collect six colours in the variable `clr`. When the loop instruction `for i in clr:` is executed after that, each collected colour is obtained as the value of the variable `i`. Afterwards, when the instruction `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 - A

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.

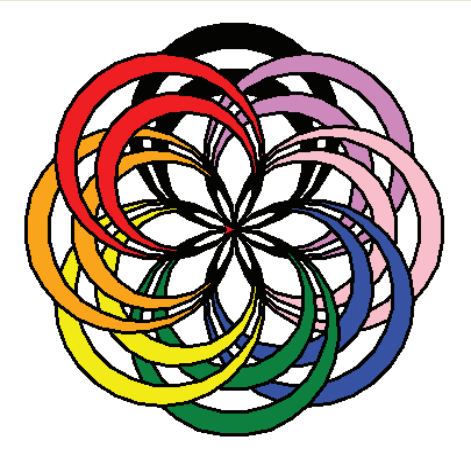


```
from turtle import*
pensize(3)
color("black","yellow")
for r in range(4):
    rt(90)
    begin_fill()
    for i in range(40,101,20):
        circle(i)
    end_fill()
```

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

Program - B

```
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)
```

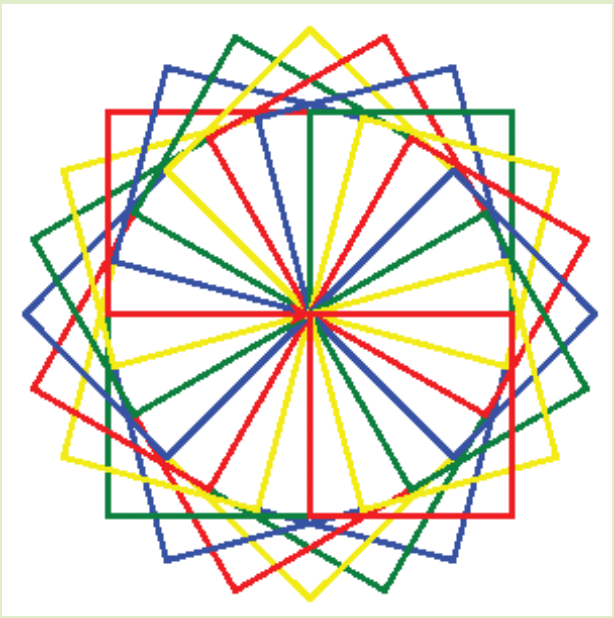


The number of circles increases compared to the earlier program (Program - A). A different colour is given to each set.

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 - C

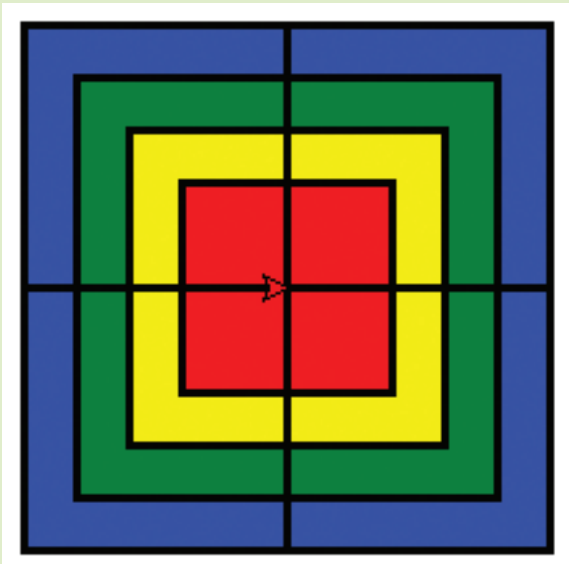
```
from turtle import*
clr=["blue","green","yellow","red"]
pensize(3)
for r in range(6):
    for n in clr:
        color(n)
        rt(15)
        for j in range(4):
            fd(100)
            rt(90)
```



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

Program - D

```
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	Used for	Example
`forward()`	Moving the turtle to the right	`forward(50)` or `fd(50)`
`circle()`	For moving the turtle in a circle	`circle(100)`
`dot()`	Marking a point on the graphic screen	`dot (20, "blue")`
`pencolor()`	Specifying the colour of the line to be drawn on the screen	`pencolor("blue")`
`pensize()`	Specifying the thickness of the line to be drawn on the screen	`pensize(5)`
`right()`	Turning 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()`	Turning 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)`	Specifying the colour of the shapes to be drawn in the Python Graphics window	`color("blue")`
`color(a,b)`	Instructing python to give different colours to the border and the body of shapes drawn.	`color("black","blue")`
`clear()`	Removing 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 now understood that programming languages are used not just 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.

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 program segments is to be used for constructing a square?

   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.

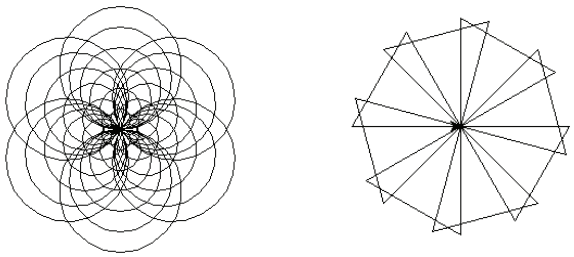
   d. The instruction is invalid.

6. Match the following.

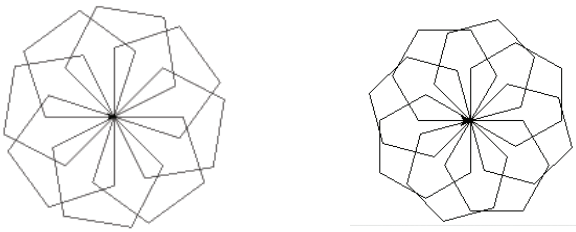
`color()`	To turn the turtle to the right according to the given angle
`pensize()`	To give colour to the drawing
`right()`	To specify the thickness of the lines that appear on the graphic screen.

Follow-up activities

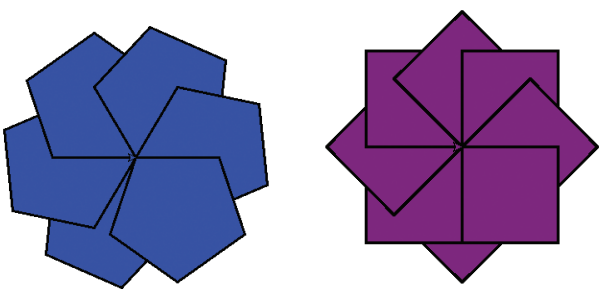
1. Draw patterns as given below using circles and triangles.



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

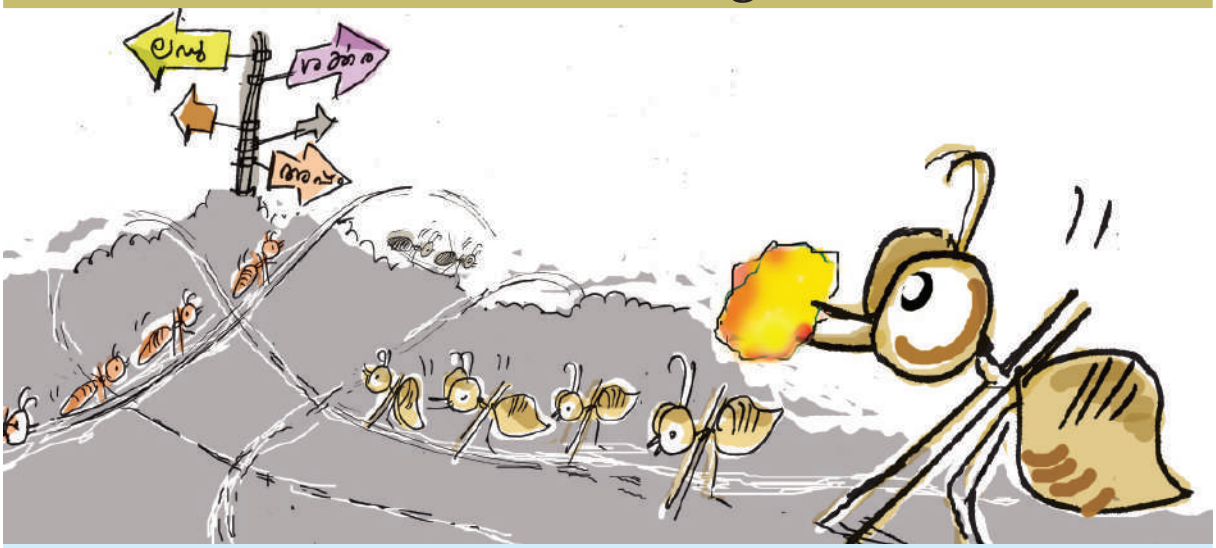


3. Create different patterns using colours as given below.



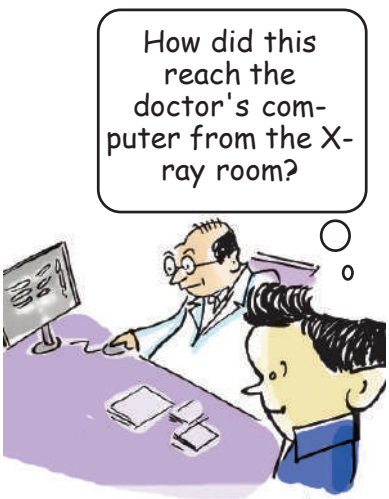
Chapter 5

Networking



Vipin had gone to the hospital with his mother. They were 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.

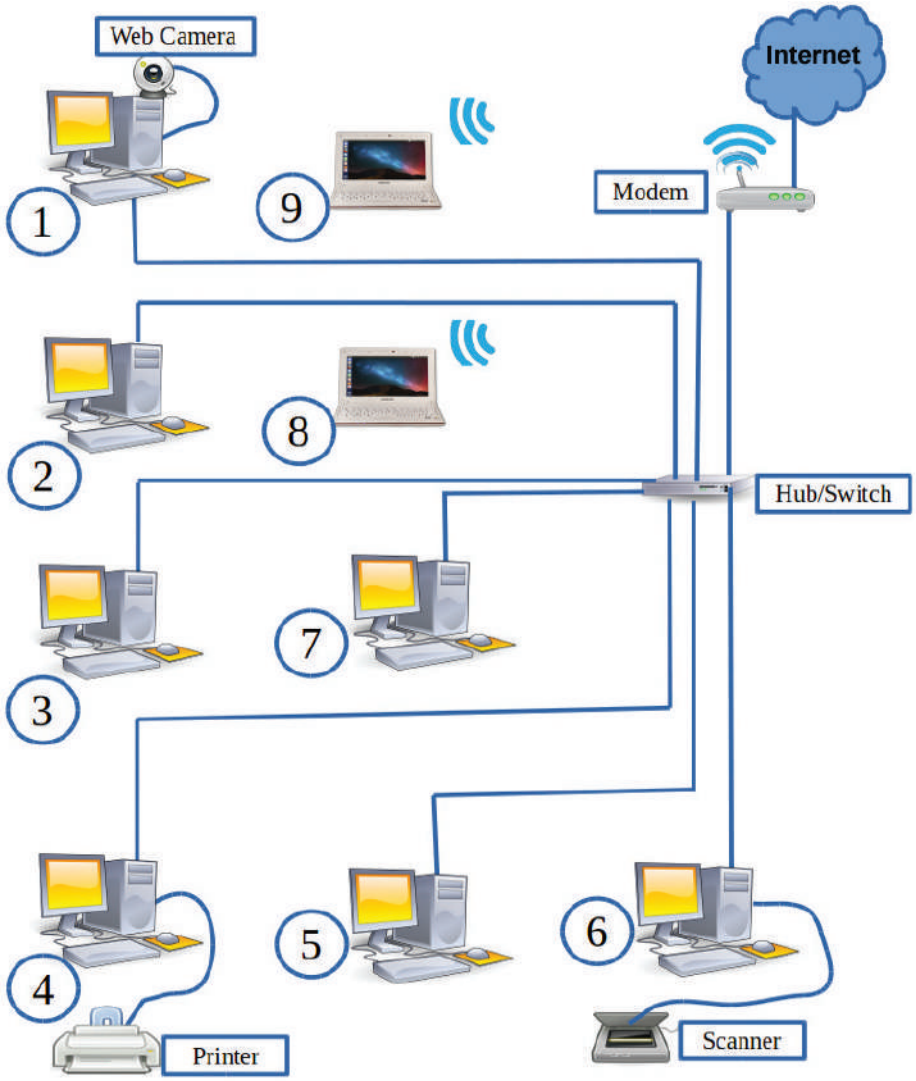


Fig. 5.1 Illustration of a computer network

- How many computers are interconnected in this network?
- Which are the other devices connected to the computer?

  Printer

  .....

  .....

  .....

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's examine each of them in detail.

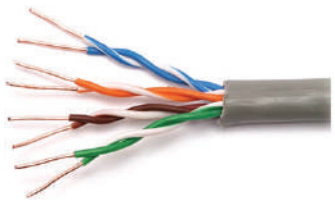


Fig. 5.2 UTP cable

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.

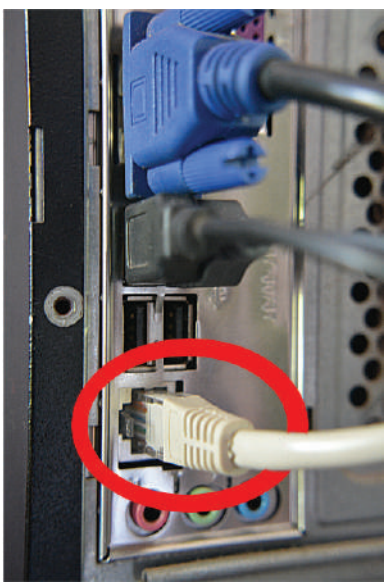


Fig. 5.3 A UTP cable is connected to a computer.

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

Orange ....

White orange ....

RJ45 Connector (Registered Jack 45)

Notice how the UTP cable is connected to the computer. The connector used is known as RJ45 (Fig. 5.4).

Fig. 5.4 RJ 45 Connector

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.

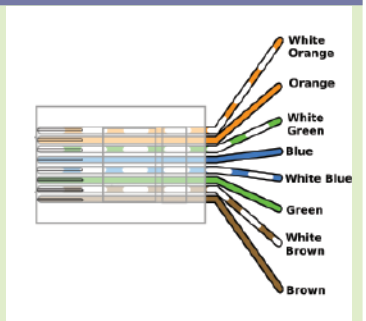
Hub and switch

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.

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 the 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 files can be easily exchanged through networks. Apart from that, what are the other uses of a network? List them.

- Share the Printer
- Share the Internet
- .....

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 an equipment that can convert digital signals to analog and vice versa. The term Modem is derived from the word 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.

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 instead 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 and list out the devices that can be connected using wireless technology.

- 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?

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.

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.

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 is operated only within a very limited range.

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

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.

.....

In this manner, start the networked computers in your lab one by one and identify the IP addresses. Then write down those addresses in the column for IP address obtained on first switching of Table 5.1.

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

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.

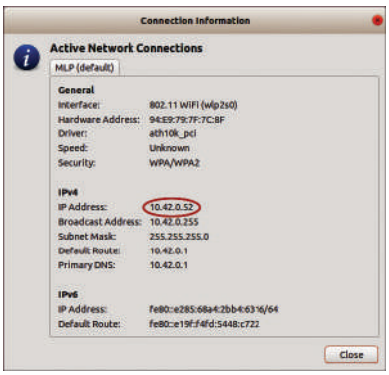
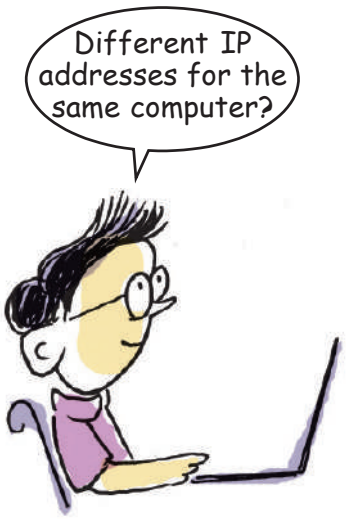


Fig. 5.6 Connection Information Window



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 this network.

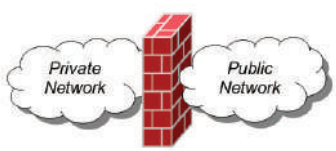
That is, each time when a system is connected to a network, it gets an IP address. The technology that gives an IP address automatically is known as Dynamic Host Configuration Protocol (***DHCP***). Each computer that enters the network is given an IP address in that order by ***DHCP***.

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.

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 and then click on the icon ***Edit the Selected Connection*** in the window.
- 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 purposes)

Netmask	:	255.255.255.0
Gateway	:	192.168.1.1
DNS servers	:	192.168.1.1

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.

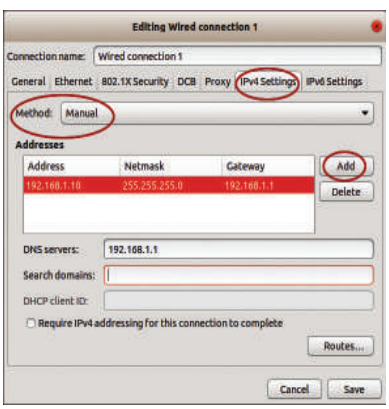


Fig. 5.7 Edit Connection Window

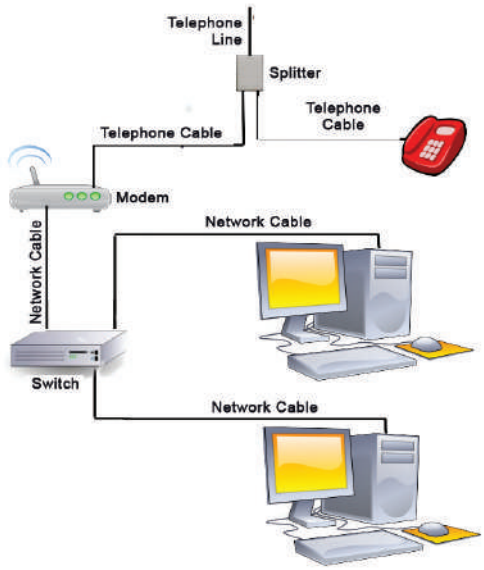


Fig. 5.8 Modem arrangement

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***.

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.

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

- Click in the order ***Places*** → ***Network*** → ***Other Locations***
- Enter the IP address of the computer in which the file is kept in the window that opens like this: ssh://192.168.1.23 (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).

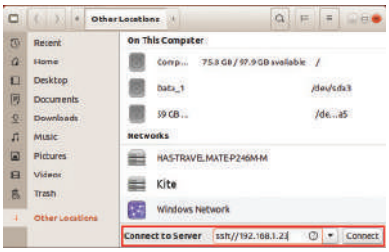


Fig 5.9 Connect to Server Window

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?

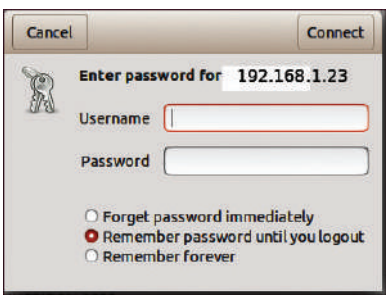


Fig. 5.10 Window for giving user name and password

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.
- In the computer connected to a printer, open the window in the order, ***System Settings*** → ***Devices*** → ***Printers***.
- In the window that appears when clicking ***Additional Printer Settings*** → ***Server*** → ***Settings***, select ***Publish shared printers connected to this system*** and then Click ***OK***. (Fig.5.11).

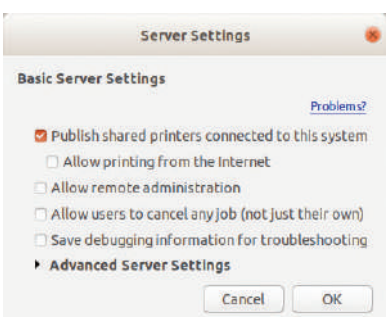


Fig. 5.11 Server Setting Window

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

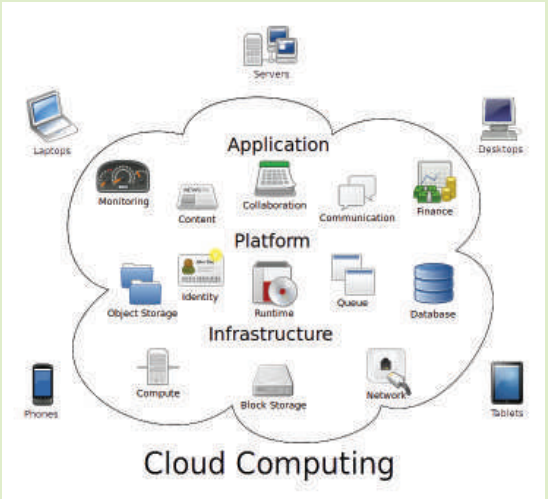
Grid computing and Cloud computing are two technological advancements that have evolved as a result of network development.

Grid computing

Grid is a collection of computer resources from various parts of the world that works towards a common goal. This type of computing is called grid computing. Servers having high capacity are being used for carrying out tasks that require high computing performance. Instead of this, carrying out the same task using computers included in the network from various parts of the world is called grid computing. Have you ever thought of the percentage of efficiency of our computers that we generally utilize? It is less than 10 percentage. The effective use of such unused resources is the most important advantage of grid computing. Ian Foster, Carl Kesselman and Steve Tuecke are the founders of grid computing.

Cloud computing

Have you ever thought of carrying out the same activities that you have been doing in your computer at home from somewhere else? Have you ever desired of such a possibility? The same has become possible today. Cloud computing offers facilities and means to avail the required applications and your personal files online. The most important objective of this is sharing the resources, basic facilities, and software required for the consumers. Public, Private and Hybrid Clouds are available today. There is hardly any doubt that clouds shall become a source of huge hope for entrepreneurs who find it difficult to arrange basic facilities. Many multinational companies depend on clouds for their various projects.



Be a Network Expert

There are plenty of job opportunities in this sector in the present world which is interconnected with networks. Network experts are to be created in a world where banks, establishments and companies provide internet based services. Smart homes and smart cities should be operated through uninterrupted network. There are short-term and long-term courses for those who wish to be trained in this field.

Let's evaluate

- The new computer lab of a school has to be networked. Other than the computers what are the equipments required 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

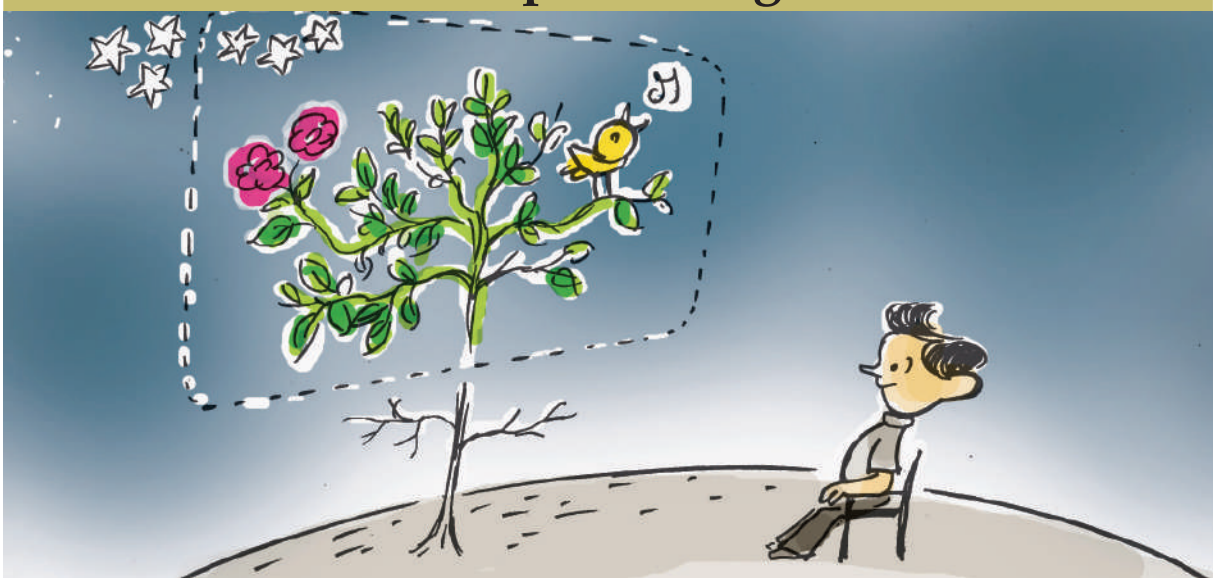
  (c) 12 (d) 2

Extended activities

1. What are the equipment used for networking computers? Prepare a short note on 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's 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 daylight while it is dark on the other. Sun doesn't rise on one part and doesn't set 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.

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.

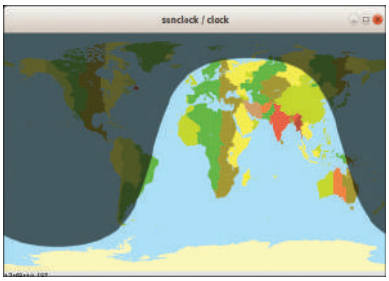


Fig. 6.1 Sun Clock window

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

Display Time Zone

To view the World Time Zone Map either click on the ***Clock and Map Window*** Menu (!) in the ***Sunclock*** or press the Spacebar in the keyboard.

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.

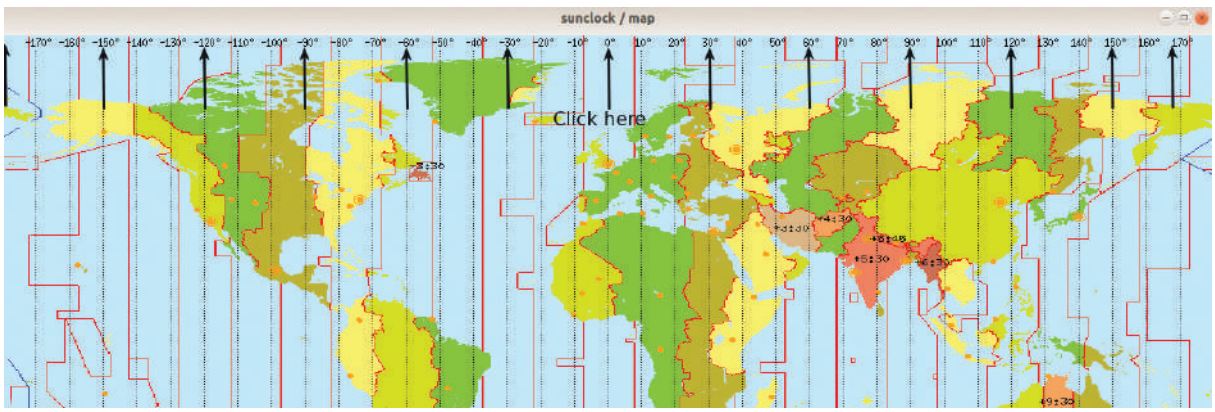


Fig. 6.3 Time zones and longitudes displayed in Sun clock map

Display longitudes and main latitudes

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.

- Open ***Sunclock*** and display the map showing time zones (***Clock and Map tool (!)***).
- Click continuously in ***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.

Activity 6.2 - Night and Day

As you know, the reason for day and night is the west

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

to east rotation of the Earth. Does the Sun always rise at the same time everywhere? And what about the sunset? Shall we find out the difference in the time of ***sunrise*** and ***sunset*** in ***Chennai*** during different months using the application?

- Open the ***Sunclock*** and display main longtitudes in time zone map (***Toggle Tropic Tool, T***).
- Adjust the time in ***Sunclock*** to 21 March and specify progress value as 1 minute. (***Adjust progress value tool - G, Forward tool - A, Backward tool - B***).

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.

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 Key

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.

- Select ***Chennai*** in the map and activate ***Animation key*** (" ' " key). Ensure that legal time is shown below (Fig.6.4).
- When the line, at which 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.

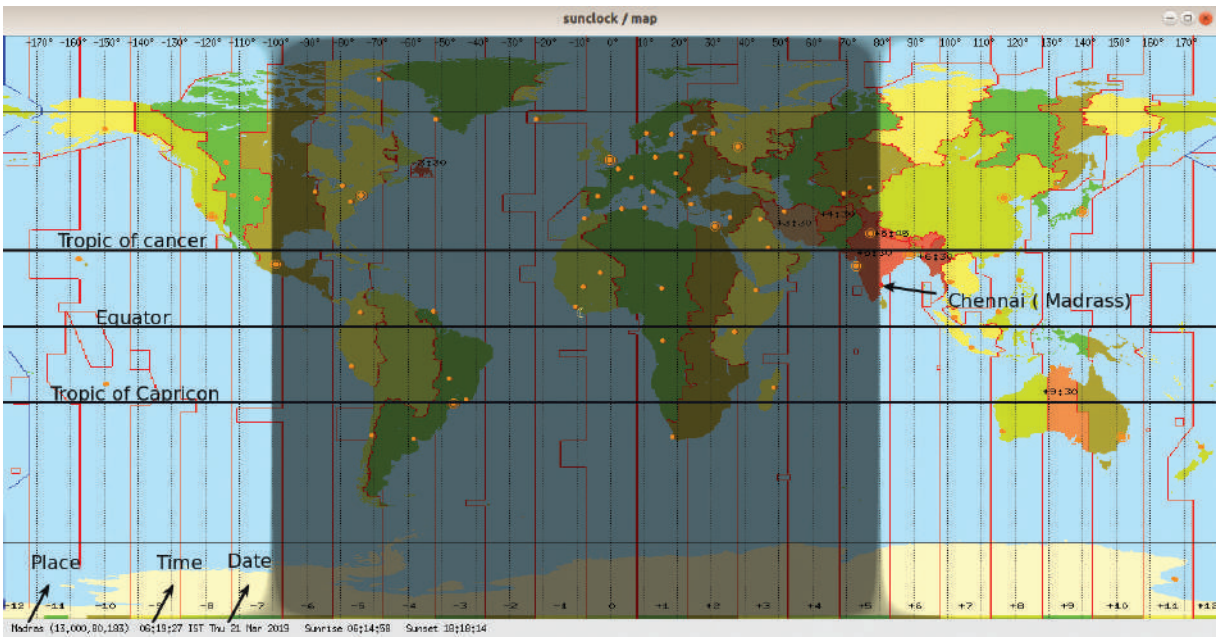


Fig. 6.5 Latitudes displayed in Sun Clock window

- 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?

- 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 21				
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.

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***.

Extended 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 Science textbook contains the instructions to open ***Wikimapia*** and find out the latitude and

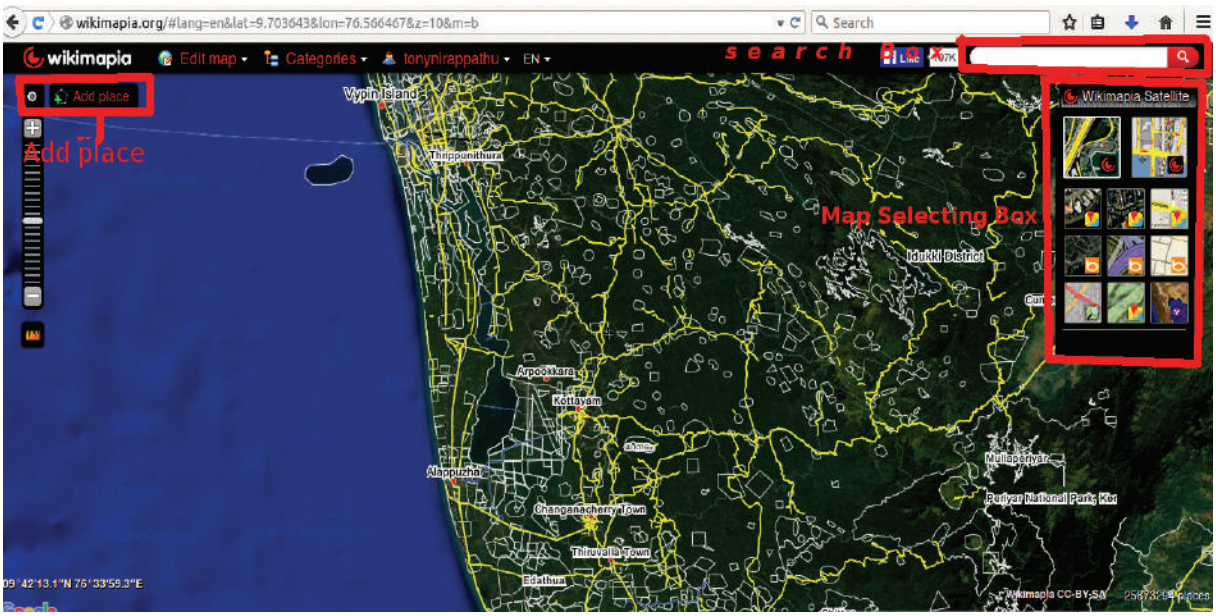


Fig. 6.6 Wikimapia window

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.

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.

Digital Maps

Map-making is an area that has benefitted a lot as a result of the advanced 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.

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 Desktop***. Start ***QGIS Desktop*** in your computer and get familiar with the tools and other facilities.

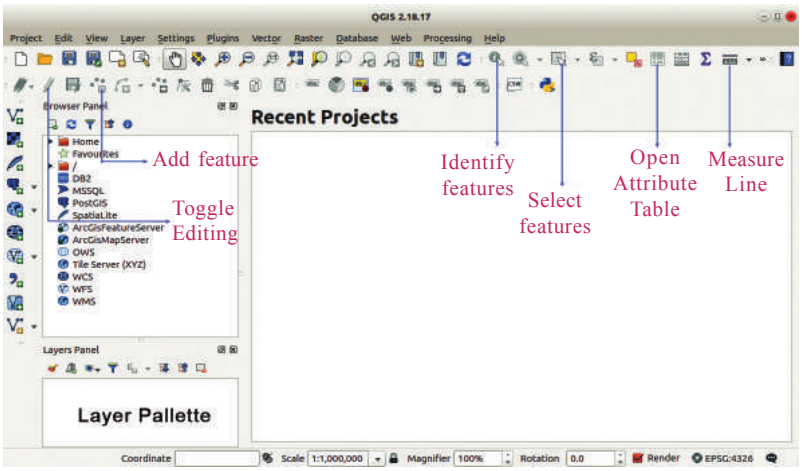


Fig. 6.7 Quantum G.I.S. window

How can we include the comprehensive 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 named ***panchayat.qgs*** created in this way is available in the ***Qgis Projects/Panchayat Projects*** in the Home of your computer. Open this project file in ***Quantum GIS*** in the order ***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?

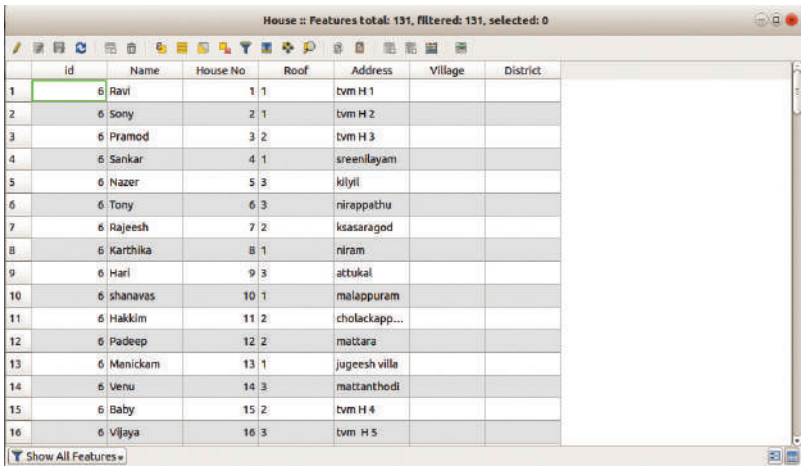
Open the attribute table from the layer ***House*** and find how many houses are included in it and their details (Fig.6.8). What are the details given about each house? Here, a house represents the location data while the

Geographical Information System

The surface features of the earth and locational information are collected in a server in the form of maps and data. 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.

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.



	id	Name	House No	Roof	Address	Village	District
1	6	Ravi	1	1	tvm H 1		
2	6	Sony	2	1	tvm H 2		
3	6	Pramod	3	2	tvm H 3		
4	6	Sankar	4	1	sreenilayam		
5	6	Nazer	5	3	kilyil		
6	6	Tony	6	3	nirappathu		
7	6	Rajeesh	7	2	ksasaragod		
8	6	Karthika	8	1	niram		
9	6	Hari	9	3	attukal		
10	6	shanavas	10	1	malappuram		
11	6	Hakkim	11	2	cholackapp...		
12	6	Padeep	12	2	mattara		
13	6	Manickam	13	1	jugeesh villa		
14	6	Venu	14	3	mattanthodi		
15	6	Baby	15	2	tvm H 4		
16	6	Vijaya	16	3	tvm H 5		

Fig. 6.8 Attributes window

details are its attributes. Now, what should be done to add a new layer of information?

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*.

The details of each well has to be collected. Assume that the table (table 6.4) 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 field***, add the attributes one by one. Here, we can add the attributes we have listed.
- Define the type of each attribute (text, number, etc.)
- Further add each ***Field*** by clicking the button ***Add to fields 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

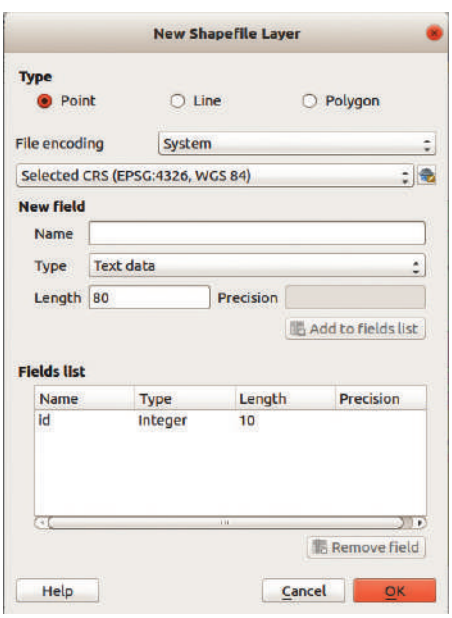


Fig. 6.9 Window for constructing new Vector Layer

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.

- Press the ***Toggle Editing*** button for activating the editing tool.
- 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. Click ***Toggle Editing*** button once again to disable editing. Click ***Save*** on the ***Stop Editing*** windows that appears.

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).

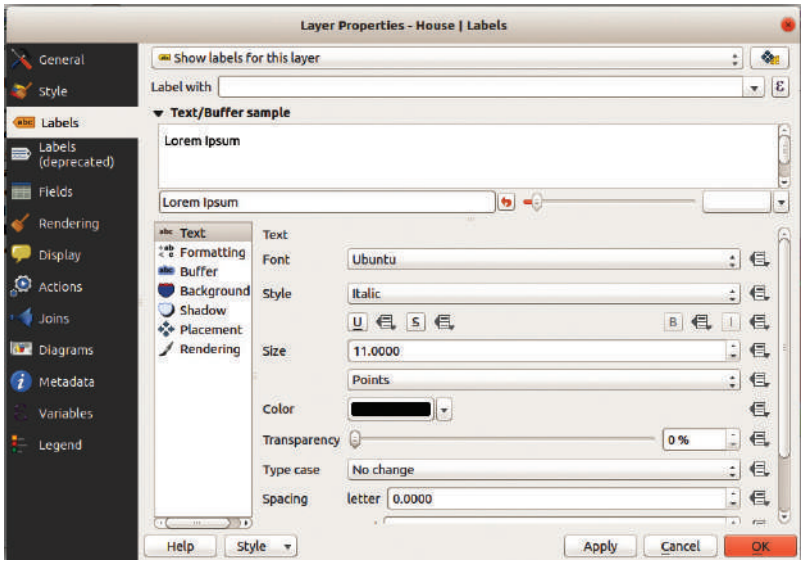


Fig. 6.10 Layer properties window

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 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 buffer analysis from Layer box (here Road).
- Select this road using the ***Select Features*** tool.
- Open the ***buffer*** window from the menubar in the order ***Vector → Geoprocessing Tools → Fixed distance buffer.***
- In the open window, select the layer that should buffer as ***input layer*** (Fig. 6.11).

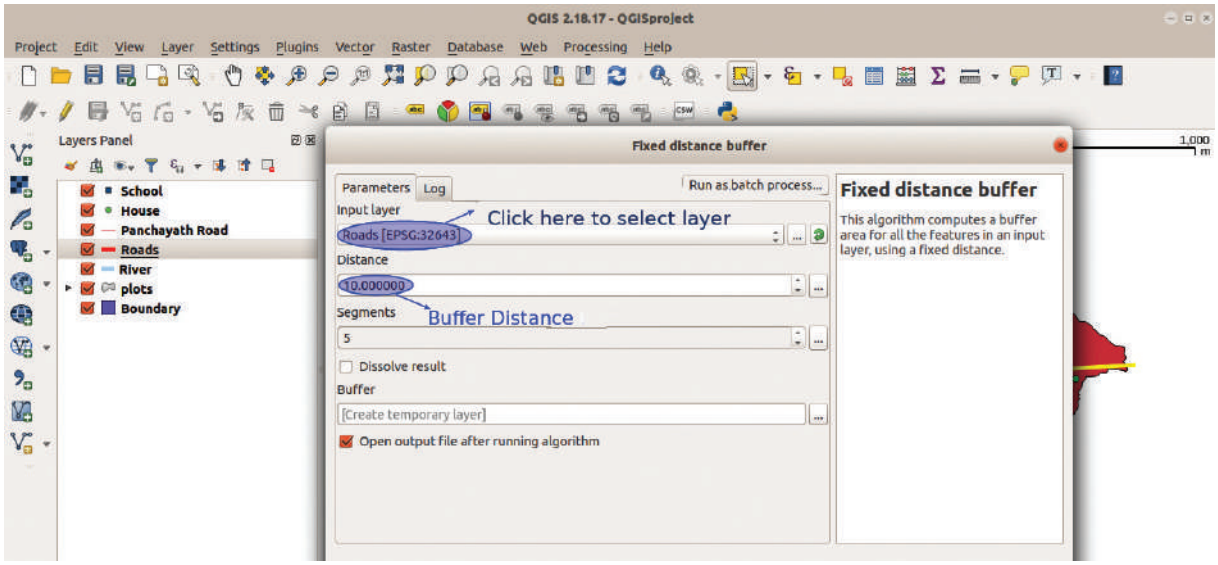


Fig. 6.11 Buffer window

- Enter the ***length of buffering*** in ***Distance*** field.
- Click ***Run***.

Have you noticed that a new layer is created in the name 'Buffer' ?

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).

Rearranging the layers

To rearrange, click on the layer and drag upwards or downwards.

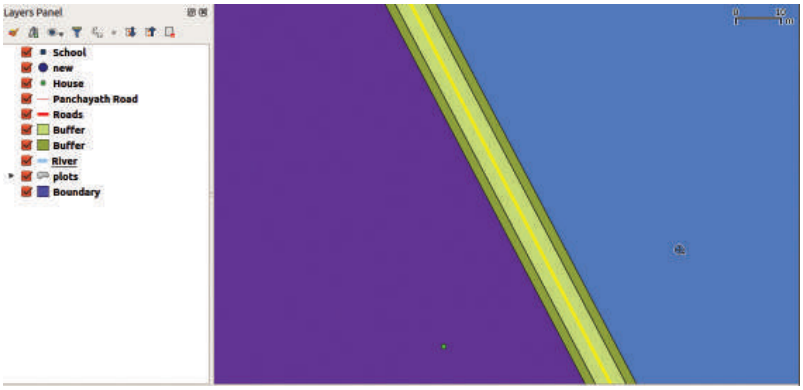


Fig. 6.12 Buffer road

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 (***Measure Line Tool*** can be used).
- The buildings that will get affected (***Identify Features*** tool can be used).

Activity 6.8 - Printing the 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***.
- Give an apt title to the map in the window that appears and then click ***OK***.
- 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).

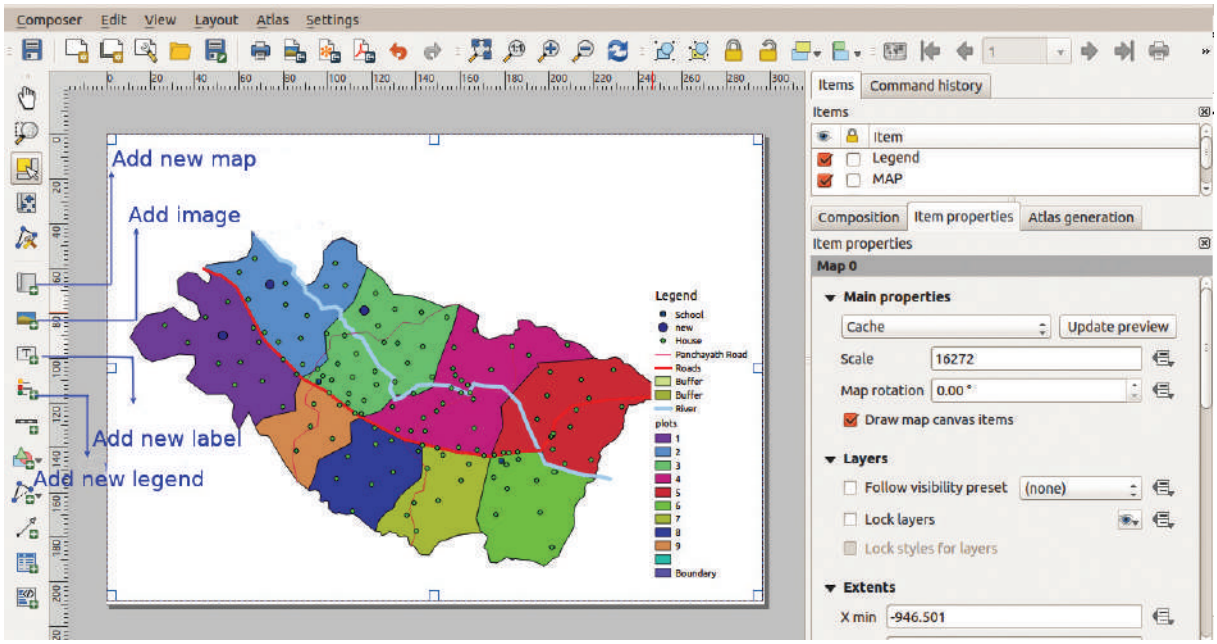


Fig. 6.13 Print composer

- Add the information required in the map using tools like ***Add new label*** **and** ***Add lew legend***.
- We can print maps in the file formats svg, pdf, png using ***Export*** from the ***Composer*** menu.

Extended Activities - 3D 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).

- Open ***Layer Properties.*** Select ***Show Labels for this layer*** from ***Label - Properties*** window. Select ***Elevation*** from ***Label with*** field. As you click ***OK***, the height markings in the contour lines appear (Fig 6.14).

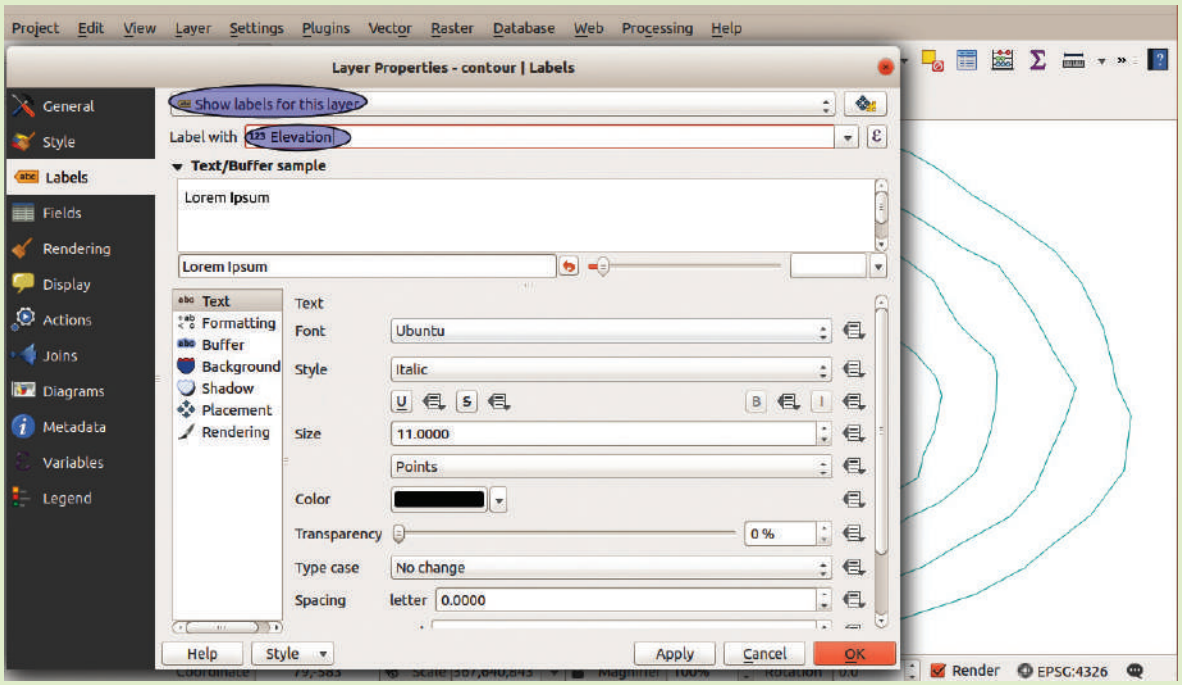


Fig. 6.14 Contour label

- Further include ***contour.asc*** in the contour folder in the input file – (DEM raster) of the window by opening ***Raster – Analysis – DEM*** (Terrain Models).

- 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.

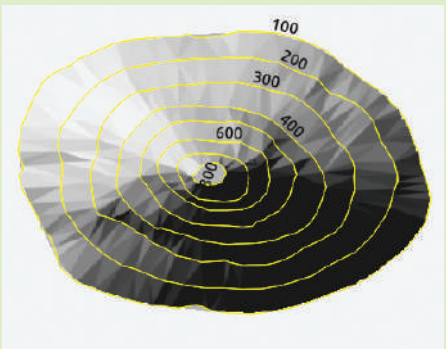


Fig. 6.15 Contour dimensional shape

Geographical Software for Disaster Management activities

There are many countries like Indonesia, Japan, Fiji, Philippines, etc., which are vulnerable to natural disasters. Noteworthy is the model adapted by Indonesia for Disaster Management. There is not a single disaster like earthquake, volcanic eruptions, tsunami and flood that has not hit Indonesia. After every disaster, rehabilitation and reconstruction pose a big challenge to the government and the people there. Indonesian government started Disaster Management Activities with the slogan "Better Planning Saves Lives" when natural disasters became a serious threat to the progress of the nation. For this purpose, they started a project InaSAFE (inasafe.org). They used geographical systems to coordinate Disaster Management activities. By adding InaSAFE plugin to ***QGIS*** Software, they used an improvised version for this. It became highly useful to foresee the impact of disasters on the people and infrastructure of the region, to mitigate the impact/damage to a greater extent and to coordinate and to strengthen Disaster Management Activities. Today many countries in the world make use of the service of the software for Disaster Management Activities.

InaSAFE is an open source software with a GPL license. The basic data with the government related to buildings, roads, population and the like are included in the software in various layers. Details of the previous disasters are also recorded in various layers and they are linked to various data layers, whereby input layer is built. Thus the layers which explain the impact are created using which the required preparatory measures can be carried out. Sri Lankan government's open source software "**Sahana**" is also noteworthy in this field.

Let's evaluate

- What layer type is to be selected from ***Quantum GIS*** if you want to create a layer containing 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 have to 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

Extended 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 through Print Composer.

Notes

Notes

Notes

Notes

Notes

Notes

Let's know about cyber safety

There is absolutely no need to mention the advantages of Internet and Social Networking sites. We have embraced their potential for communication, entertainment and information seeking.

But over the period, it is seen that a lot of teenagers are being harassed and fall prey to the abuse of Social Media. You can easily prevent yourself from being a victim, if you take a few precautionary measures while being online.

How Social Networking sites can be dangerous

- Sharing and posting too much of personal information such as phone number, address, location, photos, etc., can be misused.
- Trusting strangers believing their profile to be true can be dangerous, as they may not be the same as stated.
- Snapshots of chats, photos, videos, etc., are saved and will be used for blackmailing and threatening.
- Being cyber bullied by posting negative, derogatory comments, posts, photos, etc. to tarnish one's image.
- Lots of predators and adult criminals are lurking online to trap children.

Tips for safe Social Networking

- Always keep your personal information strictly personal.
- Customize your privacy settings so that others can see only the basic information.
- Just know about and manage your friends. Don't trust all the online friends.
- Let your friends know that you are uncomfortable if they post something inappropriate about you.
- Do not publish any information that reveals your identity.
- Always use strong passwords. Don't share them with others.
- Never share your pictures, photographs, email accounts, etc., with anyone.
- Keep your personal messages strictly personal. Once posted they are published for ever.
- If ever threatened or bullied seek the help of parents/teachers.

Helpline Phone Numbers

Crime Stopper: 1090
Cyber Cell (Tvm): 9497975998
Control Room: 100
Child Helpline: 1098 / 1517