Chapter 10. Creating the Textures

In this chapter, we will cover the following recipes:

- Making a tileable scales image in Blender Internal
- Preparing the model to use the UDIM UV tiles
- Baking the tileable scales texture into the UV tiles
- Painting to fix the seams and to modify the baked scales image maps
- Painting the color maps in Blender Internal
- Painting the color maps in Cycles

Introduction

In this chapter, we are finally going to create the textures for the **Gidiosaurus** character, meaning all the image textures that we'll need later, to build the **shaders** for the body and for the **armor**. Basically, the essential images we need are:

- A grayscale reptilian scales image to be used as a bump map and to color the skin
- Painted image textures for the skin diffuse coloration
- A tileable image for the worn armor metallic surface
- A bump image for the armor decoration patterns

In this chapter, we'll focus on the skin of the **Gidiosaurus**, and the last two textures for the **armor** will be treated in the next chapter.

The most difficult and tedious part is, no doubt, rendering the **scales** on the **Gidiosaurus** skin; I mean, if we had to paint the scales one by one. Instead, we'll try to obtain the complex scales pattern with the minimum effort possible, using a couple of techniques to speed up the work.

Trying to keep things clear, from now on we'll use *two different texture folders*: the usual `textures` one and a `textures_making` folder, where the latter is used to contain the images we need during the process to produce the final image textures.

Making a tileable scales image in Blender Internal

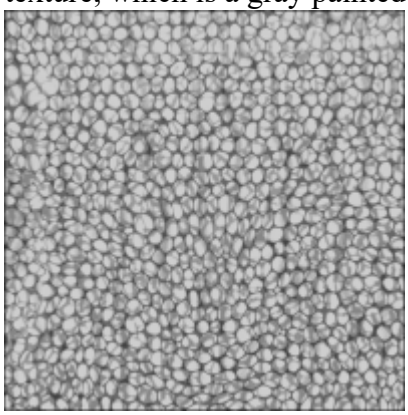
So, the first thing to do is to obtain a **tileable** grayscale **reptilian scales** image; we'll start from an already existing image obtained from an old and larger texture I had painted in **Gimp** for a dinosaur model some years ago… but that's a different story.

In any case, if you prefer, you can paint a new reptilian scales image from scratch by using painting software such as **Gimp** or **Photoshop** or open source applications such as **MyPaint** (http://mypaint.intilinux.com/) or **Krita** (https://krita.org/).

Getting ready

We are taking for granted that in your **Blender User Preferences** window, you still have the **Import Images as Planes** addon enabled; if not, start Blender and just enable it as already explained in Chapter 1, *Modeling the Character's Base Mesh*. Then, follow these steps:

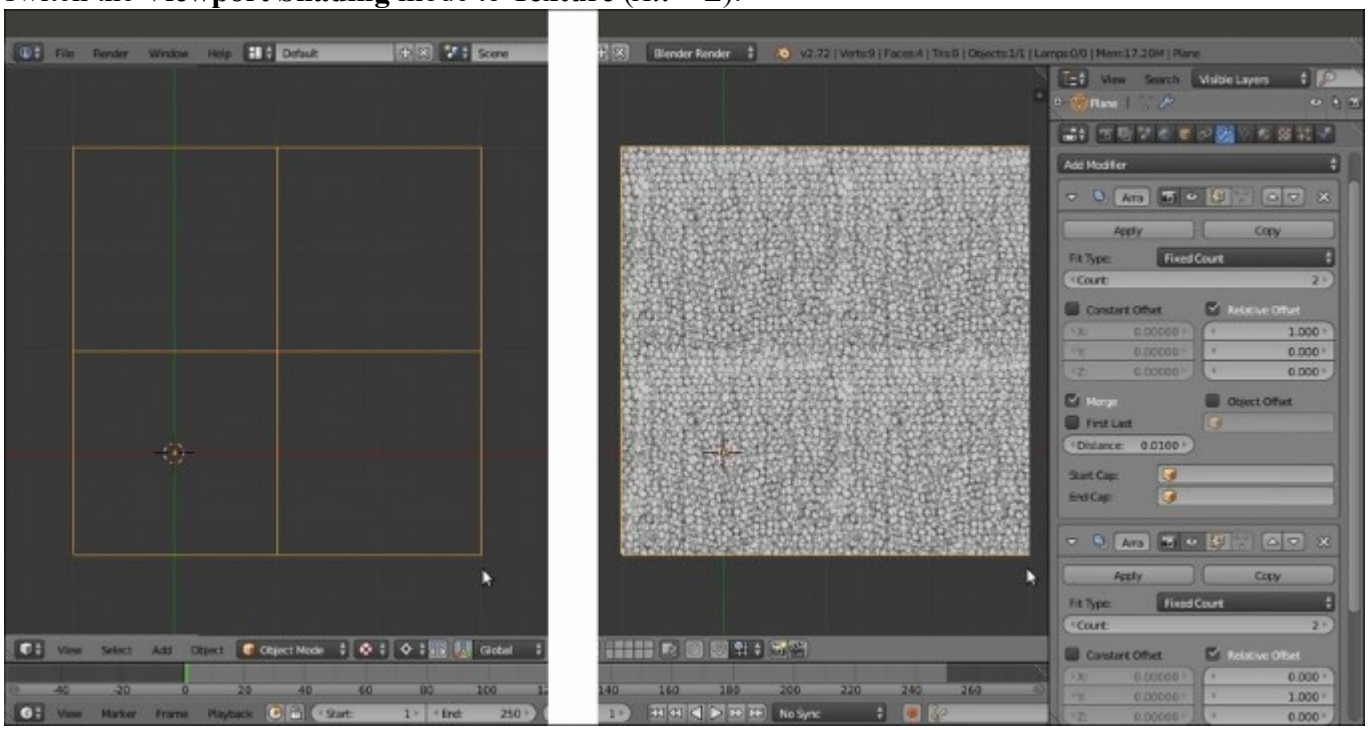
1. Select and delete the default **Cube** primitive in the scene. Select the **Camera** and the **Lamp** and move them to the **6th** scene layer.
2. Click on the main **File** menu and then on the **Import** item; select the **Images as Plane** item.
3. Browse to the `textures_making` folder and select the provided `scales.png` image texture, which is a gray painted scales image:



The "scales.png" image provided with this cookbook

4. Press the period (.) key on the numpad to center the view on the selected **Plane** and then the *7* key on the numpad to switch to the **Top Ortho** view.
5. Go to the **Object Modifiers** window and assign an **Array** modifier to the **Plane**; check the **Merge** item and leave all the other settings as they are.
6. Click on the **Copy** button to assign a new identical **Array** modifier, and in the new **Array** modifier, under the **Relative Offset** item, change **X** to **0.000** and **Y** to **1.000**.
7. Save the file as `4886OS_10_scales_tiles_01.blend`.

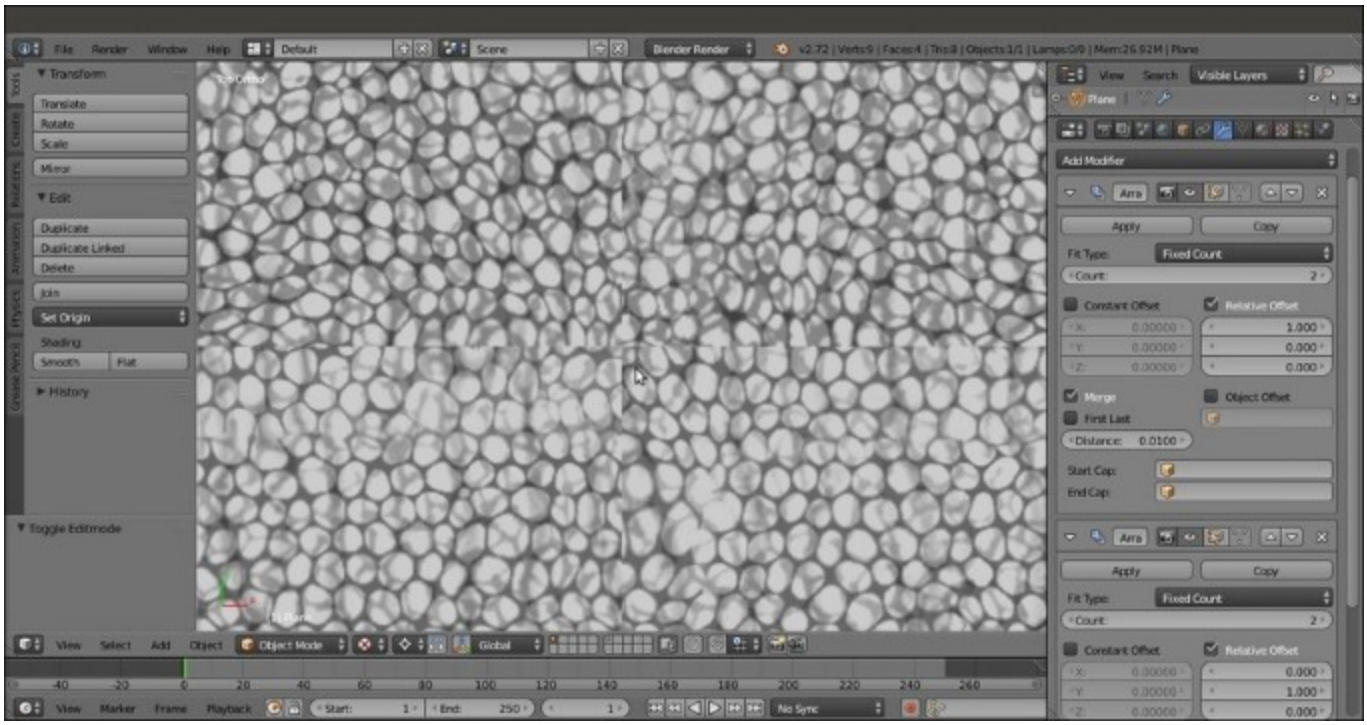
8. Press the period (.) key again on the numpad to center the view on the *enlarged* **Plane**, then switch the **Viewport Shading** mode to **Texture** (*Alt* + *Z*):



The UV mapped Plane with the Array modifiers assigned

As you can see in the preceding screenshot, the mapped **Plane** is now repeated **4** times.

By zooming towards the middle seams, it's clear that the mapped scales image is not tileable yet:



The visible seams at the borders of the Plane instances

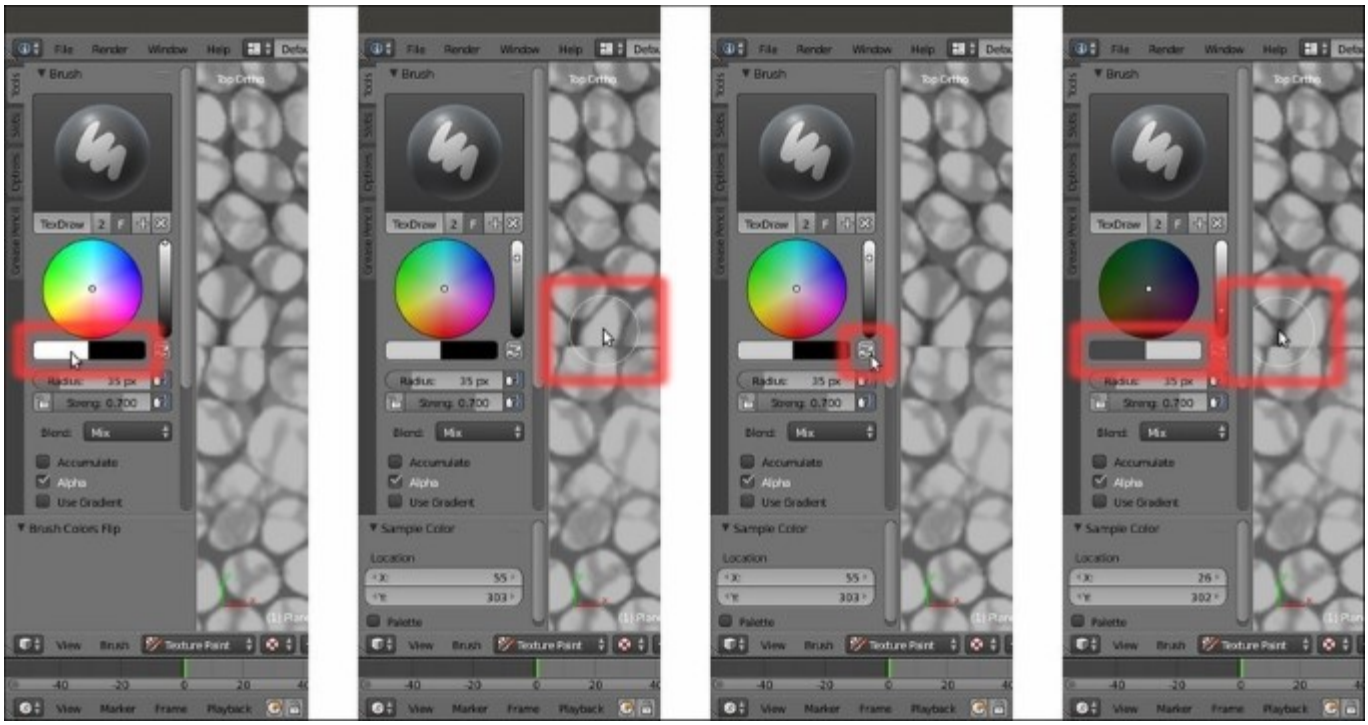
Tip

Just in case the previous screenshot is not readable enough, open the provided `4886OS_10_scales_tiles_01.blend` file to have a better look.

How to do it…

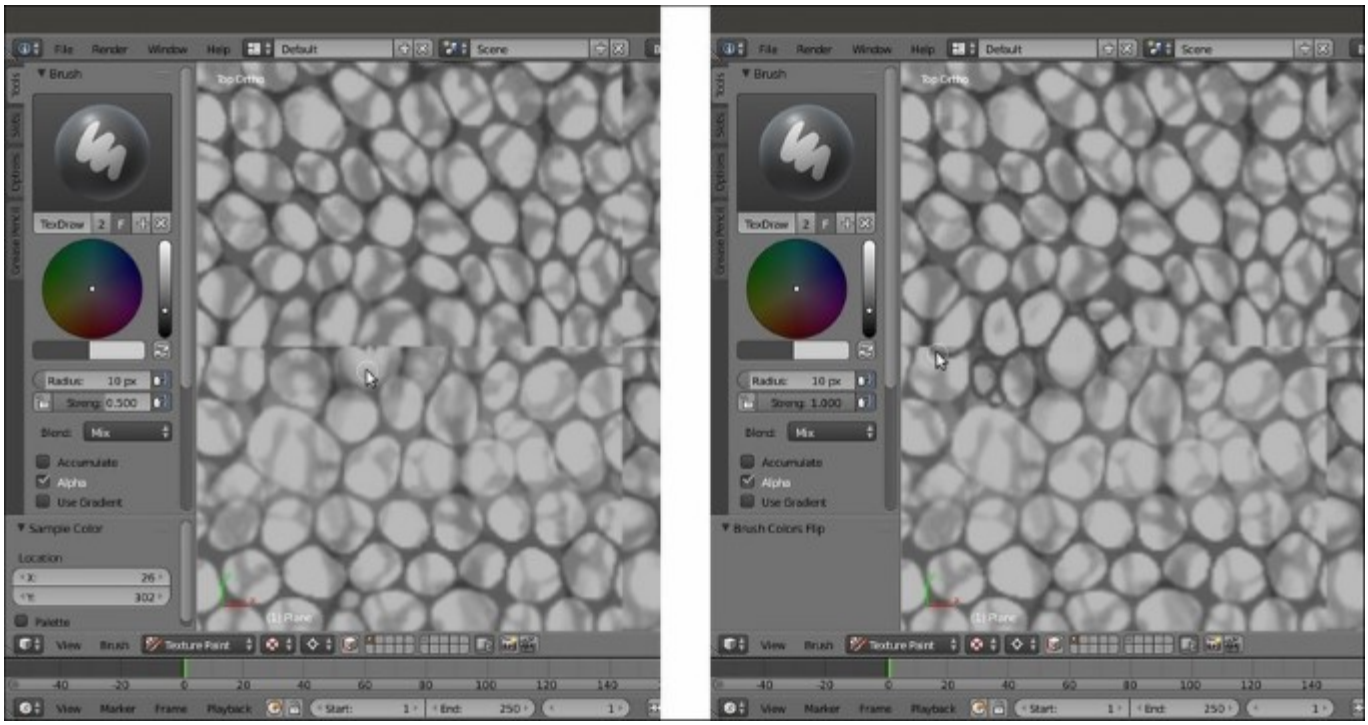
At this point, the file is ready and we can start to paint on the image to make it tileable:

1. Click on the mode button (*Sets the object interaction mode*) on the viewport toolbar to select the **Texture Paint** mode item.
2. Put the **mouse cursor** on a bright value in the scales image and press the *S* key to sample it, then go near the color selector in the **Brush** subpanel under the **Tool Shelf** to the left and click on the *Toggle foreground and background brush colors* button (the one with the two opposing arrows) to switch the active color. Otherwise, simply press the *X* key, put the mouse cursor on a dark area, and press *S* again to sample it as the opposite color.



Sampling the light and dark colors of the image

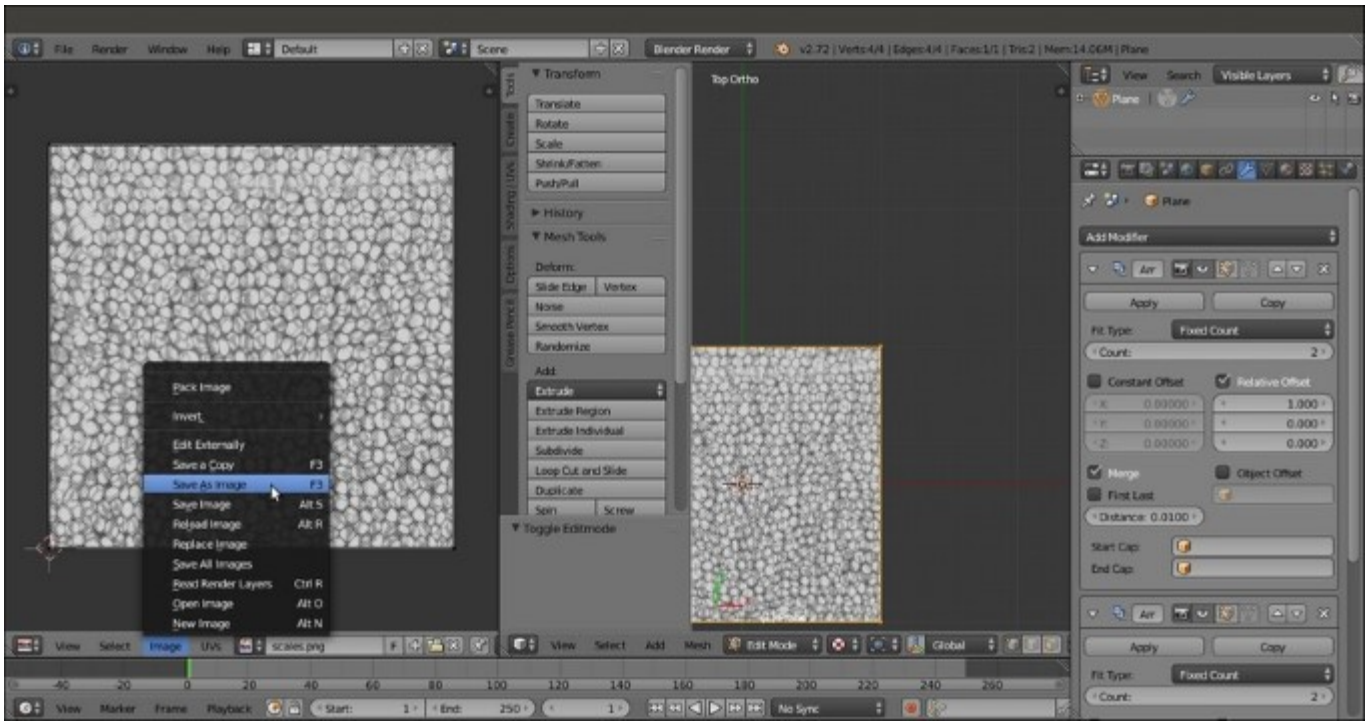
3. Set the brush's **Radius** and **Strength** values, and if you are using a **graphic tablet**, be sure to have the **two** *tablet pressure sensitivity* buttons at the sides of the previous items enabled.
4. Start to paint by fixing the scales on the image at the seams areas. Because we can also paint on the **Planes** duplicated by the **Array** modifier, and because we are always painting on the same instanced image, it's quite simple to visually join the scales at the four sides, actually making the image tileable:



Painting on the image at the borders to make the scales seamless

It's enough to fix the areas along the middle horizontal and vertical axes of the **Planes** to cover all the four edges (in fact, fixing **two** edges is automatically fixing **four**).

5. When you are done, go back into **Object Mode** and open a new window with **UV/Image Editor**; press *Tab* to go into **Edit Mode**, make the revised image appear, and save it (by clicking on **Image** | **Save as Image** in the toolbar or simply press the *F3* key) in the `textures_making` folder as `scales_tiles.png`:



Saving the tileable scales image with a different name

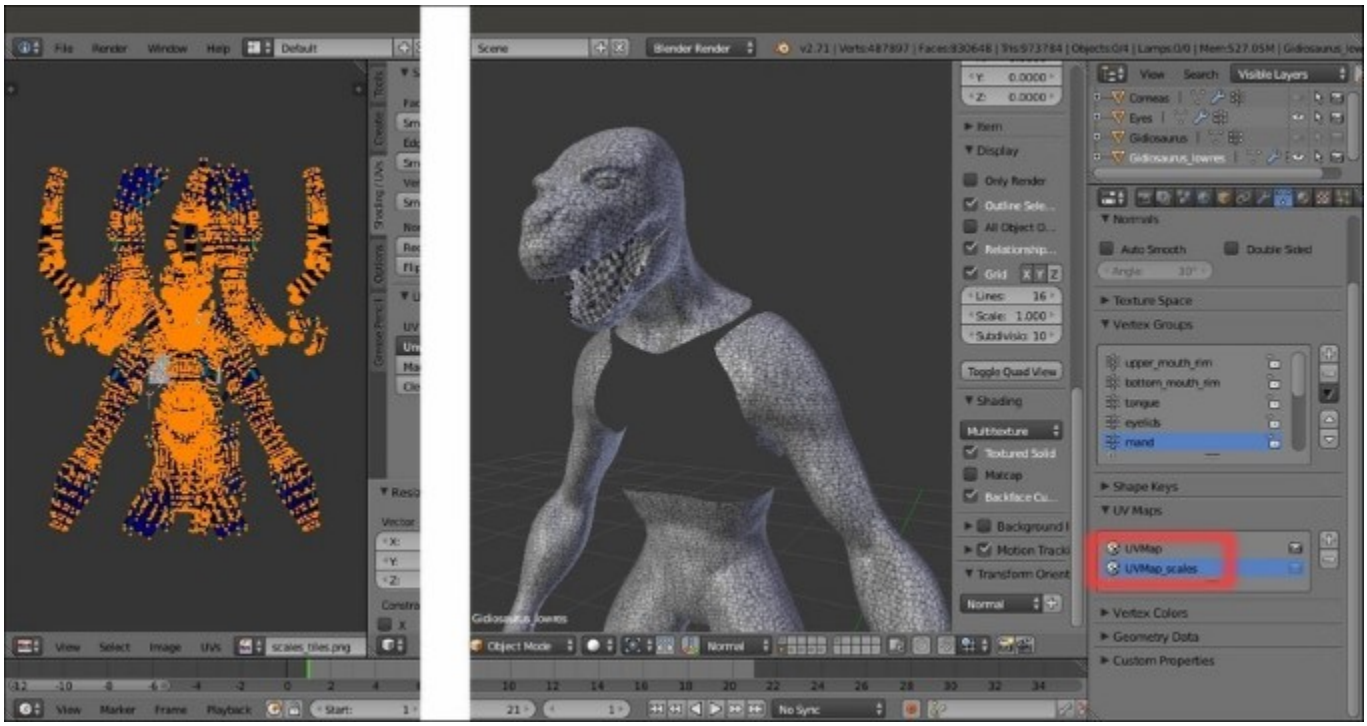
6. Save the file as `4886OS_10_scales_tiles_02.blend`.

How it works…

You might wonder why we didn't use the **Make Seamless** filter of **Gimp** (**Filters** | **Map** | **Make Seamless**) to obtain a tileable image in one click; well, the answer is simple: the **Make Seamless** plugin actually offsets and blends together whole areas of the image, and this can work in several cases, but not for a complex pattern made by scales, where a simple fading is not good enough. In this case, I prefer to paint the joining line between them by hand.

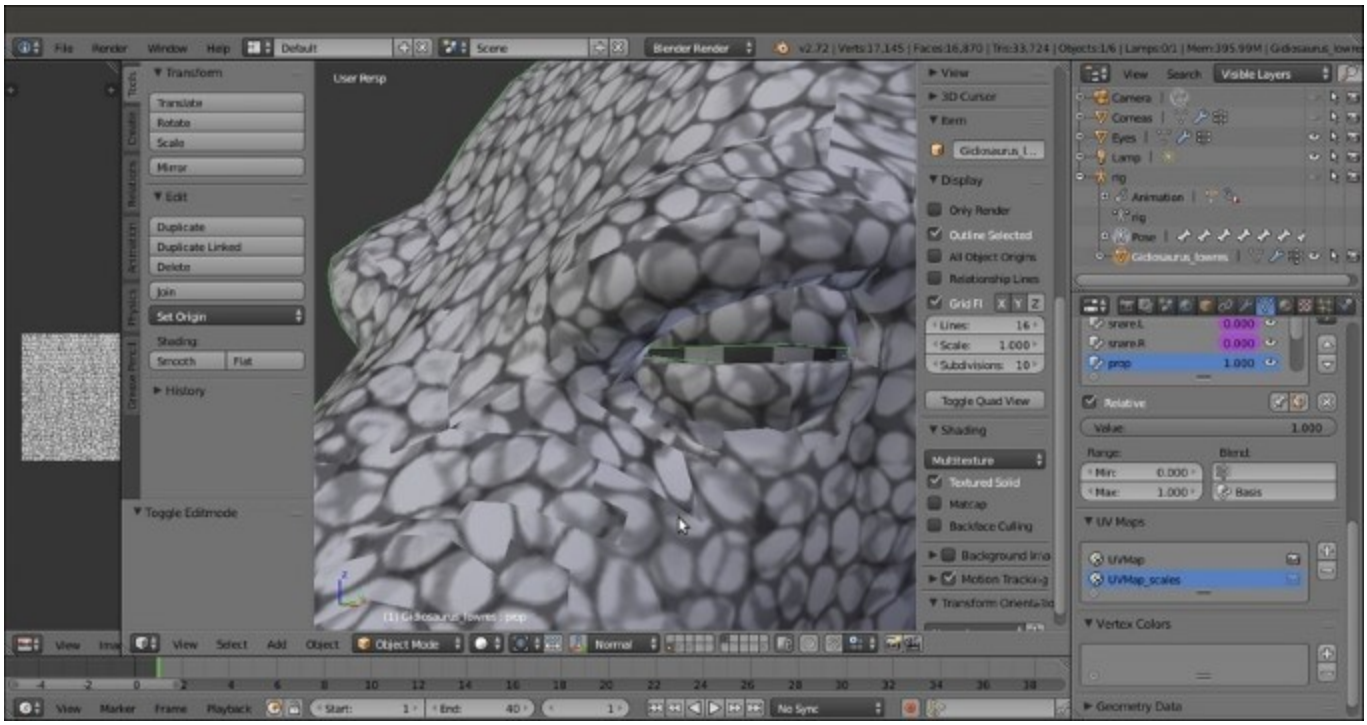
Preparing the model to use the UDIM UV tiles

In the previous recipe, we made the scales image texture seamless, ready to be seamlessly mapped on our model. If you go back to Chapter 5, *Unwrapping the Low Resolution Mesh*, you'll remember that we assigned **two** different sets of **UV coordinate** layers to it: the **UVMap** layer, divided into **5 different tiles** (this is called **UDIM UV Mapping**; it's a popular standard in the industry and means **U-Dimension**), and the **UVMap_scales** layer, set up to repeat the `scales_tiles.png` image pattern at the right size on the model:



The two UV coordinates layers in the UV Maps subpanel

By zooming in and looking carefully at the result of the tiling (in **Textured Solid** mode, which is enabled under the **Shading** subpanel of the *N* viewport sidepanel), you can see that although we used a tileable scales image, we still have seams in some areas. This is obviously due to the fact that the **UVMap_scales** layer (as you can see in **UV/Image Editor** in the **Edit Mode** after selecting all the mesh's vertices) is made up of separated and overlapping islands to obtain a randomly distributed mapping of the scales on the **Gidiosaurus** skin:



The seams on the Gidiosaurus scales skin

A simple solution to fix these seams is to bake the random scales pattern on the **5** tiles of the **UVMap** layer and then use the **Paint Tool** to adjust the gaps. This a step that we have to do in any case to allow further texture modifications such as the painting of befitting facial scales around the **eyebrows**, the **eyes**, the **nostrils**, and so on, but let's go in order.

To be able to bake and then paint on the different tiles in real time through the 3D viewport, we must prepare the file a bit.

Getting ready

Start Blender and open the `Gidiosaurus_library.blend` file; save it as `Gidiosaurus_baking_scales_01.blend`:

1. *Shift*-click on the **13th** scene layer to disable it and hide the **Armor** object, then enable the **6th** scene layer to show **Camera** and **Lamp**. Split the 3D view into two windows and change the left one into a **UV/Image Editor** window (if it shows the **Render Result** image datablock, just click on the **X** icon button to unlink it).
2. Put the mouse in the 3D viewport and press the *T* key to hide the **Tool Shelf** panel, and then maximize the **UV/Image Editor** window as much as possible. Go to the **Outliner** and click on the eye icon to the side of the **Camera** item to disable its visibility in the viewport.
3. Go to the **UV Maps** subpanel under the **Object Data** window and be sure to have the **UVMap** layer selected (the one with the **5** different space tiles); if necessary, click on the camera icon to the right to enable it as the active UV coordinates layer.

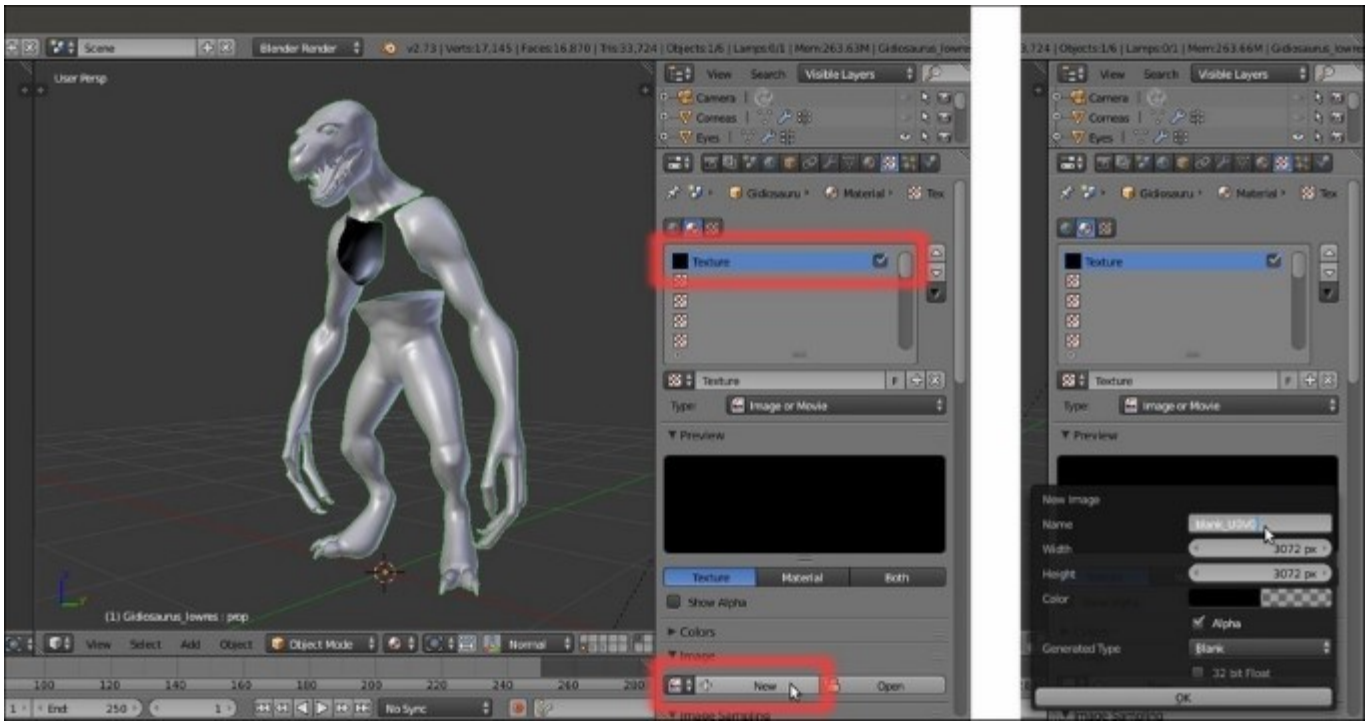
How to do it…

Now, let's prepare the materials; remember that, at the moment, we are under the **Blender Render** engine and not under **Cycles**:

1. Go to the **Material** window and out of **Edit Mode**, click on the **–** icon button to the right of the materials datablock window (*Remove the selected material slot*) to unlink both the `Enamel` and the `Body` material datablocks.
2. Now click on the **+** icon button to add **5** material slots, and then add **5** materials by selecting each slot and clicking on the **New** button.
3. Starting from the top one, rename the **5** materials as `Material_U0V0`, `Material_U1V0`, `Material_U2V0`, `Material_U0V1`, and `Material_U1V1`.

Adding the 5 materials to the Gidiosaurus object

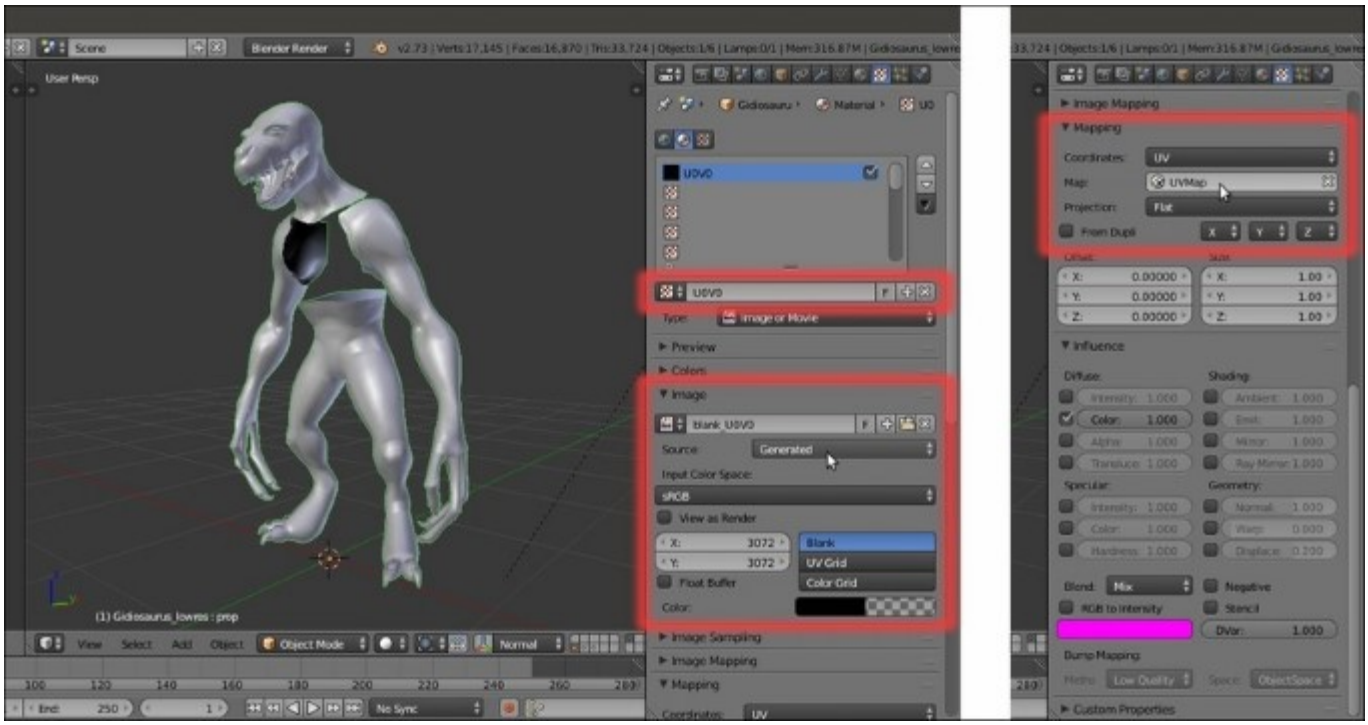
4. Select the `Material U0V0` slot and go to the **Textures** window to click on the **New** button and add a texture.
5. Scroll down the vertical panel by rotating the middle mouse wheel and click on the **New** button under the **Image** subpanel; in the **New Image** pop-up panel, click on the **Color** slot to set the **Alpha** (**A**) value to **0.000**, then *Ctrl* + click on the **Width** slot and right after the default value of **1024**, type `*3`, then press *Enter* (in Blender, you can do a math calculation for any parameter like this anywhere). Copy and paste (*Ctrl* + *C* and *Ctrl* + *V*) the result of the multiplication, **3072**, into the **Height** slot; click on the **Name** slot to write the texture name as `blank_U0V0`, then press the **OK** button at the bottom of the panel:



Adding a blank image texture to the first material

This adds a blank (*alpha background*) **3072** x **3072** pixels image as a texture on the material.

6. *Ctrl* + left-click on the *Unique datablock ID name* slot right above the **Type (Image or Movie)** slot, and rename the default **Texture** name as `U0V0`. Go down to the **Mapping** subpanel and click on the **Map** slot to select the **UVMap** item:



The "Unique datablock ID name" slot, the Image subpanel, and the Mapping subpanel

7. Go to the **UV/Image Editor** to the left side of the screen and click on the double arrows to the side of the **New** button in the toolbar; from the pop-up menu select the **blank_U0V0** item. Slide the toolbar to the right and click on the **Image** item. In the pop-up menu, select the **Save as Image** item (or press the *F3* key) and save the image in the `texture_making` folder as `blank_U0V0.png`, then click on the pin icon button to the right to activate it (*Display current image regardless of object selection*):

The assigned blank image loaded in the UV/Image Editor window and pinned to be displayed regardless of the object selection

As the image is saved under the **Image** subpanel, the **Source** slot caption changes from **Generated** to **Single Image**.

8. Repeat the procedure for all the remaining four materials, assigning and saving a blank image texture for each material. So inside the `texture_making` folder, you have saved the images: `blank_U0V0`, `blank_U1V0`, `blank_U2V0`, `blank_U0V1`, and `blank_U1V1`.
9. Start to split the **UV/Image Editor** window until you have **5 UV/Image Editor** windows. Press the *Tab* key to go into **Edit Mode** with the mesh; put the mouse in the 3D viewport and press the *A* key to select all the mesh's vertices and therefore show the UV islands in all the **UV/Image Editor** windows.
10. Enlarge one **UV/Image Editor** window as much as possible and enable the *Keep UV and edit mode mesh selection in sync* button on the toolbar.
11. If it's the case, deselect everything, then box-select the islands (*B* key then left-click and drag the mouse) in the **U1V0** tile space. In the **Material** window, select the `Material_U1V0` slot and click on the **Assign** button. Go to the top right **UV/Image Editor** window and click on the **X** icon button on the toolbar to unlink the current image datablock (which is still **blank_U0V0**). Then click on the **Image** item on the toolbar and from the drop-down list, select the `blank_U1V0` image.
12. Press the *A* key to deselect everything and box-select the islands in the **U2V0** tile; select the `Material_U2V0` slot and again click on the **Assign** button. Go to the following image editor and unlink the current image datablock to load the `blank_U2V0` image.

13. Repeat for the other two missing tiles and material slots (note that this is not necessary for the **U0V0** ones, which are, by default, first assigned to the whole mesh and the first created material and so still remain associated to `Material_U0V0`). Then go out of **Edit Mode**.

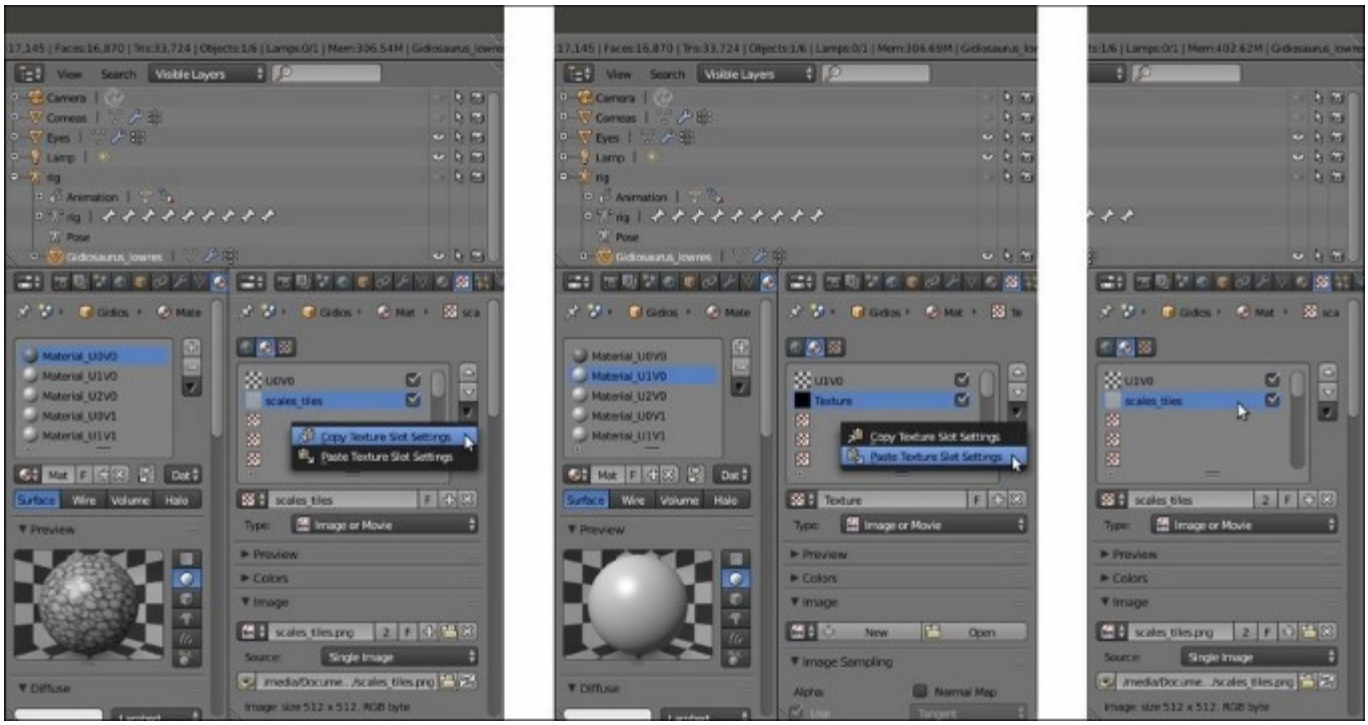
The work-space prepared with the 5 UV/Image Editor windows with their respective blank images

As you can see, by selecting the vertices of the UV islands in **UV/Image Editor**, the corresponding vertices on the mesh are also selected. Moreover, this makes all the UV islands visible in the image editor, even though, we haven't selected a single vertex on the mesh yet (normally, you see only the islands of the selected vertices in the image editor). This way, it's simple to associate a certain UV island with a certain material and a certain group of vertices on the mesh.

14. Go to the **Material** window and select the `Material_U0V0` slot. Go to the **Texture** window and click on the second texture slot right under the **U0V0** one. Click on the **New** button, scroll down to the **Image** subpanel, and click on the **Open** button to browse to the `texture_making` folder and load the `scales_tiles.png` image.
15. Go to the **Mapping** subpanel and in the **Map** slot, select the **UVMap_scales** UV coordinates layer. Rename the `Unique datablock ID name` slot as `scales_tiles`. Click on the checkbox to the side of the **U0V0** texture slot to disable it (this is just temporary but mandatory for the baking, otherwise it would create a dependency loop, that is, the *Circular reference in texture stack* message in the top main header and in the **Terminal** panel as well):

Disabling the blank texture image and loading the "scales_tiles.png" image in the first material

16. Click on the button with a black arrow pointing downward, right after the + and –icon buttons, and from the pop-up menu, select the **Copy Texture Slot Setting** item. Select the `Material_U1V0` slot and then click on the second texture slot right under the **U1V0** one and click on the **New** button. Click again on the black arrow button and this time, select **Paste Texture Slot Setting**:



Copying and pasting the "scales_tiles" texture slot to the other materials

17. Repeat this copy and paste for the other three materials, and also remember to disable the first texture slot for all the materials.
18. Press *Tab* to go out of the **Edit Mode** and save the file.

How it works…

Thanks to the pin icon button that is enabled for each loaded image, it's possible to keep the different images visible at the same time. At this moment, the **5** different PNG images are blank, so this isn't particularly evident; it will be a lot more clear when we start to actually paint on the model through the 3D viewport.

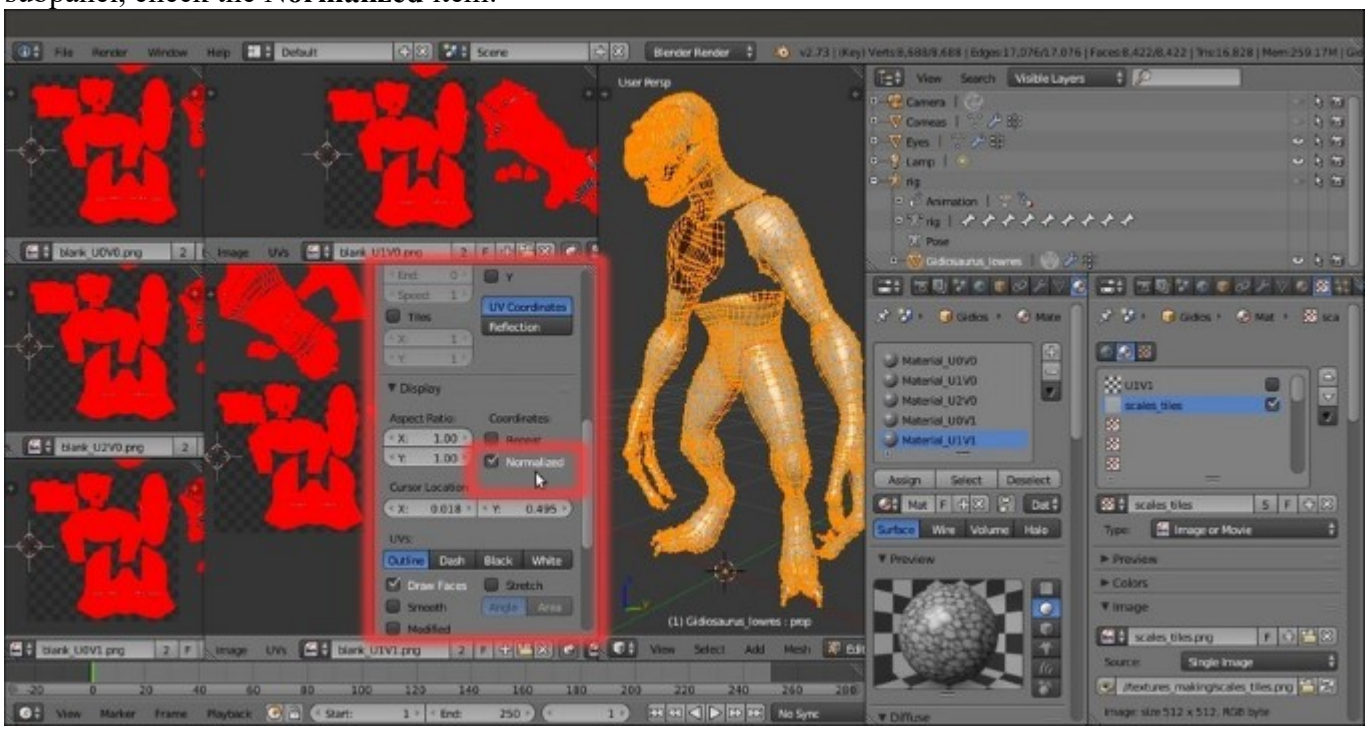
Baking the tileable scales texture into the UV tiles

What we have to do now is to bake the `scales_tiles.png` image map (used in all the materials and mapped on the **UVMap_scales** coordinates layer) on the **5** tiles of the **UVMap** coordinates layer.

Getting ready

At this moment, Blender is not able to bake automatically outside of the default **U0V0** tile space yet, so a bit of additional work is needed; nothing particularly difficult by the way. The steps are as follows:

1. Press *Tab* to go into **Edit Mode** again and then put the mouse in the **blank_U0V0 UV/Image Editor** window; press the *N* key to call the **Properties** sidepanel and under the **Display** subpanel, check the **Normalized** item:



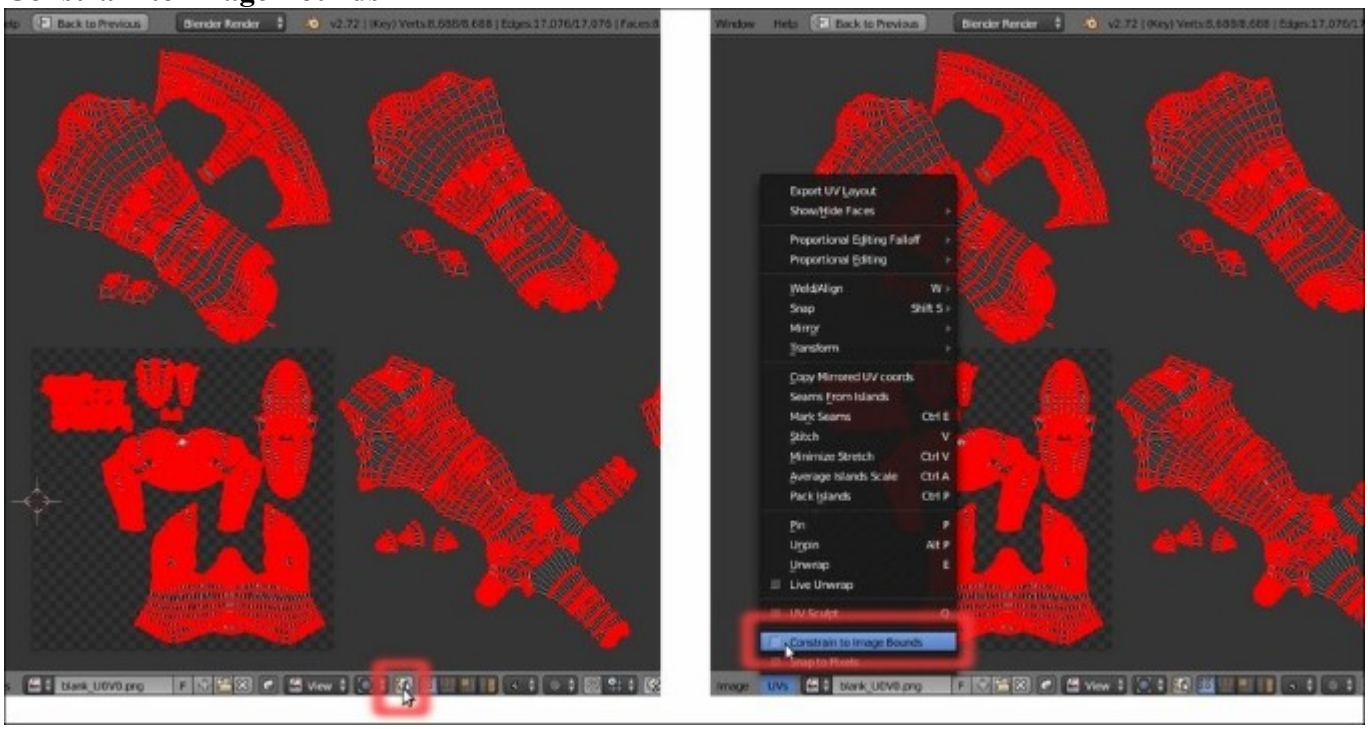
The Normalized item in the Display subpanel under the N Properties sidepanel of the UV/Image Editor window

2. Press *N* again to hide the **Properties** sidepanel. Go to the **UV Maps** subpanel under the **Object Data** window and click on the + icon button to the right to add a new UV coordinates layer (**UVMap.001**), then rename it **UVMap_temp** (or whatever you prefer).

How to do it…

We are now going to create a new UV coordinates layer for the baking by moving all the islands in the outside tiles to the space of the default one; but before we go on, we must be sure about two things:

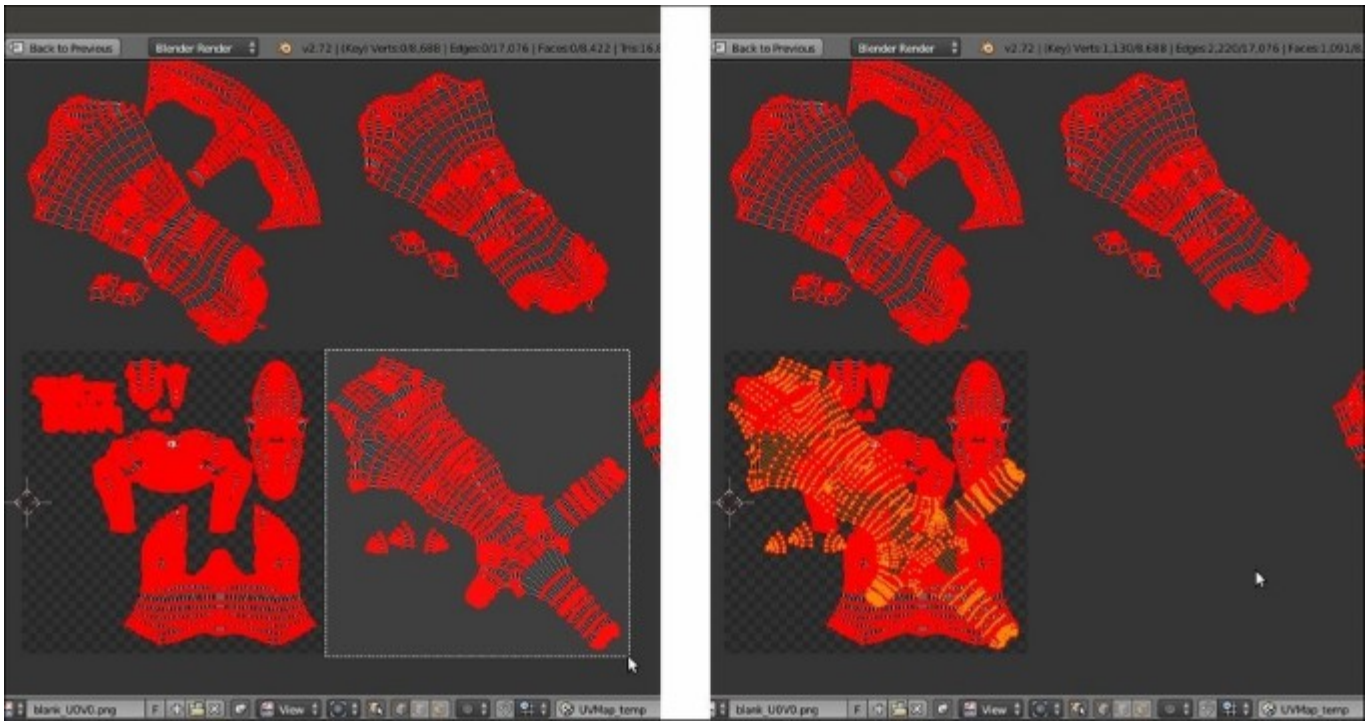
- In the toolbar of the **blank_U0V0** image editor window, the *Keep UV and edit mode mesh selection in sync* button must now be disabled
- In the pop-up menu, accessible by clicking on the **UVs** item in the image editor toolbar, the **Constrain to Image Bounds** item must be deselected:



The "Keep UV and edit mode mesh selection in sync" button and the Constrain to Image Bounds item

Go to the **blank_U0V0** image editor window; if you prefer, maximize it (mouse cursor into the window and press *Ctrl* + Up Arrow). If necessary, press *A* to deselect all the islands.

1. Now, box-select the islands on the **U1V0** tile, and move them to the default **U0V0** tile space (*G* | *X* | **-1** | *Enter*):



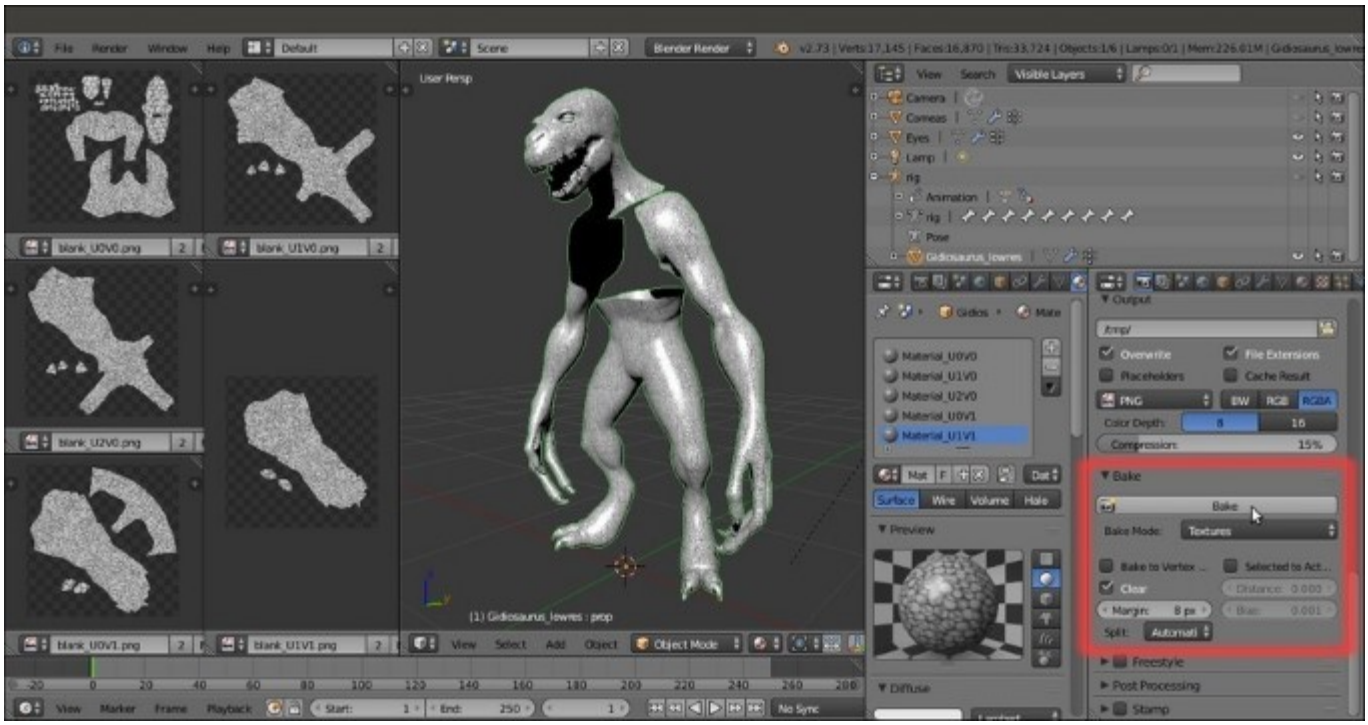
The UV islands of the U1V0 tile space, box-selected and moved to the default U0V0 tile space

2. Deselect everything and box-select the islands at **U2V0**, then move them to the default space, which is the same as the previous one (*G* | *X* | **-2** | *Enter*).
3. Repeat for the last **2** islands tiles (*G* | *Y* | **-1** | *Enter*) and (*G* | *X* | **-1** | *Enter* and then *G* | *Y* | **-1** | *Enter*), then rearrange the image editor windows.
4. Go to the **Object Data** window and in the **UV Maps** subpanel, be sure to have the **UVMap_temp** layer, the **last one**, enabled as the active one, that is, the **camera icon** to the right side of the **UVMap_temp** item must be the one enabled and visible (*Set the map active for rendering*):

The new UVMap_temp coordinates layer

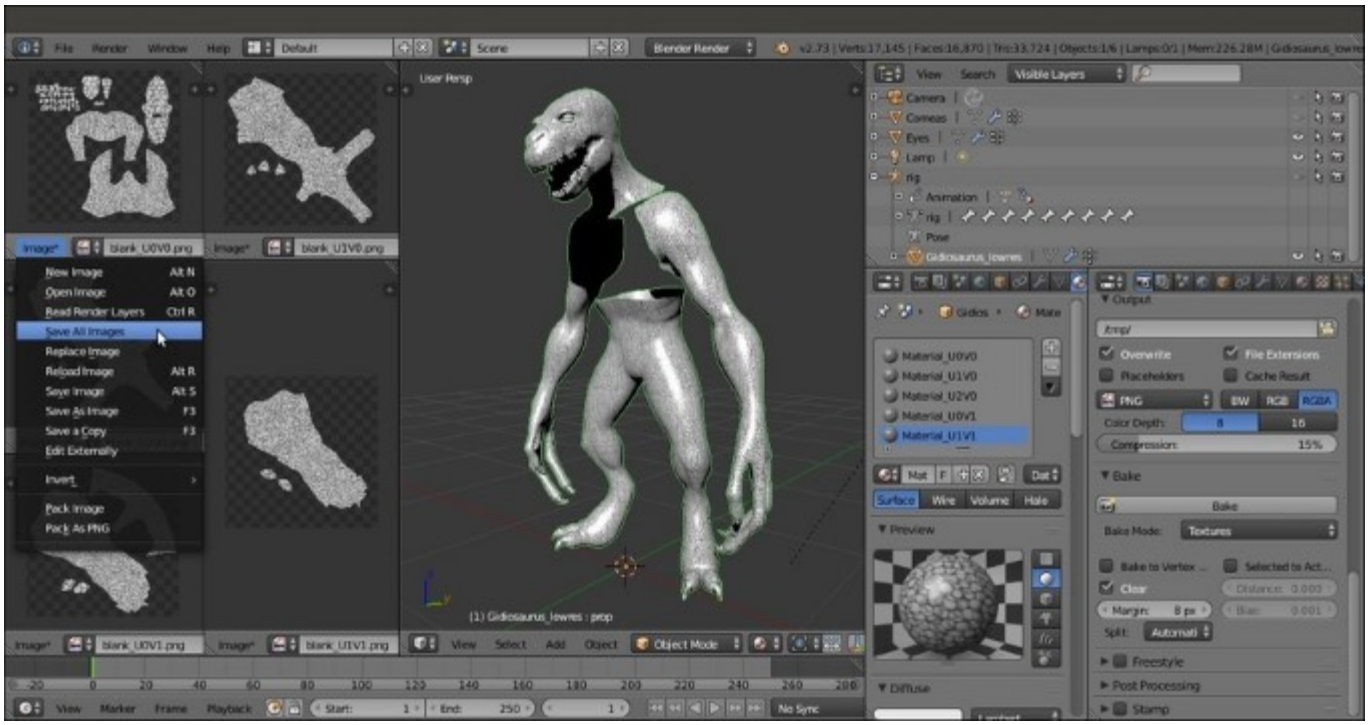
5. Out of **Edit Mode**, go to the **Render** window and then go to the **Bake** subpanel (usually at the bottom of the panel). If necessary, click on the **Bake Mode** slot to select **Textures**, then set the **Margin** value to **8** or higher; and check the **Clear** item flag. Be sure to have the **Gidiosaurus** object still selected and press the **Bake** button.

   After a while, the baked scales textures appear on the **5** PNG images, baked according to the **UV** islands of the **5** tiles of the **UVMap** layer:



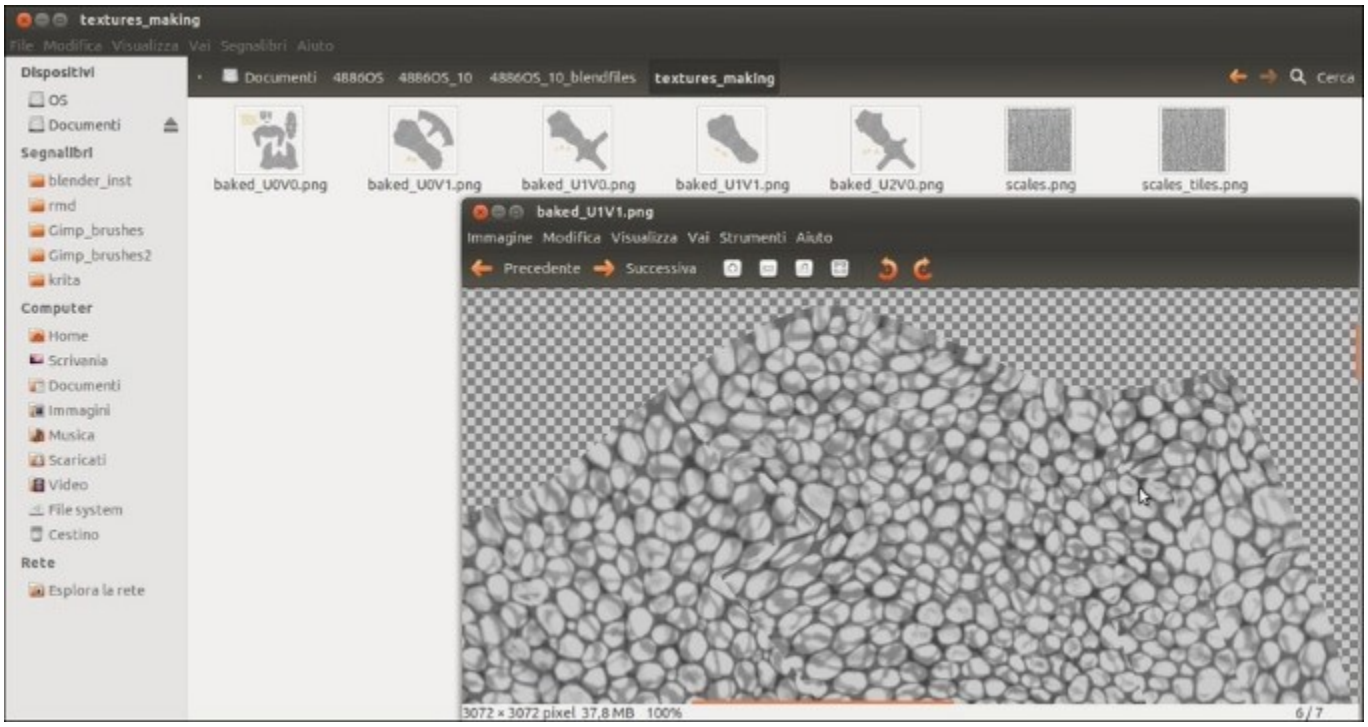
The 5 baked images and the Bake subpanel under the Render window

6. Click on the **Image** item on the **UV/Image Editor** toolbar and from the pop-up menu, select the **Save All Images** item or if you want to preserve your blank images (we are going to use them again later), just save each image at a time (**Save As Image** item or *F3* key) with the names `baked_U0V0.png`, `baked_U1V0.png`, and so on:



Saving the baked image maps

Opening the `texture_making` folder on your desktop, you will now find the baked textures:



The baked textures saved inside the "texture_making" folder

As you can see in the information bar at the bottom of the **GNOME** image viewer (I'm working in **Linux Ubuntu**), each image saved from Blender is **37.8** megabytes.

The large size of the images can of course be reduced (a lot) by opening them in **Gimp** (or any other 2D application) and re-saving.

How it works…

All the UV islands have been moved to the default **U0V0** tile space, which is the only one where the baking happens, but because each image is associated with a different part of the mesh, each image is correctly baked with the right islands and textures.

In fact, inside Blender, and in our case, the location of each tile in the UV space doesn't actually matter; we made a new UV coordinates layer and kept the old one just in case the model should be exported to a different 3D application.

To move the islands exactly by the correct number of pixels, we enabled the **Normalized** item in the **Display** subpanel of the image editor *N* sidepanel to display the UV coordinates from **0.0** to **1.0**, rather than in pixels. Anyway, without the **Normalized** item enabled, it would have been enough to move the islands by **3072** pixels, that is, the width (or/and height) in pixels of the assigned blank image.

There's more…

As with any other software, Blender is not free from bugs; particularly, the baking section seems to have an annoying bug, which is very difficult to fix because it happens very rarely and randomly, so that it cannot easily be reproduced and consequently submitted to the Blender bug tracker (https://developer.blender.org/maniphest/project/2/type/Bug/).

It's difficult to understand the reason for this, but sometimes the software refuses to do the baking, claiming that *No objects or images (are) found to bake to* (the message appears on the top right main header and in the **Terminal** panel as well); in our case, this seems to happen when you switch the *active for rendering* UV coordinates layers.

If this happens, one thing you can do is check that all the images assigned in the **UV/Image Editor** windows to the different materials under one UV layer, also appear correctly assigned under the other UV layer (it shouldn't make a difference, but who knows), eventually re-assigning them one at a time.

If the baking still fails, there is a simple workaround; switch to the **UVMap** coordinates layer instead, rather than the **UVMap_temp** one, and just move the islands to the default **U0V0** space and bake them *one at a time*. To do this, first bake the islands of the **U0V0** tile space and save the image, then move the islands of the **U1V0** tile space to the **U0V0** tile space, bake and save as a different image, and so on with the islands of all the tiles.

Painting to fix the seams and to modify the baked scales image maps

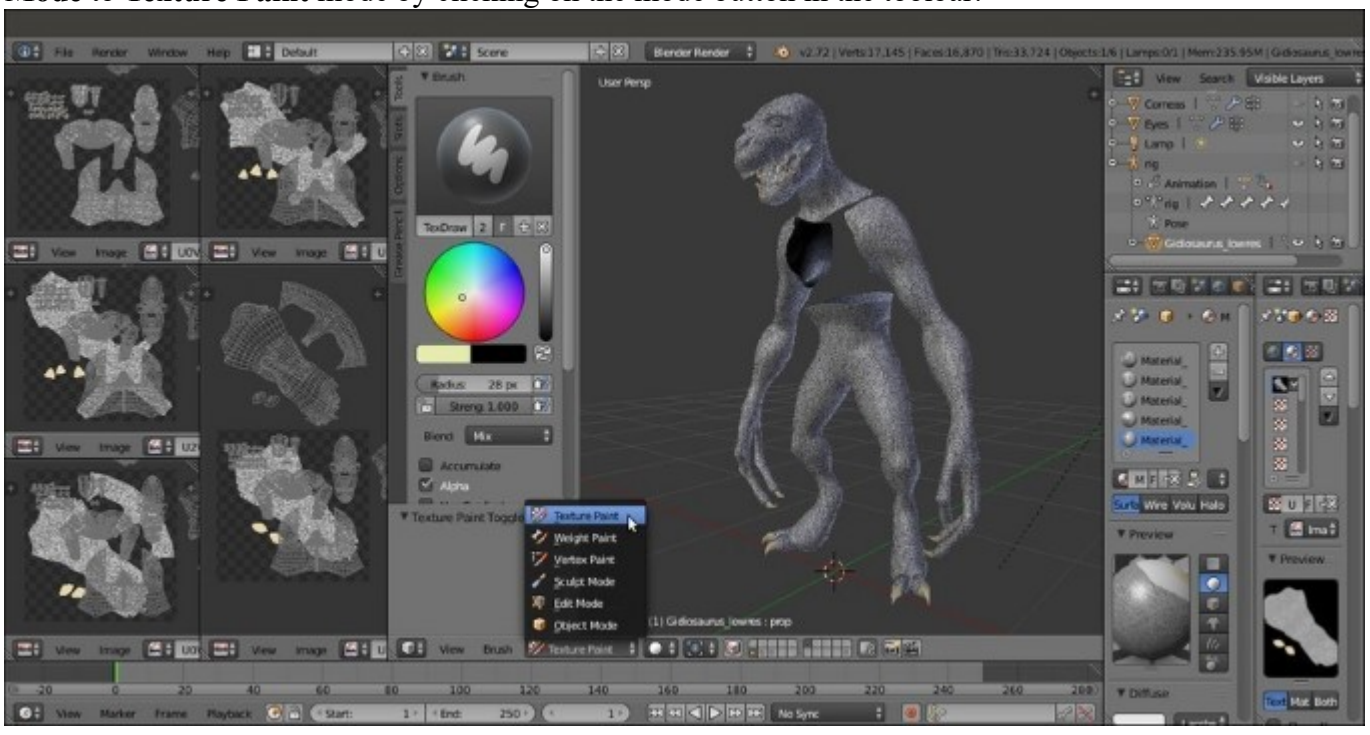
In the previous recipe, we baked the *randomly* tiled scales image map on the **5** tiles of the **UVMap** coordinates layer. This was necessary for the next step to be able to fix seams and modify certain areas of the baked scales images through the **Paint Tool**.

In order to paint in real time on both the model and on all the images assigned to the **5** different UV tiles, and at the same time, once again we need to first prepare the file. To be more precise, we must assign **5** different materials to the mesh, one for each tile and each one with the appropriate image texture.

Getting ready

Start Blender and re-open the `Gidiosaurus_baking_scales_01.blend` file; save the file as `Gidiosaurus_baking_scales_02.blend`.

1. Minimize the image editor windows on the left as much as possible, then also minimize the **Outliner**, the **Material**, and the **Texture** windows on the right to make room for the 3D viewport.
2. Click on the **Viewport** Shading button in the 3D viewport toolbar and switch the shading mode from **Material** to **Solid**, then press the *T* key to call the **Tool Shelf**. Then switch from **Object Mode** to **Texture Paint** mode by clicking on the mode button in the toolbar:



Switching to Texture Paint mode

3. Click on the **Options** tab inside the **Tool Shelf** and under the **Project Paint** subpanel, enable the **Occlude**, **Null**, and **Normal** items:

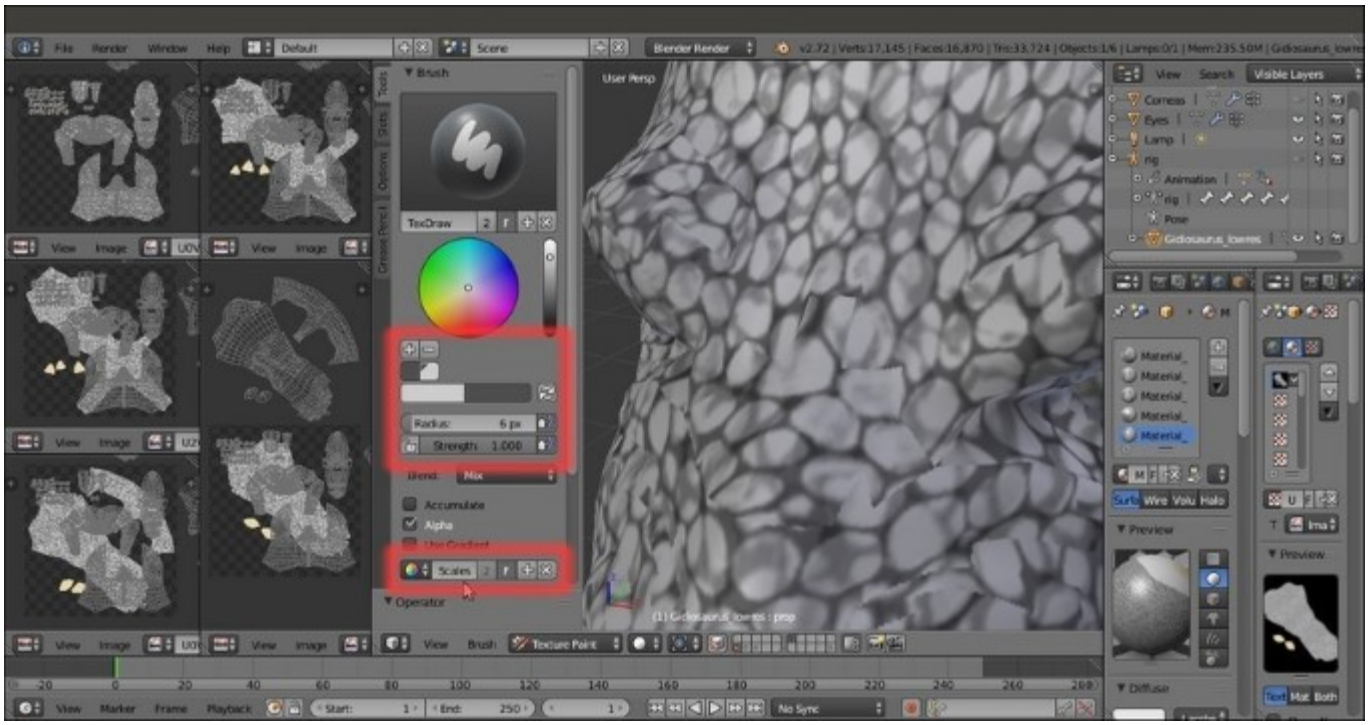
Items to be enabled under the Options tab

4. Click on the **Tools** tab inside the **Tool Shelf** to go back to the **Brush** subpanel options.

How to do it…

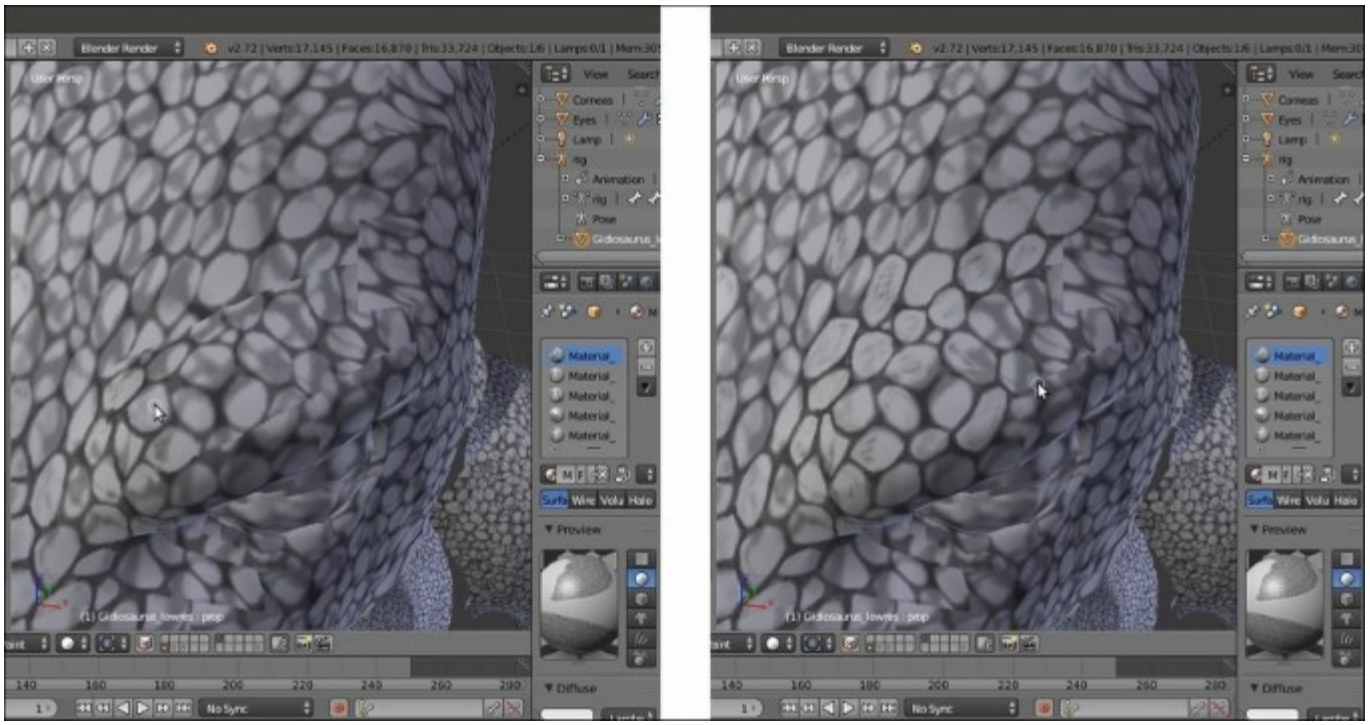
At this point, we are ready to start to paint both directly on the model in the 3D viewport or also in the **UV/Image Editor** windows (just for all eventualities, I suggest you make a copy of the baked scales images before starting to paint):

1. Zoom in on a part of the **Gidiosaurus** object in the 3D viewport, for example, the **head**.
2. Put the **mouse cursor** on a bright value of the scales image on the model and press the *S* key to sample it, then go near the color selector in the **Brush** subpanel under the **Tool Shelf** to the left and click on the *Toggle foreground and background brush colors* button (the one with the two opposing arrows) to switch the active color. Otherwise, simply press the *X* key, put the mouse cursor on a dark area, and press *S* again to sample it as the opposite color.
3. Scroll down and click on the **New** button (*Add new palette*) at the bottom of the **Brush** subpanel; + and – icon buttons will have appeared above the color switcher. Click on the + icon button to add the active color to the palette, then switch the colors and click on the + button again to add a new color to the palette.
4. Set the brush's **Radius** value to **6** and **Strength** value to **1.000**, and if you are using a **graphic tablet**, be sure to have the **2** *tablet pressure sensitivity* buttons at the sides of the previous items enabled. Change the default **Palette** name in **Scales**.



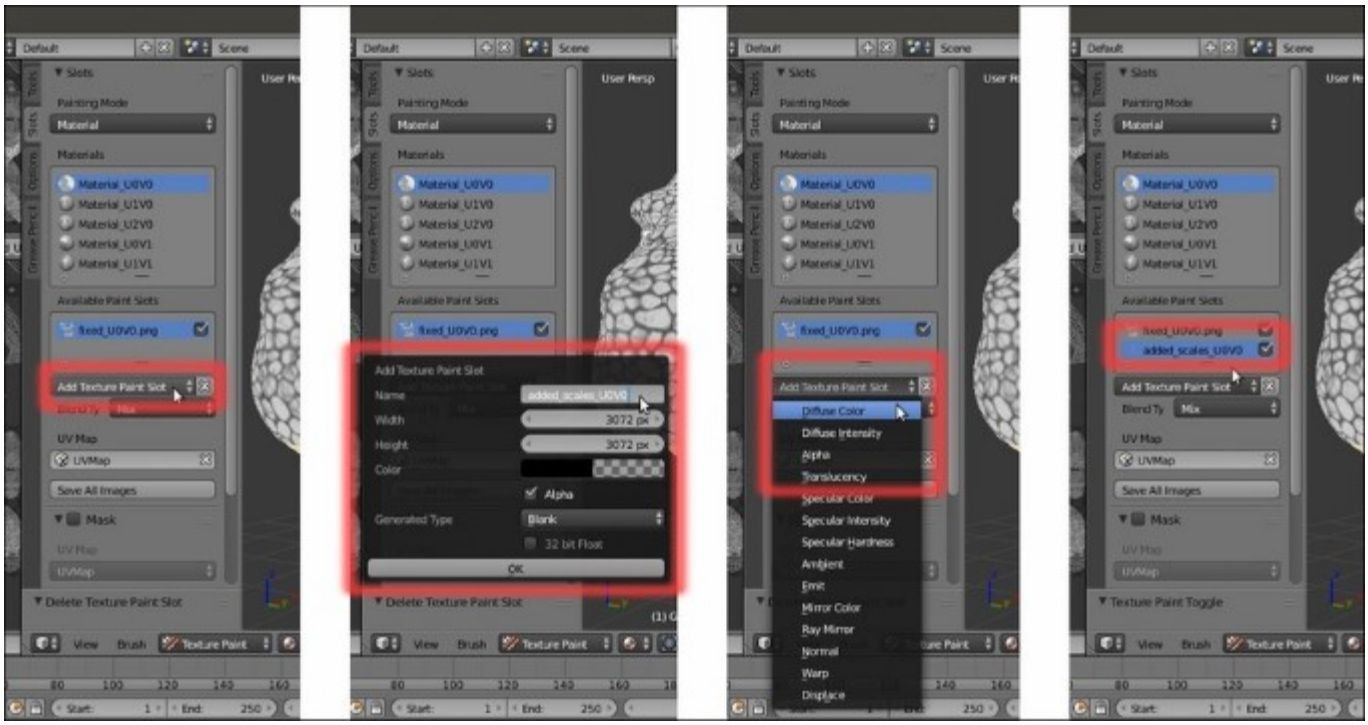
Setting a palette and the brush strength and radius

5. Simply start to paint on the model, re-drawing the scales where there are seams by flipping the color as you need to, by pressing the *X* key and painting the dark folds and the light scales. The two colors we sampled, used with the pressure sensitivity enabled, should be enough, but feel free to sample new ones and add it to the palette as you go on:



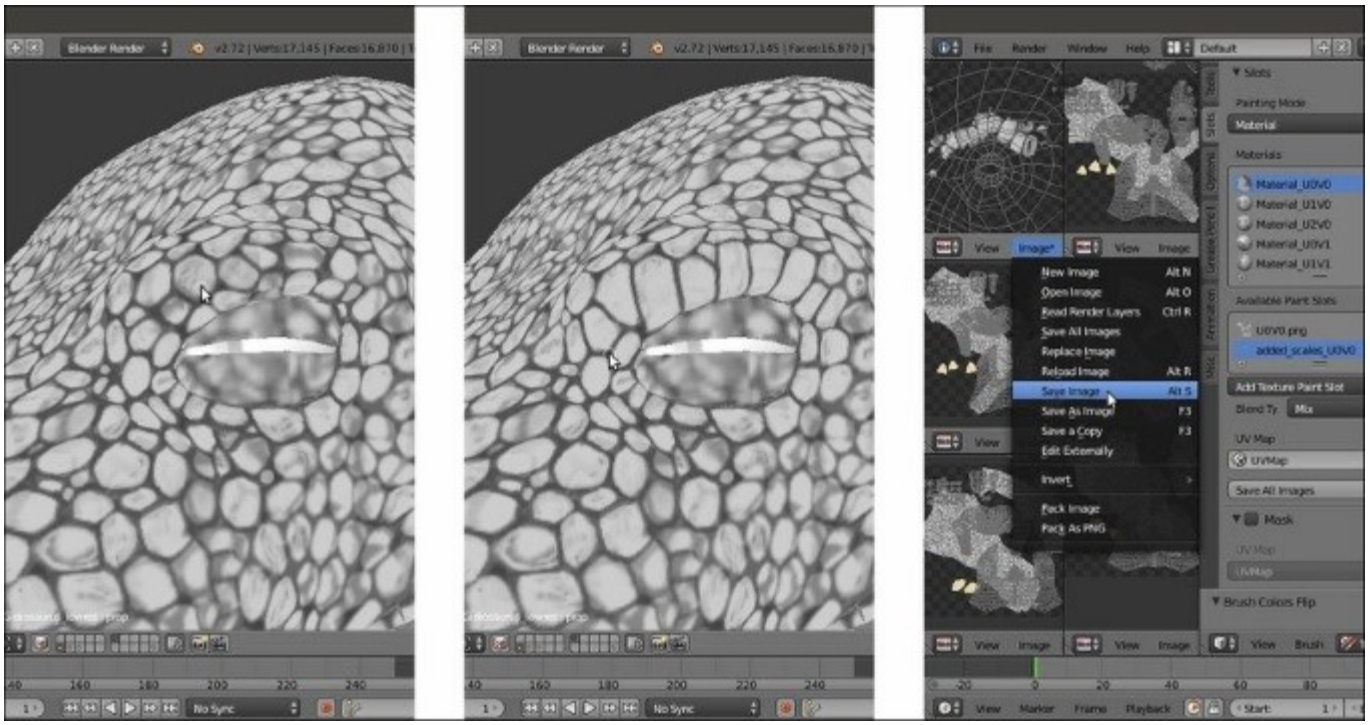
Painting on the model to fix the image texture seams

6. From time to time, click on the **Slots** tab in the **Tool Shelf** and click on the **Save All Images** button.
7. Do most of the fixing you can, across the entire **Gidiosaurus** body, keeping in mind that it's quite useless to spend time fixing seams in areas that will later be covered by the **Armor** (for example, the top of the head).
8. When you are done, *be sure to have saved all the edited images* as explained in step 6 (but you can also do it one image at a time through the **Image** | **Save Image** item in each editor window toolbar or by pressing the *Alt* + *S* shortcut).
9. Now, be sure to have the `Material_U0V0` slot selected as active in the **Material** window and go to the **Texture** window; left-click on the empty slot right under the **U0V0** one and then click on the **New** button to add a new image texture.
10. Scroll down to the **Image** subpanel and click on the **New** button. In the **New Image** pop-up panel, write `added_scales_U0V0` in the **Name** slot, then set the **Width** and **Height** values to **3072** and the **Alpha** (**A**) value to **0.000** (basically add a new blank and background transparent image as shown in step 5 of the *How to do it…* section of the *Preparing the model to use the UDIM UV tiles* recipe):



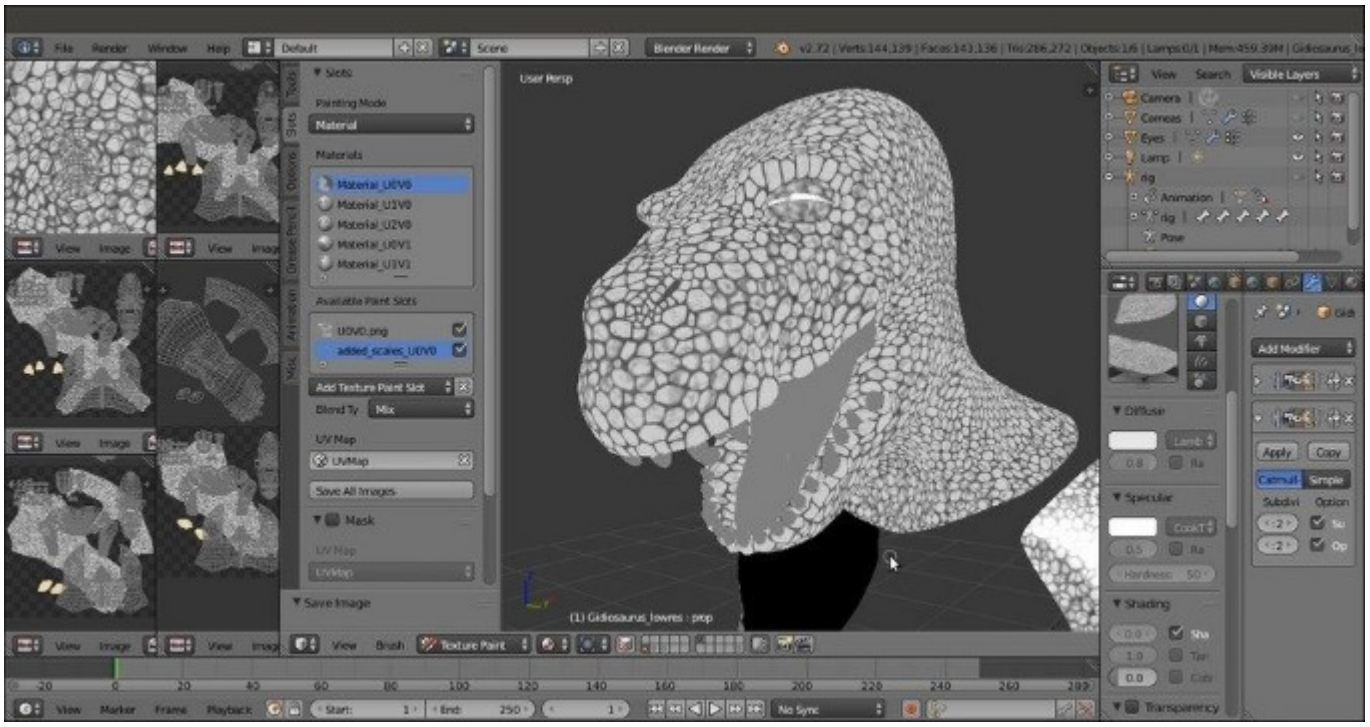
Adding a new texture paint slot layer

11. Go to the **Shading** subpanel of the **Material** window and enable the **Shadeless** item for the `Material_U0V0` slot. Then go to the 3D viewport toolbar and change **Viewport Shading** from **Solid** to **Material**.
12. If not selected already, click on the **Slots** tab in the **Tool Shelf** panel and select the `added_scales_U0V0` item that appears under the `U0V0.png` once inside the **Available Paint Slots** window.
13. Directly in the 3D view, start to paint new scales on the **eyebrows** to replace the randomly distributed ones; use the light color of the palette to conceal the old scales on the first layer, and the dark color to draw the new ones. Try to build a consistent pattern, also using photos of real reptiles as references. When you are done, save the image in the `texture_making` folder:



Painting new scales on the eyebrow

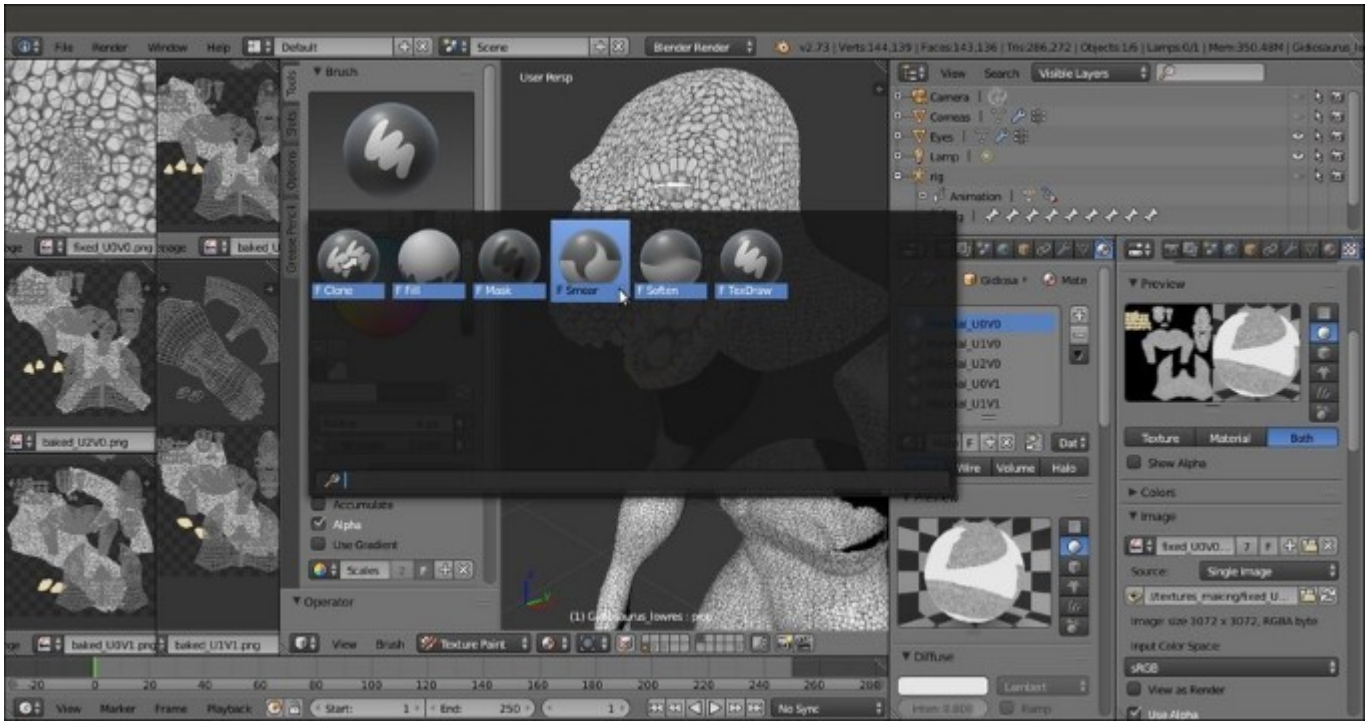
14. Draw new scales around the **nostrils** and the **rim** of the **mouth**:



Painting new scales also around the nostrils and at the rim of the mouth

The Blender **Paint Tool** also has other handy brushes; a particularly useful one is the **Smear** brush, which smudges the borders or any blotch in the scales.

To access the brushes, just click on the big window in the **Brush** subpanel under the **Tool Shelf** and click on the chosen one to select it:



The brushes selection pop-up menu

Remember to always save the painted images before closing Blender, otherwise you'll lose them.

Also remember that if you have more than one texture layer to save, it's necessary to load each one of them into an **UV/Image Editor** window. This is actually very quick and easy, just select each layer in the **Available Paint Slots** window (in the **Slots** subpanel under the **Slots** tab) to make it appear in the image editor window and save it through the **Image** | **Save As Image** menu in the editor toolbar.

Once saved the first time, it's possible to re-save all of them in one single click, through the **Save All Images** items, both in the tab, as well as in the toolbar menu.

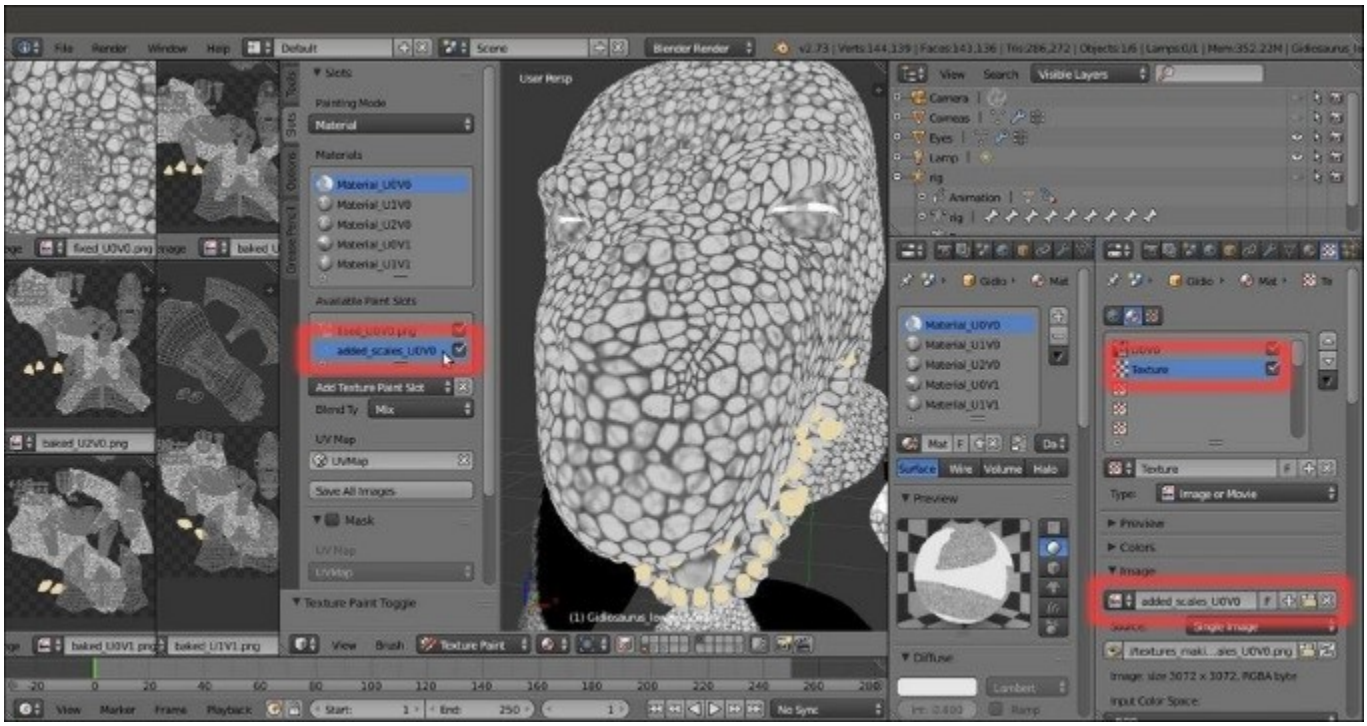
15. Save the file as `Gidiosaurus_painting_scales_fix.blend`.

Note

In the textures and blend files provided with this cookbook, you'll find textures fixed only in the **head** area; I leave the task of finishing the fixing and drawing of new scales on the rest of the body (for example, bigger scales can be added to the upper side of the hand **fingers**, **feet**, **shoulders**, and so on) to you.

How it works…

The new Blender **2.73** texture paint layering feature works simply by adding a new texture slot to the material, and automatically setting it as required, by the type of texture you selected in the **Add Texture Paint Slot**; in fact, by going to the **Texture** window, it is possible to see the added new texture slot and also, if necessary, to change the settings:



The added texture paint slot also appearing as a texture slot in the Texture window

Nonetheless, it is a great addition to Blender that can simplify the texture painting workflow a lot.

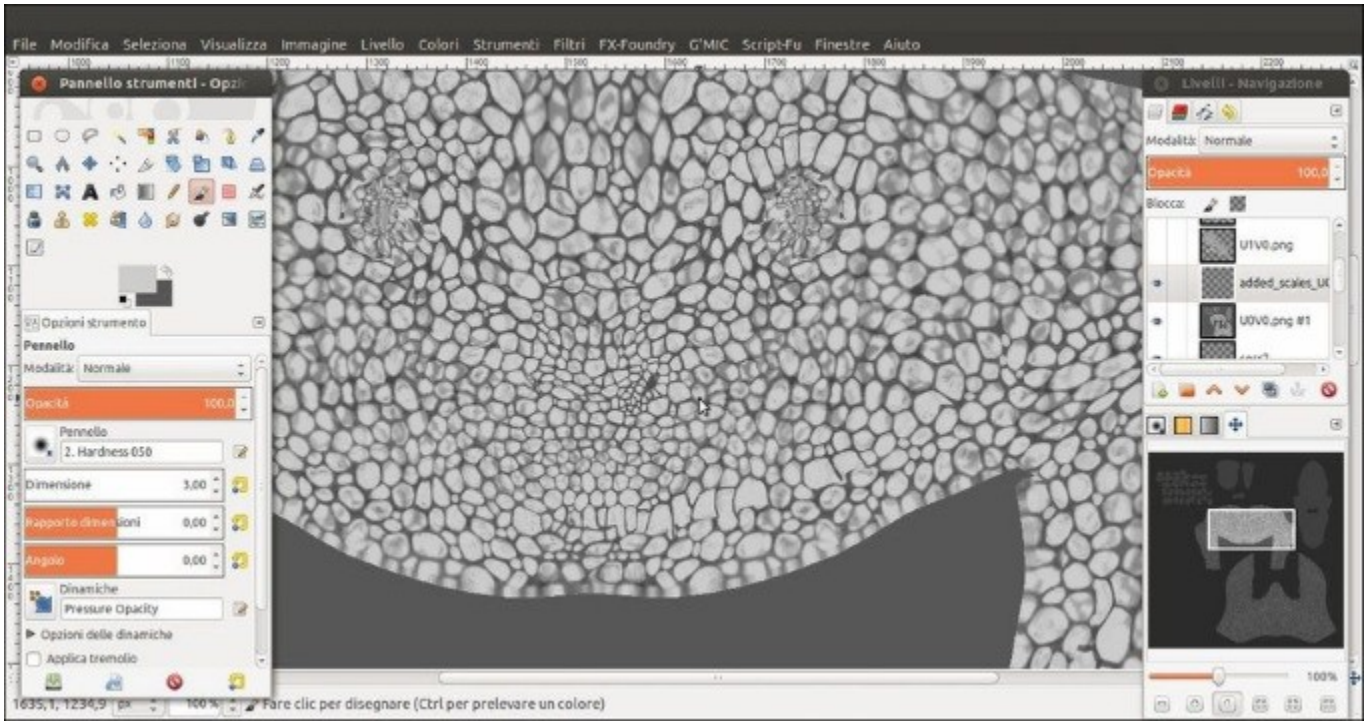
There's more…

To bake the added scales as a single image with the background scales images, perform the following steps:

1. Enter **Edit Mode** and click on the **Select** button for `Material_U0V0` to select the vertices assigned to that tile.

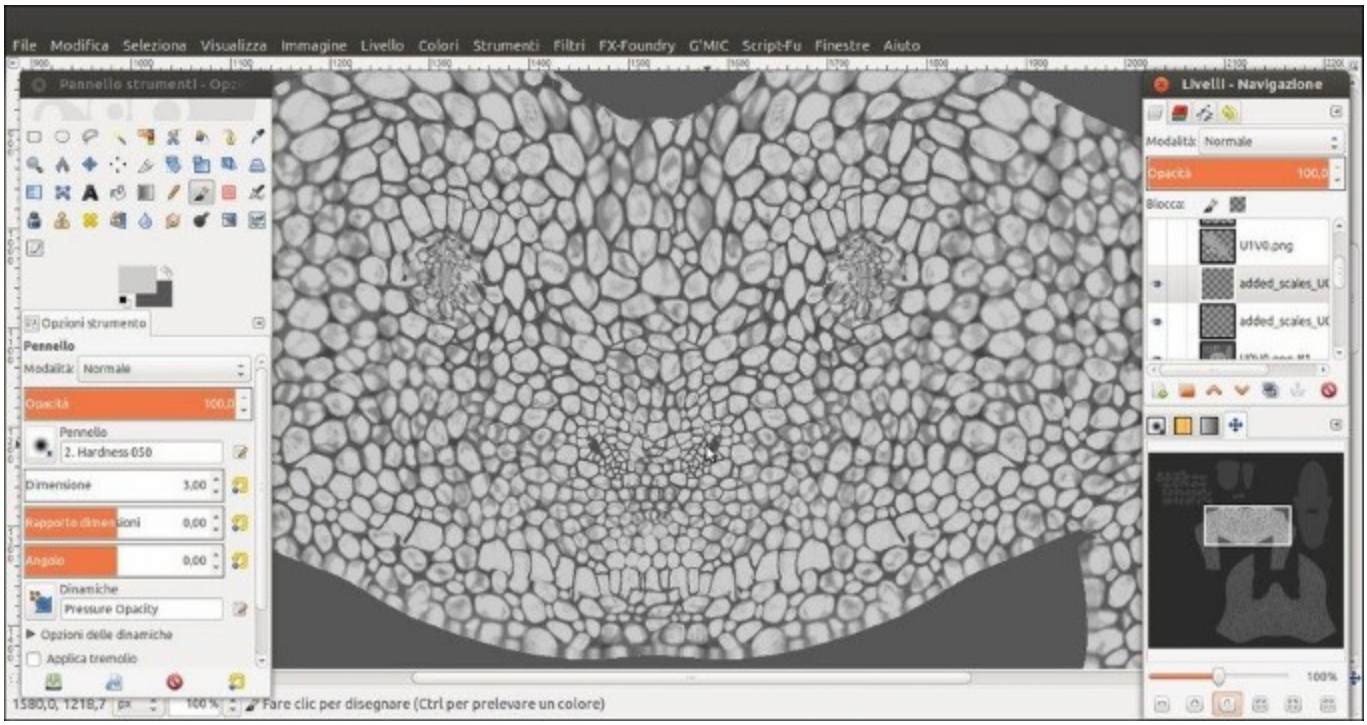
2. Go to the top left **UV/Image Editor** window and press *Alt* + *N* to call the **New Image** pop-up menu; add a new blank image of **3072** x **3072** pixels named `baked_scales_U0V0`, and save it inside the `textures_making` folder.
3. Go out of **Edit Mode** and if it's the case, click on the double arrows icon to the left side of the image name datablock to re-assign the just-created `Untitled` image.
4. Repeat for the other four materials, naming the new images according to the tile and saving them inside the `texture_making` folder as well.
5. Go to the **UV Maps** subpanel under the **Object Data** window to make the **UVMap_temp** coordinates layer active.
6. Go to the **Render** window, and be sure that the **Bake Mode** under the **Bake** subpanel is set to **Textures**, then click on the **Bake** button.
7. After the baking is done, click on the **Image** item in the toolbar of one of the image editors and select the **Save All Images** item.

Not necessarily everything has to be fixed by painting in Blender; for example, it would be enough to fix the scales on only the half of the **head**, export the painted image texture, and open it in **Gimp** (or any other 2D image editing software):



The scales "U0V0.png" image map and the "added_scales_U0V0.png" layer in Gimp

Then, by duplicating the layer and mirroring it, plus a little bit of painting to adjust the seams, it's really simple to obtain the missing half of the new scales texture:



The duplicated and mirrored "added_scales_U0V0.png" layer in Gimp

Of course, if you want to fix every side and part by hand-painting on the model in Blender to obtain a more natural looking result, no one is going to stop you!

See also

- http://wiki.blender.org/index.php/Doc:2.6/Manual/Textures/Painting
- http://wiki.blender.org/index.php/Dev:Ref/Release_Notes/2.72/Painting
- http://docs.gimp.org/en/gimp-tutorial-quickie-flip.html

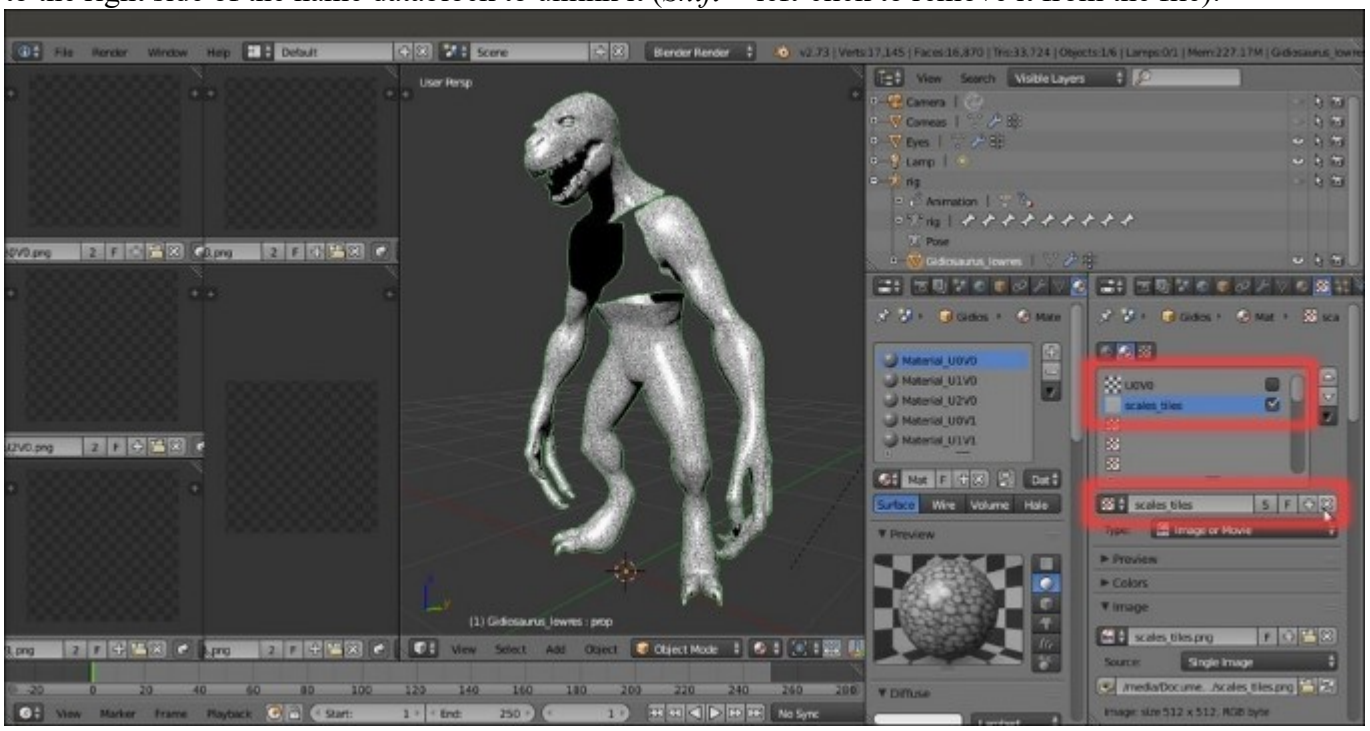
Painting the color maps in Blender Internal

After having obtained the scales textures, we must now paint the diffuse color of the **Gidiosaurus** character.

Getting ready

Start Blender and open the `Gidiosaurus_baking_scales.blend` file:

1. Go to the main **Properties** panel and be sure to have the **UVMap** coordinates layer selected and active, in the **UV Maps** subpanel under the **Object Data** window.
2. Go to the **Material** window and select the `Material_U0V0` slot, then go to the **Texture** window and be sure to have the **scales_tiles** texture slot selected; left-click on the **X** icon button to the right side of the name datablock to unlink it (*Shift* + left-click to remove it from the file):



Unlinking the scales_tiles texture slot datablock

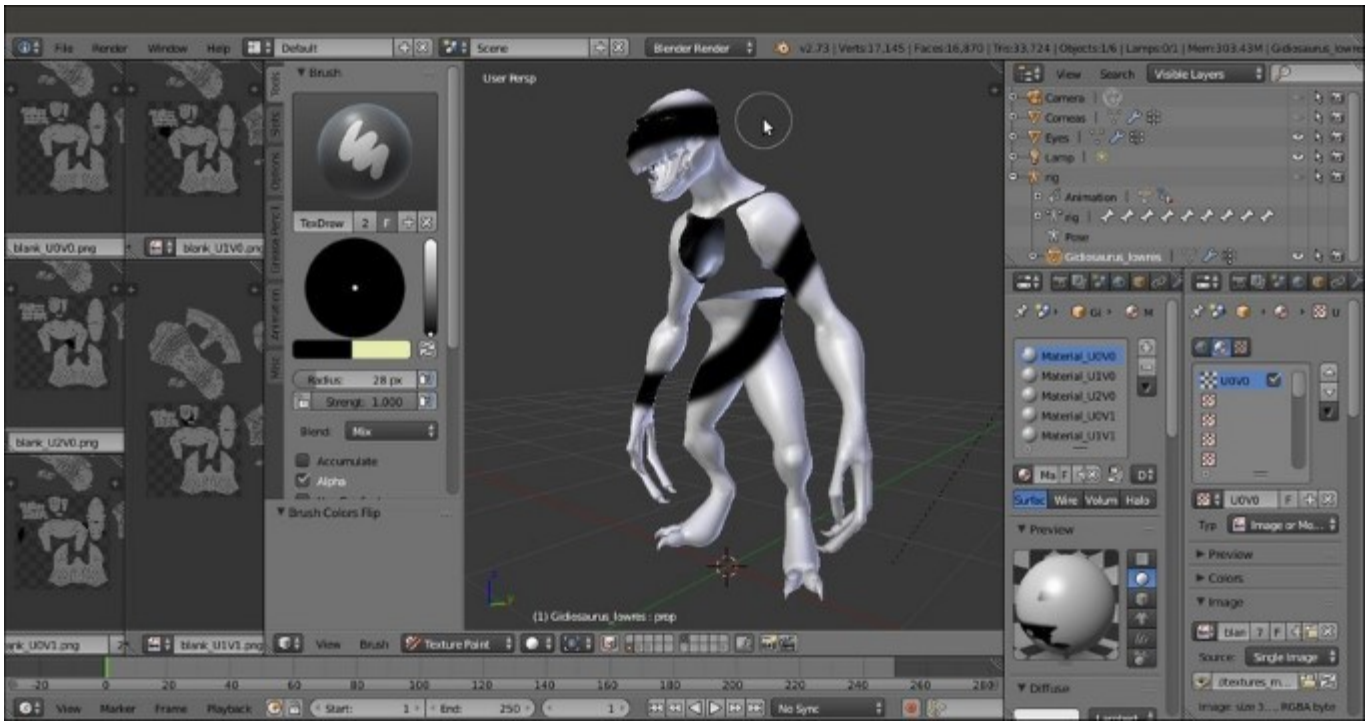
3. Select and enable (by clicking on the checkbox to the right) the **U0V0** texture slot. Repeat the procedure at steps 2 and 3 for all **5** materials.

   I'll take for granted that you have preserved your blank images and that they are the ones loaded into the current file; otherwise, substitute them with new blank images (you have to do this both in the **Texture** window as well as in the **UV/Image Editor** windows) by following steps 5 and 7 of the *Preparing the model to use the UDIM UV tiles* recipe in this chapter.
4. Minimize the image editor windows to the left and the **Material** and **Texture** panels to the right as much as possible, then click on the mode button (*Sets the object interaction mode*) on the

toolbar to go into **Texture Paint** mode. Press *T* with the mouse pointer over the 3D view to call the **Tool Shelf** and click on the **Viewport Shading** button on the toolbar to switch to **Solid** mode:

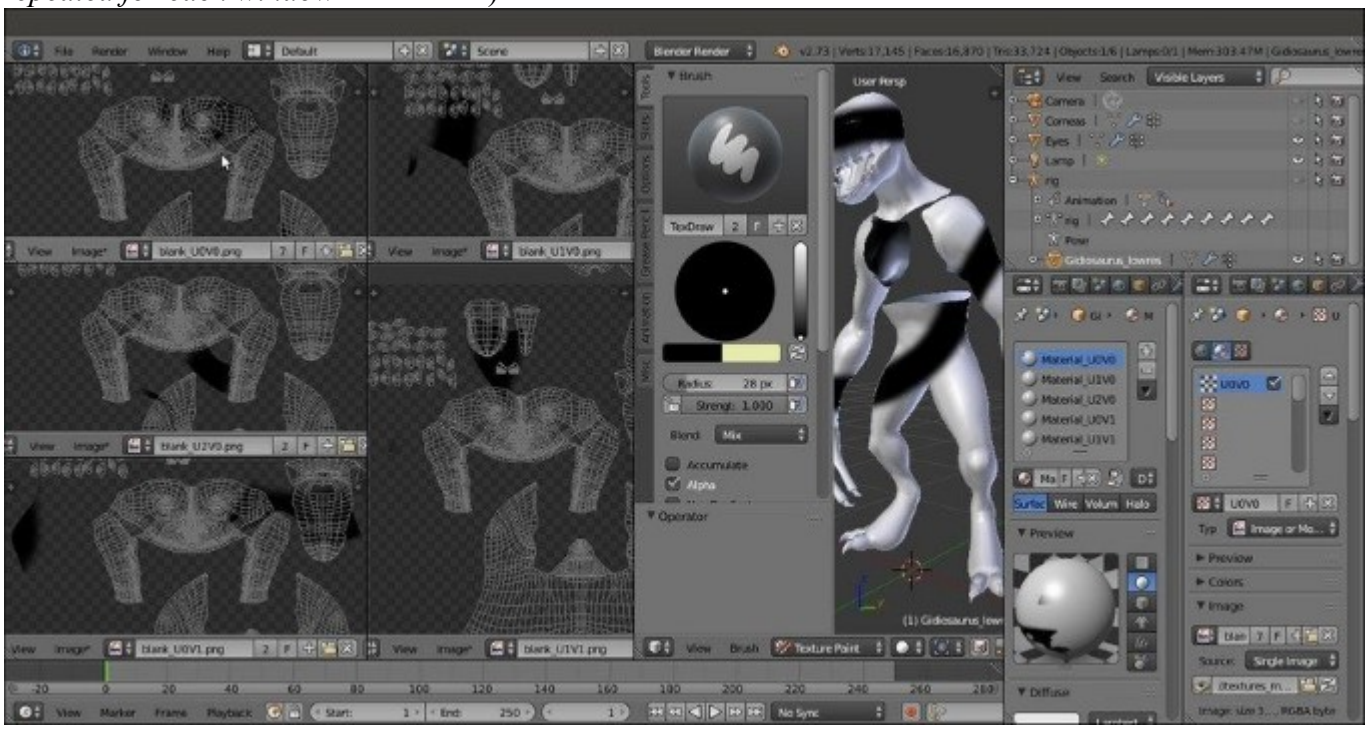
Switching to Solid viewport shading mode

5. Just to verify that everything works correctly, select a black color (or any other one) in the color wheel under the **Brush** subpanel and trace a continuous stroke in the 3D viewport that envelopes all the **Gidiosaurus** body parts:



Testing that everything works correctly with a single stroke on the mesh

By enlarging the **UV/Image Editor** windows, you will see that after the stroke, each image has been updated with the corresponding painting (pay no attention to the over-imposed and *repeated for each window* UV islands):



The test stroke correctly visible inside each one of the UV/Image Editor windows

6. Rearrange the image editor windows, then press *Ctrl* + *Z* to undo the stroke and save the file as `Gidiosaurus_painting_BI.blend`.

How to do it…

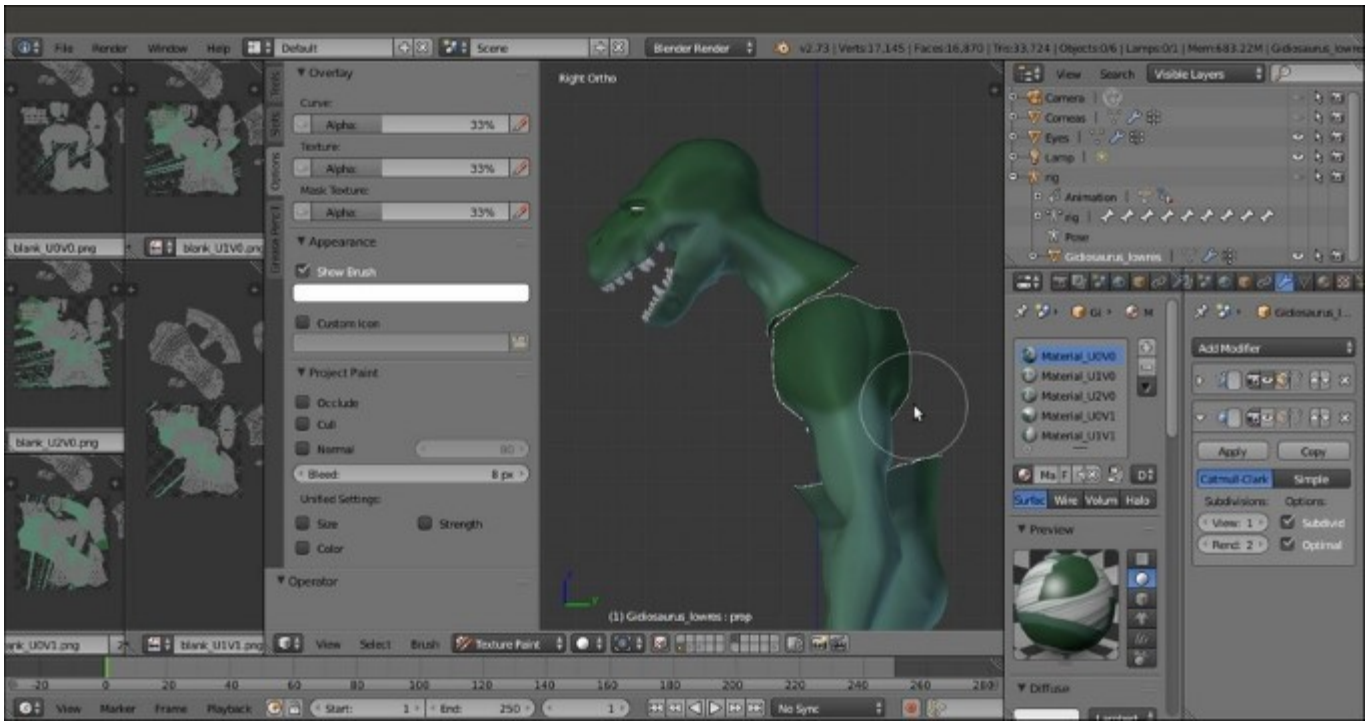
We are now ready to paint the basic color for the **Gidiosaurus** character. But first, one more little thing:

1. Select the **Gidiosaurus** object and enter **Edit Mode**; select the vertices of all the **teeth** and all the **talons**, then assign a new vertex group renamed **enamel**; press *Ctrl* + *I* to invert the selection and go out of **Edit Mode**.
2. Now, start by selecting a medium dark greenish color (**R 0.349**, **G 0.510**, **B 0.435**) in the color wheel under the **Brush** subpanel. Scroll down and go to the bottom of the subpanel and click on the **New** button to create a new palette, then click on the **+** icon button (**Add Swatch**) above the **Foreground Color** slot (the left one) to add the color to the palette. Rename the default **Palette** name as `Gidiosaurus_colors`.
3. In the 3D viewport toolbar, click on the *Face selection masking for painting* button to enable the masking tool; now it's possible to paint only on the part of the mesh that has selected vertices in **Edit Mode**, so in this case we want to paint only on the skin, leaving the teeth and the talons blank.
4. Click on the **Brush** window and select the **Fill** brush; if necessary, click on the greenish color box added to the palette (called **Swatch**) to load it as the **foreground color** (note that with the **Fill** brush, the background color swatch disappears and the foreground color swatch becomes the only one available). Set the **Strength** value to **1.000** and click on the **Gidiosaurus** object in the 3D viewport.

   After a while, all the *paintable* parts of the mesh are filled with the active color (and therefore also the textures in the **UV/Image Editor** windows; there are weird straight lines, probably a bug, but not a problem in this case because they don't show on the mesh and we can fill in the texture's backgrounds later anyway). If any tiny part is left out, just click on one of the parts again to fill it:

The Fill brush and the Mask button in the 3D view toolbar

5. Now select the **TexDraw** brush and a darker and more saturated green color (**R 0.129**, **G 0.275**, **B 0.125**) as the foreground color, and add it to the palette.
6. Under the **Tool Shelf**, go to the **Options** tab and be sure to have the **Occlude**, **Cull** and **Normal** items disabled still; then go into the **Ortho Side** view.
7. Now it's time to use a tablet, if you have one; enable both the tablet pressure sensitivity buttons to the side of the **Radius** and **Strength** items and start to shade the **Gidiosaurus** body on the **head**, **shoulders**, **arms**, and **legs**:

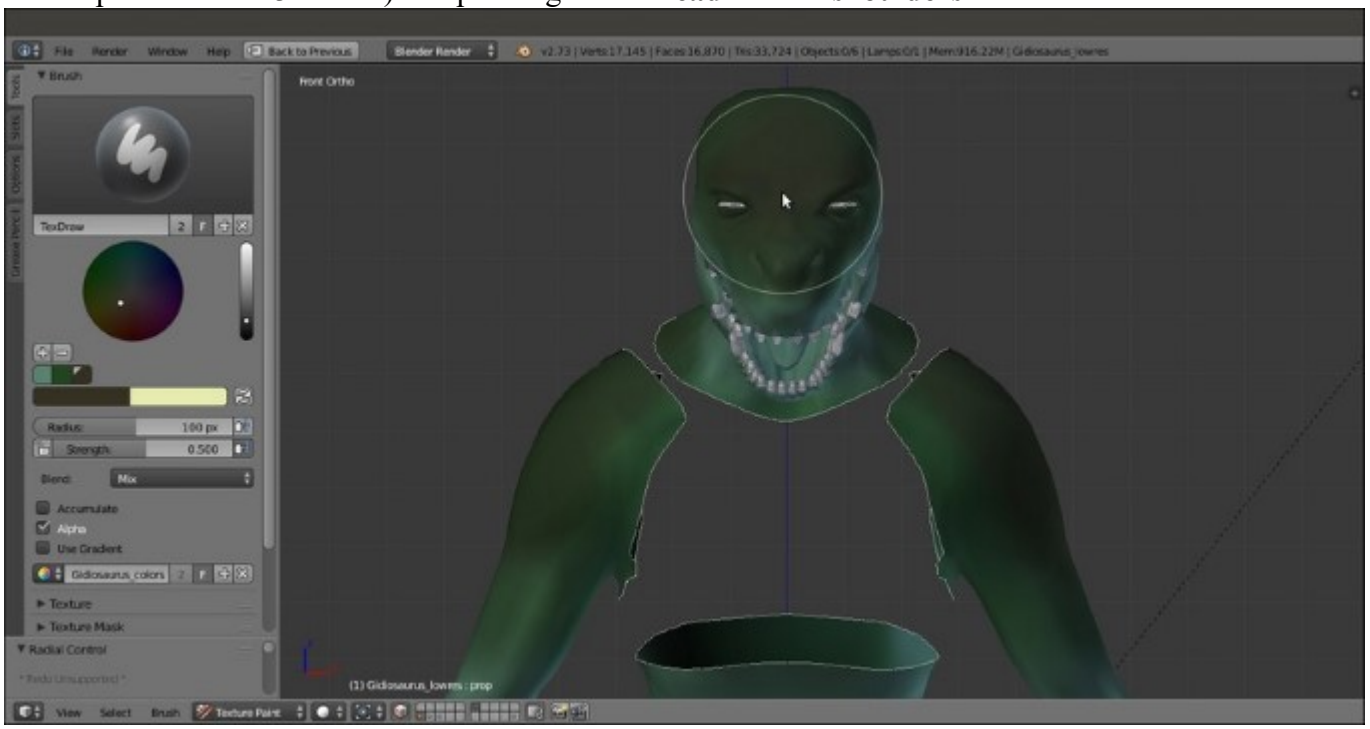


Painting colors on the model

8. Select a brownish color (**R 0.204**, **G 0.188**, **B 0.133**) and add it to the palette; disable the tablet pressure sensitivity for **Radius** and lower the **Strength** to **0.500**. Go into the **Front** view, maximize the 3D viewport (mouse pointer in the window and press *Ctrl* + Up Arrow), and keep on adding shades to the **hands**, **feet**, and **legs**:

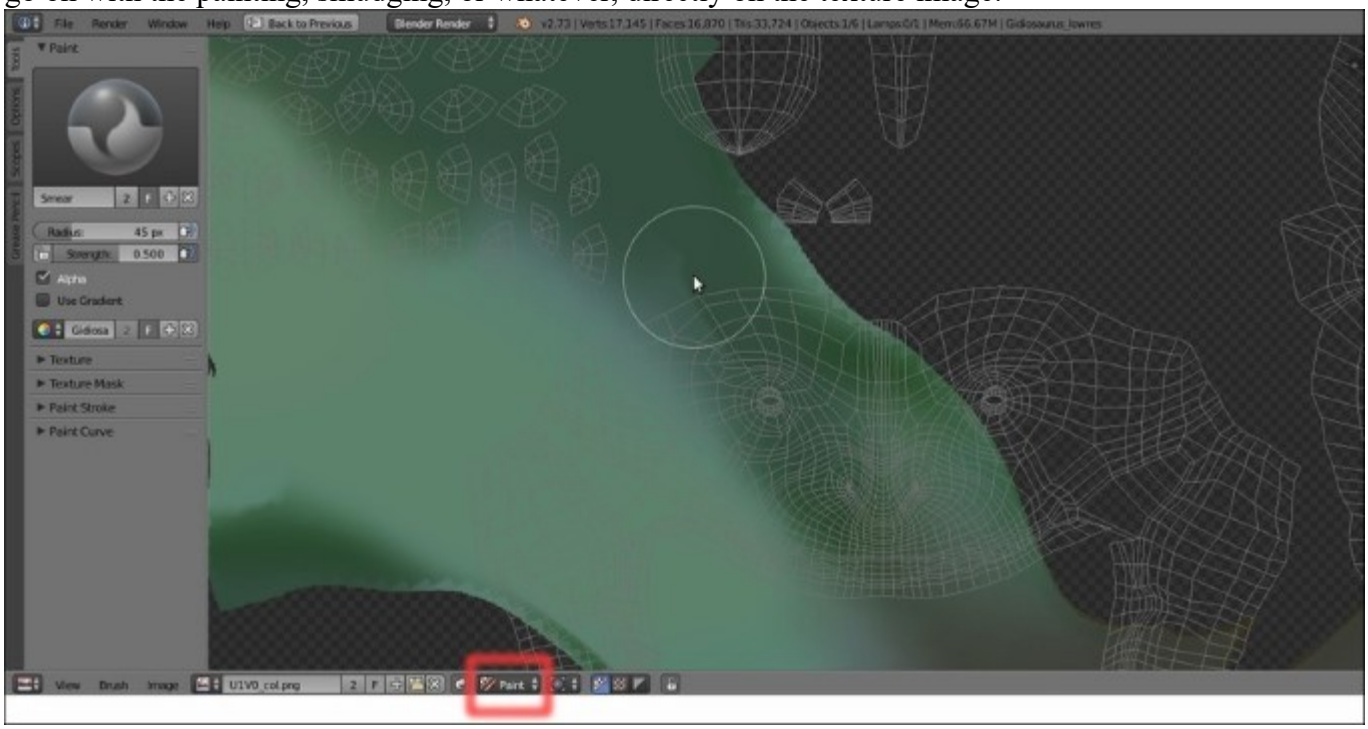
Shading the character's limbs with darker hues

9. Increase the **Radius** value to **100** (using the slider or by pressing the *F* key and moving the mouse pointer in the 3D view) and painting on the **head** and the **shoulders**:



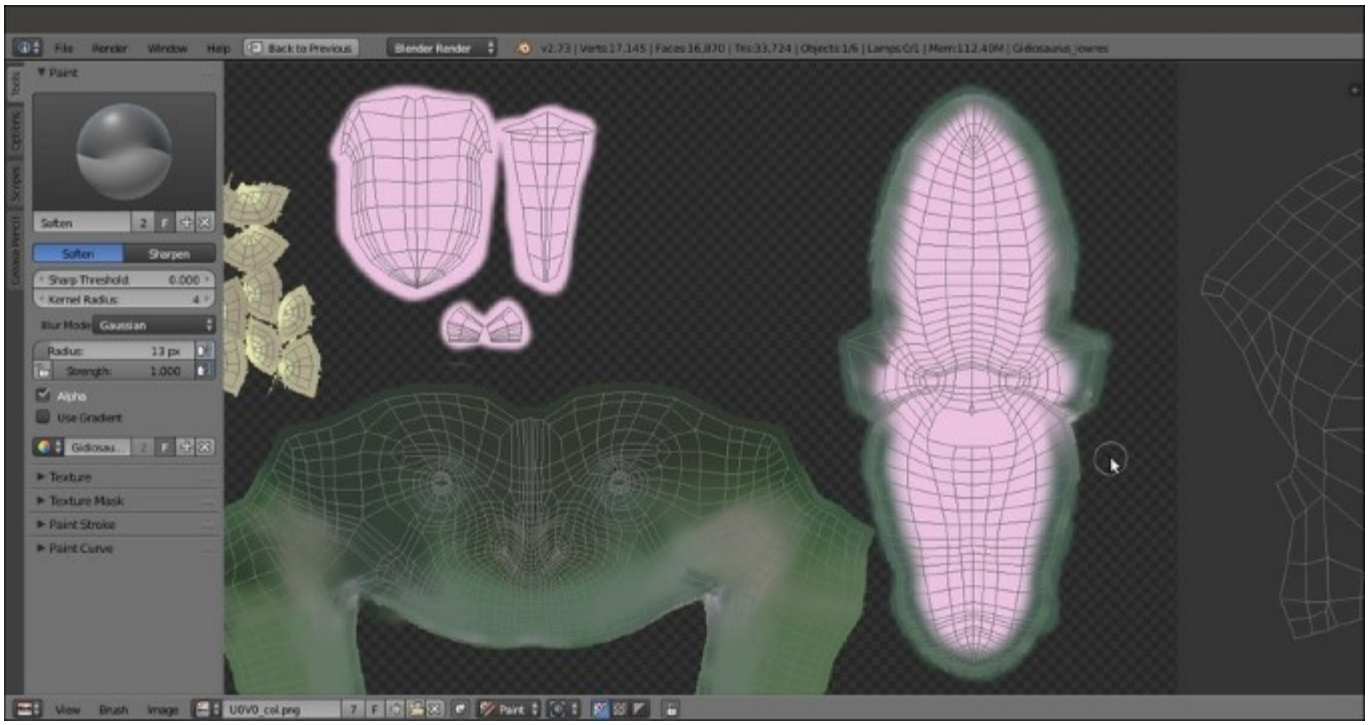
Shading the head and shoulders

10. If, for any reason, it becomes difficult to paint directly on the model through the 3D viewport, you can maximize the involved **UV/Image Editor** window (mouse pointer in the window and press *Ctrl* + Up Arrow), click on the **Mode** button (*Editing context being displayed*) in the toolbar (which by default shows **View**), and switch it to **Paint**. Press *T* to call the **Tool Shelf** and go on with the painting, smudging, or whatever, directly on the texture image:



Painting directly on the image map in the UV/Image Editor window

For example, this is the way I painted the inside of the **mouth** and the **tongue**, then went back to the 3D viewport to smudge and soften the joining line of the pink tissue with the green skin at the borders:



Working on the inside of the mouth in the UV/Image Editor window

I'm not going to show you every step in this process, but basically this is the procedure I used to paint the diffuse coloration for the character. I also added lighter and warmer colors for the face's areas close to the **mouth** and more bluish and colder hues to de-saturate the brownish **hands** and **feet**, and then inverting the **enamel** vertex group to paint in **Edit Mode**, through the use of the **Mask** tool, the **teeth** and **talons** as well:

The completed Gidiosaurus diffuse color texturing

To have a look at the final **Gidiosaurus_colors** palette, open the `Gidiosaurus_painting_BI_02.blend` file provided.

11. When you are done, go to the top left **UV/Image Editor** window, **blank_U0V0**, and click on the **Image** item in the toolbar. Save the image texture in the `textures_making` folder as `U0V0_col.png`, and do the same with the other **4** image textures.
12. To keep the palette, save the file.

How it works…

There is not that much to explain about this recipe, except I just want to highlight the fact that we disabled the **Occlude**, **Cull**, and **Normal** items in the **Options** tab under the **Tool Shelf**. This is so we were able to paint (from the **Side** view) on both sides of the model at the same time; in fact, with these settings disabled, the mesh is *not occluding itself*. It seems that all three items must be disabled for this to work.

Instead, to smear and/or soften the texture on some parts, for example, the inside of the **mouth**, we had to re-enable them, in order to prevent our mouth-painting from accidentally overwriting our skin-painting.

Remember, the **Occlude**, **Cull**, and **Normal** items should always be enabled if you want to paint only on the model's surface right under your brush. You can disable them to paint on the front/outer and the back/inside of the mesh at the same time.

See also

- http://www.cgmasters.net/free-tutorials/layered-painting-in-blender-2-72/
- http://blender.stackexchange.com/tags/texture-painting

Painting the color maps in Cycles

There are no differences in painting in **Blender Internal** or in **Cycles**, because the **Paint Tool** is exactly the same; the only difference is in the preparation of the materials.

In this recipe, we are not going to repeat the procedure already explained in the previous one; we'll just set up the file for the painting and test whether it's possible to paint in real time on all **5** image textures at the same time, as it is in **Blender Internal** (*spoiler*: it is).

Getting ready

Let's start with the `Gidiosaurus_painting_BI.blend` file; in that file, we already have the **UV/Image Editor** windows set and the **5** materials assigned to the **5** different **UDIM** tiles and parts of the mesh.

In case you want to start with a brand new file, here you need to repeat the steps of the *Preparing the model to use the UDIM UV tiles* recipe in this chapter. Then, continue with the following:

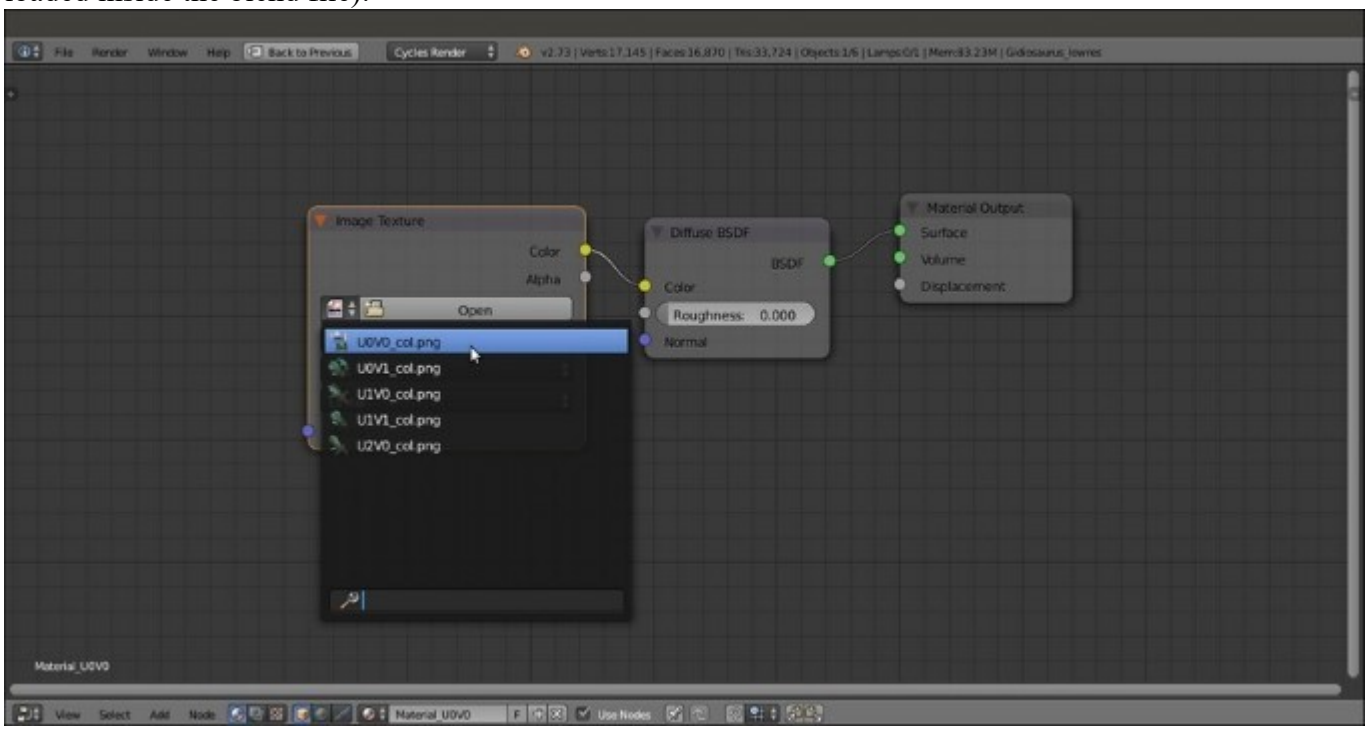
1. Be sure you're in **Object Mode**.
2. Go to the main top header and click on the *Engine to use for rendering* button; switch from **Blender Render** to **Cycles Render**.
3. Split the 3D view into two horizontal rows and change the top one into a **Node Editor** window; press the *N* key to get rid of the **Properties** sidepanel.
4. In the **Material** window, select the **Material_U0V0** slot; click on the **Use Nodes** button or select the **Use Nodes** checkbox in the **Node Editor** toolbar:

Enabling the nodes for the materials under Cycles

5. Put the mouse pointer inside the **Node Editor** window and add an **Image Texture** node (press the *Shift* + *A* keys and in the pop-up menu, go to the **Texture** item to select **Image Texture**). Connect its **Color** output to the **Color** input socket of the **Diffuse BSDF** node.

   At this point, if we haven't already painted the color textures in **Blender Internal**, we should load the `blank_U0V0.png` image in the **Image Texture** node and then do the same for the other **4** materials.

   Instead, because we already have the color textures, let's load them in the **Cycles** materials. To see whether everything works as it should, we'll paint on them through the 3D viewport.
6. Click on the double arrows to the side of the **Open** button in the **Image Texture** node and select the **U0V0_col.png** item from the pop-up menu (remember that the **5** color textures are already loaded inside the blend file):



Selecting one of the already loaded images in the Image Texture node for the materials under Cycles

7. Repeat step 4 to step 6 for the other **4** materials.

How to do it…

Now, the steps are really simple:

1. Go to the **Brush** subpanel and switch the foreground color with the background black color.
2. Trace in the 3D viewport, a continuous stroke enveloping all the **Gidiosaurus** body parts:

The single stroke test under Cycles

This is the proof that it works exactly as in **Blender Internal**.

3. Press *Ctrl* + *Z* to undo the stroke and save the file as `Gidiosaurus_painting_Cycles.blend`.

Chapter 11. Refining the Textures

In this chapter, we will cover the following recipes:

- Sculpting more details on the high resolution mesh
- Baking the normals of the sculpted mesh on the low resolution one
- The Armor textures
- Adding a dirty Vertex Colors layer and baking it to an image texture
- The Quick Edit tool

Introduction

In Chapter 10, *Creating the Textures*, we have prepared the **color** and **bump** texture images for the **Gidiosaurus** skin. In this chapter, we'll see the process for creating some additional (but equally important, nonetheless) textures, both for the character and the iron **Armor**.