Modeling

Anuj Agrawal Dan Bibyk Joe Pompeani Hans Winterhalter

Modeling

Joe

Polygon Models

- NURBS
- Subdivision Surfaces
- Locators

• Hans

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

• Dan

- Textures & Material Properties
- Manipulating & Deformers
- Anuj
 - Hierarchical Modeling
 - Grouping and Parenting
 - Kinematic Chains and IK Handles









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http://en.wikipedia.org/wiki/File:NURBS_3-D_surface.gif





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Locators

- Locators are used to find the distance between points
- Can be constrained to objects

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Locators





Locators can show the distance between objects

Splitting Polygons

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Joining Objects



- Click both objects (shift+click)
- Combine





Extruding Faces











Revolve







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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

MARA

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).

General Editors

Rendering Editors

Animation Editors

Relationship Editors

Settings/Preferences

Hypergraph: Hierarchy

Hypergraph: Connections

Attribute Editor

Paint Effects

Playblast

UV Texture Editor

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Material Sample

Common Material Attributes

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In attributes click on right box next to "Color" to change texture image.

Selecting an Image



 Image: 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, Aniosotropic
- 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.

 Move Settings 	
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Snap to live polygon:	Retain component spacing Face center Vertex
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 Soft Selection 	
Soft Select:	

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

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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

 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

- Parenting transformations are automatically applied to all children nodes
 - Limbs
 - Joints
- Grouping is not Parenting
 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



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
 - o ->
- Single Chain (SC)
- Rotate Plan (RP)
- Spline

"Rigging"



IK Handles

Three Kinds of Handles

 Single Chain (SC)
 Articulated features
 with joints between

root joints

 Spline Handle

 Curvy, Twisty shapes
 Rotate Plane (RP)
 Pole Vector
 Twist







IK Handles: How To

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



Questions/Comments

Thank you!