Blender Modeling Blitz

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Blender Resources

- Main portal: http://www.blender.org
- Support: http://www.blender.org/support
  - User's guide, tutorials, etc.
  - Blender Stack Exchange (for asking questions)
  - Plenty of external Blender support sites

Outline

- Interface basics
- Editing
- Texturing
- Export

Subwindow ("Area") Control

- Grab handle (at lower left and upper right)
  - Pull into window to split into two
  - Pull onto neighbor window to join (look for arrows)
- The type of the window is controlled by a drop-down list of icons at the left bottom or left top
  - The most common type for this exercise is the 3D View window, whose icon is a cube

Navigating

- ## Note

- Three button mouse emulation is File->User Preferences->Input->Emulate 3 Button Mouse

- Numpad emulation can be turned on by checking File->User Preferences->Input->Emulate Numpad

- Spin: MMB=middle mouse button (or ALT-LMB)

- Pan: SHIFT-MMB (or SHIFT-ALT-LMB)

- Zoom: CTRL-MMB (or SHIFT-ALT-LMB)

- Front view: NUMPAD-1 (Back view with Ctrl)

- Side view: NUMPAD-3 (Other side view with Ctrl)

- Top view: NUMPAD-7 (Bottom view with Ctrl)

Modes

- Object mode (at startup)
- Edit mode (for poly editing)
- Sculpt mode
- etc.

TAB toggles between

Saving

- Save your work often at various stages of completion
- File -> Save As, mouse over file name, and then hit NUMPAD +KEY to increment the version number

Editing

- Selecting
- Modifying
- Adding

Selecting (Edit Mode)

- Selection is orange, rest is black
- Select/unselect all: AKEY
- Select/unselect a single vertex: RMB
- Add/remove a vertex from set: SHIFT-RMB
- Edge selection: ALT-RMB
  - Or choose edge (or face) selection mode by pushing buttons below window
- Box select: BKEY (adds to selection)
- Circle select: CKEY (m. wheel scales circle)
- Note the "limit selection to visible" button

Modifying

- Translating: GKEY to Grab, LMB to drop
  - Can follow GKEY by, e.g., XKEY to constrain motion to X axis...also works for scale and rot
- Scaling: SKEY to start, LMB stops
- Rotating: RKEY to start, LMB stops
- Undo:
  - RMB (instead of LMB) undoes modification
  - CTRL-ZKEY undoes various mesh edits (and many other operations besides)

Adding

- Adding geometric solids
  - Add (or SHIFT-AKEY) -> Mesh
- Extruding
  - Select all desired vertices (e.g. that make up a face), EKEY begins, LMB ends
- Adding single vertices, edges, and faces
  - Add vertex: CTRL-LMB (with nothing selected)
  - Add edge or face: Select two or more vertices, then FKEY
- Subdividing
  - Press button in left side panel

More Internal Refinement

- Allow adding more vertices (and thus shape control) to the interior of the mesh
- Loop cut and slide
  - Hit CTRL-R
  - Move mouse until the right new loop is visible (LMB to lock in)
  - Move mouse to slide it (LMB again to lock in)
- Knife tool
  - Hit KKEY
  - LMB defines segments of the cut line
  - ENTER executes the cut

Other Modeling Tools

- ## Subdivision Surfaces

  - In a Properties pane, select Modifiers (wrench icon), then Add Modifier->Subdivision Surface. Control number of polygons in View field.

  - To convert to polys, click Apply

- ## Proportional Editing

  - In edit mode, OKEY. Select vertices and GKEY to move. Mouse wheel or PAGE-UP/PAGE DOWN controls radius. Drop down box controls falloff.

- ## Sculpting

  - Select Sculpt Mode. Controls are at left. Use LMB to sculpt

Yet More Modeling Tools

- Spin
  - Draw a 2D shape (possibly starting from a circle).
  - In edit mode, select Spin on the 3D tool shelf at the left of the 3D editor
  - Correct the options that come up at the bottom of the 3D tool shelf, particularly the axis, angle of rotation, and number of steps

Modeling from Blueprints

- Sometimes it's convenient to model an object directly from a blueprint or set of plan views pasted into the 3D editor

- Blender allows you to assign images to plan views using the Background Images panel of the Properties shelf at the right of the 3D editor (press N to toggle visibility) **provided**:

  – Orthogonal, rather than perspective, viewing is on (controlled from View menu)

  – The object is viewed from a plan view that has been assigned a background image

Texturing

Window setup

- UV Unwrapping
- Texture painting inside Blender
- Texture painting using external tools (GIMP)

Window Setup

- There is a screen layout selectable from the drop down list called "UV Editing"
- The left pane is a UV/Image Editor and the right is a 3D View

UV Unwrapping

- Go into Edit mode
- UKEY, then select unwrapping mode. "Unwrap" and "Smart UV Project" are nice.
- The outline of some of the model poly's appears in the UV window. Usually it will be a mess at first.
- In edit mode, select edges, hit CTRL-EKEY and select Mark Seam. This will allow Blender to cut the model along the seam.
- Unwrap again. Repeat until satisfied.
- Translate, scale and rotate the outline as desired

Creating a Texture

- In the Image Editor, Image→New Image, then enter a name (something.png) and dimensions for the texture (square, powers of 2)

Link the Texture to the Model

- If mesh doesn't have a material, add one in the Material tab of the Properties window
- In the Textures tab, if there is no unused texture, click an empty slot and then 'New' to add one
- Select "Image or Movie" as the type
- Then in the Image sub-pane, click the picture drop-down and select your image file
- In the Image Mapping sub-pane Coordinates drop-down, select UV

Texture Painting (in Blender)

- In a UV/Image Edit window, select the image to be painted
- In the 3D window, select texture paint mode
- Apply paint!
- In the UV/Image Edit window, select Image→Save as Image, and save the image to the same directory as your *.blend file
- Hotkeys:
    - F: brush size
    - SHIFT-F: brush intensity
    - S: sample color

Texture Painting (in GIMP)

- Select all verts in UV window, then UVs->Export UV Layout. Bitmap dimensions are selectable from the sidepanel at left.

- Open this file in your paint program (GIMP or similar)

Texture Painting in GIMP, Cntd.

- Add a new layer above the guide image (GIMP: Layer->New Layer)

- Make the new layer partially transparent so we can see the guide (GIMP: In Layers window, select layer and move the Opacity slider)

- Now paint your texture. Save as a *.png file (GIMP goes by your filename).

THREE Export

- Download the THREE exporter for Blender
- Install in appropriate script directory (see included instructions)
- Enable the three.js exporter in File->User Preferences->Add-Ons->Import-Export
- The exporter should now appear in File->Export

Advanced Topics

- The slides below are placeholders for future expansion

Terrain

- Geo-typical
  - Try using the Ant plugin that ships with Blender
- Geo-specific
  - TIFF height maps can be downloaded
  - Then UV mapped to a grid
  - Then used as a height modifier to produce polygonal terrain

Animation

- Morph animation
  - Used to animate mesh distortions (like facial expressions)
  - Called "shape keys" in Blender
  - Animation in Three needs to be driven by custom code
- Skeletal animation
  - Used for human figures, animals, robots, some types of machines
  - Skeletons are called "armatures" in Blender
  - Seem to require less code for simple uses

Other

- Foliage generation with Sapling
- Enforcing symmetry with mirror modifiers
- Normal manipulation