Objectives:

• Edit Mode
• Mesh Modeling
• Subdivision
• Head Modeling
Edit Mode

• Operations in Edit Mode affect only the vertexes /edges /faces of an object.

• **Tab** : Switch between Edit Mode and Object Mode
What is Mesh?

- A mesh is a collection of vertices and polygons that defines the shape of a polyhedral object in 3D
- Meshes usually consist of triangles and quadrilaterals
- Vertex, Edges, Faces
Mesh Modeling (1): Selection

• Three type of edit modes

Vertices

Edges

Faces
Mesh Modeling (2): Selection

- **Right Click**: Select a vertex (edge / face)
- **Shift + Right Click**: Add/deselect a vertex (edge / face)
- **A**: Select/deselect all vertexes (edges / faces)
- **B**: Drag an area to select the vertexes (edges / faces)

The same keys as object selection!
Mesh Modeling (3): Selection

- G : Grab and move the selection
- R : Rotate the selection
- S : Scale the selection

The same keys as object transformation!
Mesh Modeling (4): New Hotkey

• E : Extrude selection

Extrude Vertexes

Extrude Edges
Subdivision

• **What** is Subdivision?
  Add extra faces to refine the meshes
Subdivision

• Why Subdivision?

If I want to change the shape of an object...

Too many vertexes to modify

VS

Only 8 vertexes to modify
**Subdivision**

- **How Subdivision works?**
  
  Generally, nothing but averaging ...

  The new vertex in the middle is computed by averaging the neighbors.
Subdivision in Blender

- Select an object
- In Right Window select Modifiers
- Add Modifier Subdivision Surface
- Select View Value
- Apply
Exercise 1

- Simple mesh modeling with subdivision
- Pawn model
Ten Steps to Build Pawn

1. Add an UVSphere with 8 rings, 8 segments.
2. Select ortho view.
3. Select front view.
4. Add Modifier.
Ten Steps to Build Pawn

2

- Turn off Limit selection to visible
- Select the bottom vertexes
- Delete the bottom
Ten Steps to Build Pawn

3

- Select the bottom 8 vertexes
- **E** extrude ‘Edges’
- Remember to press **Z** so that edges extrude along z axis
Ten Steps to Build Pawn

4

• Press **E**, then
• Press **S** to scale the bottom
Ten Steps to Build Pawn

5

- E for extrude
- Keep using Z key to constrain the extrusion
Ten Steps to Build Pawn

6

- Press **E** for extrude, then
- **S** for scaling
Ten Steps to Build Pawn

7

• E for extrude, S for scale
• Keep doing twice
• Don’t forget z key…
Ten Steps to Build Pawn

8

- E for extrude again
- Use z key again…
- Extrude the bottom twice
Ten Steps to Build Pawn

9

• E then S for scaling

• Use Ctrl key for precise movement, use Shift for finer step movement. Or use them both.
Ten Steps to Build Pawn

10

• **W** to open Special menu

• Merge the 8 vertexes into one
Finished?

- Back to Object mode.
- Render it (F12).
Remember!

- **Tab** - Switch between Edit Mode and Object Mode
- **B** - Rectangular selection
- **E** - Extrude selection
Reference

- http://www.blender.org/
- www.subdivision.org
Head Modeling: Ingredients

• Your ingredients:
  • Head pictures
  • Main operations:
    • Loop Select (Alt + Right Click)
    • Loop Cut (Ctrl + R)
    • Grab (G + X / Y / Z)
Head Modeling: Stage I – Preparation (1)

- Take photos
  - One for front view, one for side view
  - You can use digital camera, cell phone
  - We provide two photos for you to practice in comp4422-lab10-examples.zip

Align the camera position and the head position horizontally.
Head Modeling: Stage I – Preparation (2)

- Set to Ortho View (NumPad 5)
- Split window in Front View (NumPad 1), and Right View (NumPad 3)
- Load the photos as Background Image
Head Modeling: Stage II – Basic Sketch (1)

- In **Front View**, start with a new plane and enlarge it a little
- Rotate it along **x-axis** with **90°**
- Extrude inward
  - **Select Four Edges**,
  - Press **E**, then **Esc**
  - Press **S**
Head Modeling: Stage II – Basic Sketch (2)

- Delete the face in the middle
  - Use face select mode (Ctrl + Tab)
  - Select the middle face, press Del
- Delete the original face
Extrude the bottom part
- Select the lower two vertexes
- Press E, extrude downward
- Extrude inward, delete the middle face
Head Modeling: Stage II – Basic Sketch (4)

- Move vertexes in Front View
  - Back to vertex select mode
  - Move every vertex individually (Right click and G)
  - Cover the face in front view
Head Modeling: Stage II – Basic Sketch (5)

- Move vertexes in Right View
  - Move every vertex individually (Right click and G), so that...
  - Cover the face in right view
- Remember to use Y key when use G
Head Modeling: Stage III – Progressive Editing

- Strategy
  - Attach the face feature lines
  - Split–adjust–split…
Head Modeling: Stage III – Progressive Editing(1)

- **Split**
  - Introduce more vertexes to represent more complex shape

- **Adjust**
  - Adjust the new vertexes first before next split

![Split: Edge Cut (Ctrl + R)](image1)

![Adjust in side view: Grab (G + Y)](image2)
Head Modeling: Stage III – Progressive Editing(2)

- Split (Ctrl+R)
- Adjust (G)
- Keep doing Split & Adjust iteratively…

Split: Edge Cut (Ctrl + R)
Adjust in side view: Grab (G + Y)
Head Modeling: Stage III – Progressive Editing(3)

- Nose
  - Select a face
  - Extrude (E) in Y direction
  - Extrude inward
  - Delete the unwanted faces
Head Modeling: Stage III – Progressive Editing(4)

- Eyes
  - Use split & adjust
Head Modeling: Stage III – Progressive Editing (5)

- **Mouth**
  - Use split & adjust
  - But, try to keep the mesh simple
Head Modeling: Stage III – Progressive Editing(6)

- Skull
  - Use Extrude (E)
  - Extrude-adjust-extrude
  - Cover the whole skull
  - Keep the mesh simple
Head Modeling: Stage III – Progressive Editing(7)

- Chin
  - Use Extrude (E)
  - Connect the previous faces (4 vertexes + F)
Head Modeling:
Stage III – Progressive Editing

Result at present
Head Modeling: Stage IV – Detail Editing

- How to?
  - Split-adjust-split
  - Extrude-adjust-extrude
  - Connect the faces (4 vertexes + F)
  - Be patient
Head Modeling: Stage IV – Detail Editing

- Enable Subdivision
Head Modeling: Some Tricks

Mirror modifier
Add modifier > Mirror

In **Object Mode**, grab \((G + X)\) the object to the middle of the face

In **Edit Mode**, select all vertexes \((A)\), then grab \((G + X)\) the object in mirror expansion

Then press **Apply** in mirror modifier
Head Modeling: Some Tricks

Loop select of both sides

Alt + Right Clicks
Shift + Alt + Right Clicks

Select loop from both sides
Head Modeling: Some Tricks

Mesh LoopTools (Artifacts on the boundary)

- File->User Preferences
- Add-ons->Mesh->Enable Mesh LoopTools
- Loop select of both sides
- Click Bridge
Remember

- Loop Cut: Ctrl + R
- Loop Select: Alt + Right Click
- Mesh LoopTools
- **Split – Adjust – Split**
Appendix A: Some Tricks in Head Modeling – Ear

- For Modeling the Ear, you can
  - Use all the available online resources
  - We provide one for you in comp4422-lab10-examples.zip
Reference

• http://www.blender.org/
• http://wiki.blender.org/index.php/Manual/Hotkeys
• http://wiki.cgociety.org/index.php/Portrait
Download:

http://www.comp.polyu.edu.hk/~csgeorge/comp4422/lab/
Try things out...