

# Blender Visualization Tutorial SS2014 I

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Forum:

<http://www.cellvisualization.org>

Direct link to this forum entry:

<http://www.cellmicrocosmos.org/Cmforum/viewtopic.php?f=21&t=750>

Actual Version of Blender:

<http://www.blender.org>

Here, Blender 2.7a is used.

## Target

This tutorial describes the basic functionality of Blender. It is important to go through the whole tutorial, because these basic knowledge will be important in the future and most of it will not be repeated!

## What is Blender?

Wikipedia

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

Roosendaal founded *NaN* in June 1998 to further develop and distribute the program. The program was initially distributed as shareware until NaN went bankrupt in 2002.

The creditors agreed to release Blender under the terms of the *GNU General Public License*, for a one-time payment of €100,000 (US\$100,670 at the time). On July 18, 2002, a Blender funding campaign was started by Roosendaal in order to collect donations and on September 7, 2002 it was announced that enough funds had been collected and that the Blender source code would be released. Today, Blender is free, open-source software and is, apart from the two half-time employees and the two full-time employees of the Blender Institute, developed by the community.

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", which did not require disclosing source code but required payments to the Blender Foundation. However, this option was never exercised and was suspended indefinitely in 2005.[5] Currently, Blender is solely available under GNU GPL

## Watch the Show Reel

[http://www.youtube.com/watch?v=QbzE8jOO7\\_0&hd=1](http://www.youtube.com/watch?v=QbzE8jOO7_0&hd=1)

And be sure to do not miss this part:

[http://www.youtube.com/watch?v=QbzE8jOO7\\_0&hd=1&t=180](http://www.youtube.com/watch?v=QbzE8jOO7_0&hd=1&t=180)

## Installation

We will be working with Blender version 2.67b, because it is quite stable. Go to the Blender website, locate the older versions, and download the version for your OS.

## Preparations

Menu → File → User Preferences

→ Addons:

activate:

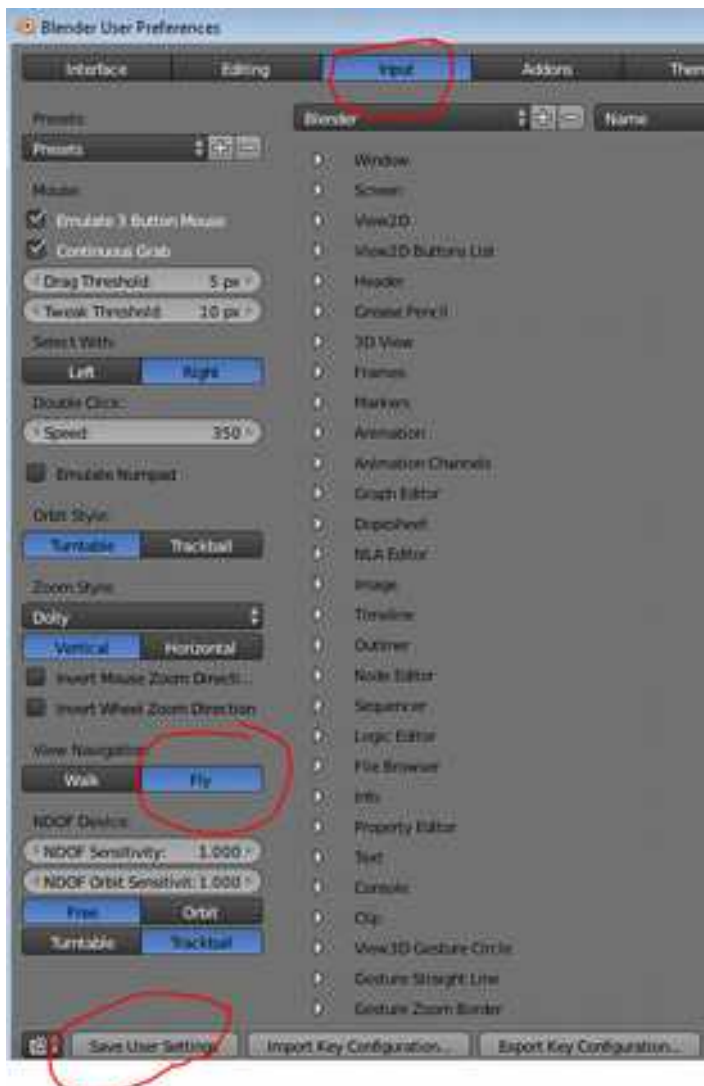
Import-Export: Import Images as Planes

→ Input

activate “Emulate 3 Button Mouse” for using Blender with a Mobile PC



In addition, activate the “Fly Mode” in the “Input” section and then press: “Save As Default/Save User Settings” to make sure, next time you start Blender, you do not have to redo these settings again:



## Shortcut keys

Now, a number of shortcuts will follow. Of course it is a good idea to remember most of the shortcuts in the future on your own, because working with Blender is much faster with shortcuts instead of using the menus. However, to support you during your work, KatsBits provides a very nice keyboard chart which you can download here for free:

<http://www.katsbits.com/tutorials/blender/useful-keyboard-shortcuts.php>

## Object Mode

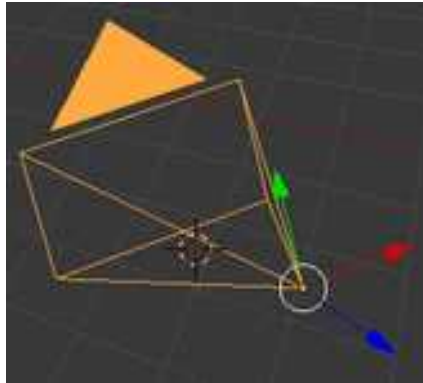
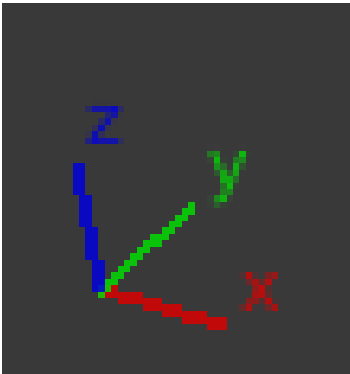
### Create an Object

First, if in the center of the blender workspace there is no cube, create a new one, by selecting the tab "Create" and clicking on "Cube".



## Orientation

Pay attention to the X/Y/Z axis at the left bottom corner of the view port:  
X is red, Y is green, Z is blue:



! The following keyboard and mouse short cuts apply only to the view port. Therefore, the mouse ! cursor must be always *inside* the view port. All short cuts depend on the actually active window !

## Viewport Movement

### Mouse-Movement

- + Center-Click *or* Alt+Left-Click: emulate Center Mouse Button & Rotate
- + Center-Click+Shift *or* Alt+Shift+Left-Click: move horizontally/vertically
- + Center-Click+Ctrl *or* Ctrl+Shift+Left-Click: zoom in/out *or* Mouse-Wheel

### Mouse-Wheel

- +Shift: movement along the camera's Y-axis
- +Ctrl: movement along the camera's X-axis
- +Ctrl+Shift: rotation along the camera's Z-axis

## Selections

- A : Select or Deselect All
- Right-Click : Select
- Left-Click : Set Position of the Cursor
- Ctrl+Left-Click : Draw Shape and Select
- B and then select by pressed Left-Click: Border Select
- C and then select by pressed Left-Click: Pencil Select
- ESC : Abort selection etc. *or* Back to 3D View (if e.g. in Render Mode)

## Num-Pad and Viewports

- 1 : Front
- 3 : Side
- 7 : Top
- CTRL+# : Opposite (e.g. CTRL+1: Rear)
- 5 : Orthographic/Perspective View
- 4,2,6,8 : Rotate in 45° steps
- 0 : Switch Camera View/Perspective View
- Shift+F : Free Floating Mode for Camera/Perspective View, finish with left click
- +/- : Zoom in/out
- Pos1 : Show all objects
- Shift-C : The view is shifted to show all objects

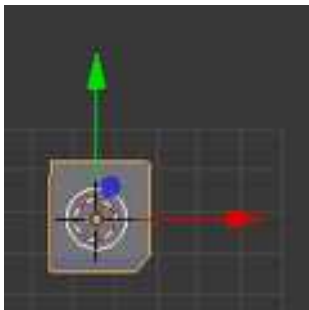
## Manipulation Modes



In combination with the Left-Mouse-Button:

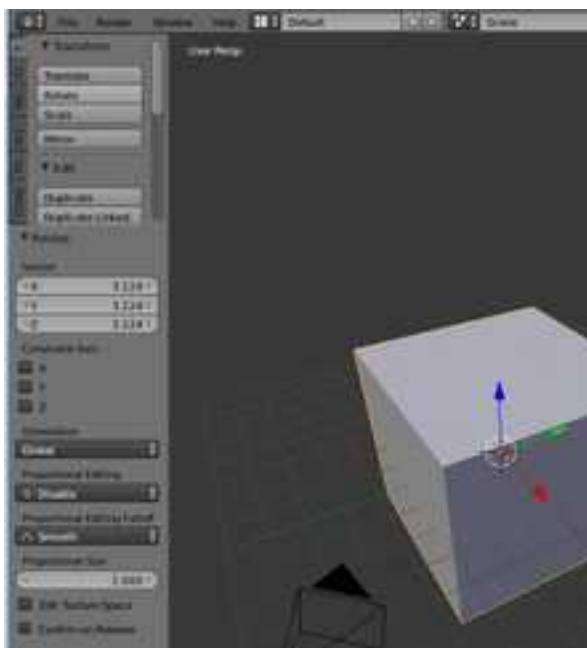
- G : Grab
- R : Rotate
- S : Scale
- G/R/S+Axis : Translation/Rotation/Scale along the chosen Axis (X,Y,Z)
- G/R/S+Alt : Undo last transformation ("Object Mode"; not in "Edit Mode")
- Esc or Right-Mouse-Button: Abort the last action
- Ctrl+Space : Show/Hide Manipulators

Select here the manipulator needed (in this case the arrow):



- Left-Click on Arrows of Object : Movement along the chosen axis
- Ctrl+Movement : in full Blender steps
- Ctrl+Shift : Movement in 1/10 Blender steps
- Ctrl-Z : Undo (32 Undos, can be changed File → Preferences → „Editing“ → Change Size of UnDo History)
- Ctrl-Shift-Z : Redos

The Last Action/Transformation is shown here and can be manipulated:



Set Origin : change the Gizmo of an object



## Edit Mode

Tab: Edit Mode (toggle between Object and Edit Mode)

select with Right Mouse Button single vertices

Shift: Multiple Selection, keep pressed by selecting 4 nodes

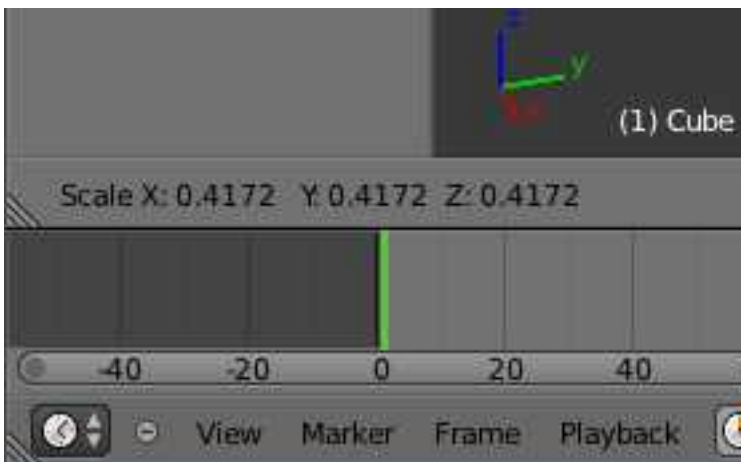
S + 0 + Enter → Place all selected nodes in one place

(S for scale, 0 Scales the distances between all selected nodes to 0;

pressing S + 10 would scale the distances between all selected nodes to the 10<sup>th</sup> of their length;

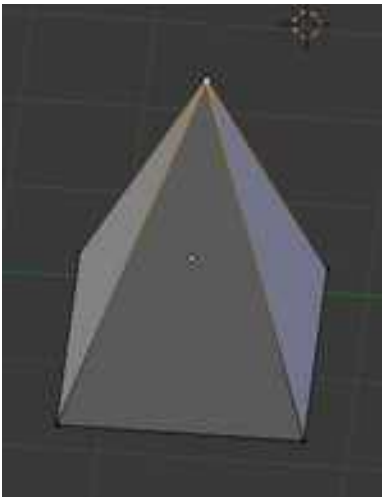
this method can again be combined with X, Y and Z restraints, e.g. by selecting S + X + 0;

watch the actual scale on the left bottom corner shown below)



W → “Specials” Pup-Up for Edit Mode appears, select:

- Remove Doubles: Removes all overlapping vertices in one position, e.g. after using S+0



Further Shortcuts:

- X : Delete Objects
- Shift+A : Add Objects to actual object (remember, we are in Edit Mode, these objects will be not single object, but they will be added to the actually edited object)
- Ctrl + Tab : Change Sub-Edit Mode: Vertex, Edge, or Face
- F : Combine selected vertices to
  - a) lines if 2 vertices are selected, or
  - b) to faces if more than 2 vertices are selected
- E : Extrude selected vertex/vertices, lines or faces
- Alt+M : Merge selected nodes (Edit Mode only)
- W → Specials: Subdivide line between selected vertices

## API-Navigator

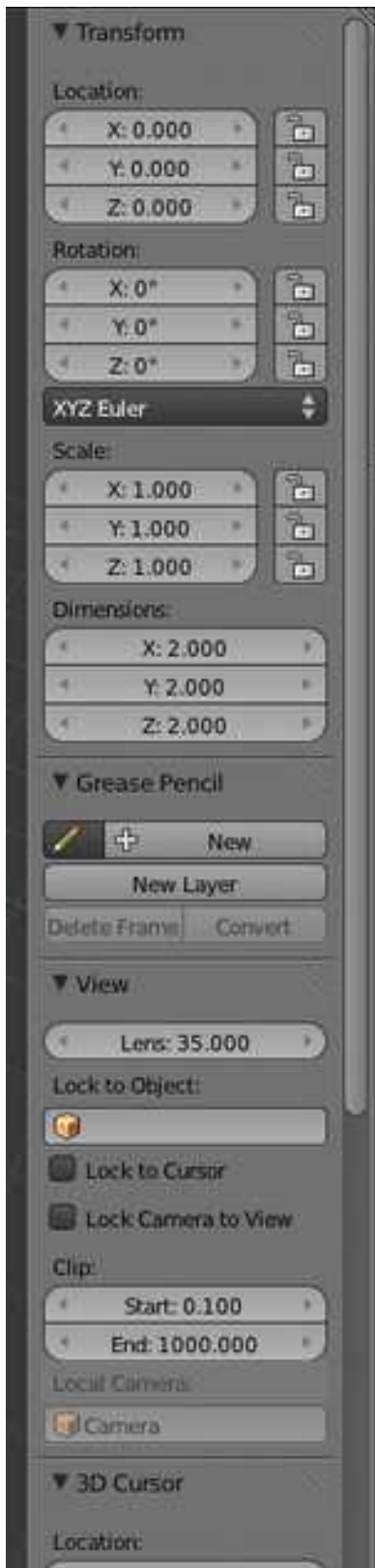
Help → Python API Reference



The Python-Scripts executed by Blender are always shown in the top section which is normally hidden. To open this section, the yellow marked line (see screen shot) has to be dragged down with the Mouse+LeftPress.

## Properties Window

$N \rightarrow$  Properties of the selected object





## Background Image

This image is only shown in view ports, e.g. in the camera perspectives:



(this is still the properties dialog)

This maybe useful if an image should be used as a base for a three-dimensional object, e.g. image segmentation. Important: If “All Views” is chosen, the images are only shown in orthographic perspective, which is toggled by “5” on the NumPad

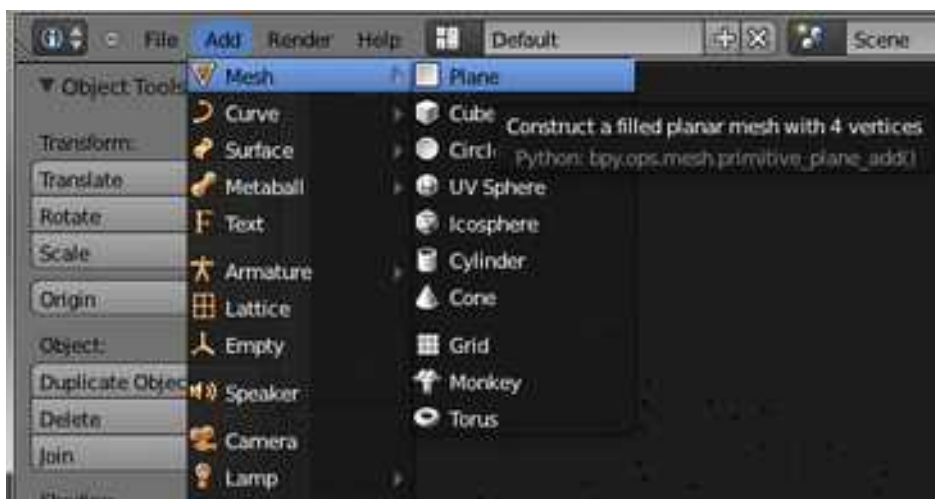
→ Therefore, usually it will be needed to correlate an image with a plane:

## A Plane with an Image

### *The complex way*

(Attention only for those who plaid around with the render settings: use the standard renderer: the Blender Renderer)

Create the Plane:



Make sure, that “Textured Solid” is checked in the properties (Press N to toggle properties):



Create a new Material (the plane has to be selected):



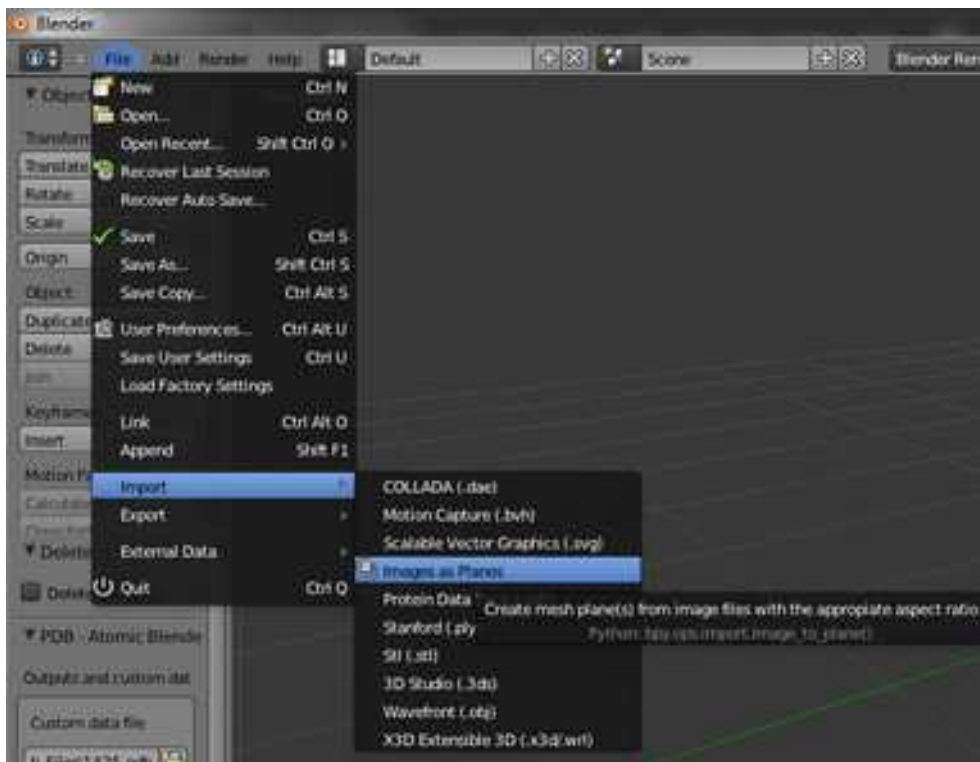
Create a new Texture: →



→

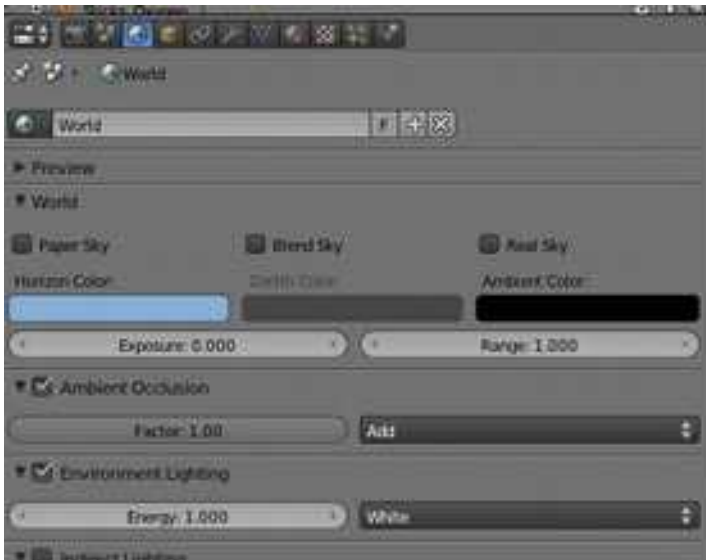


## The easy way



## World Background Settings

Change the Light/Background Settings in the World Options:



## Hide and Select Options

H → Hide all selected

Shift+H → Hide all unselected

Alt+H → Unhide all

A → De-Select All

Shift+D → Duplicate

E → Extrude selected nodes or shapes

F → create face between selected vertexes

## Modifiers

Generate/Mirror Modifier

Generate/Subdivision Surface