

# CGDD 4113 Midterm Review

Chapter 1: Introduction to Computer  
Graphics and 3D

Maya topics covered in this chapter include the following:

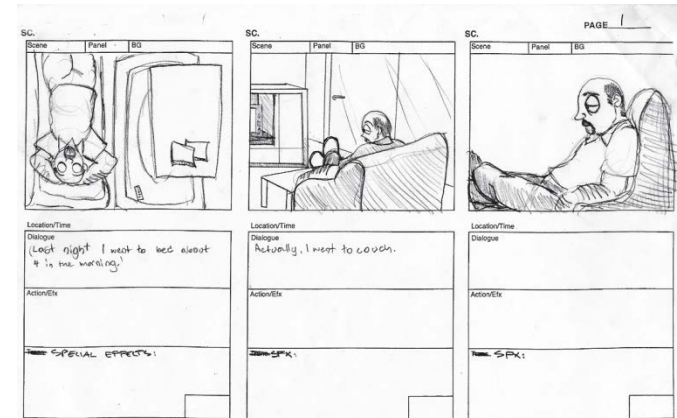
- Computer Graphics
- Stages of Production
- CG Production Workflow
- Core Concepts
- Basic Film Concepts

# Computer Graphics

- CGI: Computer Generated Imagery
- 3D Process as Photographic Process
  - Create, Layout, Animate, Render
- Animation: Change over time

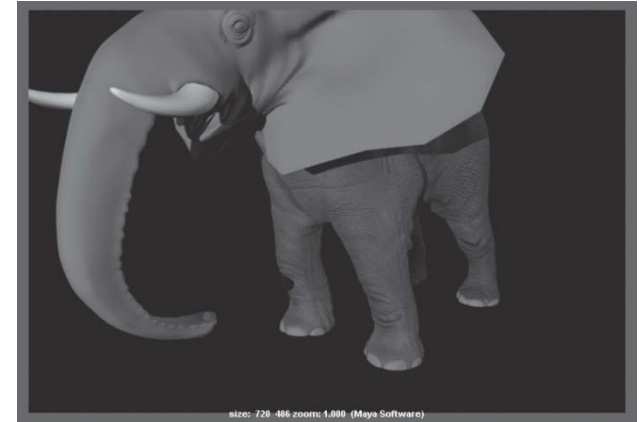
# Stages of Production

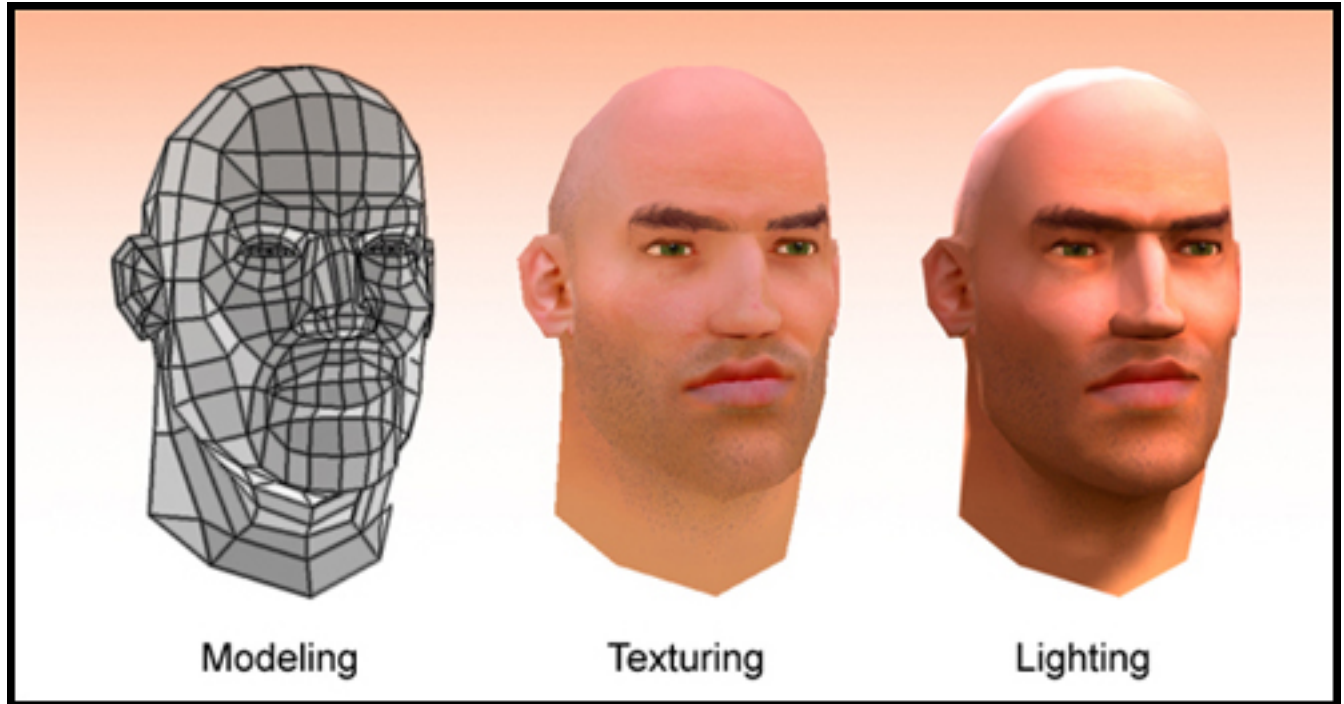
- PreProduction
  - Story
  - Script, Storyboard, Layout
  - Plan
- Production
  - Actualizing the Story
- PostProduction
  - Rendering
  - Compositing
  - Editing/Sound



# The CG Production Workflow

- Modeling
  - Characters
  - Environments
  - Props
- Texturing/Shading
- Animation
- Lighting
- Rendering





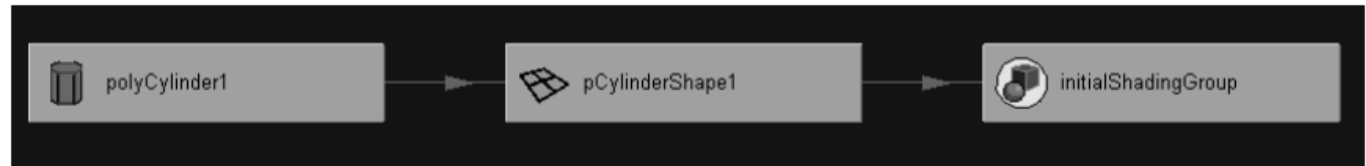
## Chapter 2: Jumping in Headfirst, with Both Feet!

# Creating Objects

- Manipulators give you interactive handles to move, scale, or rotate your objects
- Using Snaps helps in placing objects on the grid
- Primitives have several attributes to help define their shape and appearance



# Maya Node Structure



Transform Node

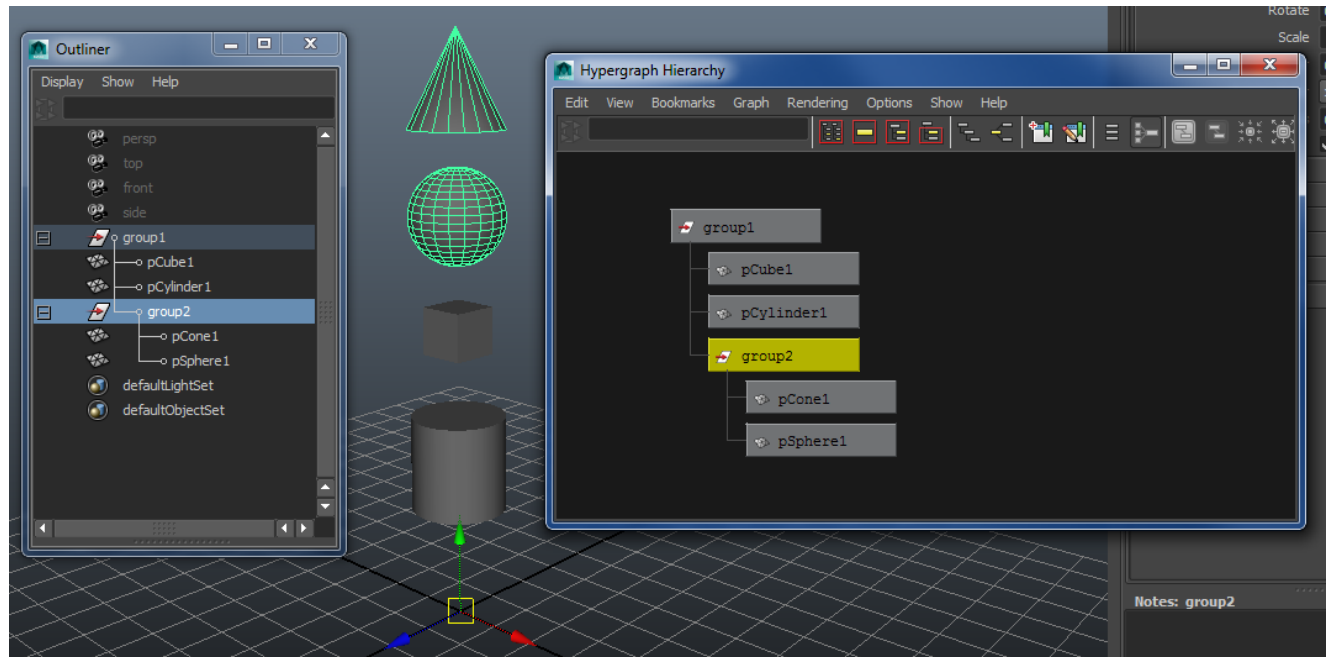
Shape Node

Shading Group Node

- Nodes encapsulate data
- Nodes interconnect to form the attributes and properties of objects
- They are accessed and modified in editors such as the Hypershade, Hypergraph, and Outliner
- With nodes, you can easily modify attributes of an object independently of other attributes

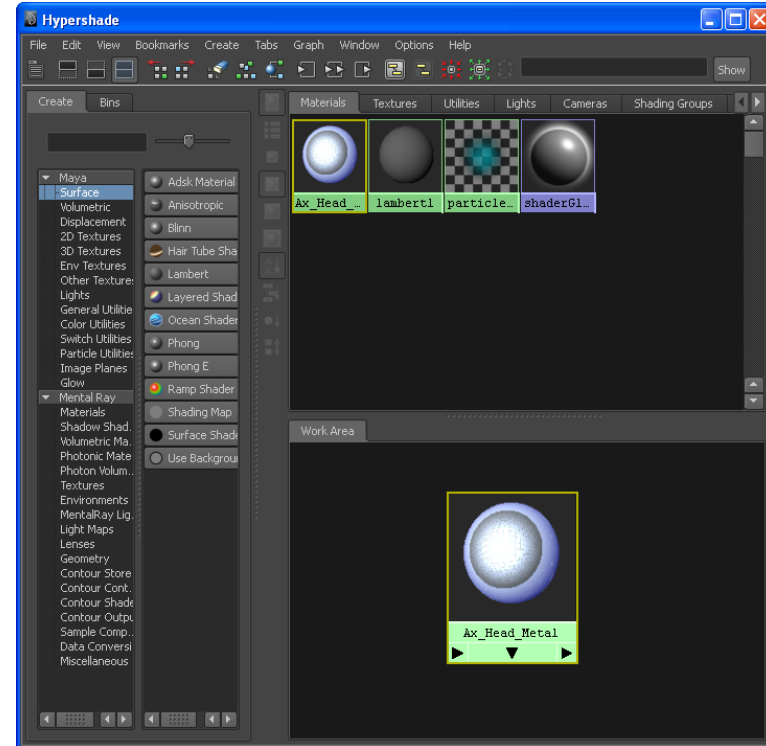
# Maya Object Structure

- Nodes
- Attributes
- Parents and Children
- Grouping/Parenting



# Assigning Materials

- Materials are created in the Hypershade
- Apply materials to objects by MM dragging a material from the Hypershade to the object or by right-clicking on a material and selecting Assign Material to selection



# Setting Keyframes

- There are various ways to set keyframes:
  - Press the 's' key when an object is selected
    - Creates a key for every keyable channel of an object by default
  - Keyframing specific channels
    - Allows you to specify which channels to keyframe, making the animation curves cleaner
    - Easier to edit
  - Auto Keyframe
    - Automatically sets keyframes on modified channels of an object
    - Easy and speedy workflow
    - Can be dangerous if you forget it is turned on, since it can easily record over animation

# Pivots and Placement

- All Maya objects can rotate about their local pivot point
- By default pivots are at the center of a newly created object
- To modify an object's pivot, press the 'insert' key and move the pivot gizmo
- An object can only have one pivot point; to simulate multiple pivots, group objects to themselves and set pivots on each of the groups

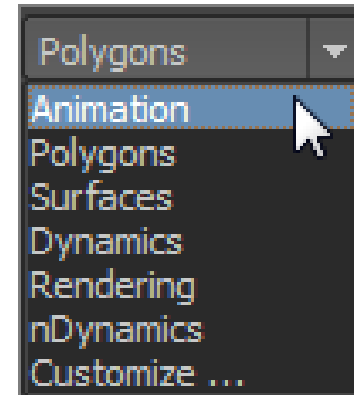
# Grouping and the Outliner

- Outliner is a great way to visualize the hierarchy of your scene.
- To parent a node to another, MMB drag the node to its new parent node.
- You can easily correct hierarchy issues by MMB dragging nodes to their proper parent.
- Grouping vs. Parenting

# Chapter 3: The Maya 2015 Interface

# Menus

- Menus are divided into Menu Sets and are organized according to their function
- Menu Sets include:
  - Animation
  - Polygons
  - Surfaces
  - Dynamics
  - Rendering
  - nDynamics
  - Customize...
    - To customize your menu set layout





# Status Line

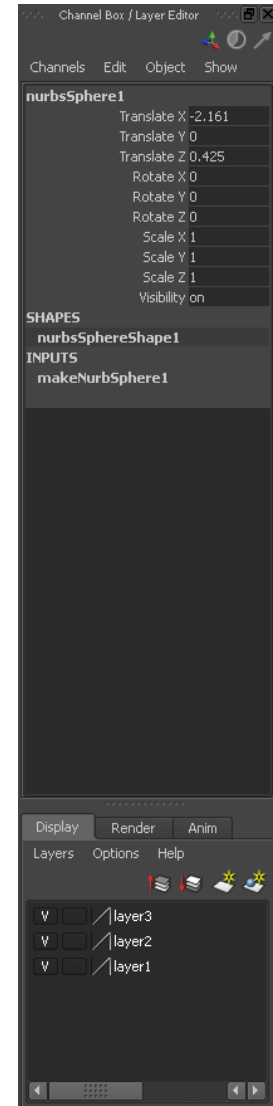


- Contains important icons
  - File Operations
- Selection Mode controls
  - Object Mode
  - Component Mode
- Snapping Functions
- Render Controls



# The Channel Box

- Lists the commonly animated attributes of a selected object
- Lets you quickly adjust attributes and add animation and expressions without having to open the Attribute Editor



# The Timeline/Range slider



- Displays the range of frames currently in your animation
- Allows you to playback or scrub an animation
- Controls what frame the current scene is on

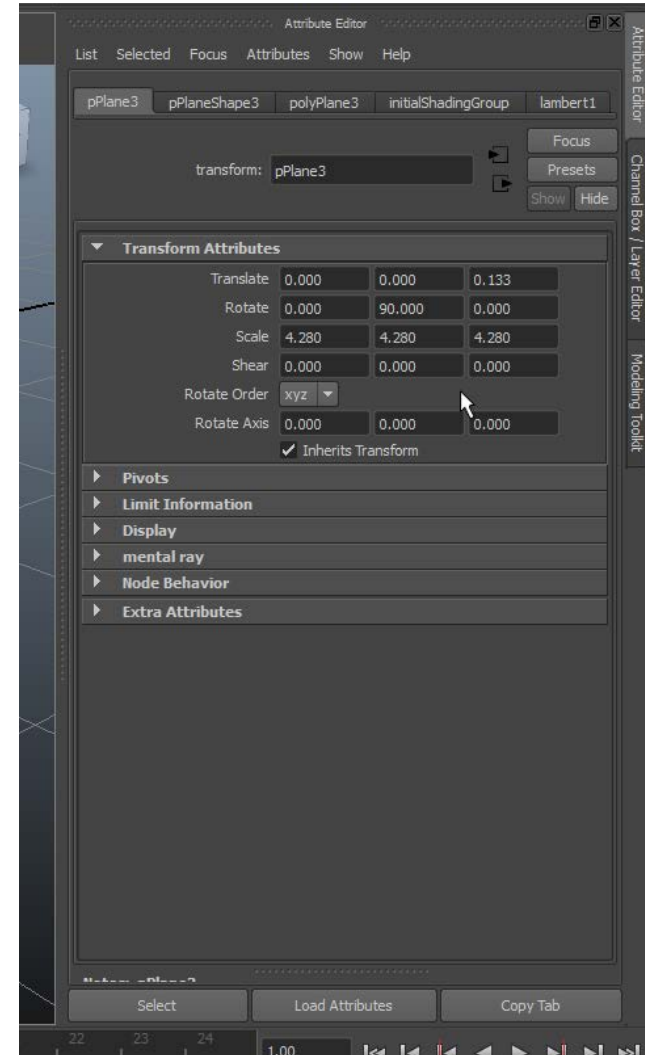
# The Command line, the Feedback line, and the Script Editor



- The Command line allows you to enter and execute MEL or Python commands
- The Feedback line tells you the status of a command
- The Script Editor allows you to write and execute MEL/Python script

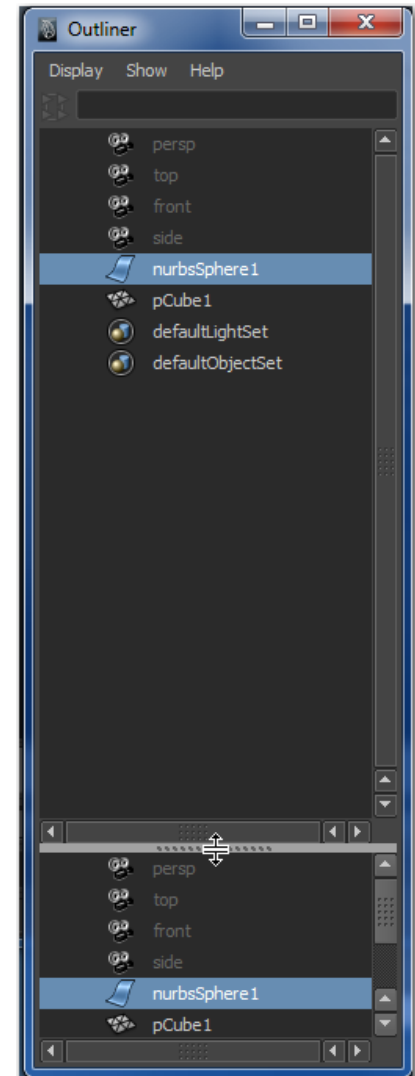
# The Attribute Editor

- Allows you to modify any attributes of a node of an object
- Creates tabs for an object's node structure
- Keep Notes on objects

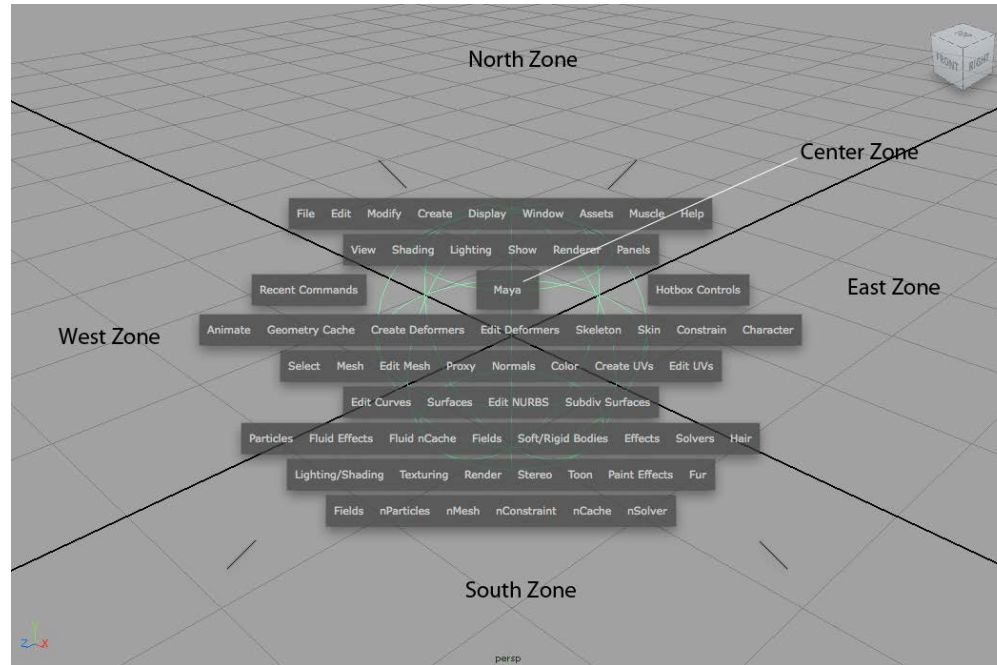


# Outliner

- You can select objects in your scene by selecting them in the Outliner
- To rename a node, double-click its Outliner entry and type the new name
- To relocate an object's entry in the Outliner to another location in the Outliner, MM drag the node's entry to place *in-between* two other node entries
- To parent one object under another, MM drag the node onto the new parent
- To pull an object out of a group, MM drag the node to a different location in the Outliner



# The Hotbox



- Provides convenient access to all menu commands
- Accessed by pressing and holding spacebar in a camera window



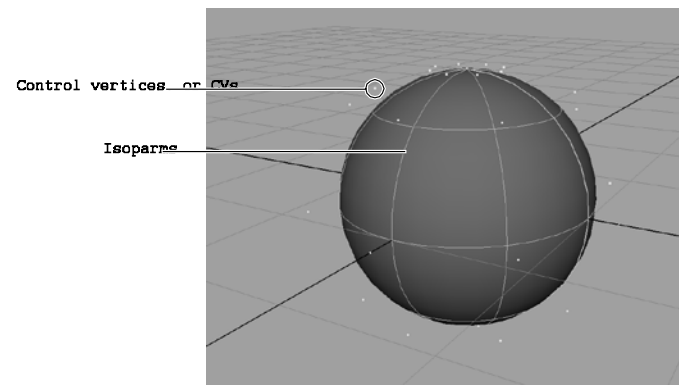
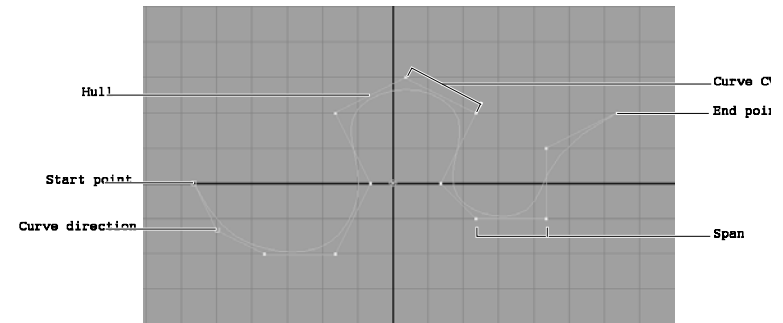
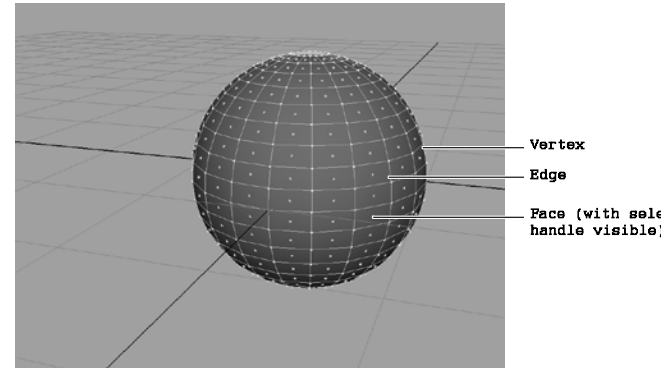
# Chapter 4: Beginning Polygonal Modeling

Maya topics covered in this chapter include the following:

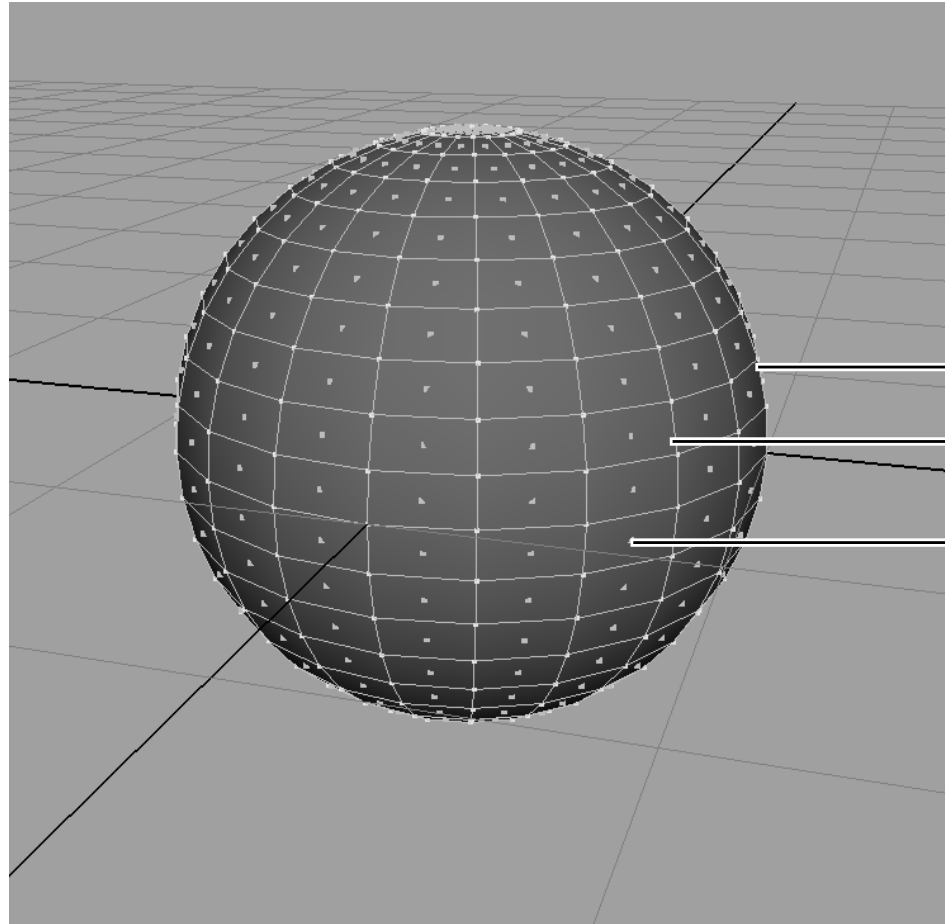
- Planning
- Polys vs. NURBS
- Polygon Basics
- Modeling Toolkit
- Polygon Editing
- A Poly model: Cartoon Hand
- Creating Areas of Detail
- Modeling the Catapult

# Polys vs. NURBS

- Polygons are made of faces that join together at Edges, with points called Vertices
- NURBS are based on smooth curves drawn between Control Vertices
- NURBS surfaces are created between isoparms and have spans

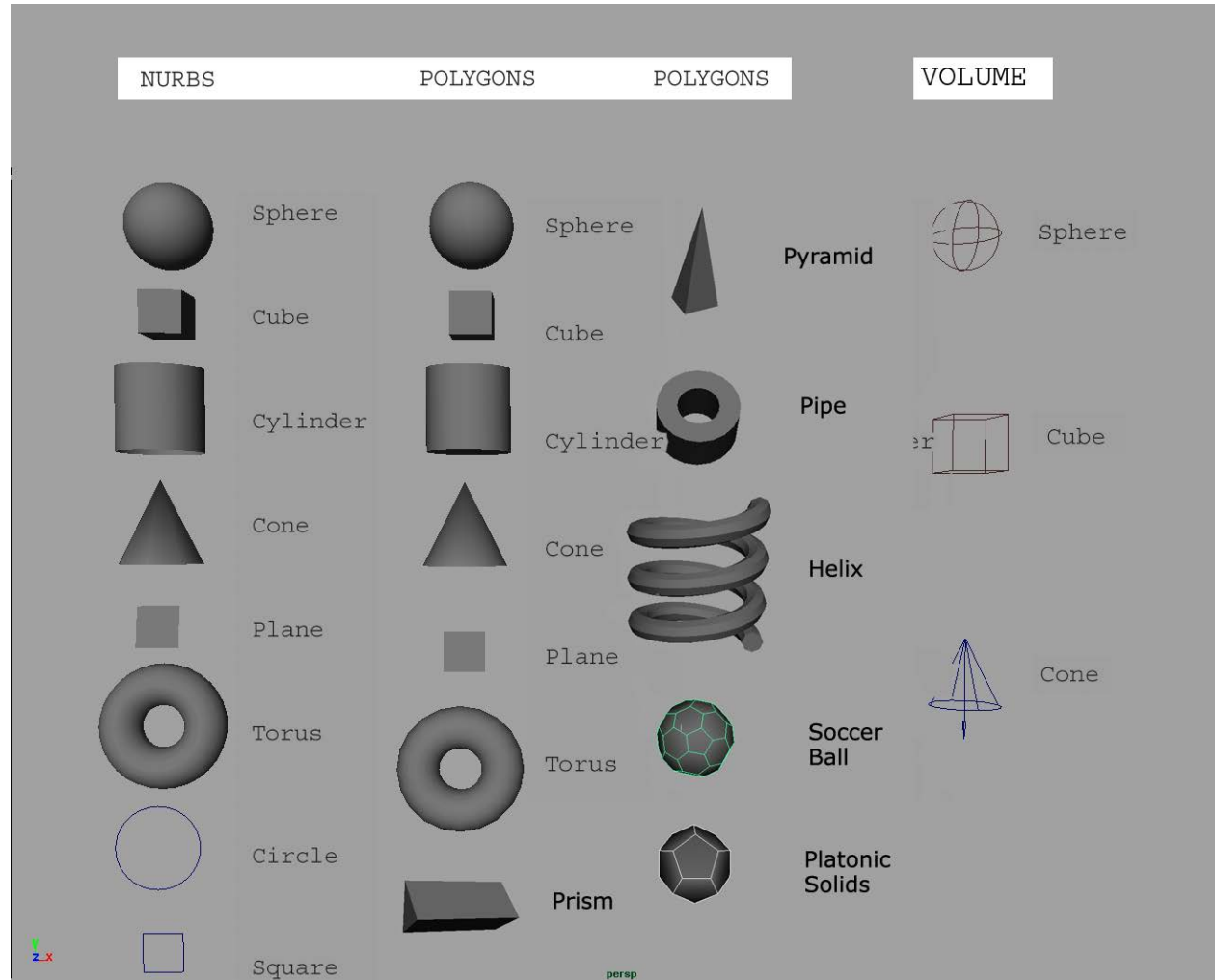


# Polygons



# Primitives

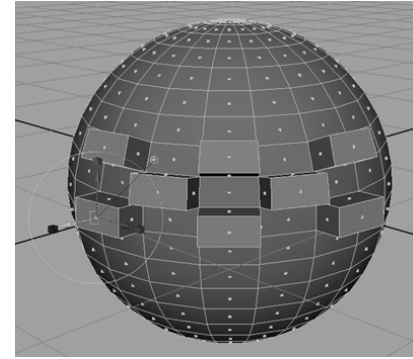
- Interactive Creation v. Traditional Creation



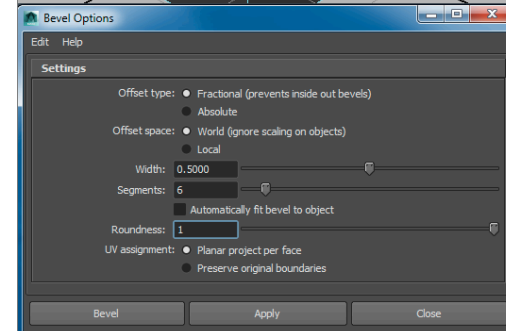
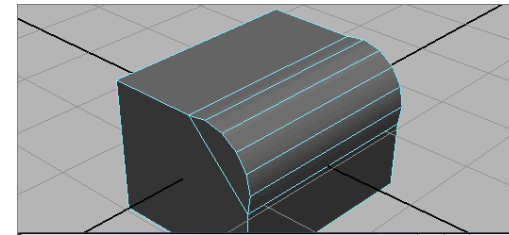
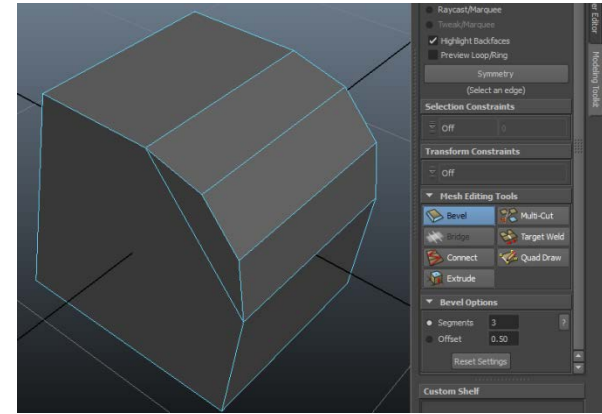
# Polygon Modeling

- Box modeling
- Use the same curves that NURBS surfaces use
- Create poly surfaces directly

# Polygon Editing

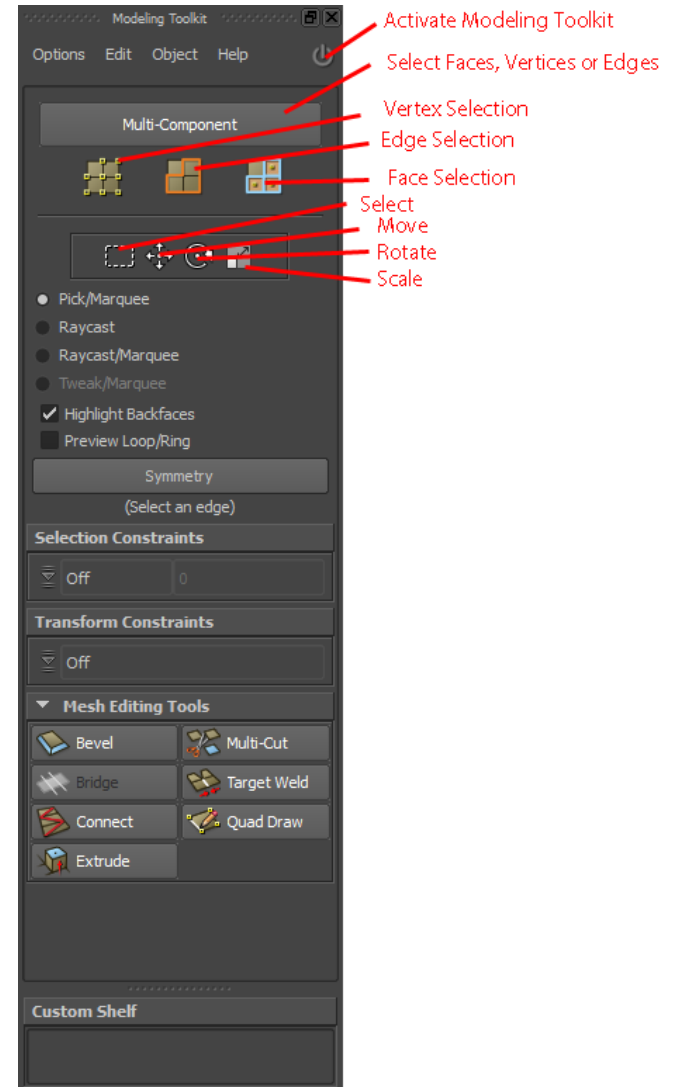


- Poly Extrusions and Bevels are popular tools
- Poly extrusion tools allow you to pull faces or edges out to form new poly faces, to expand upon your model
- Modeling Toolkit's Bevel vs. Maya Bevel – they can help round corners to help better catch light



# Modeling Toolkit

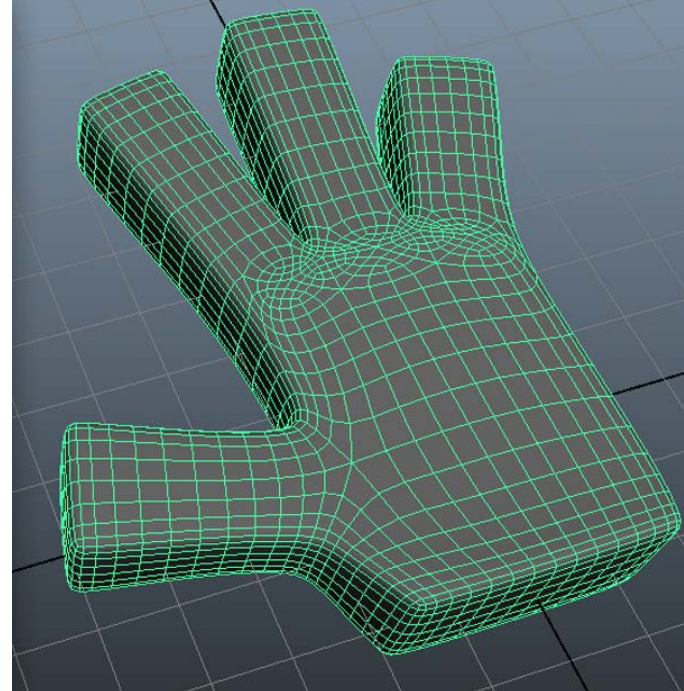
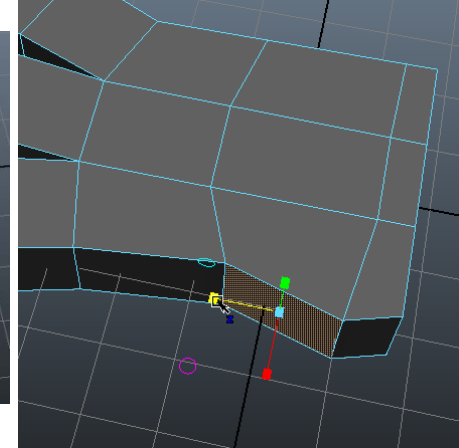
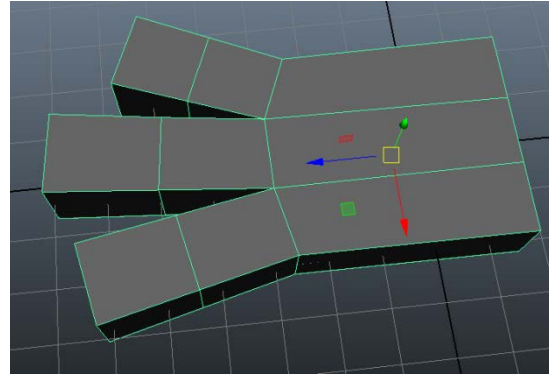
- Formerly known as the plugin NEX
- Combines workflows to make editing and creation easier
- Raycast selection rocks!
- Symmetry





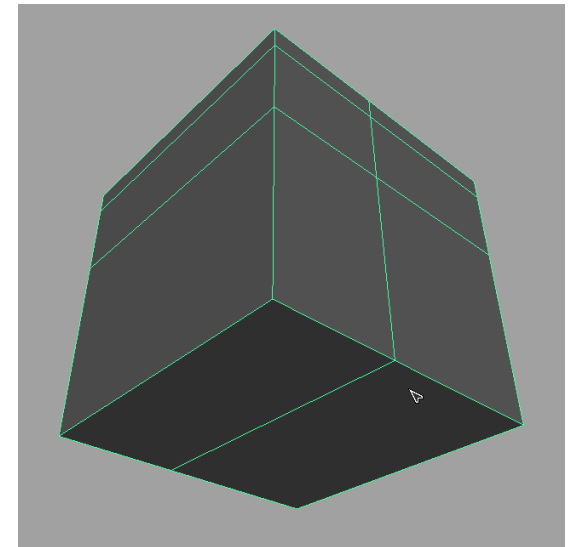
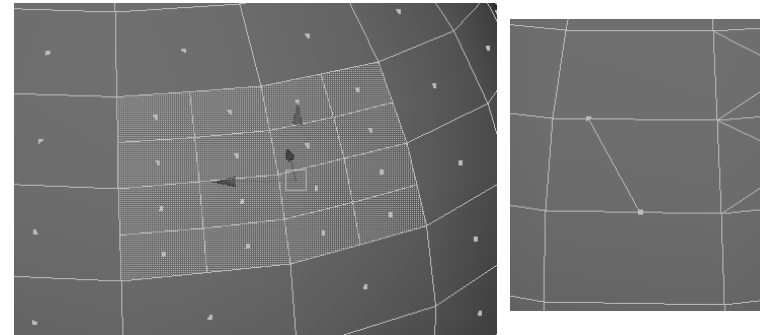
# Creating a Cartoon Hand

- You start with a simple Poly cube that is subdivided to allow for the proper extrusions
- Extrude faces to form the fingers and thumb
- Smooth the model to add subdivisions to manually edit points to sculpt a more detailed hand



# Adding Areas of Detail

- Adding detail usually involves adding faces and edges to create more vertices
- Subdivide Tool increases detail to the selection
- Interactive Split (a.k.a. Poly Split) tool is good for precisely adding edges where you need them
- Insert Edge Loop adds edges around the entire model
- Adding detail to the right areas is key to a well defined model



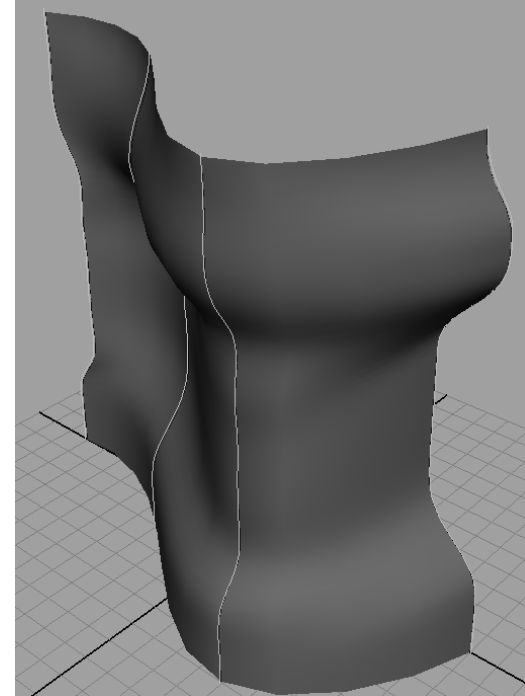
# Chapter 5: Modeling with NURBS Surfaces and Deformers

# Maya topics covered in this chapter include the following:

- Ways to make NURBS
  - Lofting
  - Revolve
  - Extrude
  - History
- Creating Polygons from NURBS
- Editing NURBS and Patch Modeling
- Modeling with a Deformer

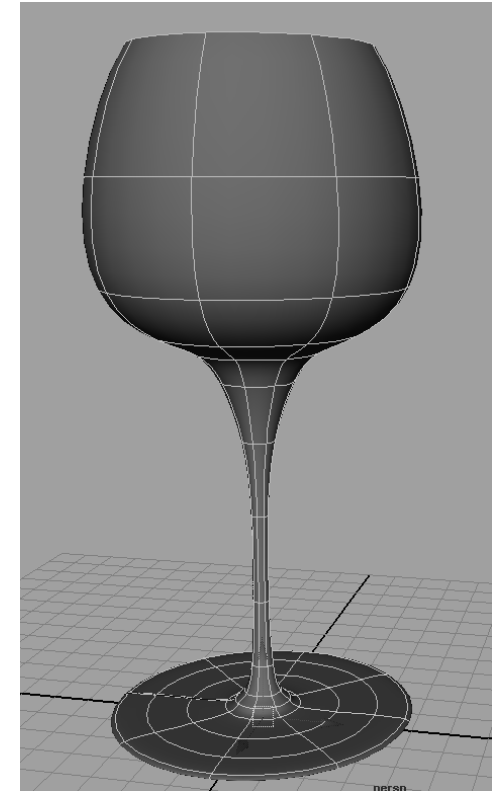
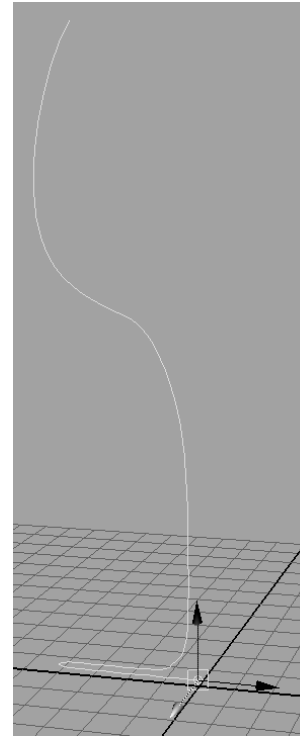
# Lofting

- A common method for creating surfaces is to use the Loft Tool
- Lofting involves creating geometry that connects between two or more curves



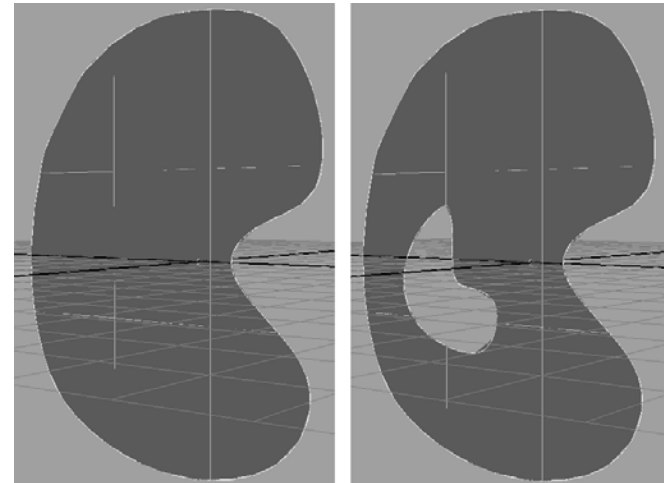
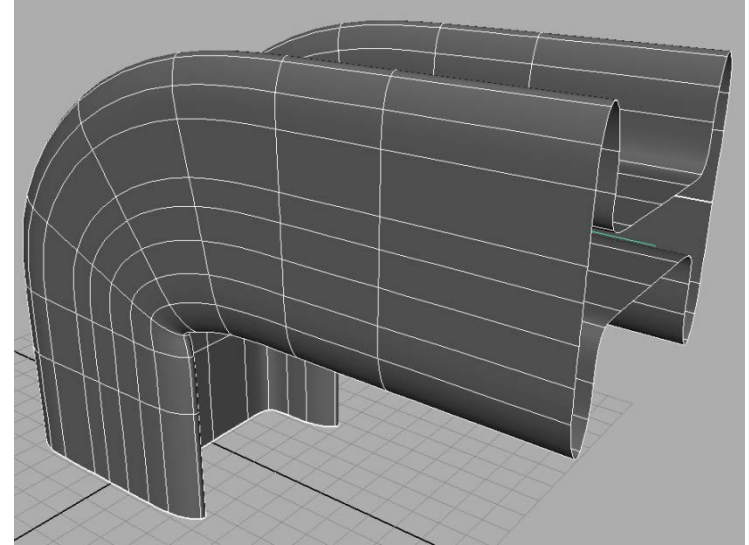
# Revolve Surface

- Revolve surface is also known as a lathe in other 3d packages
- Revolving requires a profile curve to define the shape and an axis around which to revolve



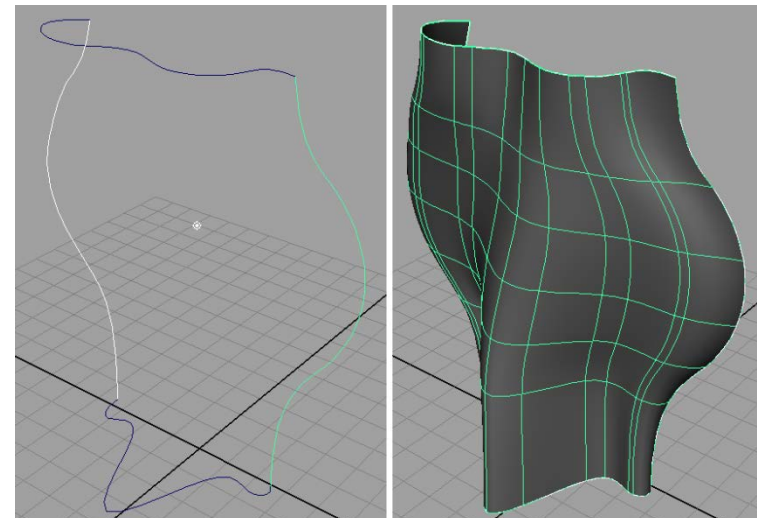
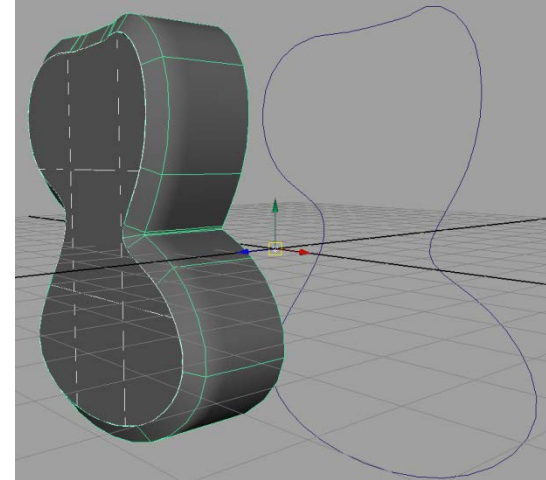
# Extruded and Planar Surfaces

- Extruding requires a profile curve and a path curve along which the profile extrudes
- Planar surface creates a perfectly flat shape according to its outline curve(s)



# Beveled and Boundary Surfaces

- A Beveled Surface creates a closed shape from an open or closed curve
- Boundary surface is created between the boundaries of adjacent curves



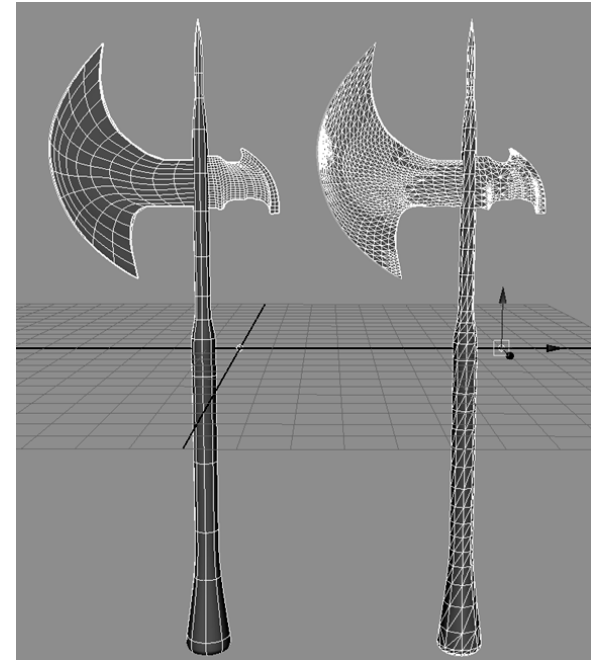


# Surface History

- Surface History creates a link between tools and actions, allowing you to edit one of the original elements of the surface and have the surface dynamically update
- Surface History is important to use when creating surfaces, but usually history should be deleted once the surface is as desired
- Yeah, like that!

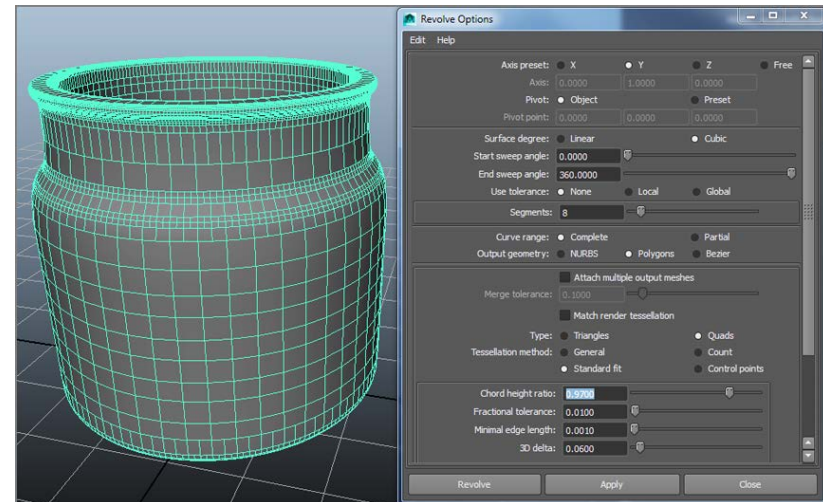
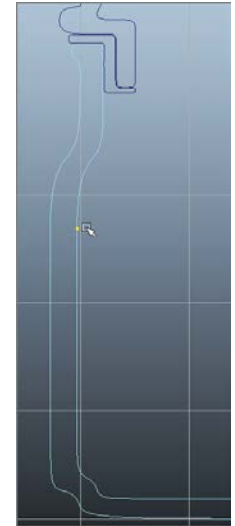
# Converting to Polygons

- You can create Polygons directly from the NURBS surface tools
- You can create NURBS models and later convert them to polygons
- Using deformers to easily edit parts of the axe to a desired shape
- Converting to Polys gives you the benefit of having a singular surface as opposed to multiple patches, as well as simplifying the rendering process
- Learning how to convert from a NURBS surface to a Poly mesh is a learned art!



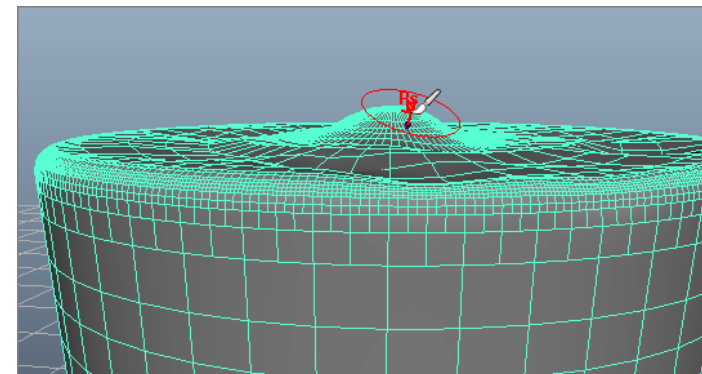
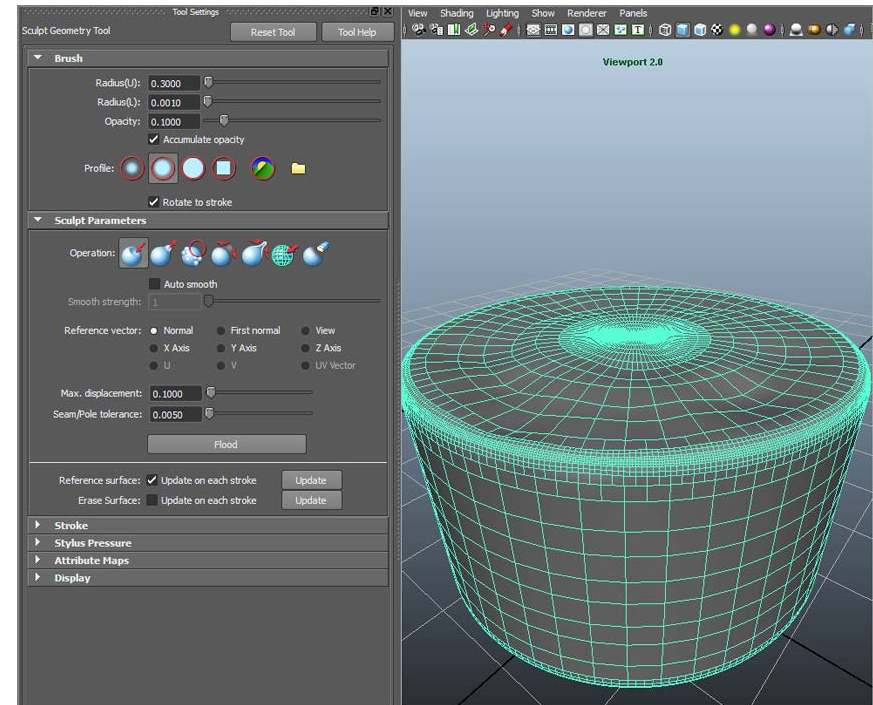
# Creating NURBS Surfaces

- Creating curves to make surfaces
- Revolve surface to make a candle jar
- The number of CVs dictate the surface density
- Creating directly to poly mesh



# Sculpting Surfaces

- Using the Sculpt Geometry tool once you've revolved the candle mesh



# Modeling with a Lattice

- Lattices will help shape a model and can be animated
- A lattice can affect part of or an entire model
- Remove the lattice when finished

