

# Chapter 1. Modeling the Character's Base Mesh

In this chapter, we will cover the following recipes:

- Setting templates with the Images as Planes add-on
- Setting templates with the Image Empties method
- Setting templates with the Background Images tool
- Building the character's base mesh with the Skin modifier

## Introduction

In this chapter, we are going to do two things: set up templates to be used as a reference for the modeling, and build up a base mesh for the sculpting of the character.

To set up templates in a Blender scene, we have at least three different methods to choose from: the **Images as Planes** add-on, the **Image Empties** method, and the **Background Images** tool.

A base mesh is usually a very low poly and simple mesh roughly shaped to resemble the final character's look. There are several ways to obtain a base mesh: we can use a ready, freely downloadable mesh to be adjusted to our goals, or we can model it from scratch, one polygon at a time. What's quite important is that it should be made from all quad faces.

To build the base mesh for our character, we are going to use one of the more handy and useful modifiers added to Blender: the **Skin** modifier. However, first, let us add our templates.

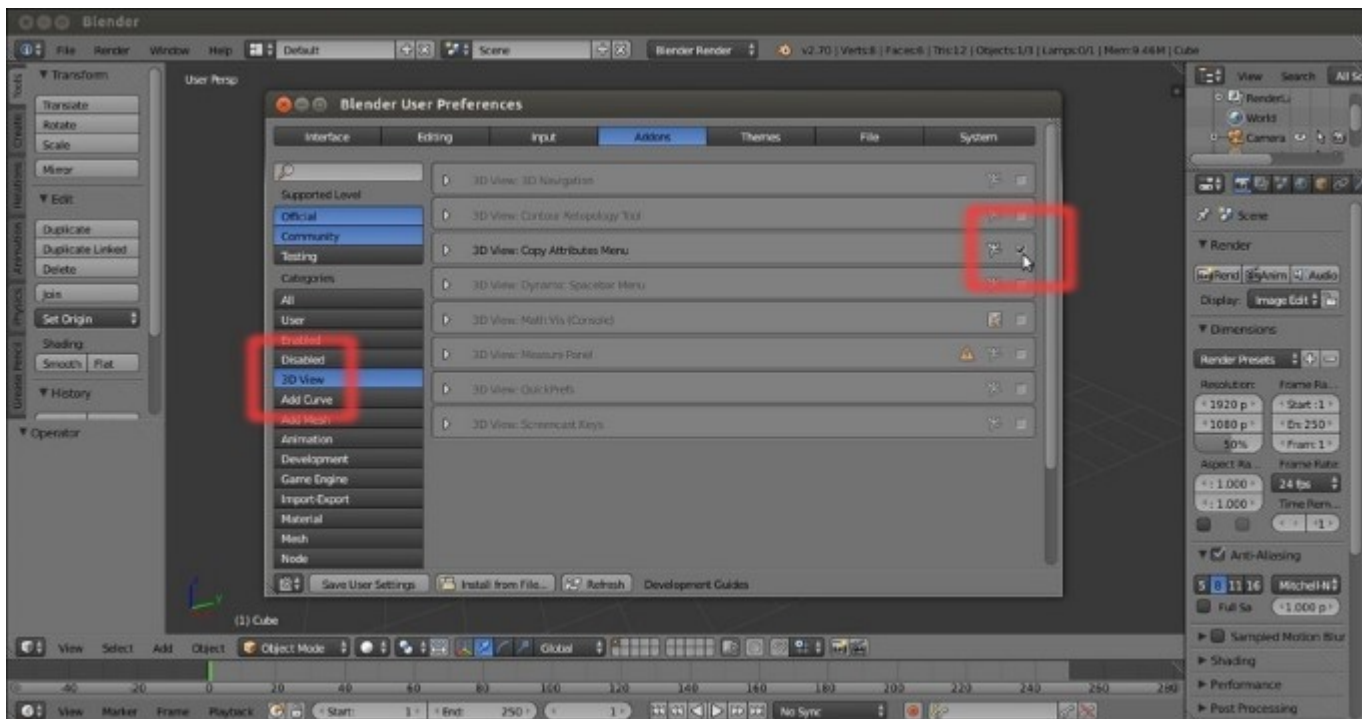
# Setting templates with the Images as Planes add-on

In this recipe, we'll set the character's templates by using the **Images as Planes** add-on.

## Getting ready

The first thing to do is to be sure that all the required add-ons are enabled in the preferences; in this first recipe, we need the **Images as Planes** and **Copy Attributes Menu** add-ons. When starting Blender with the factory settings, they appear gray in the **User Preferences** panel's **Add-ons** list, meaning that they are not enabled yet. So, we'll do the following:

1. Call the **User Preferences** panel (*Ctrl + Alt + U*) and go to the **Add-ons** tab.
2. Under the **Categories** item on the left-hand side of the panel, click on **3D View**.
3. Check the empty little checkbox on the right-hand side of the **3D View: Copy Attributes Menu** add-on to enable it.
4. Go back to the **Categories** item on the left-hand side of the panel and click on **Import-Export**.
5. Scroll down the add-ons list to the right-hand side to find the **Import-Export: Import Images as Planes** add-on (usually, towards the middle of the long list).
6. Enable it, and then click on the **Save User Settings** button to the left-bottom of the panel and close it.



*The User Preferences panel with the Categories list and the Addons tab to enable the several add-ons*

There are still a few things we should do to prepare the 3D scene and make our life easier:

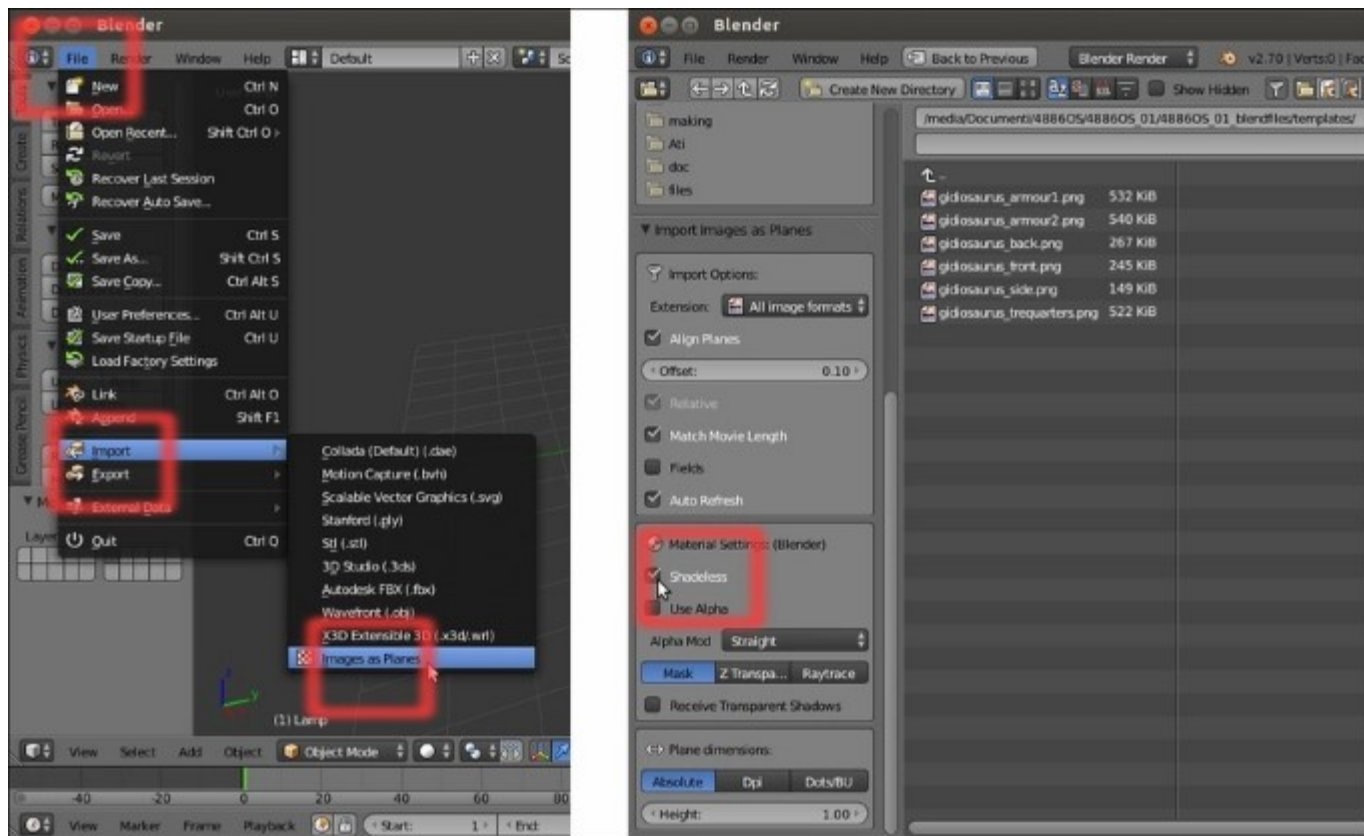
7. Delete the already selected **Cube** primitive.
8. Select the **Lamp** and the **Camera** and move them on to a different layer; I usually have them on the **sixth** layer (*M* key), in order to keep free and empty both the first and second rows of the left layer's block.
9. The **Outliner** can be found in the top-right corner of the default workspace. It shows a list view of the scene. Set **Display Mode** of the **Outliner** to **Visible Layers**.
10. Lastly, save the file as `Gidiosaurus_base_mesh.blend`.

## How to do it...

Although not strictly necessary, it would be better to have the three (at least in the case of a biped character, the **Front**, **Side**, and **Back** view) templates as separated images. This will allow us to load a specific one for each view, if necessary. Also, to facilitate the process, all these images should be the same height in pixels.

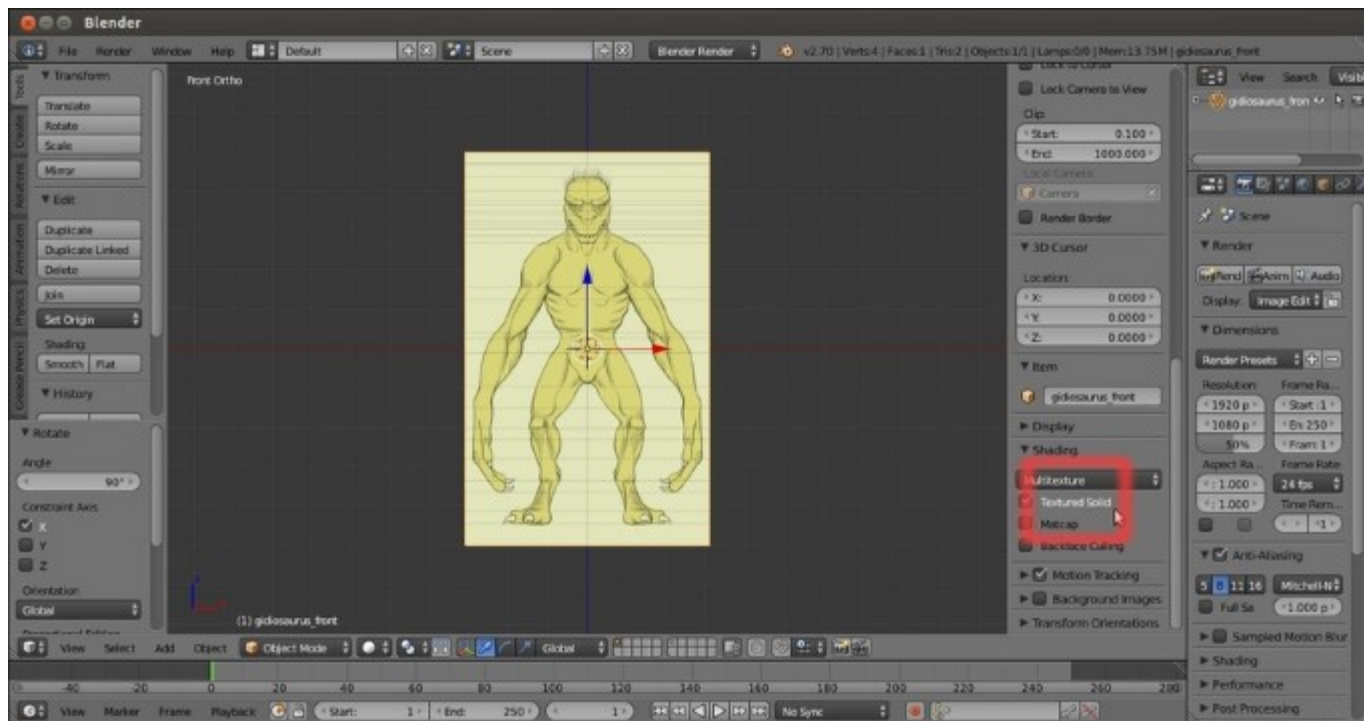
In our case, the required three views are provided for you in the files that accompany this module. You will find them in the `templates` folder. The **Import Images as Planes** add-on will take care of loading them into the scene:

1. Left-click on **File | Import | Images as Planes** in the top-left menu on the main header of the Blender UI.
2. On the page that just opened, go to the **Material Settings** column on the left-hand side (under the **Import Images as Planes** options) and enable the **Shadeless** item. Then, browse to the location where you placed your `templates` folder and load the `gidiosaurus_front.png` image:



*The Import pop-up menu and the material settings subpanel of the Import Images as Planes add-on*

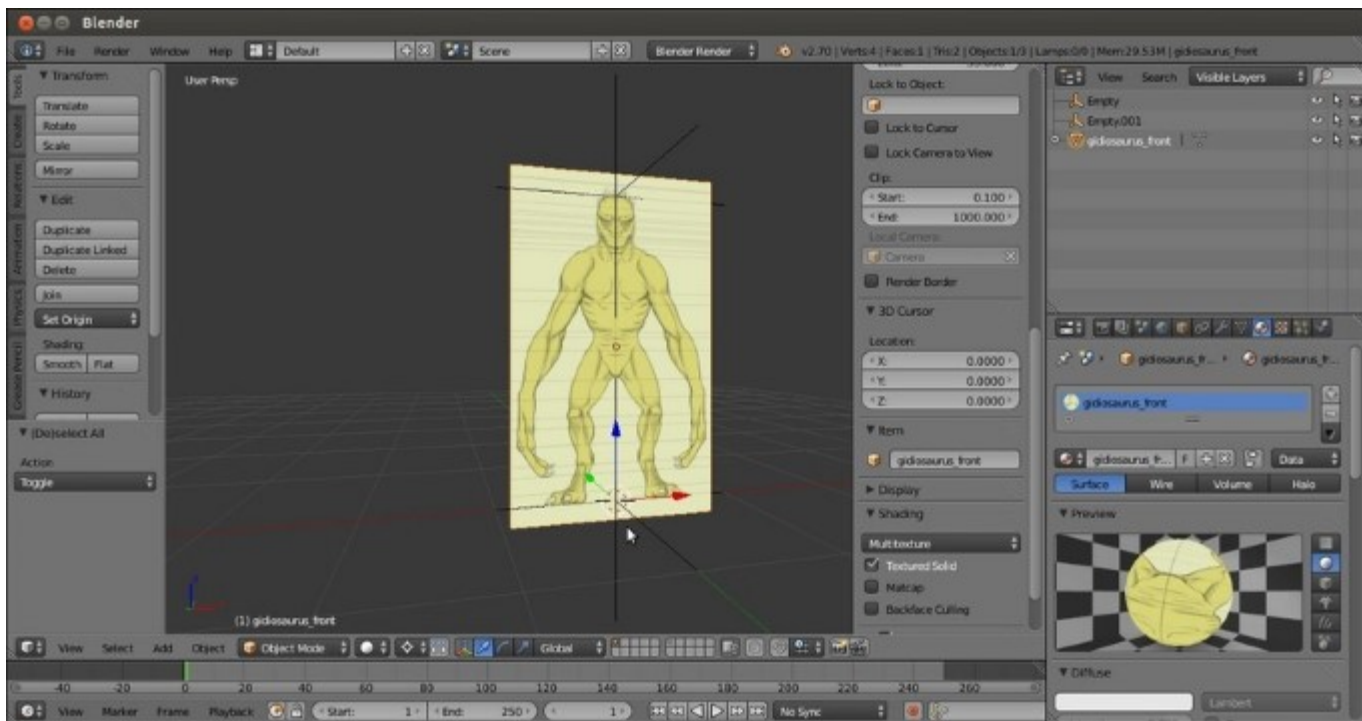
3. Rotate 90 degrees on the  $x$  axis ( $R \mid X \mid 90 \mid \text{Enter}$ ) of the **Plane** that just appeared at the center of the scene (at the **3D Cursor** location, actually; to reset the position of the **3D Cursor** at the center of the scene, press the  $\text{Shift} + C$  keys).
4. Press  $N$  to call the **Properties** sidepanel on the right-hand side of the active 3D window, and then go to the **Shading** subpanel and enable the **Textured Solid** item.
5. Press  $I$  on the numpad to go to the **Front** view:



*The imported plane with the relative UV-mapped image*

Now, we know that our **Gidiosaurus** is a **2.5** meters tall beast. So, assuming that **1 Blender Unit** is equal to **1 meter**, we must scale the plane to make the character's front template **two and a half Blender Units** tall (Note that it is not the plane that must be 2.5 units tall, it's the character's shape inside the plane).

6. Add an **Empty** to the scene (*Shift + A | Empty | Plain Axes*).
7. Duplicate it and move it **2.5** units up on the z axis (*Shift + D | Z | 2.5 | Enter*).
8. Go to the **Outliner** and click on the arrows on the side of the names of the two **Empties** (**Empty** and **Empty.001**), in order to make them gray and the **Empties** not selectable.
9. Select the **Plane** and move it to align the bottom (feet) guideline to the horizontal arm of the first **Empty** (you actually have to move it on the z axis by **0.4470**, but note that by pressing the *Ctrl* key, you can restrict movements to the grid and with *Ctrl + Shift*, you can have even finer control).
10. Be sure that the **3D Cursor** is at the object origin, and press the period key to switch *Pivot center for rotation/scaling* to the **3D Cursor**.
11. Press *S* to scale the **Plane** bigger and align the top-head guideline to the horizontal arm of the second **Empty** (you have to scale it to a value of **2.8300**):



*The properly scaled plane in the 3D scene*

12. Left-click again on **File | Import | Images as Planes** in the top-left menu on the main header of the Blender UI.
13. Browse to the location where you placed your templates folder and this time load the `gidiosaurus_side.png` image.
14. **Shift** + right-click on the first **Plane** (`gidiosaurus_front.png`) to select it and make it the active one. Then, press **Ctrl** + **C** and from the **Copy Attributes** pop-up menu, select **Copy Location**.
15. Press **Ctrl** + **C** again and this time select **Copy Rotation**; press **Ctrl** + **C** one more time and select **Copy Scale**.
16. Right-click to select the second **Plane** (`gidiosaurus_side.png`) in the 3D view, or click on its name in the **Outliner**, and rotate it 90 degrees on the z axis (**R** | **Z** | **90** | **Enter**).
17. Optionally, you can move the second **Plane** to the second layer (**M** | second button on the **Move to Layer** panel).
18. Again, left-click on **File | Import | Images as Planes**, browse to the templates folder, and load the `gidiosaurus_back.png` image.
19. Repeat from step 12 to step 15 and move the third **Plane** on a different layer.
20. Save the file.

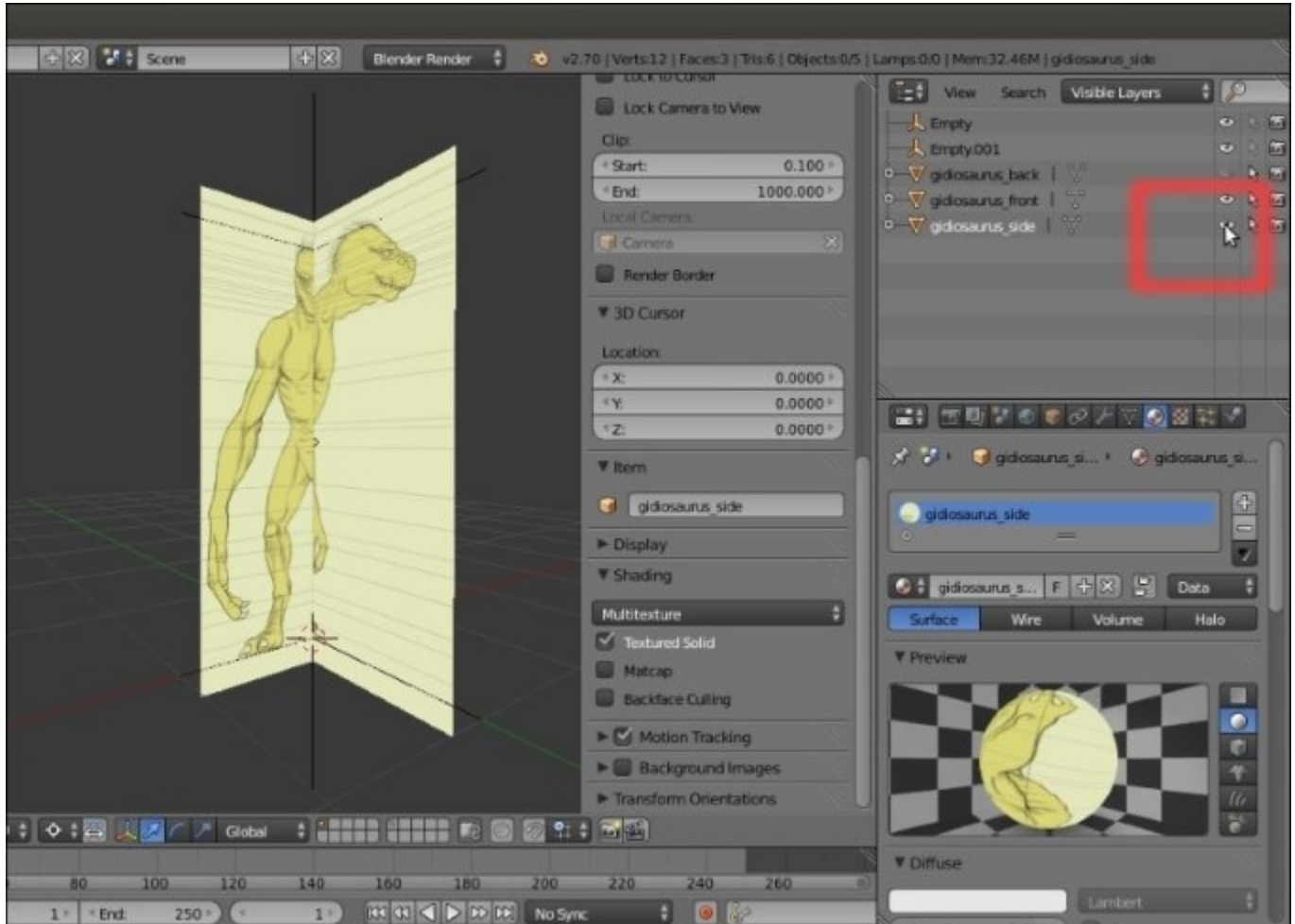
## How it works...

We used a Python script, which is an add-on, to import planes into our scene that are automatically UV-mapped with the selected image, and inherit the images' height/width aspect ratio.



To have the textures/templates clearly visible from any angle in the 3D view, we have enabled the **Shadeless** option for the **Planes** materials; we did this directly in the importer preferences. We can also set each material to shadeless later in the **Material** window.

We then used another add-on to copy the attributes from a selected object, in order to quickly match common parameters such as location, scale, and rotation:



*The template planes aligned to the x and y axis (Front and Side views)*

The imported **Planes** can be placed on different layers for practicality; they can also be on a single layer and their visibility can be toggled on and off by clicking on the eye icon in the **Outliner**.

# Setting templates with the Image Empties method

In this recipe, we'll set the character's templates by using **Image Empties**.

## Getting ready

For this and the following recipes, there is no need for any particular preparations. Anyway, it is handy to prepare the two **Empties** to have markers in the 3D view for the **2.5** meters height of the character; so we'll do the following:

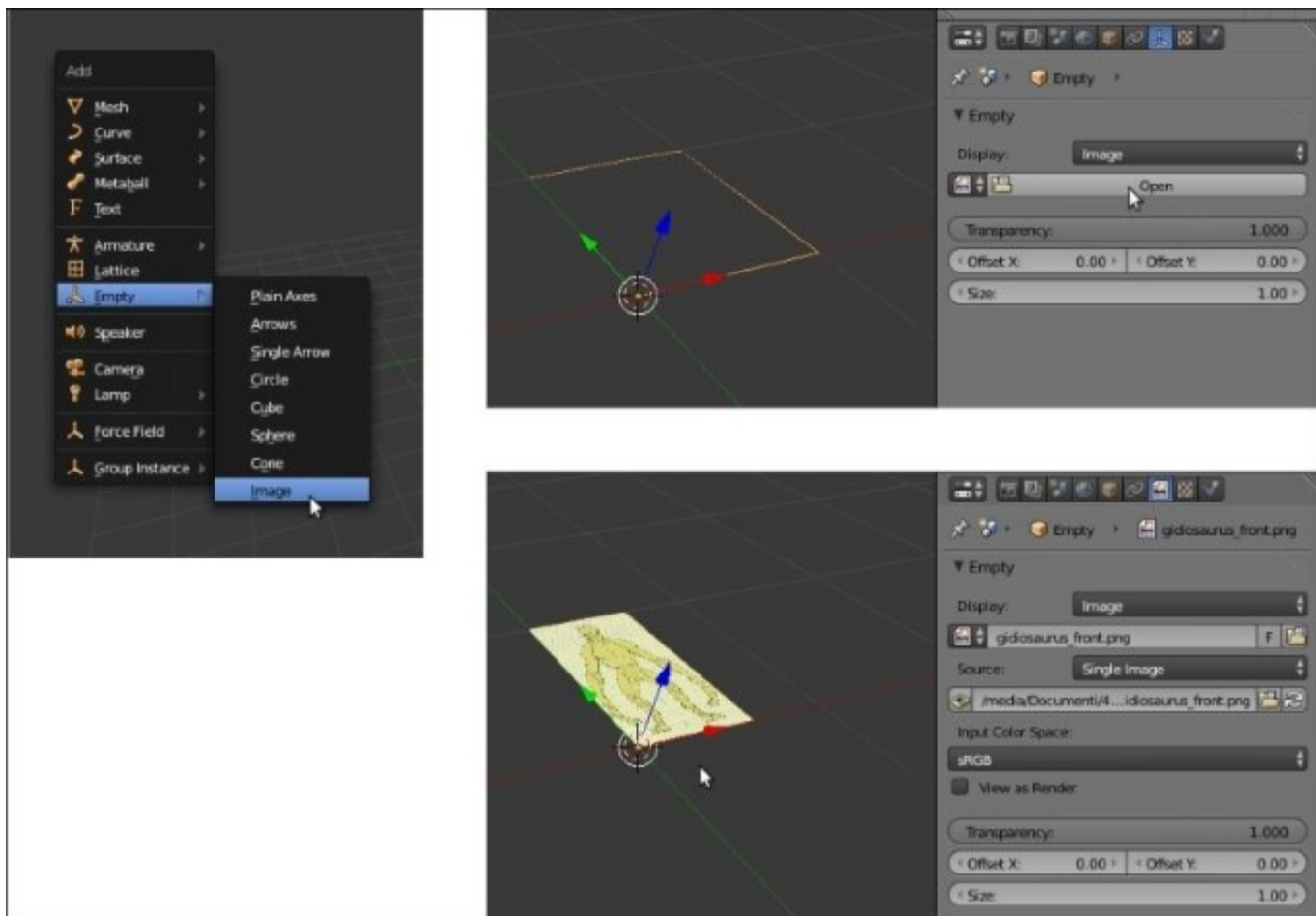
1. Start a brand new Blender session and delete the already selected **Cube** primitive.
2. Select the **Lamp** and **Camera** and move them on a different layer; I usually have them on the **sixth** layer, in order to keep free and empty both the first and second rows of the left layer's block.
3. Add an **Empty** to the scene (*Shift + A* | **Empty** | **Plain Axes**).
4. Duplicate it and move it **2.5** units up on the *z* axis (*Shift + D* | *Z* | **2.5** | *Enter*).
5. Go to the **Outliner** and click on the arrows on the side of the names of the two **Empties** (**Empty** and **Empty.001**), in order to make them gray and the **Empties** not selectable.
6. Save the file as `Gidiosaurus_base_mesh.blend`.

## How to do it...

So, now we are going to place the first **Image Empty** in the scene:

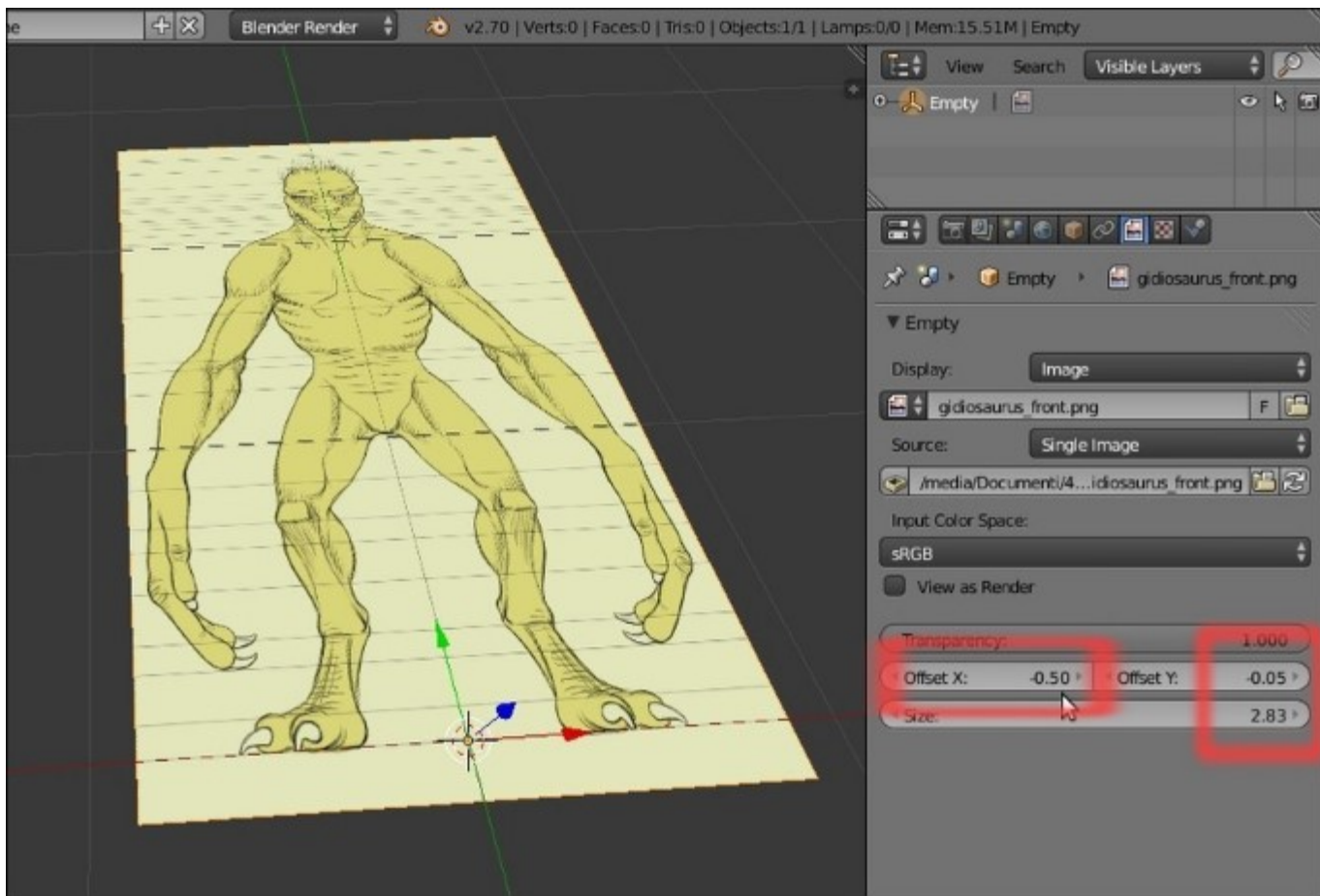
1. Add an **Empty** to the scene (*Shift + A* | **Empty** | **Image**; it's the last item in the list).
2. Go to the **Object Data** window in the main **Properties** panel on the right-hand side of the Blender UI; under the **Empty** subpanel, click on the **Open** button.
3. Browse to the `templates` folder and load the `gidiosaurus_front.png` image.





*The Add pop-up menu and the Image Empty added to the 3D scene, with the settings to load and set the image*

4. Set the **Offset X** value to **-0.50** and **Offset Y** to **-0.05**. Set the **Size** value to **2.830**:

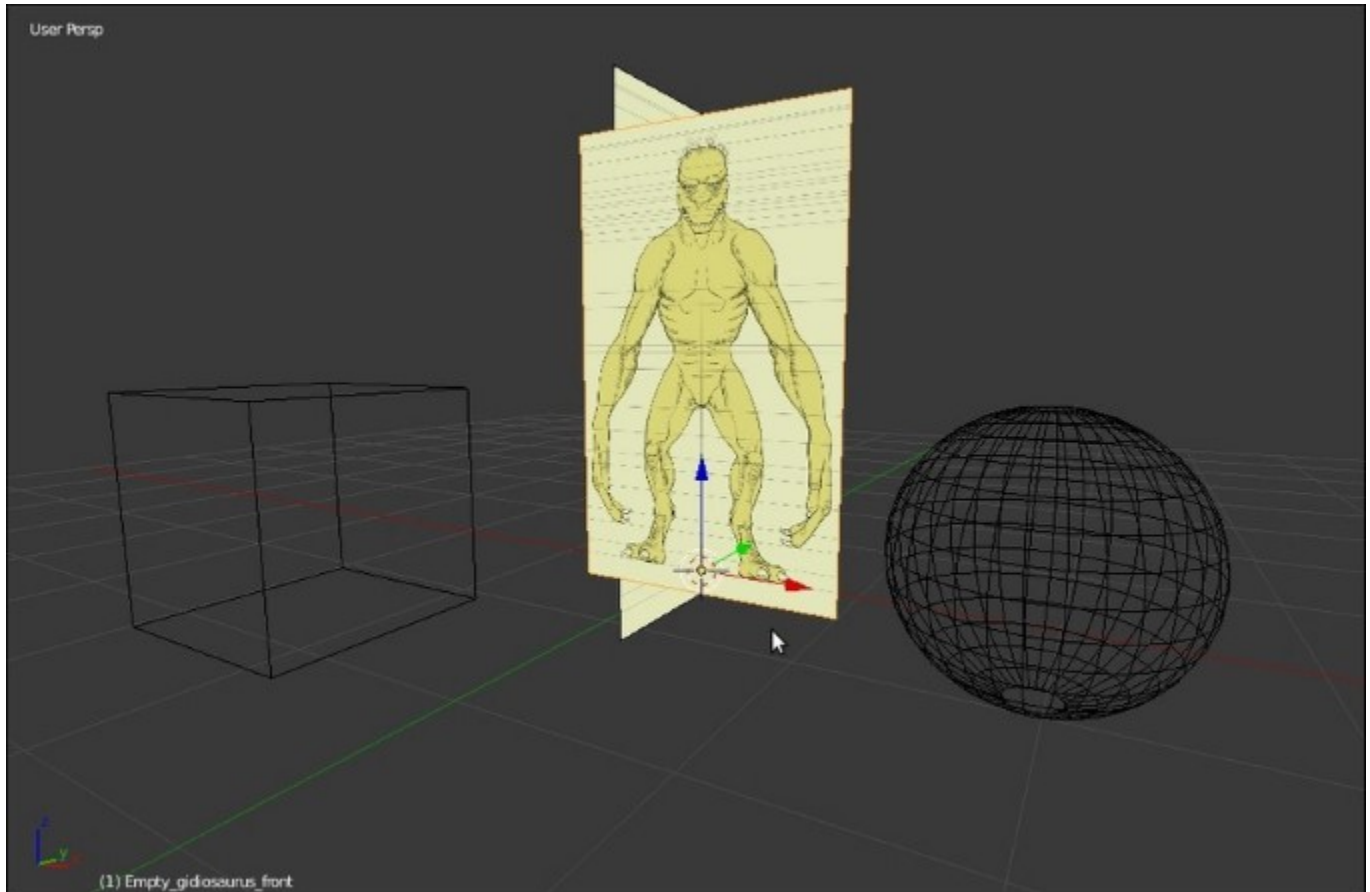


*The Offset and Size settings*

5. Rotate the **Empty** 90 degrees on the *x* axis (*R | X | 90 | Enter*).
6. Go to the **Outliner** and rename it `Empty_gidiosaurus_front`.
7. Duplicate it (*Shift + D*), rotate it 90 degrees on the *z* axis, and in the **Outliner**, rename it as `Empty_gidiosaurus_side`.
8. In the **Empty** subpanel under the **Object Data** window, click on the little icon (showing 3 users for that data block) on the right-hand side of the image name under **Display**, in order to make it a single user. Then, click on the little folder icon on the right-hand side of the image path to go inside the `templates` folder again, and load the `gidiosaurus_side.png` image.
9. Reselect **Empty\_gidiosaurus\_front** and press *Shift + D* to duplicate it.
10. Go to the **Empty** subpanel under the **Object Data** window, click on the little icon (showing 3 users for that datablock) on the right-hand side of the image name under **Display**, in order to make it a single user. Then, click on the little folder icon on the right-hand side of the image path to go inside the `templates` folder again, and this time load the `gidiosaurus_back.png` image.
11. Go to the **Outliner** and rename it `Empty_gidiosaurus_back`.

## How it works...

We have used one of the most underrated (well, in my opinion) tools in Blender: **Empties**, which can show images! Compared to the **Images as Planes** add-on, this has some advantages: these are not 3D geometry and the images are also visible in the 3D view without the **Textured Solid** option enabled (under **Shading**) and in **Wireframe** mode.



*The Image Empties appear as textured also in Wireframe viewport shading mode*

Exactly, as for the imported **Planes** of the former recipe, the visibility in the 3D view of the **Image Empties** can be toggled on and off by clicking on the eye icon in the **Outliner**.

# Setting templates with the Background Images tool

In this recipe, we'll set the character's templates by using the **Background Images** tool.

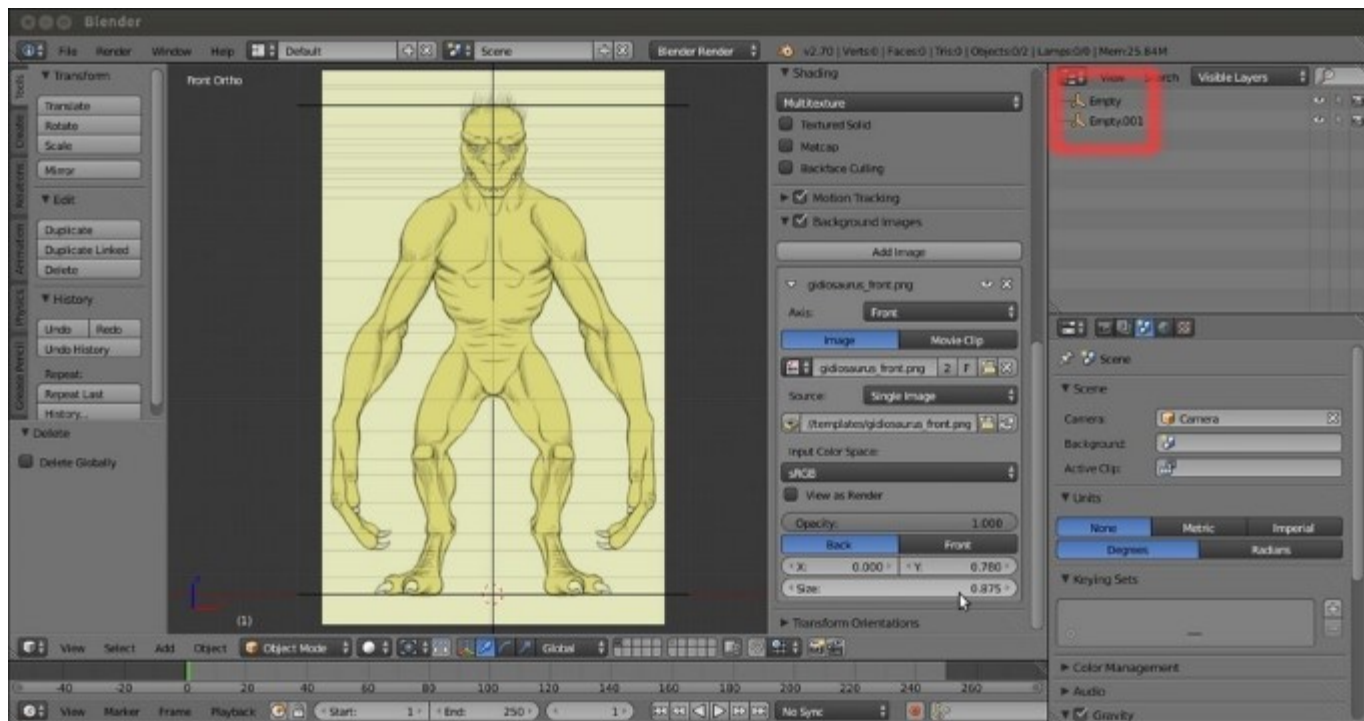
## Getting ready

As in the former recipe, no need for any particular preparations; just carry out the preparatory steps as mentioned in the *Getting ready* section of the previous recipe.

## How to do it...

So let's start by adding the templates as background images; that is, as reference images only visible in the background in **Ortho** view mode and, differently from the previous recipes, not as 3D objects actually present in the middle of the scene:

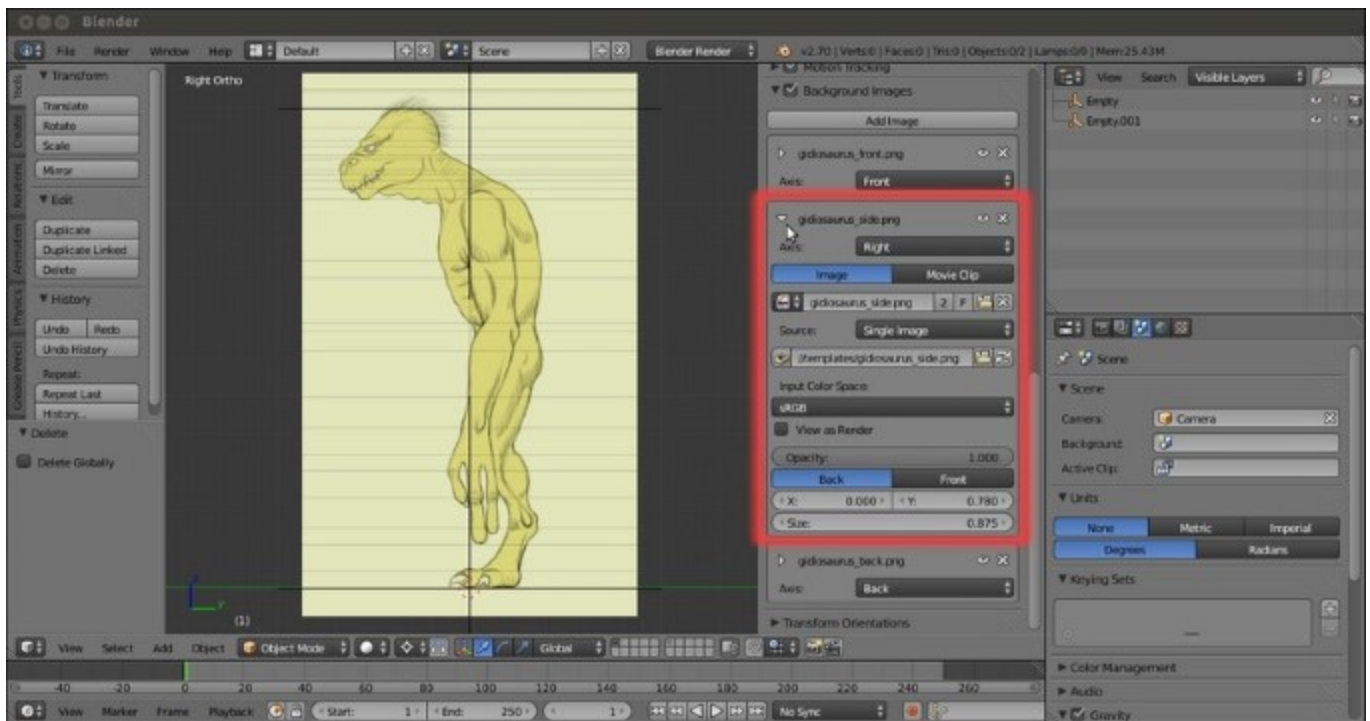
1. Press *I* on the numpad to switch to the orthographic **Front** view and press *Alt + Home* to center the view on the **3D Cursor**.
2. If not already present, press *N* to bring up the **Properties** sidepanel to the right-hand side of the 3D window; scroll down to reach the **Background Images** subpanel and enable it with the checkbox. Then click on the little arrow to expand it.
3. Click on the **Add Image** button; in the new option panel that appears, click on the **Open** button and browse to the `templates` folder to load the `gidiosaurus_front.png` image.
4. Click on the little window to the side of the **Axis** item and switch from **All Views** to **Front**, and then set the **Opacity** slider to **1.000**.
5. Increase the **Y** offset value to make the bottom/feet guideline of the reference image aligned to the horizontal arm of the first **Empty** (you have to set it to **0.780**).
6. Scale **Size** smaller, using both the **Empties** that we set as references for the **2.5** meters height of the creature (you actually have to set the **Scale** value to **0.875**).



*The background image scaled and positioned through the settings in the N sidepanel*

7. Click on the little white arrow on the top-left side of the `gidiosaurus_front.png` subwindow to collapse it.
8. Click on the **Add Image** button again; then, in the new option panel, click on the **Open** button, browse to the `templates` folder, and load the `gidiosaurus_side.png` image. Then, set the **Axis** item to **Right**, **Opacity** to **1.000**, **Scale** to **0.875**, and **Y** to **0.780**.
9. Repeat the operation for the `gidiosaurus_back.png` image, set **Axis** to **Back**, and so on.

Press **3** on the numpad to switch to the **Side** view, **1** to switch to the **Front** view, and **Ctrl + 1** to switch to the **Back** view, but remember that you must be in the **Ortho** mode (**5** key on the numpad) to see the background templates:



*The N sidepanel settings to assign the background image to a view*



# Building the character's base mesh with the Skin modifier

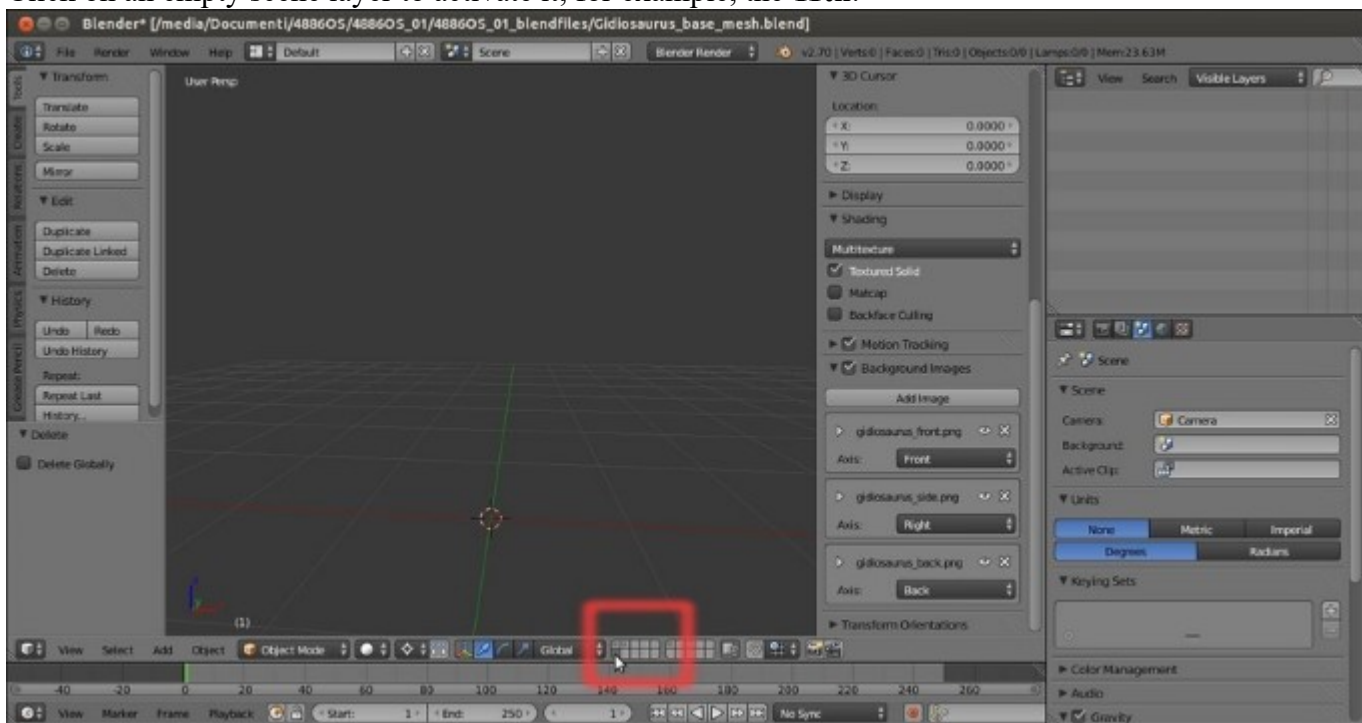
In the previous recipes, we saw three different ways to set up the template images; just remember that one method doesn't exclude the others, so in my opinion, the best setup you can have is: **Image Empties** on one layer (visibility toggled using the eye icons in the **Outliner**) together with **Background Images**. This way you can not only have templates visible in the three orthographic views, but also in the perspective view (and this can sometimes be really handy).

However, whatever the method you choose, now it's time to start to build the character's base mesh. To do this, we are going to use the **Skin** modifier.

## Getting ready

First, let's prepare the scene:

1. In case it's needed, reopen the `Gidiosaurus_base_mesh.blend` file.
2. Click on an empty scene layer to activate it; for example, the **11th**.

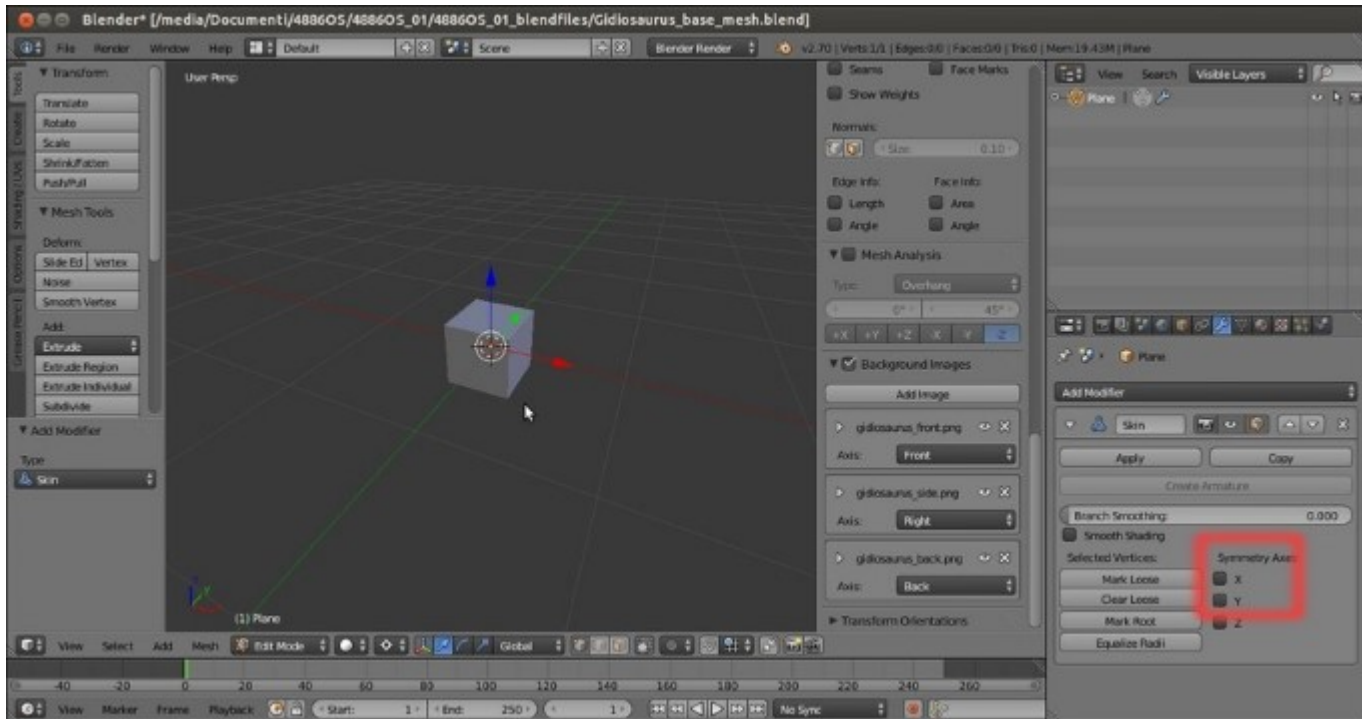


*The starting empty scene and the scene layer's buttons on the 3D window toolbar*

3. Be sure that the **3D Cursor** is at the center of the scene (**Shift + C**).
4. Add a **Plane** (press **Shift + A** and go to **Mesh | Plane**). If you are working with the **Factory Settings**, you must now press **Tab** to go in to **Edit Mode**, and then **Shift + right-click** to deselect just one vertex.

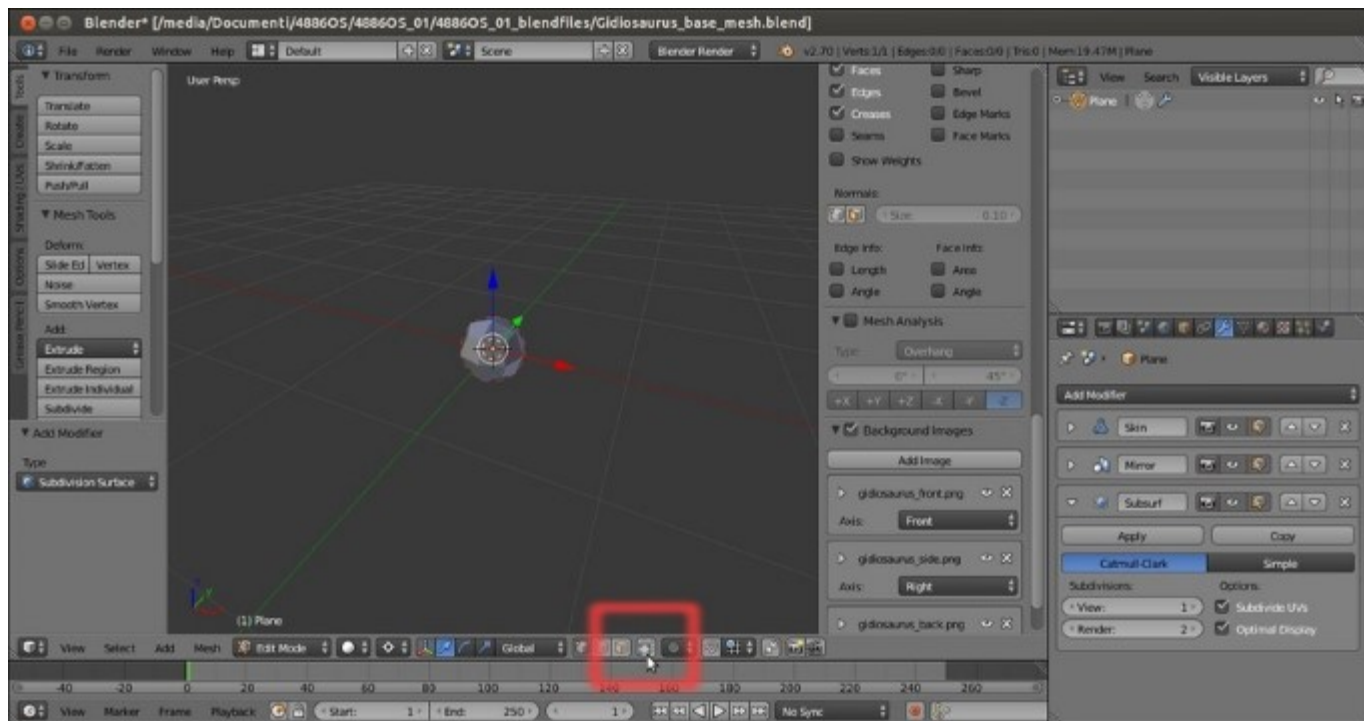


5. Press *X* and delete the three vertices that are still selected.
6. Right-click to select the remaining vertex and put it at the cursor location in the center of the scene (*Shift + S*, and then select **Selection to Cursor**).
7. Go to the **Object Modifiers** window on the main **Properties** panel, to the right-hand side, and assign a **Skin** modifier; a cube appears around the vertex. Uncheck **X** under **Symmetry Axes** in the modifier's panel:



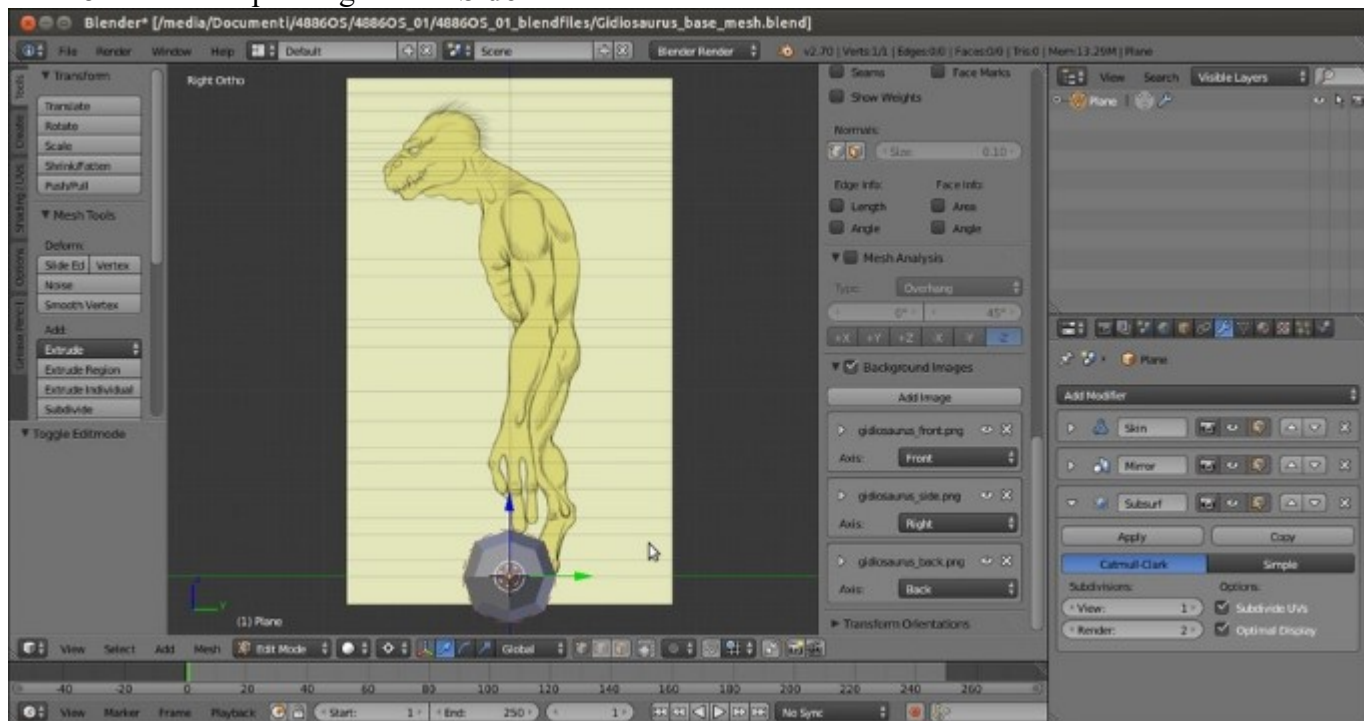
*The cube geometry created by just one vertex and the Skin modifier*

8. Assign a **Mirror** modifier and check **Clipping**.
9. Assign a **Subdivision Surface** modifier and check **Optimal Display**.
10. Go to the toolbar of the 3D view to click on the *Limit selection to visible* icon and disable it; the icon appears only in **Edit Mode** and in all the viewport shading modes, except for **Wireframe** and **Bounding Box**, and has the appearance of a cube with the vertices selected:



*The “Limit selection to visible” button on the 3D viewport toolbar and the cube geometry subdivided through the Subdivision Surface modifier*

11. Press 3 on the numpad to go in the **Side** view:



*The created geometry and the side-view template reference*

## How to do it...

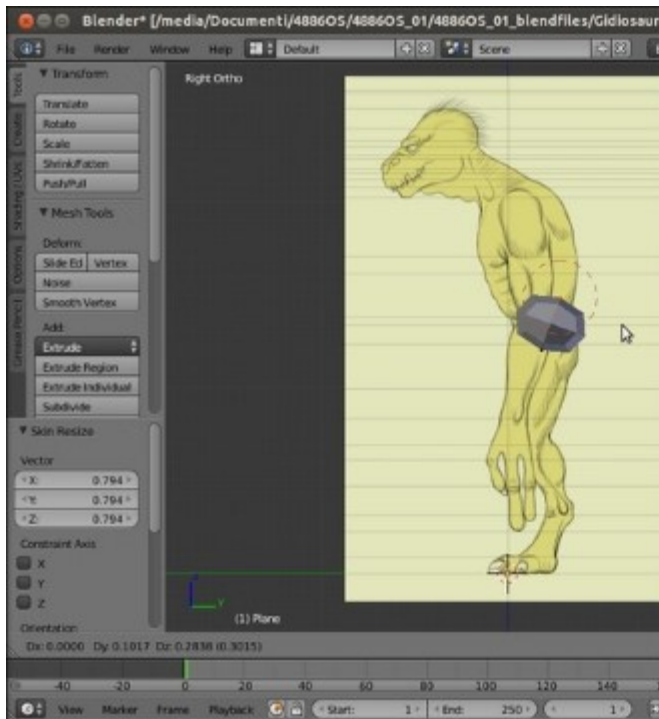
We are now going to move and extrude the vertex according to our template images, working as guides, and therefore generating a 3D geometry (thanks to the **Skin** modifier):

1. Press *G* and move the vertex to the pelvis area. Then, press *Ctrl + A* and move the mouse cursor towards the vertex to lower the weight/influence of the vertex itself on the generated mesh; scaling it smaller to fit the hip size showing on the template:



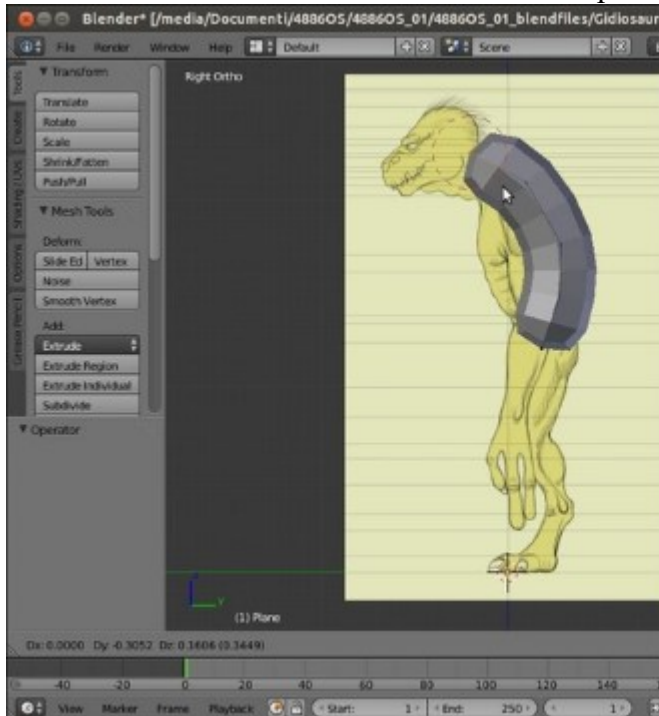
*Moving the geometry to the character's pelvis area*

2. Press *E* and extrude the vertex by moving it up on the *z* axis; place it at the bottom of the rib cage.
3. Go on extruding the vertex by following the lateral shape of the character in the template. Don't be worried about the volumes; for the moment, just build a *stick-figure* going up the torso:



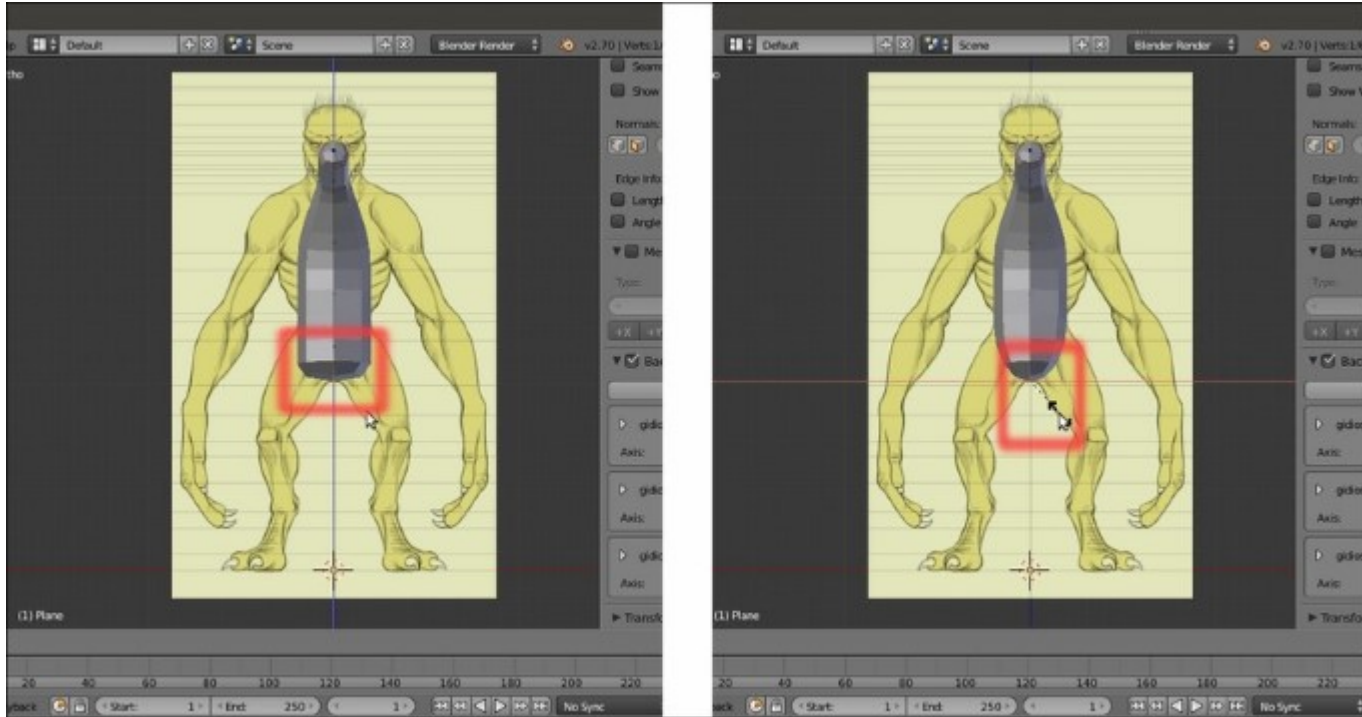
*Extruding the vertices to create a new geometry*

4. Proceed to the neck and stop at the attachment of the head location.
5. Select the last two vertices you extruded; press *Ctrl + A* and move the mouse cursor towards them to scale down their influence in order to provide a slim-looking neck:



### *Scaling down the influence of the vertices*

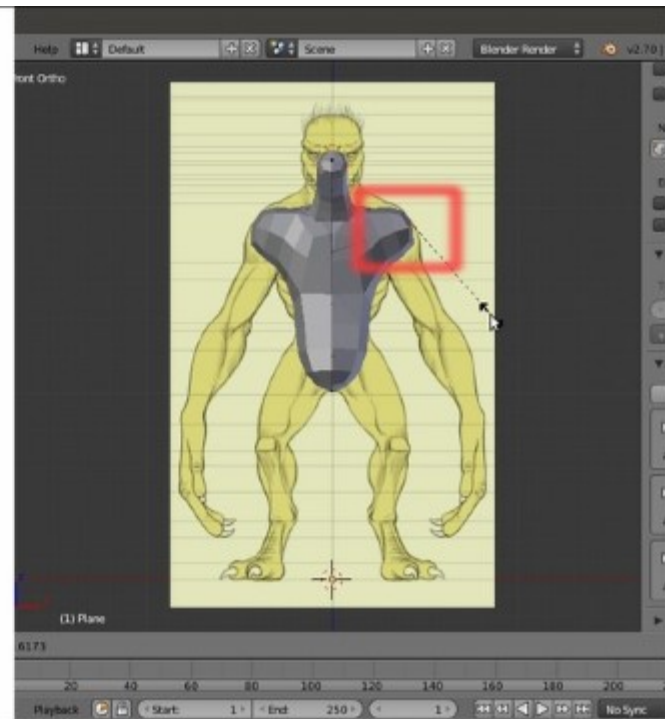
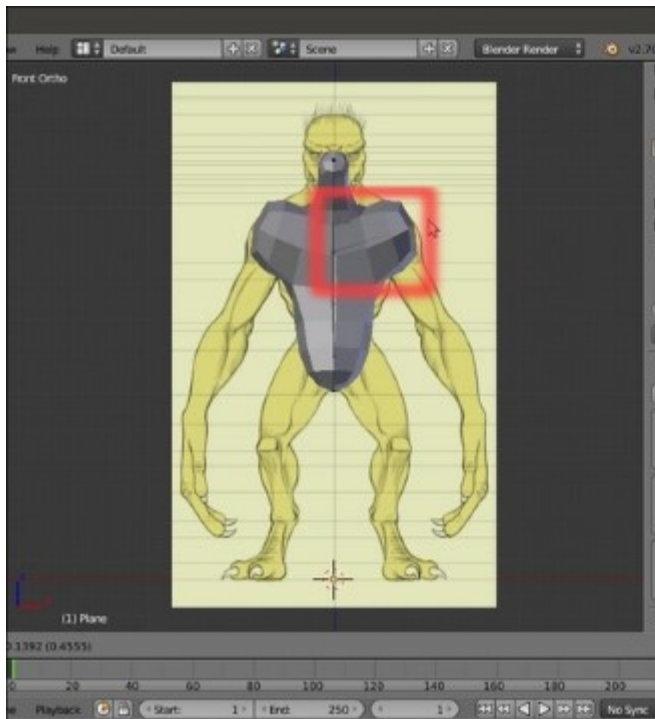
6. Press **I** on the numpad to switch to the **Front** view, and then select the bottom vertex and extrude it down to cover the base of the creature's pelvis. Press **Ctrl + A | X** to scale it only on the x axis:



### *Adjusting the weight of the vertices in the Front view*

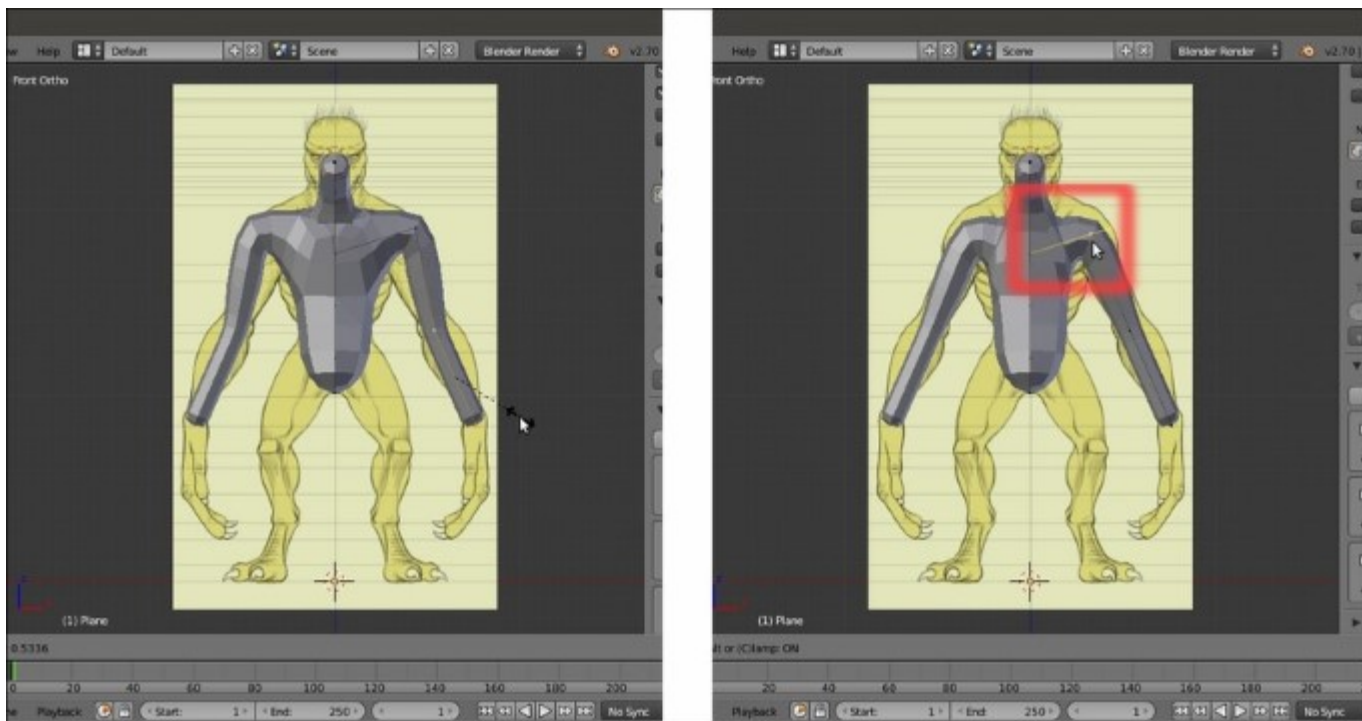
7. Go to the **Mirror** modifier and uncheck the **Clipping** item.
8. Select the middle thorax vertex and extrude it to the right-hand side to build the shoulder. Press **Ctrl + A** to scale it smaller:





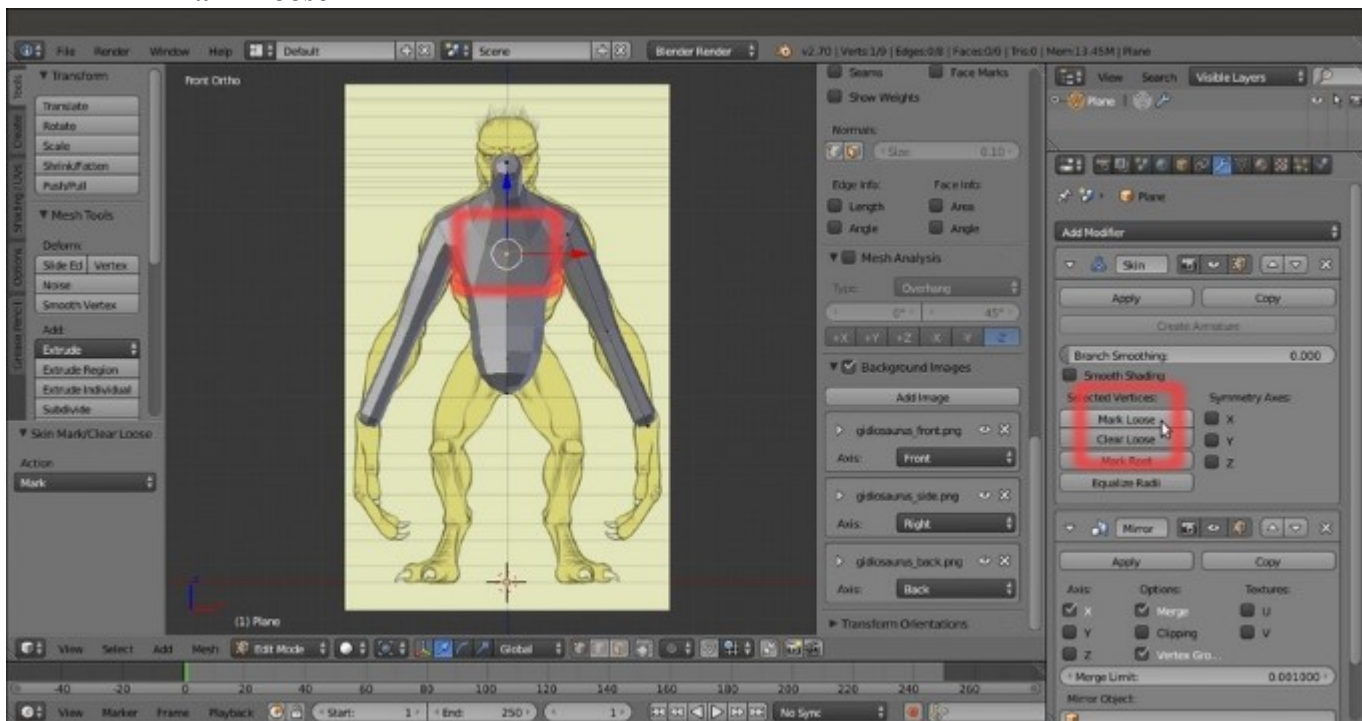
### *Creating the shoulders*

9. Extrude the shoulder vertex, following the arm shape, and stop at the wrist; select the just-extruded arms' vertices and use *Ctrl + A* to scale them smaller.
10. Reselect the shoulder vertex, and use *Shift + V* to slide it along the shoulder's edge in order to adjust the location and fix the area shape:



*Creating the arms*

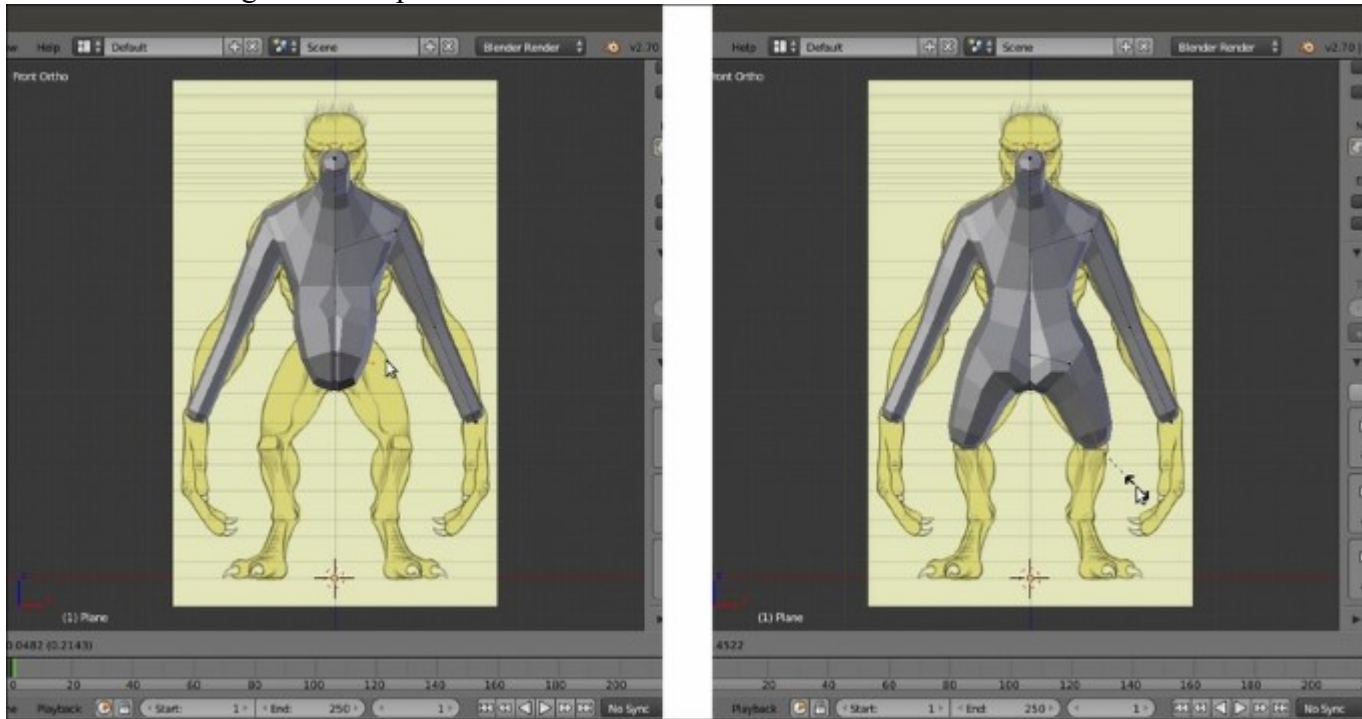
11. Select the middle thorax vertex we extruded the shoulder from and go to the **Skin** modifier; click on the **Mark Loose** button:



*Making a more natural transition from the thorax to the arms*

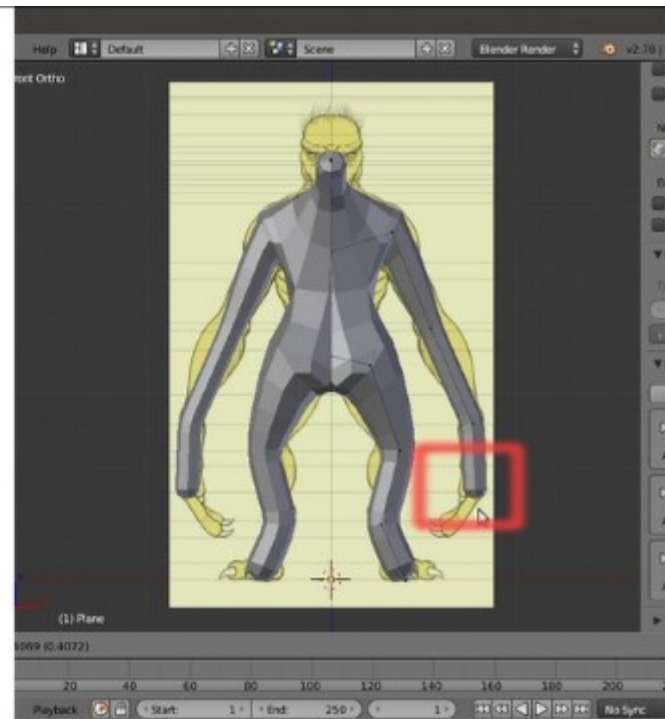
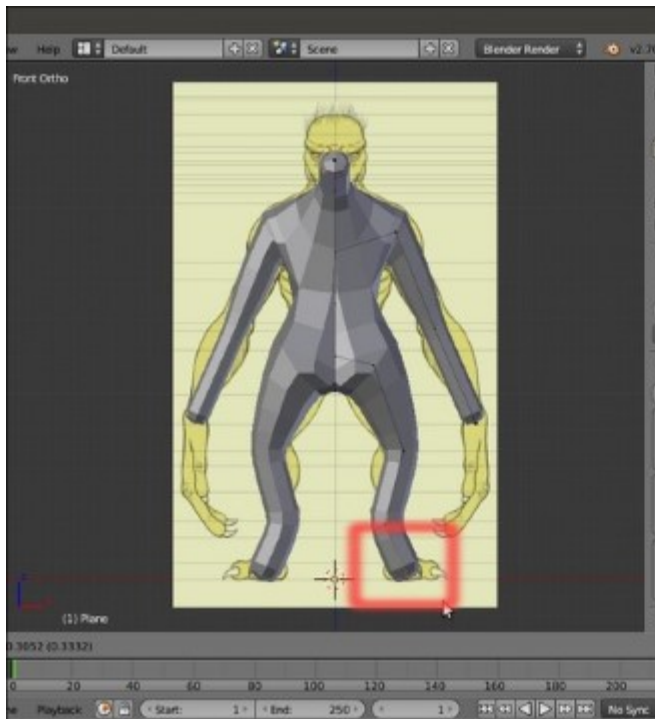


12. Select the second vertex from the bottom and extrude it to the right-hand side to build the hip, and then extrude again and stop at the knee. Use *Ctrl + A* on the vertex to make it smaller:



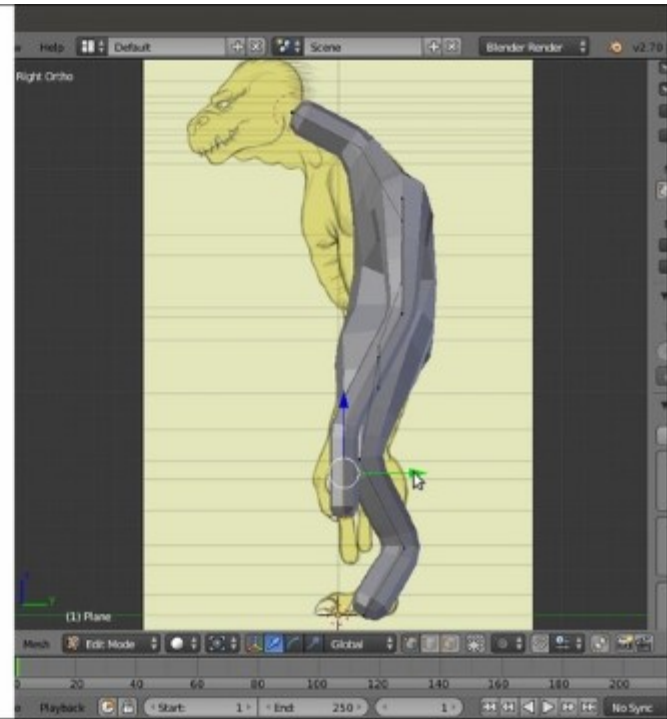
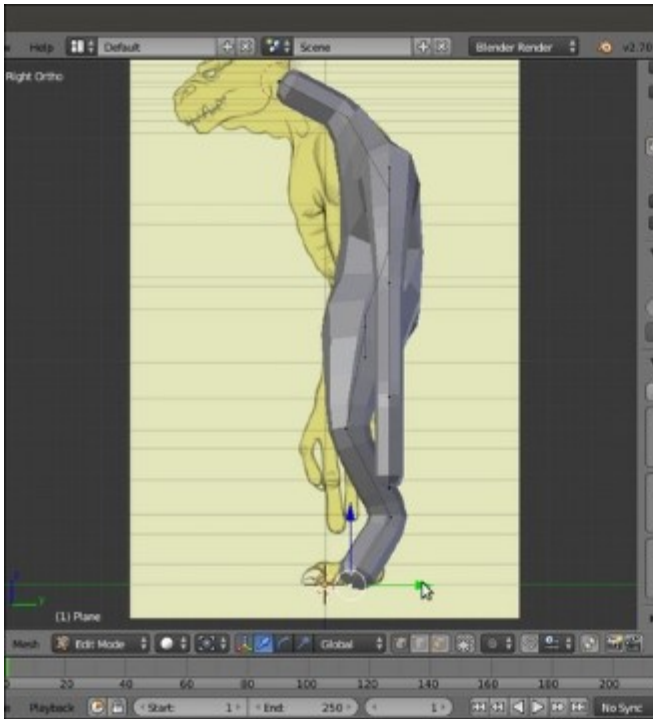
### *Extruding the thighs*

13. Go on extruding the vertex to build the leg. Then, select the wrist vertex and extrude it to build the hand:



*Extruding to complete the leg*

14. Press 3 to go to the **Side** view.
15. Individually, select the vertices of the knee, ankle, and foot, and move them to be aligned with the character's posture (you can use the widget for this and, if needed, you can press Z to go in to **Wireframe** viewport shading mode); do the same with the vertices of the arm:



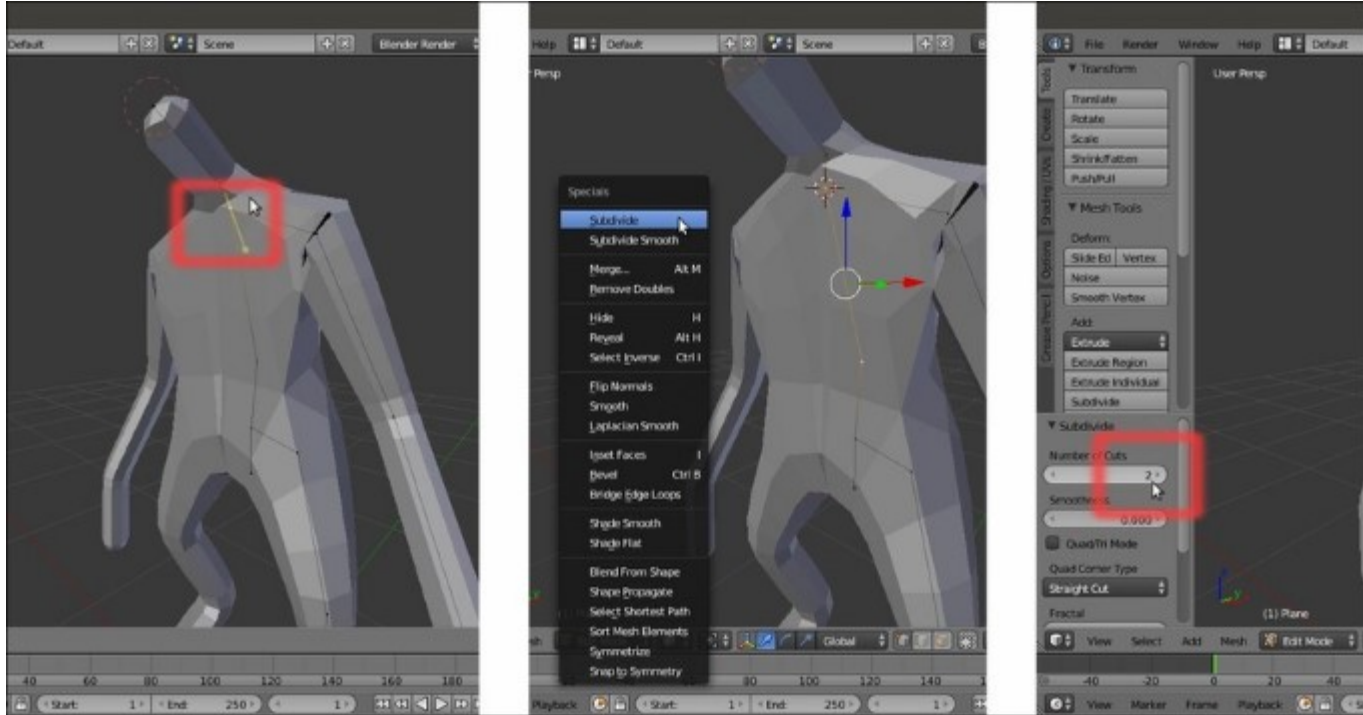
*Adjusting the arm's position*

16. Select the vertices of the shoulder and elbow, and move them forward according to the template position; do the same with the vertices of the neck and waist:



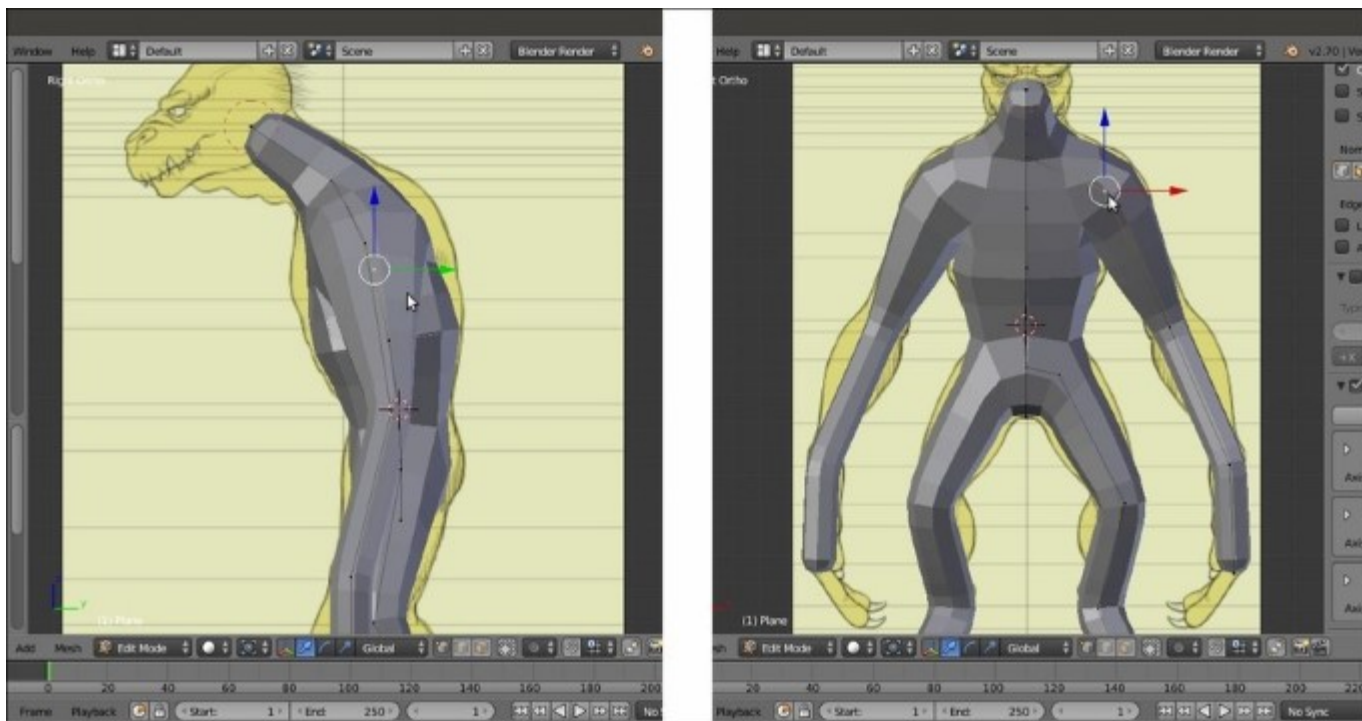
*Adjusting the position of the shoulders, thorax, and neck*

17. Select the vertex connecting the shoulder to the thorax and use *Shift + V* to slide it upwards, in order to make room for more vertices in the chest area. Use *Shift* to select the vertex at the bottom of the rib cage and press *W*; in the **Specials** pop-up menu, select **Subdivide** and, right after the subdivision, in the option panel at the bottom-left of the Blender UI, set **Number of Cuts** to 2:



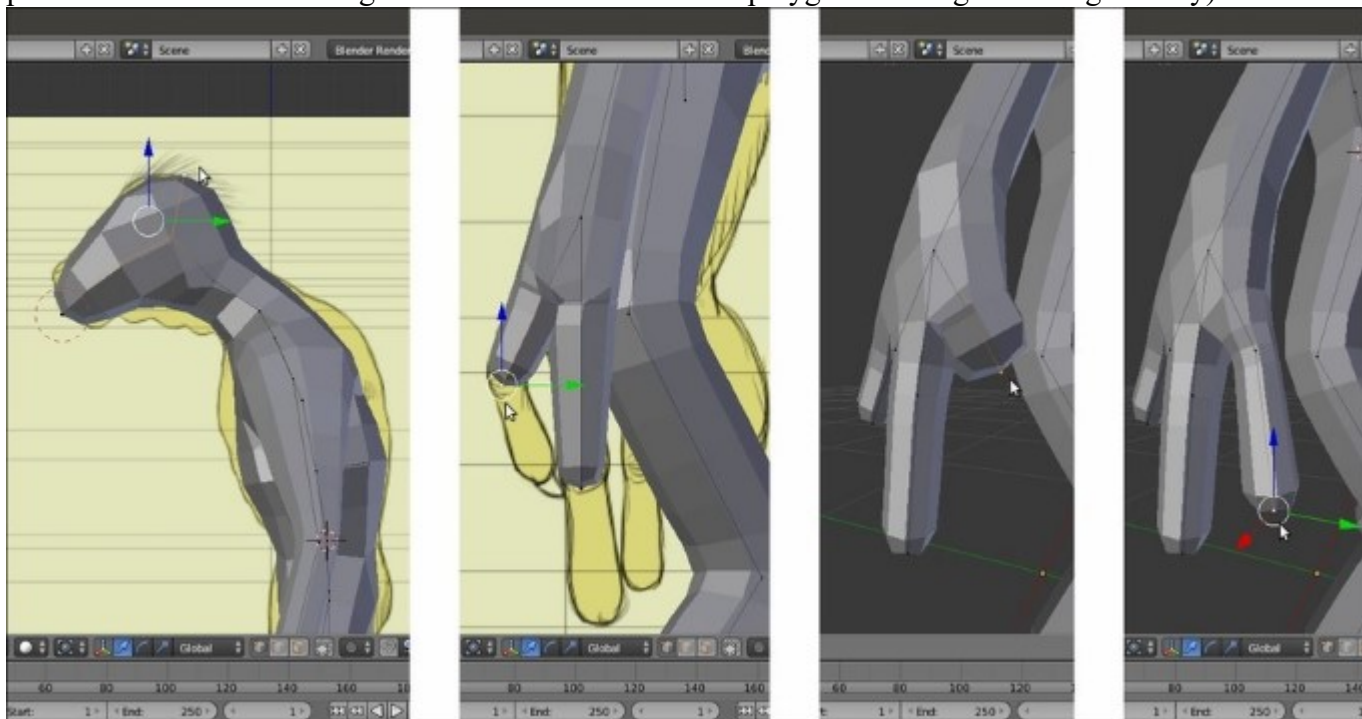
### *Subdividing an edge*

18. In the **Side** view, select the upper one of the new vertices and use *Ctrl + A* to scale it bigger. Adjust the position and scale of the vertices around that area (neck and shoulder) to obtain, as much as possible, a shape that is more regular and similar to the template. However, don't worry too much about a perfect correspondence, it can be adjusted later:



### *Refining the shoulder's shape*

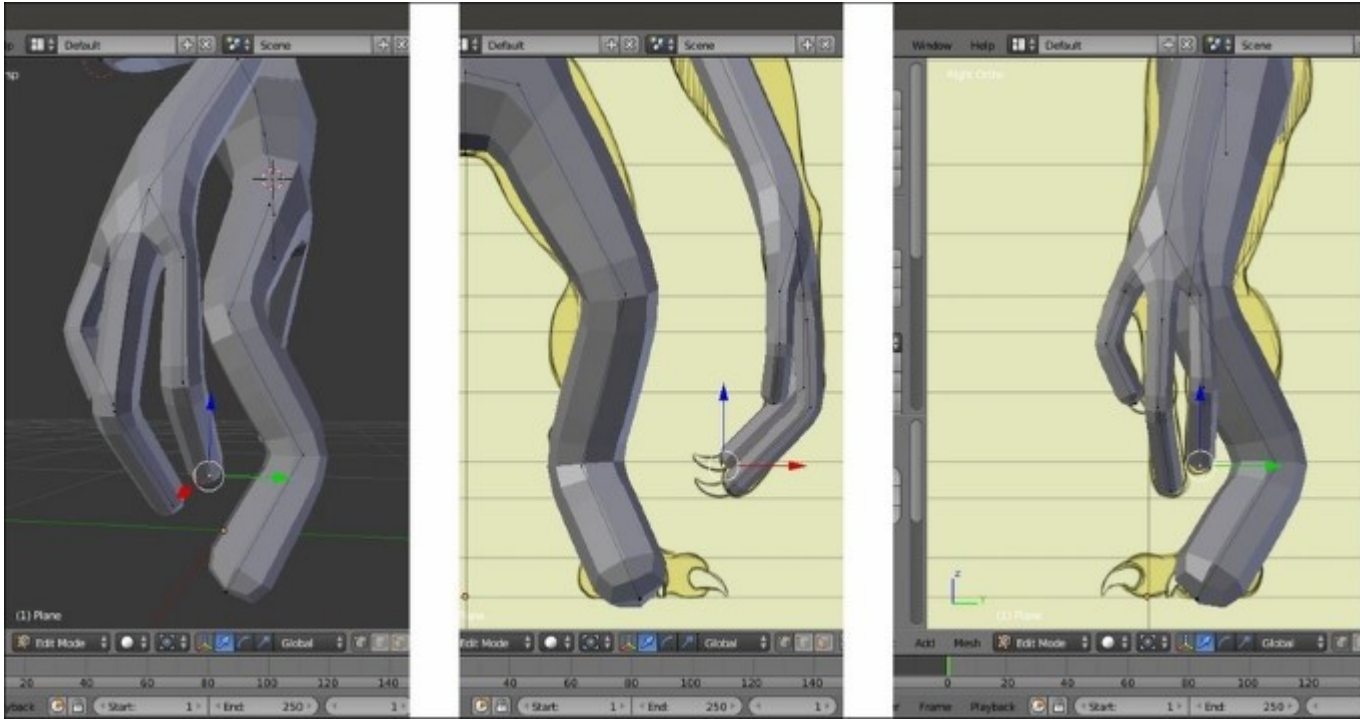
19. Extrude the bulk of the head. Select the last hand vertex and scale it smaller. Then, select the upper hand vertex and extrude two more fingers (scale their influence smaller and adjust their position to obtain a more regular and ordinate flow of the polygons in the generated geometry):





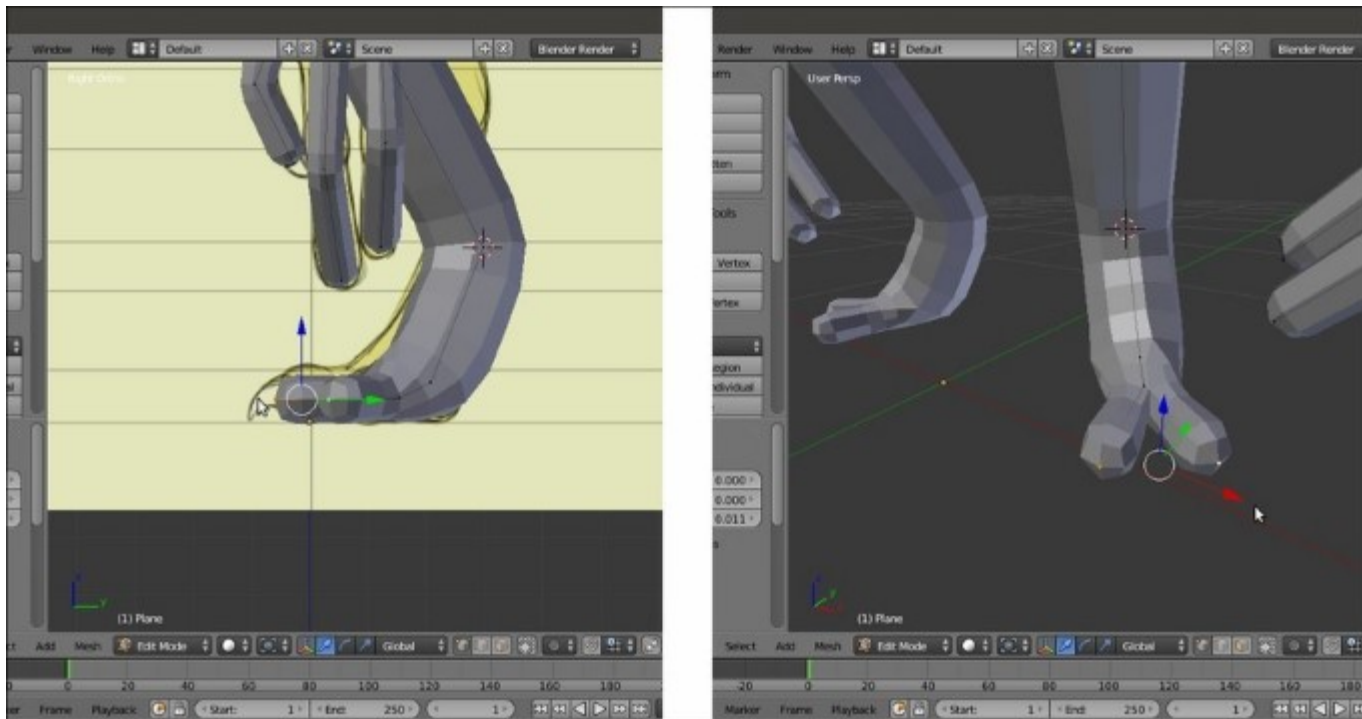
### *Creating the head, hands, and fingers*

20. As always, following the templates as reference, extrude again to complete the fingers; use all the templates to check the accuracy of the proportions and positions, and the **Front**, **Side**, and **Back** views too:



### *Adjusting the position of the fingers according to the templates*

21. Do the same thing for the foot, and we are almost done with the major part of the mesh:

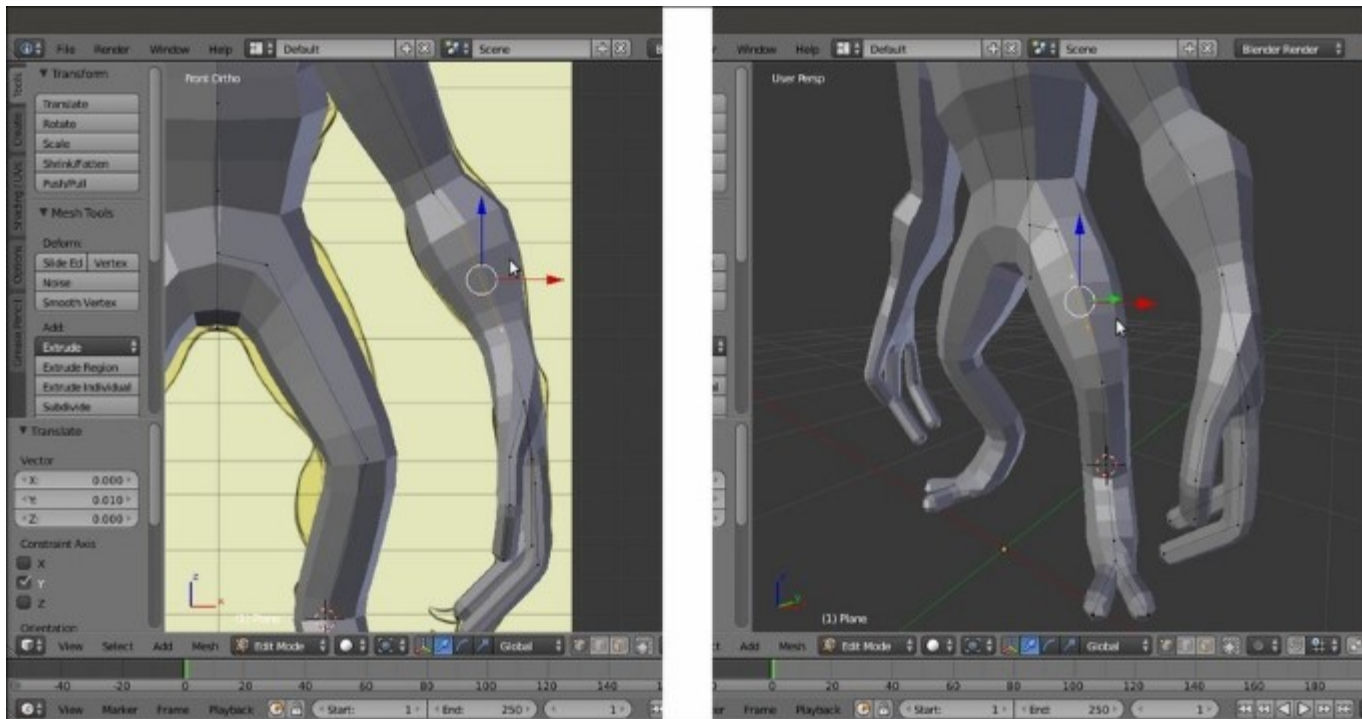


### *Creating the feet toes*

Now, it's only a matter of refining, as much as possible, the mesh's parts to resemble best the final shape of the character. Let's try with the arm first:

22. Select the two extreme vertices of the forearm and press **W** | **Subdivide** | **2** (in the bottom **Tool** panel) to add **2** vertices in the middle. Then, use **Ctrl + A** to scale and move them outward to curve the forearm a little bit. Do the same for the thigh by slightly moving the vertices outward and backward:





*Refining the shape of arms and legs*

23. Repeat the same procedure with the upper arm, shin, foot, and fingers; any part where it's possible, but don't go crazy about it. The goal of such a technique is just to quickly obtain a mesh that is good enough to be used as a starting point for the sculpting, and not an already finished model:



*The completed base mesh*

24. Press *Tab* to go out of the **Edit Mode**; go to the **Outliner** and rename the base mesh as Gidiosaurus. Then, save the file.

## How it works...

The **Skin** modifier is a quick and simple way to build almost any shape; its use is very simple: first, you extrude vertices (actually, it would be enough to add vertices; it's not mandatory to extrude them, but certainly it's more handy than using *Ctrl* + left-click to add them at several locations), and then using the *Ctrl* + *A* shortcut, you scale smaller or bigger the influence that these vertices have on the 3D geometry generated on the fly.

If you have already tried it, you must have seen that the more the complexity of the mesh grows, the more the generated geometry starts to become a little unstable, often resulting in intersecting and overlapping faces. Sometimes this seems unavoidable, but in any case it is not a big issue and can be easily fixed through a little bit of editing. We'll see this in the next chapter.

# Chapter 2. Sculpting the Character's Base Mesh

In this chapter, we will cover the following recipes:

- Using the Skin modifier's Armature option
- Editing the mesh
- Preparing the base mesh for sculpting
- Using the Multiresolution modifier and the Dynamic topology feature
- Sculpting the character's base mesh

## Introduction

In the previous chapter, we built the base mesh by using the **Skin** modifier and on the base of the reference templates; in this chapter, we are going to prepare this basic mesh for the sculpting, by editing it and cleaning up any *mistakes* the **Skin** modifier may have made (usually, overlapping and triangular faces, missing edge loops, and so on).