

Practices Virtual Environments

one

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Introduction

The practices of the subject aim to learn to develop virtual environments. This involves learning to create scenarios, scheduling simulations and interaction.

In practice each system component will be addressed. Analyze the practices must have a system with at least the following components:

- articulated a 3D model and texturing
- physical simulation (collision detection and kinematic)
- Interaction

The first thing to ask yourself is the subject of your work, so that different components you do in each practice are useful for the same. By way of example, you might consider the following topics:

- 3D maze
- Interactive decoration
- 3D game
- Simulator

Blender

To make practical use Blender. Blender is a tool modeling, rendering, animation and virtual environments. It has been used to create animated films, interactive environments and games.

Blender was originally developed for the animation studio NeoGeo in 1998 (<http://www.blender.org/>). From 2003 he began distributing as free software. Currently is a popular system multiplatform It has a broad user community, one of the tools Most popular modeling. System maintenance is done by the foundation Blender. Its modeling tool lets you use a wide range of primary mitivas Građića cas, including polygon meshes, NURBS, metaballs and systems particle.



Figure 1: Image of a game developed in Blender

Can generate animations using skeletons and free deformations (free form deformations), and calculate inverse kinematics. Also detect collisions and simulate the physical behavior. It can be used to perform interactive applications as it manages input events. It has indeed **an integrated game engine**. The? Gure **one** shows a screenshot YoFrankie game! developed in Blender. A video of this game can **To see in** <https://www.youtube.com/watch?v=c7RRaEvWqJc> .

The rendering system is very powerful. In addition you can with? Gure para use an external ray tracer. Multiresolution implemented. It is also **programmable, can be generated in python addons [3]**.

There is extensive literature on Blender, including video tutorials **Youtube. A good starting point is the guide by Joaquin Herrera [one]**.

The following section explains how to install Blender on Linux. A brief introduction of the user interface is Blender to facilitate the first contact.

Each of the following chapters is devoted to a practice.

Installation

Ubuntu installation can be performed simply using aptitude:

```
apt-get install blender
```

Then run it from the console:

```
blender
```

the home screen shown in? gure should appear **two** .

Classroom practices will find the latest version installed.

Getting Started with Blender

The middle mouse button allows us to move around the scene, wheel is used to zoom.

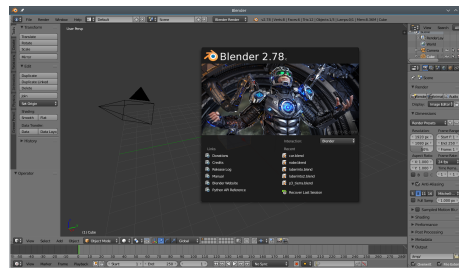


Figure 2: Startup Screen Blender

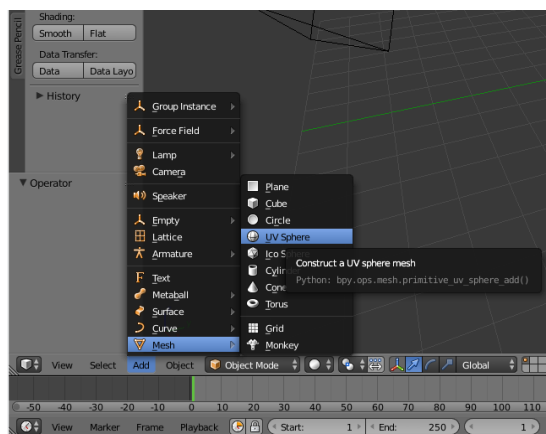


Figure 3: Adding an object

The right button is used to select objects.

With the left button we can manipulate the selected object (by pressing about? You miss that appear in it).

Blender model is composed of a graph of objects. The objects They are represented as polygon meshes.

When you create a normal scene it is from prede objects? Nests insert at the scene. To add an object we use the option Mesh the menu Add (Figure 3).

Objects can be transformed. We use controls bottom of the 3D window having the selected object (see? gure 4). The Check to move the arc to rotate and the square to climb.

To select items from the scene press the right mouse button.

Blender works in different ways. Mode? Object? are selected and transform whole objects. In edit mode are selected and transformed components of objects (edges, faces or vertices). To change the mode We use the switch located on the bottom bar of the window 3D (Displayed in the lower left corner of the image capture 4). To the

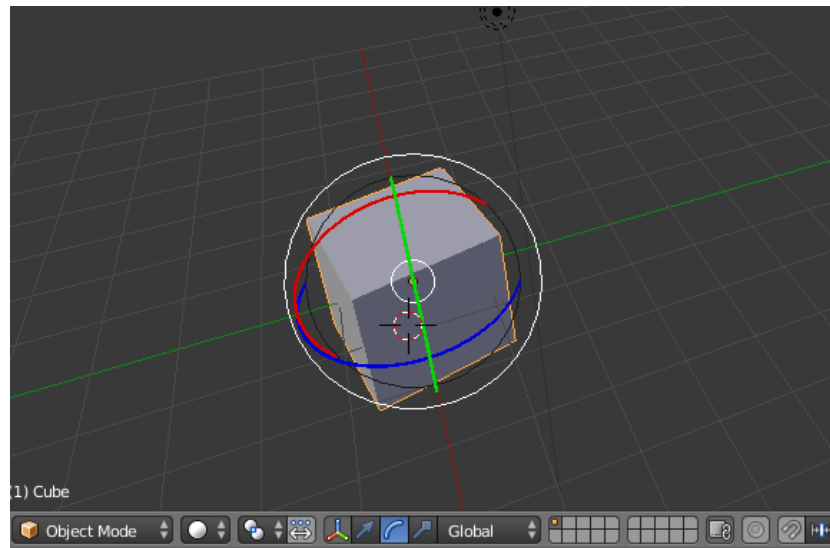


Figure 4: Controls transformation. It is active in capturing rotation, to both sides are translation and scaling.

switch to edit mode buttons appear to indicate the area of selection (Edges, faces or corners) to the right of selectors transformations.

A detailed description of the interface can be found in [[one](#)], a video tutorial navigation can be seen in [[two](#)]. Most operations

They can be used by keyboard shortcuts, in describing practices

It has tried to avoid keyboard shortcuts. If you were to use Blender form

Continuous learning is preferable shortcuts. The? Gure 5 shows a map of keyboard shortcuts.

<http://www.giudansky.com/design/51-blender-map>)

Practice 1

Modeling with Blender

The aim of this practice is to learn the basic techniques of modeling Blender.

1.1. Introduction

This section briefly describes the most common operations. a description Detailed information can be found in [4]. To delete items we can use the key **supr**. You can extend or restrict the selected area with **orders less Y more menu Select**.

1.1.1. Chains of edges

An edge chain is a (open or closed) sequence edges. Chain is selected from an edge, at which adjacent edges are added end vertices having four edges, always selecting the edge central. The propagation continues to form a closed cycle, reaching Mesh end or a vertex that not? uyan three other edges (see **Figure 6**).

Selecting an edge chain

To select a string must use Edit mode, indicating **we selected edges (edge select, see? gure 7)**, Select the button right one edge of the string, and? nally on the menu Select We use the option **Edge Loop (see? gure 8)**.

Select interior region

We can select the faces in the interior of a closed chain **using the option Inner Loop Region menu Select (see? gure eleven)**.

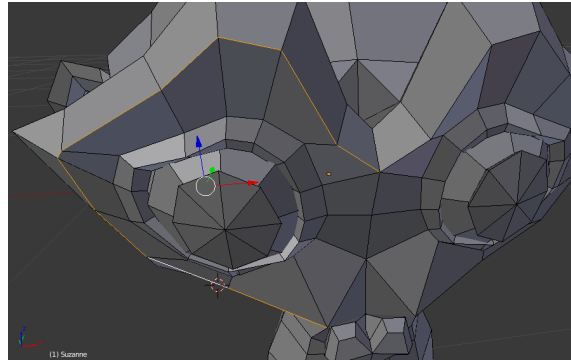


Figure 6: Chain edges



Figure 7: mode selection edge

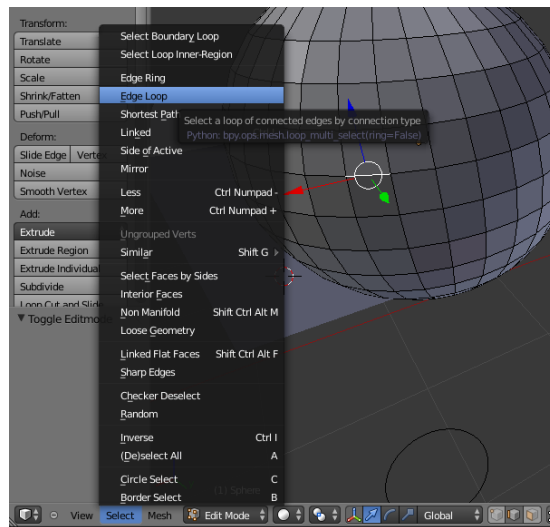


Figure 8: Selecting edge chain

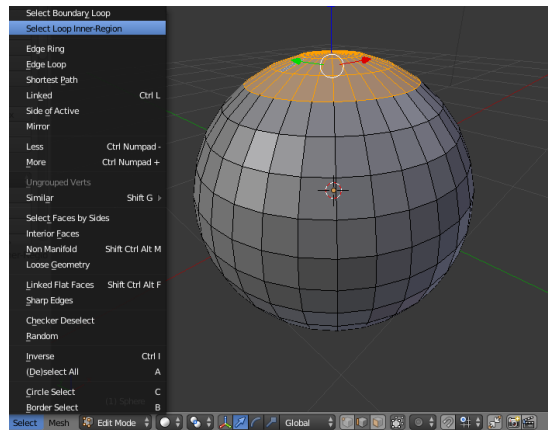


Figure 9: Selecting inner faces

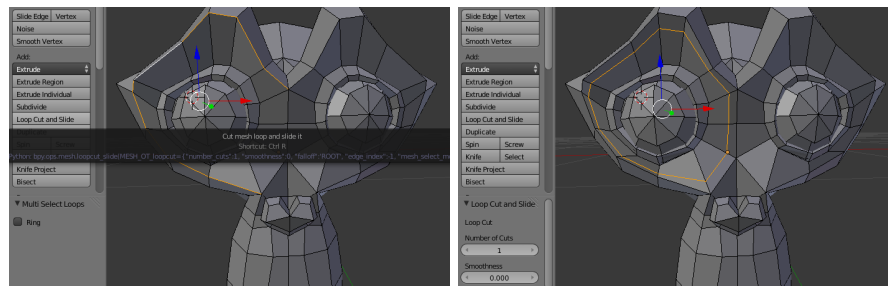


Figure 10: Cut and slide

Cut and slide

Cut Loop and Slide creates a copy of an edge chain (in **side panel on the left, in the side flap tools, in the group Add**). He You must have a selected edge to perform the operation. The new copy inserted into the mesh by sliding parallel to the original string.

1.1.2. Rings edges

Rings edges are sets of parallel edges. They are selected from **Similarly to strings, using the option Edge Ring menu Select (watch Figure eleven).**

1.1.3. Extrusion

Extruding adds detail to a model moving geometric elements (Faces, edges or corners) to the outside or inside the object. extrusion It generates long side faces joining the displaced region with the rest of

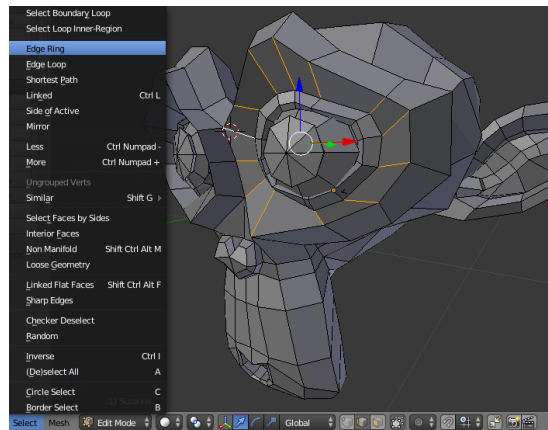


Figure 11: Selecting ring edges

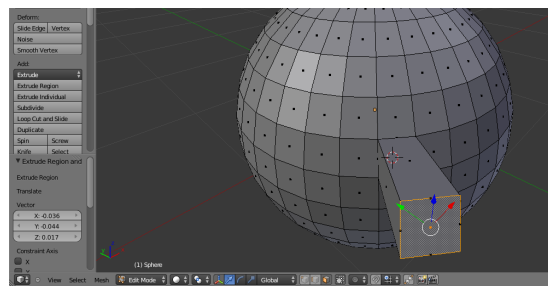


Figure 12: Extrude

object. The? Gure 12 It shows the extrusion of a side of a sphere. For do extrusion must select the elements that we want to operate and use the command Extrude the left pane (see? gure 10 right). Compare the result of extrusion with sliding face.

1.1.4. cut

The order Knife can cut a mesh inserting new edges in cutting zone. The result is a single mesh with a sequence of edges in the cutting zone. Line cutting of? Ne marking on edges of the object with the left button, the operation with? rmed by pressing enter or space.

1.1.5. Double

To duplicate a subset of the mesh we use the command Add Duplicate menu Mesh.

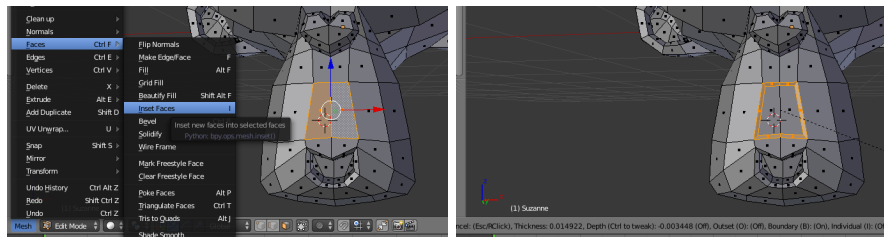


Figure 13: Inset

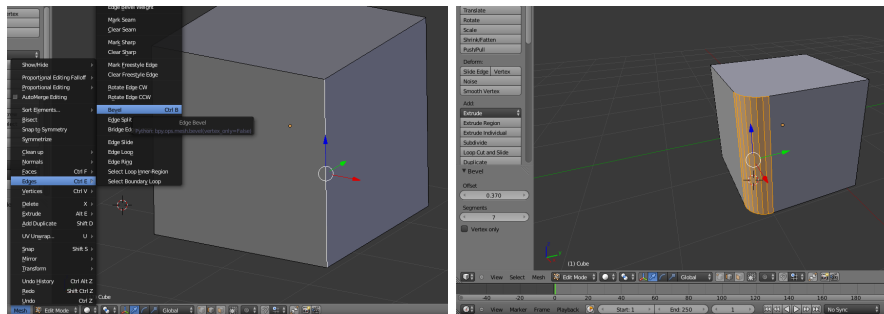


Figure 14: Bevel

1.1.6. inset

The Inset command creates a narrow band of faces in the border area selected, allowing to add details to the model. The order inset Faces he in the submenu Faces menu Mesh. When run can interactively adjust the width of the band. The operation with? Rmed with enter or by click with the left button.

1.1.7. Beveled

The chamfering acts on selected edges replacing a sequence of rounded faces the object shape in the edge. The order Bevel It is in submenu Edges menu Mesh. parameters operation can be adjusted interactively or editing fields They appear in the Mesh Tools (left) after making click (see? gure 14).

1.1.8. smoothing

The smooth tool smooths the shape of the object by moving its vertices to homogenize the angle between faces. It can be done through the mesh panel Tools and choice Smooth Vertex submenu vertices menu Mesh.

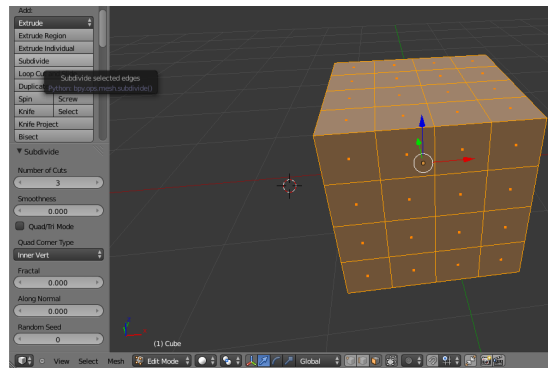


Figure 15: Extrude

1.1.9. Subdivision

Operation subdivides dividing each face into several smaller faces. For be performed must be in Edit mode, and access the operation panel Mesh Tools (see? gure fifteen) And option subdivides submenu Edges menu Mesh. When performing the operation for dialogue on the panel modi? Cation of operation parameters, which control the number of subdivision, if performed smoothing form and if noise is added.

1.1.10. Super? CIES subdivision

Subdividing super? Cie has the disadvantage of increasing complexity geometric object and complicate further editing. This can be solved using Super? subdivision surfaces. Super? Cie subdivision is represented as a simple geometric mesh is displayed as the result of applying a process of subdivision mesh.

These types of operations are performed in Blender by modi? Ers, which They are automatic operations that process the object non-destructively. The modi? Ers are accessed from the properties panel which is right (see? gure 16).

At any time we can apply the modi? Er, transforming geometry permanently.

1.1.11. Booleans

Boolean operations are performed in Blender as a modi? Er. pA- ra apply must select one of the operands, add the modi? er, selecting the operation to be performed and the object with which it operates.

The result will be visible only after applying the modi? Er and remove or delete the rest of the operands.

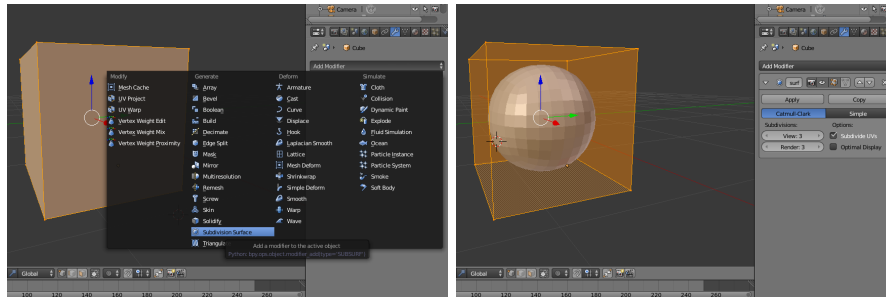


Figure 16: Super subdivision surfaces

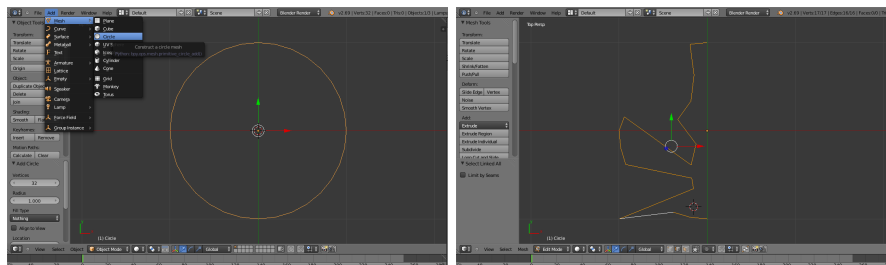


Figure 17: Creating a per l?

1.1.12. Revolution

To create rotationally symmetrical objects can edit the per? L create the mesh of this revolution. A simple way to do this is? Jar a view **perpendicular to the one plane (eg top)**, and add a mesh type circle (actually it is a regular polygon that approximates a circle).

Now we edit the circumference passing Edit Mode. We can erase segments and insert new vertices using the order subdivide (see? gure 17). Once created per? L select it (we can do it using Select> Linked) and the panel Mesh Tools We seek the order Spin.

When pressed the object of revolution is created. We adjust now per number? les, the center and the axis of rotation (see? gure 18).

1.2. Process

- Try the Blender modeling capabilities.
- Decide the theme of your work practices
- Choose one of the objects you'll use and modelalo.
- Documents the process that you followed.

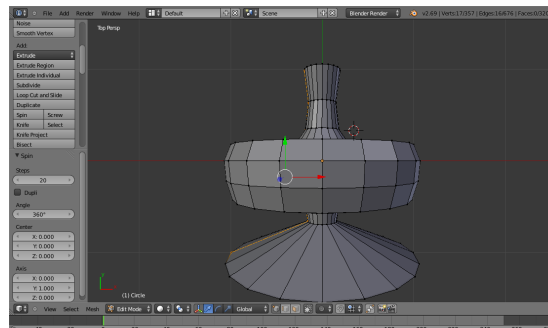


Figure 18: Super surface of revolution

1.3. Documentation to be submitted

- Memory practice (must contain a description of the object and the steps followed to shape it).
- Blender model format.

1.4. Evaluation

In practice the following aspects will be assessed:

- Model complexity.
- Correction model.
- Design process followed.
- Documentation.

Bibliography

- [1] Joaquin Herrera Goas: guide of initiation to Blender.
<https://joaqlintistgud.wordpress.com/2009/11/27/blender-guide-to-initiation-to-newly-arrived-adapted-to-version-2-5/> /
(Document)
- [2] <http://cgcookie.com/blender/lessons/interface-and-navigation/> (Document)
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- [5] Blender manual. <http://wiki.blender.org/index.php/Doc:2.6/Manual/>
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