Modeling

Anuj Agrawal
Dan Bibyk
Joe Pompeani
Hans Winterhalter
Modeling

• Joe
  o Polygon Models
  o NURBS
  o Subdivision Surfaces
  o Locators

• Hans
  o Splitting polygons, joining objects, extruding faces
  o Extrude, Loft, Revolve, Trim, Fillet Blend Surfaces
  o Instances vs. Copies

• Dan
  o Textures & Material Properties
  o Manipulating & Deformers

• Anuj
  o Hierarchical Modeling
  o Grouping and Parenting
  o Kinematic Chains and IK Handles
Polygon Primitives
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NURBS

• Non-Uniform Rational Basis Spline

NURBS
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Subdivision Surfaces
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Locators

- Locators are used to find the distance between points.
- Can be constrained to objects.
Locators can show the distance between objects
Splitting Polygons
Splitting Polygons
Joining Objects
• Click both objects (shift+click)
• Combine
Extruding Faces
EP Curve Tools: Create a curve on the grid or live surface specifying edit points.
Loft
Instances vs Copies

• Think of copies as completely fresh objects taking form of copied object
• Instances have geometry dependent on original
• Copies can be assigned shader independently
Texture Mapping

• The projection of a 2D image onto the surface of a 3D object.
• Can be done through Maya’s stock texture library, custom manipulated textures, or imported images (.jpg, .png, etc).
• Advanced texturing involves features like custom UV coordinates and 3D layered textures (ex. Bump maps).
Setting Up Textures in Maya

- In Render panel, select shader (ex. Lambert).

- In attributes click on right box next to “Color” to change texture image.
Selecting an Image

- Select stock texture or choose “File” for imported texture.
Mapping UV Coordinates

• Go to Window> UVTexture Editor or select Create UVs in Polygons panel.

• UV options include Planar, Cylindrical, Spherical and Automatic Mapping.

• “Move UV Shell Tool” can manipulate geometry to coordinates of texture image.
Materials - Overview

- Materials/Shaders control the appearance of a 3D objects surface in lighting and rendering (result of raytracing).
- In Maya, most materials are controlled by networks of nodes determining different aspects.
- Regular surface materials:
  - Lambert (default), Phong/PhongE, Blinn, Anisotropic
- Others:
  - Layered Shaders, Shading Maps, Bump Maps, etc.
Materials – Hypershade Menu

- Right-click Materials Panel > Graph > Graph Materials on selected objects.
- Work area displays network of materials applied to object.
- Right click material for additional options (ex. Assign material to selection or paint assign shader.)
Manipulators – Basic

• All basic manipulators rely on click-and-drag axis controls.
• Axis and transformation paths depend on tool settings.
• All can be applied to edges, faces and whole objects.
• Move transformations can be done to vertices.
Manipulator Settings

• Move Axis
  – Determines axis of X,Y,Z plane based on object, world or custom coordinates.

• Joint Orient Settings
  – Determines rotation point, useful for setting up pivot points on hierarchical objects.

• Move Snap Settings
  – Objects can be limited to placement on grid or other object coordinates.
Other Manipulators – Soft Select

- Can be applied to vertices, edges, and faces.
- Allows for “sculpted” manipulation of polygons.
- Falloff settings in control panel set shape of the transformation.
Deformers

- Used by animators for non-linear bending/twisting motions.
- Used by modelers to manipulate geometry smoothly.
- Ex: non-linear bend to plane
Deformers

- Ex.1: Wave deformation to plane.
- Ex.2: Squash deformation applied to NURB cube.

- Other deformers:
  - Cluster: batch vertices/other data types for manipulation. Useful for animating isolated parts.
  - Sculpt: Organic-esc manipulation of geometry.
  - Jiggle: used for rippling deformations in motion
Hierarchical Modeling

• Node is unit of information
  o Sphere = creation node + transform node + shape node
• Hierarchy is a grouping of child nodes under parent nodes

• View in the Outliner and Hypergraph.

• Parenting is not Grouping
  o Parenting transformations are automatically applied to all children nodes
    ▪ Limbs
    ▪ Joints
• Grouping is not Parenting
  o Grouping involves independent objects sharing a pivot
    ▪ Solar System
Hierarchical Viewing

Outliner

Hypergraph

Leg Model
Grouping

- Create Group Node
- With Shared Pivot Point
- Apply changes to Pivot Point
- Ungroup

- Solar System
Parenting

• Middle-click Drag!!

• Unparent
Kinematic Chains and IK Handles

- Rigid body segments connected by joints
  - Limbs
- Forward Kinematics (FK)
  - Every Joint
- Inverse Kinematics (IK)
  - Highest Joint to Lowest
  - Faster
  - ->
- Single Chain (SC)
- Rotate Plan (RP)
- Spline
IK Handles

• Three Kinds of Handles
  o Single Chain (SC)
    ▪ Articulated features with joints between root joints
  o Spline Handle
    ▪ Curvy, Twisty shapes
  o Rotate Plane (RP)
    ▪ Pole Vector
    ▪ Twist
IK Handles: How To

• Skeleton >
  o Joint Tool
  o IK Handle Tool
    ▪ ikSCsolver (SC)
    ▪ ikRPsolver (RP)
  o IK Spline Handle Tool
    ▪ Spline
• Click first Joint location
• Shift-Click next (or last) joint location
• Press Enter to complete
Questions/Comments

Thank you!