

COMPUTER GENERATED ANIMATION

Dr. Saurabh Sawhney
Dr. Aashima Aggarwal
Insight Eye Clinic, Rajouri Garden, New Delhi

Animation comes from the Latin word *anima*, meaning life or soul. Animation is a technique, which, by presenting a sequence of slightly different images to the observer so quickly that they are merged by the brain into a flow, seeks to establish the illusion of movement. The technique was mastered by Walt Disney, who enthralled the world with the antics of an entire array of characters.

In the medical sciences, animated sequences have become a part of life. They are invaluable adjuncts to explaining complex disease patterns and events to patients, and to doctors who are learning. Animations can often illustrate clearly and with precision concepts that the camera cannot catch. Even theoretical concepts like an embolus blocking the coronary artery, for instance, can be simulated by means of an animated film. Apart from clarity and accuracy, animation is also an art form whose visual impact can be stunning.

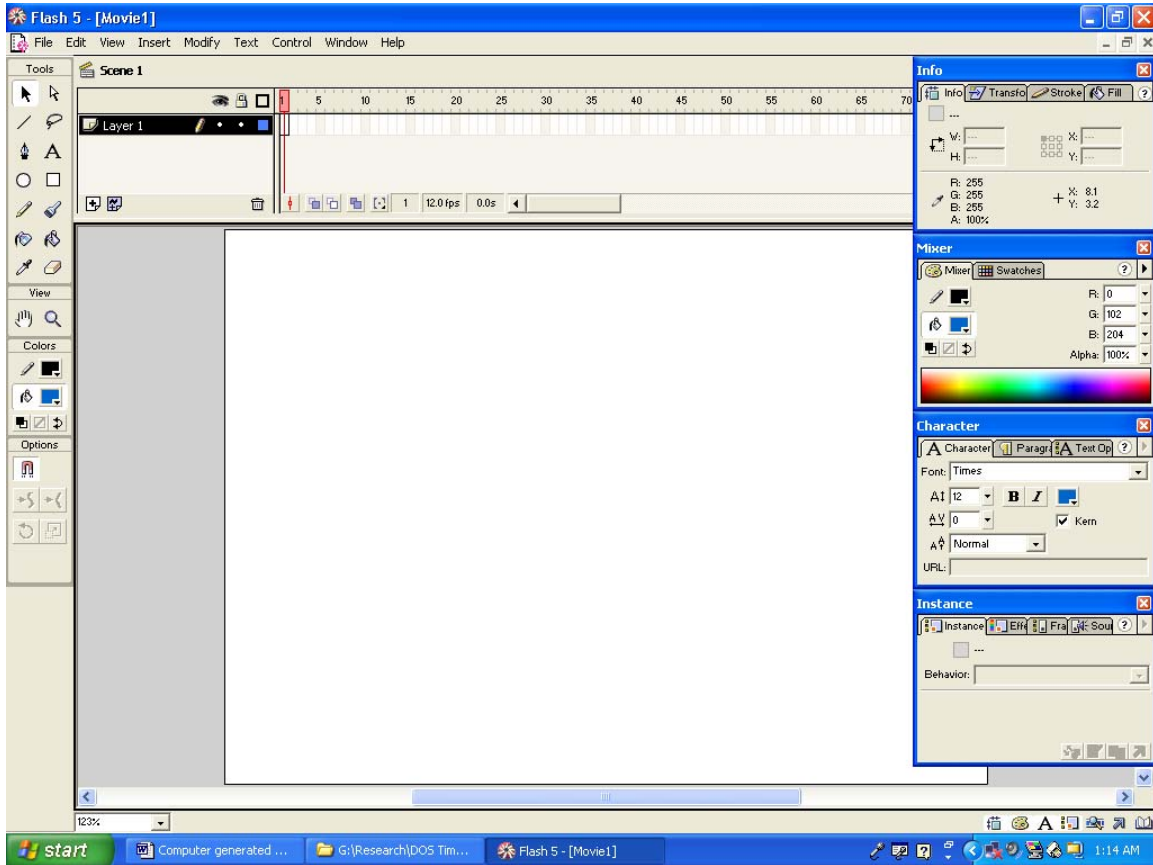
In the earlier days, a master artist used to draw what were called key frames, which depicted the beginning and end of a particular movement, for example a smile. Junior artists would then draw a number of frames in between, which would all be compiled and rapidly flitted across the screen, producing an effect of someone smiling. Often, the background would remain stationary, and the smile sequence drawings would be on transparent cellophane paper, so that they could be placed over the background drawings and then photographed, frame by painstaking frame. At the end of it, you would get a smiling face over a background. This was called working in layers.

The principles are still valid today, but the actions are now performed in a much more stylish manner. Professional animation software does most of the work, and the animator needs only to know what orders to give. One of the most popular software for developing 2-D animation is Flash (Adobe). It allows one to work in layers, does the in-between drawings itself (called tweening), and generally makes life a lot easier. We shall be discussing with reference to Flash version 5.0.

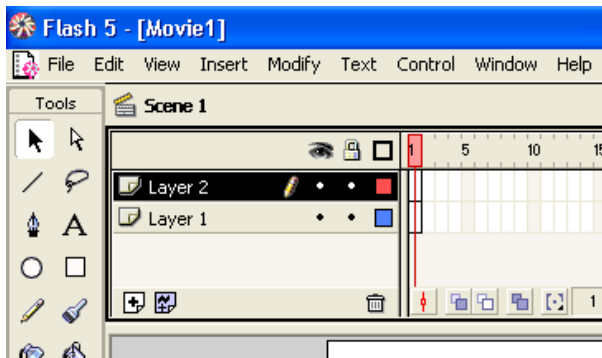
Let us look at the basic principles of working in a Flash environment. First up, you need a computer that has Flash loaded onto it, preferably with a dedicated graphics card, and a good quality coloured monitor. A high speed processor and a good RAM are preferable, but not essential.

Flash files are identified as flash movies (with filename extension .fla). You can create a blank flash movie by right clicking on an empty area in a folder, or on the desktop, and following the new menu. Or you could open flash from the programs list, but remember to give the movie a name and save it where you can

find it later. Once you have created a flash movie file and are in the workspace, your view is something like this

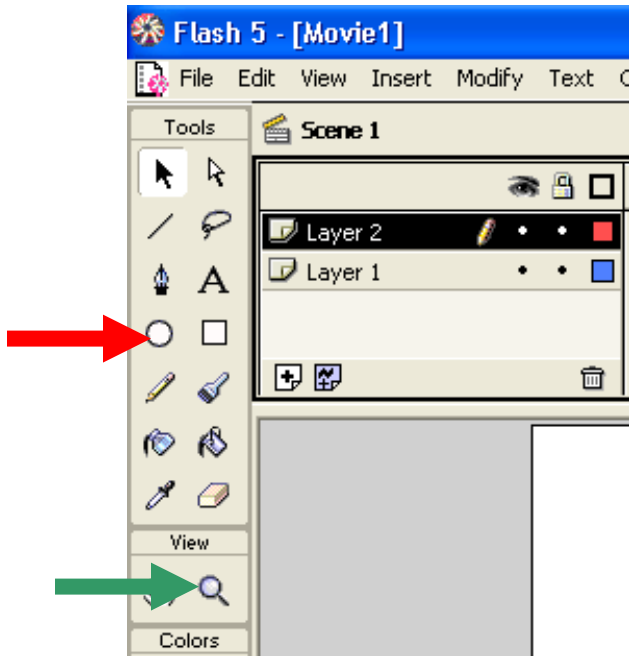


To begin with, one needs an object that is to be animated, and a background to animate it against. So that's at least two layers we are talking about. Now, on your monitor, look at the upper left corner, where it says scene1. Below this is written layer 1, and a bit further down is a plus sign. Click this sign, and a layer is added above layer 1. The figure below captures part of the screen now.

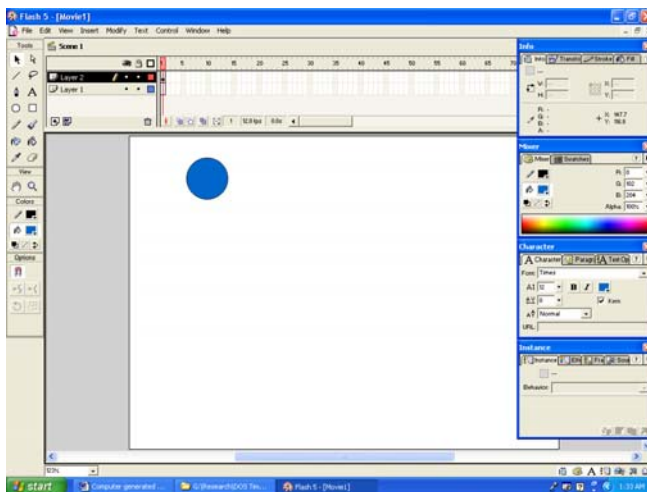


You will notice that layer 2 is selected (marked by black colour). This means that whatever you now draw will be drawn in layer 2. So let's draw a ball. To do this, pick the oval tool (by clicking on it). It is placed on the left side of the screen, on the palette marked **Tools**. See red arrow in the figure given below. Now, click in

the white central area of the screen (the workspace), and drag the mouse to form an oval. Once it is about 3-4 cm in size, release the mouse button, and you have a blue coloured ball. If you don't like the ball, then go to edit and undo the action. Flash is a very forgiving program and allows a lot of undo, even if you've saved your work in between (100 undo levels by default, but can be set up to 300 undo levels).



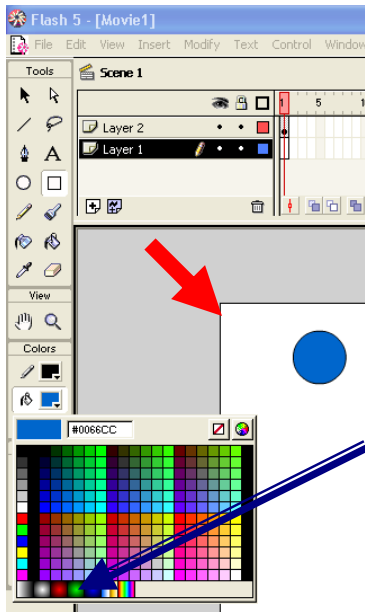
Now, if you've pressed the right buttons, you should have a display like this. You can always decrease the magnification to get better perspective (use the magnifying/minifying lens in the tools area, near the bottom, see green arrow in the above figure).



Now we need a background against which to animate the ball. This background needs to be in a separate layer so that it stays stationary whilst the ball moves. First select layer 1 by clicking the part of the screen that says layer 1, just below

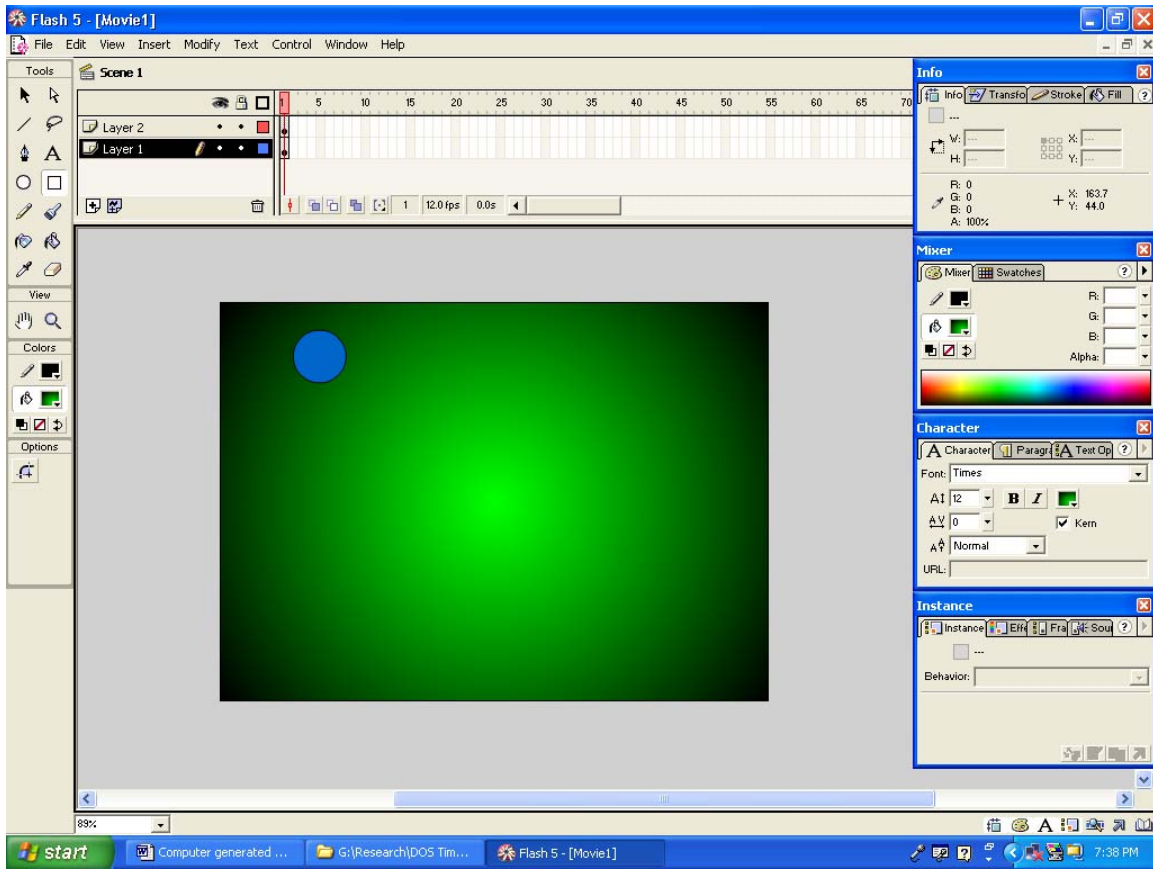
the selected layer 2. As you click, layer 1 becomes black while layer 2 becomes the default colour. Now, use the minifying lens to adjust the workspace so that all corners are easily visible. If you have minified too much, use the magnifier button. It is just next to the minifier and is marked with a plus sign. The options to magnify and minify are available only after you have picked up the tool from the **Tools** palette.

Once the workspace is set to your liking, pick up the rectangle tool, which is located just to the right of the oval tool, which we used to draw the ball. The rectangle needs to be a different colour from the ball to provide contrast, so let's look into the **Color** palette now. This is located below the Tools palette and the View palette, and has two parts. The upper one is **Stroke** colours, while the lower one is **Fill** colours. The former refer to outlines, while the latter refer to colour inside closed areas. Having picked up the rectangle tool, click the fill portion of the palette, where there is a blue patch of colour. Refer to the figure below; this is what your screen will now look like:



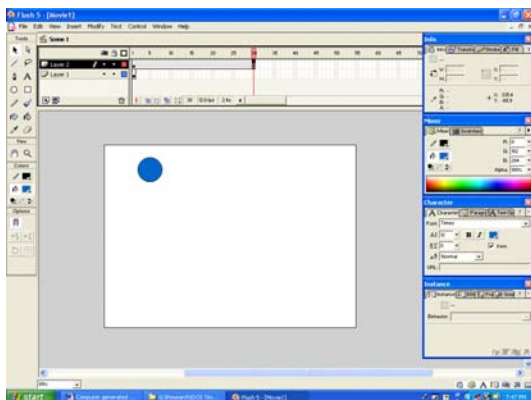
Note that the rectangle tool is selected, as is layer 1. In this colour palette, you can choose any colour by just clicking with your mouse pointer, which, if you notice, will acquire a very different shape, called an eyedropper. It will pick up colours from not just the palette, but almost any part of the screen. Use the eyedropper tool to pick up the centre of the green coloured circle, as marked by the blue arrow.

This is a predefined gradient and produces a rather neat effect in our rectangle to be. To make the background, just go to the top left corner of the workspace, (marked in the above figure by a small red arrow), click and drag the mouse to the bottom right corner, and leave it there. If you have followed the steps correctly, your display will look like this:



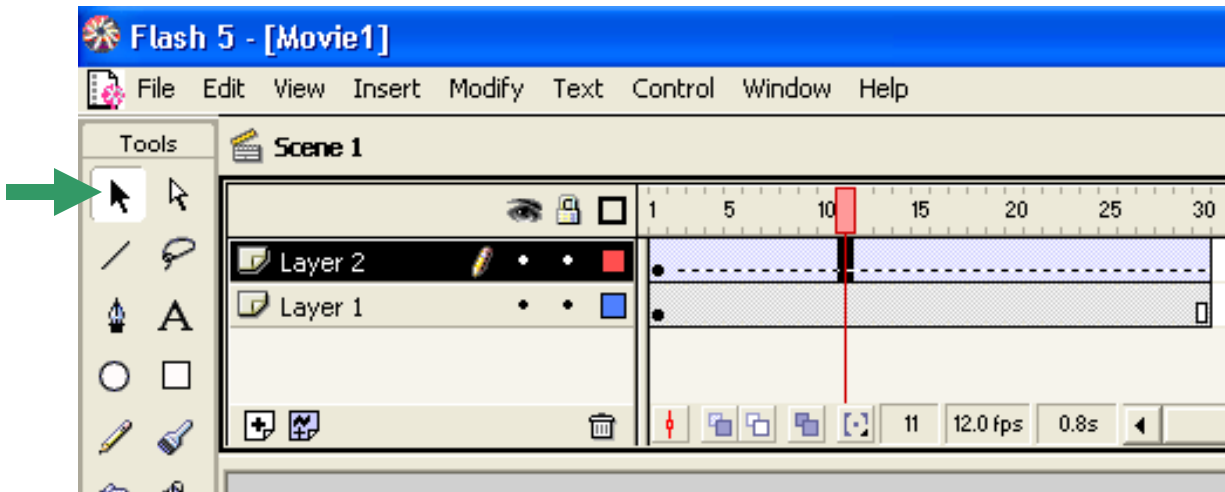
The entire workspace, which was white to begin with, is now covered with a green to black gradient.

Now our first animation is all set in its basic elements. We have the object to be animated and the background in separate layers, and the first keyframes are already drawn by you. Look at the frames section, just to the left of the layers section. There are two black dots in frame 1, corresponding to each layer. Now we need to add more frames, over which the action will take place. This is just a little bit tricky. In the frames section, you will notice numbers that go 1, 5, 10, 15, 20 and so on. These refer to frame numbers. Position the cursor below the number marked 30, in line with layer 2, and click the right button of the mouse. On the menu that pops up, click '**Insert frame**'. The screen will now look like this.

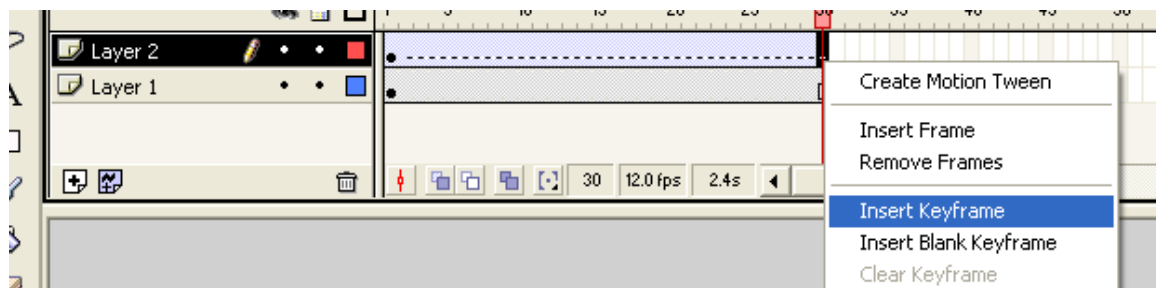


Notice that our beautiful background is nowhere to be seen. This is rectified easily. Just move the cursor to below number 30, but in line with layer 1, and 'Insert frame' like we did earlier. That restores the background.

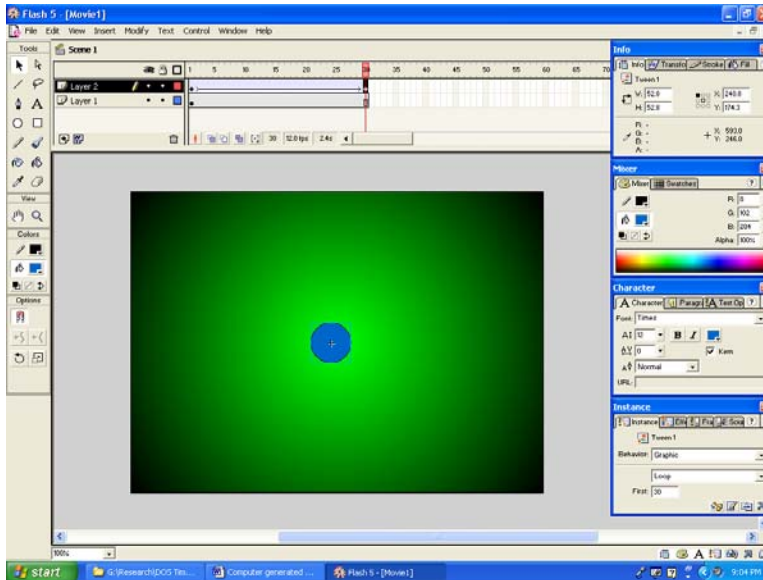
Now, once again, position the cursor somewhere between frames 1 and 30, but in layer 2, and right click. On the popup menu that appears, the topmost option reads, create motion tween. Click this. The layer 2 frames section looks like this now.



We have just instructed the computer to create a 'motion tween', which means that we have asked it to draw the intermediate frames between two keyframes. We have already drawn the first keyframe, defining the initial position of the blue ball. Now we need to insert a second keyframe, defining the final position of the ball. This is done by right clicking at frame 30 in layer 2, and then selecting 'insert keyframe', like this.



Another dot appears at that frame, signifying that we have added the second keyframe. Now pick the arrow tool (marked with a green arrow), located at the top left corner of the **Tools** palette. Using this, position the ball somewhere near the centre of the background. The screen looks like this:



Now you are ready to see the result of your animation. Press **Enter**, and watch the ball move from the top left corner of the screen to the centre.

This is a short animated film, with a very simple animation, but it illustrates the powerful processes that go into making extremely complex movements. Remember, the computer will draw the intermediate frames, but you have to provide the keyframes. Work in layers. Every separate moving object has to be in a separate layer. Once keyframes and layers are understood, you are on firm ground as far as fundamentals of animations are concerned.

If you are happy with the movie, you can export it as an .avi movie, which can be played in the windows media player, inserted into powerpoint, edited by movie editing software such as Adobe Premiere, and is generally a helpful format. It is worthwhile to note that as you export (the path is File-Export Movie), Flash offers you the option of compressing your final output. Do use compression, as it significantly reduces file size without really affecting quality.

We have just scratched the surface in so far as 2-D animation is concerned, but we have covered several important principles. We shall be conducting a workshop on Flash animation in the DOS annual meeting in April 2007, and those interested in a more practical and hands on session are invited.