



# 8th Advanced School on **SCIENTIFIC** VISUALIZATION

## Blender

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# BLENDER FOUNDATION

BLENDER

<http://www.blender.org>



Blender Movies

Features | Features Videos | Gallery | Movies | Blender Open Projects | Requirements

1. The Wires  
2. Typewriter Dance  
3. The Safest Place  
4. Emo Creates  
5. End Title  
6. Teaser Music  
7. Ambience

© 2006 Jan Margrethens  
http://www.blender.org

OmniVFX reel  
Showreel, 4 min, All in Blender + Cinema 4D/After Effects  
2011 - OmniVFX - Tom Rabe - Reel  
<http://www.omnivfx.com.br/>

Blender 2011 Showreel

Sintel  
Film, 15 min  
2011 - Blender Foundation  
[www.sintel.org](http://www.sintel.org)

Project London  
Table, 22 min  
2009 - Independent  
[www.projectlondon.com](http://www.projectlondon.com)

Kajimba  
Table, 2 min  
2009 - Pakistan Studios  
[www.kajimba.com](http://www.kajimba.com)

Lighthouse  
Short movie, 2 min  
2008 - Pakistan Studios

Big Buck Bunny  
Short movie, 10 min  
2008 - Blender Foundation  
[www.bigbuckbunny.org](http://www.bigbuckbunny.org)

Murnau the Vampire  
Short movie, 27 min  
2007 - Oscar Abovde

Rounce to space  
Animation, 1 min  
2008 - Rabe Marwan

Elephants Dream  
Short movie, 10 min  
2006 - Blender Foundation  
[www.legionofmeme.org](http://www.legionofmeme.org)

Meisheid  
Short animation, 7 min  
2007 - Marwan

Esign  
Animation, 4 min  
2008 - Chris Lurie

Man in Man  
Character animation, 7 min  
2008 - Saha Goolagham

Plumiferas  
Feature film, 4 min  
2001 - Sudeh Ramez Djalali

Soft Boy  
Animation, 17 min  
2003 - Andy Conkayk

Art festival intro  
Animation, 2 min  
2004 - Andy Conkayk

Chicken Chair  
Character animation, 1 min  
2004 - Bassem Kerdal

Showreel 1995  
Showreel, 4 min  
1995 - Blender

Mindfields  
Short movie, 1 min  
2008 - Andy Conkayk



## BLENDER HISTORY

“Blender is a free and open-source 3D computer graphics software product used for creating animated films, visual effects, art, 3D printed models, interactive 3D applications and video games. Blender's features include 3D modeling, UV unwrapping, texturing, rigging and skinning, fluid and smoke simulation, particle simulation, soft body simulation, sculpting, animating, match moving, camera tracking, rendering, video editing and compositing. It also features a built-in game engine.”

[http://en.wikipedia.org/wiki/Blender\\_\(software\)](http://en.wikipedia.org/wiki/Blender_(software))



# BLENDER HISTORY

“The Dutch animation studio Neo Geo and Not a Number Technologies (NaN) developed Blender as an in-house application. The primary author was Ton Roosendaal, who previously wrote a ray tracer called Traces for Amiga in 1989. The name Blender was inspired by a song by Yello, from the album Baby.

Rosendaal founded NaN in June 1998 to further develop and distribute the program.

... The Blender Foundation initially reserved the right to use dual licensing, so that, in addition to GNU GPL, Blender would have been available also under the Blender License that did not require disclosing source code but required payments to the Blender Foundation. However, they never exercised this option and suspended it indefinitely in 2005.[5] Currently, Blender is solely available under GNU GPL.

## *Suzanne*

... As a sort-of easter egg, a last personal tag, the artists and developers decided to add a 3D model of a chimpanzee. It was created by Willem-Paul van Overbruggen (SLiD3), who named it Suzanne after the orangutan in the Kevin Smith film Jay and Silent Bob Strike Back.

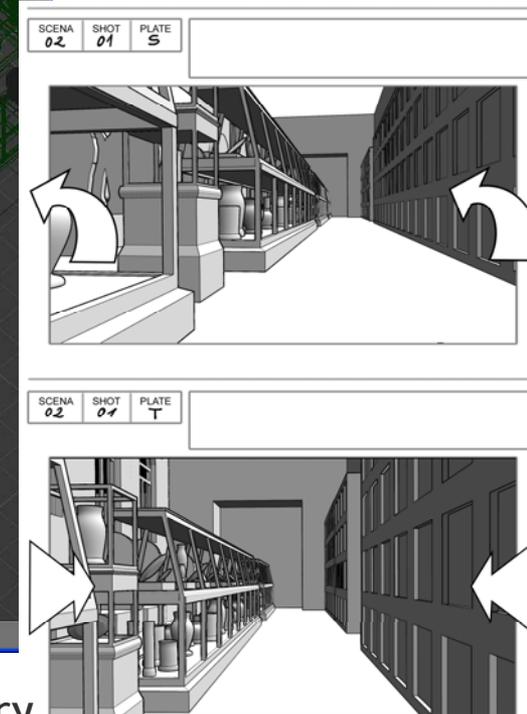
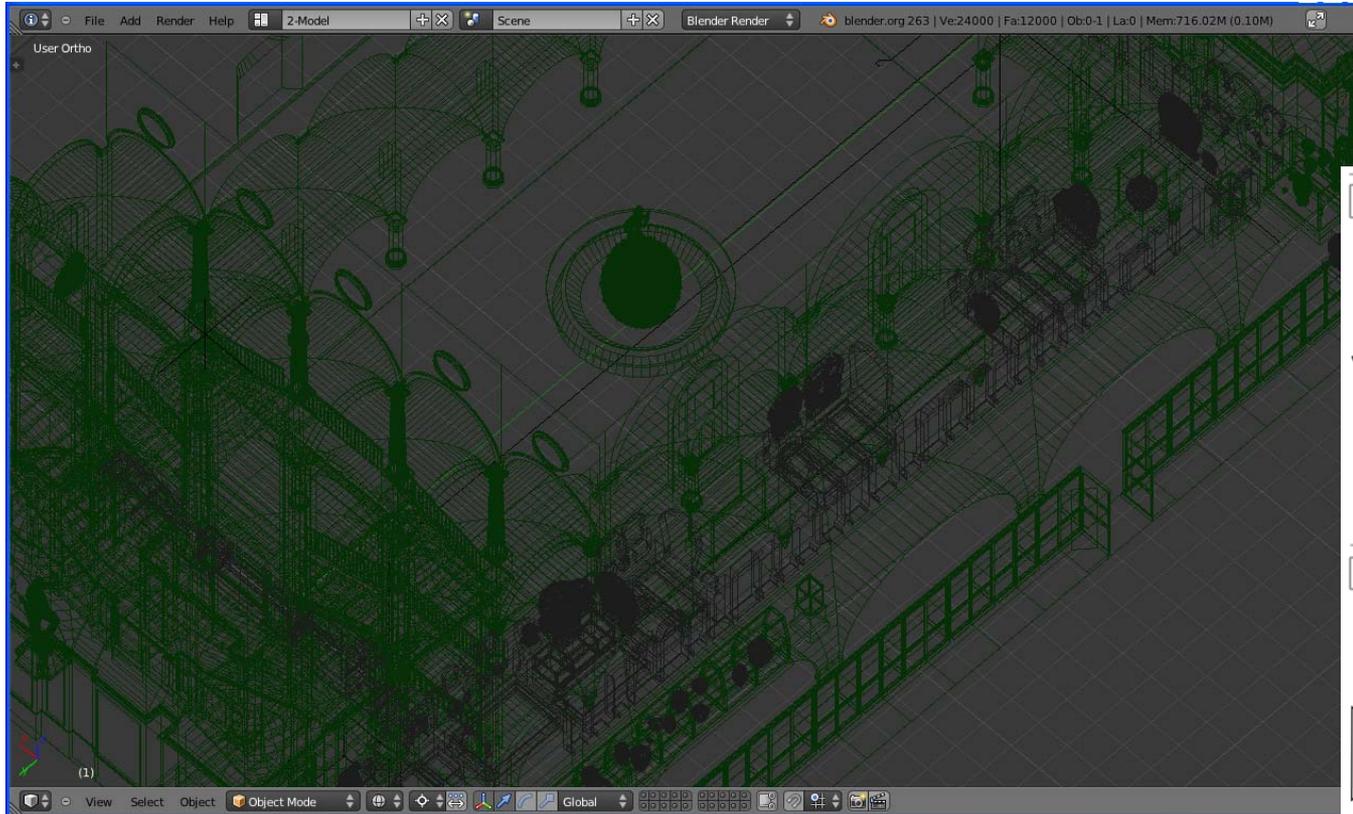
Suzanne is Blender's alternative to more common test models such as the Utah Teapot and the Stanford Bunny. A low-polygon model with only 500 faces, Suzanne is often used as a quick and easy way to test material, animation, rigs, texture, and lighting setups, and is also frequently used in joke images[citation needed]. Suzanne is still included in Blender. The largest Blender contest gives out an award called the Suzanne Awards.”

[http://en.wikipedia.org/wiki/Blender\\_\(software\)](http://en.wikipedia.org/wiki/Blender_(software))



# BLENDER - CINECA APPLICATIONS

- SCENE:



Apa the Etruscan and 2700 years of Bolognese History  
(in ACM SIGGRAPH ASIA 2011, Posters and Sketches Proceedings, Hong Kong, 2011)



# BLENDER - CINECA APPLICATIONS

- RENDER:



Apa the Etruscan and 2700 years of Bolognese History

(in ACM SIGGRAPH ASIA 2011, Posters and Sketches Proceedings, Hong Kong, 2011)



# Basis of Modeling



# SCENE

The scene includes points, lines and polygons that exist inside a three dimensions space defined by X, Y, Z axis.

In order to compose a scene is necessary:

- define 3D object geometry - OBJECT MODELING
- define texture and material of all objects - SHADING AND TEXTURING
- define scene light for realistic final render - LIGHTING
- realize frame (RENDERING) or export created models in format file for real time navigation



# OBJECT MODELING

- 3D models created with Blender
- 3D models created with others software and imported in Blender
- 3D models from laser scanner

software to manage point clouds  
<http://meshlab.sourceforge.net/>

- 3D models from photographs

software to create models from photographs  
<http://www.photomodeler.com>

<http://www.arc3d.be/>

[http://labs.autodesk.com/utilities/photo\\_scene\\_editor/](http://labs.autodesk.com/utilities/photo_scene_editor/)



# OBJECT MODELING

Example of imported models in Blender:

-terrain created with osgdem

<http://openscenegraph.sourceforge.net/documentation/OpenSceneGraph/doc/osgdem.html>

-building with the software City Engine

<http://www.esri.com/software/cityengine>





# OBJECT MODELING

## 3D MODELS

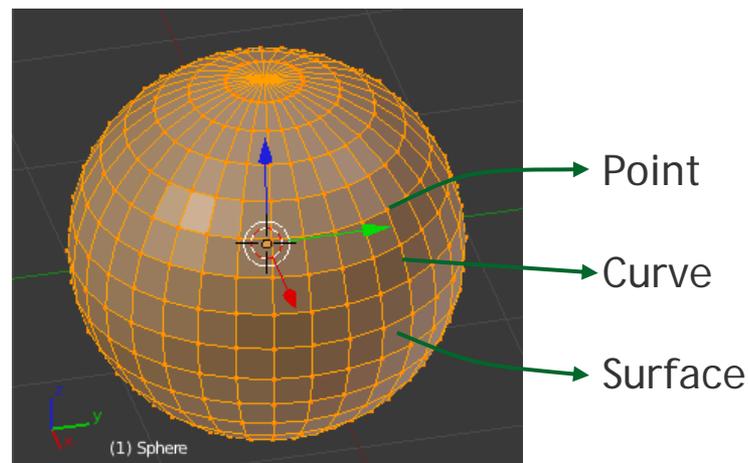
### 3D MODELS

a representation of 3D OBJECTS by using points connected each others by curves that define surfaces like triangles, quadrilaterals or other type.

A number of polygons linked together is called polymesh (mesh) and so can define a 3D object.

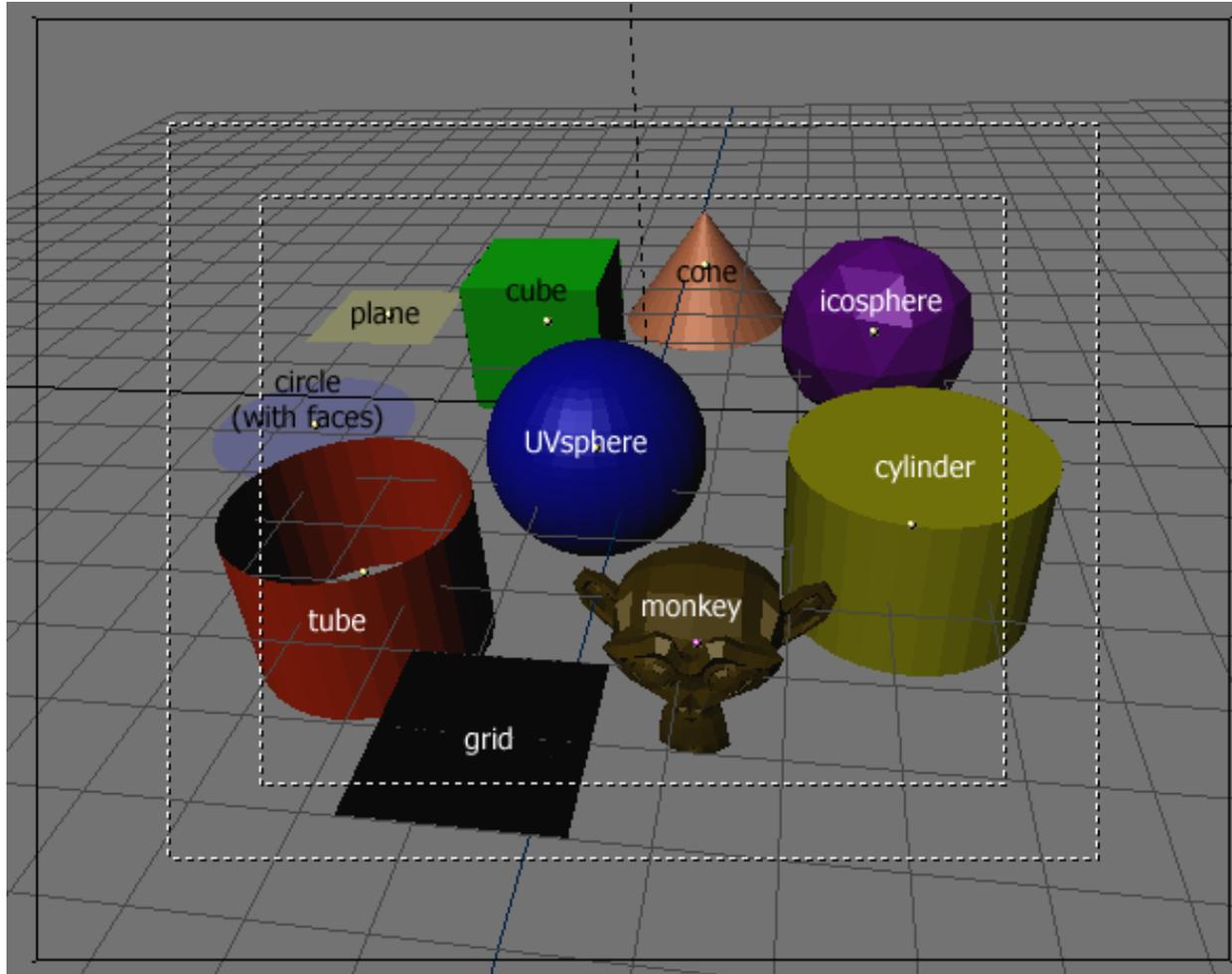
The coordinates are the geometric information, while the way in which the faces are made from the vertices are the topological information.

→ The set of faces is called Mesh.





# BLENDER MESH PRIMITIVES





# OBJECT MODELING

- Box modeling

Suited for simple and organic shapes

Starting from simple Mesh type objects (i.e. cube, sphere, ...) by changing vertices, edges and/or polygons 3D complex object can be created

- Spline modeling

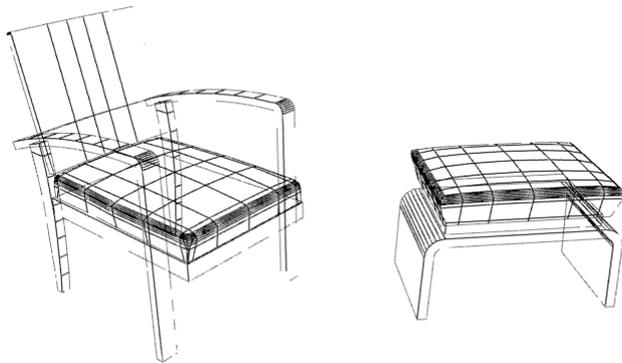
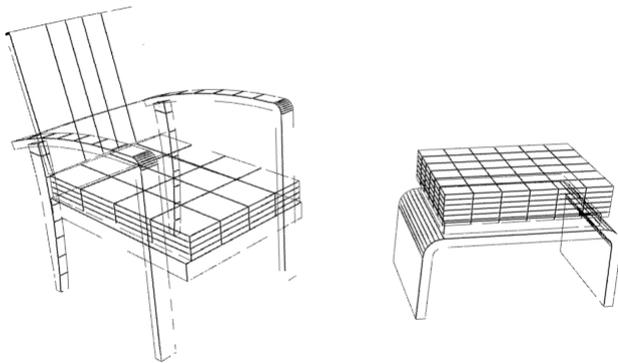
Suited for the design and mechanical models

Starting from a 2D Spline, like a building's plant, with specific operations like extrusion it is possible to obtain 3D object



# OBJECT MODELING

Example of BOX MODELING from "MUVI", house of the Thirties

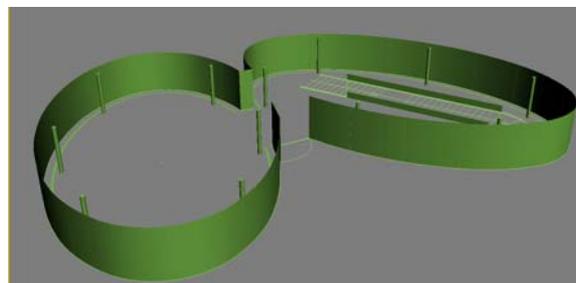
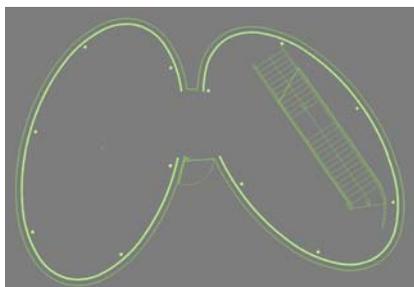




# OBJECT MODELING

Example of SPLINE MODELING, extruded surface:

surface created by extending a curve along a direction.



Example of revolved surface from "MUVI", house of the Thirties:

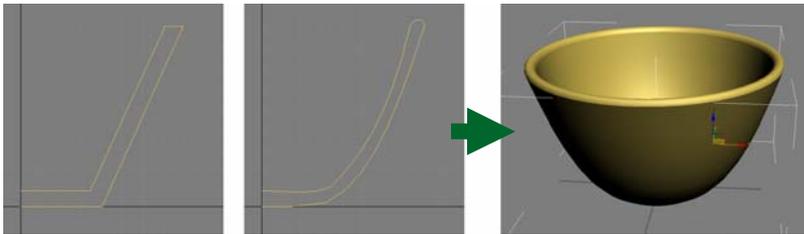




# OBJECT MODELING

Example of SPLINE MODELING, revolved surface:

surface created using a simple curve, which is rotated about an axis to define a shape.



Example of revolved  
surface from "MUVI",  
house of the Thirties:





# SHADING

Each object must be better identified with its own material.

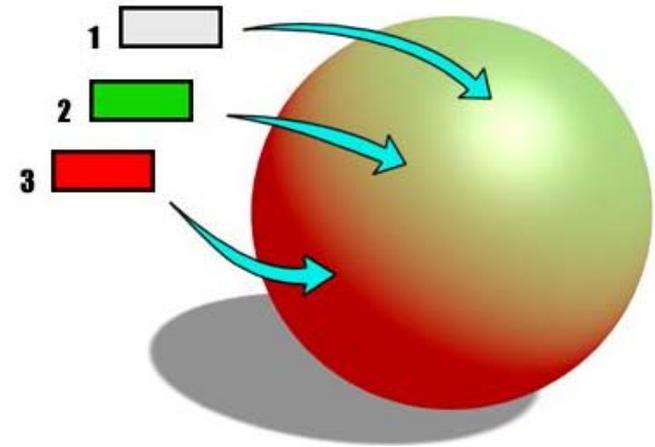
In particular, the material must be defined with different attribute and properties, which identify the material behavior to light.

The shadow and the light parts make an object appear three-dimensional, other information, such as transparency, refraction, roughness or smoothness, give more information of objects.

The following are lighting components:

- Ambient (3), color of the shaded part of the material that is still affected by the indirect light;
- Diffuse (2), color of the part directly affected by the light;
- Specular (1), color of the part of a glossy object.

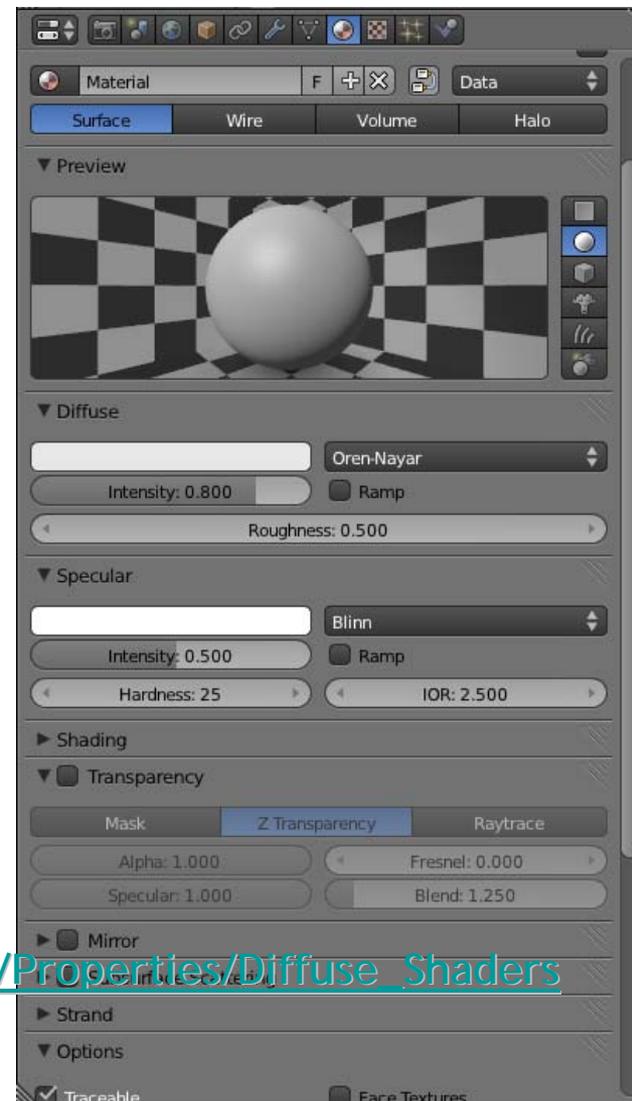
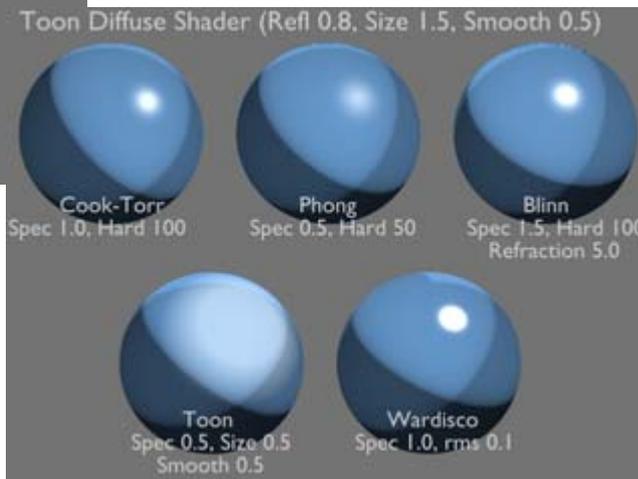
In reality,  
Ambient and Diffuse  
are the same color!





# SHADING

Examples of Blender shading:



[http://wiki.blender.org/index.php/Doc:2.4/Manual/Materials/Properties/Diffuse\\_Shaders](http://wiki.blender.org/index.php/Doc:2.4/Manual/Materials/Properties/Diffuse_Shaders)

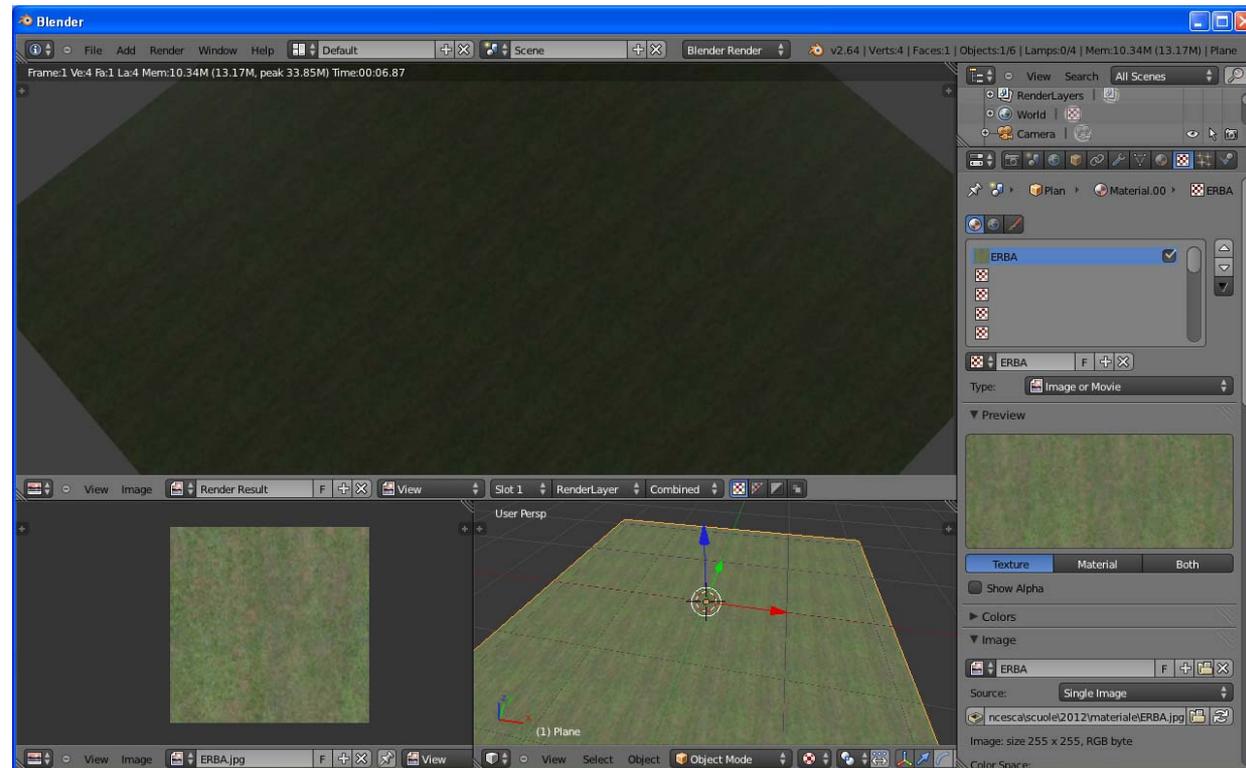


# TEXTURING

## Example of texture bitmap



The texture must be elaborated in order to have continuity up-down and left-right to be able to be repeated it over the entire object without discontinuity.



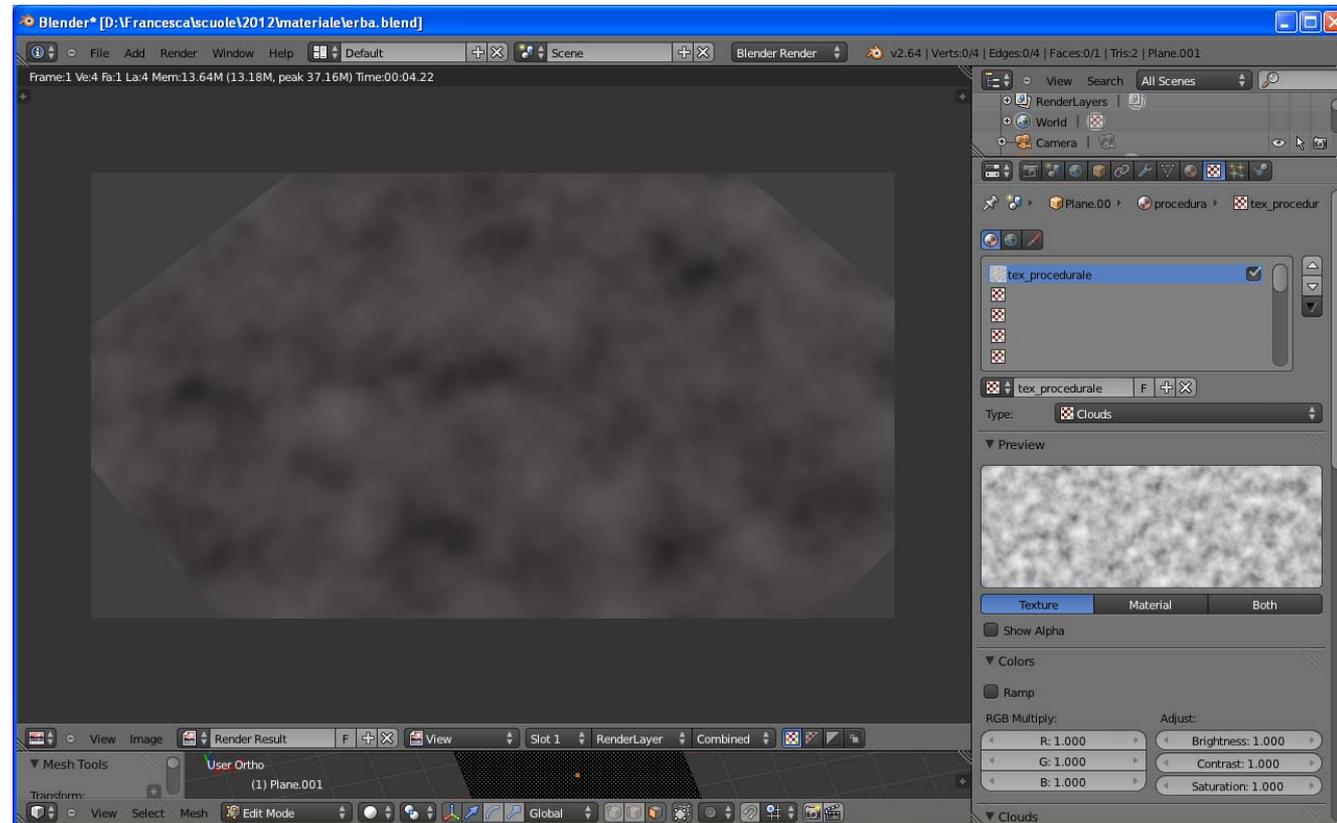
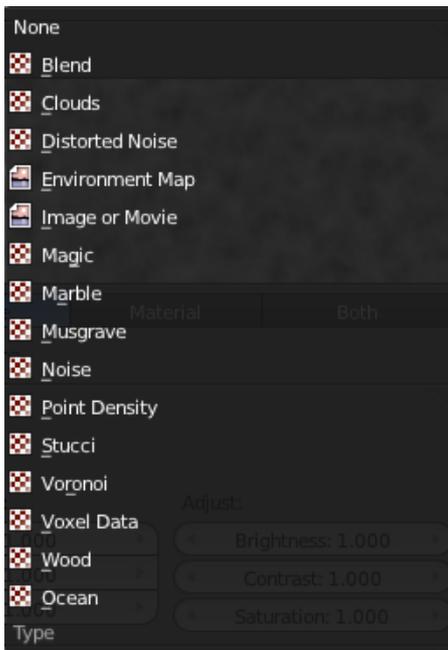


# TEXTURING

## Procedural texture

a computer-generated image created using an algorithm in order to create a realistic representation of natural elements.

## Blender procedural texture:

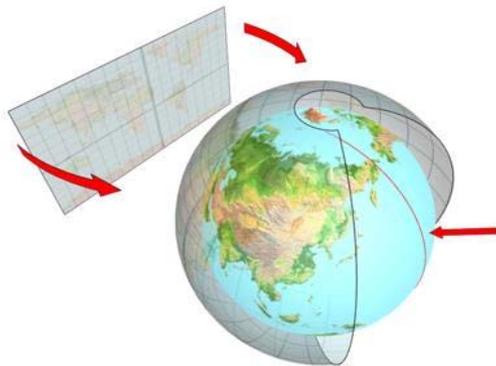




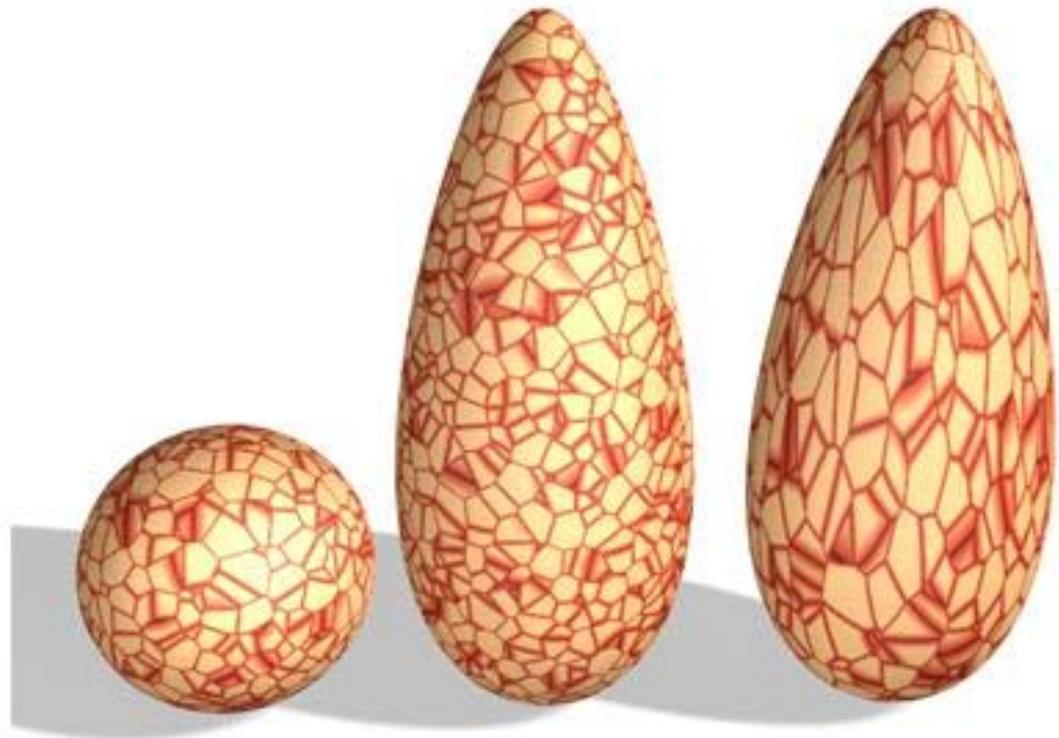
# TEXTURING

In order to correctly apply a texture must be set up texture coordinates, that define how is visualize on a object:

- projection method,
- orientation,
- repetition.



Example of a spheric projection





# SHADING/TEXTURING

Example from "MUVI", house of the Thirties

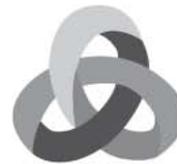




# SHADING/TEXTURING

Example from "MUVI", house of the Eighties





# LIGHTING

Lighting is a necessary step and is recommended even before the definition of the materials, in this way (with neutral material for all objects in the scene) can be better valuated the effect of the lights.

Below three general types of light that can be used:

- **Omni** (points of light that emit in all directions);
- **Spot** (cones of light used for simulate lamps or projectors);
- **Direct** (cylinders of light, usually used to simulate sunlight).

Each light can be customized by location and illumination intensity parameters, like decay, color, ...

For real-time navigation is useful to develop the textures so that they contain lighting and rendering information through a procedure called Render to Texture:

shadows and multi-texture are compacted into a single texture.



# RENDERING

The set of operations required to transform a three-dimensional model (all 3D objects in the scene and their properties) in a two-dimensional visual representation (bitmap), depending on the view parameters and the type of the chosen mode of visual presentation .

By using algorithms that allow to make the effects of **Global Illumination** it is possible to achieve realistic effects of the scene.

## *GLOBAL ILLUMINATION definition:*

It is a method (algorithm) of computation for light calculation in the scene which, takes in to account the light bounces from the neighboring surfaces, along with the normal illumination of direct lights. In Other words GI calculates the Indirect light also, thus it makes the renders more photo-realistic.



# RENDERING

YafaRay

<http://www.yafaray.org/>



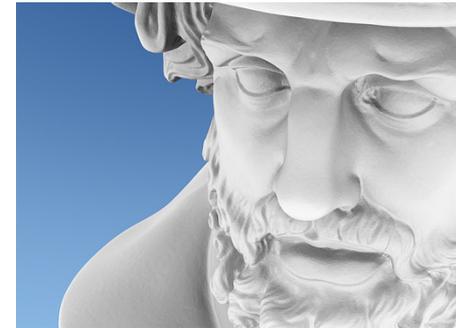
LuxRender

<http://www.luxrender.net/>



Aqsis Renderer

<http://www.aqsis.org/>



<http://www.blender.org/download/get-blender/external-renderers/>



# REAL TIME - RENDER TO TEXTURE

## Render to Texture

This operation allows to precompute light and shadow information on the individual objects, necessary for real-time navigation.





# WEB

By exporting models in format x3d it is possible to put the model in a html page and navigate it freely (<http://www.x3dom.org/> ).

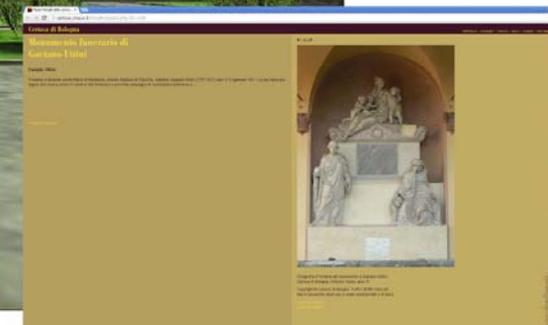
[https://hpc-forge.cineca.it/files/visit\\_3Dmodels/public/ChiostroIII\\_X3D/ChiostroIII.html](https://hpc-forge.cineca.it/files/visit_3Dmodels/public/ChiostroIII_X3D/ChiostroIII.html)

MUSEO VIRTUALE DELLA CERTOSA: Chiostro III

Prove di navigazione del modello in x3d.



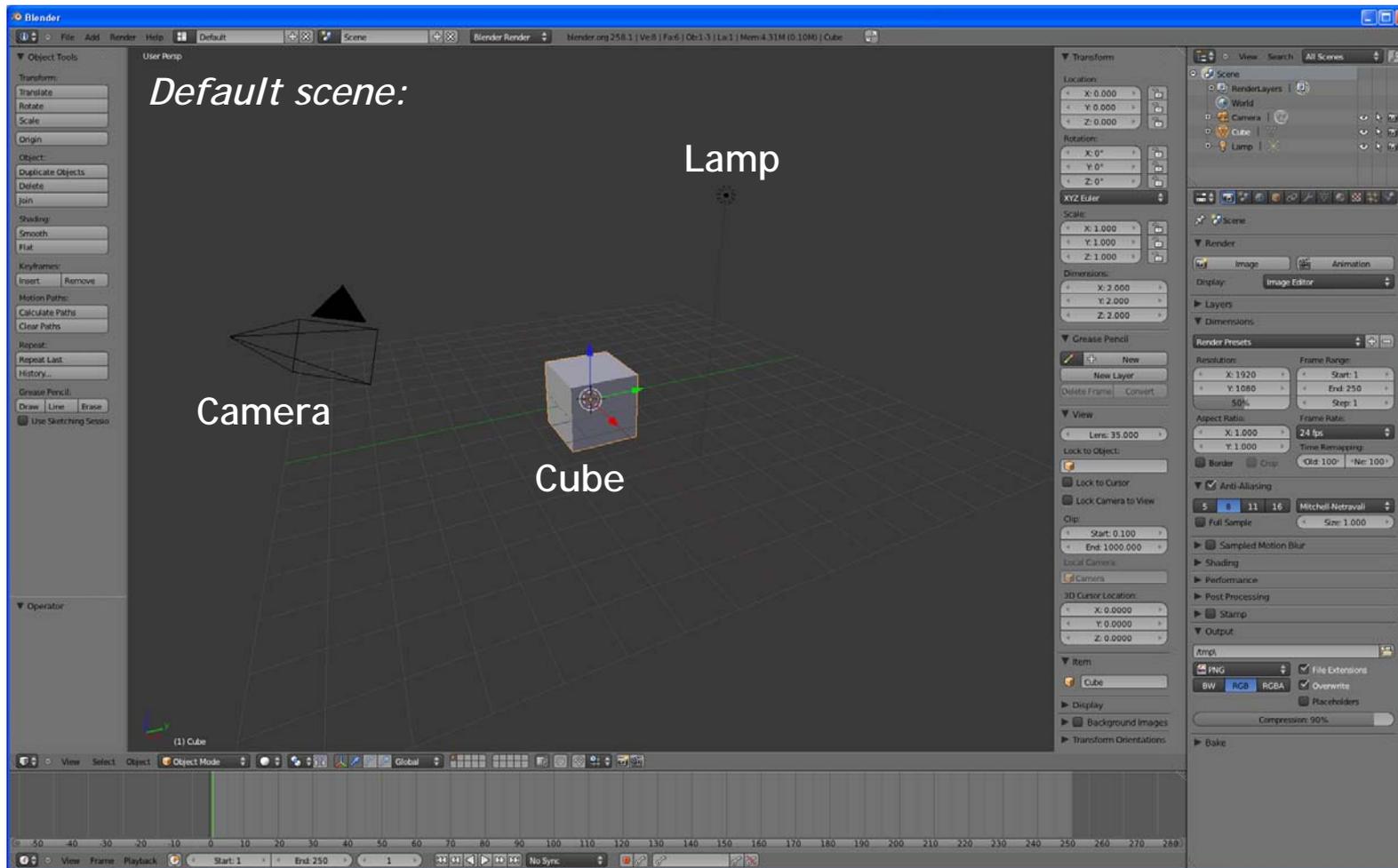
Lato EST Tomba Ulmi Inizio lato SUD Lato SUD Lato SUD-OVEST Lato OVEST Lato NORD-OVEST Lato NORD Centro Chiostro Percorso





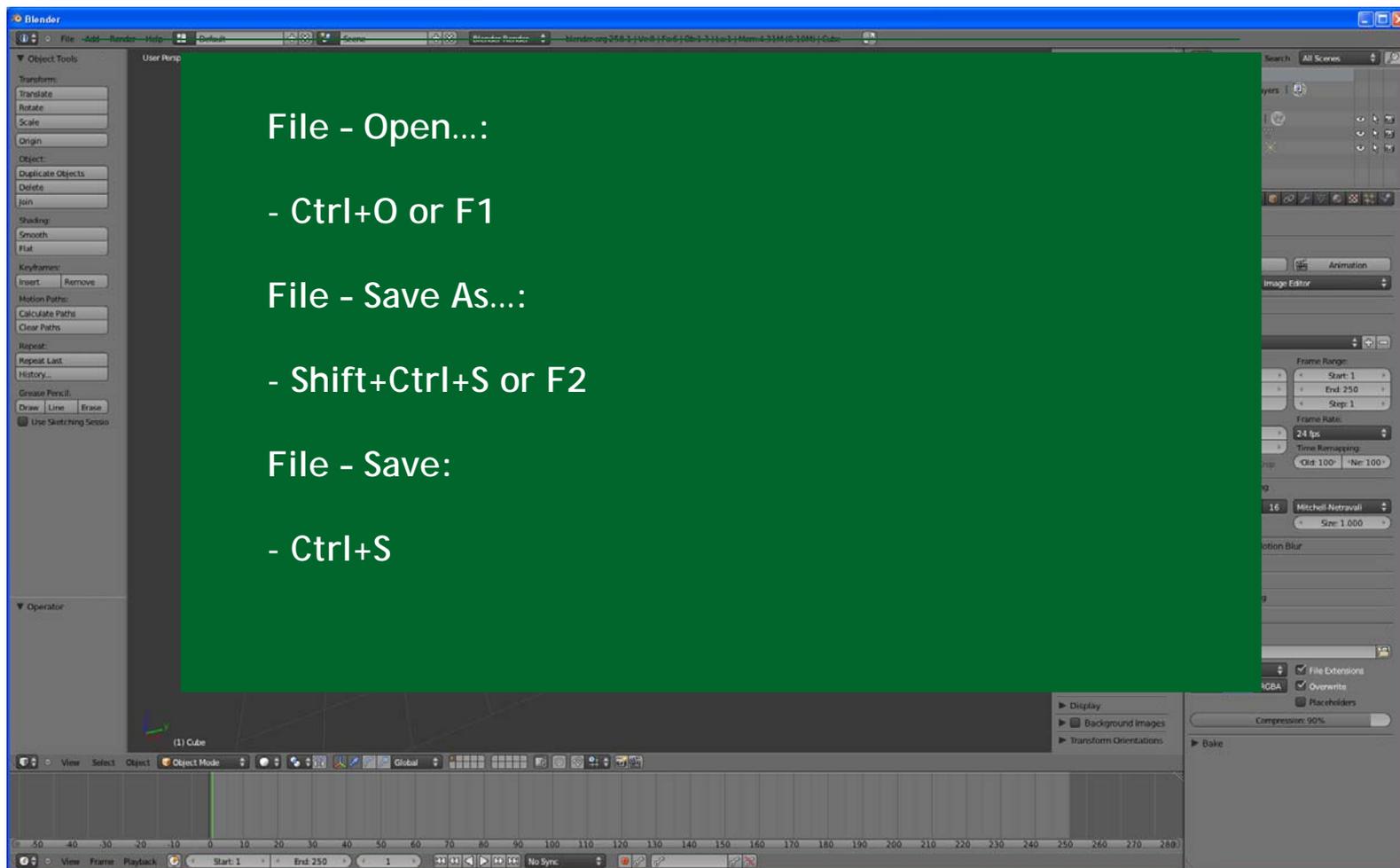
# Blender

# INTERFACE



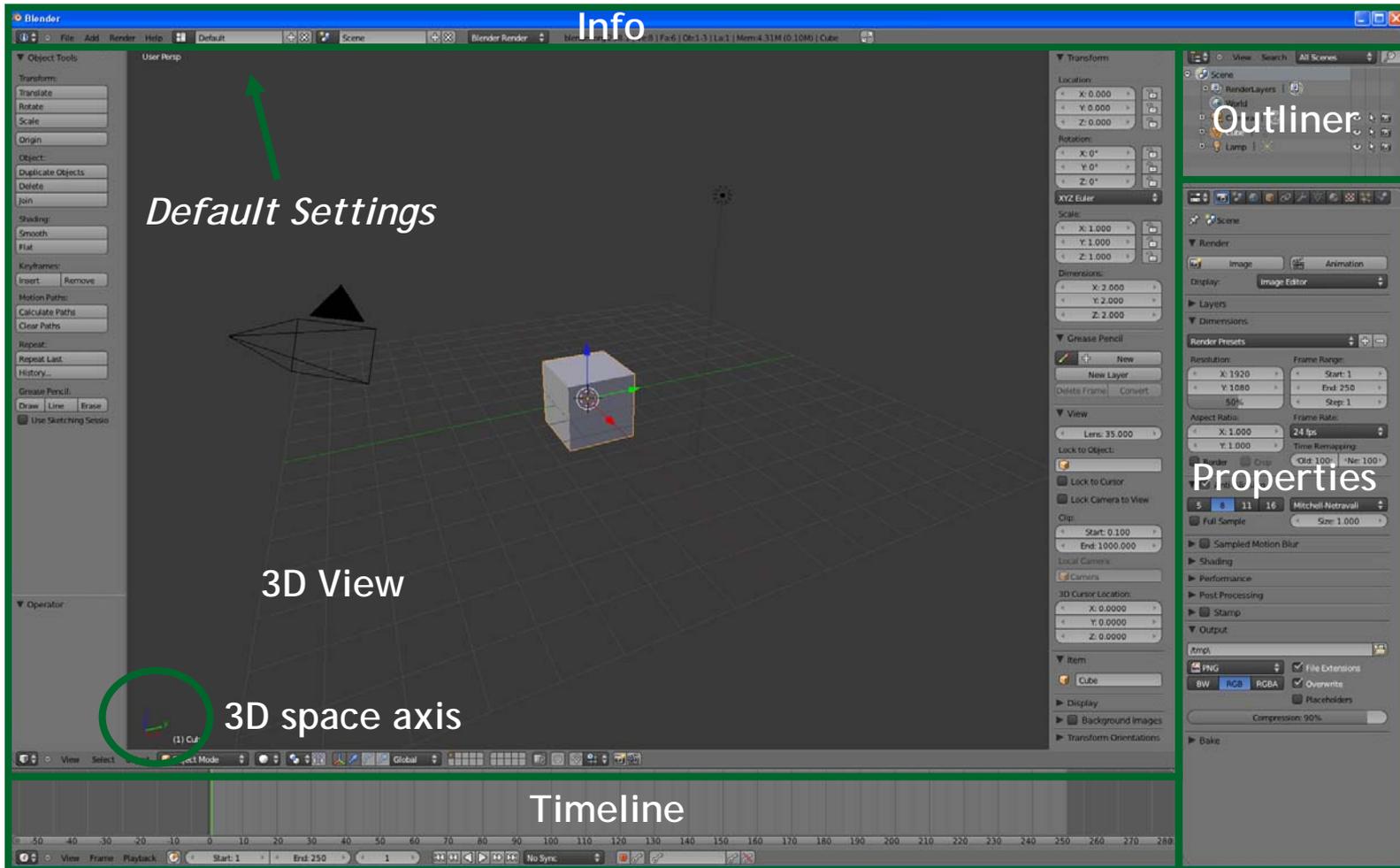


# INTERFACE





# INTERFACE





# INTERFACE - USER PREFERENCES

*Import/Export modules*

Modules of import or export different file format can be chosen in the User Preferences window and let them visible in the Info window (File - Import, Export)

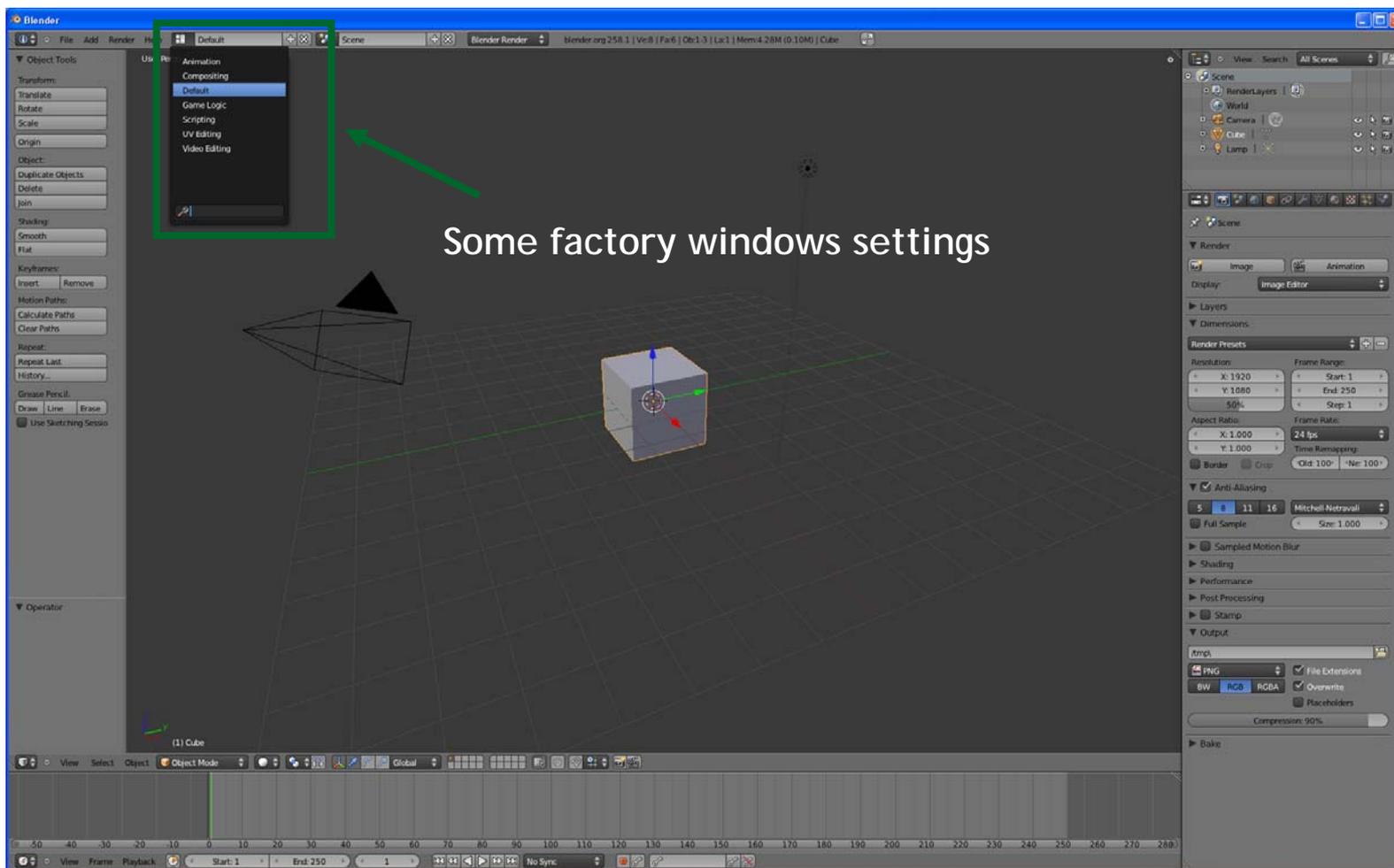


# SHORTCUT

Combinations of keys that are used for a lot of commands (keyboard and/or mouse) instead of using tool bar, faster in the modeling stage.



# INTERFACE





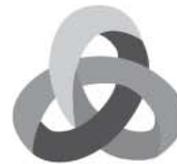
# INTERFACE

Drag the windows corner when highlighted

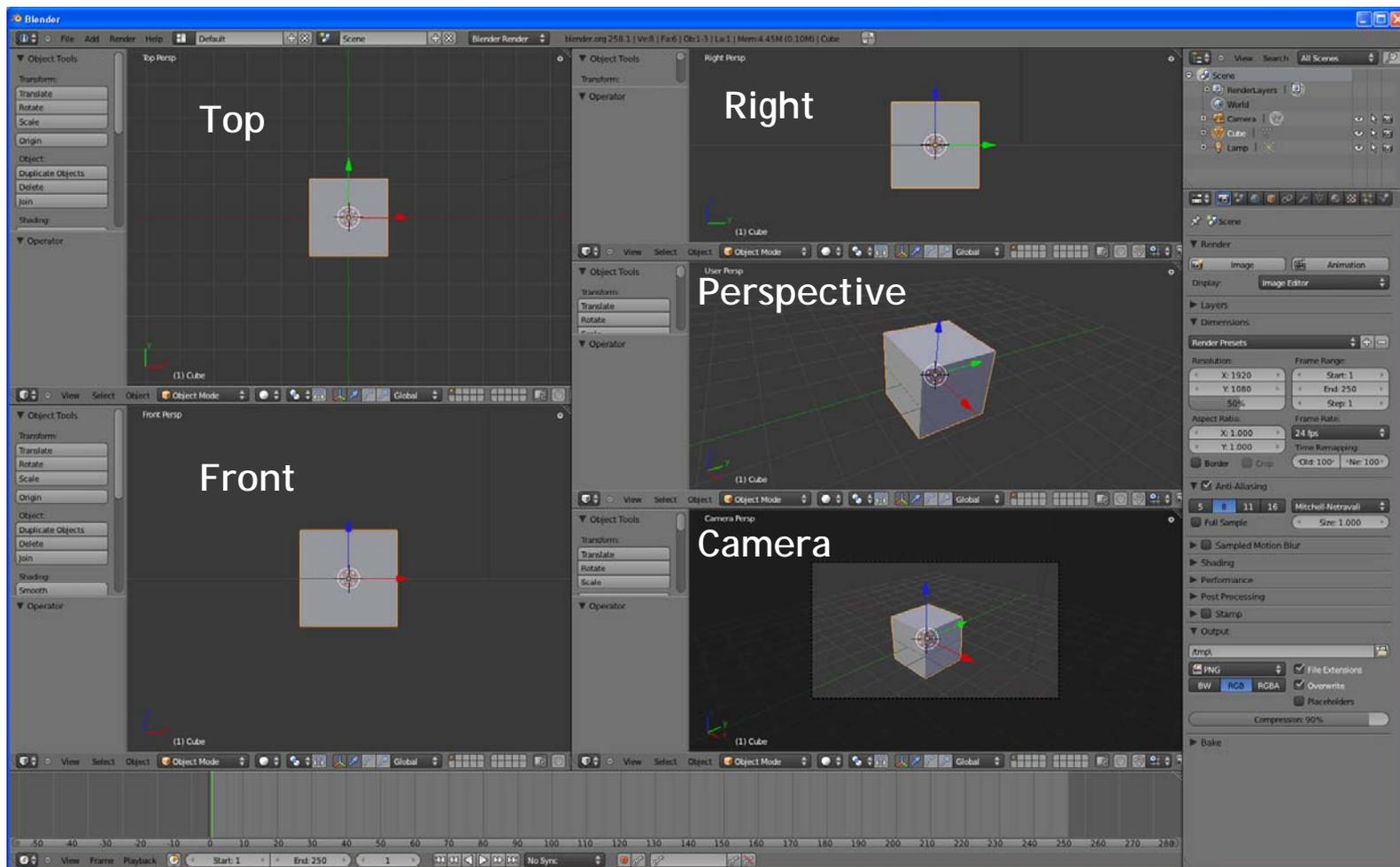
By putting mouse on window border will appear a double arrow, with click right button mouse it is possible to chose between:

- SPLIT → split selected area into new windows
- JOIN → join selected areas into new window

Area Options  
Split Area  
Join Area



# INTERFACE





# INTERFACE

The image shows the Blender 2.48.1 interface. The central 3D viewport displays a cube with a red arrow pointing to the front view. A green arrow points from the text 'Tool bar View or' to the 'View' button in the top toolbar. A menu is open, listing various view shortcuts. The right sidebar shows the 'Render' and 'Output' panels.

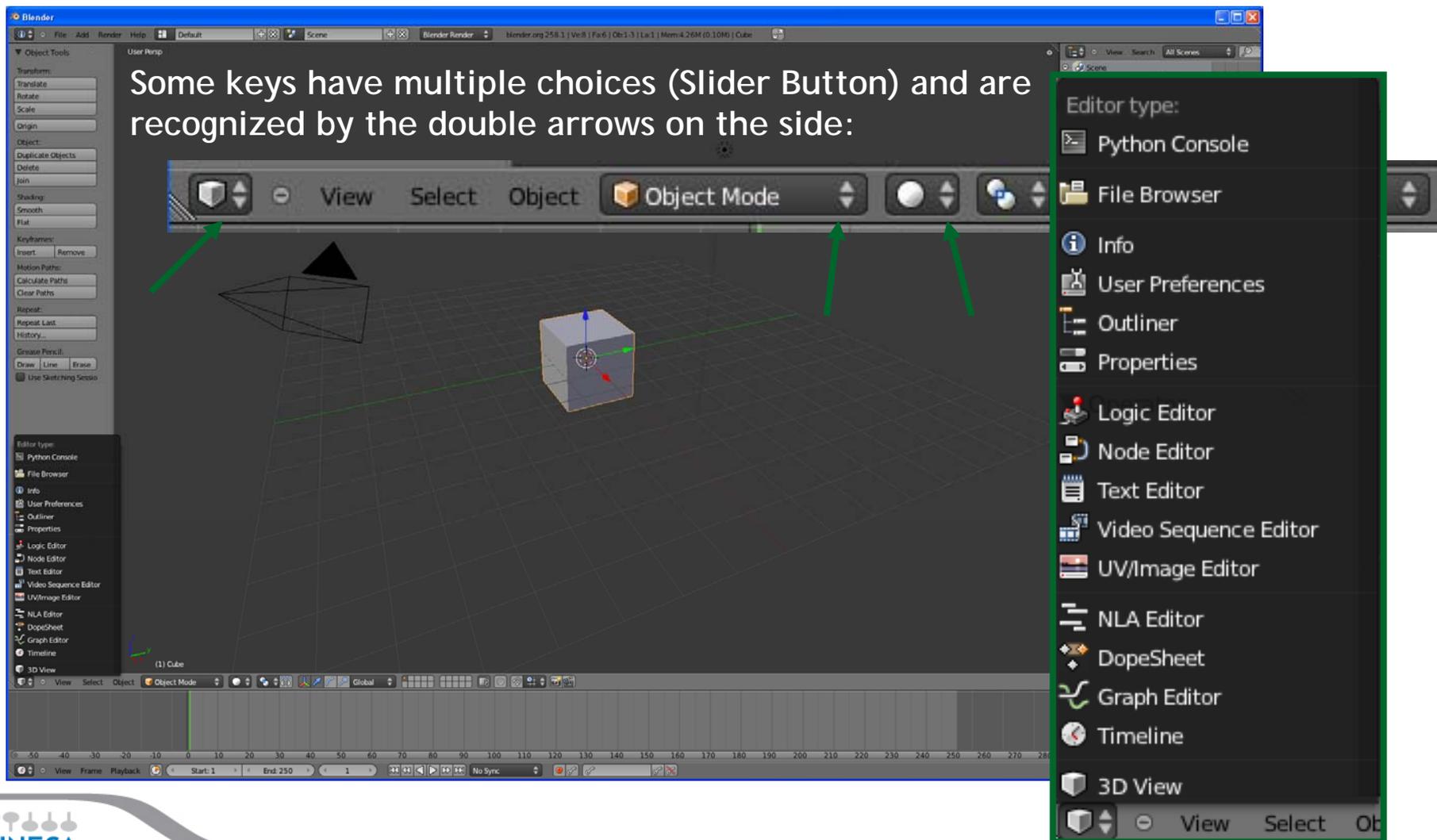
Tool bar View or

- Numpad 1 → Front
- Numpad 3 → Right
- Numpad 7 → Top
- Ctrl and one of previous shortcut for the opposite view (Back, Left, Bottom)
- Numpad 0 → Active camera
- Numpad 5 → perspective or orthographic



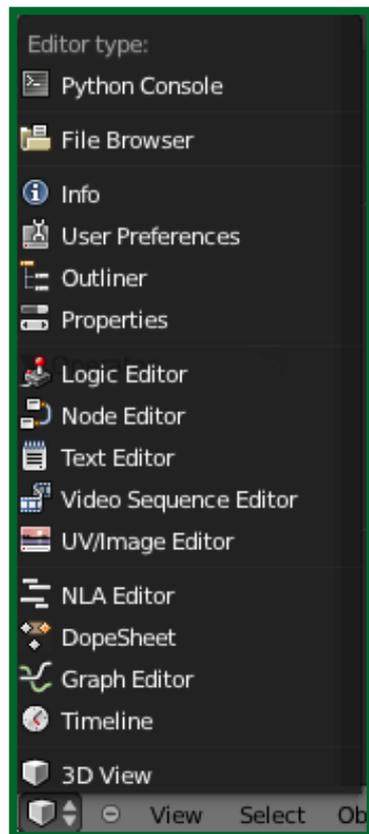
# INTERFACE

Some keys have multiple choices (Slider Button) and are recognized by the double arrows on the side:





# INTERFACE



**PYTHON CONSOLE** - to directly use python in Blender

**FILE BROWSER** - used to organize, load and save files

**INFO** - provides information and options for managing files, windows and engines

**USER PREFERENCES** - customize Blender to your work style and computer

**OUTLINER** - helps you find and organize your objects

**PROPERTIES** - shows the several attributes of the currently selected object

**LOGIC EDITOR** - a game logic editing window

**NODE EDITOR** - allows you to use nodes for texturing, materials and compositing

**TEXT EDITOR** - keep notes and documentation about your project, and write Python scripts

**VIDEO SEQUENCE EDITOR** - assemble video sequences into a film strip

**UV/IMAGE EDITOR** - an image editor with advanced UV management tools

**NLA EDITOR** - manage non-linear animation action sequences

**DOPE SHEET** - combine individual actions into action sequences

**GRAPH EDITOR** - manage animation keys (and drivers) and inter/extrapolation of these

**TIMELINE** - controls for animation playback

**3D VIEW** - a graphical view of your scene



# PYTHON CONSOLE

The image shows the Blender 2.68 interface. The main 3D viewport displays a scene with a cube and a camera. The Python console at the bottom is active, showing the following code and output:

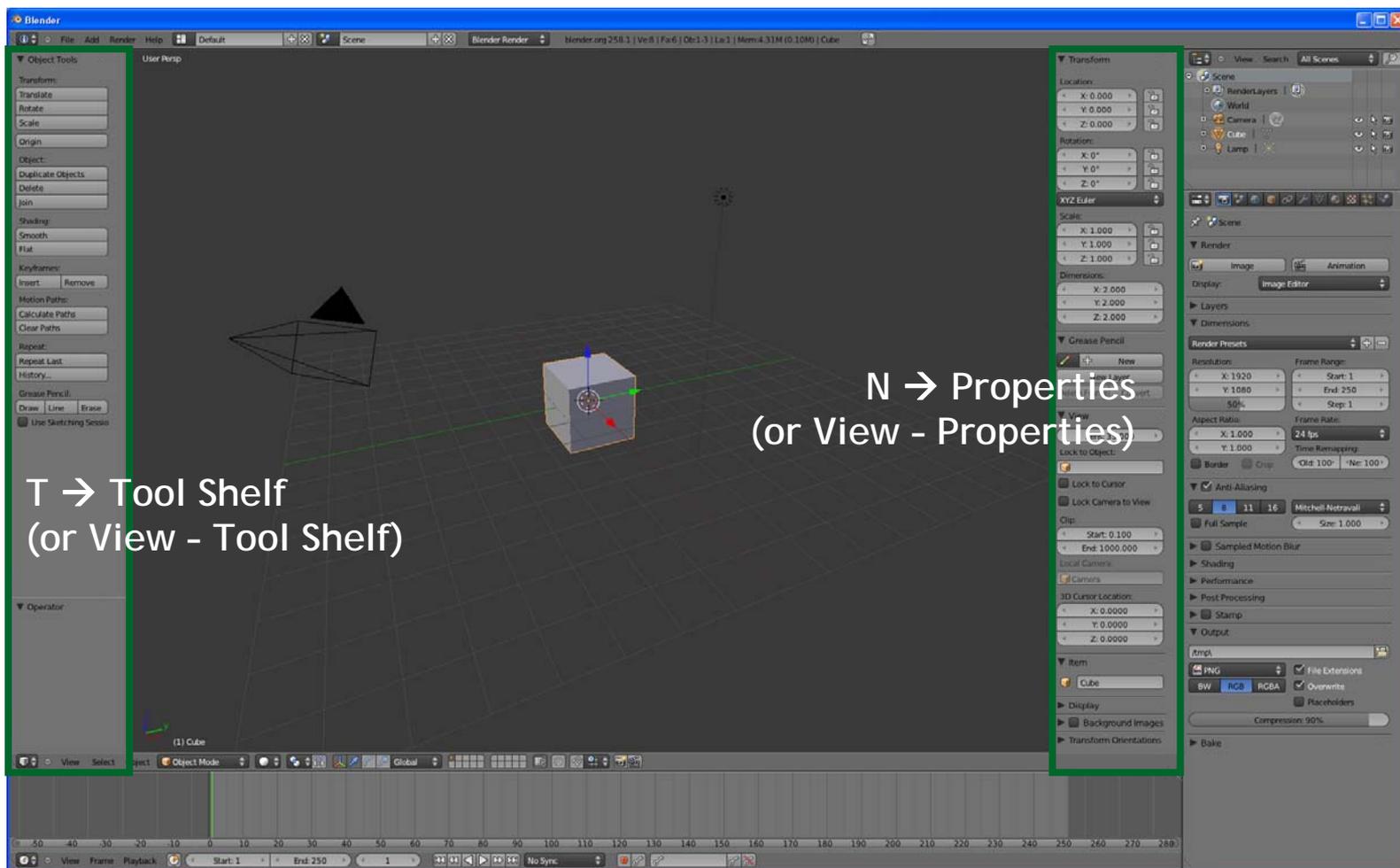
```
Command history: up/down Arrow
Cursor: Left/Right Home/End
Remove: Backspace/Delete
Execute: Enter
Autocomplete: Ctrl-Space
Zoom: Ctrl +/-, Ctrl-Wheel
Builtin Modules: bpy, bpy.data, bpy.ops, bpy.props, bpy.types, bpy.context, bpy.utils, bgl, blf, mathutils
Convenience Imports: from mathutils import *; from math import *
Convenience Variables: C = bpy.context, D = bpy.data

>>> import bpy
>>> for i in bpy.data.objects:
...     print(i)
...
<bpy_struct, Object("Camera")>
<bpy_struct, Object("Cube")>
<bpy_struct, Object("Lamp")>

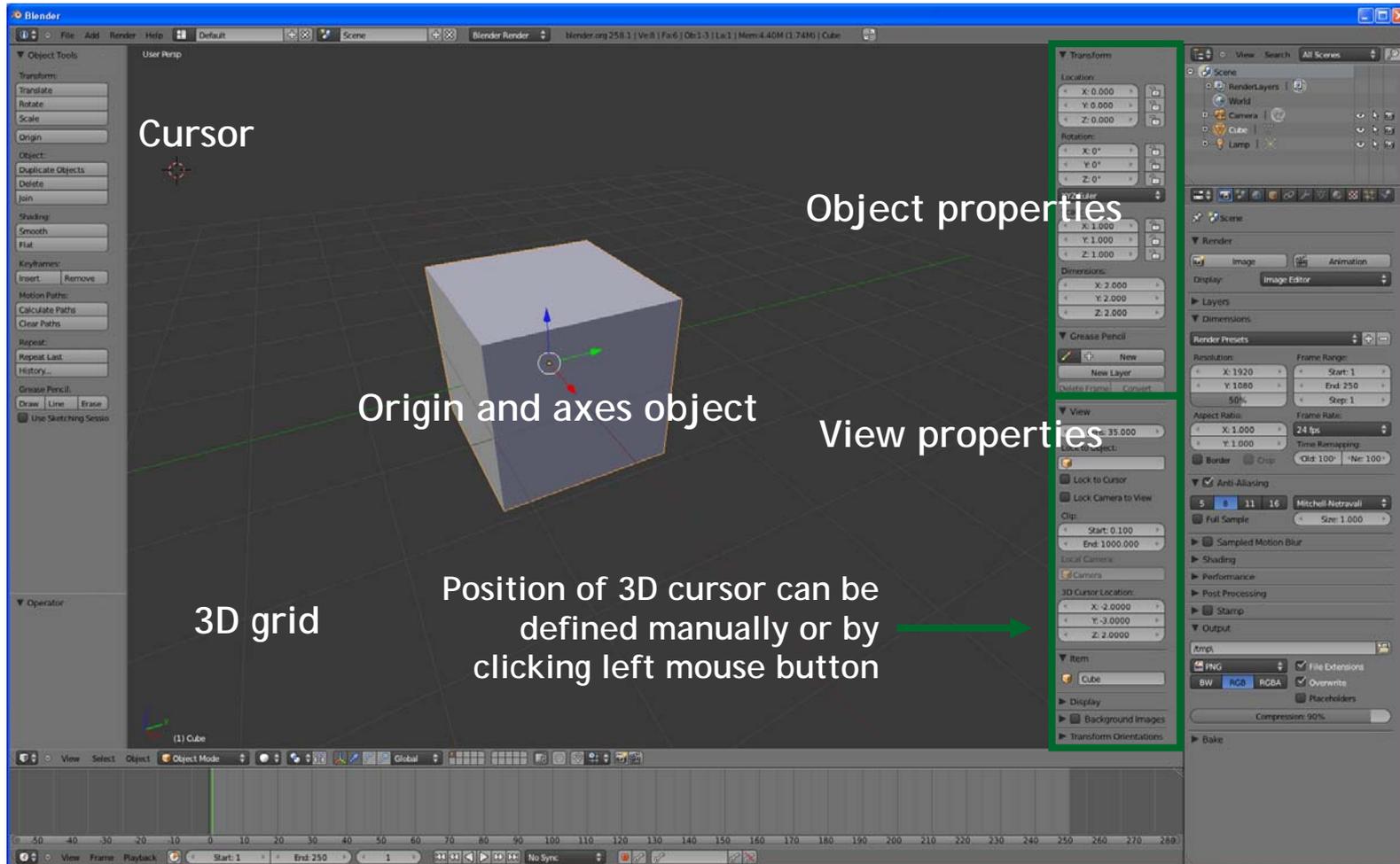
>>> |
```



# INTERFACE



# INTERFACE





# INTERFACE

Orange border identifies selected objects

Selection can be done with right mouse button  
→ SHIFT for multiple selection  
Or with Select from 3D View tool bar

A → Select/Deselect All  
B → Border Select  
C → Circle Select

SHIFT + G → similar selection



# INTERFACE

The image shows the Blender 2.58.1 interface. A large green rectangular overlay is positioned in the center of the 3D viewport, containing white text. The text lists keyboard shortcuts for undo, redo, and history, and a general statement about action visualization. The background interface includes the top menu bar, the left-hand 'Tools' shelf, the right-hand 'Properties' panel, and the bottom timeline.

**UNDO:**

- Ctrl+Z

**REDO:**

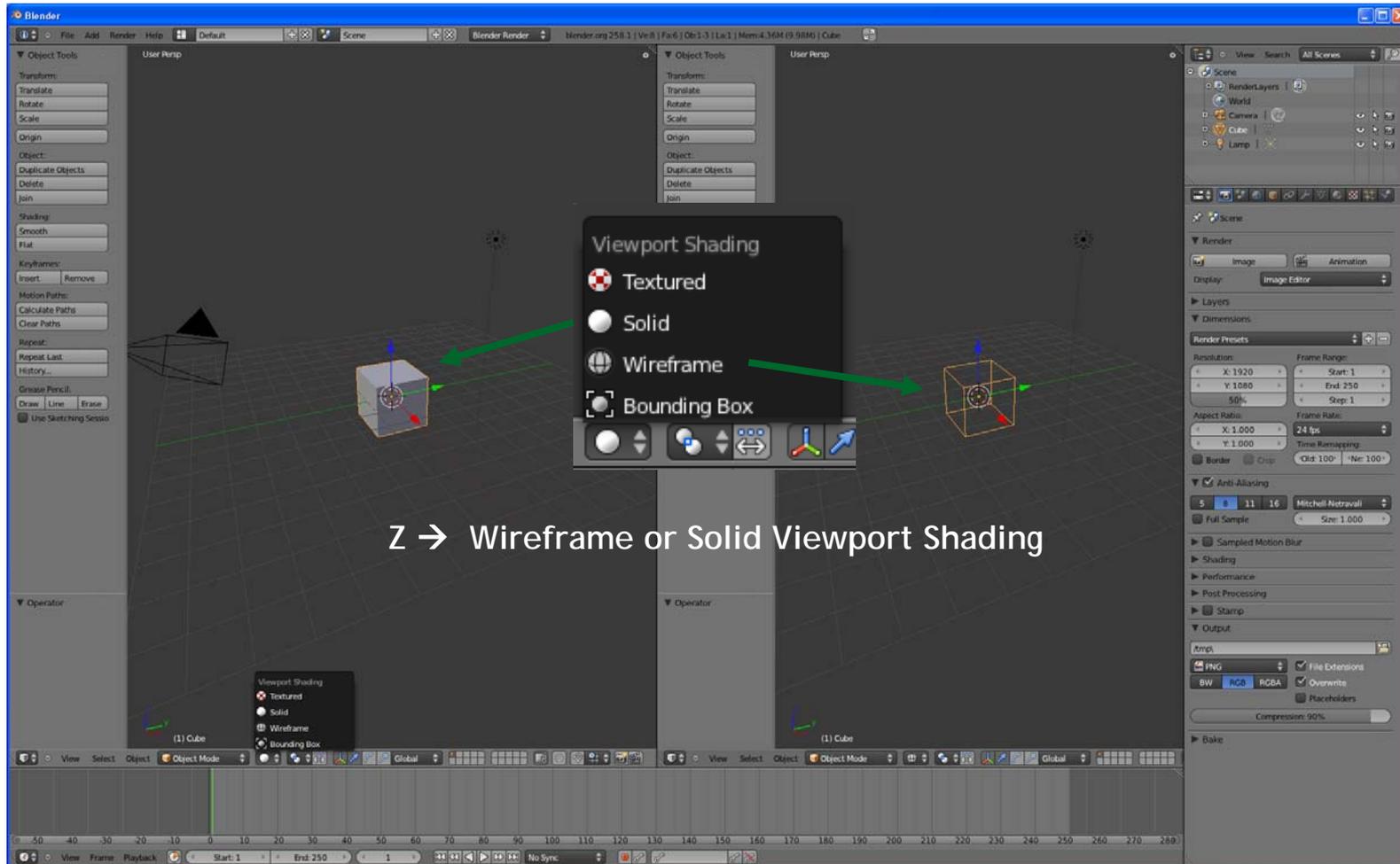
- Shift+Ctrl+Z

**HISTORY:**

- Ctrl+Alt+Z

All action are visualized and it is possible to choose from which action restart modeling

# INTERFACE



# INTERFACE



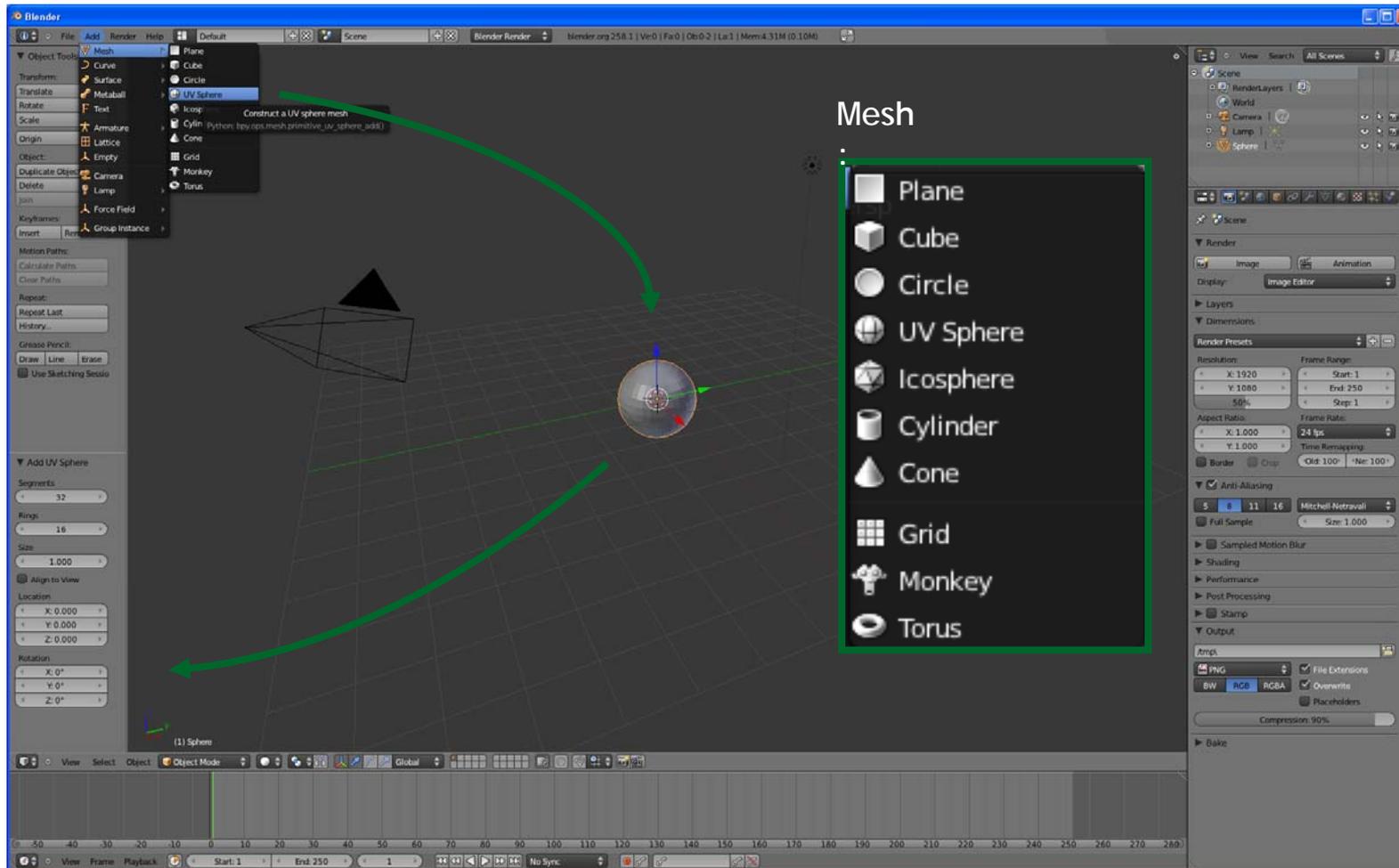
**Movement inside windows**

Center mouse button pressed → View rotation  
Shift+center mouse button pressed → View translation  
Ctrl+center mouse button pressed → View zoom

The screenshot shows the Blender 2.58.3 interface. The central 3D viewport displays a scene with a cube and a cone. The left sidebar contains the 'Object Tools' shelf with options like Translate, Rotate, Scale, and Duplicate Objects. The right sidebar shows the 'Properties' panel for the selected object, with tabs for Transform, Grease Pencil, View, and Item. The bottom status bar shows the current frame (1) and the frame range (Start: 1, End: 250).



# ADD MESH



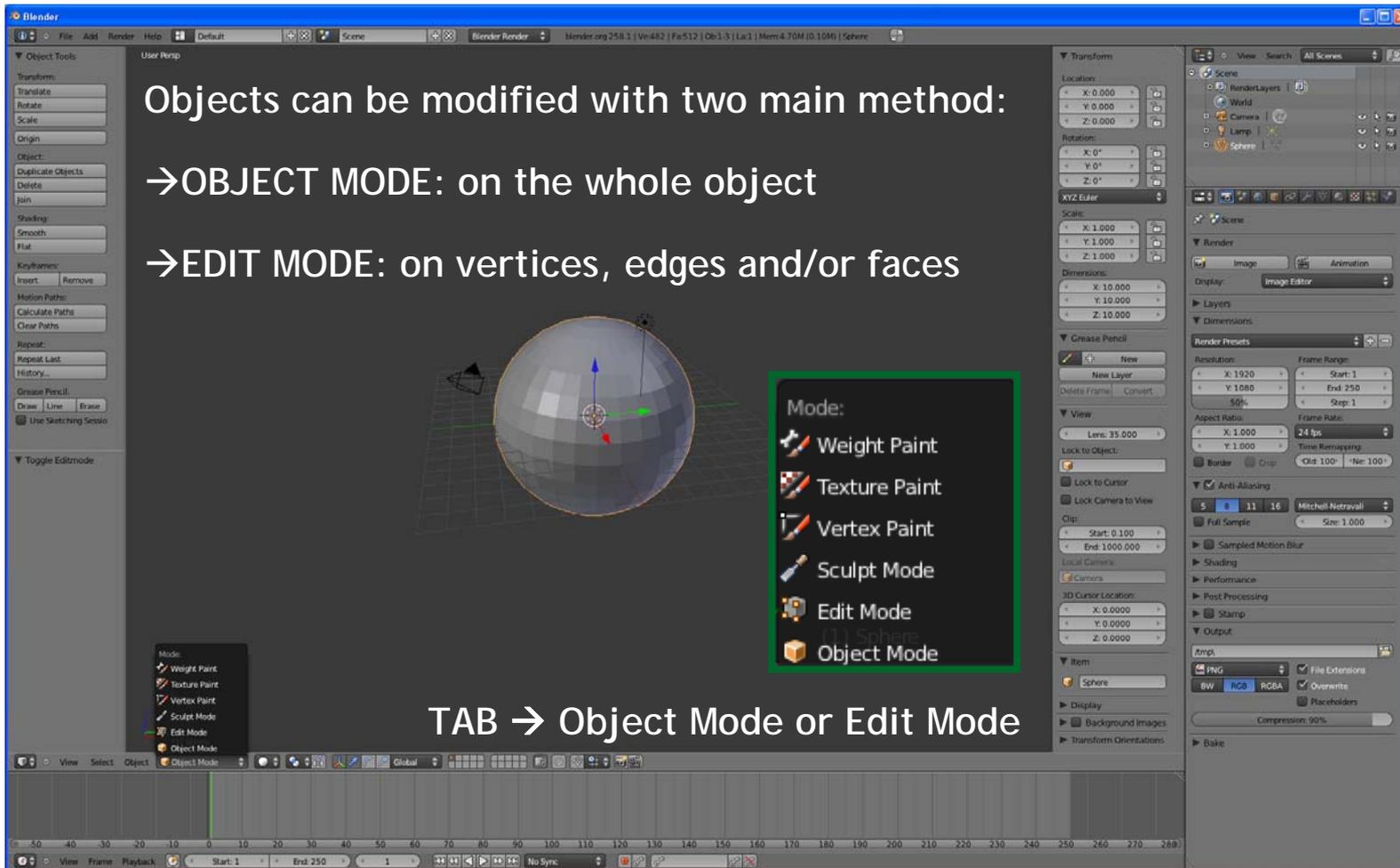


# MODIFY OBJECTS

Objects can be modified with two main methods:

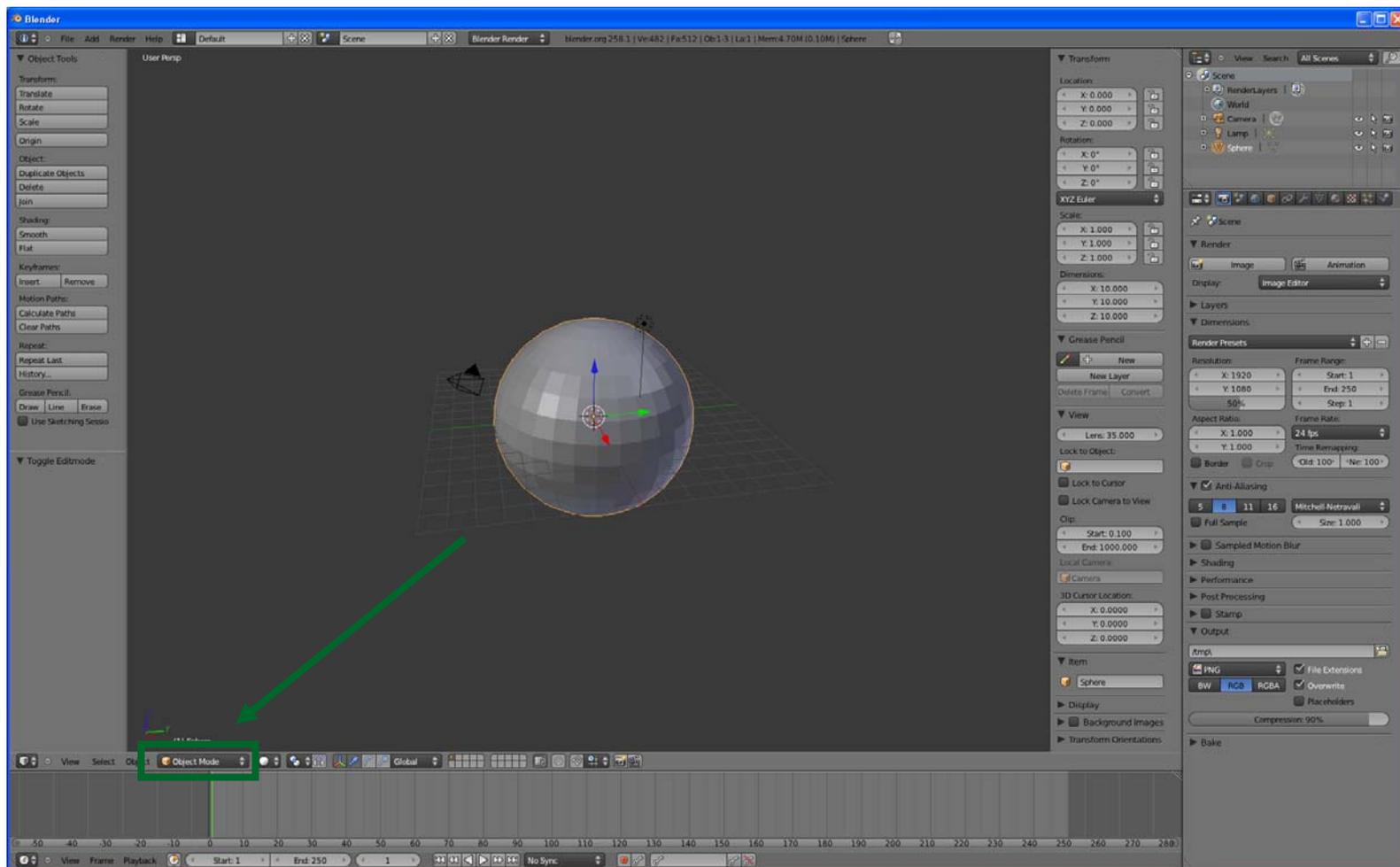
→ OBJECT MODE: on the whole object

→ EDIT MODE: on vertices, edges and/or faces



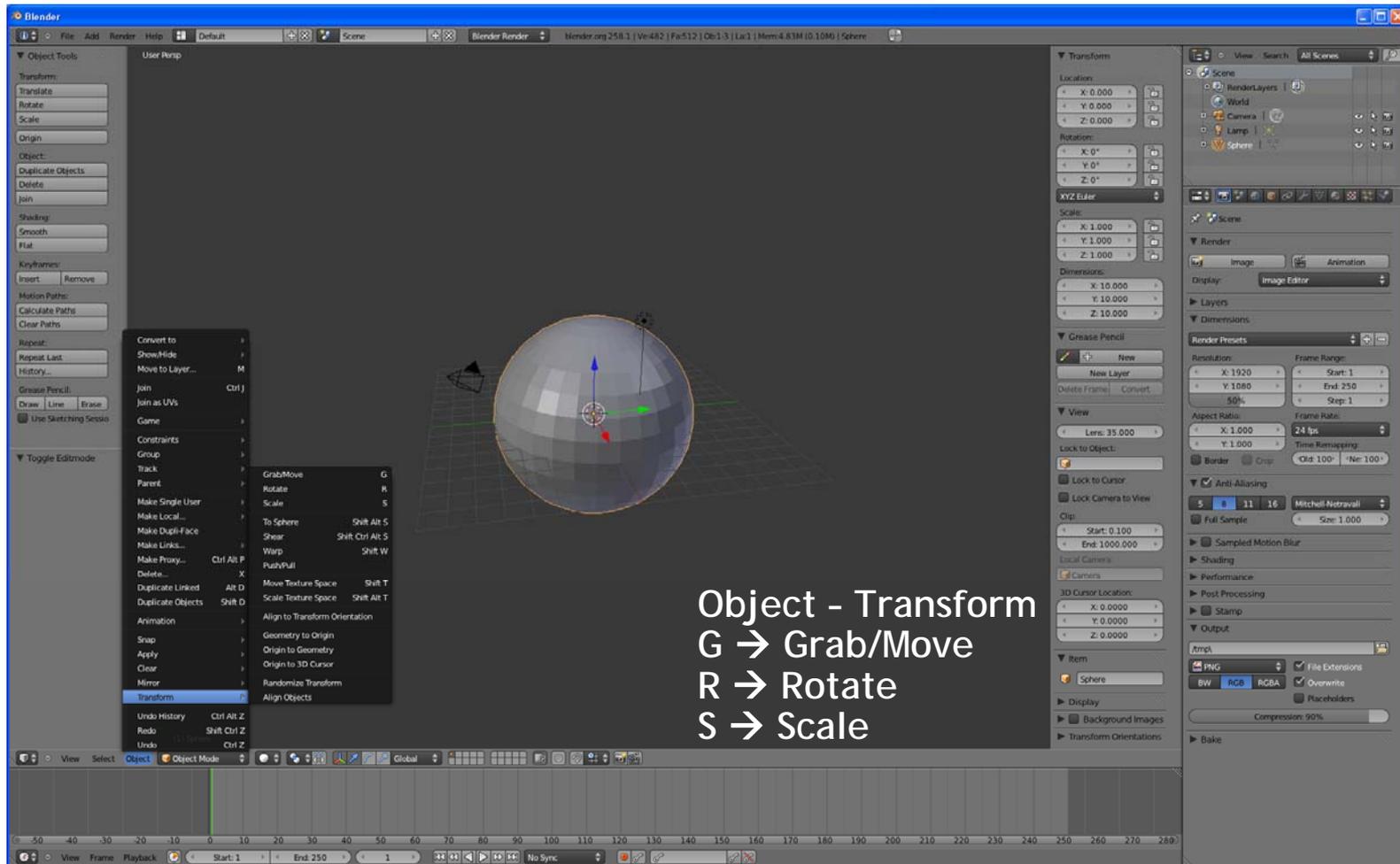


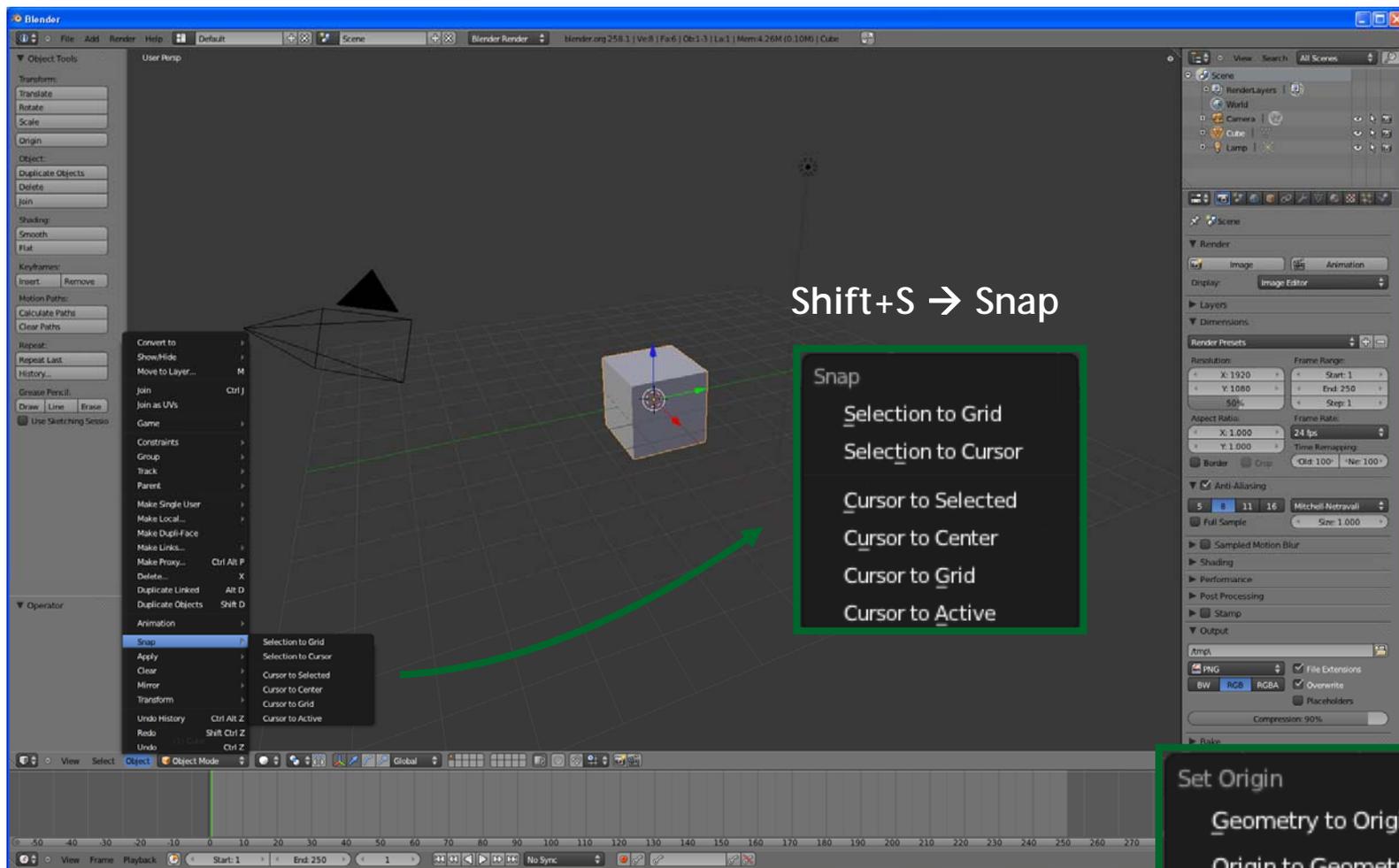
# OBJECT MODE





# OBJECT MODE





SHIFT + CTRL + ALT + C → set origin



# PIVOT POINT

Pivot Point

- Active Element
- Median Point
- Individual Origins
- 3D Cursor
- Bounding Box Center

An object transformation (scale or rotation) are made respecting a pivot point



# 3D MANIPULATOR

The image displays the Blender 2.48.1 interface with a central 3D viewport showing a cube. Four different manipulator widgets are overlaid on the cube, each enclosed in a green box:

- Translate manipulator:** A wireframe cube with three colored arrows (red, green, blue) pointing along the X, Y, and Z axes respectively.
- Rotate manipulator:** A wireframe cube with three colored circular arcs (red, green, blue) around the X, Y, and Z axes, indicating rotation.
- Translate, Rotate, Scale manipulator:** A wireframe cube with three colored arrows (red, green, blue) and three colored circular arcs (red, green, blue) around the axes, indicating combined translation, rotation, and scaling.
- Scale manipulator:** A wireframe cube with three colored arrows (red, green, blue) pointing along the axes, indicating scaling.

At the bottom center, a small menu is visible with the following options: Orientation, View, Normal, Gimbal, Local. The 'Global' option is highlighted with a green box.

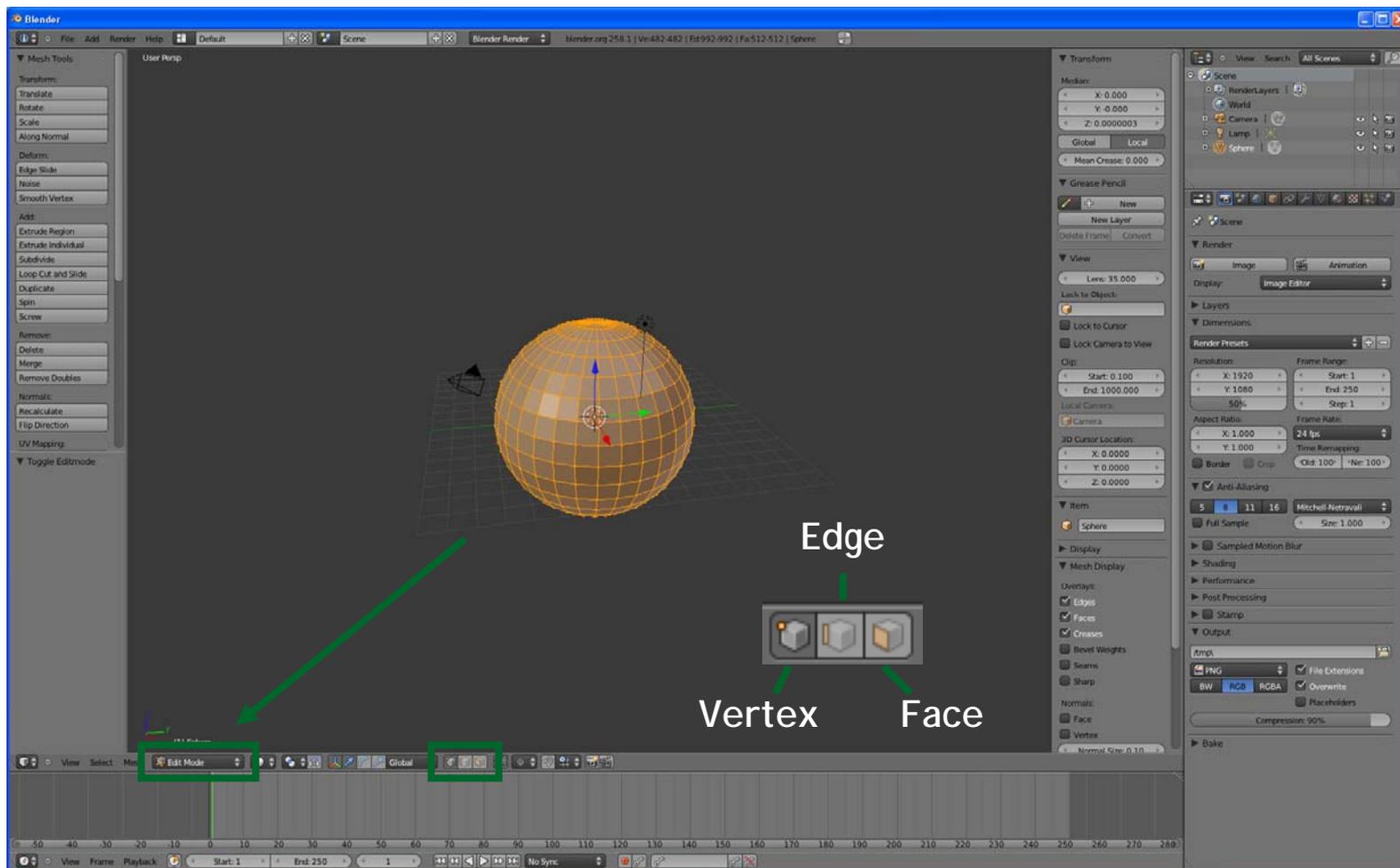
Text labels are placed over the image to identify each widget:

- Translate manipulator
- Rotate manipulator
- Translate, Rotate, Scale manipulator
- No manipulator
- Scale manipulator

At the bottom of the interface, a text box reads: "Use a 3D manipulator widget for controlling transforms".



# EDIT MODE



# EDIT MODE



Mesh - Transform  
G → Grab/Move  
R → Rotate  
S → Scale



# EDIT MODE

- Show/Hide
- Proportional Editing Falloff
- Proportional Editing
- AutoMerge Editing
- Normals
- Faces
- Edges
- Vertices
- Delete... X
- Add Duplicate Shift D
- Extrude Individual
- Extrude Region E
- UV Unwrap...
- Snap
- Mirror
- Transform
- Undo History Ctrl Alt Z
- Redo Shift Ctrl Z
- Undo (1) Sphere Ctrl Z

Mesh Edit Mode

- Recalculate Outside Ctrl N
- Recalculate Inside Shift Ctrl N
- Flip Normals

- Flip Normals
- Make Edge/Face F
- Fill Alt F
- Beautify Fill Shift Alt F
- Solidify
- Sort Faces
- Make F-gon
- Clear F-gon
- Quads to Tris Ctrl T
- Tris to Quads Alt J
- Edge Flip Shift Ctrl F
- Shade Smooth
- Shade Flat
- Rotate Edge CW
- Rotate UVs
- Mirror UVs
- Rotate Colors
- Mirror Colors

- Make Edge/Face F
- Subdivide
- Mark Seam
- Clear Seam
- Mark Sharp
- Clear Sharp
- Rotate Edge CW
- Rotate Edge CCW
- Edge Slide
- Edge Crease Shift E
- Edge Loop
- Edge Ring
- Loop to Region
- Region to Loop

- Merge Alt M
- Rip V
- Split Y
- Separate P
- Smooth Vertex
- Remove Doubles
- Vertex Sort
- Vertex Randomize
- Select Vertex Path
- Blend From Shape
- Blend Vertex Group
- Shape Propagate
- Vertex Groups
- Hooks

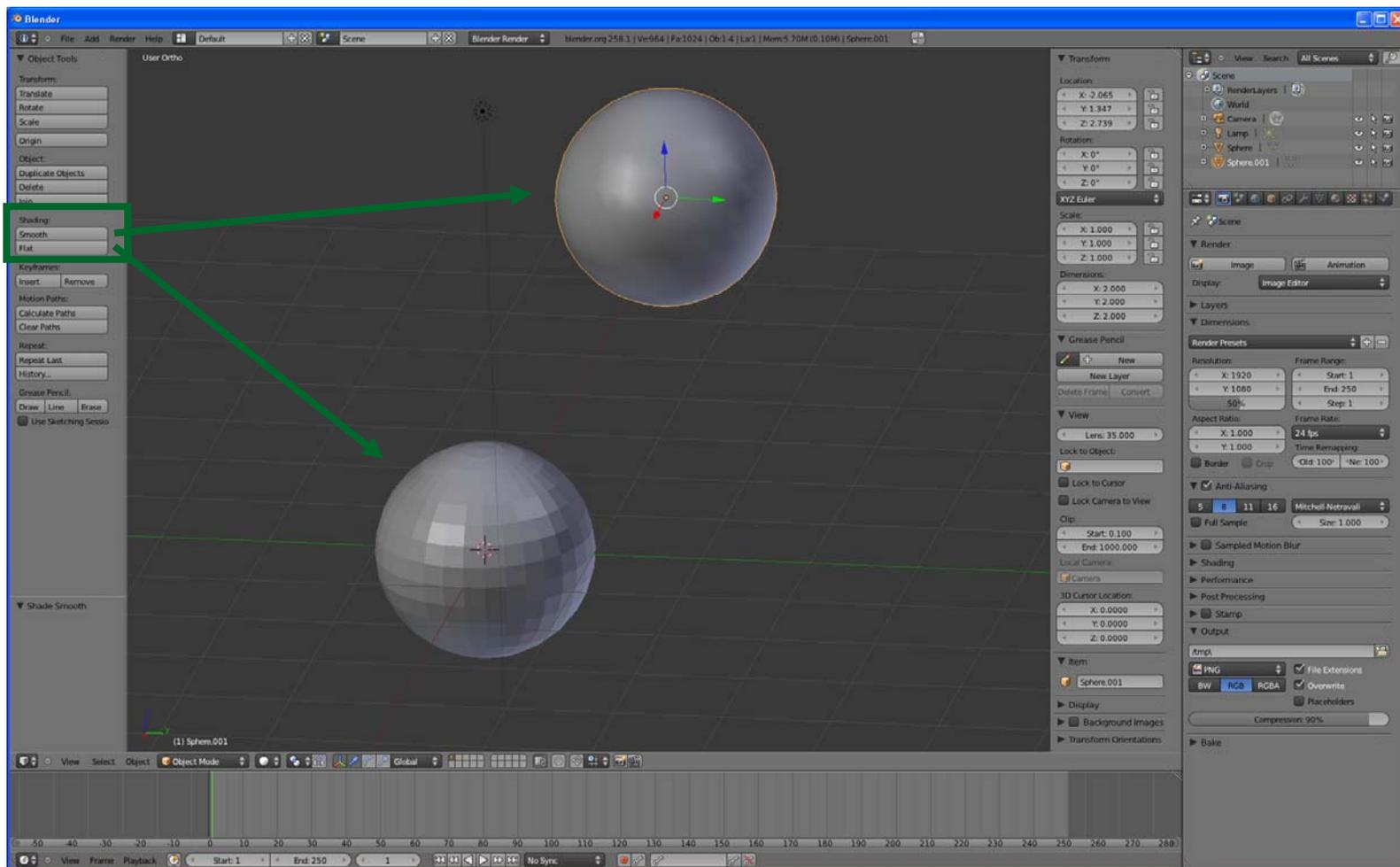
Ctrl+F

Ctrl+E

Ctrl+V

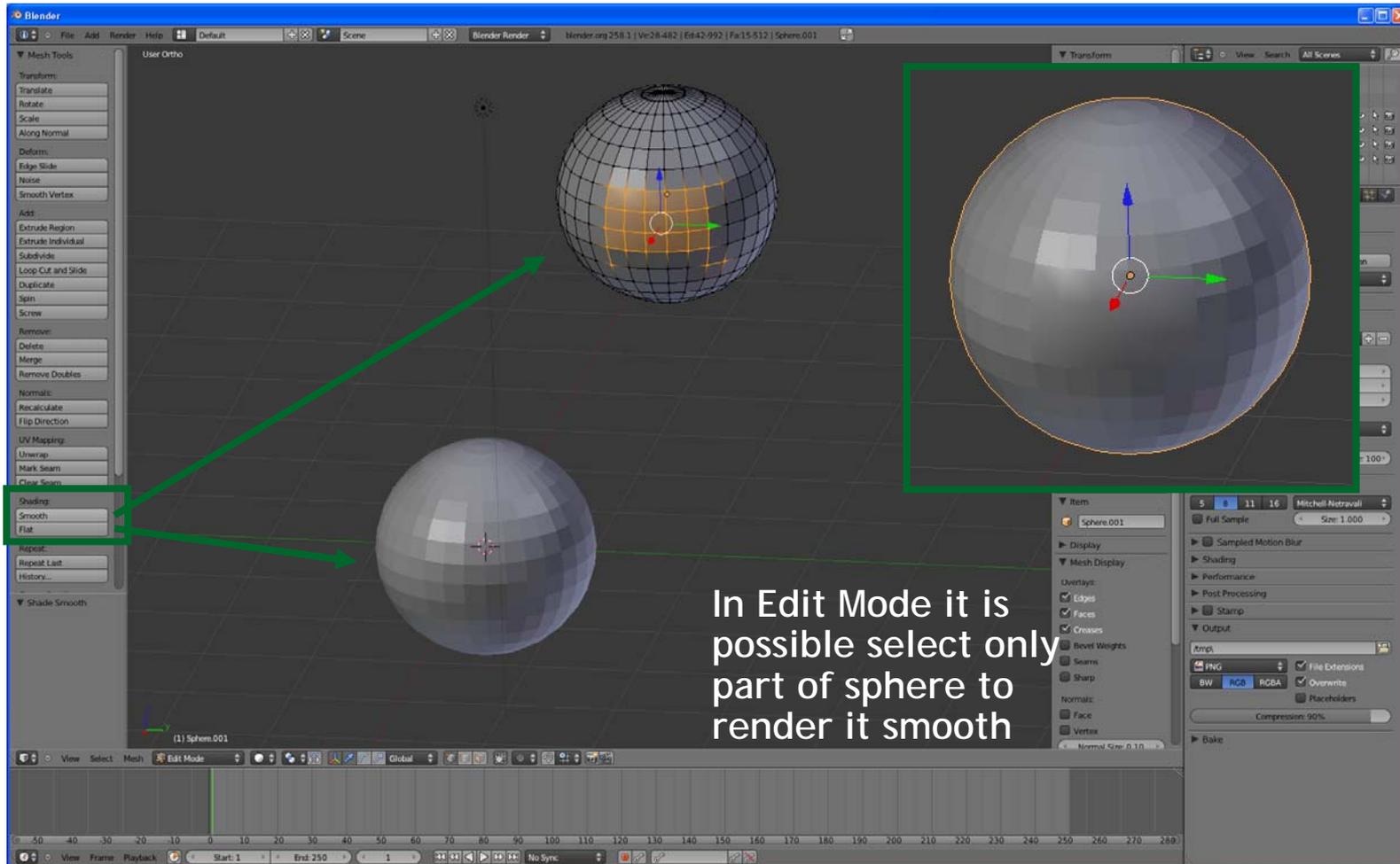


# OBJECT MODE - SMOOTH SHADING



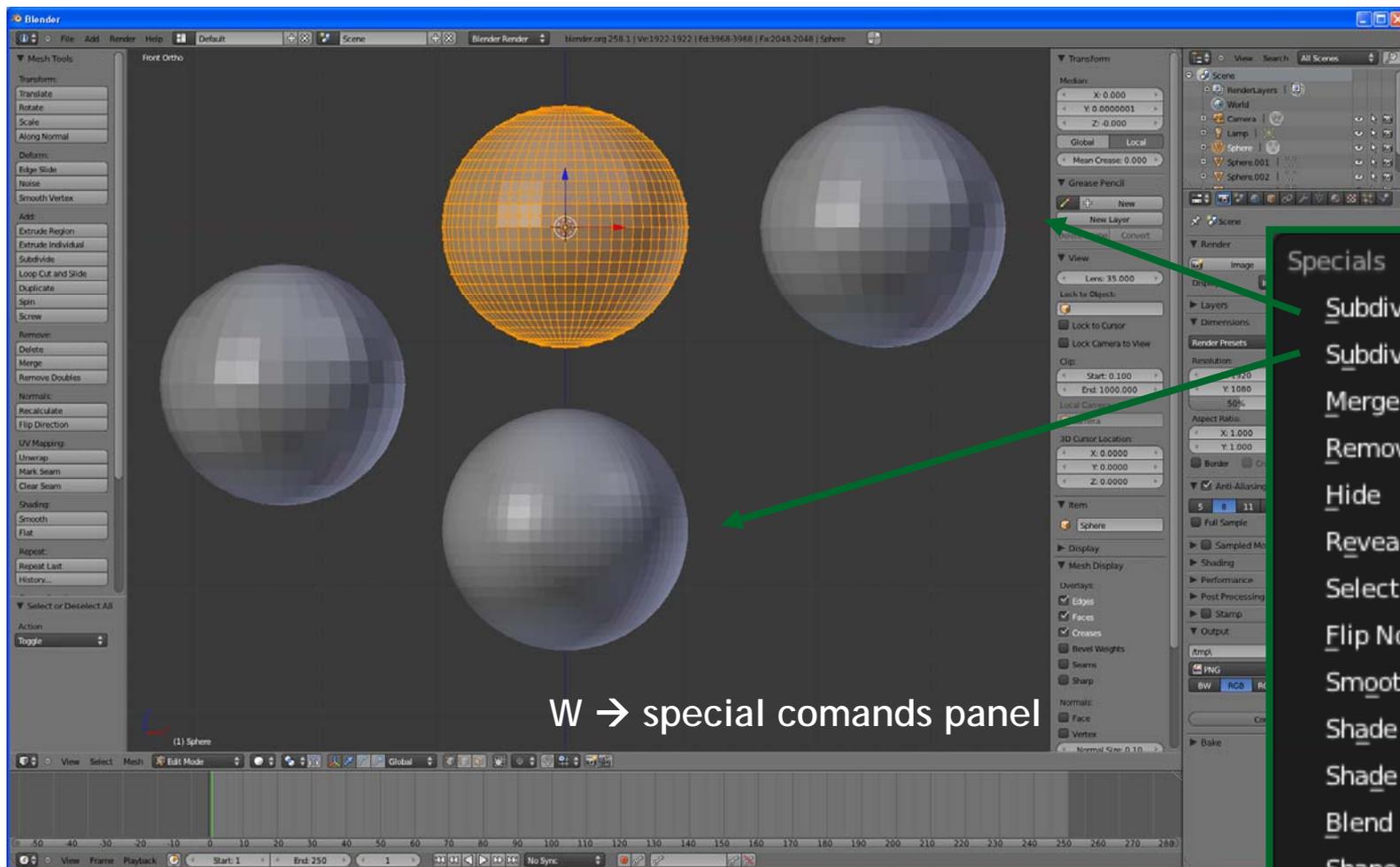


# EDIT MODE - SMOOTH SHADING





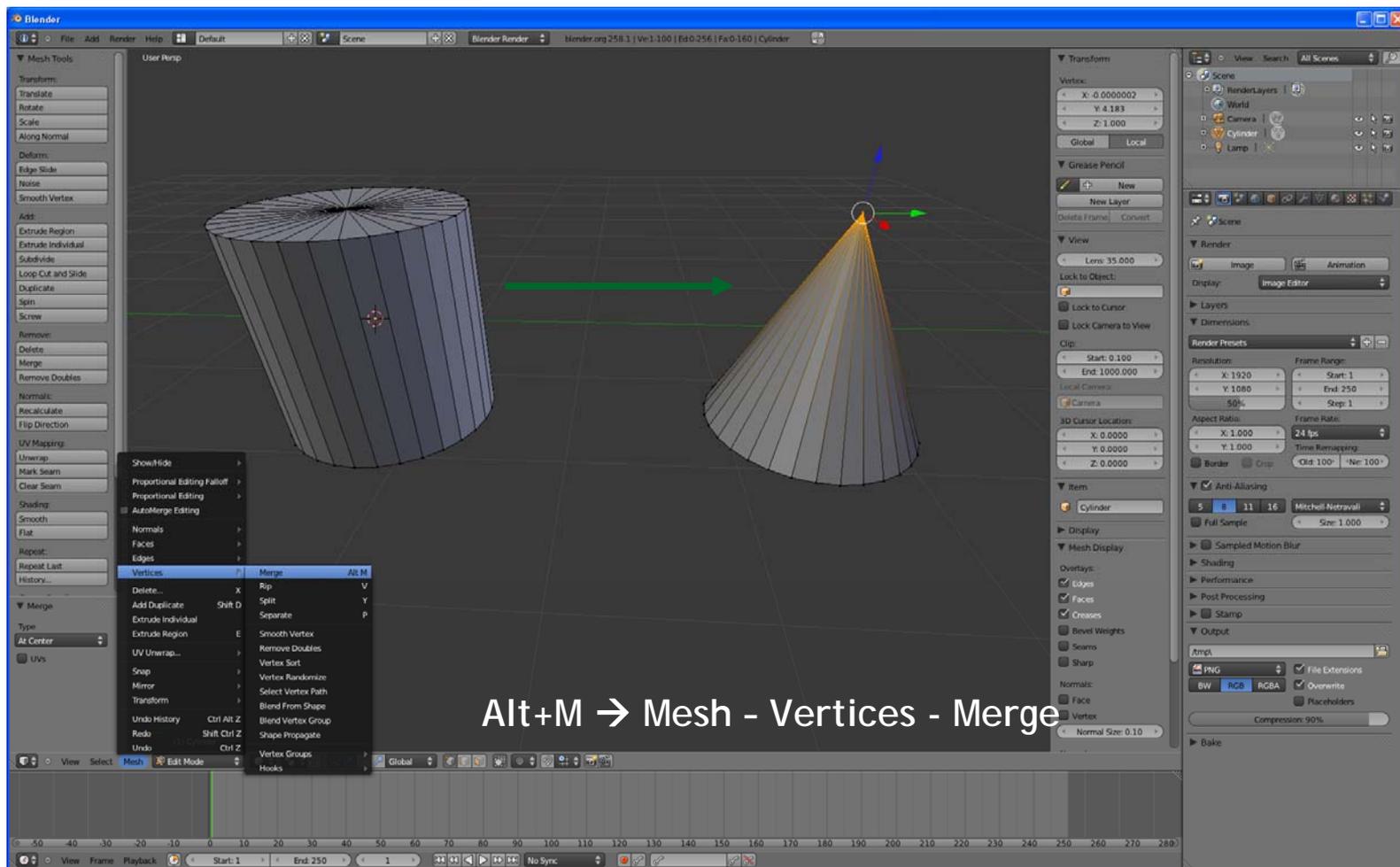
# EDIT MODE - FACES - SUBDIVIDE



- Specials
- Subdivide
- Subdivide Smooth
- Merge... Alt M
- Remove Doubles
- Hide H
- Reveal Alt H
- Select Inverse Ctrl I
- Flip Normals
- Smooth
- Shade Smooth
- Shade Flat
- Blend From Shape
- Shape Propagate
- Select Vertex Path

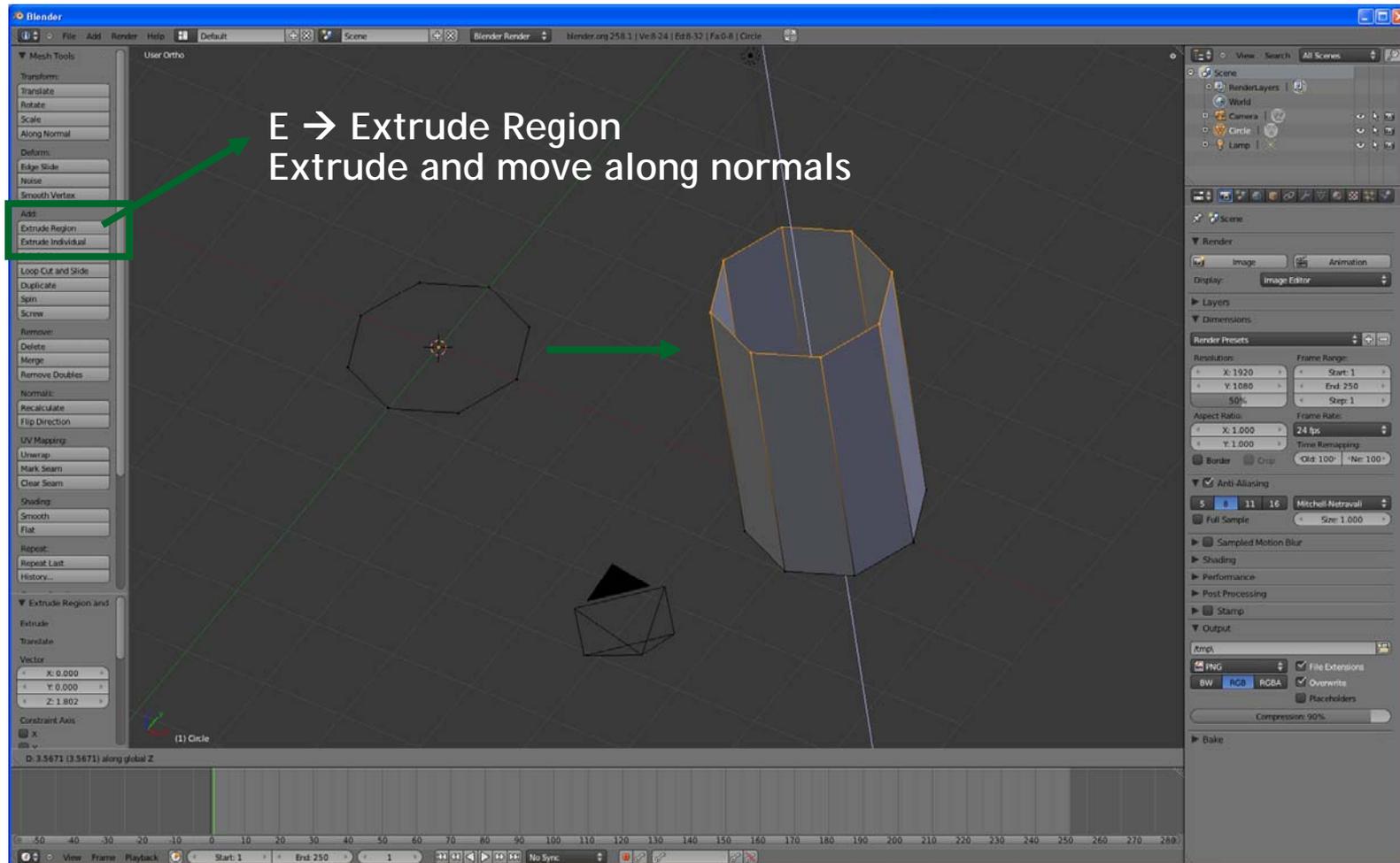


# EDIT MODE - VERTEX - MERGE



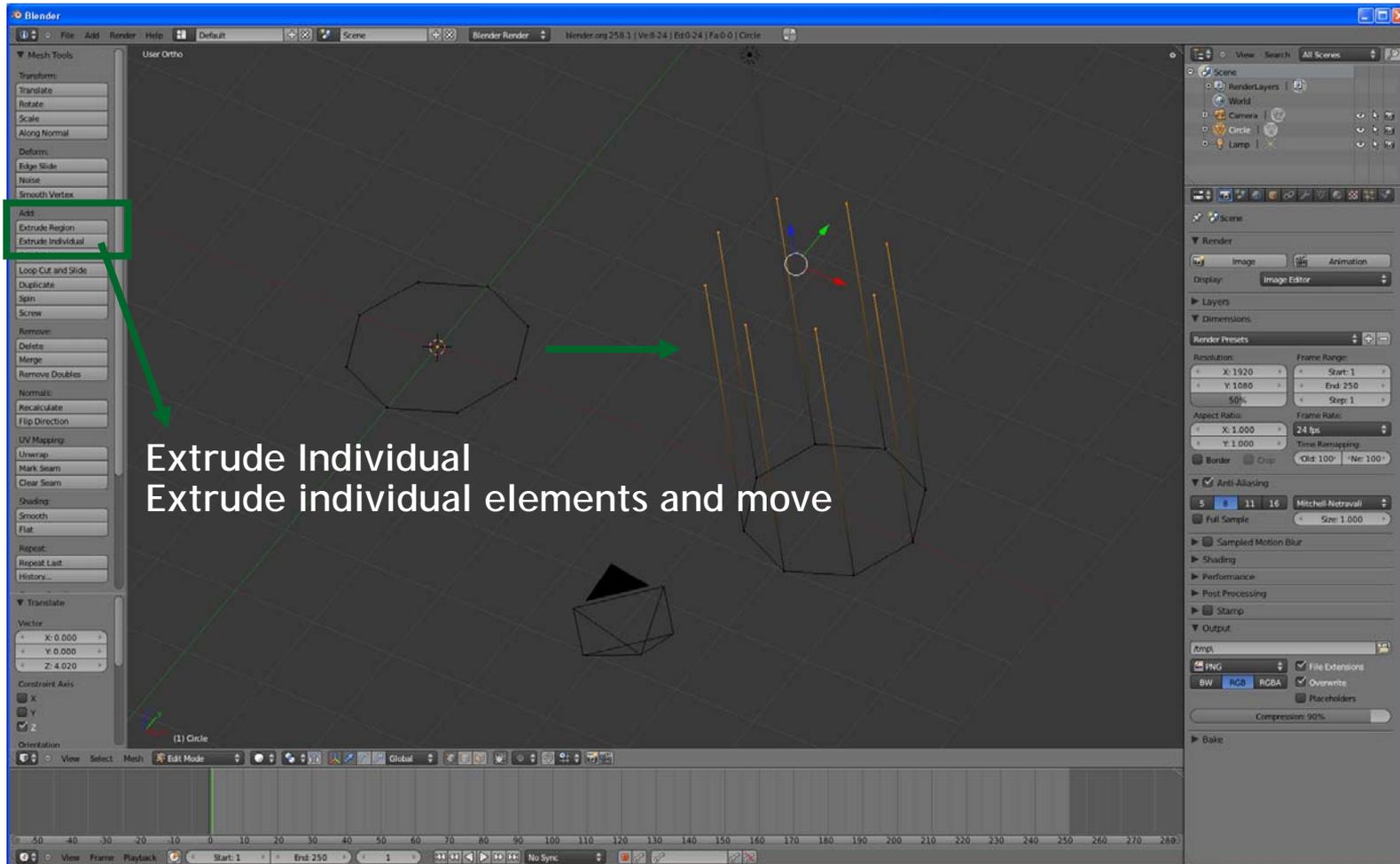


# EDIT MODE - EXTRUDE





# EDIT MODE - EXTRUDE





# EDIT MODE - SPIN

Blender

Mesh Tools

Transform:

- Translate
- Rotate
- Scale
- Along Normal

Deform:

- Edge Slide
- Noise
- Smooth Vertex

Add:

- Extrude Region
- Extrude Individual
- Subdivide
- Loop Cut and Slide
- Duplicate
- Spin
- Screw

Remove:

- Delete
- Merge
- Remove Doubles

Normals:

- Recalculate
- Flip Direction

UV Mapping:

- Unwrap

Operator

Blender

Mesh Tools

Transform:

- Translate
- Rotate
- Scale
- Along Normal

Deform:

- Edge Slide
- Noise
- Smooth Vertex

Add:

- Extrude Region
- Extrude Individual
- Subdivide
- Loop Cut and Slide
- Duplicate
- Spin
- Screw

Remove:

- Delete
- Merge
- Remove Doubles

Normals:

- Recalculate
- Flip Direction
- UV Mapping

Spin

- Steps: 24
- Dupli
- Degrees: 360.000
- Center: X: 0.000, Y: 0.000, Z: 0.000
- Axis: X: 0.000, Y: 0.000, Z: 1.000

Spin parameters

(1) Circle

View Select Mesh Edit Mode

Start: 1 End: 250 1 No Sync

(1) Circle

View Select Mesh Edit Mode

Start: 1 End: 250 1 No Sync



# EDIT MODE - KNIFE

Blender\* [D:\Francesca\scuole\2012\materiale\ROOM.blend]

File Add Render Window Help Default Scene Blender Render v2.64 | Verts:32/473 | Edges:16/936 | Faces:0/464 | Tris:928 | Plane

Extrude Region  
Extrude Individual  
Subdivide  
Loop Cut and Slide  
Duplicate  
Spin  
Screw  
Knife Select

Knife (K)

Options:

- Left mouse button to define cut lines
- Return/Spacebar to confirm
- ESC or right mouse button to cancel
- E for a new cut
- Ctrl to turn on midpoint snap
- Shift to ignore snap
- C to turn on angle constrain
- Z to turn on cut through

LMB: define cut lines, Return/Spacebar: confirm, Esc or RMB: cancel, E: new cut, Ctrl: midpoint snap (Off), Shift: ignore snap (Off), C: angle constrain (On), Z: cut through (On)



# LAYER

M → to move selected objects from a layer to another

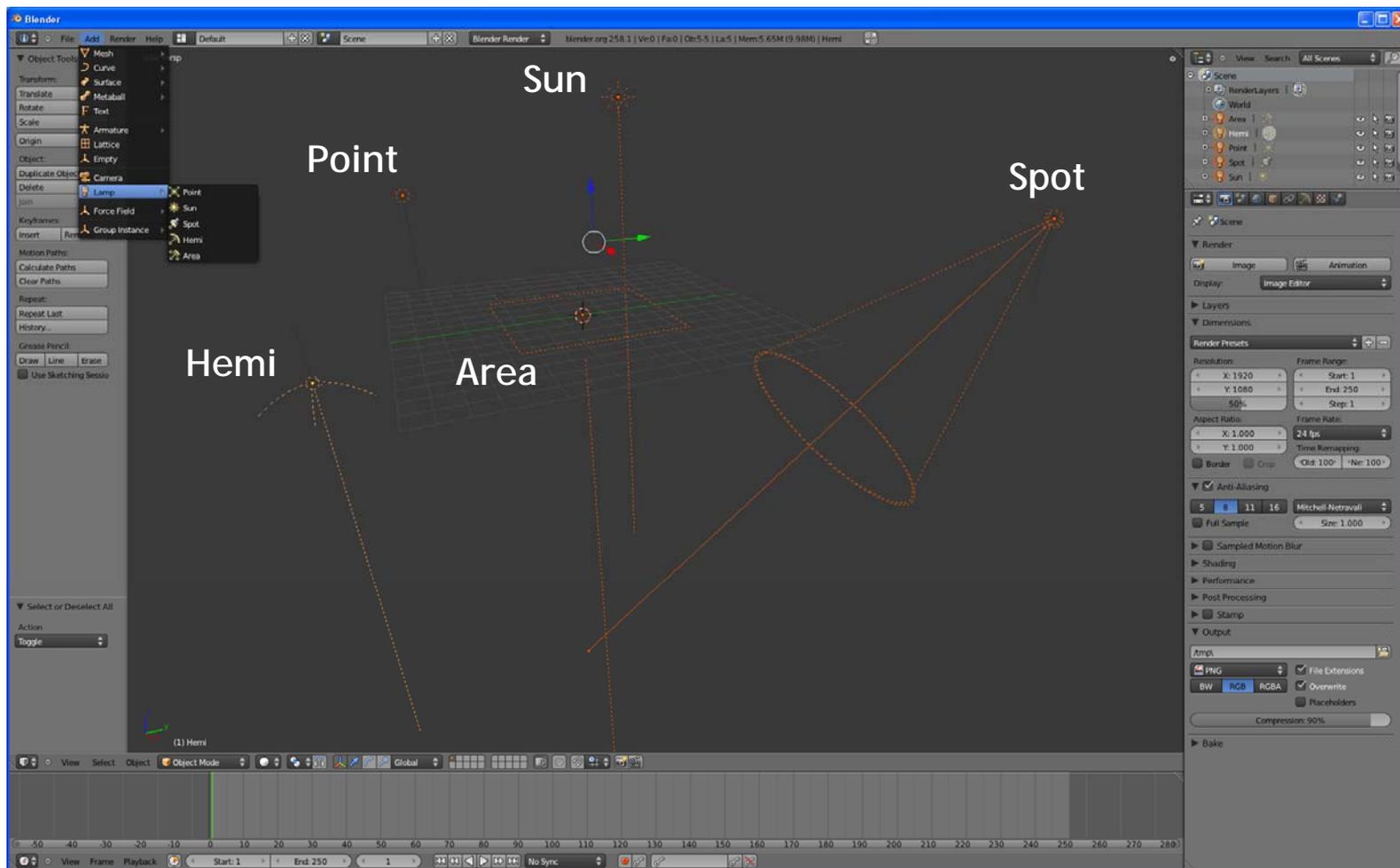
Shift+click on layer → to visualize more layer at the same time

Only objects on visible layers are rendered.

The image shows the Blender 2.58.1 interface. In the center, a 3D scene contains a sphere, a cube, a cylinder, and a cone. A 'Move to Layer' dialog box is open, showing a grid of layer icons. The 'Move to Layer' dialog box has a title bar 'Move to Layer' and a label 'Layer' above a grid of 16 small square icons. The interface also shows the 'Layers' panel on the right, which includes 'Render Layers', 'Dimensions', 'Render Presets', 'Anti-Aliasing', 'Shading', 'Performance', 'Post-Processing', and 'Bake' sections. The 'Layers' panel shows a grid of layer icons, with the first one selected. The 'Render Presets' section shows 'Resolution' (X: 1920, Y: 1080), 'Frame Range' (Start: 1, End: 250), 'Aspect Ratio' (X: 1.000, Y: 1.000), and 'Frame Rate' (24 fps). The 'Anti-Aliasing' section is checked, and the 'Shading' section is also checked. The 'Performance' section is expanded, showing 'Full Sample' and 'Size: 1.000'. The 'Post-Processing' section is expanded, showing 'File Extensions' (checked), 'Overwrite' (checked), and 'Placeholders' (checked). The 'Bake' section is also expanded, showing 'Compression: 90%'. The interface also shows the 'Object Tools' panel on the left, the 'Scene' panel at the top, and the 'Timeline' at the bottom.

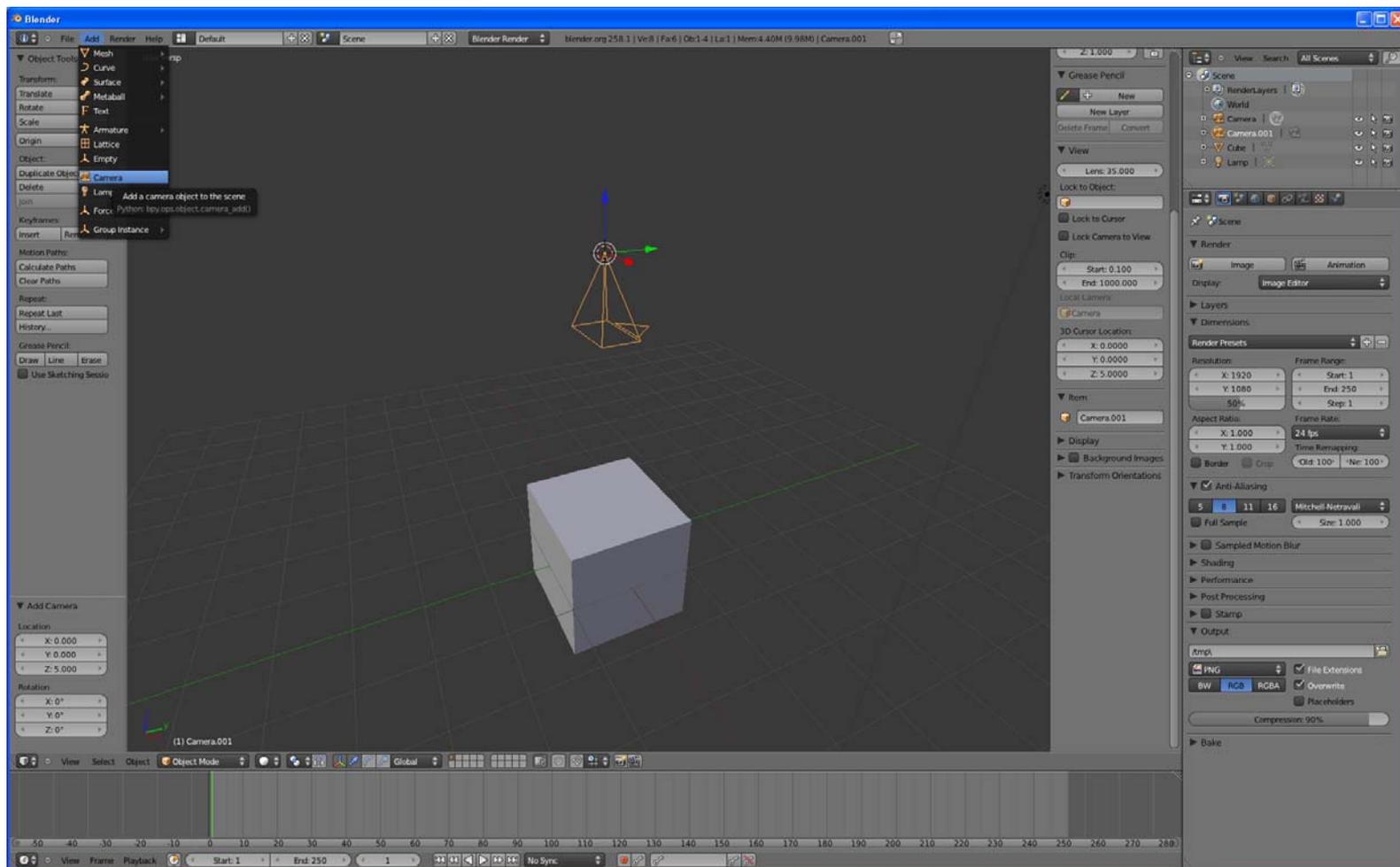


# ADD LAMP





# ADD CAMERA





# PROPERTIES



Render

Scene

World

Object

Object Constraints

Modifiers

Object Data

Material

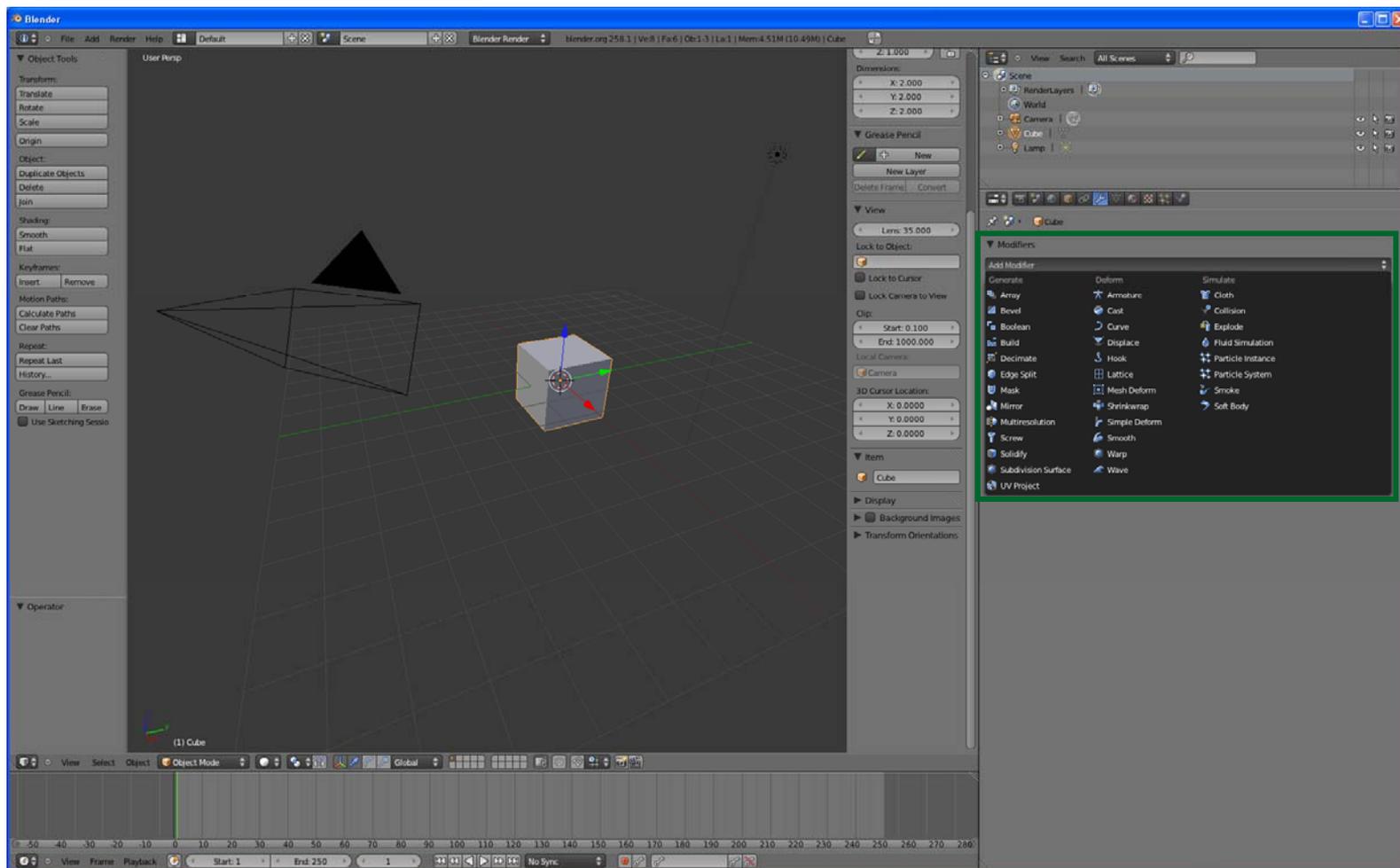
Texture

Particles

Physics

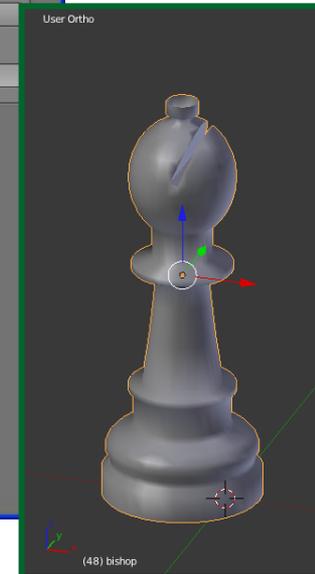
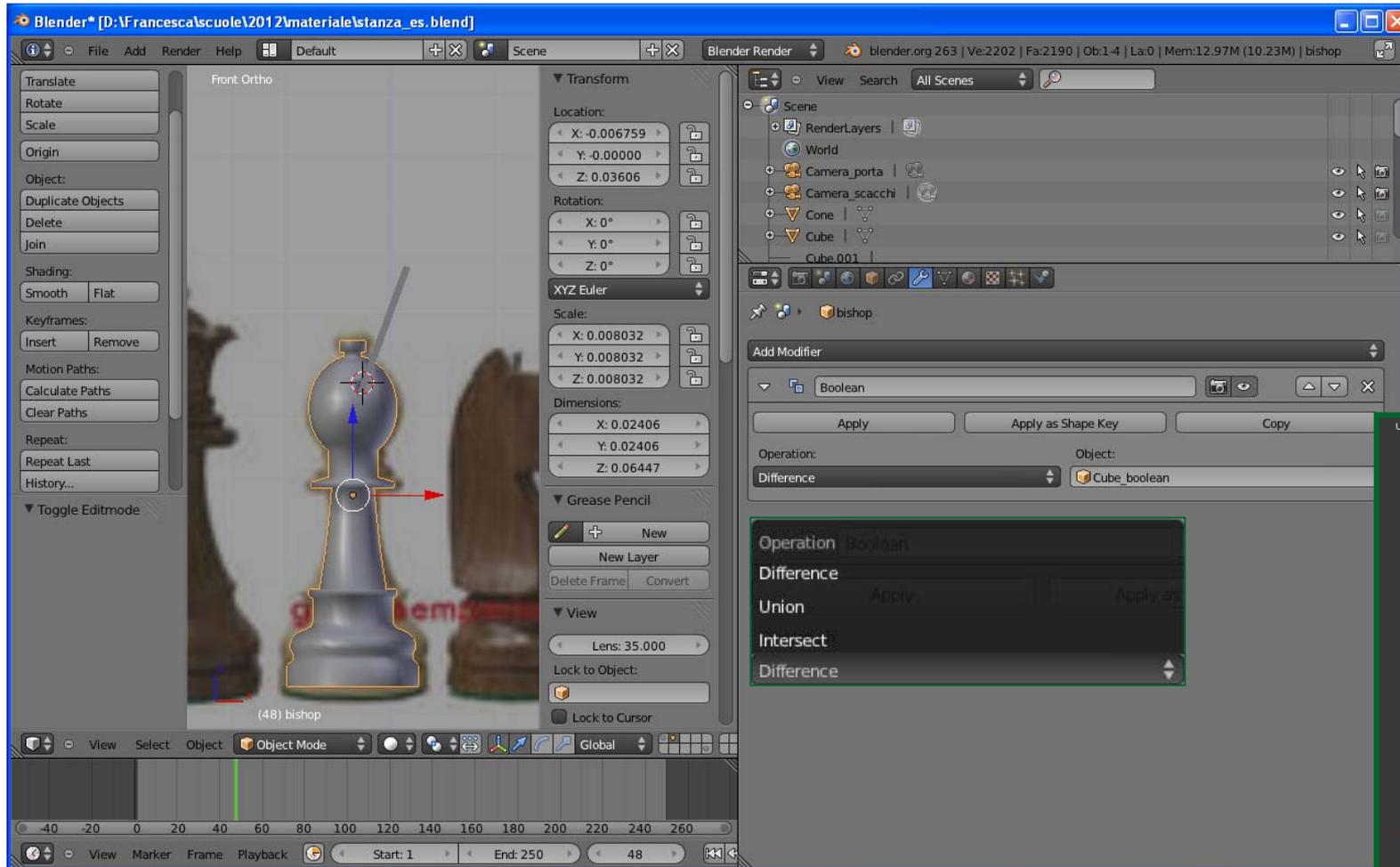


# PROPERTIES - MODIFIERS



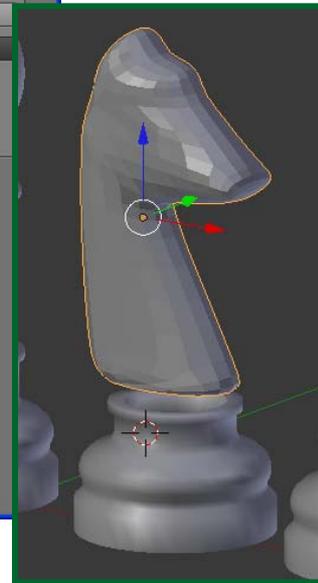
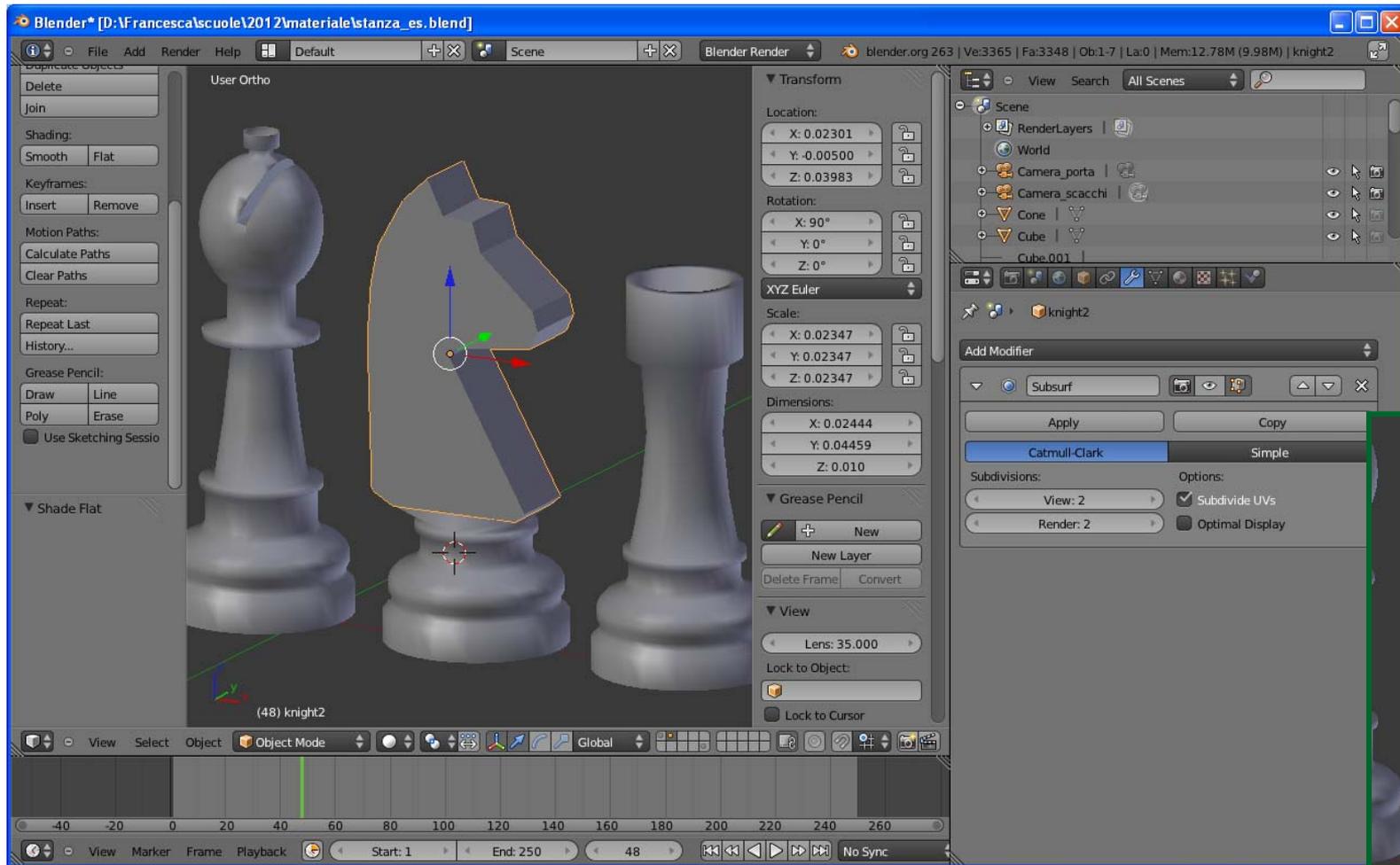


# MODIFIERS - BOOLEAN





# MODIFIERS - SUBDIVISION SURFACE





# PROPERTIES - MATERIAL

Object color parameters

Diffuse Shader Model  
Fresnel  
Minnaert  
Toon  
Oren-Nayar  
Lambert  
Oren-Nayar

Specular Shader Model  
Ward  
Toon  
Blinn  
Phong  
Cook-Torr  
Blinn

Material Properties Panel:  
Material: Material  
Surface | Wire | Volume | Halo  
Preview: Sphere on checkerboard  
Diffuse: Oren-Nayar, Intensity: 0.800, Roughness: 0.500  
Specular: Blinn, Intensity: 0.500, Hardness: 50, IOR: 1.500  
Shading: Emit: 0.00, Ambient: 1.000, Translucency: 0.00  
Transparency: Z-Transparency, Raytrace  
Options: Tractable, Full Oversampling, Sky, Use Mist, Invert Z Depth, Z-Offset: 0.000  
Light Group: Exclusive  
Shadow: Custom Properties

[http://wiki.blender.org/index.php/Doc:Manual/Materials/Properties/Diffuse\\_Shaders](http://wiki.blender.org/index.php/Doc:Manual/Materials/Properties/Diffuse_Shaders)



# PROPERTIES - TEXTURE

The image shows a Blender 2.58.1 interface with a cube in the center. A dropdown menu is open, listing various texture types. A green arrow points from the 'None' option in the dropdown to the 'None' option in the 'Type' field of the 'Tex' material property panel on the right.

**Texture Types List:**

- None
- None
- Blend
- Clouds *Generated*
- Distorted Noise
- Environment Map
- Image or Movie
- Magic
- Marble
- Musgrave
- Noise
- Point Density
- Stucci
- Voronoi
- Voxel Data
- Wood
- Type

**Material Properties Panel (Tex):**

- Type: None
- Mapping: None
- Coordinates: Clouds
- Projection: Distorted Noise
- From Dupli: Environment Map
- Offset: Image or Movie
- Influence: Noise
- Diffuse: Stucci
- Specular: Intensity: 1.000, Normal: 1.000, Color: 1.000, Warp: 0.000, Hardness: 1.000, Daylen: 0.200
- Blend: Mix, Negative, Invert
- Bump Mapping: Method: Compatible, Space: ViewSpace



# PROPERTIES - MATERIAL

The image shows the Blender 2.58.1 interface with a material editor. The main 3D viewport displays a scene with a sphere, a cube, and a cylinder. The right sidebar shows the material properties for the selected cylinder. The 'Transparency' panel is expanded and highlighted with a green box, showing the following settings:

- Mask: Z Transparency (selected)
- Alpha: 0.200
- Fresnel: 0.000
- Specular: 1.000
- Blend: 1.250

A green arrow points from the 'Transparency' panel in the right sidebar to the expanded panel at the bottom of the interface.

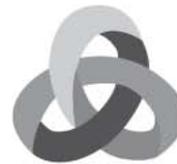


# PROPERTIES - MATERIAL

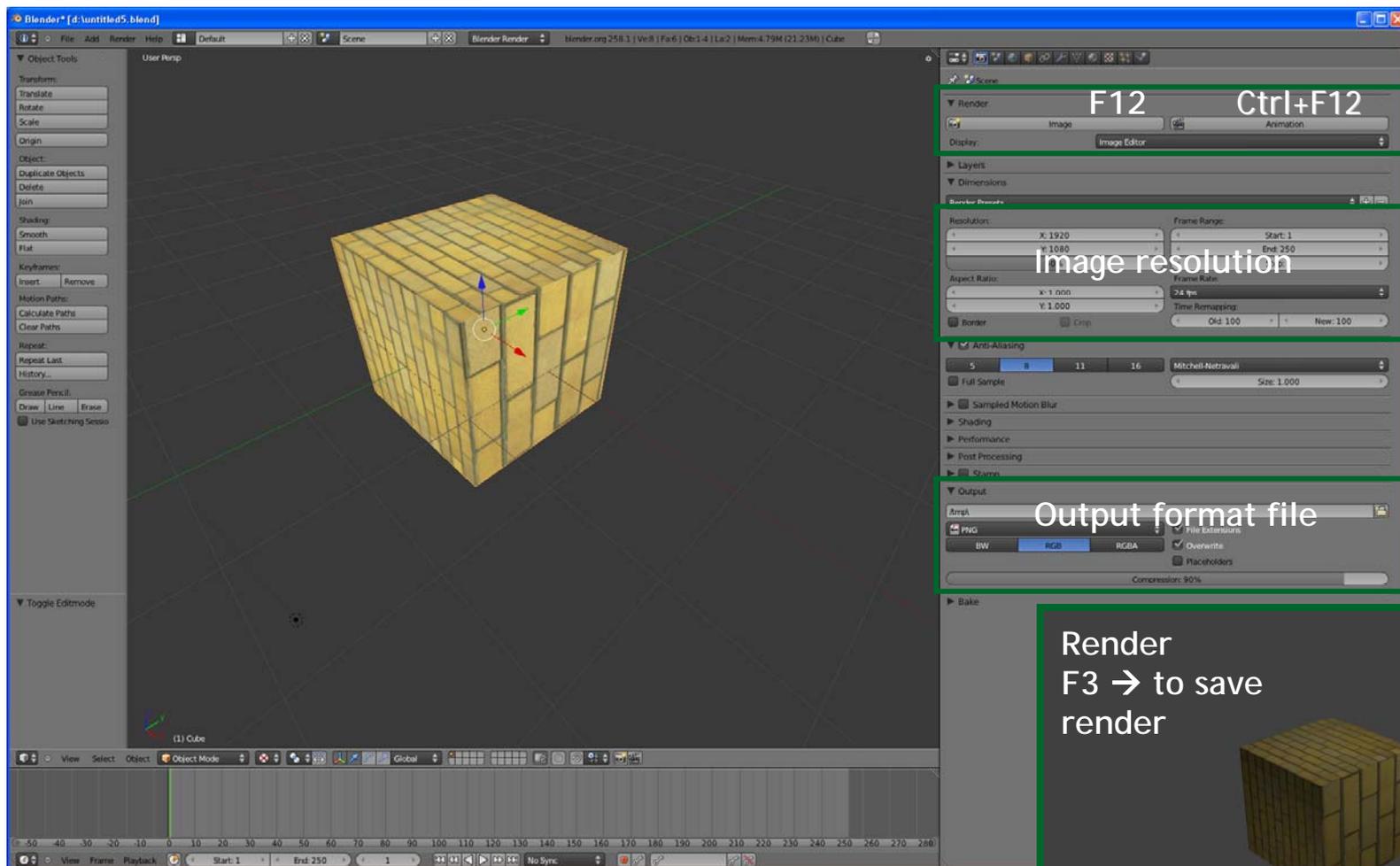
The image shows the Blender 2.58.1 interface with a scene containing a green sphere, a yellow cylinder, and a red cube. The material properties panel on the right is set to 'Mirror'. A green box highlights the 'Mirror' properties section, and a zoomed-in view of this section is shown in the foreground.

**Mirror Properties:**

- Reflectivity: 0.500
- Fresnel: 0.000
- Blend: 1.250
- Depth: 2
- Gloss: Amount: 1.000, Threshold: 0.005
- Max Dist: 0.000
- Fade To: Sky
- Samples: 18
- Anisotropic: 1.000



# PROPERTIES - RENDER



F12      Ctrl+F12

Image resolution

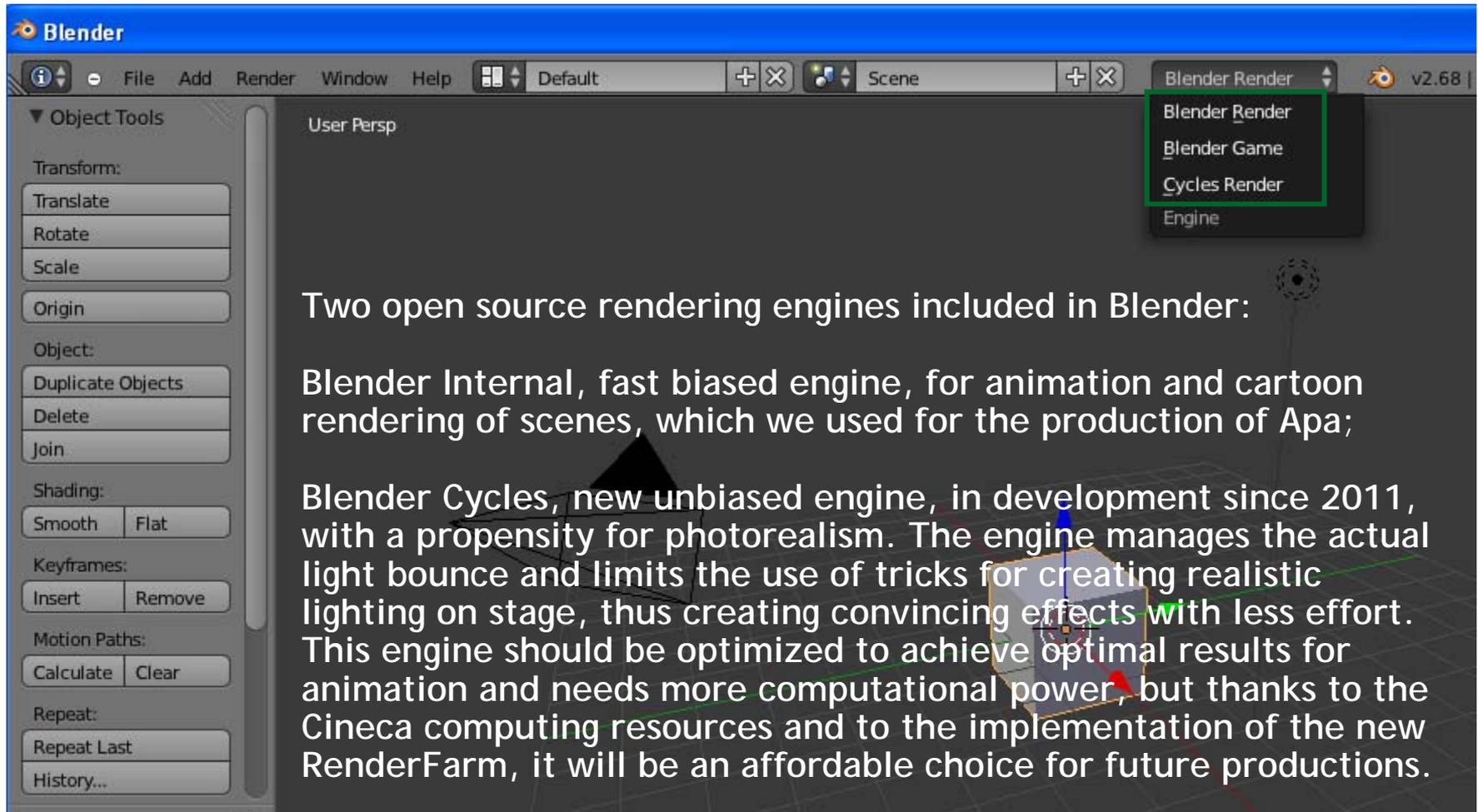
Output format file

Render  
F3 → to save  
render





# PROPERTIES - RENDER



Two open source rendering engines included in Blender:

Blender Internal, fast biased engine, for animation and cartoon rendering of scenes, which we used for the production of Apa;

Blender Cycles, new unbiased engine, in development since 2011, with a propensity for photorealism. The engine manages the actual light bounce and limits the use of tricks for creating realistic lighting on stage, thus creating convincing effects with less effort. This engine should be optimized to achieve optimal results for animation and needs more computational power, but thanks to the Cineca computing resources and to the implementation of the new RenderFarm, it will be an affordable choice for future productions.



# LINK

→Official website:

- <http://www.blender.it>
- <http://www.blender.org>

→Library:

- <http://www.blendswap.com/>
- <http://matrep.parastudios.de/>

→Documentation:

- [http://wiki.blender.org/index.php/Main\\_Page](http://wiki.blender.org/index.php/Main_Page)
- <http://www.blendermagazineitalia.it/>
- [http://en.wikibooks.org/wiki/Blender\\_3D:\\_Noob\\_to\\_Pro](http://en.wikibooks.org/wiki/Blender_3D:_Noob_to_Pro)