Animation

➔ Animation is the process of displaying still images in a rapid sequence to create the illusion of movement.

➔ Animation is especially useful for illustrating concepts that involve movement. Concept such as playing guitar or hitting a cricket ball is difficult to explain using a text or a single photograph. Animation makes it easier to portray these aspects of multimedia application.

Steps of Animation sequence Designing

The following are the four steps of animation sequence designing

1) Animation story layout

The animation story layout or storyboard layout defines the motion sequence of the object as a set of basic events. For example, for creating a scene of cricket playing, one has to define action and motion of batting, bowling, fielding, running etc. The storyboard layout consists of models, sketches or even some verbal description.

2) Animation object definition

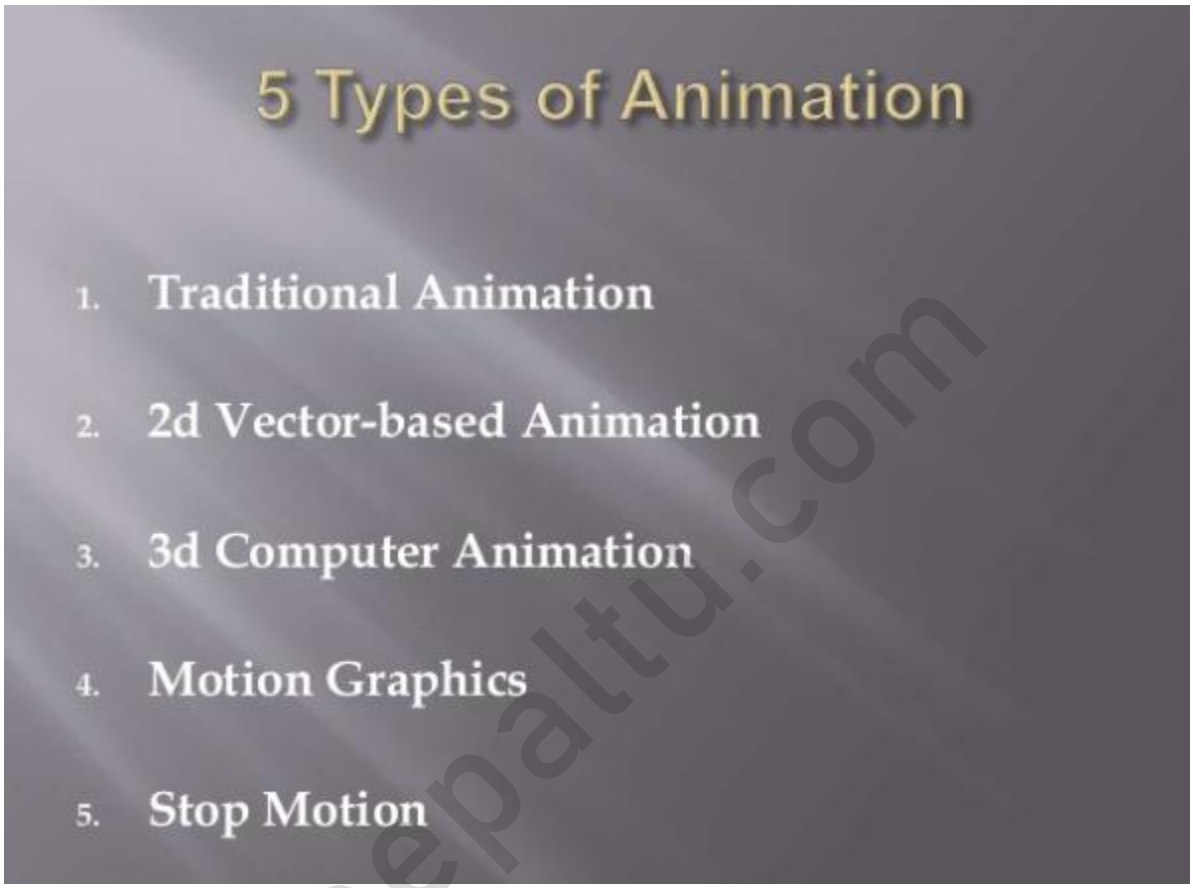
After preparing the storyboard layout, all the objects, which are used in animation scene, are defined in detail. I.e. each object is described in terms of its dimensions, shapes, colors, movements etc and any other additional information which is needed to define that object. In cricket playing scene, the player's dimensions, colors of their uniform, dimensions of the ball, bat, stamps etc are defined.

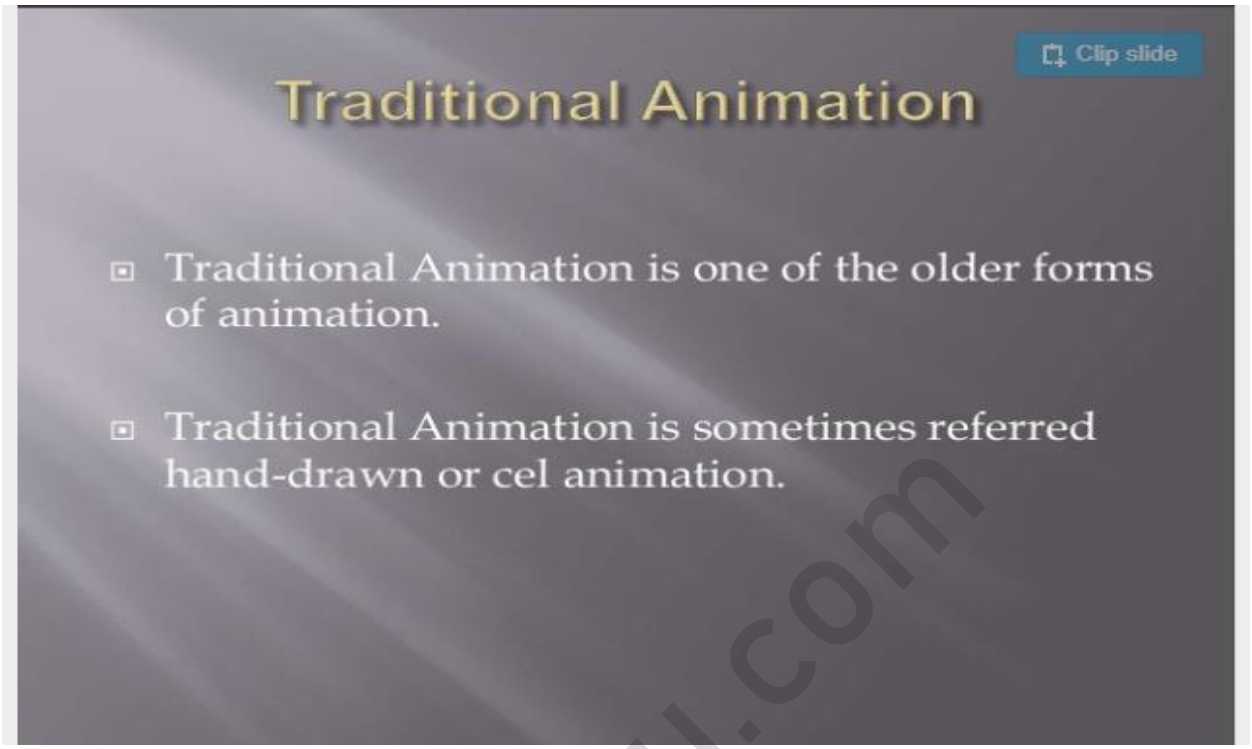
3) Frame specification

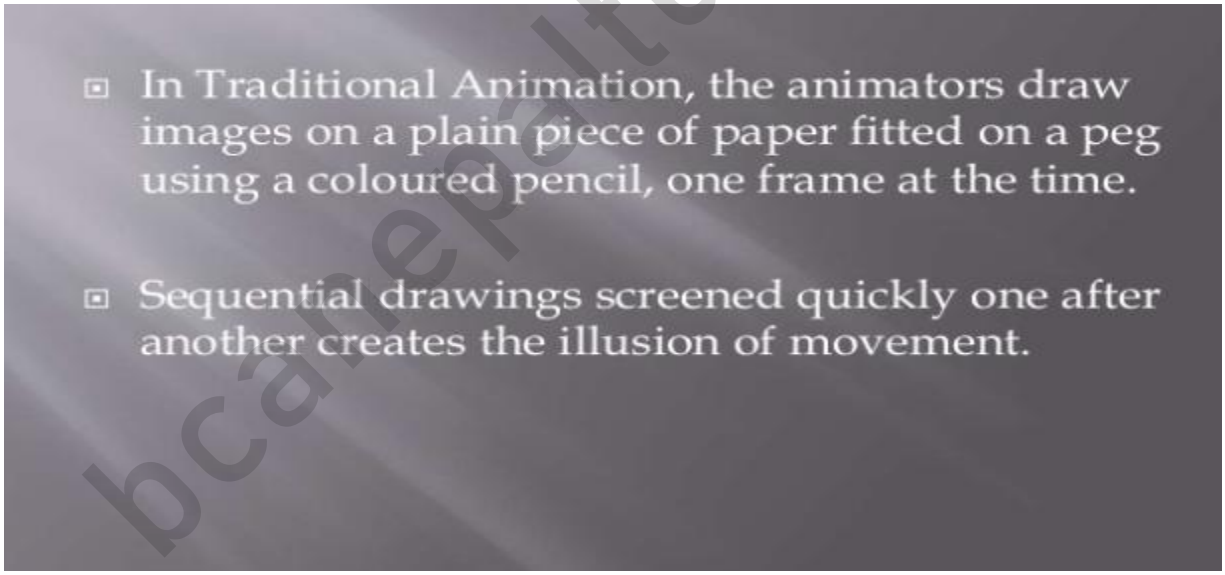
The next step in the process of creating animation is the key frame specification. Here some of the important frames are defined and created in detail. In these frames, the position, color, shapes etc of all the objects at a particular point of time in animation are created in detail.

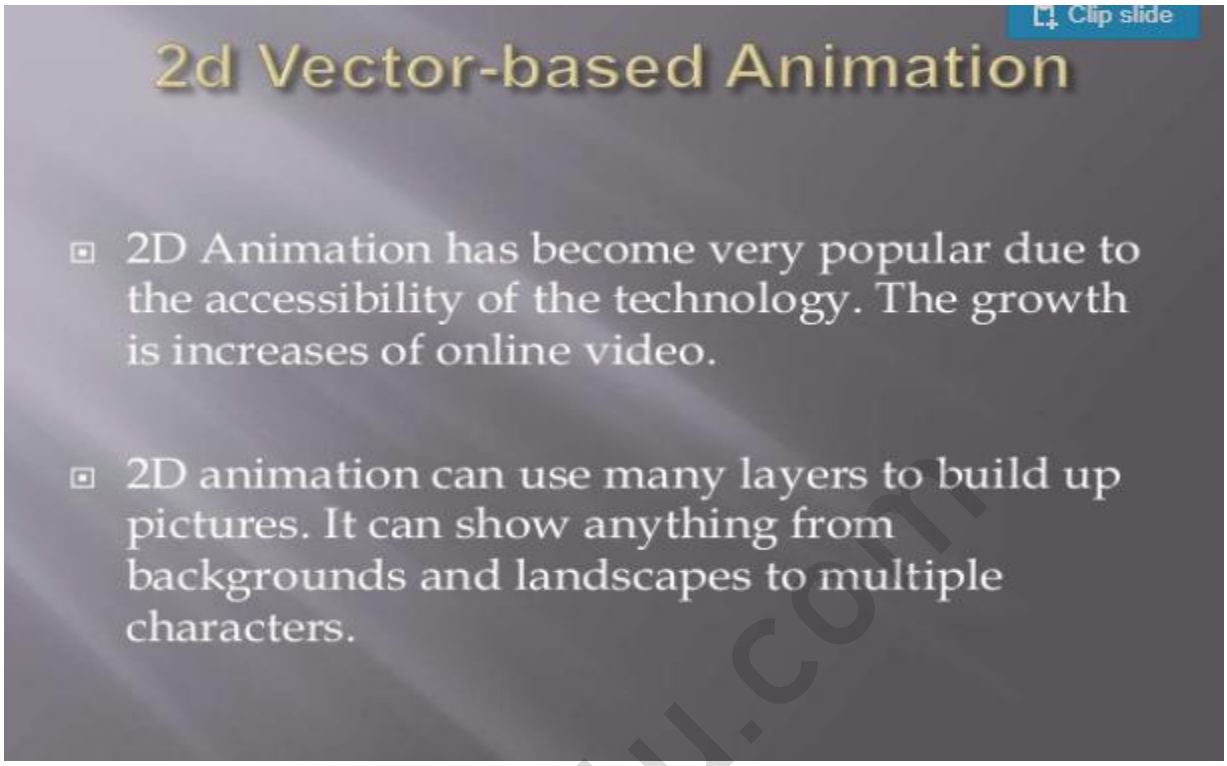
4) Generation of in-between frames

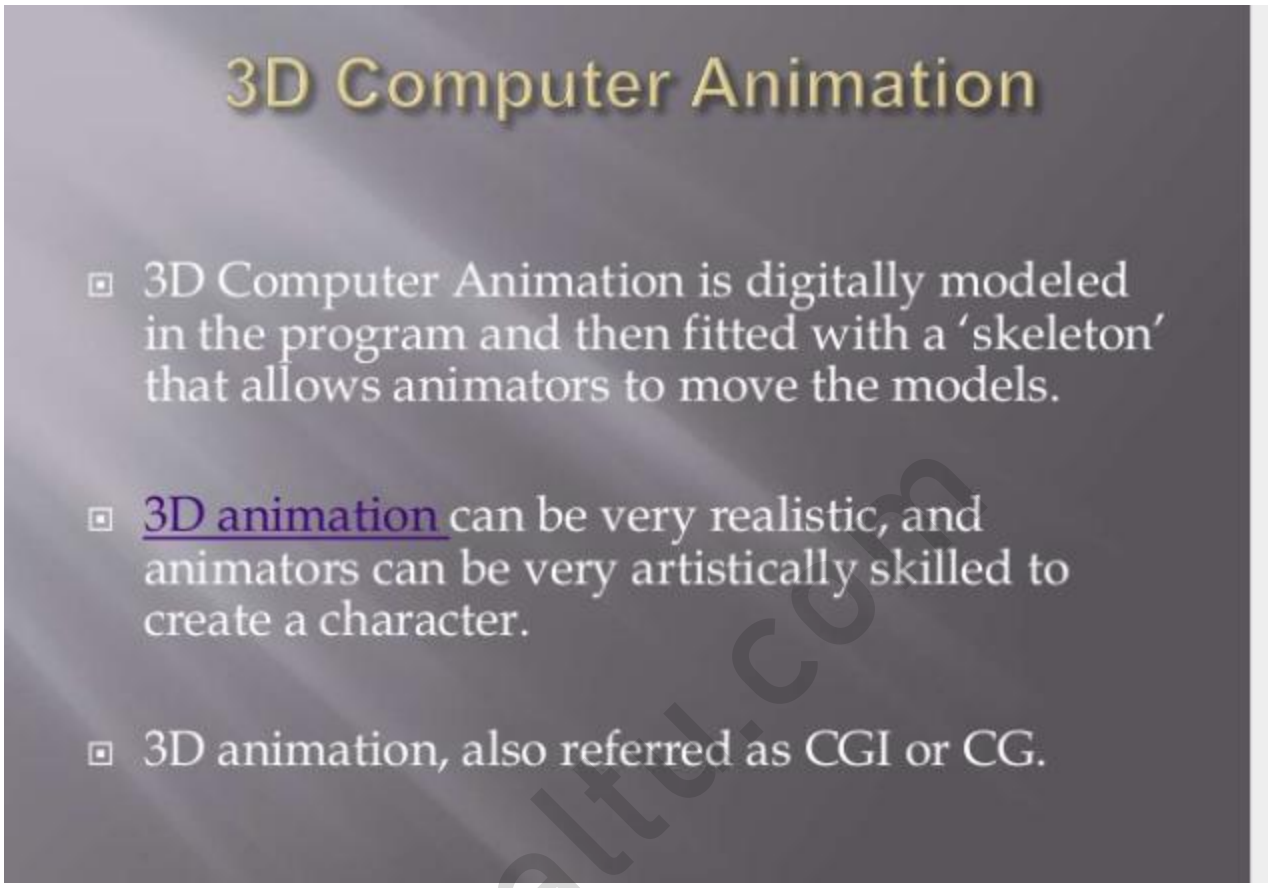
The in- between frames are then created after frame specification. These in-between frames may be created with the help of geometric transformation. Approximately 1500 frames are needed for a clip of one minute of film.

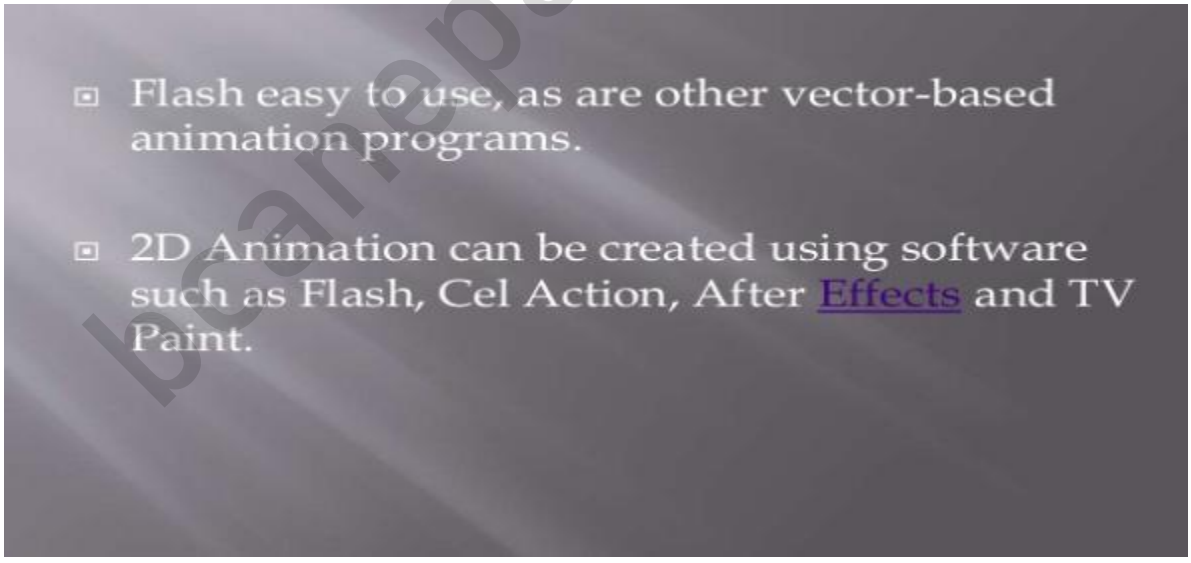












- It is made by generating images using computers.
- The series of images are the frames of an animated shot.
- In 3D Animation, they use programmes such as Maya to create animation.

Clip slide

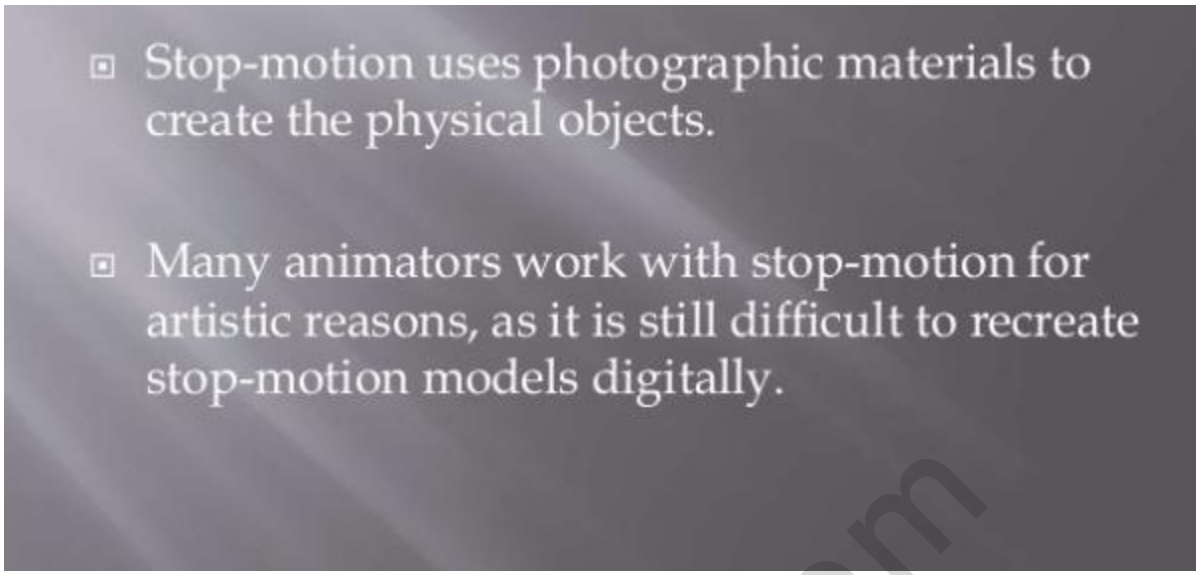
Motion Graphics

- It is the art of creatively moving graphic texts or elements, usually for commercial or promotional purposes.
- The process of creating Motion Graphics depends on different programs.

- An actor will be filmed doing actions, speaking, or even acting full scenes, while special sensors on body and face are 'captured' using a film camera.
- This is then translated into a digital character, which can be controlled by the animator.

Stop Motion

- The process of Stop Motion is done by taking a photo of an object, and then moving a little bit and then taking another picture.
- The process is repeated and when the photos are played one after another they give the illusion of movement.



BCA
Fifth Semester
Computer Graphics & Animation
Unit: #5

Prepared by :Narayan Dhamala

Introduction to Virtual Reality (VR)

- Virtual reality is an artificial reality that makes users to feel in a virtual environment by using the computer hardware and software.

OR

- Virtual reality is a computer generated, immersive (or wide field), multisensory information program which tracks a user in real time.
- VR is used in application areas like aircraft pilot training, training for surgical procedures, engineering and scientific visualization, computer games etc.

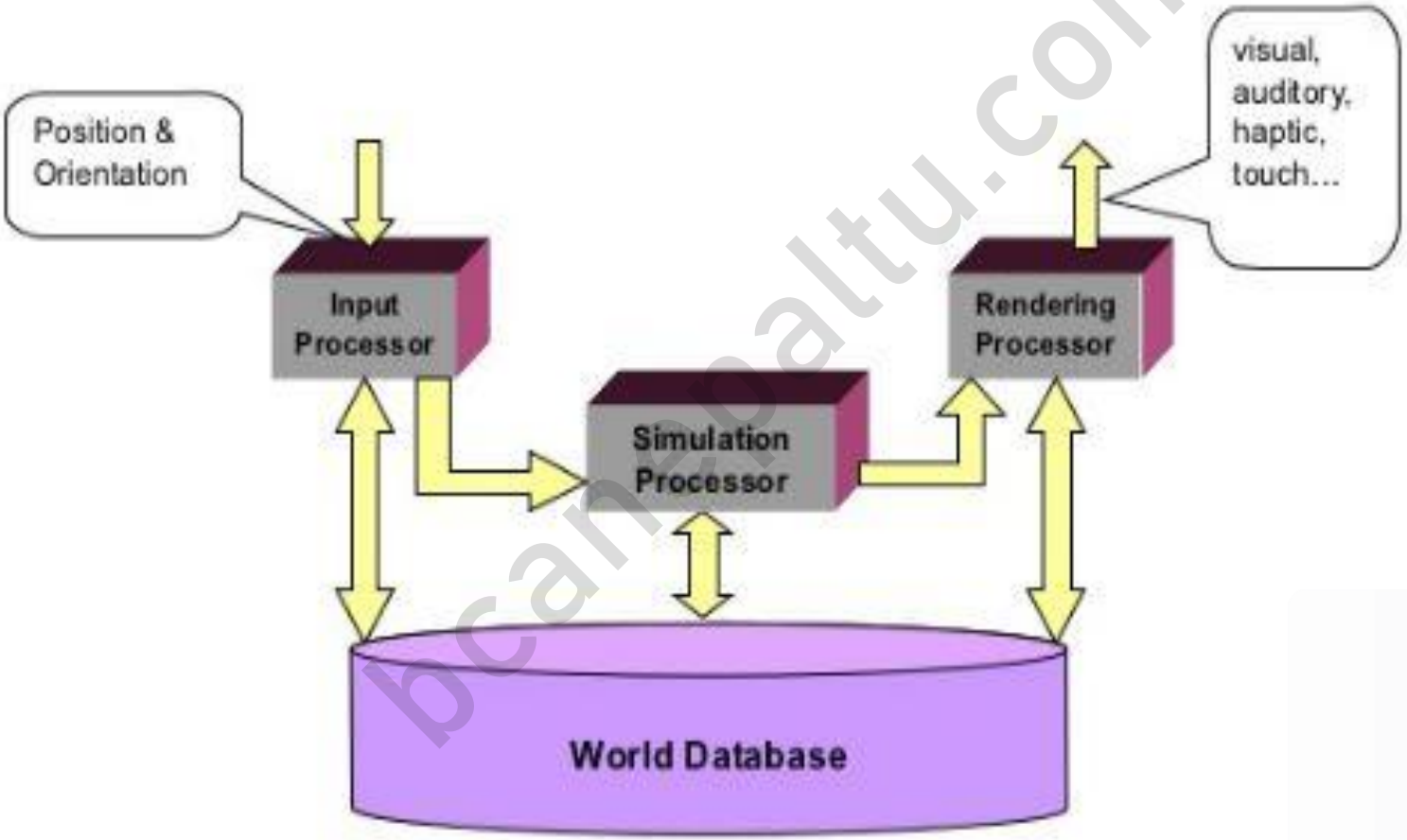
ADVANTAGES

- Interaction with the environment.
- User interface
- User can see and even feel the shaped surface under his/her fingertips.
- Flight simulators and games.
- CAD/CAE
- Biomedical Engineering the projects mentioned are use of virtual reality for viewing of X-RAY's and MRI's.
- Rendering and 3-D lighting, modeling for resource management.

DISADVANTAGES

- New technologies have also revealed new problems.
- VR in medical treatment is going through some growing pains.
- There are limitations with VR devices as well in regards to usability.
- Lack of standardization of hardware and protocols.
- Most troublesome are the side effects it can induce, like disorientation, dizziness and nausea.
- People often find navigating in 3-D spaces and performing actions in free space extremely difficult.
- Practical problems in spatial cognition research

Architecture of VR System



Components of VR System

- **Input Processor**
- Controls the devices used to input information to the computer.
- The objective of input processor is to get the coordinate data and provide to the rest of the system with minimum time.
- Example of input processor are: Mouse, Keyboard, 3D position trackers, a voice recognition system etc..

Components of VR System Contd..

- **Simulation Processor**
  - Simulation processor is the core component of VR system.
  - It takes the user input along with any task programmed into the world and determine the action that will take place in the virtual world.
- **Rendering Processor**
  - Rendering processor creates the sensations that are output to the user.
  - The separate rendering processor are used for visual, auditory, haptic and other sensory systems.
  - Each rendering processor take a description of the world from the simulation processor or derive it directly from the world database for each time step.

Components of VR System Contd..

- **World Database**
  - The world database store the objects that exist in the world and scripts that describes the actions of those objects.

Types of Virtual Reality

- VR system can be classified into 3 major categories based on the important feature of the VR, which is immersion or type of interfaces or components utilized in the system. Which are as follows:

1. **Non-Immersive**

- Non-immersive VR system is also called Desktop VR system, fish tank or window on world system.
- Non-immersive VR system is least immersive and least expensive of the VR systems, as it requires the least sophisticated components.
- It allows user to interact with a 3D environment through a stereo display monitor and glasses.

Types of Virtual Reality Contd..

2. Immersive

- Immersive VR system is most expensive and gives the highest level of immersion.
- It's component includes HMD(Head Mounted Display), tracking devices, data gloves and others, which encompasses the user with computer generated 3D animation that gives the user the feeling of the part of the virtual environment.

3. Semi-Immersive

- Semi-immersive VR system provides high level of immersion, while keeping the simplicity of the desktop VR system or utilizing some physical model.
- Example of such system includes: CAVE (Cave Automatic Virtual Environment) and an application is the driving simulator.

APPLICATIONS

END

BCA
Fifth Semester
Computer Graphics and Animation
Unit: #5

Prepared by :Narayan Dhamala

Introduction to Flash Interface

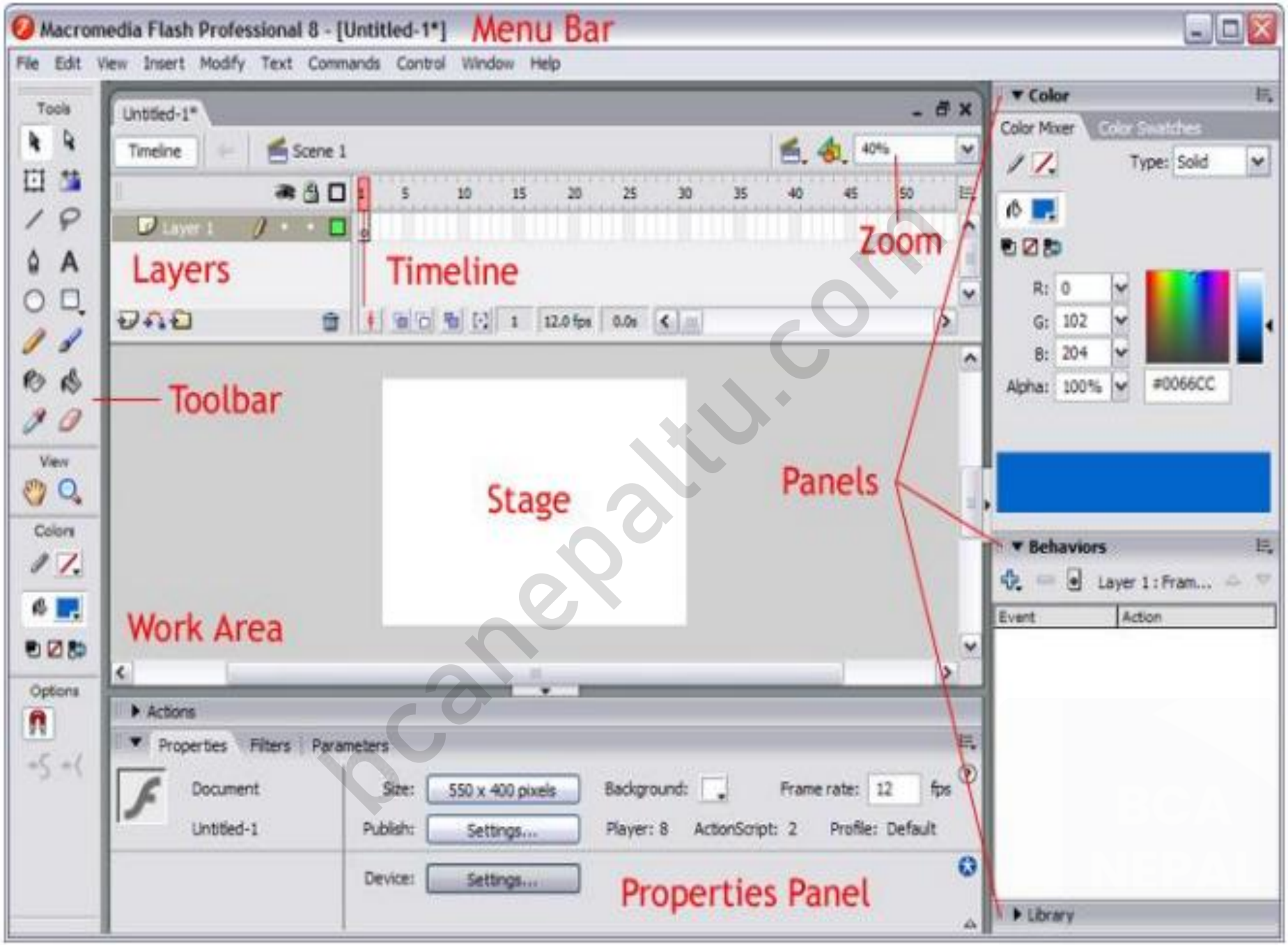
- A flash is a vector animation software, originally designed to create animation for display on web pages. Vector graphics are ideal for web because they are so lightweight.
- Flash uses vector graphics, which means that the graphics can be scaled to any size without losing clarity/quality.
- Flash is a multimedia graphics program specially for use on the web.
- Flash enables to create interactive “movies” on the web.

Advantages of using Flash Interface

- Flash does not require programming skills and is easy to learn.
- Flash movies load faster and save download time because flash is vector based.
- Flash intelligently caches it's movies so they don't have to be reloaded.
- Flash gives the user a more responsive 'rich-client' like experience.
- Flash allows interactivity.

Flash Work Environment

- **Stage:** The rectangular area where the movie plays.
- **Timeline:** Where graphics are animated over time.
- **Symbols:** The re-useable media assets of a movie.
- **Library Window:** Where symbols are organized.
- **Movie Explorer:** Which gives an overview of a movie and it's structure.
- **Floating, Dockable Panels:** Which enables to modify various elements in the movie and configure the flash authoring environment to best suit workflow.



Setting Stage Dimension

- Stage is the rectangular area where we compose the content for individual frames in the movie, draw artwork on it directly or rearrange imported artwork.

OR

- Stage is the visible area of the movie where we place graphics and build animation.
- The stage reflects the actual size of the movie we create when it is published.

Steps for Setting Stage Dimension

- Goto location where you install flash and double click on flash application.
- Create new flash document by clicking on File > New and on the General tab, select Flash Document.
- Goto properties by pressing Ctrl+F3 (or click windows menu and choose properties)
- Now, Change the stage dimension like: size, background color and frame rate .

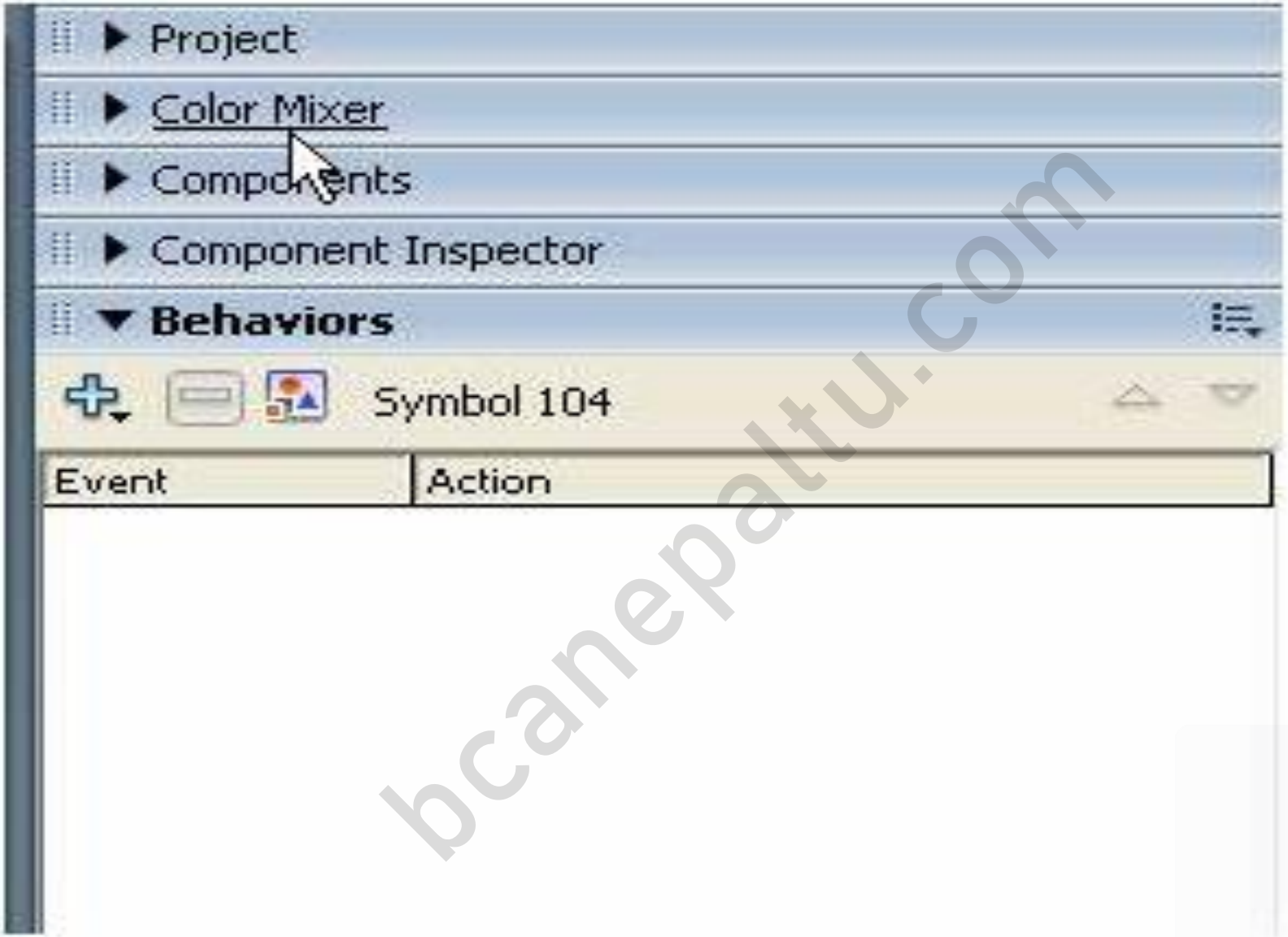
Flash Panels

Panels generally appear in two places in the Flash window: vertically, along the right side, and horizontally, at the bottom of the window. Flash includes a large number of panels, many of which don't appear by default; you can access these from the **Window** menu.

Panels display information about your movie, or about selected objects in the movie, and let you define properties and add ActionScript to control the Timeline. Some panels, like the **Project** panel and the **Library** panel, help you keep your work organized. For example, the **Library** panel contains "symbols" of objects that you can place on the Stage. Each time you drag a symbol from the library to the Stage, you create a new instance of that symbol. In this way, Flash promotes both efficiency and reusability.

You'll frequently only use a few panels at a time, and these panels will vary depending on the tasks you're performing. Some of the most common panels, which you'll see in this tutorial, are the **Color Mixer** panel, the **Behaviors** panel, the **Library** panel, the **Properties** panel (also referred to as the Property Inspector), and the **Actions** panel.

Panels can be expanded or collapsed, and floated or docked, much like toolbars. To expand a panel, simply click on its name:



Some Common Types of Panels are

The **Timeline Panel** is where you will control every object's animation using frames and Keyframes. You will learn more about Keyframes in the animation tutorial. In the Timeline, you are able to layer objects as you would in Adobe Photoshop. This allows for easier control and modification of your objects.

The **Tools Panel** is very similar the Tools panel in Adobe Photoshop. Tools include selection (move), free transform (scale, rotate), line, lasso, magic wand, shape, fill, gradient, erase, pencil, pen, brush and more.

The **Library Panel** is where Flash will store all of your imported items, graphics, motion tweens, audio, video and symbols. Flash also has "Common Libraries" with useful buttons, Actionscript programming classes and "learning interactions".

The **Canvas** is where you will place all of your viewable objects. If an object is on the stage, you will be able to see it in your movie. It is not recommended that you place objects outside of the stage because these could sometimes be seen as well.

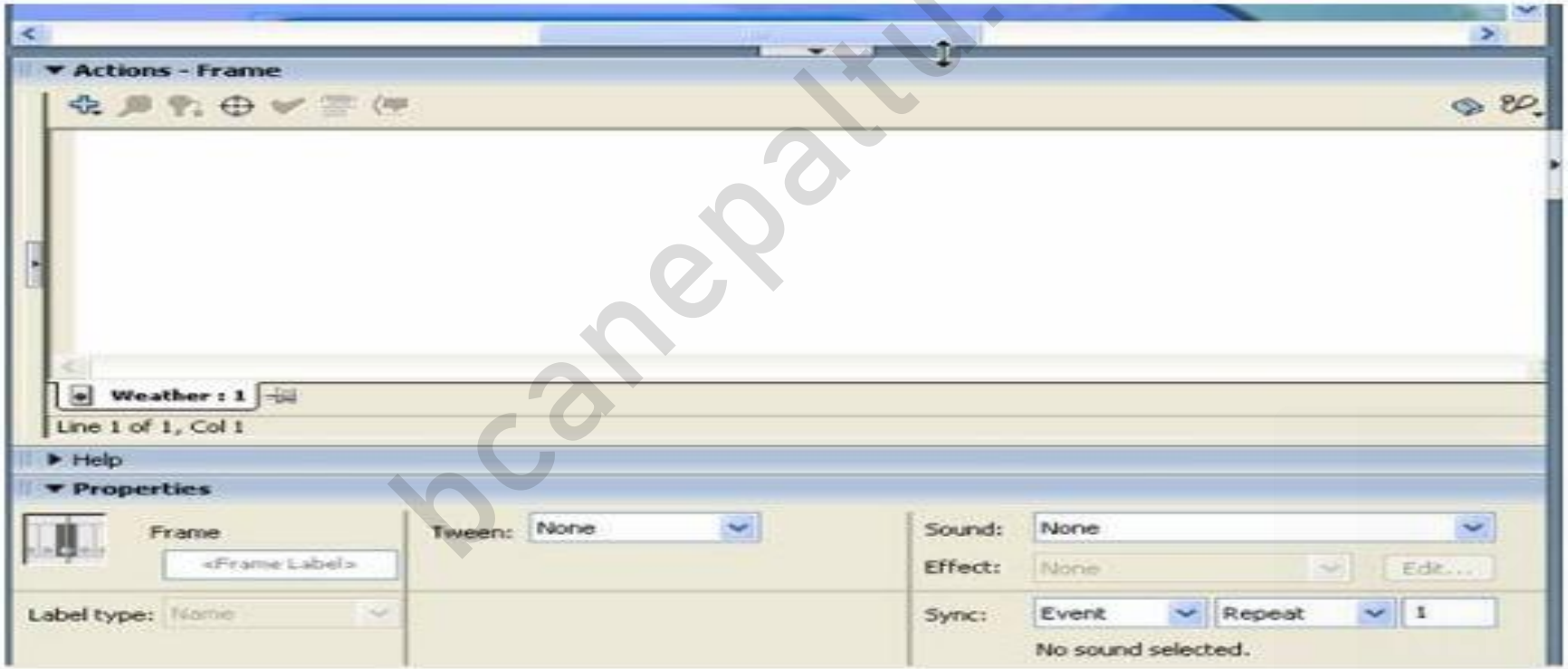
The **Properties Panel** is where you will control and select options. The properties will change depending on what you are currently selecting. In the screenshot, the properties displayed include stage size, background color and frames per second. If you were to create text, all of your font options would be here.

To collapse the panel, click its name again.

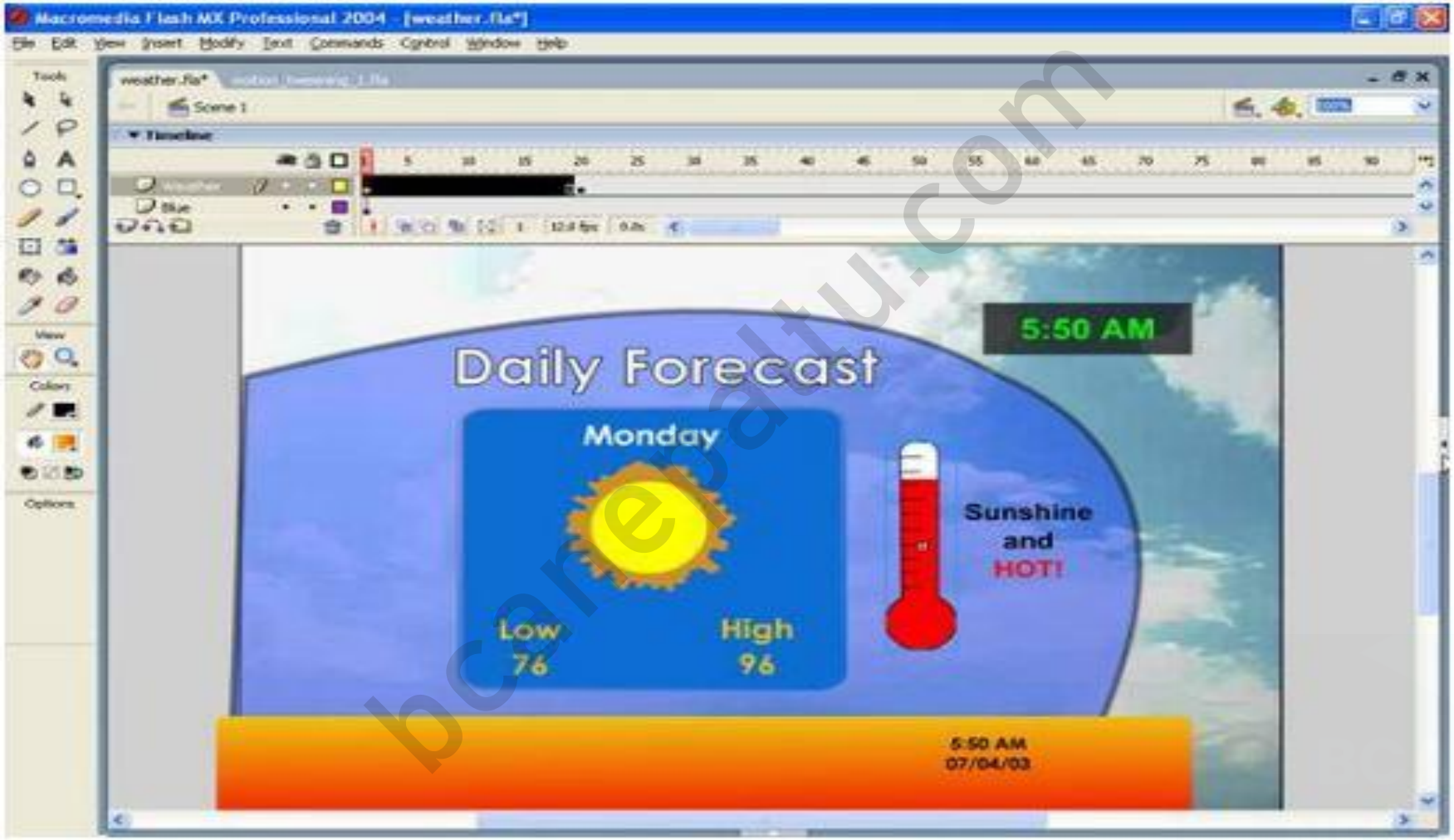
To float a panel, click on the gripper at the edge of the panel's title bar and drag it away from the rest of the panels:

You can also drag a panel from the vertical group to the horizontal group, and vice versa.

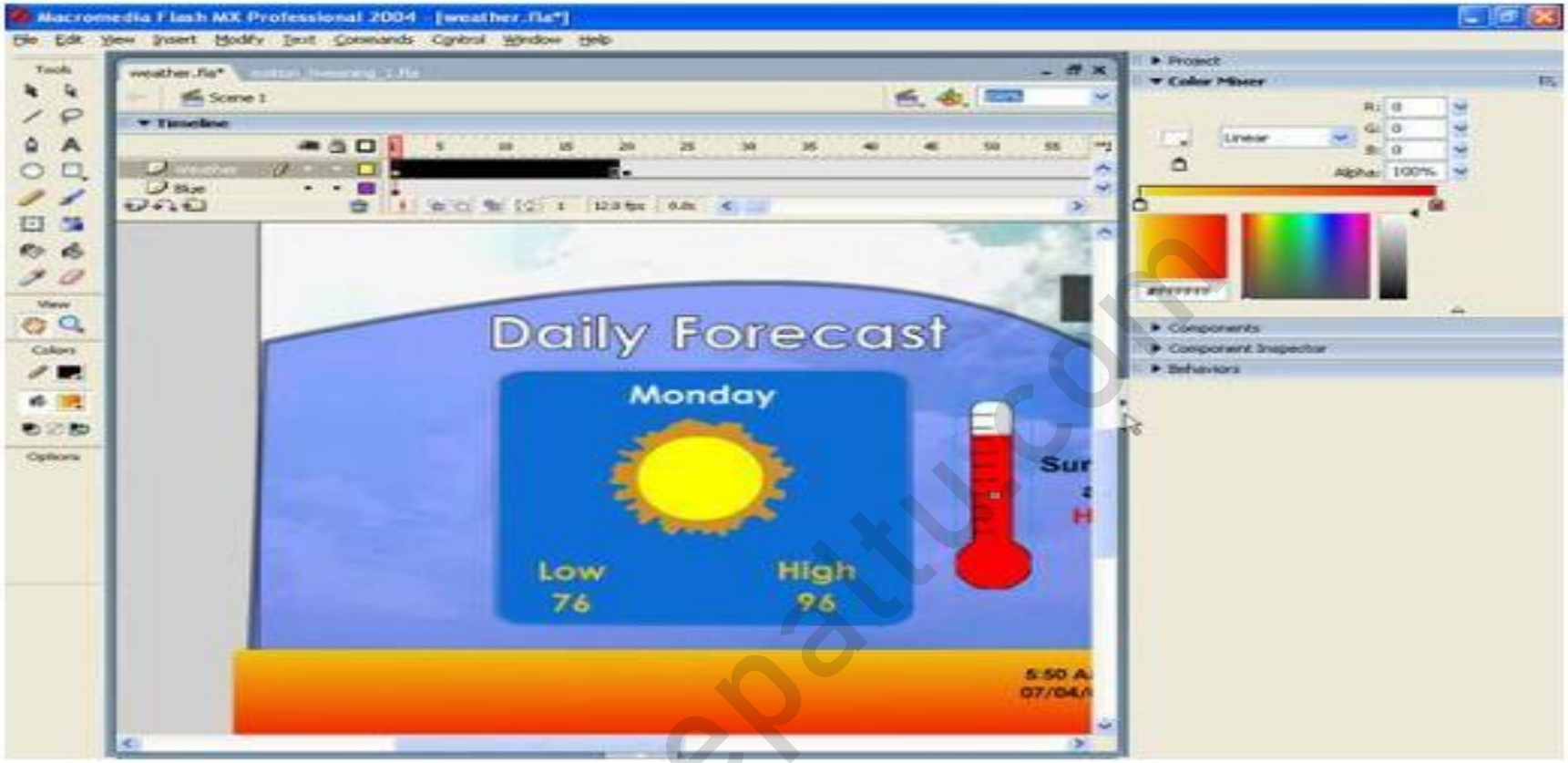
Panels can be resized by clicking and dragging their outer edges:



When you need the screen space, you can slide the panels off-screen by clicking the grey arrow button located just to the left of the vertical panels, or just above the horizontal panels:



To display the panels, click the button again:



One of the panels you'll use most frequently is the Property Inspector, which is located in the panel group at the bottom of the Flash window:

The Property Inspector is used to define the properties of the selected object.

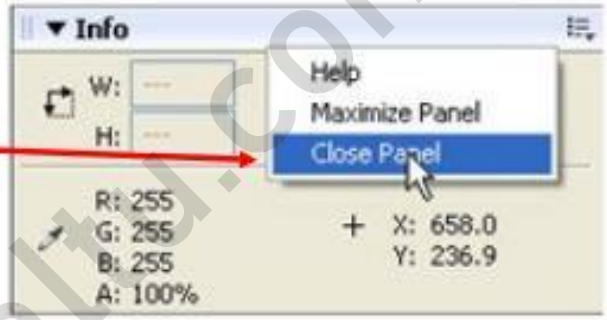
The Property Inspector is used to define the properties of the selected object.

Finally, some panels have an **Options**  button located at the upper-right corner. Clicking this button opens a menu of additional options for that panel.

As you become accustomed to performing different tasks in Flash, you'll probably devise several different comfortable arrangements of panels. You can save a custom panel set for reuse by selecting **Save Panel Layout** from the **Window** menu. When you save a panel layout, it becomes available in the **Panel Sets** submenu of the **Window** menu.

Examples of manipulating panels

This figure shows how to close an open panel by selecting the Close Panels option from the Options menu.



You can dock an undocked panel by clicking the grip on the left of the panel title and dragging the panel to the desired location.

You can collapse a panel to provide more visible work area by clicking the panel's title bar.

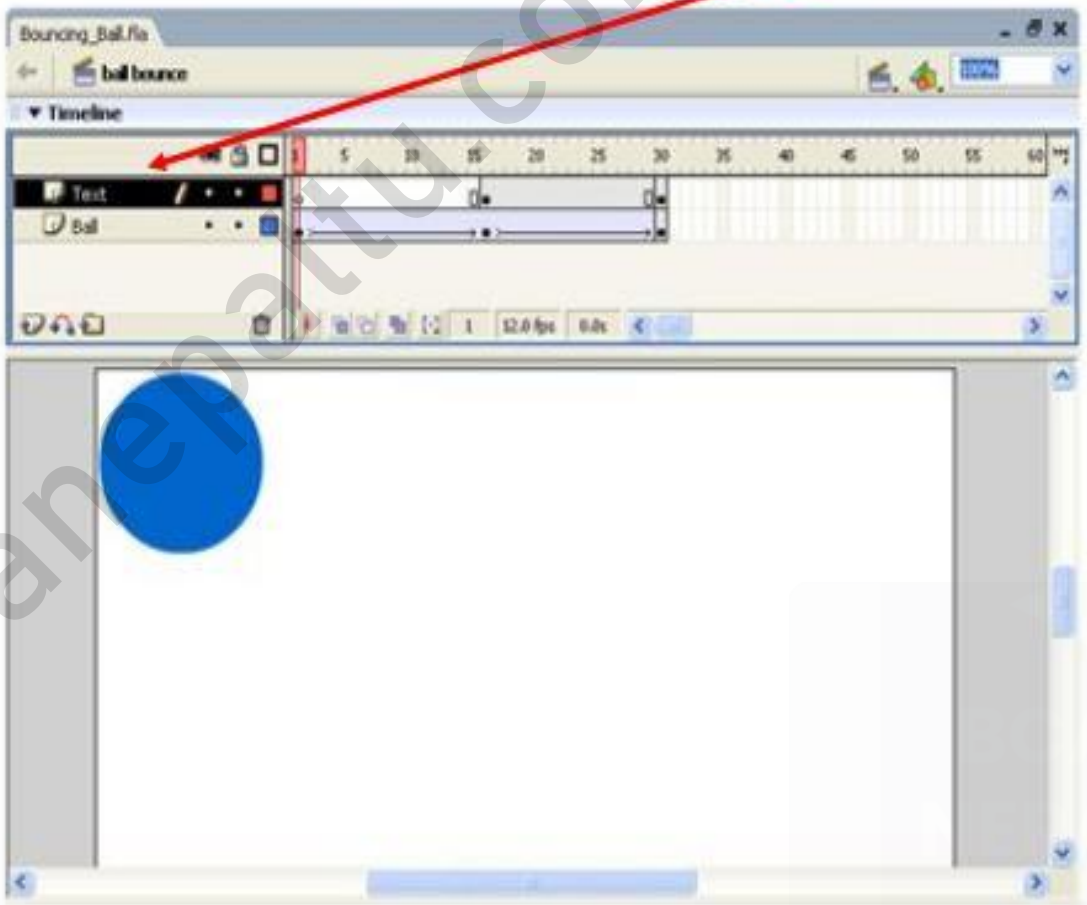
Working with layers

- The Timeline contains a layers section where you can organize your objects, artwork, and animation.
- Layers are like transparent sheets placed one on top of the other.
- Layers can be turned on or off to make them visible or invisible.
- Frames and layers interact on the Stage, and that interaction can be controlled via the Timeline.

An animation with two layers

This figure shows a Flash document that contains two layers, Text and Ball.

The animation can be played by clicking the Control menu, then Play.



Using layers

Layers are like transparent sheets of acetate stacked on top of each other. Layers help you organize the artwork in your document. You can draw and edit objects on one layer without affecting objects on another layer. Where there is nothing on a layer, you can see through it to the layers below.

To draw, paint, or otherwise modify a layer or folder, you select the layer to make it active. A pencil icon next to a layer or folder name indicates that the layer or folder is active. Only one layer can be active at a time (although more than one layer can be selected at a time).

When you create a new Flash document, it contains one layer. You can add more layers to organize the artwork, animation, and other elements in your document. The number of layers you can create is limited only by your computer's memory, and layers do not increase the file size of your published SWF file. You can hide, lock, or rearrange layers.

You can also organize and manage layers by creating layer folders and placing layers in them. You can expand or collapse layers in the Timeline without affecting what you see on the Stage. It's a good idea to use separate layers or folders for sound files, actions, frame labels, and frame comments. This helps you find these items quickly when you need to edit them.

Creating layers and layer folders

When you create a new layer or folder, it appears above the selected layer. A newly added layer becomes the active layer.

To create a layer, do one of the following:

- Click the Insert Layer button at the bottom of the Timeline.
- Select Insert > Timeline > Layer.
- Right-click (Windows) or Control-click (Macintosh) a layer name in the Timeline and select Insert Layer from the context menu.

To create a layer folder, do one of the following:

- Select a layer or folder in the Timeline, then select Insert > Timeline > Layer Folder.
- Right-click (Windows) or Control-click (Macintosh) a layer name in the Timeline, then select Insert Folder from the context menu.

  The new folder appears above the layer or folder you selected.

Viewing layers and layer folders

As you work, you may want to show or hide layers or folders. A red X next to the name of a layer or folder indicates that it is hidden. When you publish a Flash SWF file, any layers that were hidden in the FLA document are preserved and visible in the SWF file.

To help you distinguish which layer an object belongs to, you can display all objects on a layer as colored outlines. You can change the outline color used by each layer.

You can change the height of layers in the Timeline in order to display more information (such as sound waveforms) in the Timeline. You can also change the number of layers displayed in the Timeline.

To show or hide a layer or folder, do one of the following:

- Click in the Eye column to the right of the layer or folder name in the Timeline to hide that layer or folder. Click in it again to show the layer or folder.
- Click the eye icon to hide all the layers and folders. Click it again to show all layers and folders.
- Drag through the Eye column to show or hide multiple layers or folders.
- Alt-click (Windows) or Option-click (Macintosh) in the Eye column to the right of a layer or folder name to hide all other layers and folders. Alt-click or Option-click it again to show all layers and folders.

Editing layers and layer folders

You can rename, copy, and delete layers and folders. You can also lock layers and folders to prevent them from being edited.

By default, new layers are named by the order in which they are created: Layer 1, Layer 2, and so on. You can rename layers to better reflect their contents.

To select a layer or folder, do one of the following:

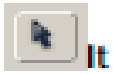
- Click the name of a layer or folder in the Timeline.
- Click a frame in the Timeline of the layer you want to select.
- Select an object on the Stage that is located on the layer you want to select.

Views

- Apart from, typical Zooms, it allows you to move the frames and scenes.
- View also includes the possibility to create a grid and some guides.
- These ones can be selected from submenu Grid and Guides from where you can configure its options.

Toolbar, Basic Tools

The **Tools Bar** contains all necessary Tools for the drawing. Let's see which of them are the most important and how they are used:

Selection (arrow) Tool:  It is the most used tool among all. Its main use is to select objects, it allows selecting the borders of the objects, the fillings (with only one click), the borders (with double click), zones on our choice... Moreover, its adequate use can save time of our work.

Line Tool:  It allows creating straight lines in a quick way. The lines are created as in any program of drawing. Click and drag to show up a straight line until the desired end point. Once created, the line can be modified just by placing the cursor near the line: above of the extremes for dragging them, and in any other part near the straight line to curve it.

Text Tool:  It creates a text in the place where we click. Its properties will be shown in the next theme.

Oval Tool:  The **Oval Tool** enables drawing circles or ellipses in a fast and simple way.

Rectangle Tool:  Its handling is identical to the Oval Tool, they only differ in the objects they create.

Pencil Tool:  It allows drawing lines, after being drawn you will be able to edit its shape as you like. The color applied by this Tool can be modified from the **Color Mixer Panel** or from the subpanel **Colors** that is in the **Tool Bar**.

Brush Tool:  Its functionality is equivalent to the pencil, but its stroke is much thicker. It is usually used for fills. We can modify its thickness and stroke shape.

Paint Bucket Tool:  It lets you apply fillings to the created objects. Many other programs of drawing don't allow to apply fillings if a border doesn't limit the zone, it does. The color applied by this Tool can be modified from the **Colors Mixer Panel** or from the subpanel **Colors** that are in the **Tool Bar**.

Eraser Tool:  It works like the Brush Tool. Nevertheless its function is to erase everything what "it draws".

Tools Bar ,Advanced Tools

Lasso Tool:  Its function is complementary to the **Arrow Tool**, since it can select any object in a free way (the Arrow Tool can only select objects or rectangular or square zones). In counterpart, the **Lasso Tool** can't select fillings nor objects (if we don't make the selection by hand).

By selecting this Tool, the following images appear on the Options Panel:  This is the **Magic Wand Tool**, which is so popular in other programs. It lets you make selections according to the objects color. The third option you have is the following:  It allows you to select polygon shapes.

Pen Tool:  creates polygons (and moreover straight lines, rectangles...) in a simple way. Many people find this tool to be complicated, although it's one of the most powerful tools that Flash provides. Its use consists in clicking on the places that we want to define as vertices of the polygons. In order to create curves, indicate the anchor points, which limit curvature, and then drag the tangent on them.

Sub selection Tool:  This Tool complements the **Pen Tool**, as far as it lets us move or adjust the vertices that make up the objects created by the above mentioned tool.

Ink Bottle Tool:  It is used to change quickly the color of a stroke. It is applied to objects with borders, changes the color of the boundary with one click in the **Colors Mixer Panel.**

Eyedroppers Tool:  Its mission is to "Capture" colors to use them afterwards.

Drawing and Modifying Shapes

- Using Tools panel, draw any shape you would like to make.
- Select the object you draw by using selection tool.
- Click on modify submenu from the menu bar.
- Go to **transform** option and choose any operation: Scale, rotate, flip etc..) you would like to modify.
- Finally the shape is modified.

Bitmap Images and Sounds

- Firstly, import image to stage (by clicking File->Import-> import to stage and choosing image from drive location) and rename layer1 to image.
- Secondly, import sounds to library (by clicking File->Import-> import to library and choosing sound from drive location) .
- Insert a new layer, named sound.
- Drag the frame1 to any frame number(say frame30) and right click on frame 30 and click insert keyframe.
- Goto properties and add sound that you have selected from the desired drive location.
- Click on control submenu and then play option (or Test movie option).

Types of Animation in Flash (Macromedia mx 2004)

- Macromedia flash provides several ways to create animation and special effects.
- Each method provides different possibilities for creating engaging animated content.
- The most common types of animation are

1) Frame by Frame animation
2) Shape Tween
3) Motion Tween

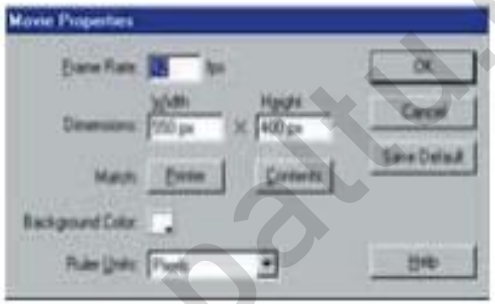
Frame by Frame Animation

- Frame by frame animation is a technique that creates the illusion of movement by making incremental changes between every keyframe.
- It increases the size of file rapidly because animate has to store the contents of each keyframe.
- This technique is useful for complex animation where the graphic elements of each frame must be different.

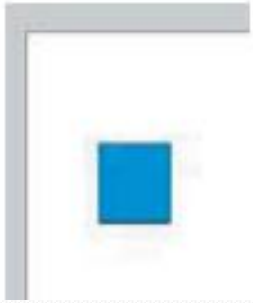
Steps for Creating Frame by Frame Animation

1. Create a new Flash document.

2. Open the Modify -> Movie dialog box. For this exercise, select a width and height of 300x300 pixels. Leave everything else the way it is.



3. In the timeline, select Frame 1 on layer 1 and then draw a square box on the stage. Fill it with a color you like using the Paint Bucket Tool.



Steps for Creating Frame by Frame Animation Contd..

4. **Next, select frame 2 and insert a new keyframe via the shortcut menu, or by pressing F6.**

   Notice how the playhead (the red bar on the top row of the timeline) moves to frame 2, indicating that frame 2 is now the active frame.

5. **Select the box you just drew and move it a few pixels to the right.**

6. **Repeat this process for frames 3 through to 5.**

7. **Now, at frame 6, insert a new keyframe, and move the square a few pixels down. Repeat this process for frames 7 through 10.**

   At this point, you've created your first animation sequence - you just don't know it yet.

8. **Select Control -> Play, or press the Enter key.**

   Flash will play the animation clip for you by displaying each frame in succession. Note that you can loop the clip via the Control -> Loop Playback command.

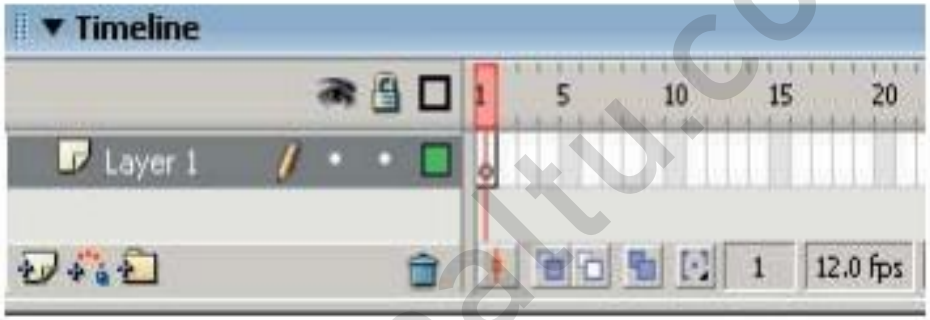
Shape Tween

- In shape tweening, we can draw a shape at one specific frame in the Timeline, and change that shape or draw another shape at another specific frame.
- Animate then interpolates the intermediate shapes for the frames in between, creating the animation of one shape morphing into another.
- It is also possible to tween the position and color of the shapes with in a shape tween.

Steps for Creating Shape Tween

1. **Open a new flash file.**

   The Timeline window displays a single Layer called "Layer1".



2. **Select the first frame in Layer 1. Go to the stage and draw a circle.**

   This is going to be your initial object.

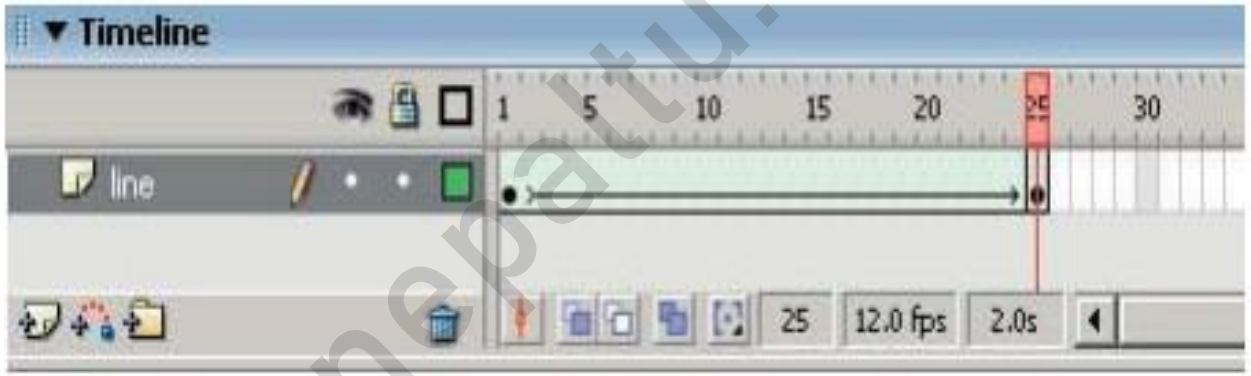
3. **Select frame 25 and insert a blank keyframe (F7).**

4. **Still keeping playhead on frame 25, draw a polygon on the stage using the Polystar tool. Change the fill color of the polygon.**

Steps for Creating Shape Tween Contd…

5. Select any frame between, 2 to 24 and select Shape from the tween drop-down menu in the Property inspector.

   Now your Layer will look something like the one shown below.



6. Play your movie to view your motion tween.

7. Close the file.

Motion Tween

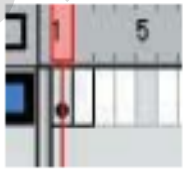
- Motion tween is used to animate the motion of an object which will automatically move the object from the beginning location to ending location.
- Motion tweens are useful for animation that consists of continuous motion or transformation of an object.
- Motion tweens appear in the Timeline as a contiguous span of frames that can be selected as a single object by default.
- Motion tweens are powerful and simple to create.

Steps for Creating Motion Tween

1. **Create a new Flash document.**

2. **Use the Oval tool to draw a simple ellipse and fill it with your favorite color.**

Notice that Flash automatically adds a keyframe at frame 1 when you create the ellipse.



3. **Convert the ellipse to a graphic symbol by selecting Modify -> Convert to Symbol, or by pressing F8. Make sure that the Graphic radio button is selected, and name the symbol Oval and click OK.**

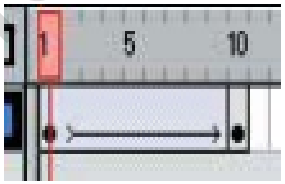
Steps for Creating Motion Tween Contd…

4. Click on frame 10 and insert a new keyframe

5. Move the ellipse to a new location on the Stage.

6. Click on frame 1 in the timeline. In the Properties Inspector, select "Motion" in the tween drop-down menu.

   The area between frames 1 and 10 should fill up with a light blue color and a solid arrow - this indicates a motion tween.



7. Play the animation - your ellipse should move smoothly from its original location to the new location you specified.

END