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

- 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
Shelves

• A shelf is a row of icons at the top of the workspace that allow you to quickly access menu items or MEL scripts
• By default, there are a variety of shelves that group similar items
• Shelves increase productivity by saving time hunting through Maya’s complex menu system
• Shelves are customizable
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

<table>
<thead>
<tr>
<th>NURBS</th>
<th>POLYGONS</th>
<th>POLYGONS</th>
<th>VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphere</td>
<td>Sphere</td>
<td>Pyramid</td>
<td>Sphere</td>
</tr>
<tr>
<td>Cube</td>
<td>Cube</td>
<td>Pipe</td>
<td>Cube</td>
</tr>
<tr>
<td>Cylinder</td>
<td>Cylinder</td>
<td>Helix</td>
<td>Cone</td>
</tr>
<tr>
<td>Cone</td>
<td>Cone</td>
<td>Soccer Ball</td>
<td>Cone</td>
</tr>
<tr>
<td>Plane</td>
<td>Plane</td>
<td>Torus</td>
<td>Platonic Solids</td>
</tr>
<tr>
<td>Torus</td>
<td>Torus</td>
<td>Circle</td>
<td>Square</td>
</tr>
<tr>
<td>Circle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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