

School of Computing  
National University of Singapore

CS5245 Vision and Graphics for Special Effects

Lab 3: Animation with Maya

**Objective:**

- Learn to use Maya to animate a 3D model.

**Notes:**

- Follow the guided exercise below.
- Once you have completed the exercise, show your results to the Teaching Assistant for grading.
- Refer to [maya.pdf](#) for various Maya tools and keyboard shortcuts. This file is available in [animation-demo.zip](#) in [www.comp.nus.edu.sg/~cs5245/labs.html](http://www.comp.nus.edu.sg/~cs5245/labs.html).

**Notations:**

- **BoldFace** for Maya tools.
- Underline for user files and object names.

**Procedure:**

1. Create new project.  
Run Maya. Create a new project folder using **File** → **Project** → **New**. In the **New Project** window, give a folder name under drive D. Then, click **Use Defaults** followed by **Accept**.
2. Download demo files.  
Now, if you look into the project folder that you have created, you should see many sub-folders, one of which is called **scenes**. Download [animation-demo.zip](#) from [www.comp.nus.edu.sg/~cs5245/labs.html](http://www.comp.nus.edu.sg/~cs5245/labs.html) and unzip the following files into the **scenes** folder: `plane.ma`, `pskeleton.ma`, `curve.ma`.
3. Import 3D model.  
In Maya, import 3D Model [plane.ma](#) using **File** → **Import**. The 3D model airplane is quite large. You can zoom out to view the whole 3D model (see attached [maya.pdf](#) for keyboard shortcuts).
4. Import partial skeleton.  
Import partial skeleton `pskeleton.ma` using **File** → **Import**. Next, open the **Outliner** and click **PlaneRootJoint** to highlight the partial skeleton built for the airplane model.
5. Complete the skeleton.  
Go to **Animation Menuset** and click **Skeleton** → **Joint Tool**. Add a new bone to the wing of the airplane model as follows:

- Click on an existing joint (displayed as a sphere) in the skeleton at which you want to add a new bone. You may need to zoom in to see the joints more clearly.
- Click some other position in the model where you want to place a new joint. A new bone is created that links the two joints. Then, press enter to complete the addition of the new bone.

Repeat this process to add another bone to the other wing of the airplane model. Now, you can click PlaneRootJoint again to display the complete skeleton.

6. Bind skeleton to skin.

In **Outliner**, select PlaneRootJoint and control-select Plane. Now go to **Animation Menuset** and click **Skin** → **Bind Skin** → **Smooth Bind**. This will bind the skeleton to the skin (i.e., polygonal model of the plane). After binding, if you rotate any joint in skeleton, the corresponding polygons of the airplane model will move accordingly.

7. Save completed skeleton.


At this stage, you may save the 3D model with complete skeleton into a separate file using **File** → **Save Scene As**.

8. Set number of frames in animation.


Increase the number of frames from the default of 24 to 360 (or other numbers of your choice).

This is done by clicking the preference icon  at the bottom right of the Maya window. Then, change the number of frames in the **Playback Start/End** fields. The timeline settings should be similar to those shown in figure 1. Click **Save** to complete the setting.

9. Hide skin for animation.

This step is used to hide the skin of the model and display only the skeleton to facilitate animation. Select the Plane by clicking on it or using **Outliner**. Create a new layer by opening **Channel Box** and clicking  in the bottom half of **Channel Box**. Now click and hold the right mouse button on the newly created layer and choose **Add Selected Objects**. Click on the box with **V** to hide the skin and display only the skeleton.

10. Create keyframes for animation.

- In **Outliner**, click the  icon of PlaneRootJoint to expand it. Select LeftWing joint. In the **Time Slider**, click on frame 1. Now set a keyframe for LeftWing joint at frame 1 by pressing 's' or selecting **Animate** → **Set Key**.
- Select another frame in **Time Slider**, say, 20 for a new keyframe. Select LeftWing joint and rotate it about the Z-axis by, say, 45 degrees. An easy way to do this is enter 45 in the **Z rotation field** in **Channel Box**. Next, right mouse click in the **Panel** and then press 's' to set the keyframe. This will move the left wing upward.
- Select another frame in **Time Slider**, say, 40 for a new keyframe. Select LeftWing and rotate it so that it comes back to same position as in frame 1. This can be easily done by entering 0 in the **Z rotation field** in **Channel Box**. Next, right mouse click in the **Panel** and then press 's' to set the keyframe.
- The 3 keyframes just created animate the flapping motion of the wing for half a cycle, i.e., flap up. Complete the other half cycle of the flapping motion by adding more keyframes for the wing to flap down.

The sequence of keyframes created is only for the left wing joint. Repeat the same procedure to animate the right wing joint. Every joint to be animated must have a sequence of keyframes

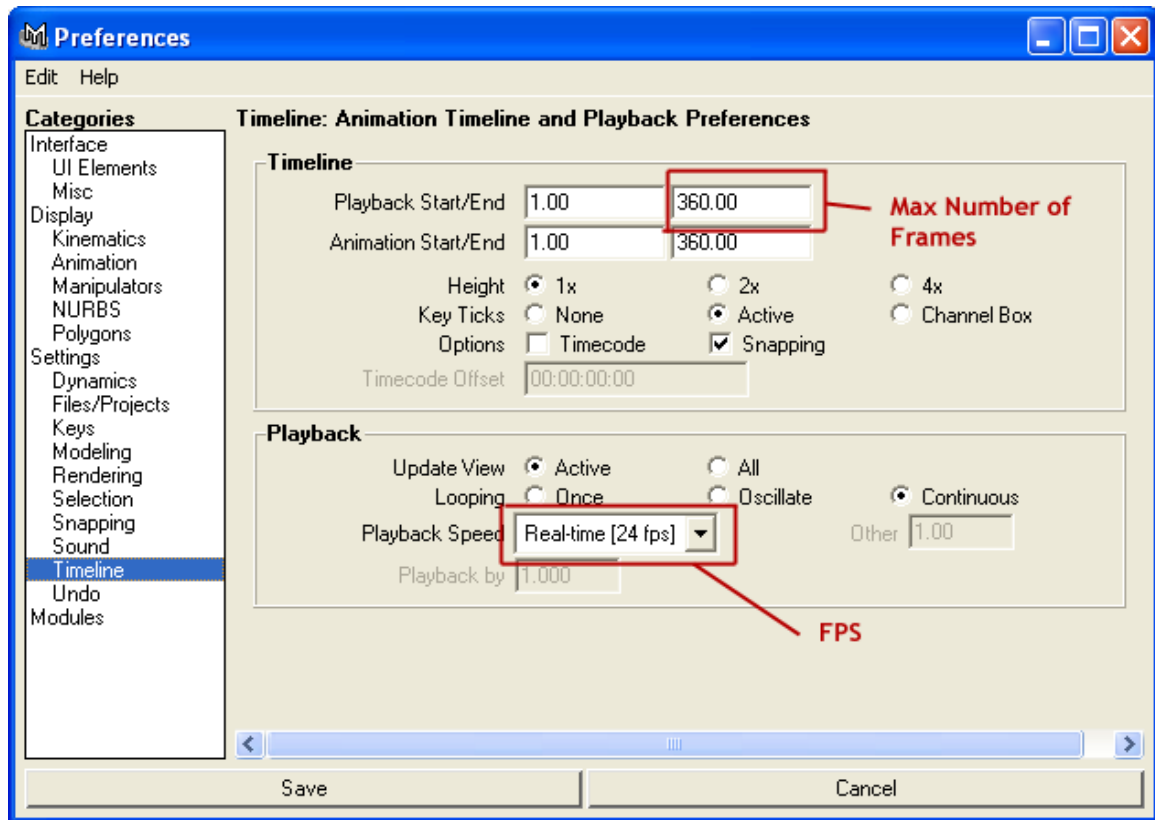


Figure 1: Timeline settings.

created for it. The keyframes for different joints need not be synchronized (i.e., set at the same frame numbers) though they often are.

11. View animation.  
You can now view the animation of the wings by first clicking the rewind button followed by the play button to the right of the **Time Slider**.
12. Save animation.  
At this stage, you may save the 3D model with animation into a separate file using **File** → **Save Scene As**.
13. Import motion path.  
Import motion path curve.ma using **File** → **Import**. Select PlaneRootJoint and then control-select MotionPath. Click **Animate** → **Motion Paths** → **Attach to Motion Path**. This is to constrain the airplane to move along this motion path. Click rewind and play buttons to view the animation.
14. Display model skin.  
To display the skin of the 3D model, open the **Channel Box** and click the left-most box of **layer 1**. Then, press '5' to display the model in shaded mode.
15. Change skin color.  
The default skin color may be quite difficult to see against a default black background. You can change the skin color as follows:

- Click and hold the right mouse button on the 3D model.
- Choose **Materials** → **Assign New Material** → **Blinn**.
- Click on the color box to choose a light color.

Note: In a good animation, you also need to put light sources in the scene to illuminate the 3D models appropriately.

16. Save animation.

Use **File** → **Save Scene As** to save the animation into a separate file.

17. Save Video.

To save the animation of the 3D model into a video file, do the following:

- Choose **Rendering** menu.
- Choose **Windows** → **Rendering Editors** → **Render Globals**.
- Choose **Render using Maya Software**.
- Enter a video file name.
- Choose a video file format, e.g., avi.
- Set **end frame** according to the number of frames you have set for the animation.
- Set the resolution, e.g., 640 × 480.
- Close the **Render Globals** window.
- Click **Render** → **Batch Render**.

The progress of rendering is displayed in the **Command Feedback** box at the bottom of the Maya window.

Notes:

- Rendering using Maya hardware means Maya will use the graphics card to perform rendering. This method is faster but it may or may not work depending on the type of graphics card installed in the PC.
- By default, the rendered video is saved in the **images** sub-folder of your project folder.