

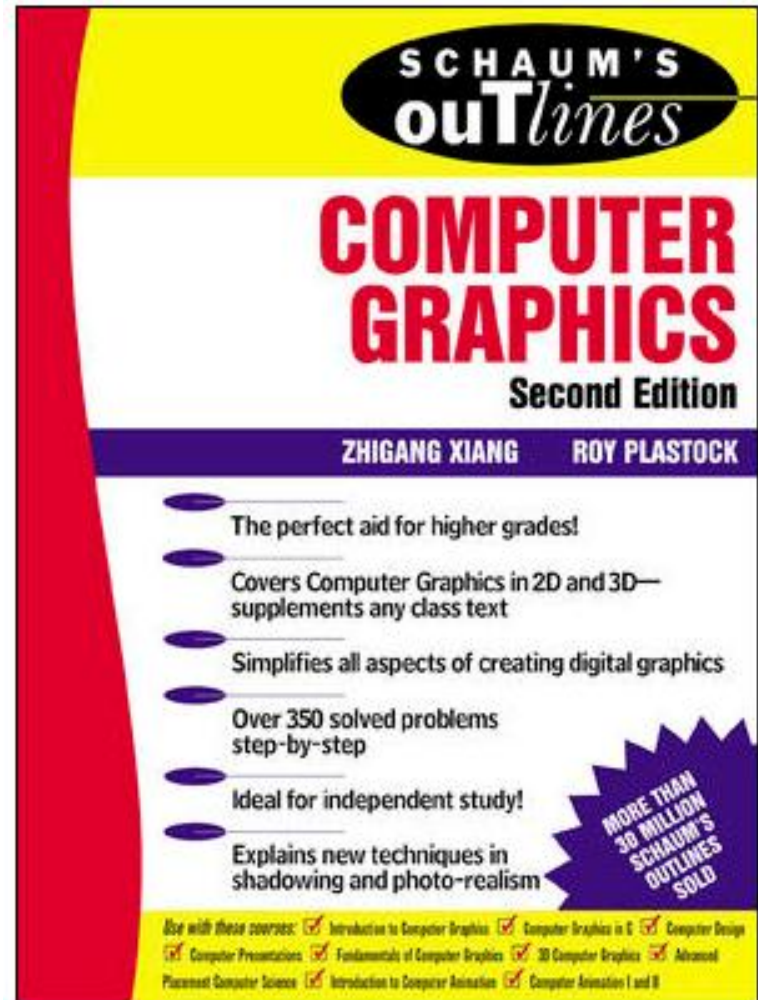
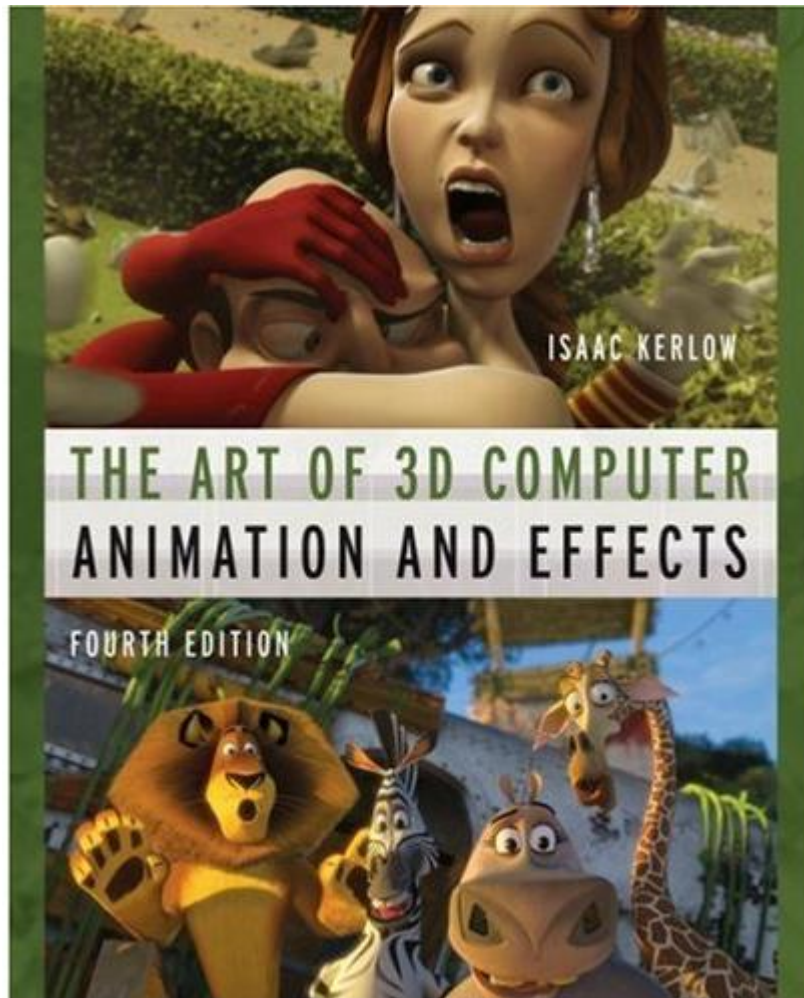
Week 1 Lab

IAT 343: Animation

Spring, 2012

Kyung Jae Lee (kla8sfu.ca)

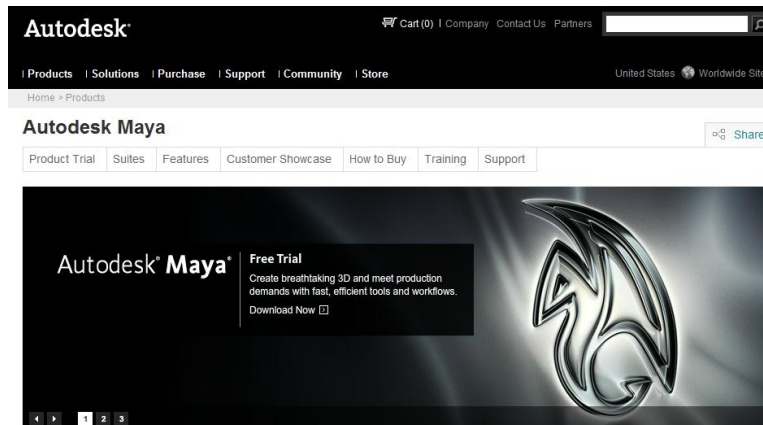
Two Required Textbooks



3D animation tool in IAT 343

<http://usa.autodesk.com/maya/>

- Autodesk Maya 3D 2011 version at SFU Surrey campus, not 2012 version. If you use 2012 version at home, the school computer with 2011 version may not be able to handle/open 2012 version.
- All your team members should use the same version.
- Free Autodesk software for students
(http://students.autodesk.com/?nd=download_center)



Course overview

1. Individual

1. Web Portfolio (16%)

1. Modeling + shading + texturing
2. Character Animation

2. Individual Lab exercises (11 %)

3. Participation/Quiz (15%)

1. 2 quizzes (5% each, 8%)
2. Attendance (5%)

4. Essay (2 %) 2 to 3 page – single space with images, APA reference style

5. Final exam (20 %)

2. Group project (35%)

1. Script & character-environment sketch (3%)
2. Storyboard with pitch (4%)
3. Three second animation drawing (2%)
 - pencil or Adobe Flash,
 - 24f/2 x 3 second = 36 frames,
 - separate character(s) and background in layers)
4. Animatic (animated video storyboard with pitch)(4%)
5. Animation short video (20%)
6. Final presentation & Documentation (2%)

Team Project

(look for team members! Size 1 to 5)

- **Due dates (1/29, Sunday)**

1. Script

- **1 page, could be extended with dialog**

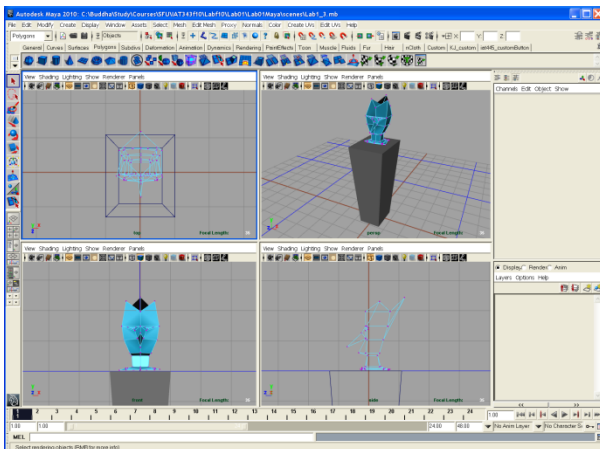
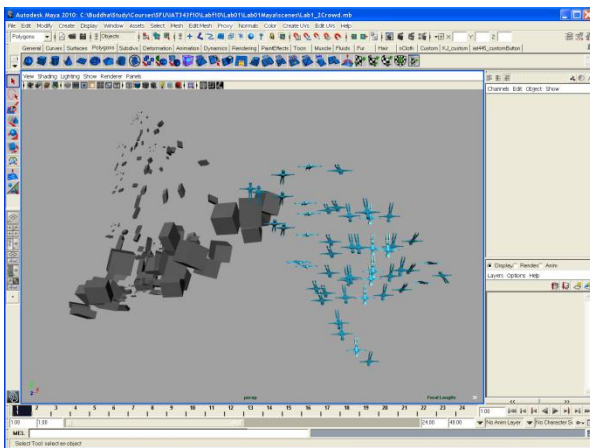
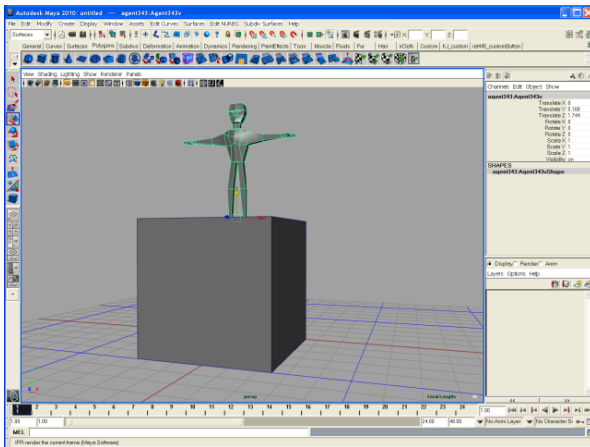
2. Character & Environment Sketch with Description

- **Character history**
- **Personality**
- **Background**
- **Shape, size etc.**
- **Location**
- **Atmosphere & mood etc.**

All the course materials available through
SFU WebCT IAT 343

<http://webct.sfu.ca/>

Download '**Lab01_343.zip**' file
from the WebCT



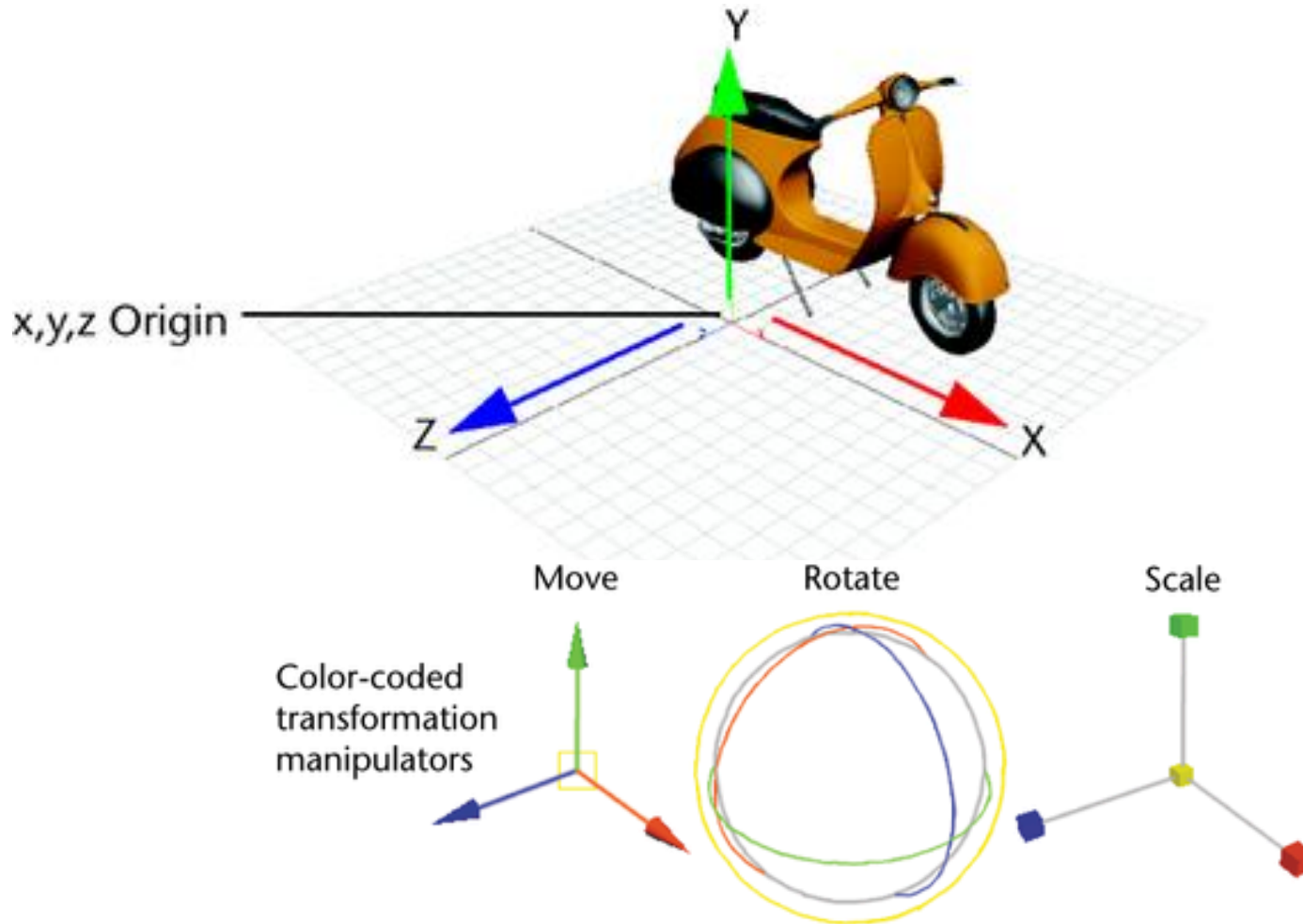
Today's Lab

1. Overview of 3D geometry & User Interface & Navigation in Maya 3D
2. Lab exercises
 - 1.1: File Import & Transformation
 - 1.2: Duplication
 - 1.3: Shape modification

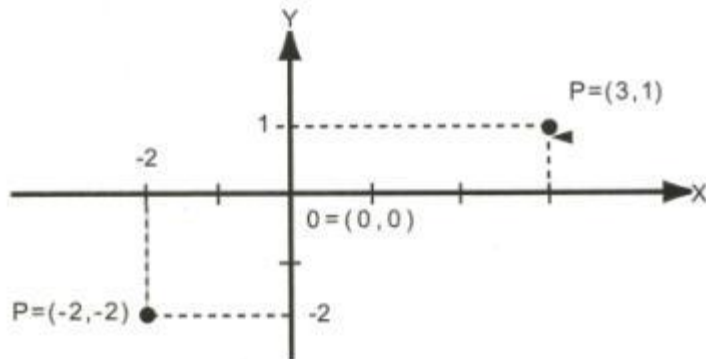
Due Dates:

- **Individual:** Lab Exercises week 1 – 3 & individual website. **(2/05)**
- **Team:** Script, team website & character sketch **(1/29)**

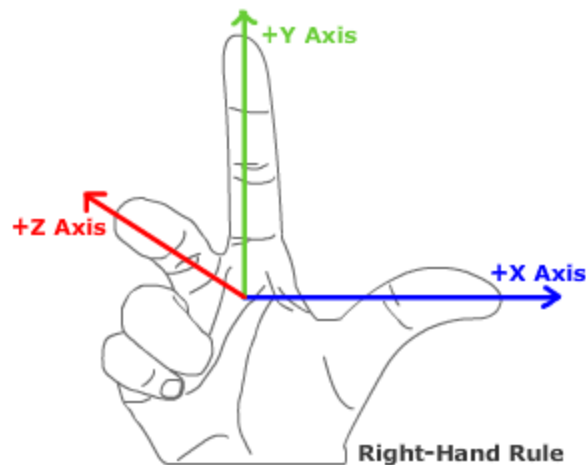
Coordinate System



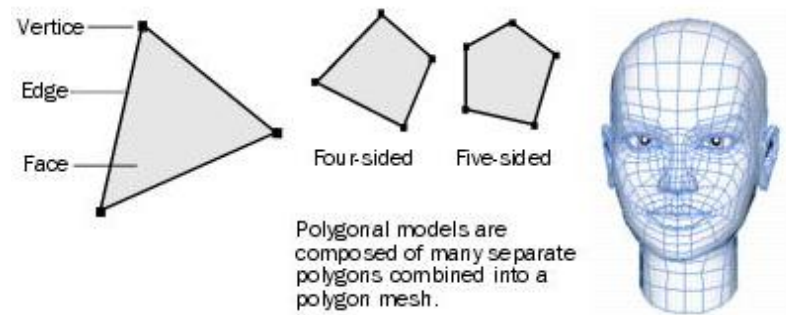
Coordinate System



(Hearn, 2003)



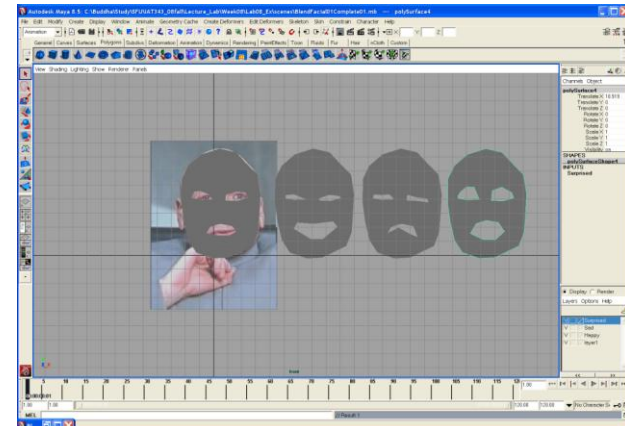
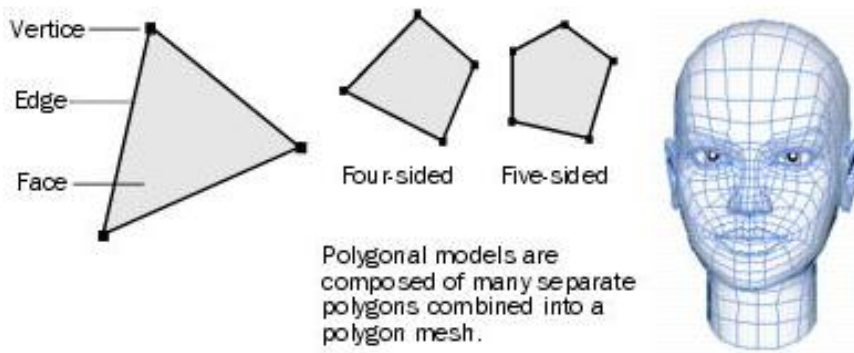
- **Cartesian coordinate system**
 - Two axes perpendicular each other and met at the origin.
 - Horizontal axis: x
 - Vertical axis: y
 - 3D Cartesian system by extending along the Z axis



Polygon terminology

Polygons are straight-sided shapes (3 or more sides), defined by three-dimensional points (vertices) and the straight lines that connect them (edges). The interior region of the polygon is called the *face*. Vertices, edges, and faces are the basic components of polygons. You select and modify polygons using these basic components.

- Simple Geometric Forms
 - Points (Vertex in Maya)
 - Lines (Edge in Maya)
 - Polylines
 - Polygons (Face in Maya)



Point, Lines & Primitives

- Point: a location in space plus its color
- Scalar: a number that we multiply other variables by
- Vector: a line that has magnitude, direction and a color

Source: OpenGL graphics through applications / Robert Whitrow

```
struct Point
```

```
{
    int x;
    int y;
}
```

```
struct Line
```

```
{
    Point start;
    Point end;
}
```

```
struct Polygon
```

```
{
    int total_points;
    array<Point> points;
}
```

```
struct Vector3D
```

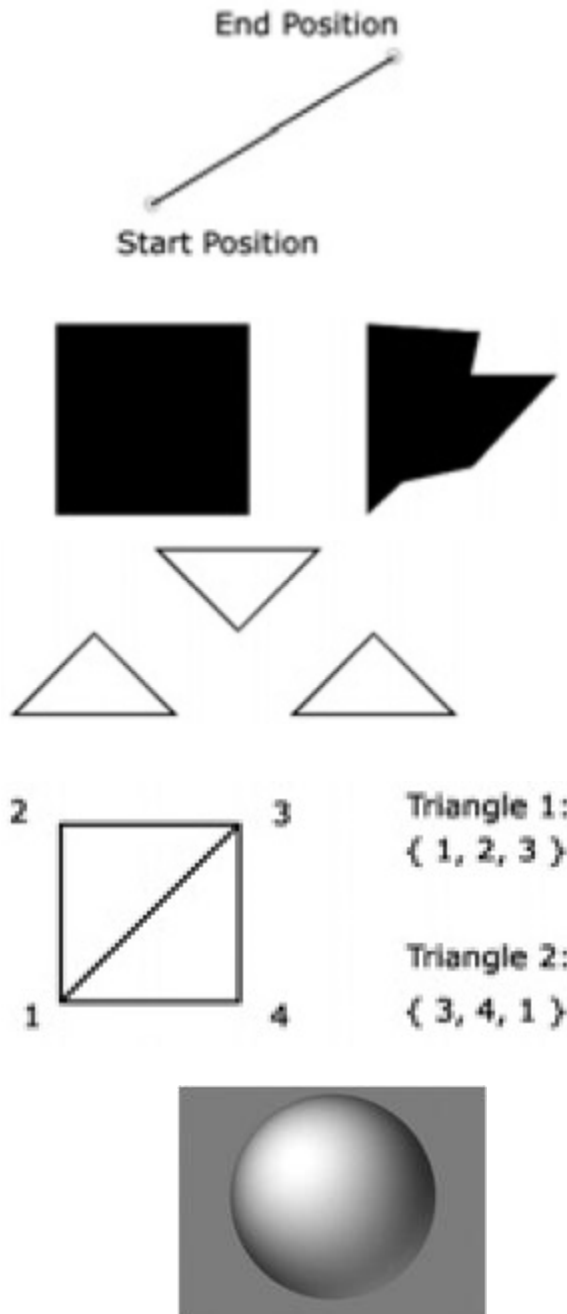
```
{
    float x, y, z;
};
```

```
struct Vector3D
```

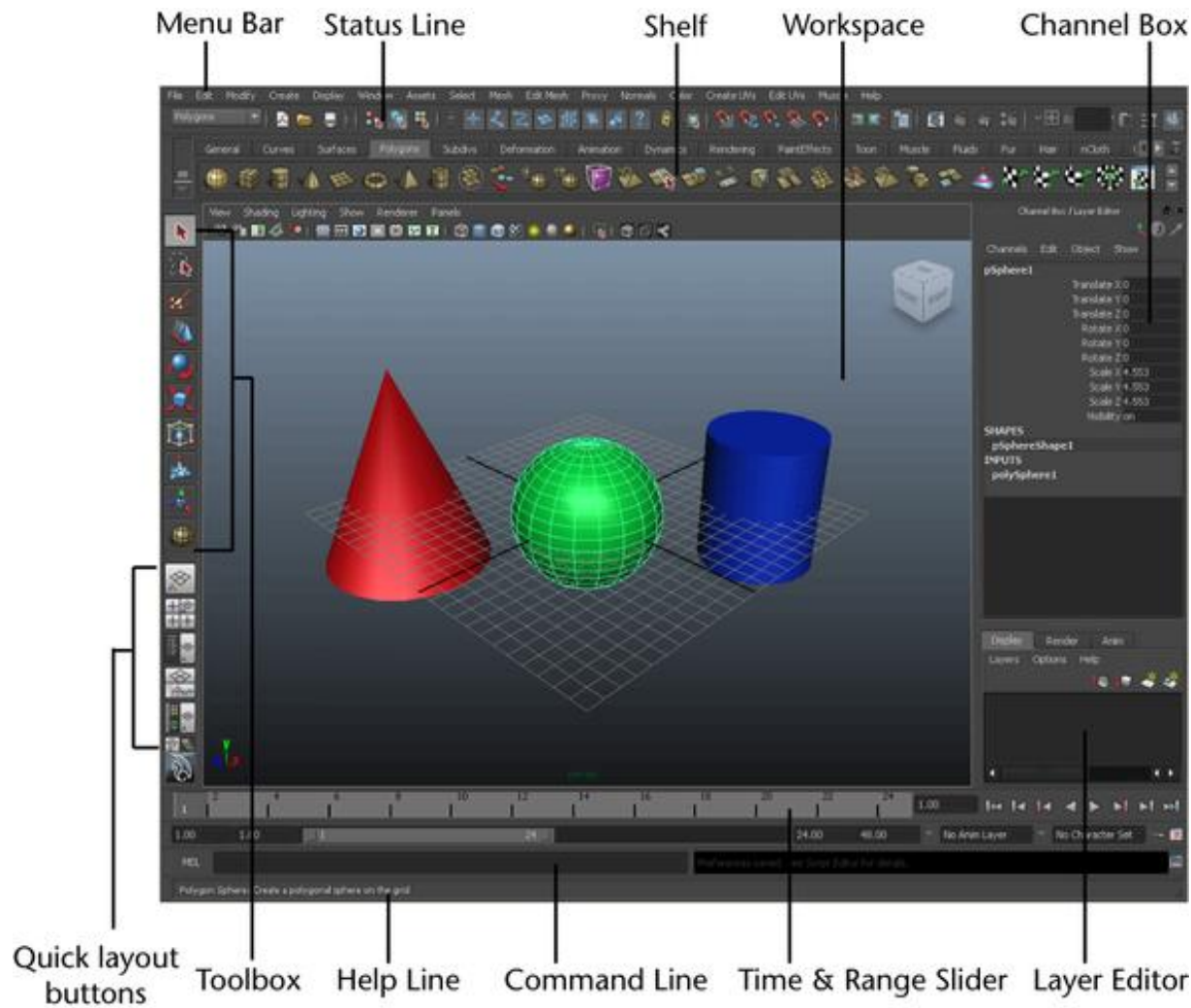
```
{
    float pos[3];
}
```

```
struct Sphere
```

```
{
    int radius;
    Point position;
}
```



Graphic User Interface of 3D Animation Software



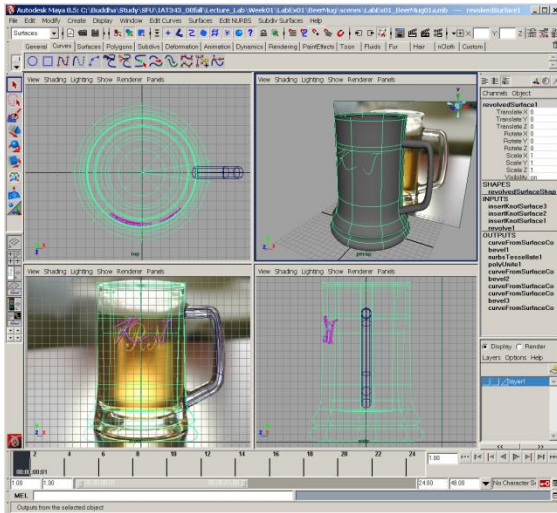
Interface & Navigation Comparison

Which interface design do you prefer,
Firefox or Internet Explorer?



Differences in Interface Design across diverse applications

- Web application
 - Internet Explorer, FireFox
- 2D imaging application
 - Adobe Photoshop
- Application Development Tool
 - Java Eclipse, Microsoft Visual Studio
- 3D applications
 - Animation
 - CAD
 - Data visualization



Important Elements in User Interface

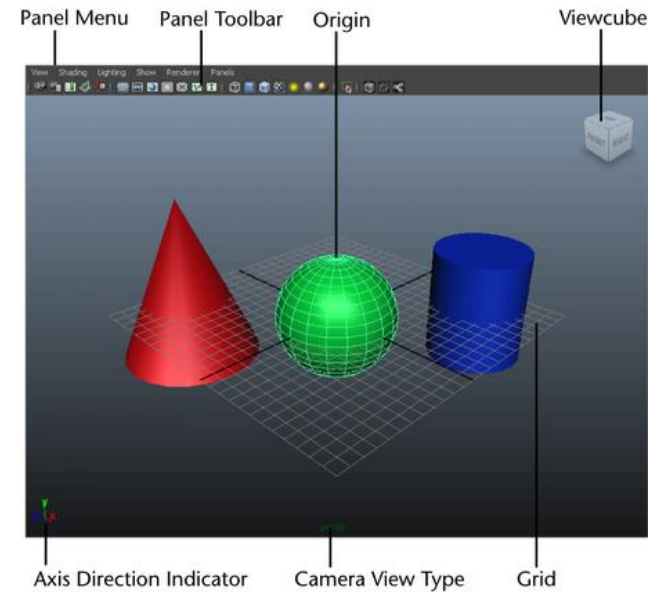
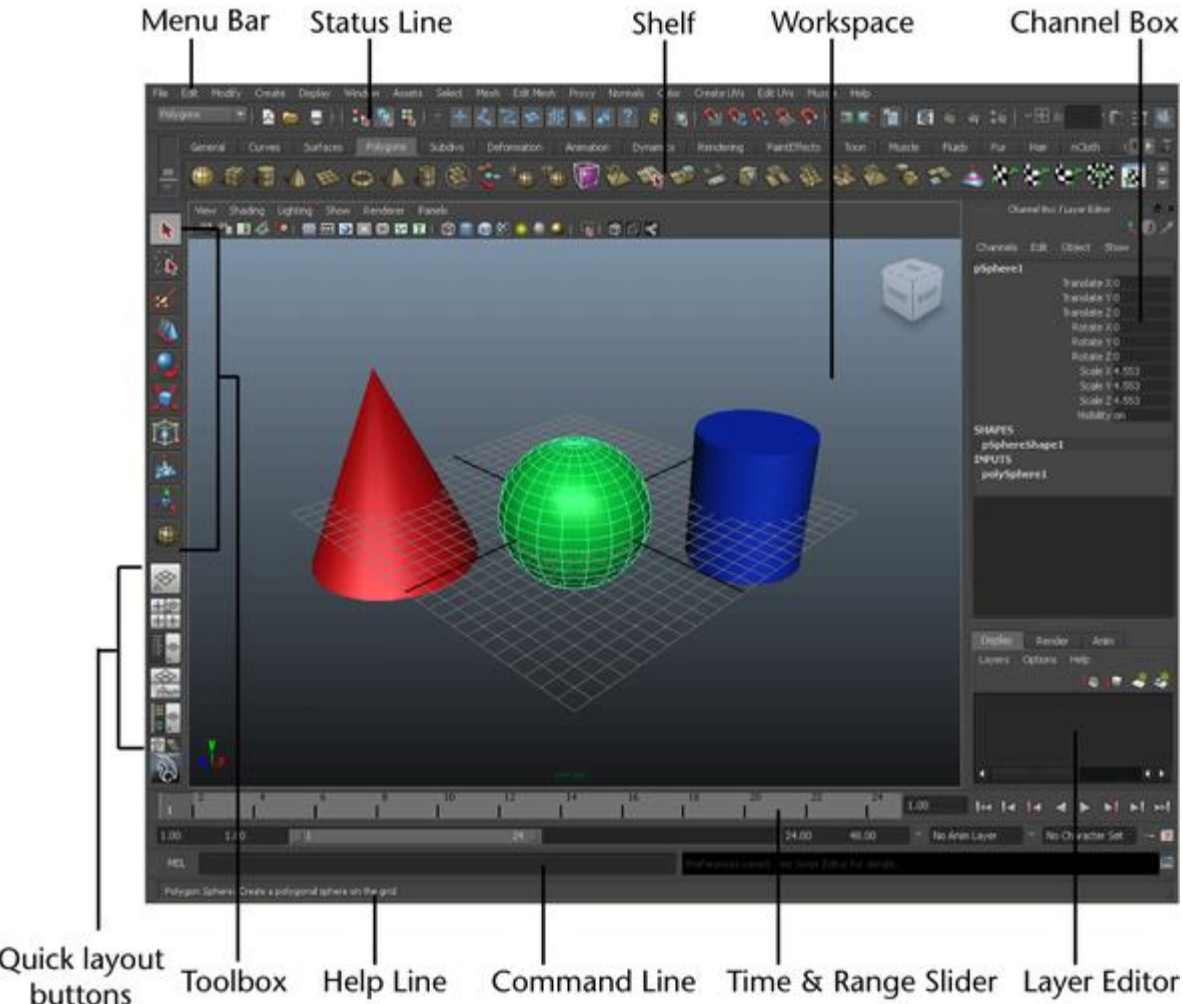
- Easy to use, learning curve
- Workflow
- Productivity
- Customization
- Layout optimization



- Can you imagine...
 - How many button clicks were performed to make this scene?
- Was UI optimized when performing the render of this scene?
- Any human error during the production due to UI?



Maya 3D Interface

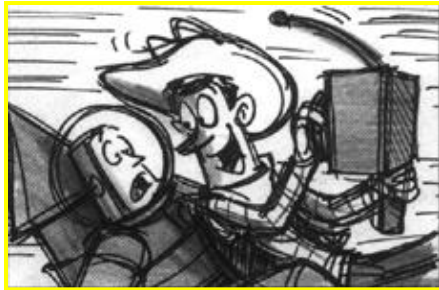


To generate this scene in the most effective-efficient manner, could a User Interface of 3D software affect the productivity and quality of 3D animation? How should a User Interface of 3D animation system look alike? Is there any principle?



Star Wars

Animation Process



Story Board



Modeling



Animation



Shading



Lighting



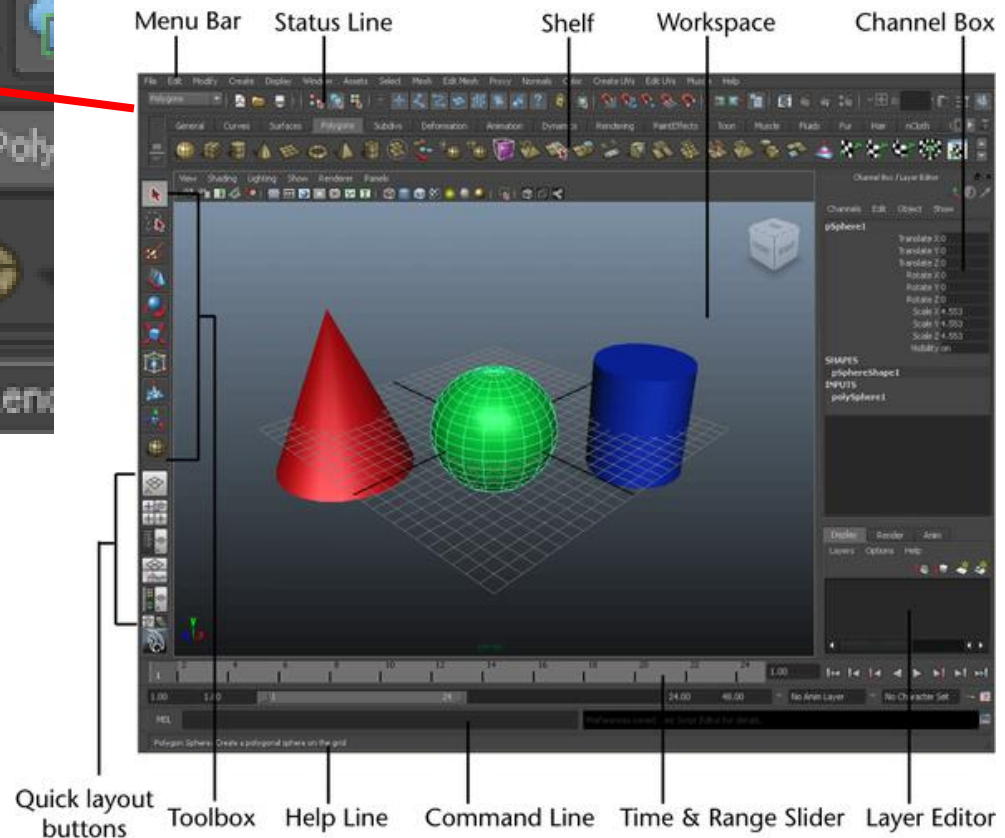
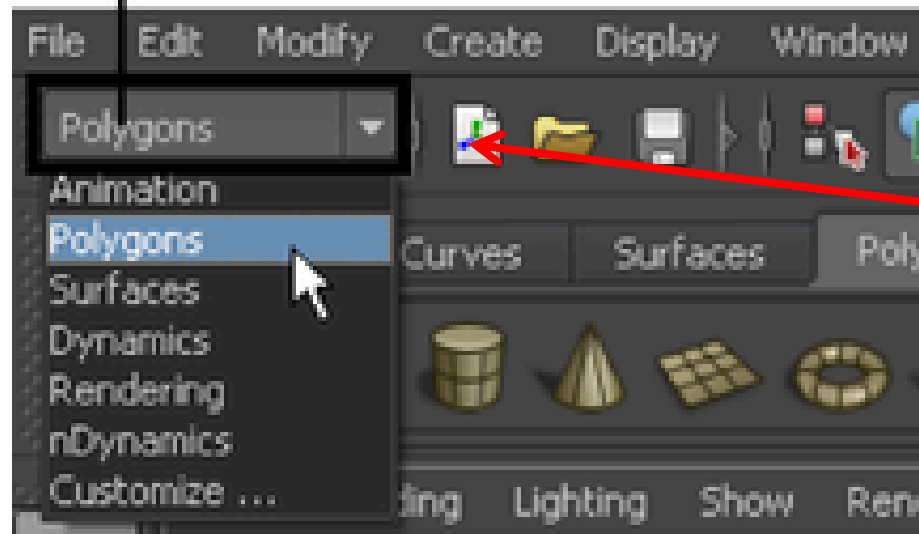
Rendering



Source:
Pixar Animation Studio

Integrating animation production stages into User Interface

menu selector



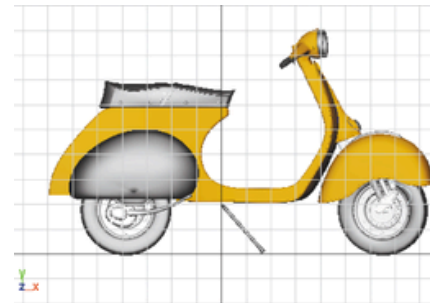
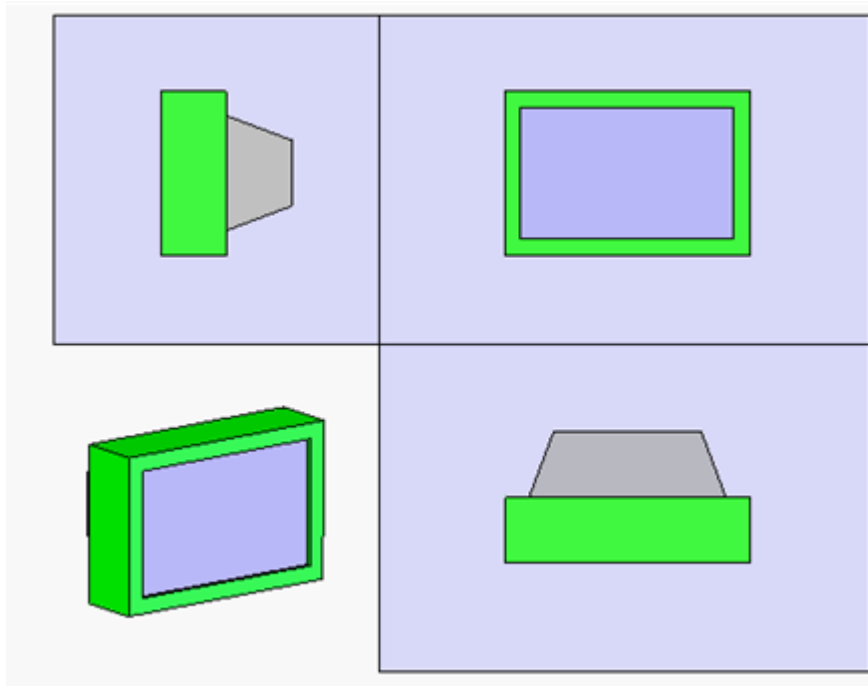
Viewing Projections in 3D Space

- **3D projection** is any method of mapping three-dimensional points to a two-dimensional plane. As most current methods for displaying graphical data are based on planar two-dimensional media, the use of this type of projection is widespread, especially in computer graphics, engineering and drafting.

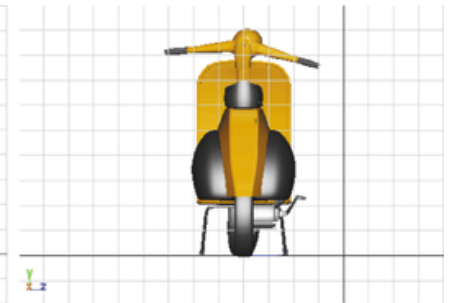
http://en.wikipedia.org/wiki/3D_projection

http://en.wikipedia.org/wiki/Perspective_%28graphical%29

Orthographic Projection



Front orthographic view



Side orthographic view

http://www.ul.ie/~rynet/orthographic_projection_fyp/webpages/home.html

Perspective Projection



Perspective View



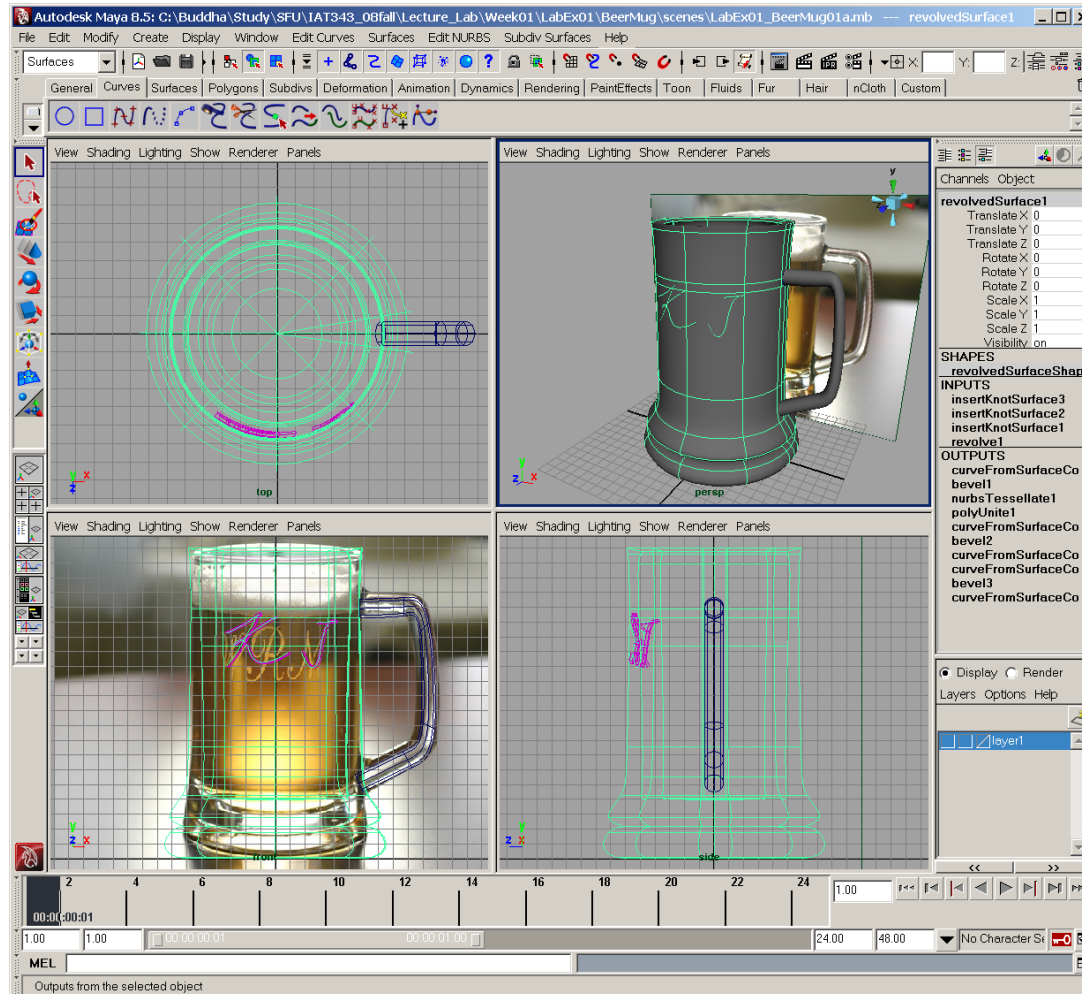
Multiple Viewport Projection

Top view

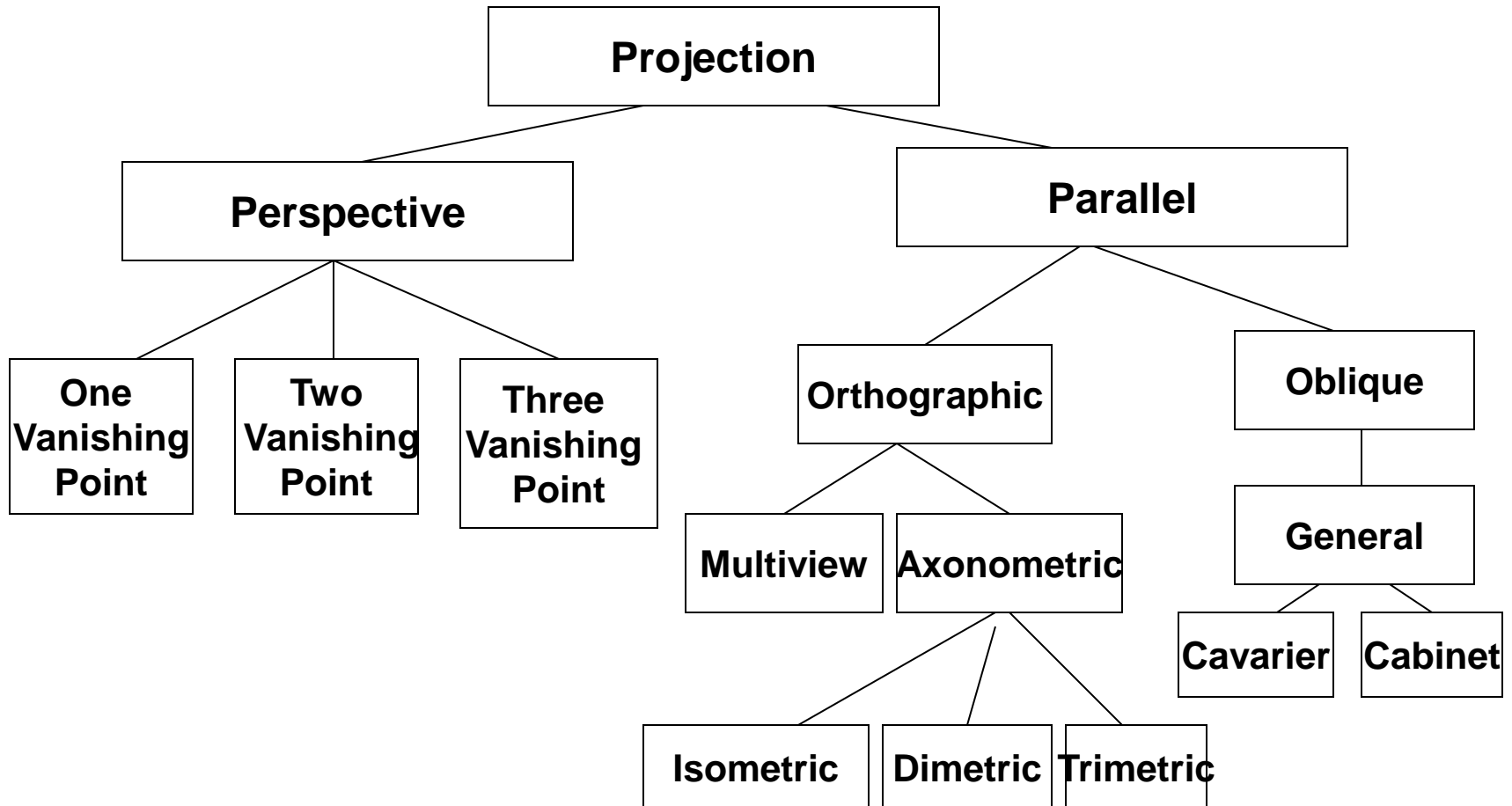
Perspective view

Front view

Side view

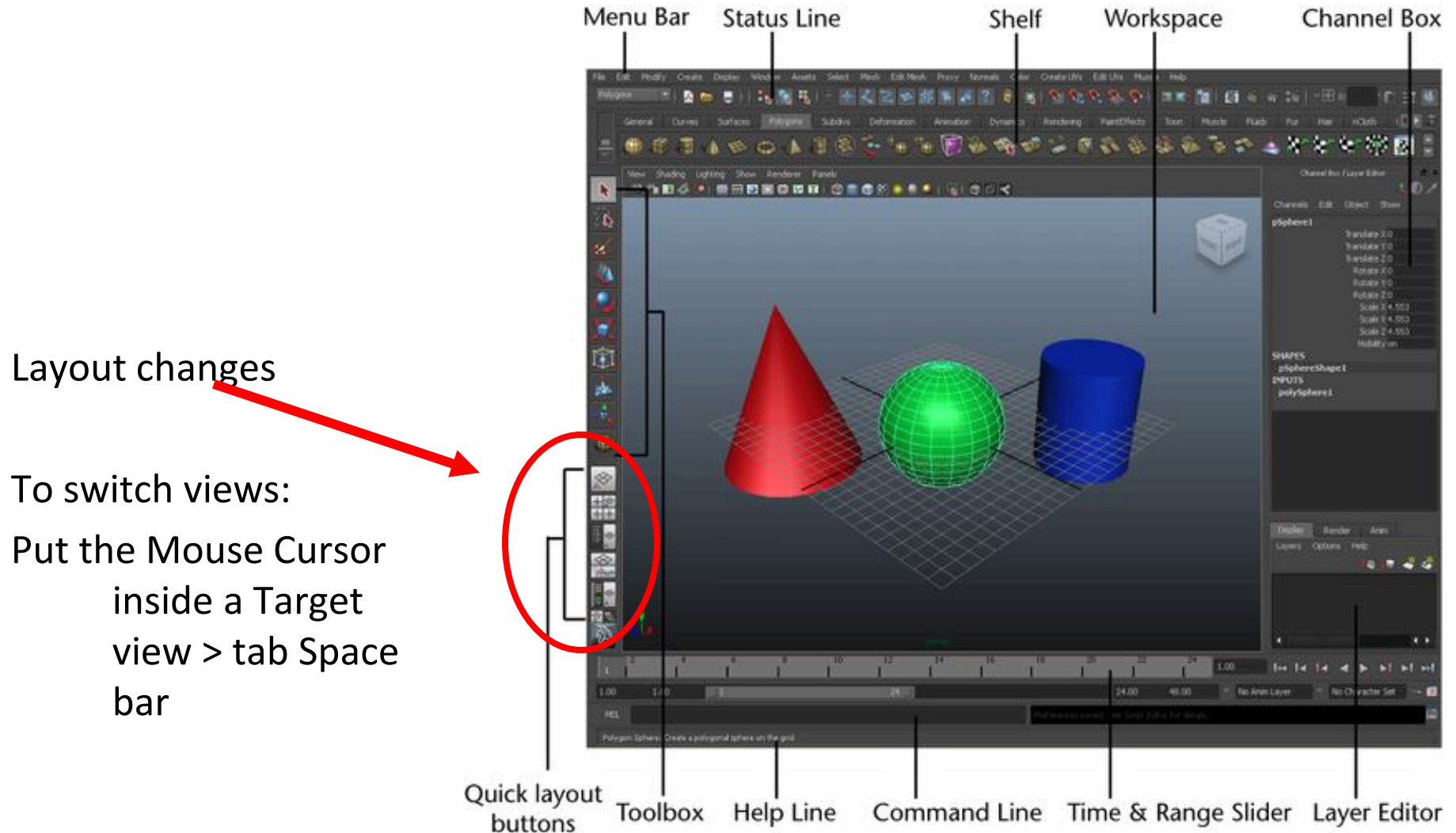


Taxonomy of Projection



Perspective foreshortening is the illusion that objects and lengths appear smaller as their distance from the center of projection increases. (Source: Schaums Outline of Computer Graphics by Zhigang Xiang & Roy A. Plastock)

Interface in Maya



Interface in Maya

Panel Menu

Panels > Perspective

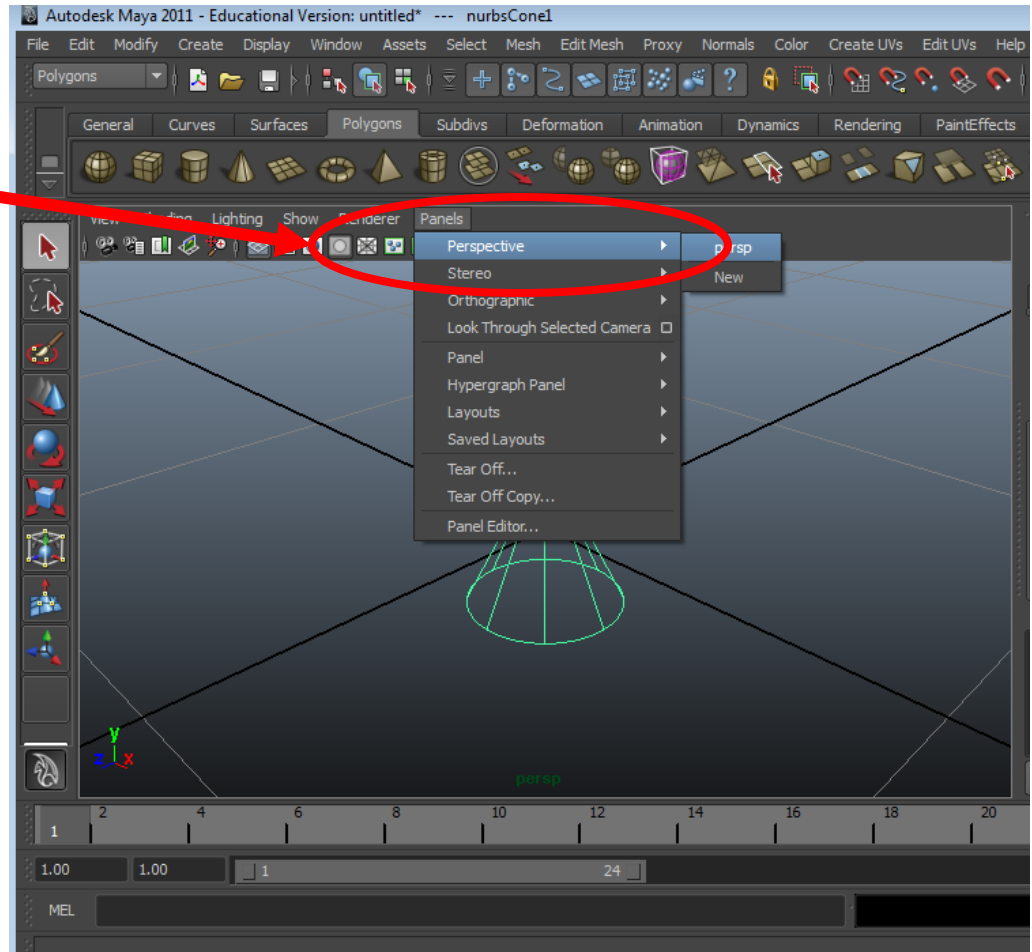
Panels > Orthographic > front, side, top

Shading

Wireframe: '4'

Flat shade: '5'

Textured: '6'



Help menu: User Guide > General > Basics > Basics Tools >

1. Create > Polygon Primitives > Cube. (Interactive Creation mode on/off)

2. Shortcut keys to transform objects

q: select

w: move

e: rotate

r: scale

Insert/home – edit pivot

3. Navigation

Switch viewport:

tab 'Spacebar'

Tumble/spin/rotate view:

'Alt + LMB'

Track/pan/side-to-side:

'Alt + MMB'

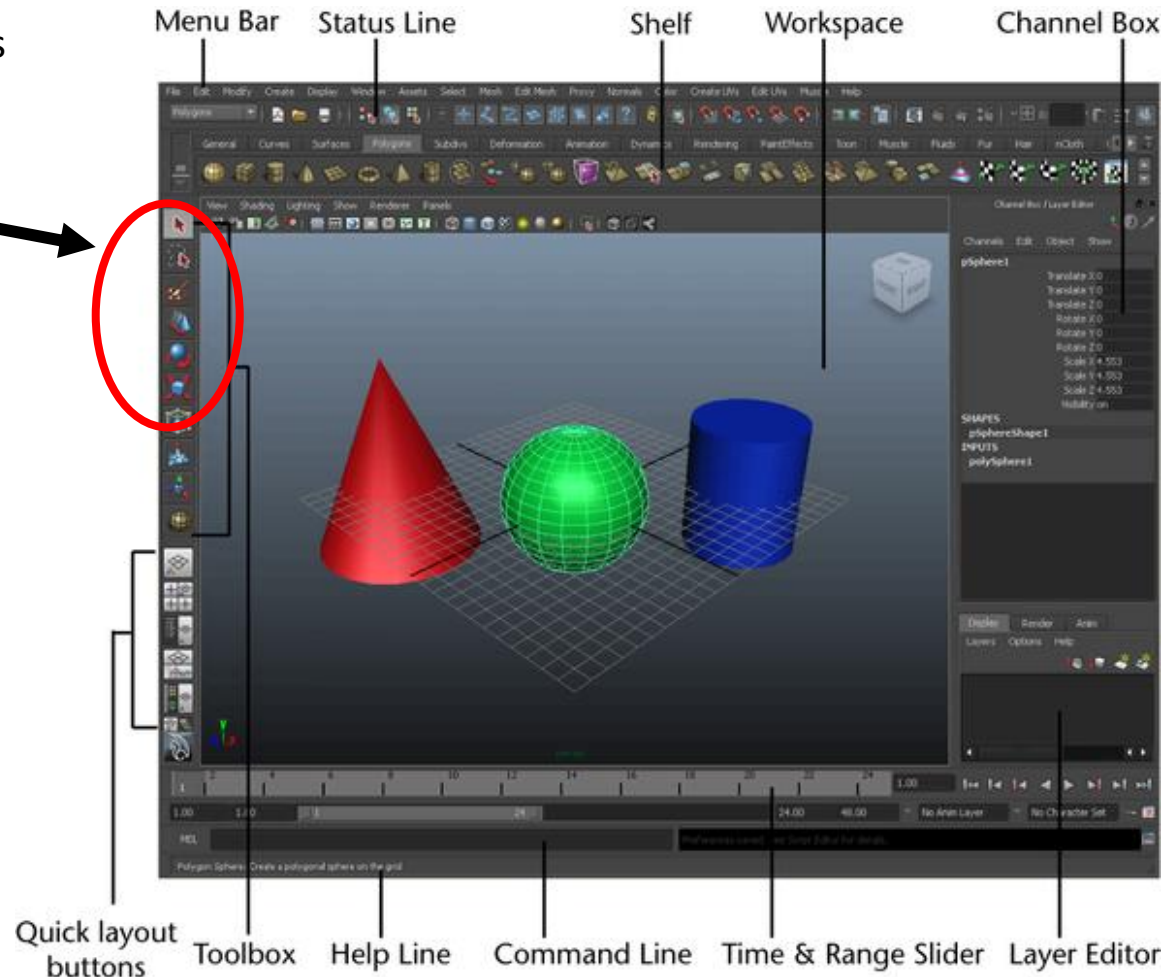
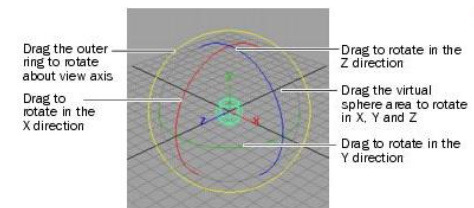
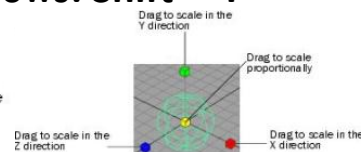
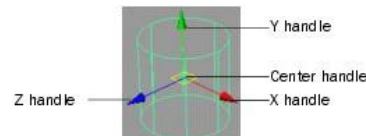
Dolly/zoom view:

'Alt + RMB'

Focus on objects: **'F'**

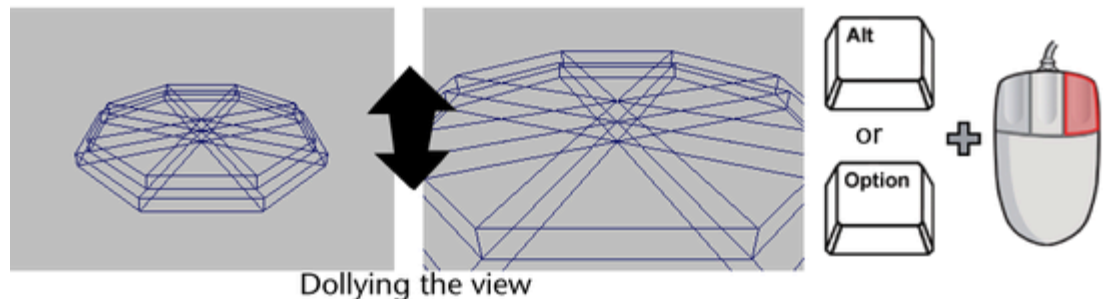
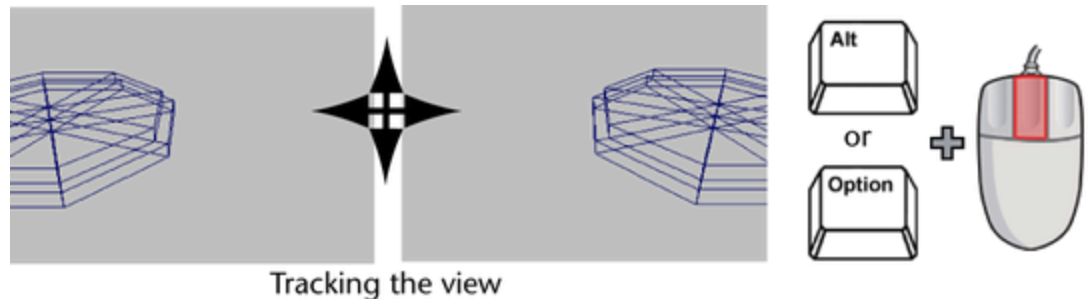
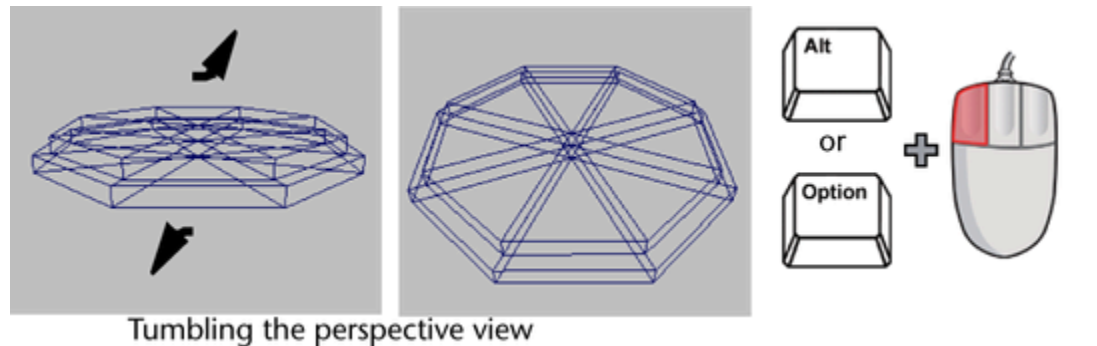
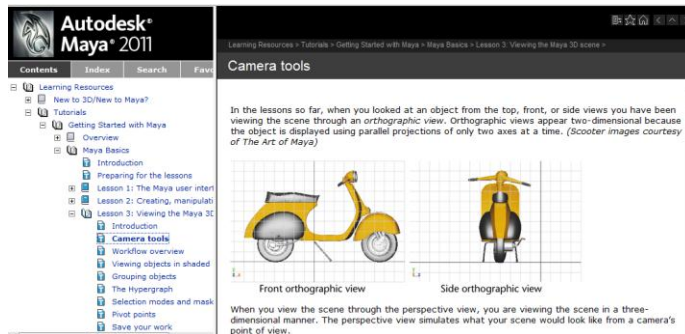
Focus on objects in all viewport windows: **Shift + 'F'**

Frame all: **'A'**



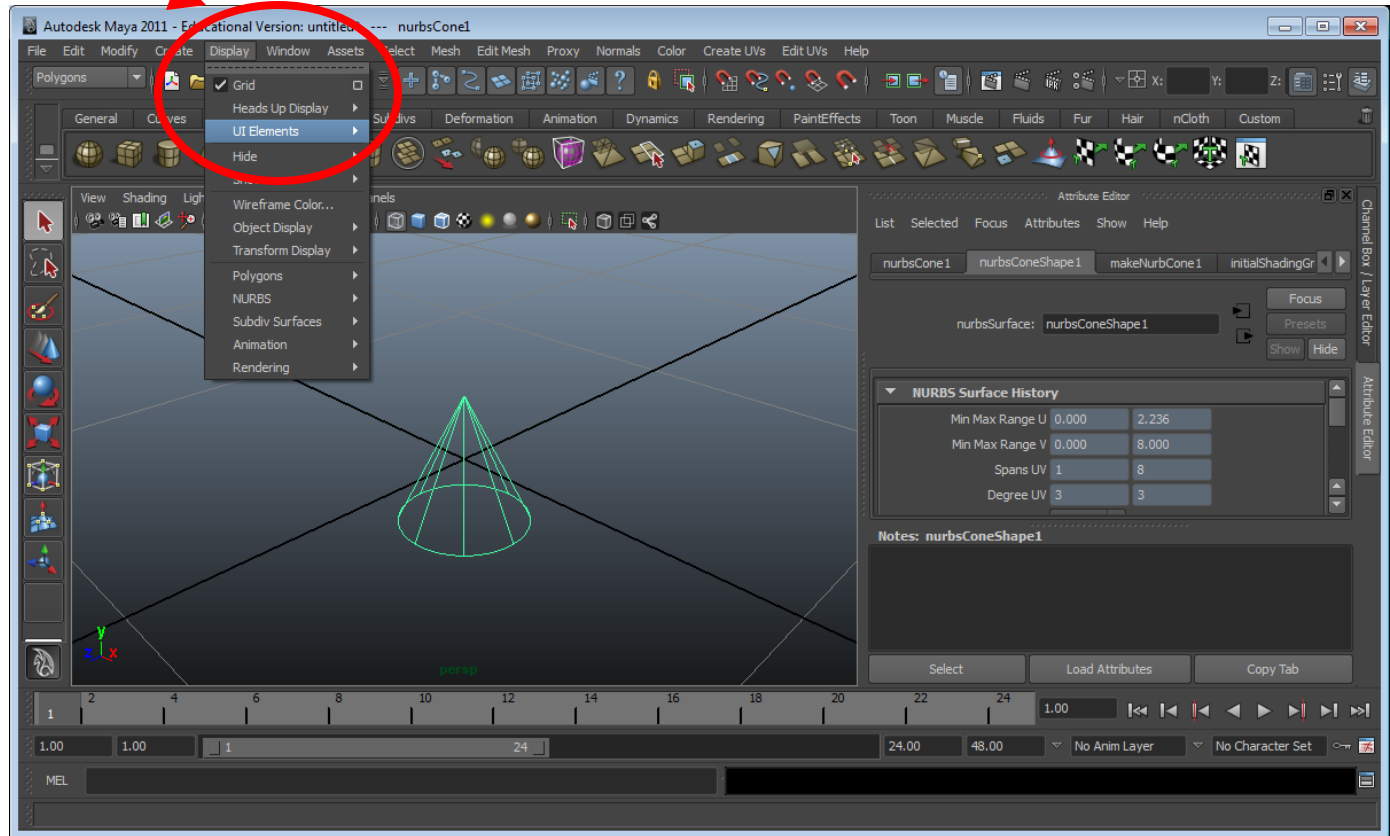
To access more information about Camera Tools, pressing 'F1' opens up the Help menu.

Learning Resources > Tutorials > Getting Started with Maya > Maya Basics > Lesson 3: Viewing the Maya 3D scene > Camera tools



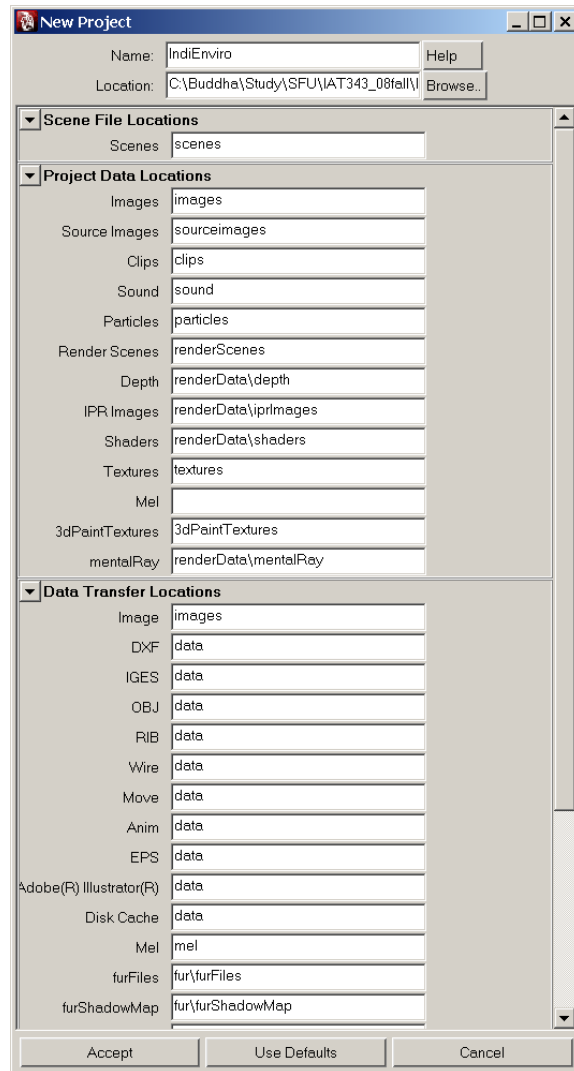
If you can't find menu bar...

Display > UI Elements



Lab Exercise 1.0

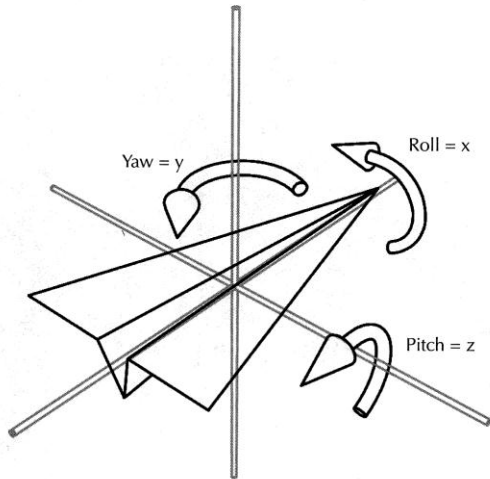
Organization: Project set-up



Creating new Project Directory

1. Launch **Autodesk Maya**.
2. Go to **File** menu > **Project** > **New**, then choose **Location** of a project (click '**Browse**') and give a project name (e.g. 'LastName_Lab01').
3. By clicking **Use Defaults** button, all sub-directories are created to keep different digital assets.
4. Press **Accept** button when done.
5. Open the Window Explorer (**Start + E**) to review whether these directories has been created.

Ex 1_1. Navigation & Transformation



Source: <http://static.howstuffworks.com/gif/space-shuttle-glass-cockpit2.jpg>



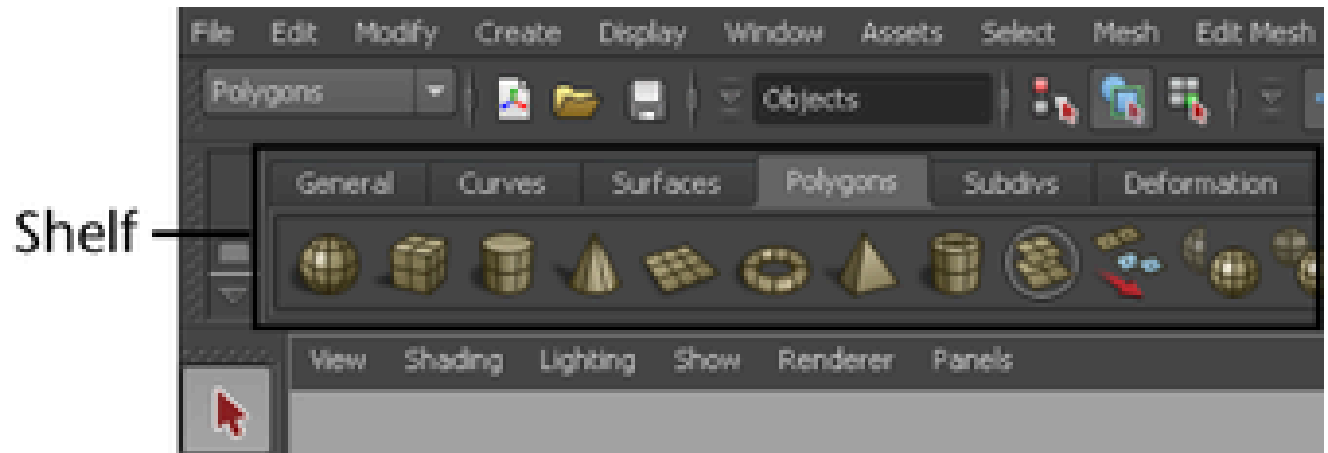
Source: <http://www.telecoms.com/18914/vodafone-navigation-unit-at-dead-end/>

Source:
<http://blog.niot.net/en/post/163173/video:+mexican+chevy+dealer%27s+transforming+bumblebee+suit+has+us+jonesin%27+for+halloween.htm>

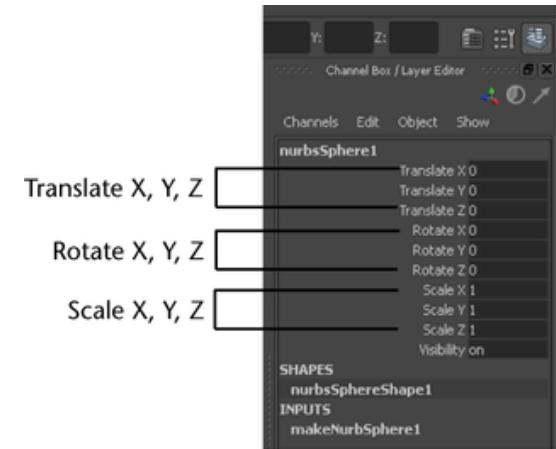
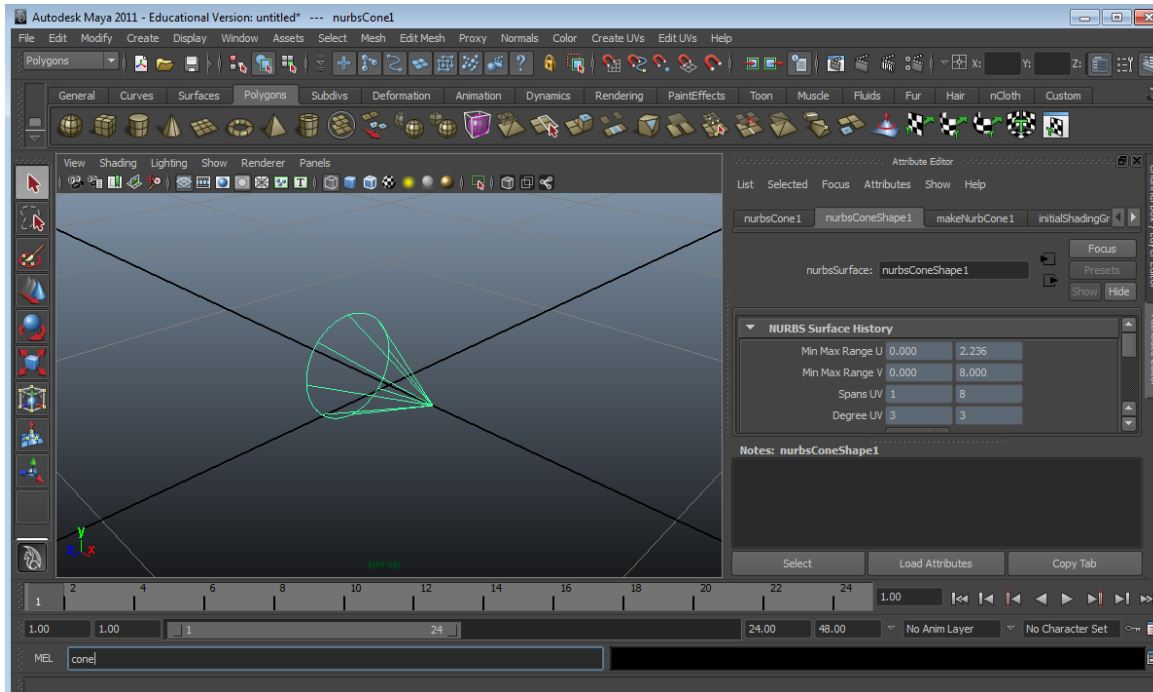


Ways to generate an object in Maya 3D space

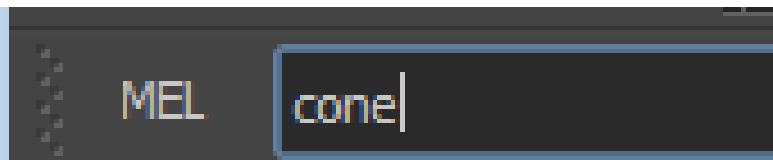
1. Scripting through MEL (Maya scripting language)
2. File import
3. Using pre-defined 3D primitives



Object Creation & Transformation through scripting

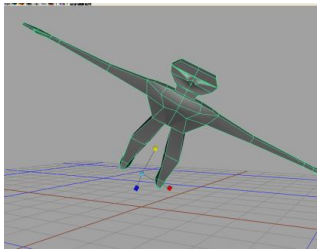
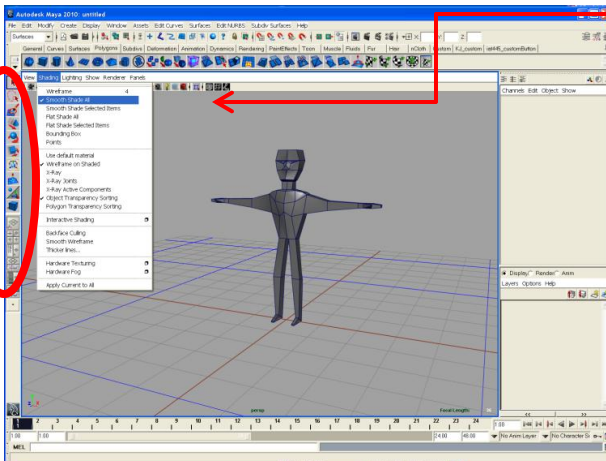
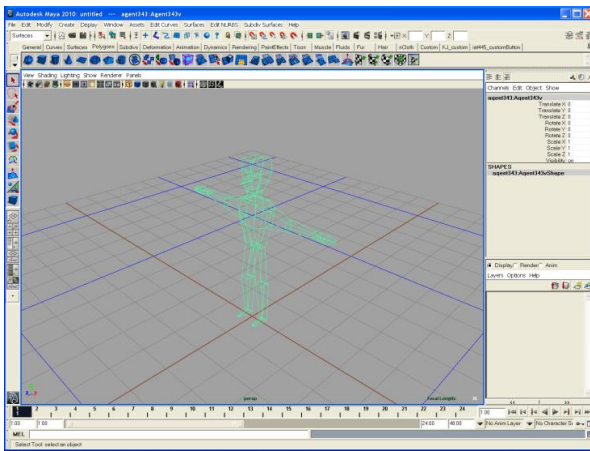


- To create a cone
 - Type `cone` and press Enter (try with the numeric keypad).
 - Press `'f'` to focus on the selected object.
- To transform the object across x, y, & z axis.
 - `rotate 0 0 90 <Enter>`
 - `move 5 2 5 <Enter>`
 - `scale 2 1 1 <Enter>`



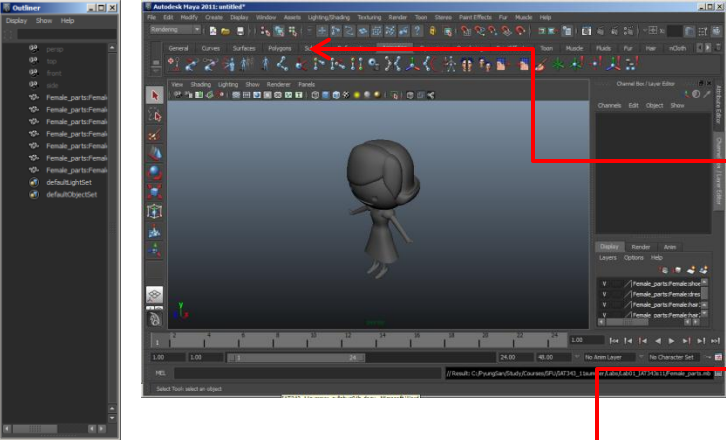
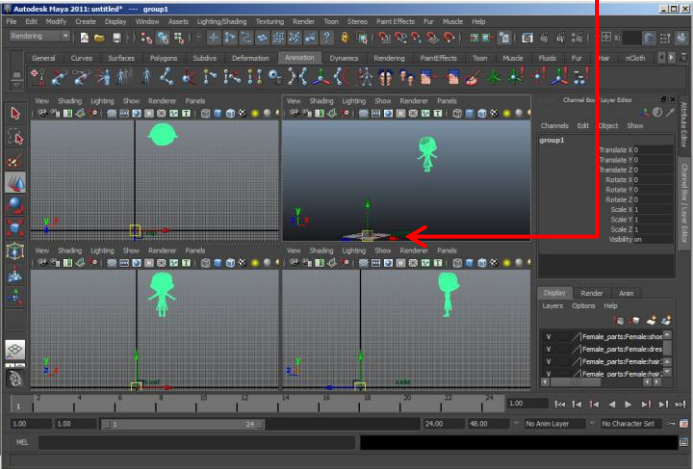
Ex 1.1. File Import, Navigation & Transformation

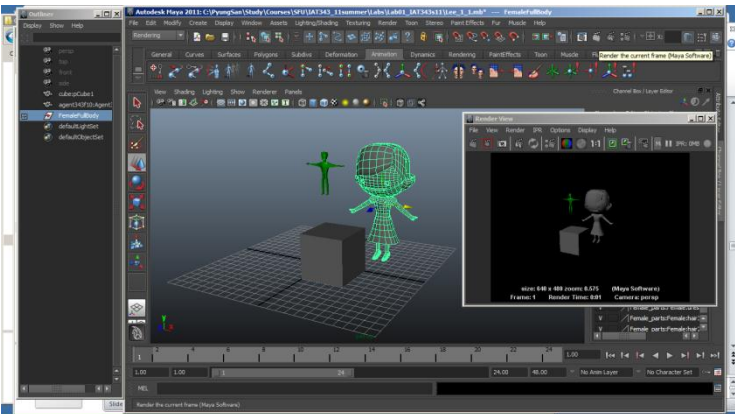
1. Download 'Lab01_IAT343f10.zip' file from the WebCT and import 'agent343f10.obj' into Maya (File > Import). To focus the current camera view on this object, click on this model and press 'F' on the keyboard.
2. To navigate this view, press/hold 'Alt' button and click-move with either the left, middle or right button of your mouse. Camera navigation can be accessed through View > Camera Tools on each viewport.
3. By pressing '5' (or 4), we can switch the surface shading of 3D model from 'Wireframe (4)' to 'Smooth (5)'. This function can also be accessed by selecting 'Shading' inside the viewport.
4. Using Transformation tools (Move:'W', Rotate:'E' or Scale:'R'), we can reposition the current location of the object and orient along with different axis (x:red arrow, y:green arrow or z:blue arrow). In addition, apply scaling across different axis.
5. To 'undo' previous steps, simply press 'z' multiple times (or apply Edit > Undo).
6. Import 'cube.obj' and place the character on top of the cube based on previous steps. Save your file (File > Save Scene As > 'LastName_1_1.mb') for the assignment submission. Feel free to modify this exercise.
7. By pressing 'Del' (or 'Backspace') key, we can remove a selected object.
8. Feel free to import more than one file.



Link to 'obj' file format(<http://people.sc.fsu.edu/~jburkardt/data/mtl/mtl.html>)

Grouping

9. Let's import another file 'Female_parts.mb'.
10. If a certain view doesn't show this object, press 'A' to zoom all. There are different ways to locate a target object and one approach is to use 'Outliner' scene management window (.

11. To move different parts of female body as a group, select all the parts inside outliner by click-drag (or just mouse drag while holding left mouse button) and press Ctrl + G to group into one object. To rename the default name, just double-click on the label 'group1' and retype (i.e., FemaleFullBody)

12. When we select the **Move** tool, Maya shows the pivot point (center point) of the grouped object which shown at the origin. To reposition the pivot point into the approximated center region of the multi[le-parts, we need to apply a function (**Modify > Center Pivot**). Reposition the female body near the cube.
13. Feel free to transform any object.
14. Re-save this file for the lab submission



Ex 1.2. Model Duplication



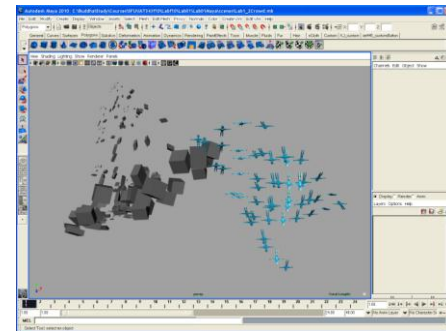
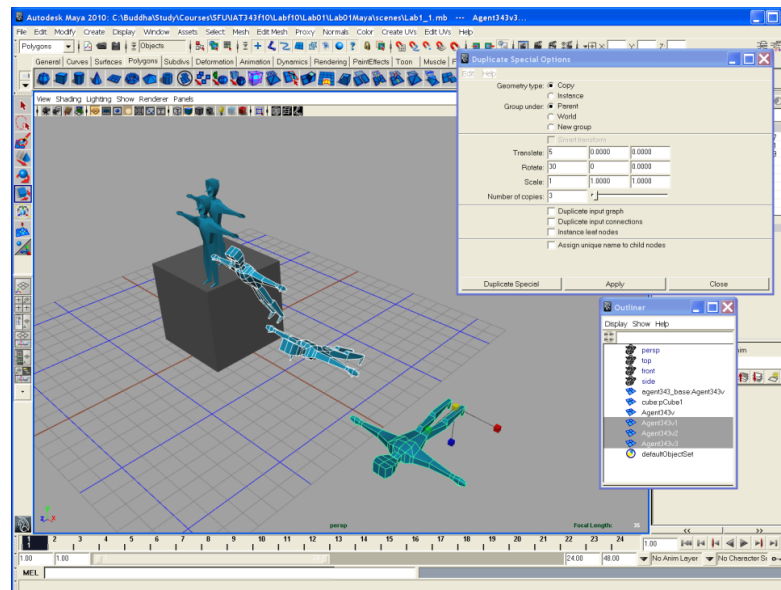
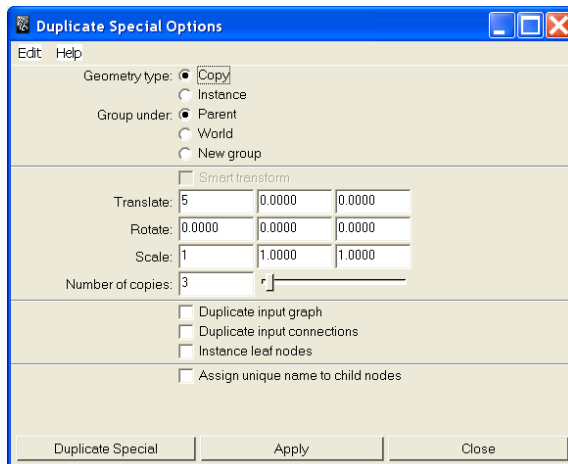
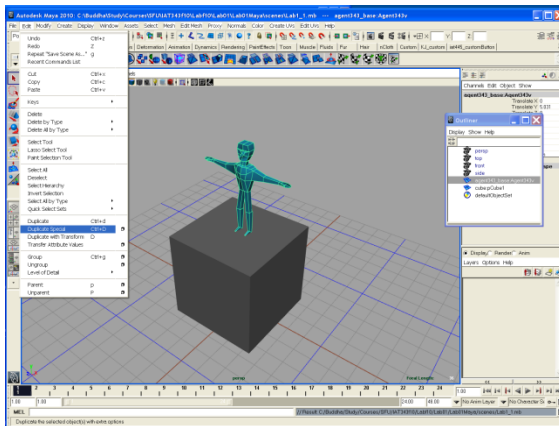
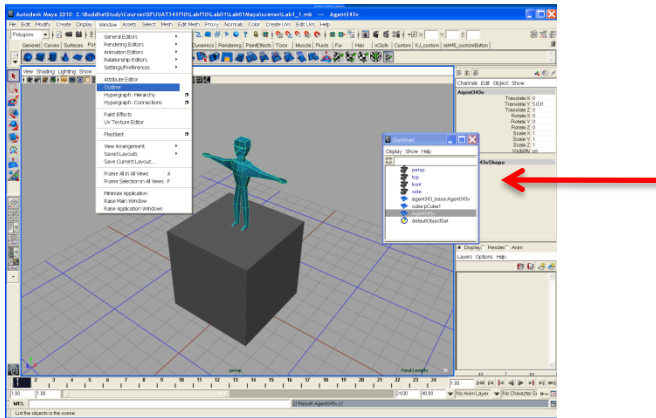
Lord of the Rings



The Mummy

Ex 1.2. Duplication

1. Using the **Selection** tool (or press 'q'), select a target object for duplication. By pressing **Ctrl + D**, we can duplicate an object on top of the original object. To verify this, open the **Outliner** which shows all the objects in the scene (go to **Window > Outliner**). Using the **Move** tool ('W'), reposition the duplicated object.
2. To generate multiple copies, Go to **Edit > Duplicate Special Option Box**. Select **Help > Help on Duplicate Special Options**.
3. Apply values in different parameters (e.g., **Number of copies, Rotate, Translate**). Each box next to **Translate, Rotate and Scale** indicates X, Y and Z values. Click **Apply**. You can select multiple objects, not just single, and apply the duplication. To group certain objects, apply **Edit > Group (or Ctrl + G)** and rename it (e.g. 'agent343Clan'). Save your scene as '**LastName_1_2.mb**'.



Important!

- Back up your files (USB or portable hard drive)
- Do not run your Maya file (*.mb) directly from USB.
- Always create a new project folder directory including all the default sub-folders. So, Maya 3D can search for the right location of your Maya files (under scenes sub-directory) and other scene assets.

Auto-save instruction

To save your scene automatically in timed intervals

1. Select Window > Settings/Preferences > Preferences. The Preferences window appears.
2. In the Categories, under the Settings section, select Files/Projects.
3. In the Autosave section, turn on Enable.
4. Set any additional options and click the Save button.

User Guide > General > Basics > File management > Autosave a file