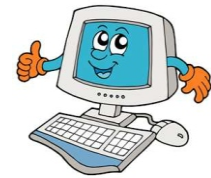# 4 Introduction to Layers

A beautiful sight of a rising sun is always soothing to eyes. If this sunrise is observed in mountains, the sight becomes more pleasurable. This scene consists of many objects like mountains, sun, birds, trees etc. Assume that we want to create such an animation. Each of these objects when drawn on the canvas will be either above or below another object. For example, sun rises from behind the mountains, so the object 'sun' should be placed behind the object 'mountain'. Similarly, if the mountain is behind the hut, the object 'hut' will be placed above the object 'mountain'. Likewise we can place the other objects in our example like the trees and birds above or below the other objects. In this chapter we will learn about a concept named "layers" that will help us to create the scene mentioned here.

Layers

A "layer" in Synfig refers to different levels on which we can place our drawing objects or pictures, stacked above and below each other. Top layers will hide bottom layers. We can think of layers as sheets of paper which are cut into different shapes. On one layer we have a paper-sheet shaped like a star. On second layer we have a paper-sheet shaped like a square. The square might overlap and hide some part of the star.

Use of layers gives us the freedom to work with each object individually. When modified it does not disturb the other objects either above or below it. Layers can also be rearranged, allowing us to change the order in which objects are displayed, thus changing the appearance of our scene.

In Synfig, each individual element of the canvas is broken down into layers. For example, when we had drawn a circle it appeared on a different layer. The layers in Synfig are different from other animation software in the following two aspects:

1. Every object, element, and effect have their own layer. We do not have a layer with multiple effects. In other words a layer represents a single primitive such as object, outline or image.

2. The upper layer can change the behavior of the layers below it. It can distort or modify the layers beneath. This is done by using effect or filter layers.

There are different types of layers such as gradient, blur, distortion, filter and others.

Each layer has its own set of parameters. We can see the parameters of a layer by first selecting the layer from the layers panel and then looking into the params panel. Let us understand layers

concept by taking an example. Assume that, we want to give a gradient effect to a circle layer. Perform the steps mentioned to achieve gradient effect.

- Create a new file.
- Create two circles of different sizes using the circle tool. Keep the color of the circle as white so as to see the effect of gradient. Figure 4.1 shows these two circles.
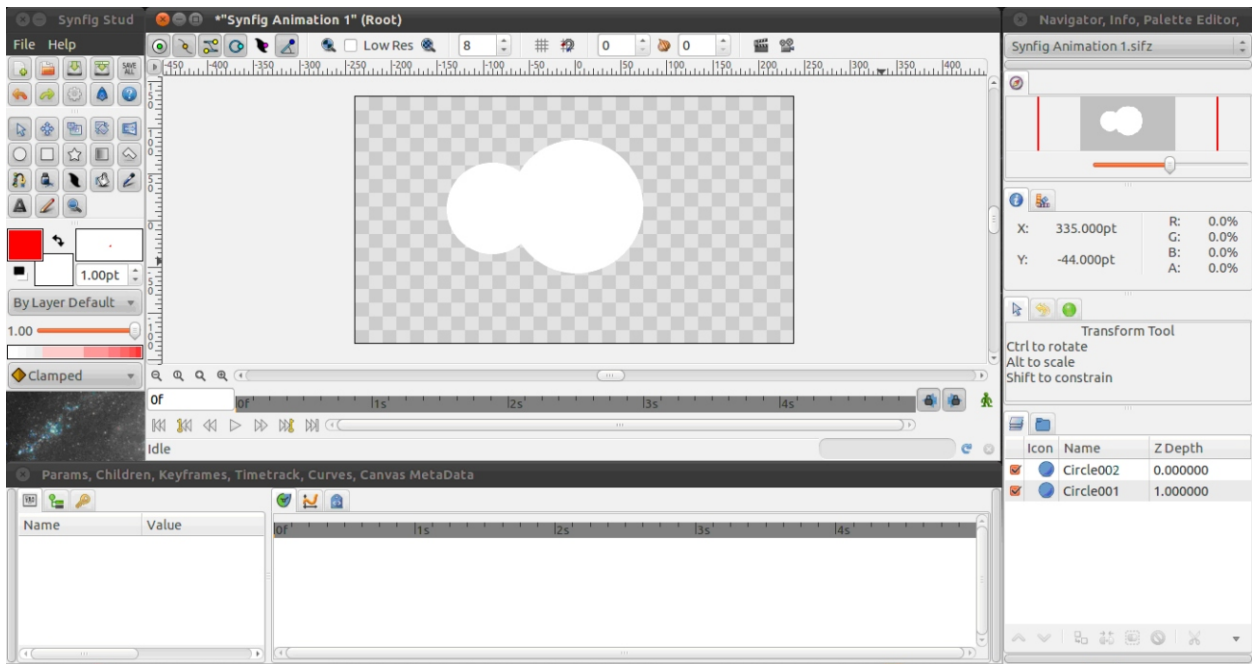

Figure 4.1 : Two circles of different size

- Select the gradient tool from toolbox. Select the outline color of your choice. Here we have selected the outline color as red. Now drag the gradient over the area as shown in the figure 4.2.
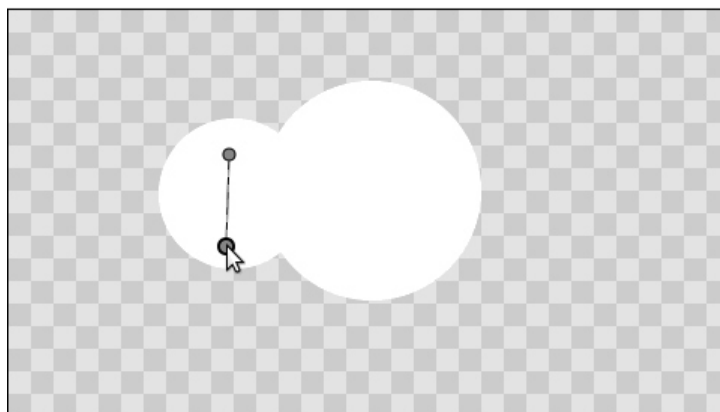

Figure 4.2 : Add gradient

- You see the entire canvas is covered by the gradient as in figure 4.3. This can be useful if you want to use the gradient as the background layer. But we want the gradient to be applied only onto the objects.
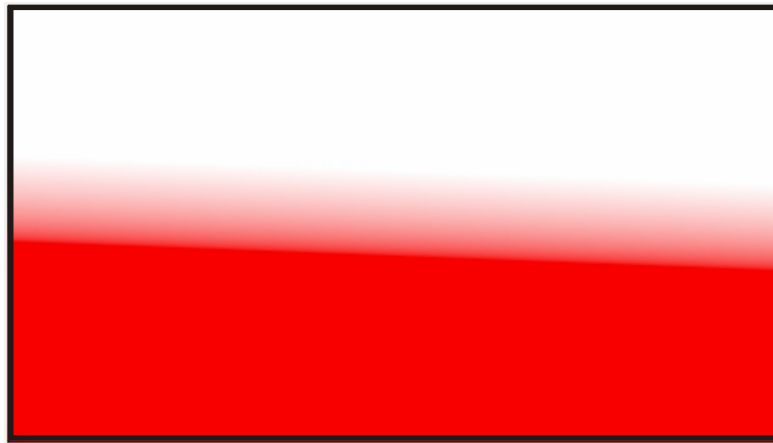
Figure 4.3 : Effect of Gradient on the canvas

● Select the gradient layer and go to the params panel. You can see "blend method" parameter. Blend mode defines how the image is layered on everything below it. By default, the setting is "Composite", which simply displays the content of the layer. In the blend method parameter change the setting to "straight onto" as shown in figure 4.4. Now you can see that the gradient is applied to the object layers below it. But we want the gradient to be applied only to a single object and not all the objects below the gradient layer. For this we will be using encapsulation.

Encapsulation means grouping things together. If we want to apply gradient to a particular object or a group of objects then we need to encapsulate them into a layer. Thus, using encapsulation we can apply the gradient to one layer without applying it to the layers beneath it.

So, in our example we need to select the gradient and the object (to which the gradient is to be applied) and encapsulate them together.
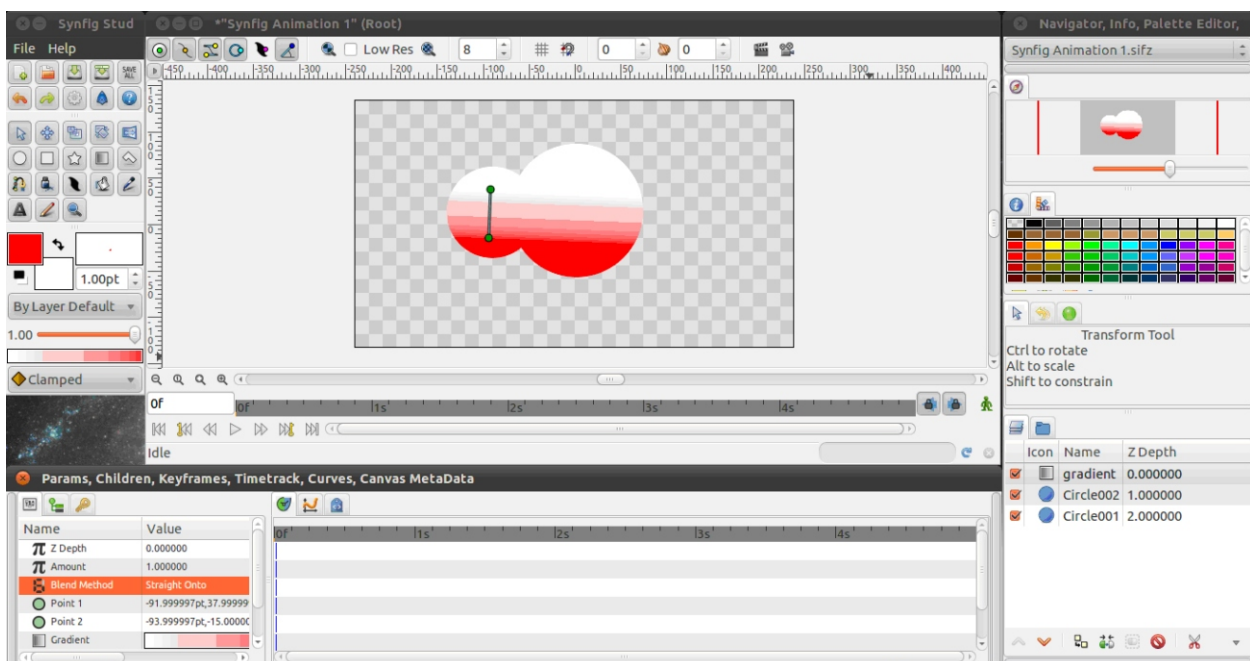

Figure 4.4 : Use of "straight onto" blend method

- Select the gradient layer and the circle layer (press and hold the CTRL key to select two layers) on which we want to apply the gradient. Right click → Encapsulate. This will create a new layer named "inline canvas" as shown in figure 4.5. You can see a small triangle near the inline canvas. Click on this and the inline canvas will expand to show you the two layers: gradient and circle as given in figure 4.6. Figure 4.7 shows the canvas with gradient applied only to the smaller circle.
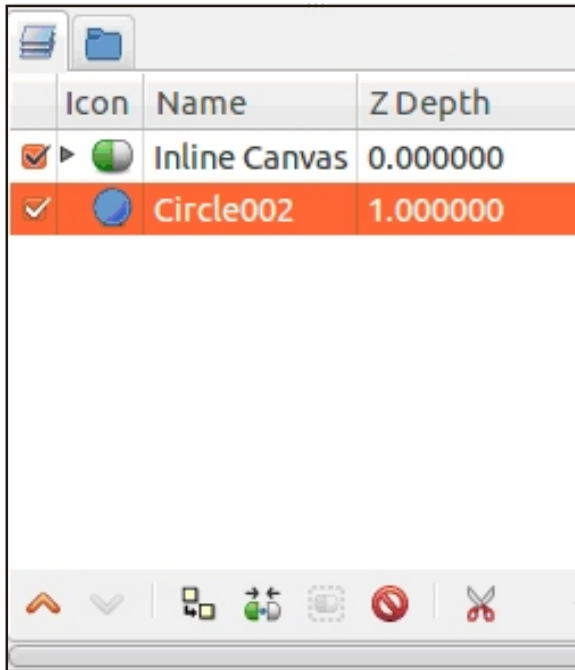

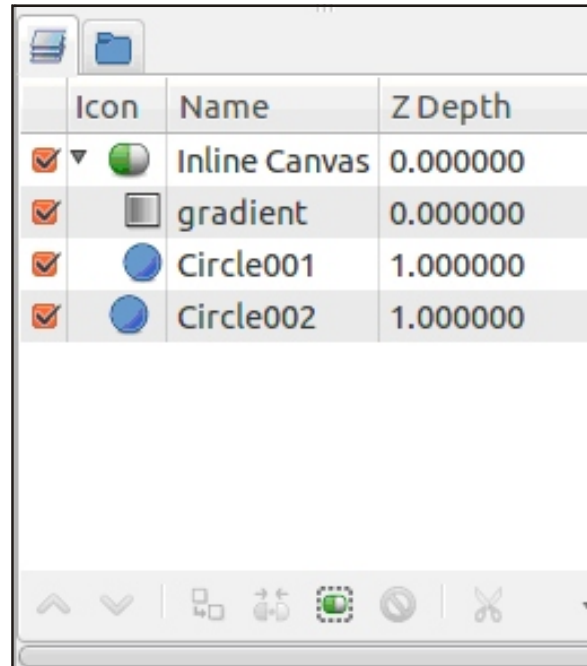**Figure 4.5 : Inline canvas layer created**   **Figure 4.6 : Expanded Inline canvas layer**
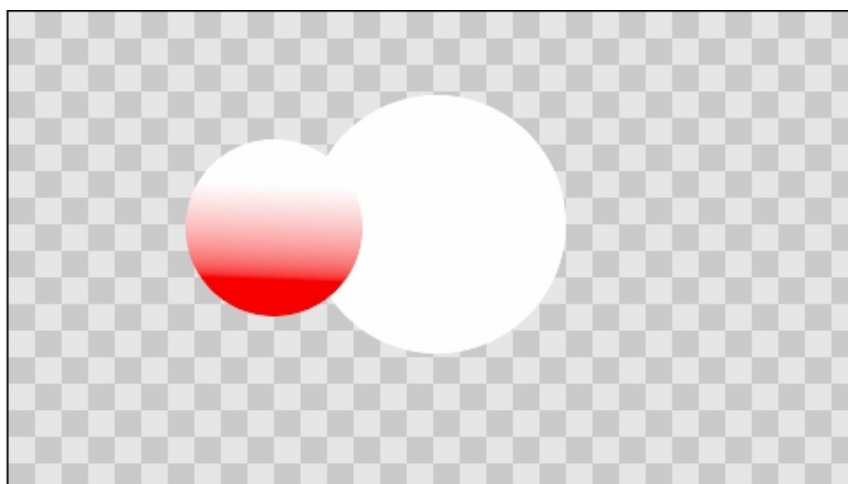

Figure 4.7 : Canvas showing the gradient effect after encapsulation

Thus we have seen how the gradient is applied to the objects using encapsulation. To make it more clear let us add one more circle using the circle tool as shown in figure 4.8.
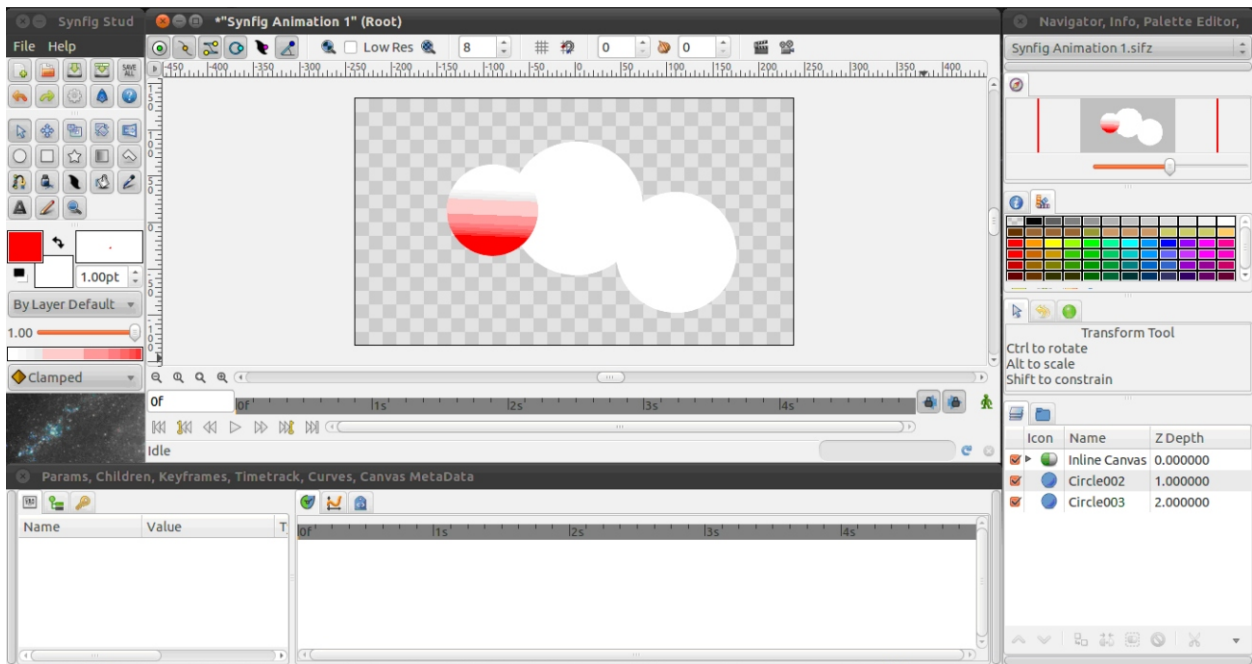
Figure 4.8 : Create a new circle layer

Now drag this new circle layer into the inline canvas layer. We place the circle layer just below the gradient layer and the effect will be as shown in figure 4.9. Here you can see the gradient is applied to all the objects inside the encapsulated area.
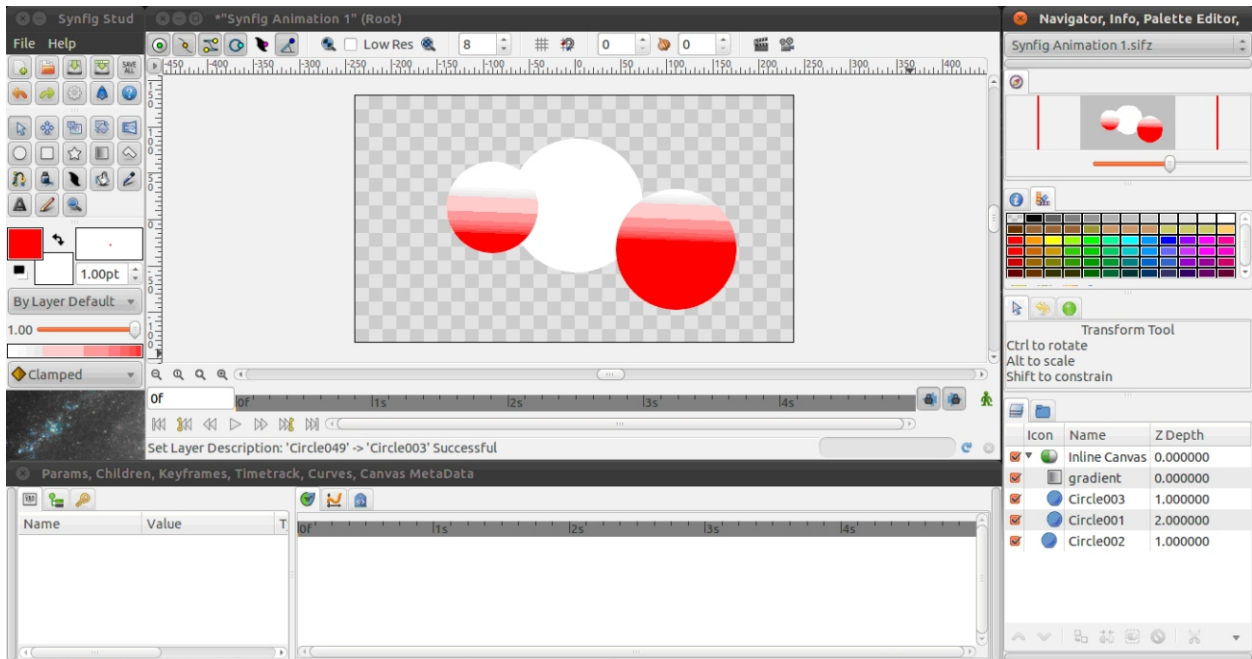

Figure 4.9 : New circle layer placed below the gradient layer

If we reposition the gradient layer using the lower layer button as shown in figure 4.10 (a), the gradient will now be applicable to only one of the circle layer. In other words, we can say that the gradient layer has an effect on only the layers that are below it in the encapsulated area. Figure 4.10 (b) shows the effect of this repositioning.
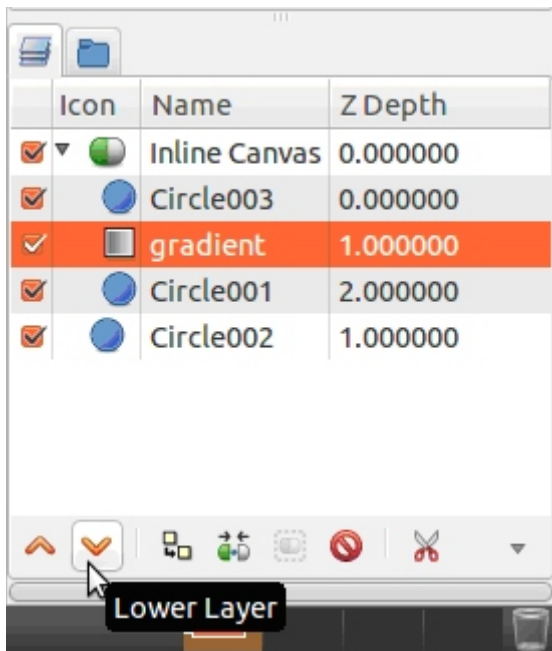
Figure 4.10(a) :
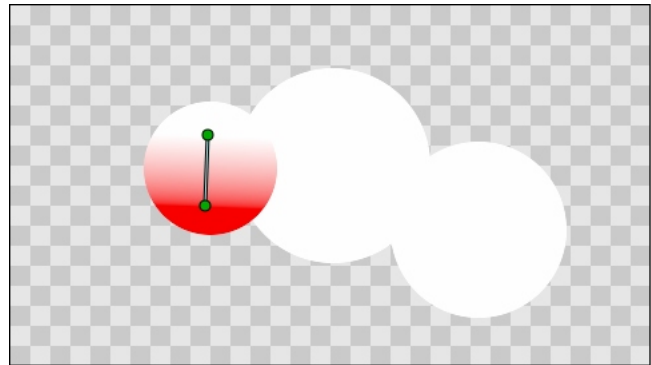
Reposition gradient layer

Figure 4.10(b) :

Effect of repositioning gradient layer

The important point to remember here is that a layer can only modify the data that it gets from the layer directly below it. For example if we used a Blur Layer on top of the layers inside the inline canvas, it would just blur the inline canvas layers and not every layer that lies under the inline canvas.

Rotation on a specified path

Using the concept of encapsulation, let us discuss another example of a ball rotating around a particular path. In our animation example of the circle moving from left to right described in previous chapter, we defined the starting point and the ending point. Here, Synfig automatically assumes the path to be straight. But in our example we want to move the object as per our defined path. Follow the steps mentioned to create user defined path.

- Create a new file.
- Let us first create our path for rotation using the Bline tool. Select the Bline tool and draw an oval shaped path as shown in the figure 4.11. In the Tool options panel select only the *Create Outline Bline* option.
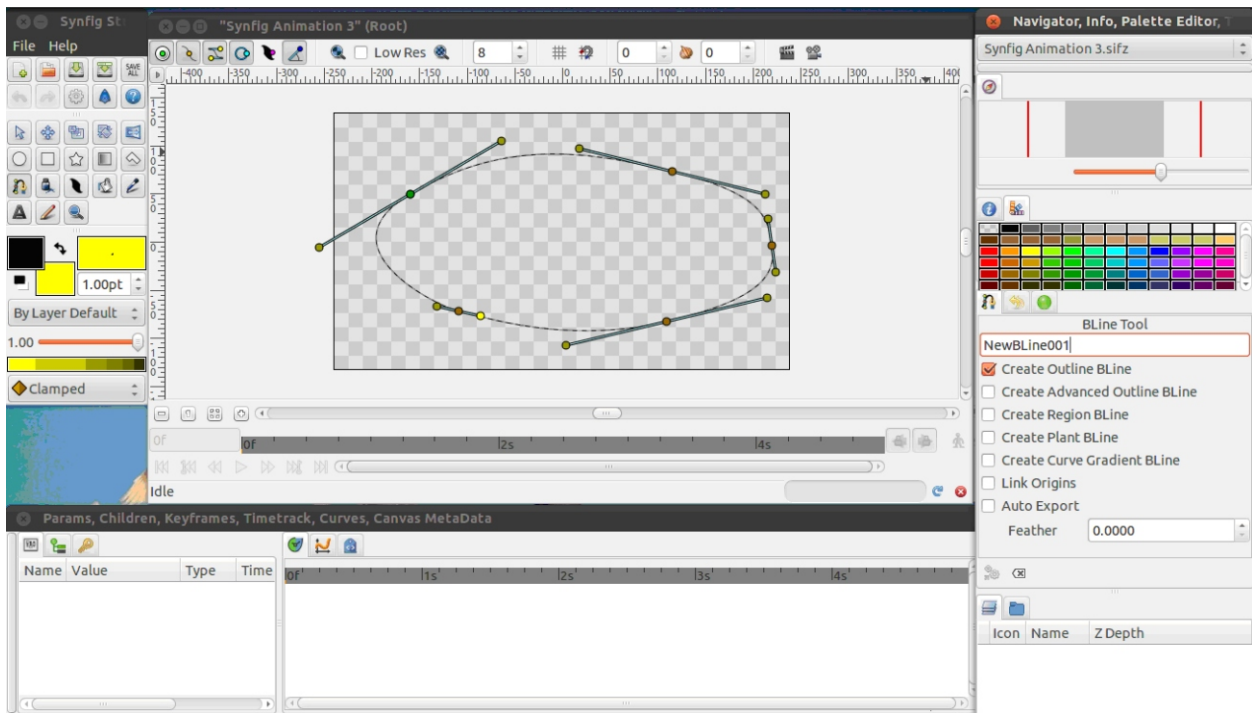
Figure 4.11 : Creation of path using Bline tool

- Select the transform tool to finish the Bline. (Pressing Esc will clear the Bline).

- Now select the circle tool. Using the palette editor select a color of your choice and draw a circle on the canvas as shown in figure 4.12.
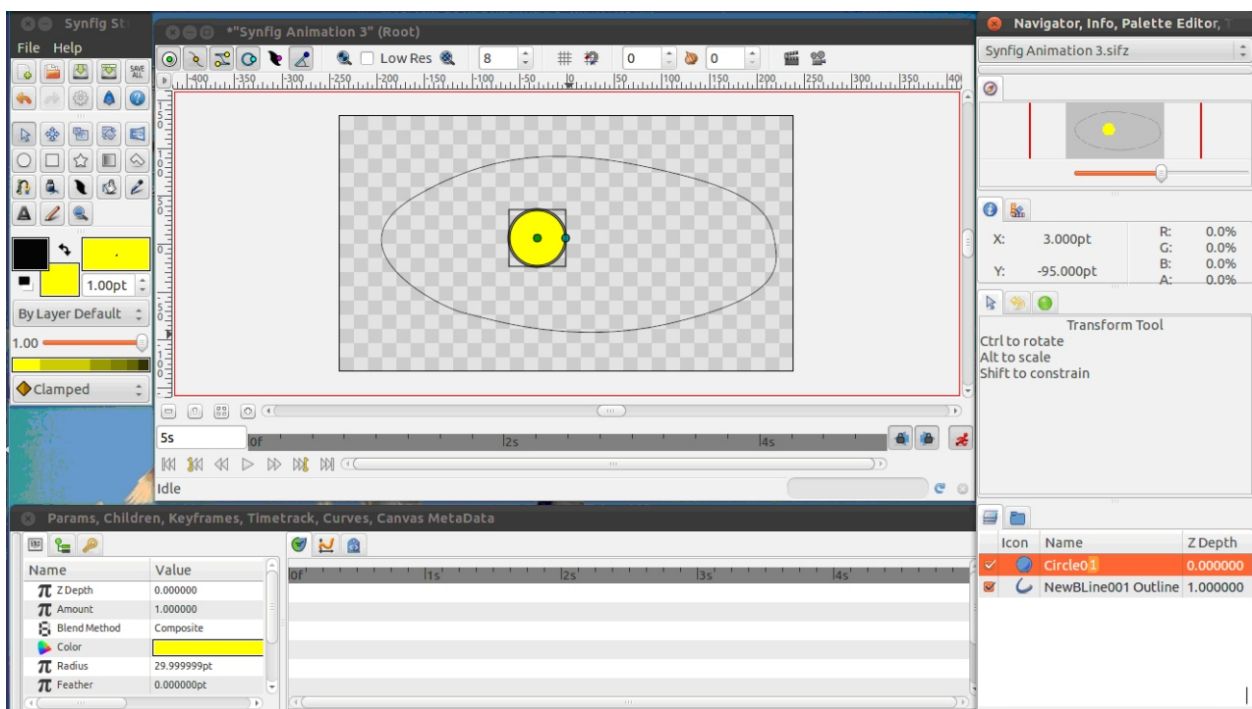

Figure 4.12 : Create the circle

- Let us add a new rotate layer above the circle layer. In the layers panel select the circle layer → Right click → New layer → Transform → Rotate. This will add a new layer named rotate above the circle layer as shown in figure 4.13 (a) and 4.13 (b).
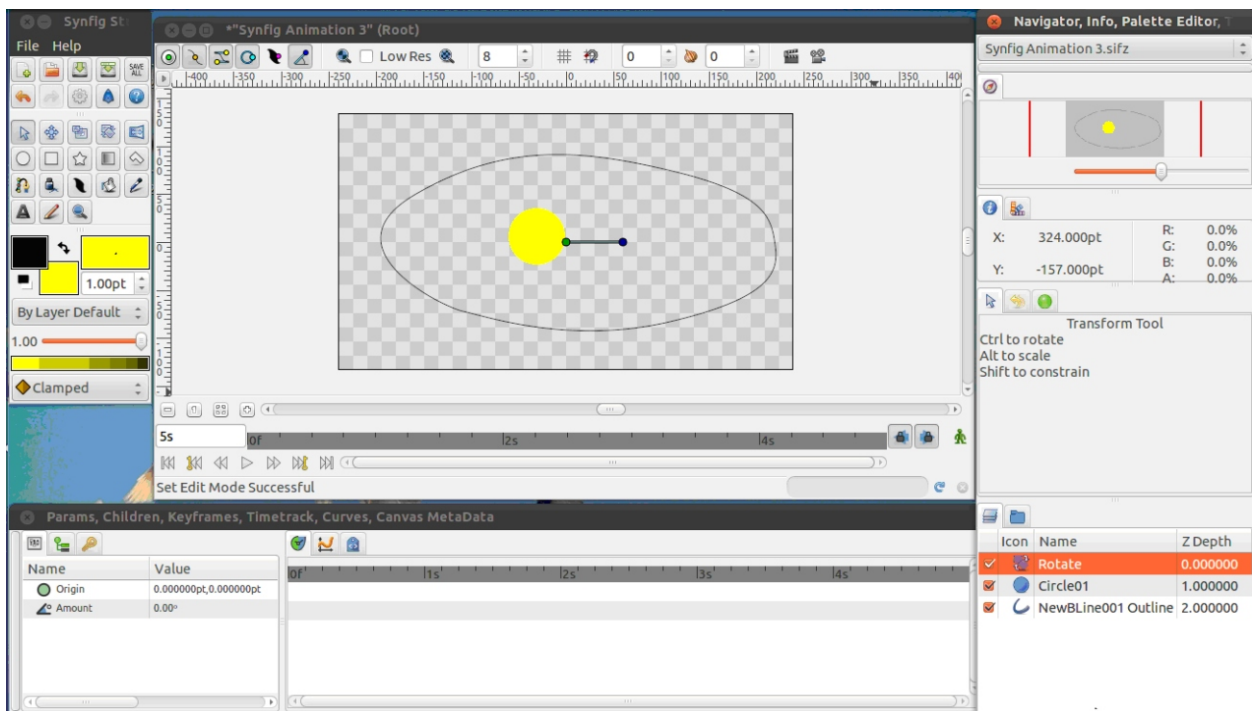
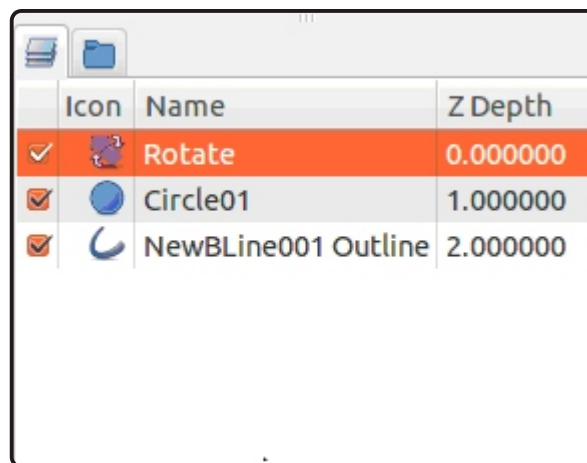**Figure 4.13(a) : New rotate layer above the circle layer**

Figure 4.13(b) : Layers panel showing rotate layer above the circle layer

As we need to rotate the circle, we have added a rotate layer above the circle layer.

- Now we will encapsulate the circle layer and rotate layer. To select both the layers, click on the rotate layer in the layers panel, press shift and select circle layer.

- Right click and select encapsulate. Thus the rotate and the circle layer are encapsulated into a layer
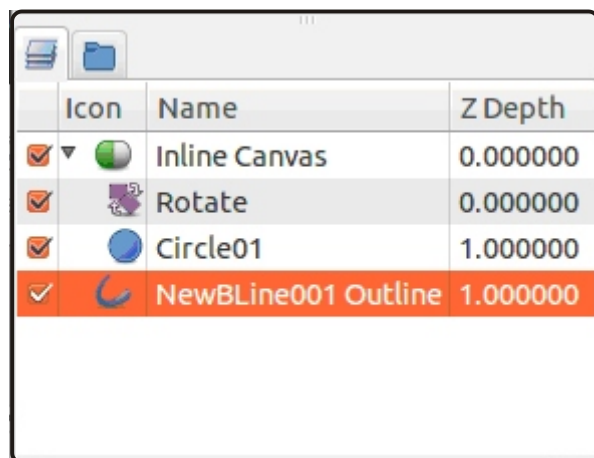

Figure 4.14 : Encapsulate rotate and circle layer

named inline canvas. You can change the name of the encapsulated layer. Figure 4.14 shows the encapsulated layer 'Inline Canvas'.

- Select the rotate and the circle layer and bring their positioning duck (green duck) near to one another as shown in figure 4.15.
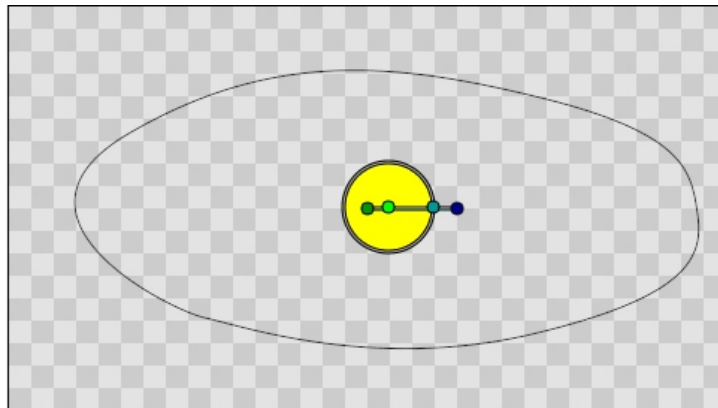

Figure 4.15 : Dragging the green ducks near to one another

- Select the inline canvas layer and select its positioning duck (green duck). Hold the CTRL key and choose the rotate layer. Continue to hold the CTRL key and select the blue duck on the rotation layer. Continue to hold the CTRL key and select the Bline layer. Now right click on the Bline in the canvas where you want the circle to start from. Select the option 'Link to Bline'.

- Link to Bline feature is used to attach a vertex of an object to the vertex of a Bline. The vertex gets stuck to the Bline vertex and can be moved along with it. Figure 4.16 shows the effect of using link to bline option.
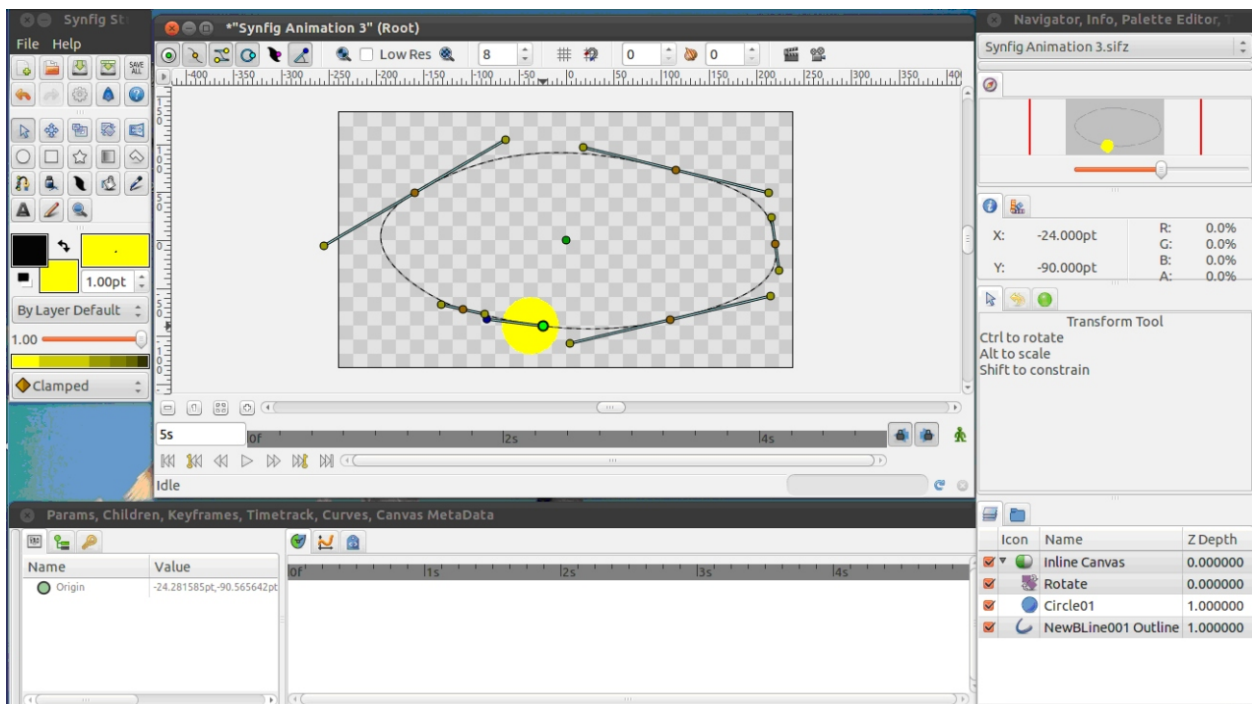

Figure 4.16 : Link to Bline option selected

- Click on the small triangle near the inline canvas layer to close it. Select the inline canvas layer as shown in figure 4.17.
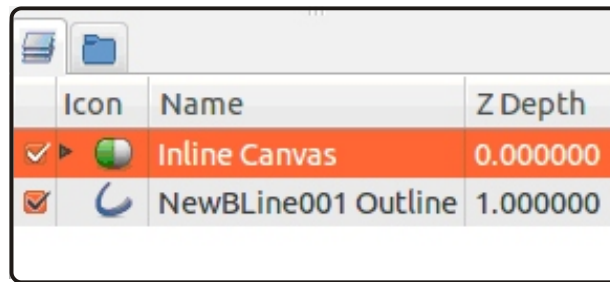

Figure 4.17 : Select Inline canvas layer

- Turn on the animation editing mode.

- In figure 4.18 you can see the red line around the canvas indicating that the animation mode is on. Drag the circle a little bit using the positioning duck (green) to record the starting position on the "0f" mark in the timeline as in figure 4.18. You can see a waypoint is added at "0f" mark.
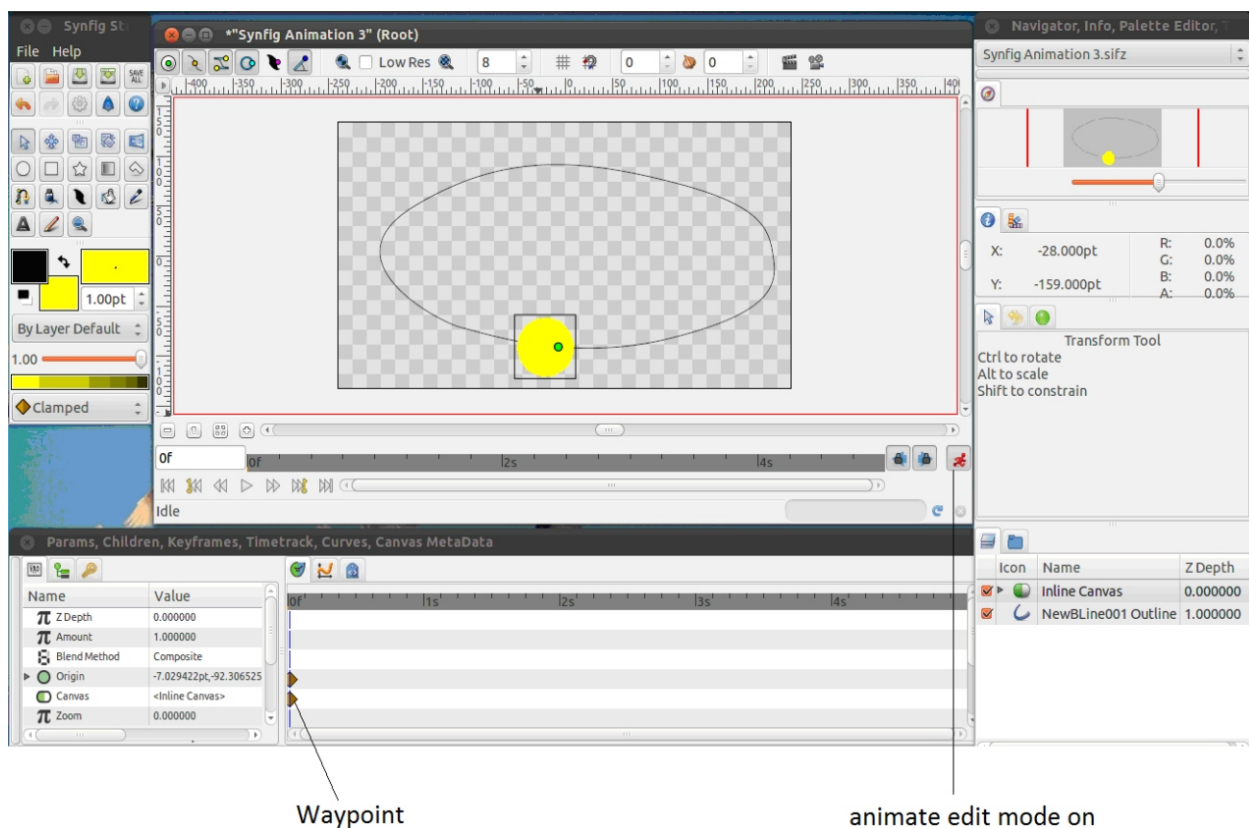

Figure 4.18 : Recording the position at 0s in the timeline

- Now click on 5s mark in the timeline and drag the circle in anticlockwise direction using the positioning duck (green duck) till you reach the ending point of the bline.

Figure 4.19 (a), (b) (c), (d), (e) and (f) shows the circle dragged from starting point to ending point. The timeline in each image shows the position of the circle at that particular time.

Note : Do not drag the circle directly to the end point by moving in clockwise direction. This will not record properly the position of the circle at different timing locations.
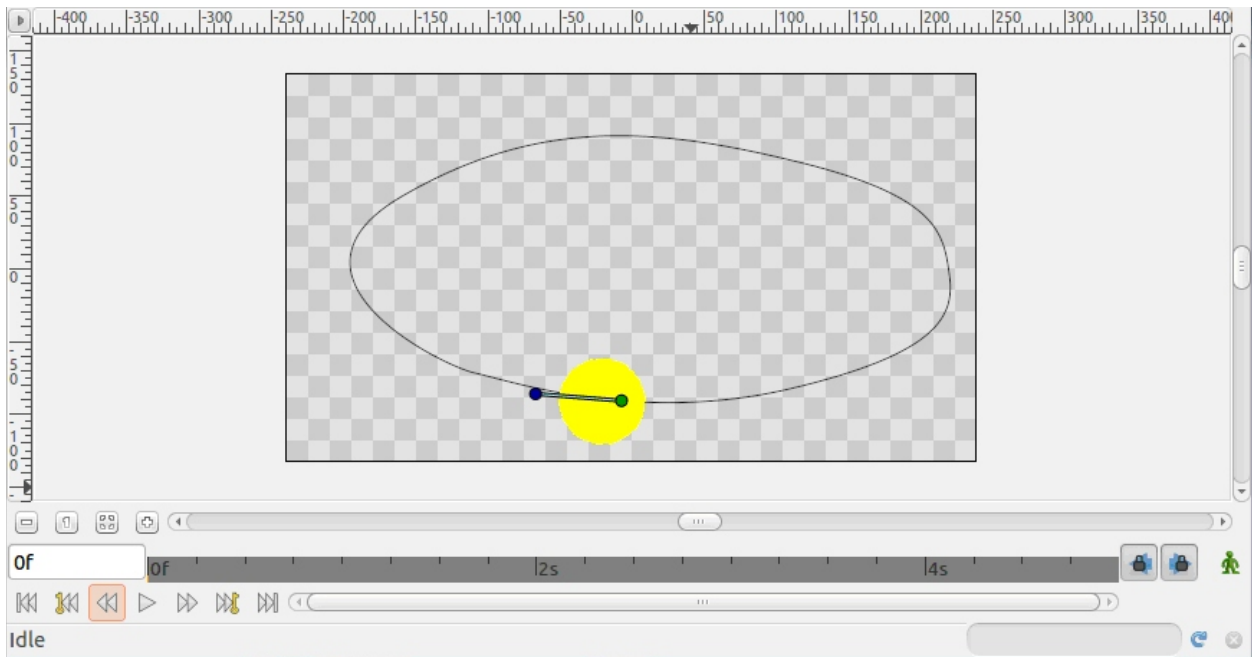

Figure 4.19(a) : Position of circle at 0f

Figure 4.19(b) : Position of circle at 1s
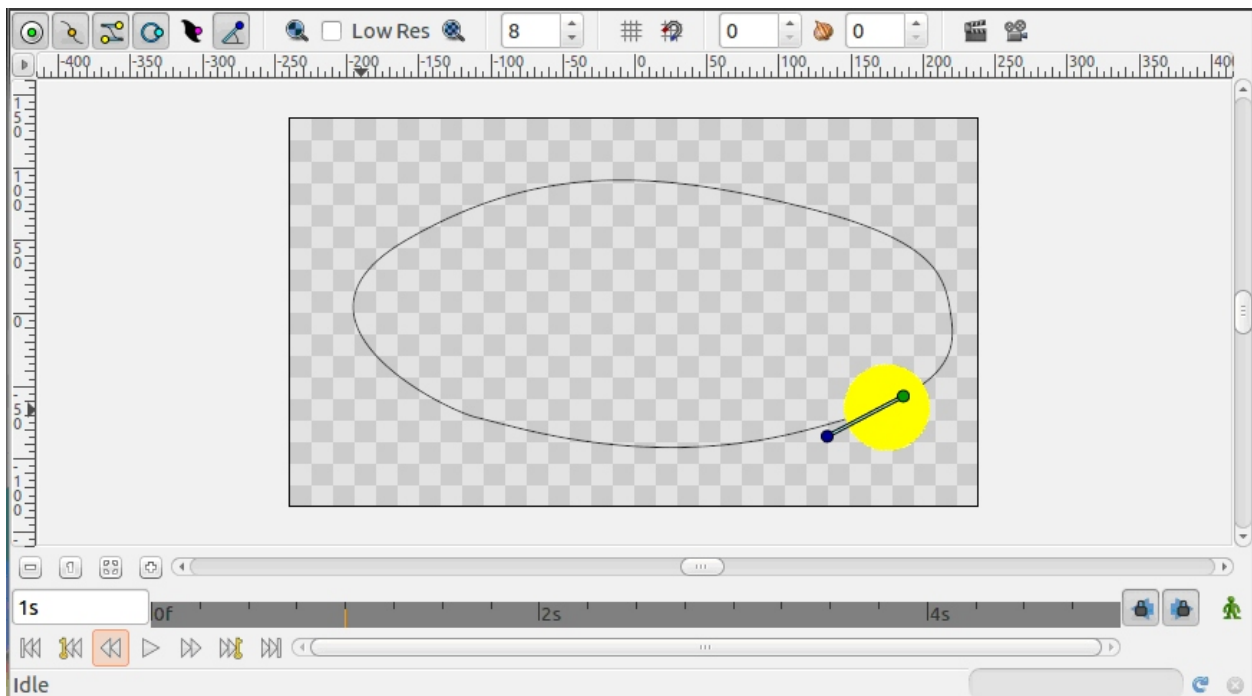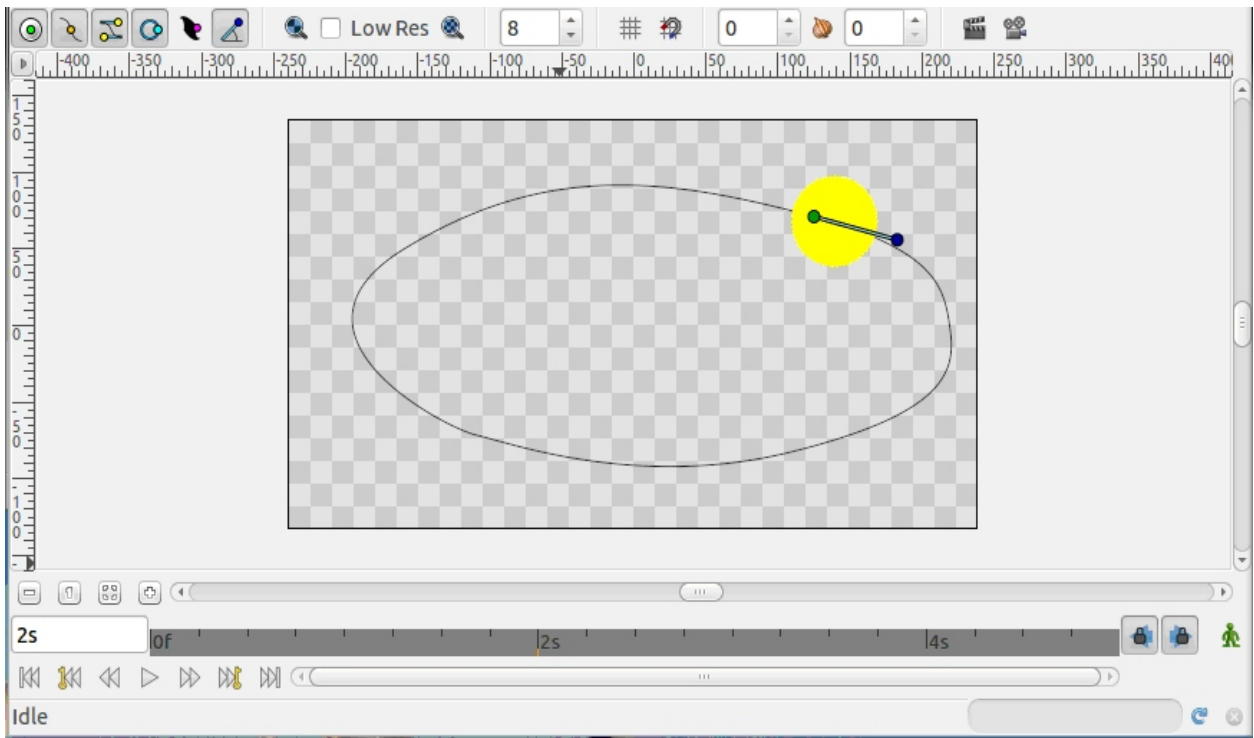
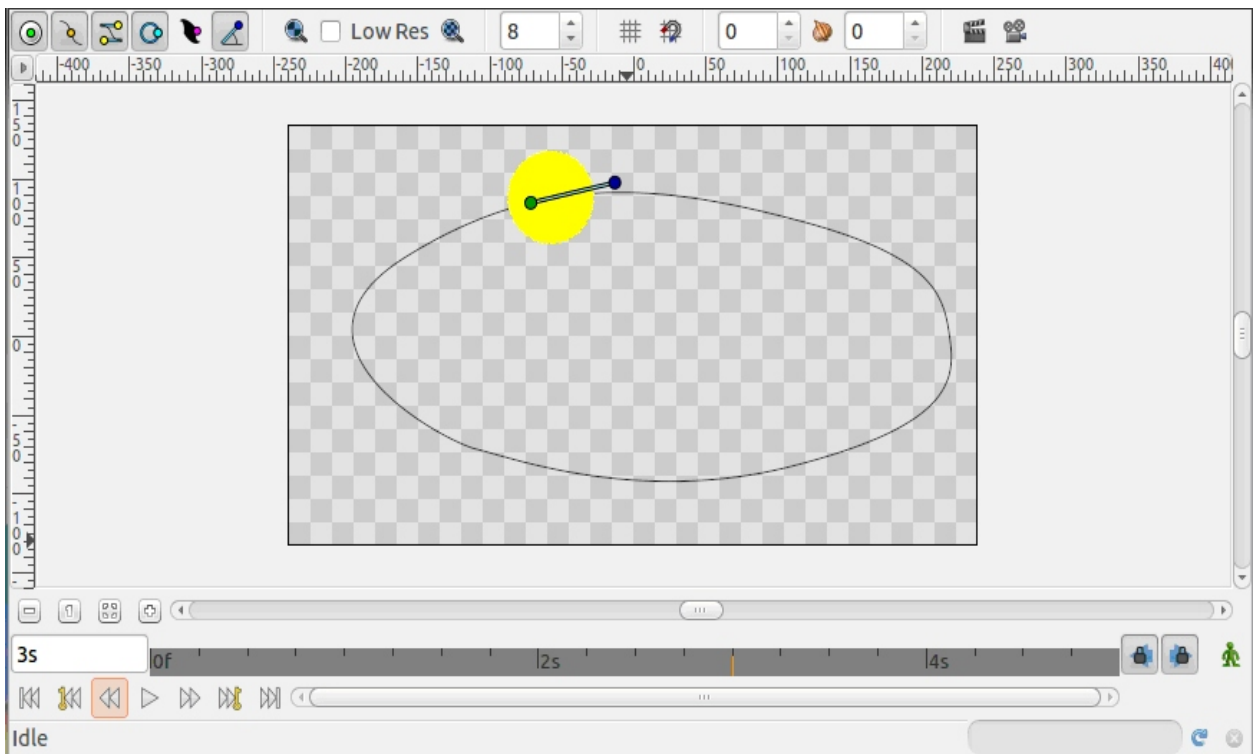**Figure 4.19(c) : Position of circle at 2s**

Figure 4.19(d) : Position of circle at 3s
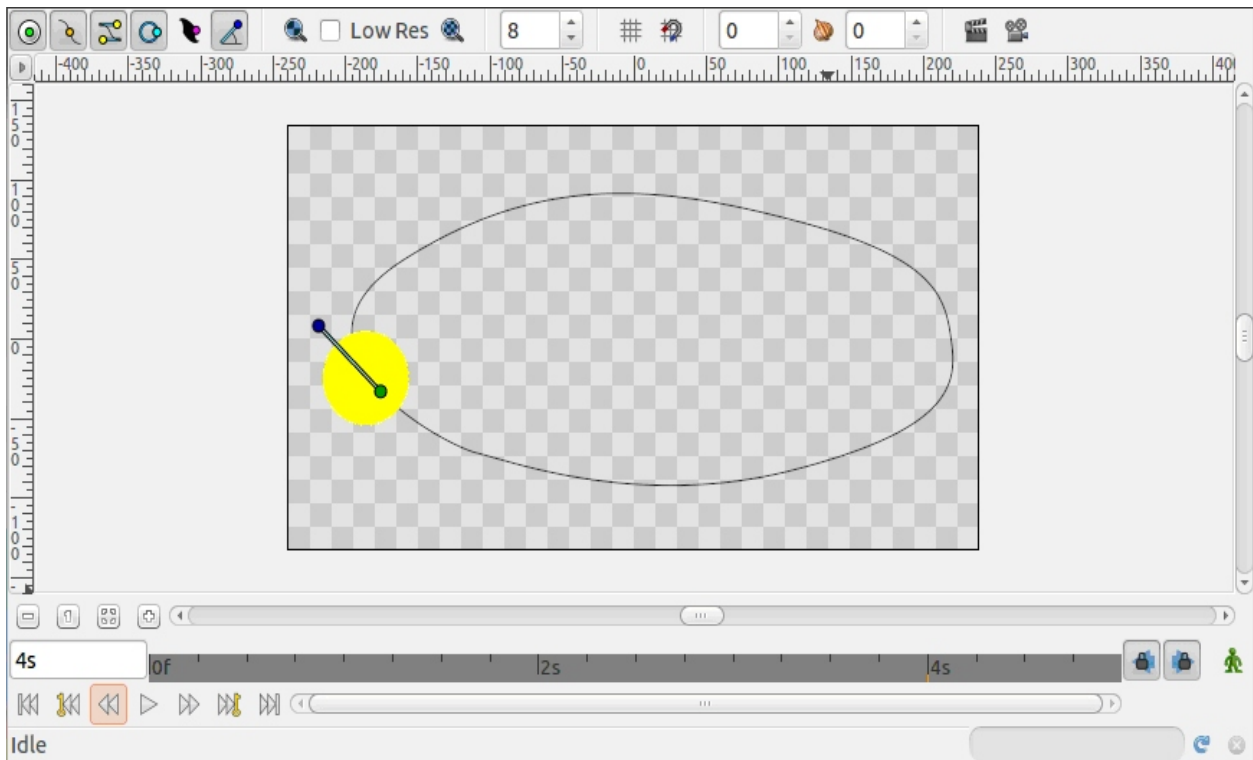
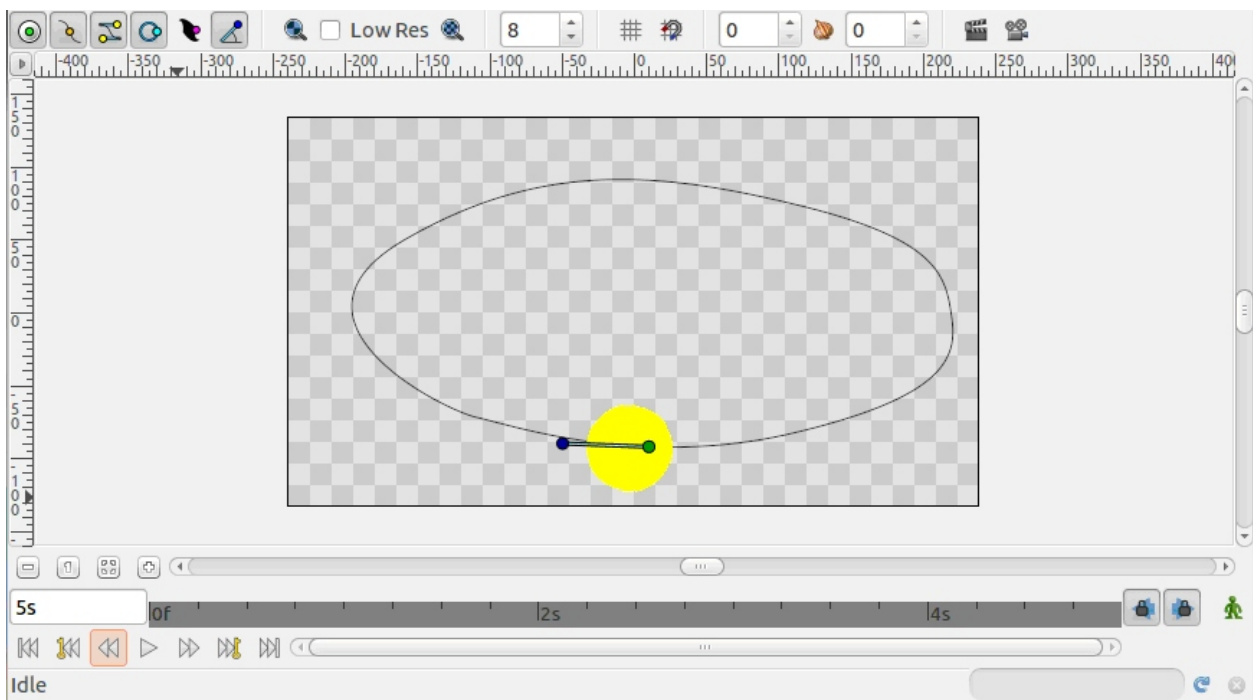**Figure 4.19(e) : Position of circle at 4s**

Figure 4.19(f) : Position of circle at 5s

- Click on play to preview the animation. You can see the circle moving in anticlockwise direction.

- Save and render the file. Figure 4.20 show the output as viewed using a web browser.
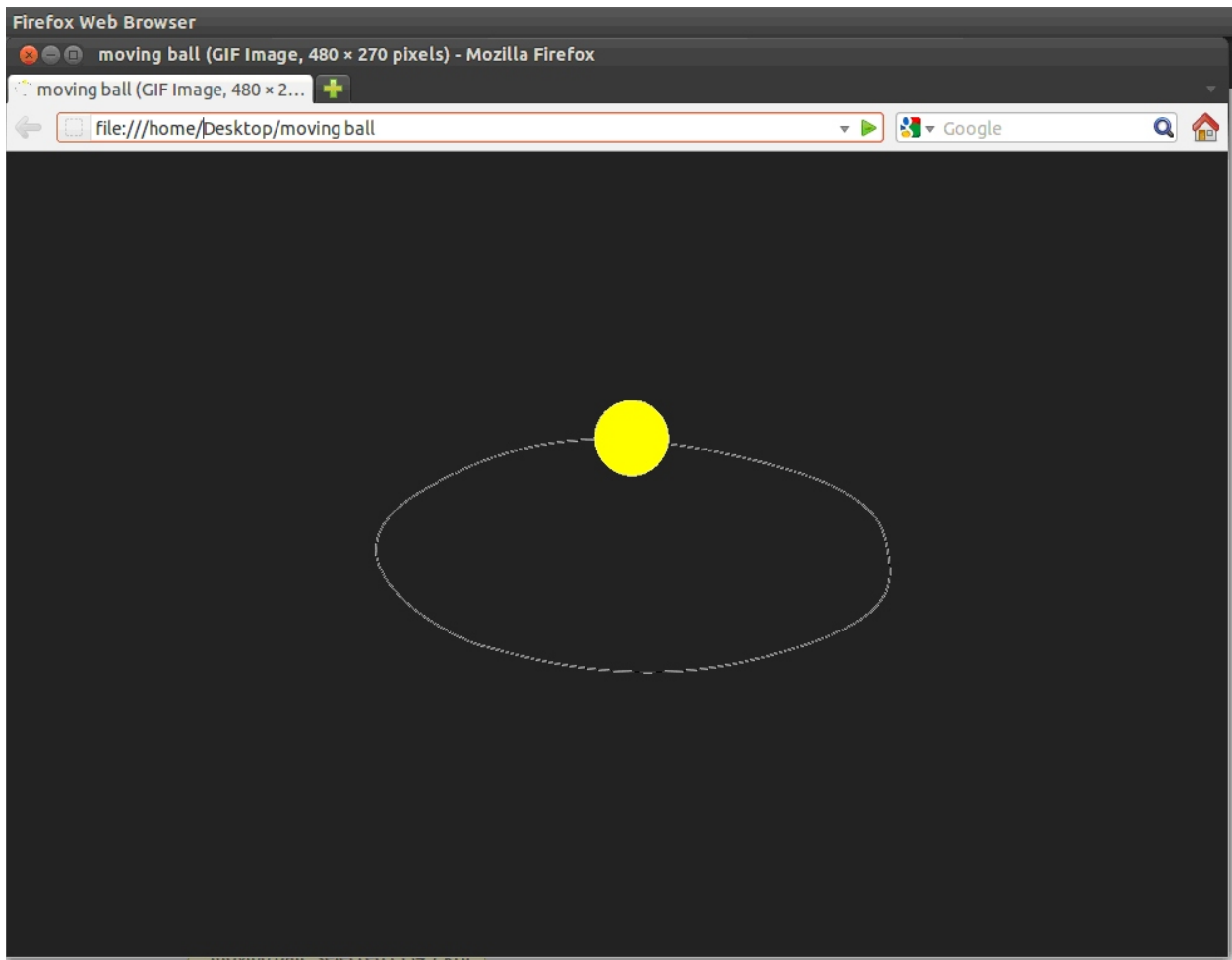
Figure 4.20 : Output displayed in web browser

Summary

In this chapter we introduced the concept of layers and how we can place our objects above or below another objects. Layers give us the freedom to work with each object individually. We introduced an important concept called "Encapsulation". Using encapsulation, we can give effects to various objects without changing other objects in the animation. We also discussed how to animate objects on a user defined path.

EXERCISE

1. Explain Layers. Give an example.

2. What is Encapsulation? Why do we need it?

3. Imagine a street view with objects such as building, car, sun, traffic light and person. State which layer will be above and below?

4. What is the purpose of Link to Bline option?

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

(1) Which one of the following is a type of layer?

    (a) Timebar   (b) Gradient

    (c) Palette   (d) Animate edit mode

(2) Which of the below have their own layer?

    (a) object, element, effect   (b) parameter, object, panel

    (c) time, parameter, layer   (d) effect, object, panel

(3) Which of the following panel shows the parameters of a layer?

    (a) layer   (b) keyframe

    (c) params   (d) timetrack

(4) Which of the following is the default setting for blend method?

    (a) composite   (b) alpha over

    (c) straight   (d) straight onto

(5) Using which of the following feature we can apply an effect to one layer without applying it to the layers beneath it?

    (a) encapsulation   (b) groups

    (c) elements   (d) parameters

(6) Each individual element of the canvas is broken down into which of the following components?

    (a) frames   (b) layers

    (c) keyframes   (d) panels

(7) Which of the following feature is used to attach a vertex of an object to the vertex of a Bline?

    (a) link to object   (b) link to line

    (c) link to bline   (d) link to object

(8) Which of the following represents a new layer created after encapsulation operation?

    (a) inline layer   (b) inline frame

    (c) inline keyframe   (d) inline canvas

(9) Each layer has its own set of which of the following components?

    (a) frames   (b) keyframes

    (c) parameters   (d) panels

(10) Which of the following terms represent grouping things together?

    (a) cluster   (b) inline

    (c) parameters   (d) encapsulation

(11) Which of the following terms represent the different levels on which we place our objects stacked above and below each other?

(a) layer   (b) frame

(c) parameter   (d) panels

(12) Gradient, blur, distortion and filter are types of which of the following components?

(a) frames   (b) layer

(c) keyframes   (d) panels

<div align="center">

LABORATORY EXERCISES

</div>

1. Draw a rectangle, circle and square overlapping each other. Select different tool options and different color for each object. Also give a background color to the canvas.

2. Create a star and a circle layer. Apply gradient on the star layer. Create a square and apply blur effect on it. Now create a rectangle and also apply the blur effect. Note: the objects should overlap each other.

3. On the canvas using gradient show the sky and ground. Use different colored gradient for both. For sky use the shades of blue color as gradient and for ground use the shades of green color as gradient.

4. Draw two circles overlapping each other and apply blur effect to one of them.

5. Create an animation showing a star moving on the user defined path.

6. Create an animation showing a star rotating while moving from left to right.

7. Create an animation to show a kite flying in the sky.

◆