Chapter 9. Animating the Character

In this chapter, we will cover the following recipes:

- Linking the character and making a proxy
- Creating a simple walk cycle for the character by assigning keys to the bones
- Tweaking the actions in Graph Editor
- Using the Non Linear Action Editor to mix different actions

Introduction

There are literally a *plethora* of tutorials and manuals about animation principles in general, and in Blender in particular, on the Web and in bookstores, so this one is going to be just a very *easy* chapter, mainly about the **technical aspects** of creating a simple animation with the rigged **Gidiosaurus** character, following the most usual pipeline commonly used in Blender (at least for the **open movies**).

Linking the character and making a proxy

The habit of linking assets from library files is the most useful and used, I would say, not only in a Blender based workflow, but also in the *industry*. A linked asset, in our case a creature character, can be placed and animated even if not already completed in all its parts, thus it allows a team to work almost *at the same time* on the different aspects. In our case, the **Gidiosaurus** is still missing **texturing** and **shaders**, but can already be placed *on stage* and animated anyway.

To link an asset in Blender and keep the possibility of animating it through a rig, we must make a proxy of the **rig** itself. A **proxy object** overrides the animation controls of a linked object in a non-destructive way, so that an animator can animate it locally to the `.blend` file the rigged character has been linked to. This way, the linked character object retains all its original information and is *only locally* altered by the proxy object scene.

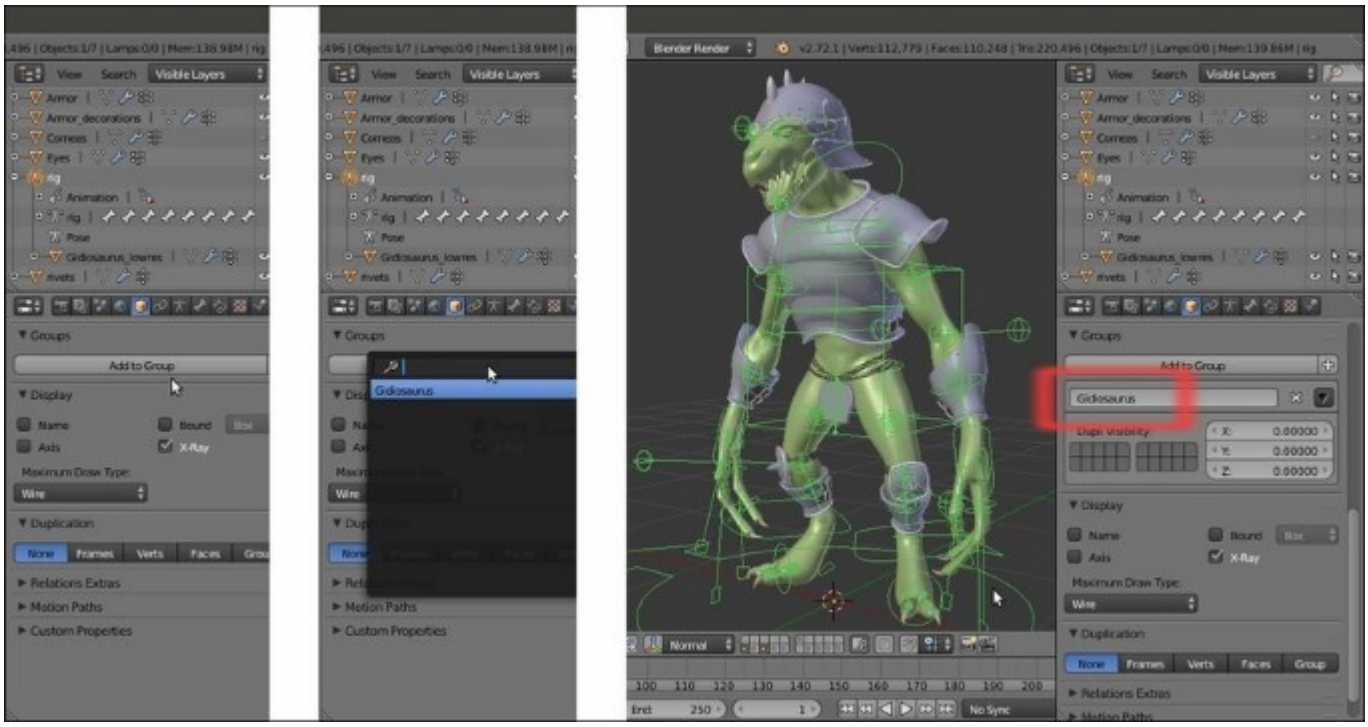
Getting ready

As the first thing, we must prepare the **library**, so open the `Gidiosaurus_final_detailing.blend` file:

1. Go to the **Outliner** and select the **Gidiosaurus_lowres** mesh, then also *Shift*-select the **Armor**, the **Armor_decorations**, the **rivets**, the **Eyes**, and the **Corneas** objects.
2. Press *Ctrl* + *G*, and all the selected objects are outlined in green to show that now they belong to a **group**, in this case, to the same group we created just now.
3. Go to the **Object** window and in the **Groups** subpanel, change the generic default **Group** name to **Gidiosaurus**.

Creating a Group and assigning all the selected objects to it

4. Go to the **Outliner** and click on the eye icon to the side of the **rig** item to make it visible again, and then click on the **rig** item itself to select it.
5. Press *Ctrl* + *Tab* to go out of **Pose Mode** and go to the **Groups** subpanel under the **Object** window again. Click on the **Add to Group** button and in the pop-up menu, select the **Gidiosaurus** item (in this case, the only group already created). The **rig** is outlined in green as well:



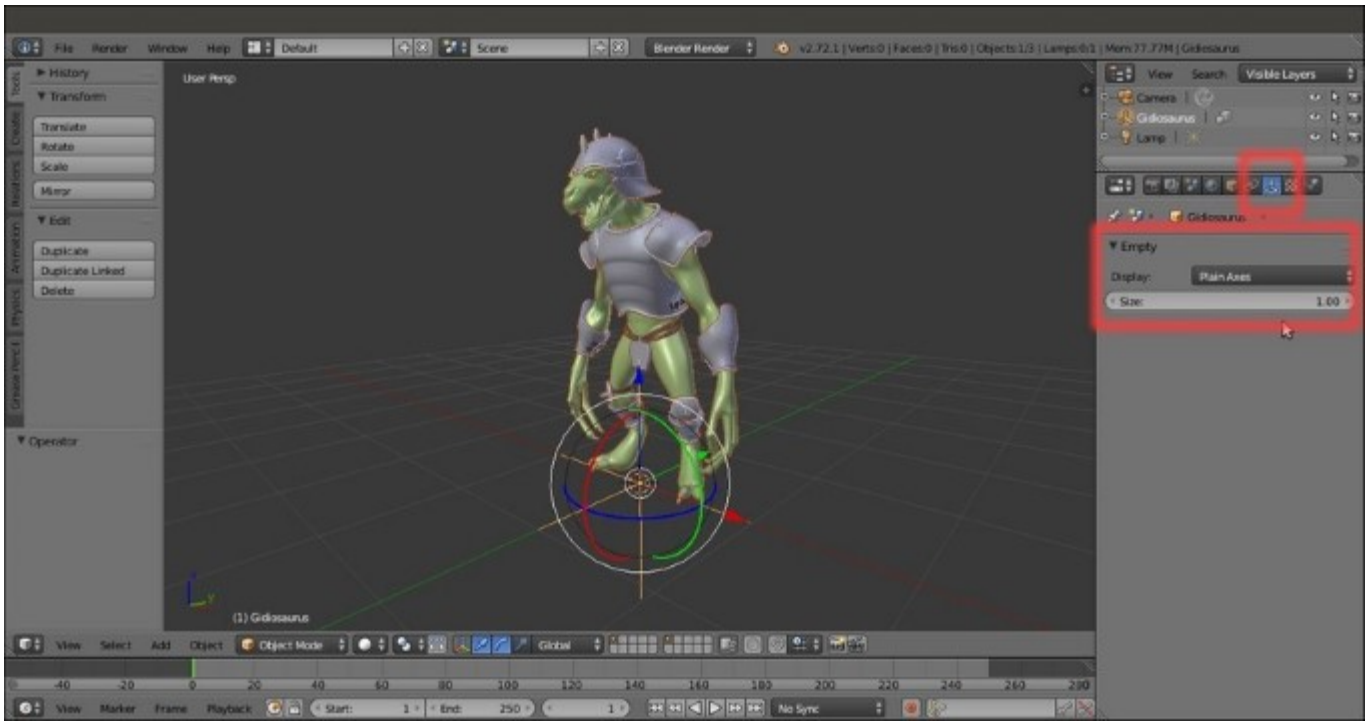
The rig assigned to the group as well

6. Click again on the *Restrict view-port visibility* button (the one with the eye icon) to the side of the **rig** item to hide it and save the file as `Gidiosaurus_library.blend`.

How to do it…

1. Click on the **File** item in the main menu bar, select the **New** item, and confirm by clicking on the **Reload Start-Up File** pop-up (or just press *Ctrl* + *N*).
2. Select the default **Cube** and delete it, then go to **File** | **Link** (or press *Ctrl* + *Alt* + *O*). Browse and click on the `Gidiosaurus_library.blend` file, then click on the **Group** folder item, and finally click on the **Gidiosaurus** item. Click on the **Link from Library** button to the top right of the screen.

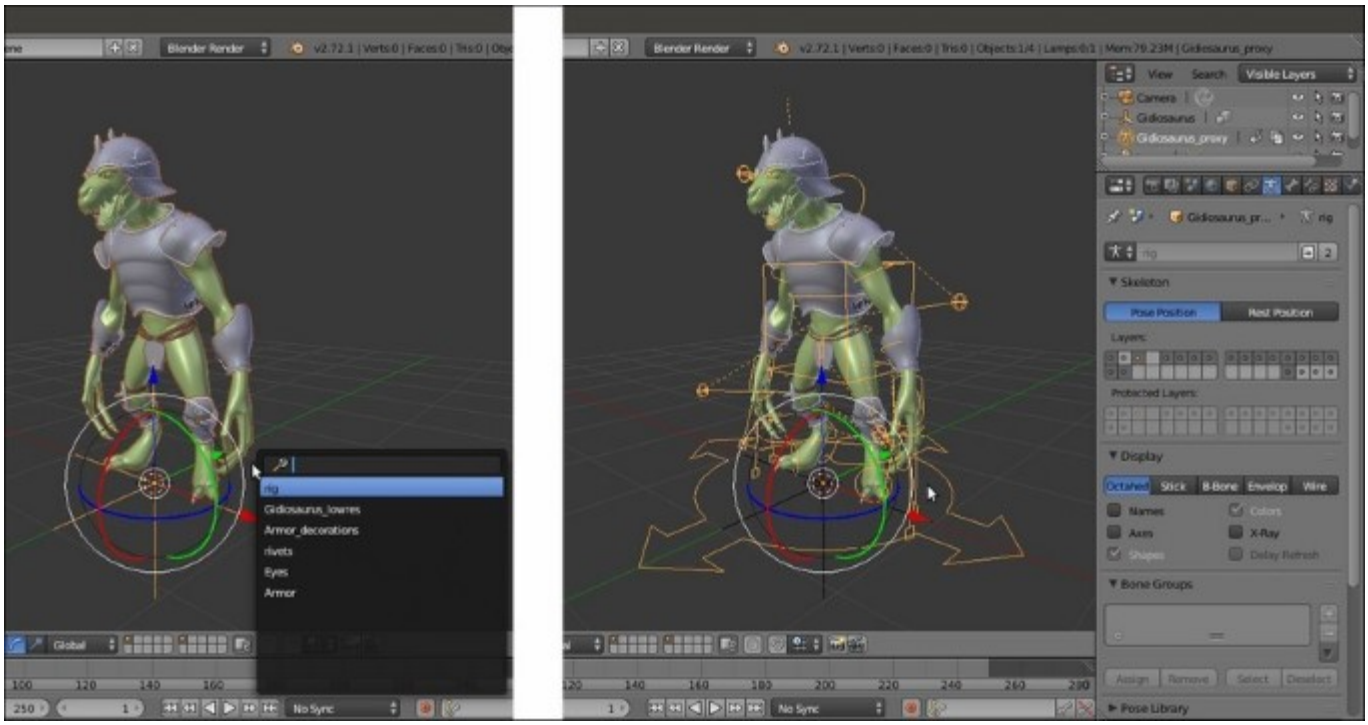
   A new object has appeared at the **3D Cursor** location (that should be placed at the center of the scene), and what we have got at this point is the **linked Gidiosaurus group**; this means that the character and any other object inside the **Gidiosaurus** group in the library file are now linked and *instanced* on an **Empty** that is named **Gidiosaurus** as well:



The Gidiosaurus group linked and instanced on the Empty

Remember that in the library file, inside the **Gidiosaurus** group we put also the **rig**, which for the moment is not visible in the linked group because it is *hidden in the library file*.

3. Press *Ctrl* + *Alt* + *P*, and a new pop-up appears where we can select the item we want to *proxify* (although all the objects inside the group appear in the list, at the moment only an **Armature** can be proxified). Click on the **rig** item:



The proxified rig

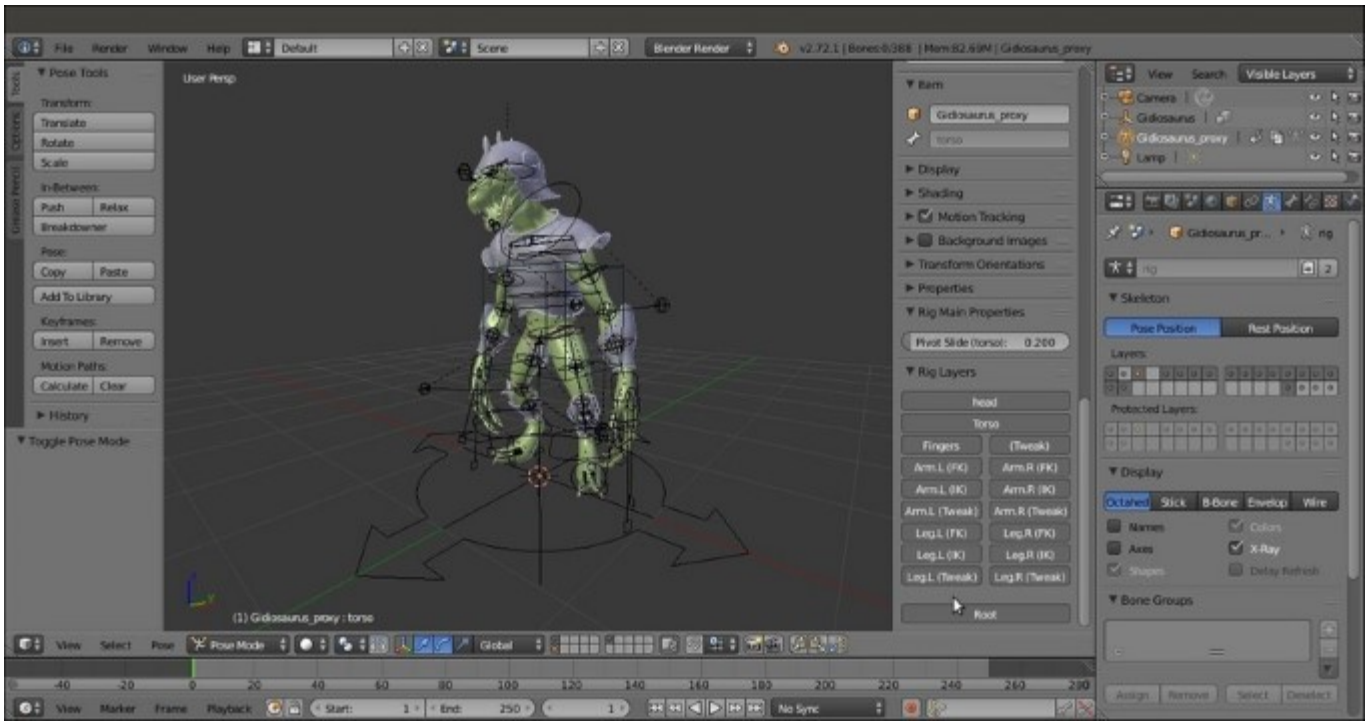
The **rig** appears as a separate object in the **Outliner**, identified by the name **Gidiosaurus_proxy**; at this point, it is possible to only select the **rig** (which is still in **Object Mode**) and move it to a different layer.

4. Select the **Gidiosaurus_proxy** object and move it to the **11th** scene layer (use the *M* key). *Shift*-click to enable the layer and then go to the **Display** subpanel, under the **Object Data** window, to enable the **X-Ray** item.
5. Press *Ctrl* + *Tab* to go into **Pose Mode** and the *N* key to call the viewport **Properties** sidepanel.
6. Save the file as `Gidiosaurus_proxy.blend`.

At this point, looking at the viewport **Properties** sidepanel, we will see the **Rig Layers** interface usually created by the **Rigify** addon, *but* if we save the file and reopen it, the interface is gone.

This is because, at least for the moment, the Python script that draws the rig interface doesn't get automatically linked with the rig, so it's something we must do by hand. This is not a big issue, and by the way, the procedure is incredibly simple:

7. Click again on **File** | **Link** in the main header menu (or press *Ctrl* + *Alt* + *O*).
8. Browse to the `Gidiosaurus_library.blend` file, click on it, and then click on the **Text** item. Click on the **rig_ui.py** item (the Python script for the interface) and then on the **Link from Library** button.
9. Save the file and reopen it; the rig interface is visible again on the viewport **Properties** sidebar:



The rig interface at the bottom of the Properties sidepanel

See also

- http://wiki.blender.org/index.php/Template:Release_Notes/2.43/Animation/Proxy_Objects
- http://www.blender.org/manual/data_system/linked_libraries.html?highlight=proxy#proxy-objects

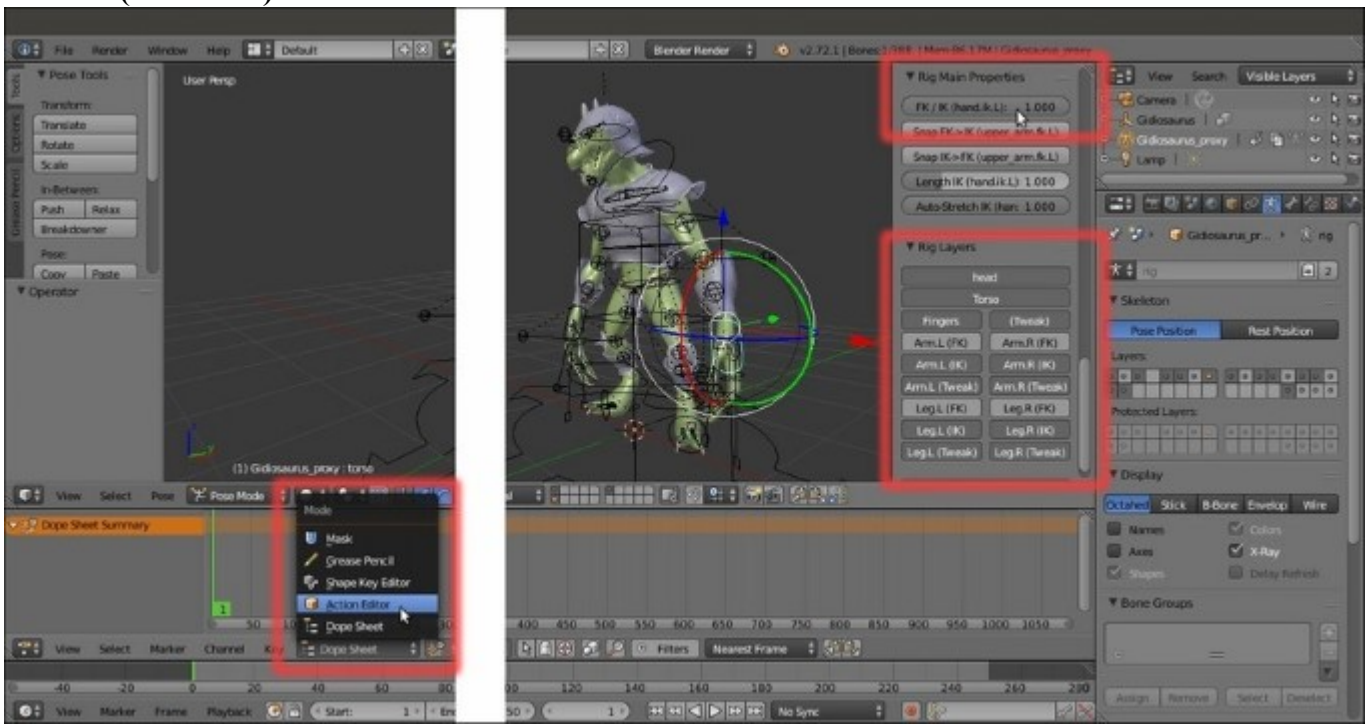
Creating a simple walk cycle for the character by assigning keys to the bones

We are now going to create a simple **walk cycle** for the **Gidiosaurus** character by assigning **position** and **rotation** (and in some cases, also **scaling**) keys to the **control bones** of the **rig**.

Getting ready

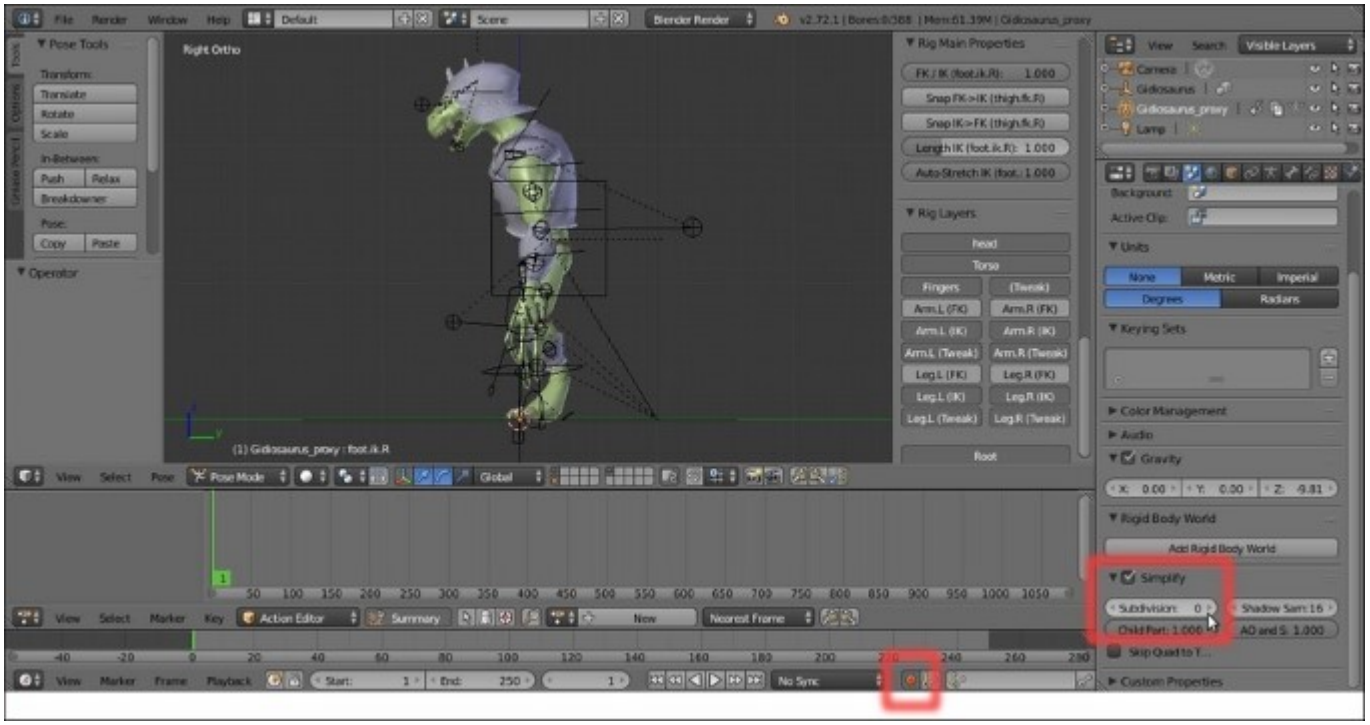
In Blender, there is already a **preset screen** layout named **Animation** that you can switch to and start animating. By the way, I usually prefer to set up my screen layout for the required task, and animating is no exception, so let's first prepare the scene and the screen for the job:

1. Open the `Gidiosaurus_proxy.blend` file.
2. If necessary, enable the **3D manipulator widget** in the toolbar of the 3D view (press *Ctrl* + Spacebar), click on the **Translate** icon button, and set **Transform Orientation** to (just for the moment) **Global**.
3. Split the 3D view horizontally into two windows and change the bottom one into a **Dope Sheet** window. Click on the *Editing context being displayed* button on its toolbar to switch from **Dope Sheet** to the **Action Editor** context **Mode**.
4. Go to the **Properties** sidepanel of the 3D viewport (use the *N* key to make it appear if necessary) and under the **Rig Layers** subpanel, disable the **Arm.L (FK)**, **Arm.R (FK)**, **Leg.L (FK)**, and **Leg.R (FK)** buttons.
5. Select the **Gidiosaurus_proxy** rig, making sure you're in **Pose Mode**, and select the **hand.ik.L** control bone. Go to the **Rig Main Properties** subpanel under the **Properties** panel and set the **FK / IK (hand.ik.L)** slider to **1.000**:



Switching from the Graph Editor to the Action Editor and setting the Inverse Kinematics in the Rig Layers subpanel

6. Repeat for the **hand.ik.R** bone and for the **foot.ik.L** and **foot.ik.R** control bones as well.
7. Go to the **Scene** window, enable the **Simplify** subpanel, and set the **Subdivision** level to **0** (or, if you have a more powerful machine than my laptop, also to **1**).
8. Go into the **Side** view and press the *5* key on the numpad to go into the **Ortho** view.
9. Click on the **red button icon** (*Automatic keyframe insertion for Objects and Bones*) in the **Timeline** toolbar.



The red button icon and the Subdivision Surface modifier subpanel

10. Save the file as `Gidiosaurus_walkcycle.blend`.

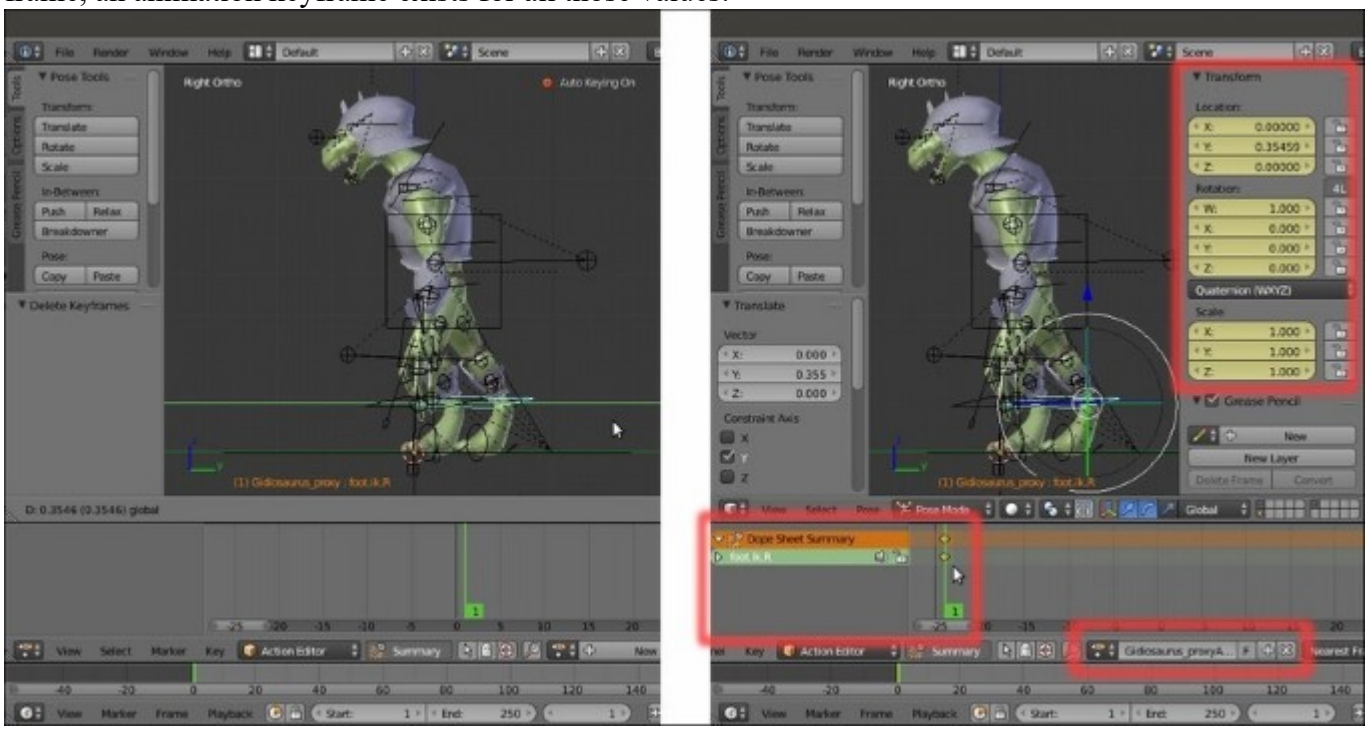
How to do it…

To create a walk cycle, it's important to first establish the start and the end poses of the walk, so let's pose our character for his first step:

1. Be sure to be in the first frame (which in Blender is frame **1** and not **0**), both by clicking on the *Jump to first/last frame in frame range* left button on the **Timeline** toolbar or by pressing the *Shift* + Left Arrow keys.
2. Select the **foot_ik.R** control bone and, by using the widget, move it backward on the global *y* axis to around **0.350**.

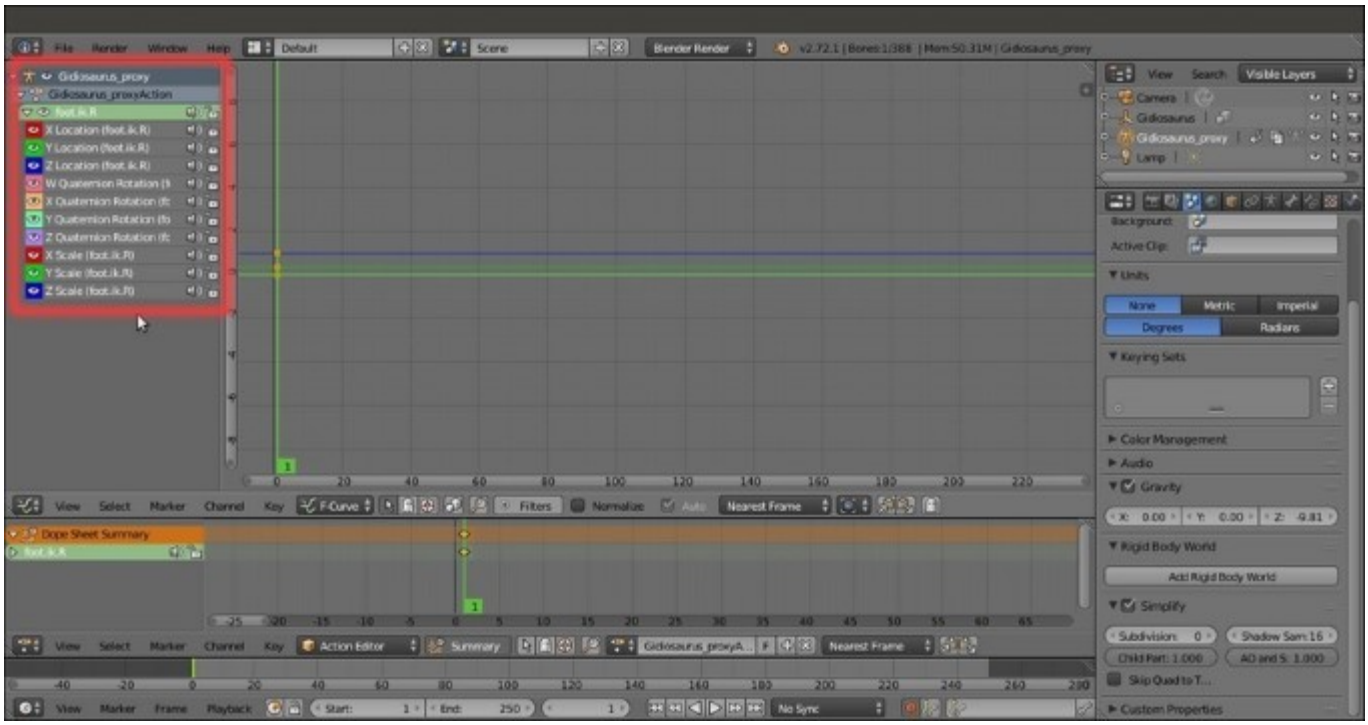
As you release the mouse button, an **Action** datablock, automatically named **Gidiosaurus_proxyAction**, is created and a keyframe for the **foot_ik.R** bone is automatically added in the first frame in the **Action Editor** window. We can also see the value for the movement on the *y* axis in the **Transform** subpanel.

Note that all the transformation value slots turned yellow; this is to show that at the current frame, an animation keyframe exists for all those values:



Setting the first key at frame 1

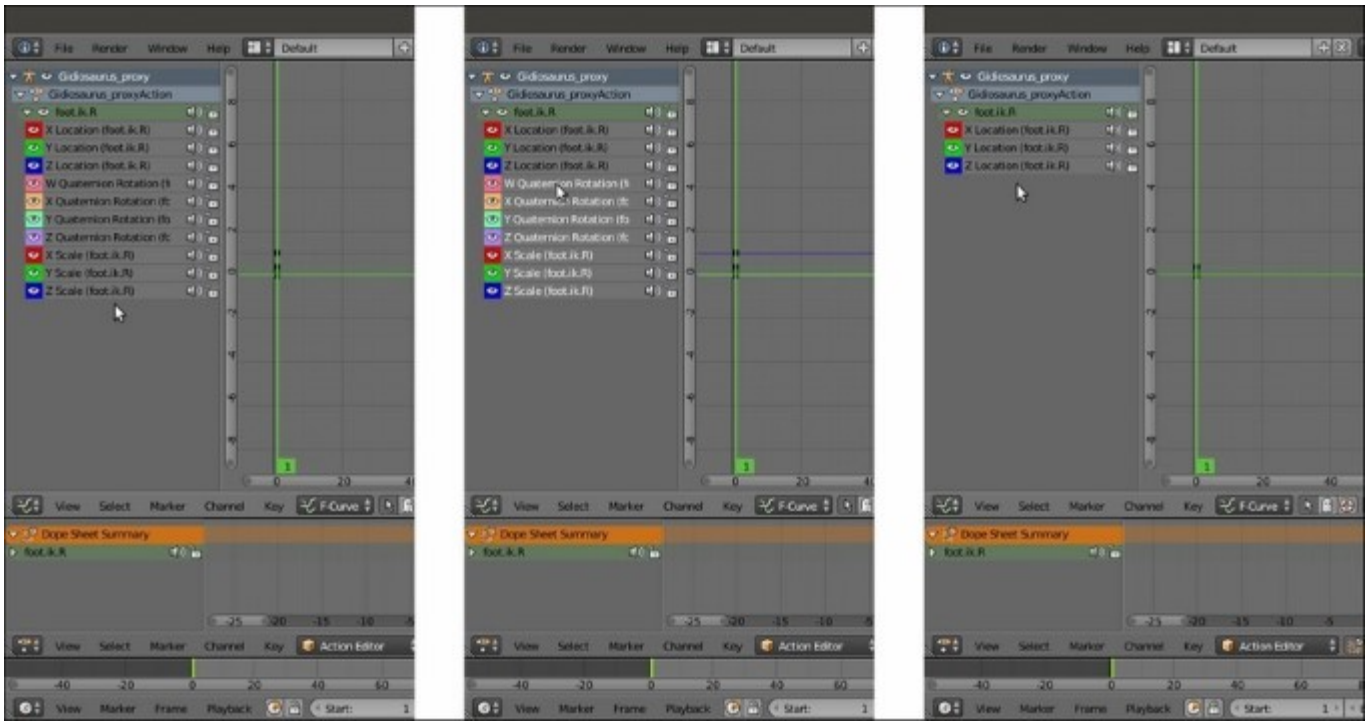
3. Temporarily, switch **3D View** to the **Graph Editor** window:



The Graph Editor window

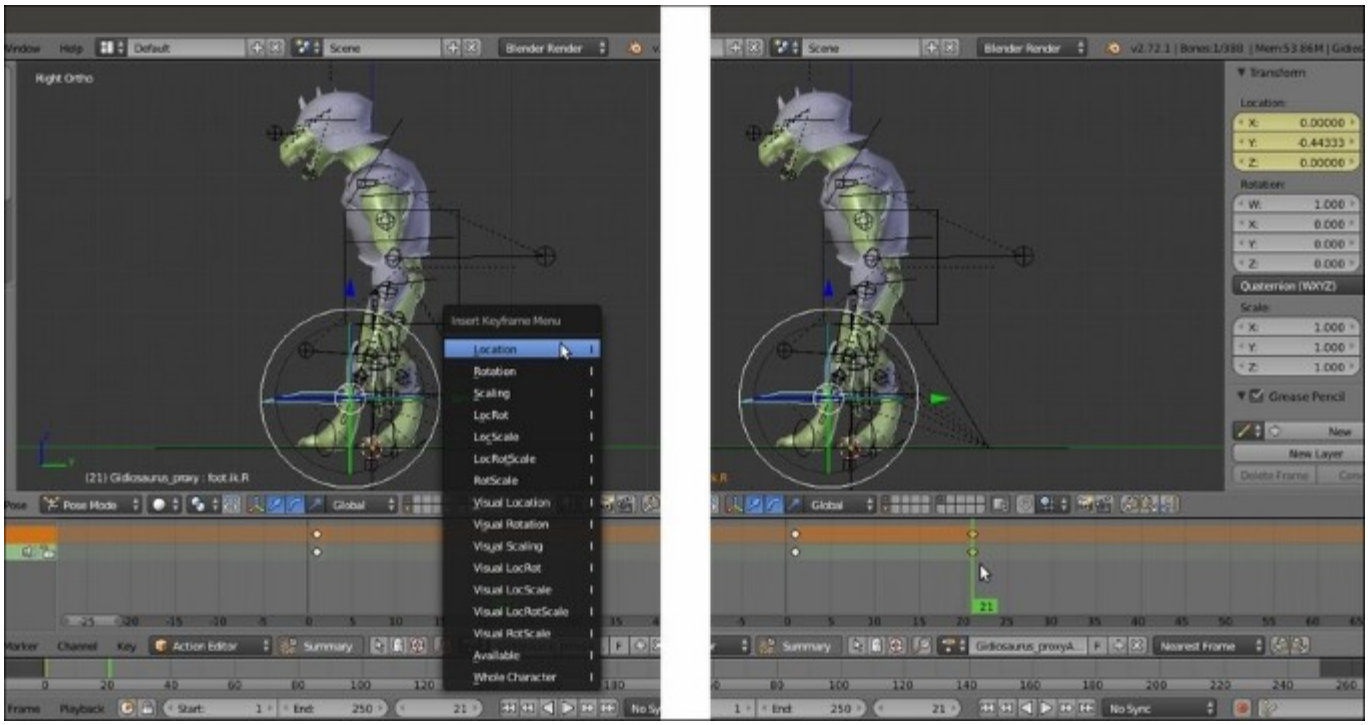
As you can see, because we enabled the **red button icon** (*Automatic keyframe insertion for Objects and Bones*) in the **Timeline** toolbar, every time we move, rotate, or scale a bone, a keyframe for **Location**, **Rotation**, and **Scaling** is automatically added to the **Action**. This can be handy, but also results in a lot of useless keyframes, for example, for most of the rig bones, we need to set keys for the **Location** and/or the **Rotation**, but very rarely for the **Scaling**.

4. Put the mouse cursor inside the **Curve Editor** area of the **Graph Editor** and press the *A* key to deselect everything.
5. *Shift* + left-click on the **Scale** and **Quaternion Rotation** items in the **Gidiosaurus_proxy** Channel Region to select them, then press *X* to delete them:



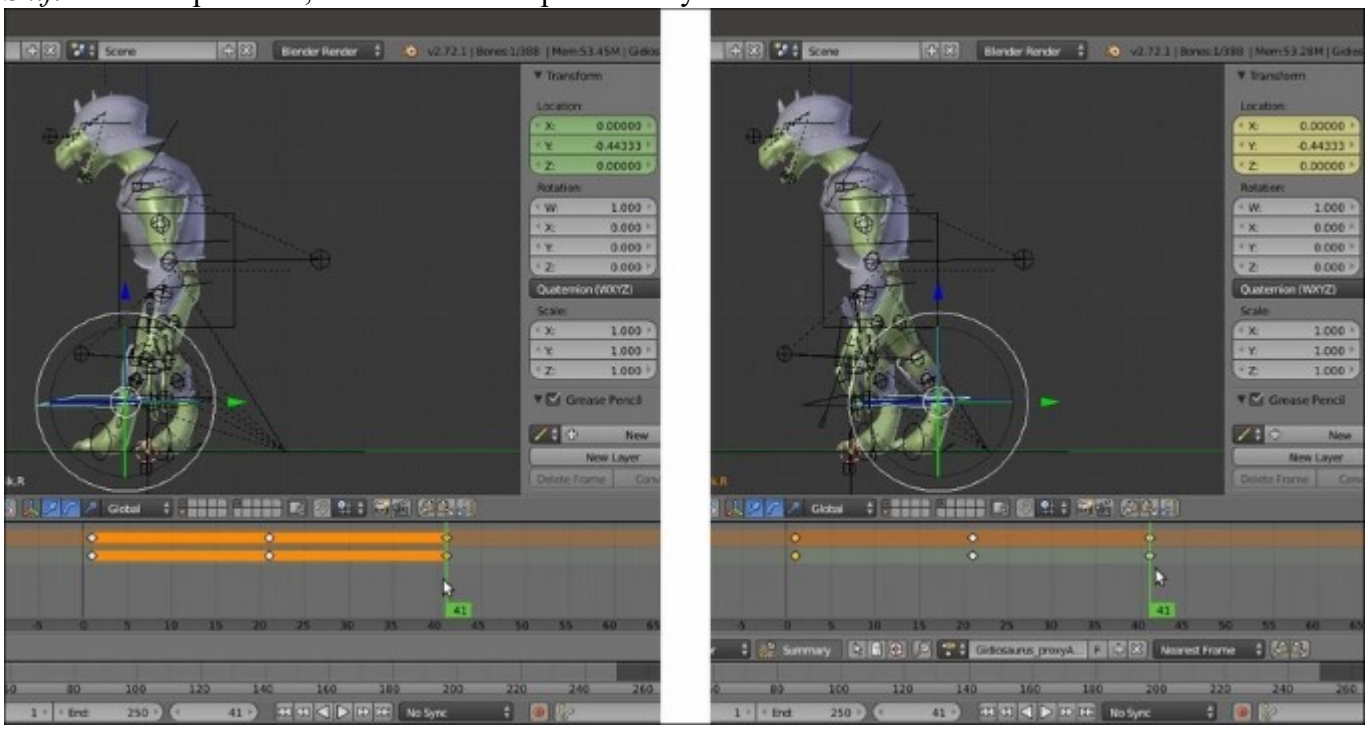
Deleting the useless transformation channels

6. Switch back to the **3D View**, and in the **Transform** subpanel in the **Properties** sidebar (and in the **Transform** subpanel under the **Bone** window in the main **Properties** panel), now only the **Location** slots are highlighted in yellow.
7. Disable the **red button icon** (*Automatic keyframe insertion for Objects and Bones*) in the **Timeline** toolbar.
8. Go to frame **21** by grabbing and moving the **Time Cursor** inside the **Timeline** window or the **Action Editor** window, or by typing the frame number inside the *Current Frame* button on the **Timeline** toolbar.
9. Select the **foot_ik.R** control bone and by using the widget, move it forward on the global *y* axis for around **-0.440**.
10. Press *I* and in the **Insert Keyframe Menu**, select the **Location** item; this adds a second key to the **foot_ik.R** bone at frame **21**, but this time only for **Location**:



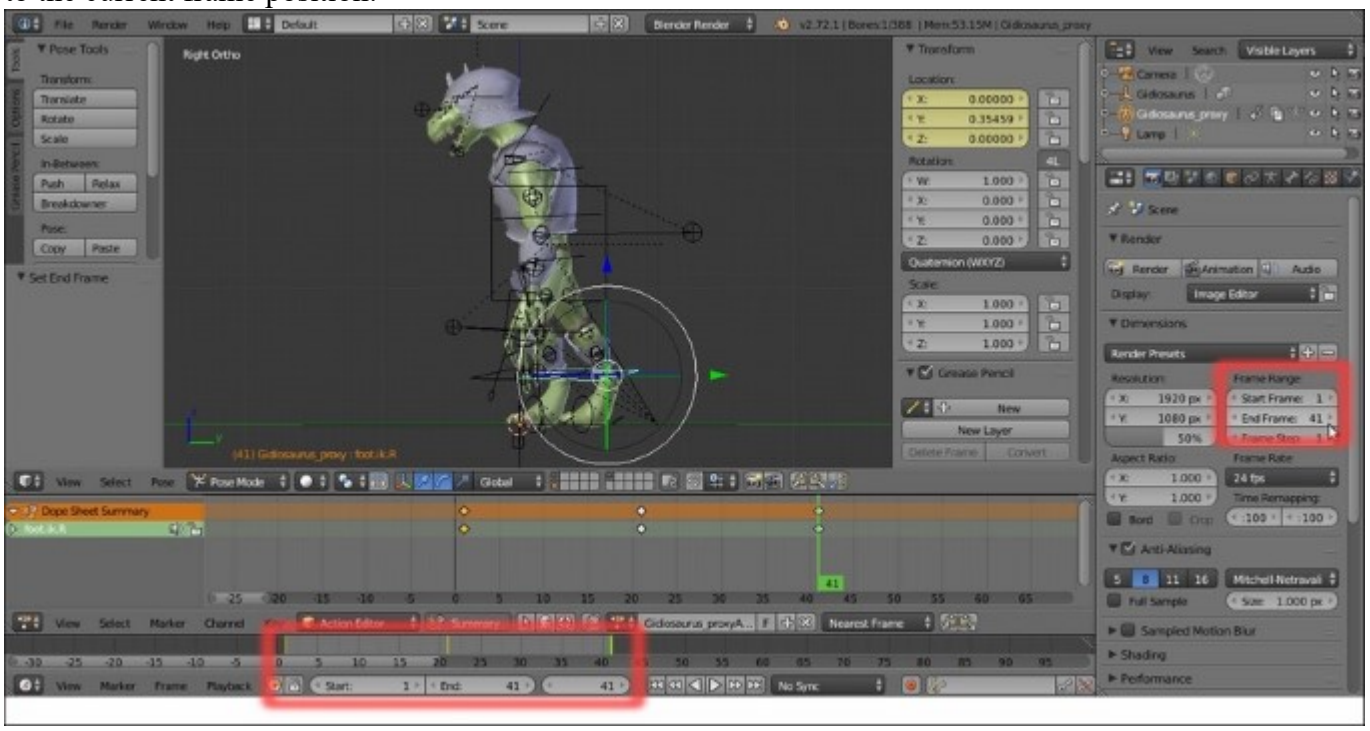
Setting a Location only key through the Insert Keyframe Menu pop-up

11. Go to frame **41**, right-click to select the key at frame **1** in the **Action Editor** window, and press *Shift* + D to duplicate it, then move the duplicated key to frame **41**.



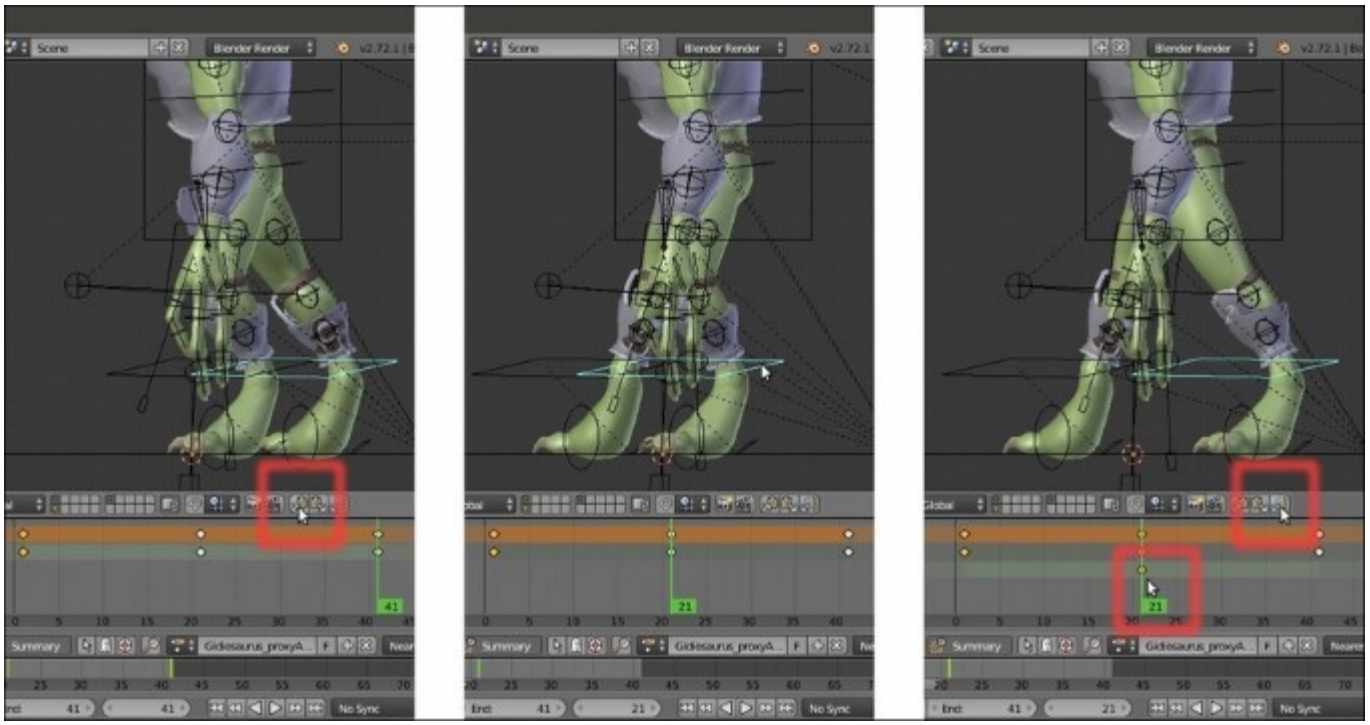
Creating poses at different frames by duplicating keys

12. Put the mouse cursor in the **Timeline** and press the *E* key to set the total length of the animation to the current frame position:



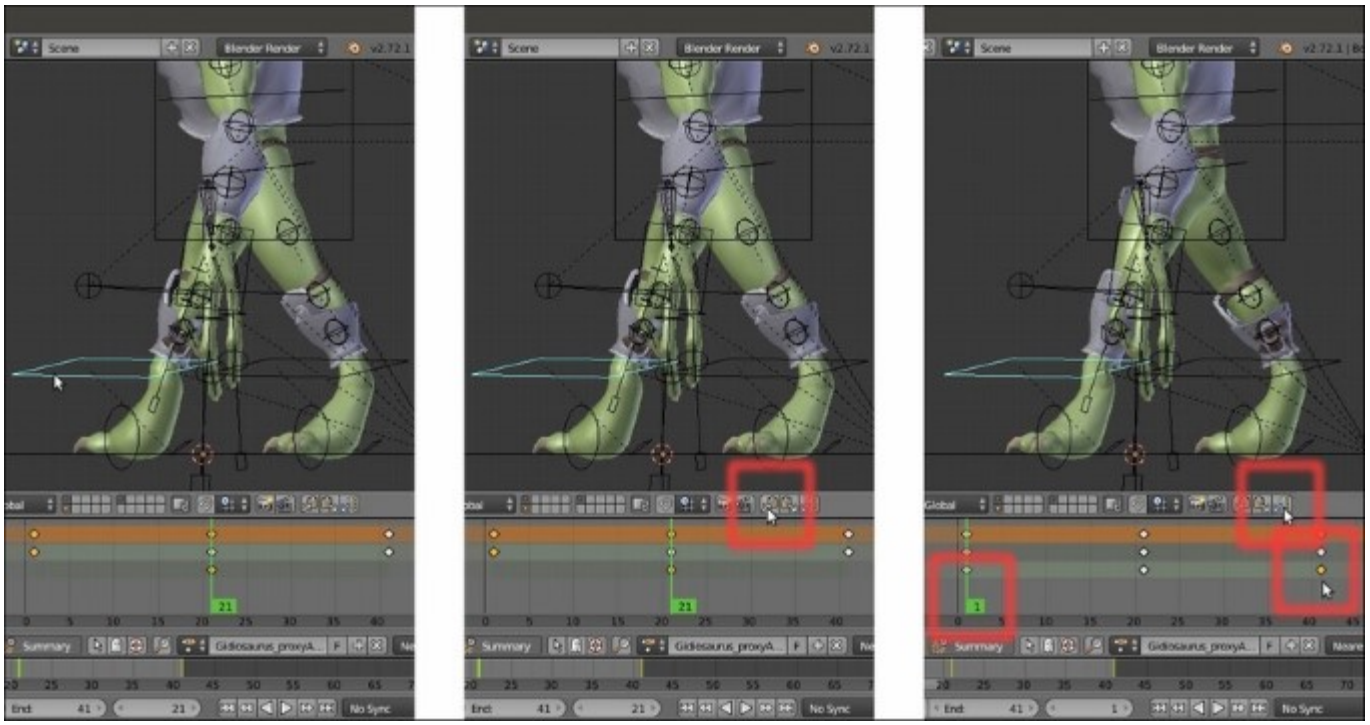
Setting the action total length in frames

13. Still at frame **41** (but this being a cycle, frame **1** could also be fine) and with the **foot_ik.R** bone selected, click on the *Copy the current pose of the selected bone to copy/paste buffer* button on the 3D viewport toolbar.
14. Go to frame **21** and select the **foot_ik.L** bone, then click on the *Paste the stored pose on to the current pose* button at the extreme right side of the 3D viewport toolbar to paste a **mirrored pose**.
15. Press the *I* key and in the pop-up menu, click on the **Location** item to add a new key:



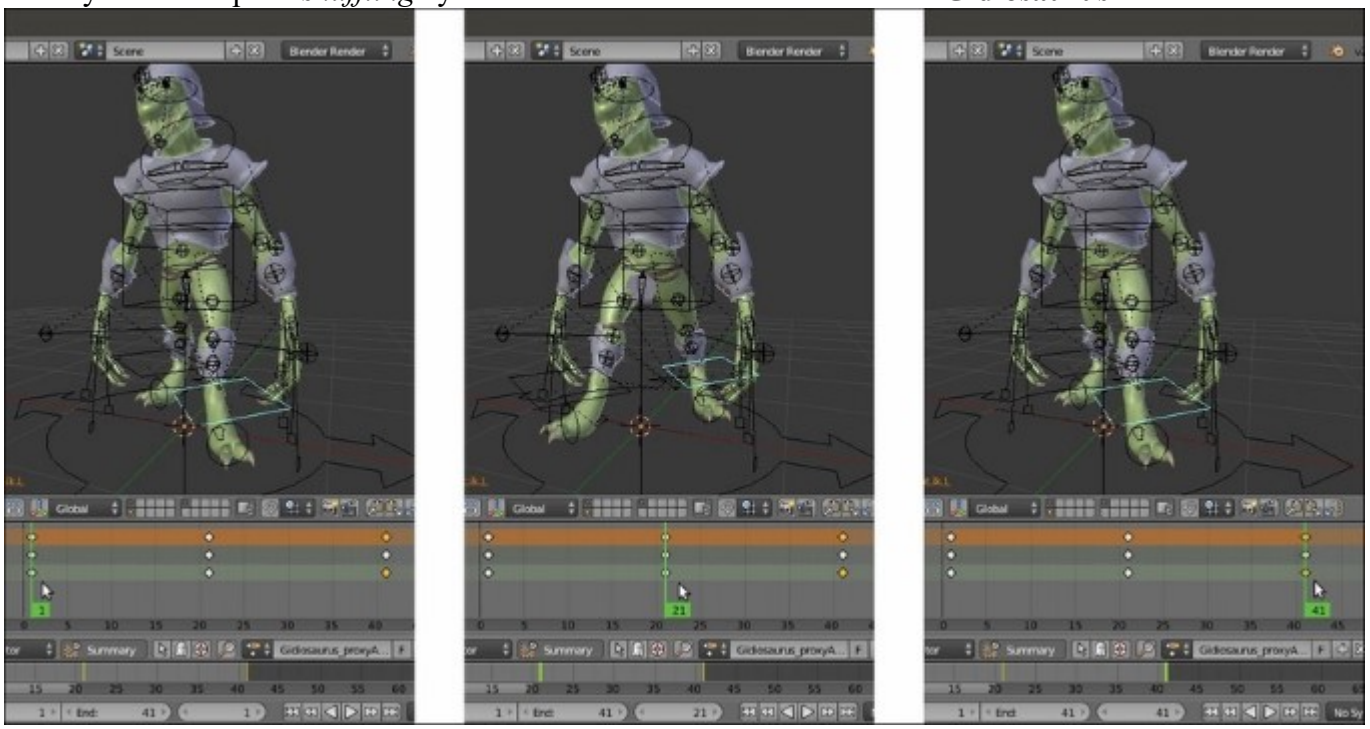
Copying a pose and pasting it reversed

16. Now, still at frame **21**, select the **foot_ik.R** bone and click on the *Copy the current pose of the selected bone to copy/paste buffer* button on the 3D viewport toolbar.
17. Go to frame **1**, select the **foot_ik.L** bone, and again click on the *Paste the stored pose on to the current pose* button to paste the reversed pose, then press *I* and insert a **Location** key.
18. Select and duplicate the new key at frame **1** for the **foot_ik.L** bone and move the duplicated one to frame **41**:



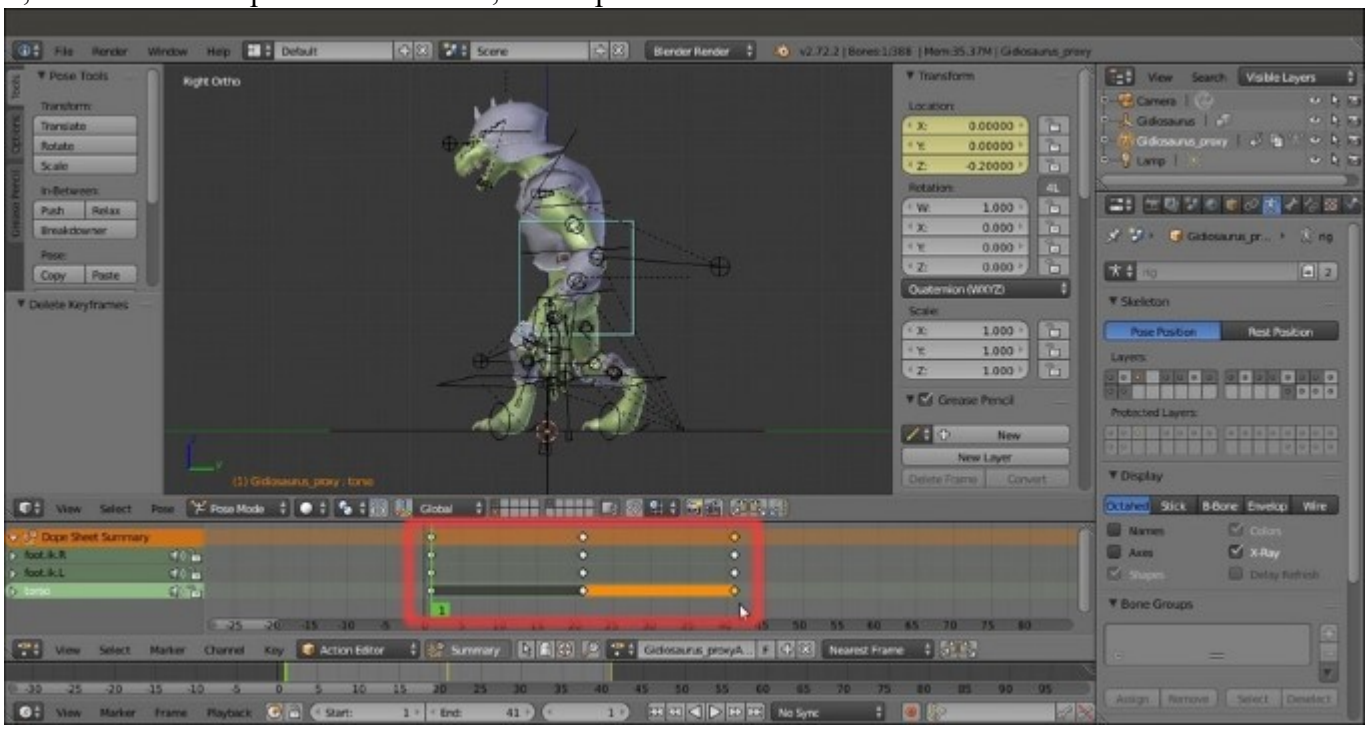
Creating new keyframes by copying, pasting, and duplicating pose keys

At this point, by scrolling the **Time Cursor** in the **Timeline**, in the **Action Editor** window, or by clicking on the *Play Animation* button in the **Player Control** on the **Timeline** toolbar, we can already see a complete *shuffling* cycle of the movement of the feet of the **Gidiosaurus**:



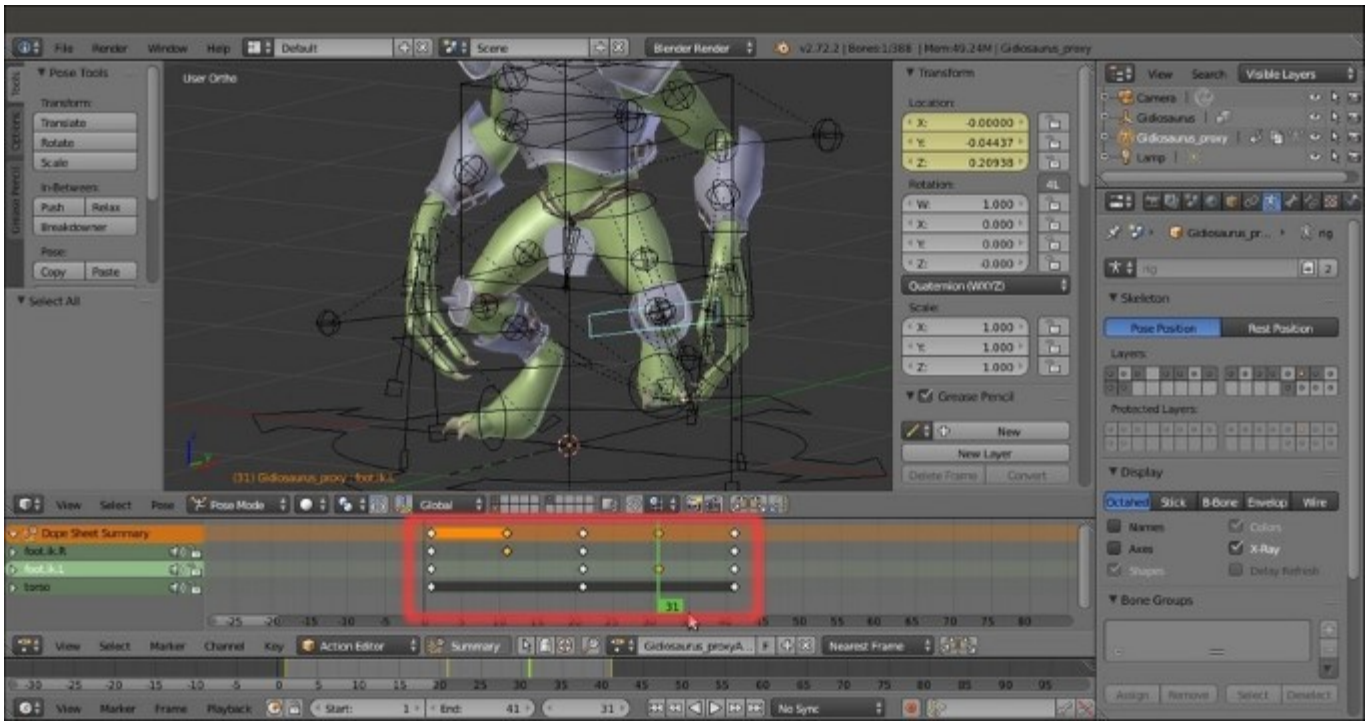
The Gidiosaurus' walk cycle with sliding feet

19. Now go to frame **1**, select the **torso** bone, and lower it on the *z* axis for almost **-0.200**, then assign a position key.
20. Select the just added **torso** bone key in the **Action Editor** window, press *Shift* + *D* to duplicate it, and move the duplicate to frame **21**, then repeat for frame **41**:



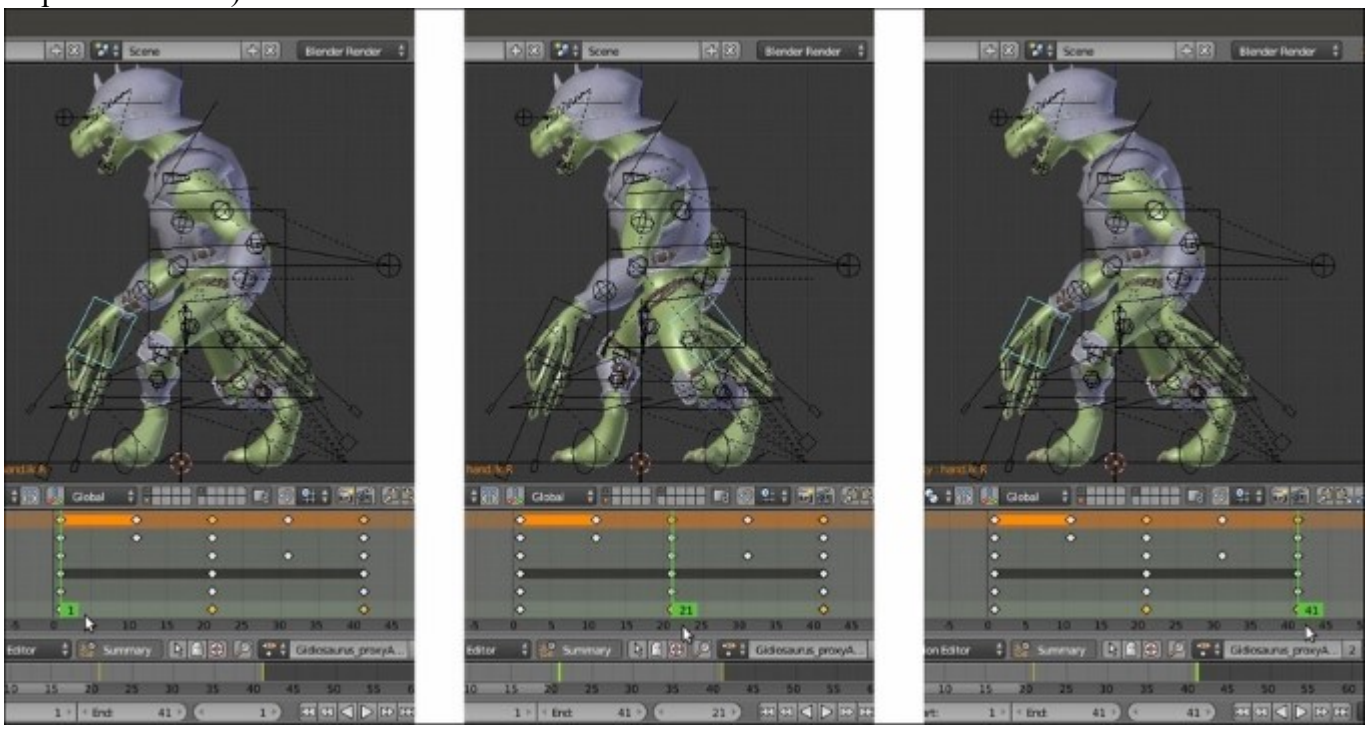
Animating the torso

21. Go to frame **11**, select the **foot_ik.R** bone, and move it on the *z* axis for **0.200**, then assign a position key.
22. As we already did at steps 16 and 17, copy the bone pose, go to frame **31**, and paste it reversed, then assign a position key to the **foot_ik.L** bone.



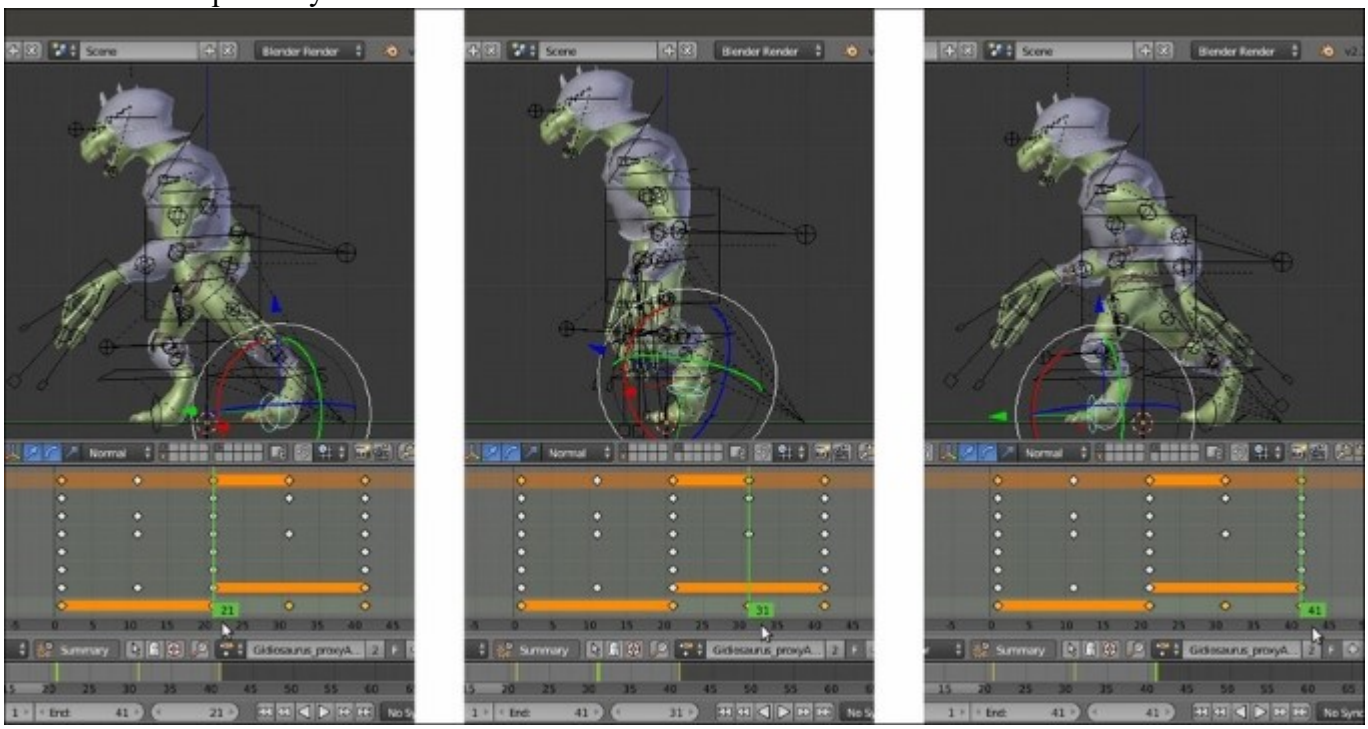
Assigning more translation keys

23. Working in the same manner, select the **hand_ik.R** and **.L** bones and animate them according to the **Gidiosaurus'** walk (note: as for any average walk cycle, in the opposite position with respect to the feet):



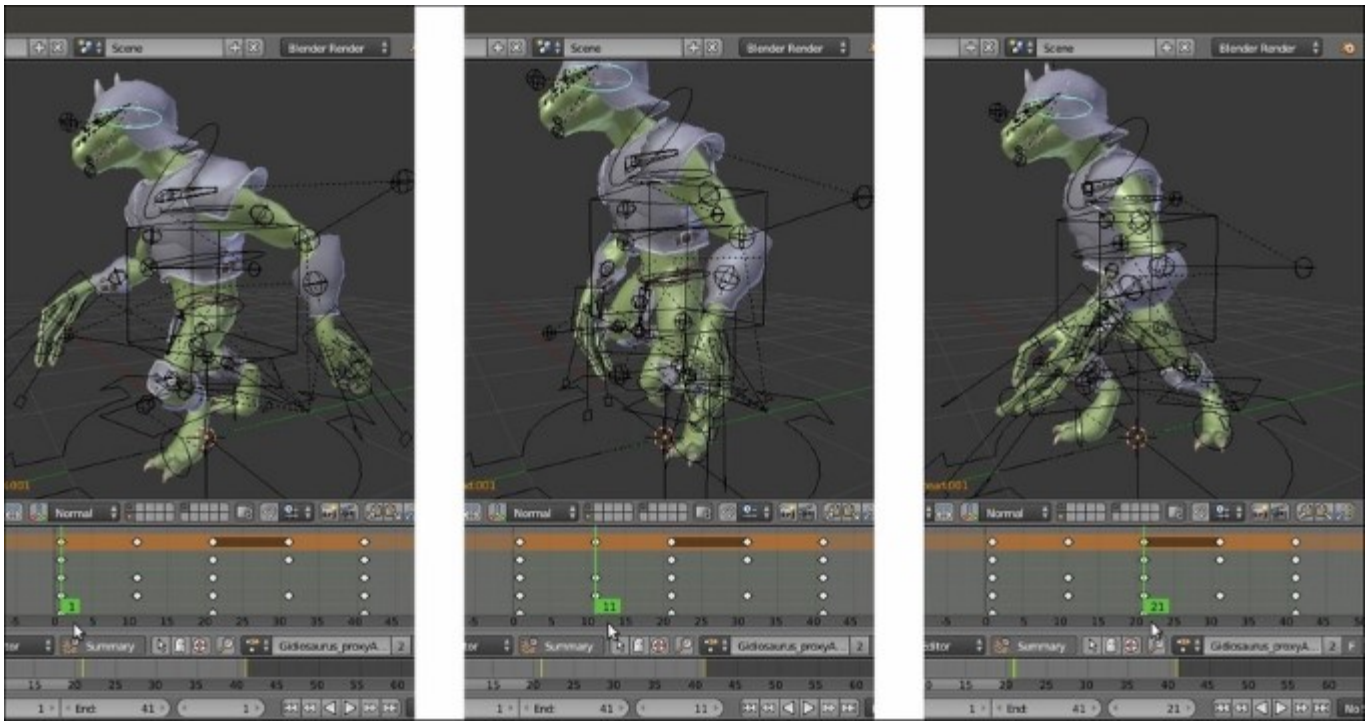
Animating the arms to complete the walk cycle

24. Reselect the **torso** bone, go to frame **1**, and move it forward for **0.240** on the *y* axis. Assign a new position key (to overwrite the old one), then delete the keys at frames **21** and **41** and substitute them with duplicates of the new frame **1** key.
25. Go to frame **11** and move the **torso** bone for almost **0.200** upward on the *z* axis. Duplicate the key for frame **31**.
26. Go to frame **1** and select the **toe.R** bone, then assign a rotation key. Go to frame **11** and rotate the bone on the normal *x* axis (the red circle in the widget tool with **Transform Orientation** set to **Normal**) for **75°**. Go to frame **21** and press *Alt* + *R* to clear the rotation pose and assign a rotation key. Use *Shift* + *D* to duplicate the last added key and move the duplicated one to frame **41**.
27. Select the **toe.L** bone and assign a rotation key at frame **1**, then go to frame **21** and repeat. Copy the **toe.R** pose at frame **11** and paste it reversed for the **toe.L** bone at frame **31**, then assign a cleared rotation pose key at frame **41**:



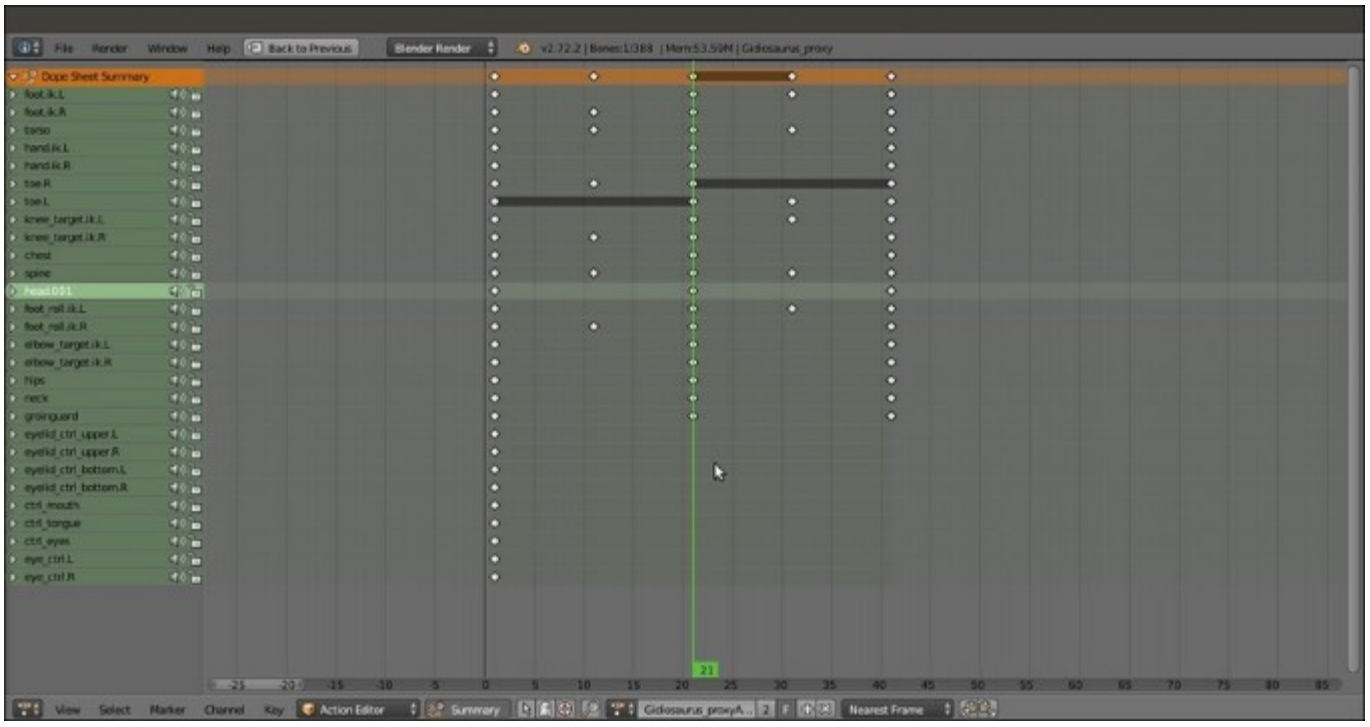
Adding the in-between poses for the feet

28. Following the previous procedures, set keys for the position and/or the rotation of all the affected bones, also adding movements such as the rotation of the **torso** and of the **hips**, the position of the **pole target** for **legs** and **arms**, the swinging of the **head** to compensate for the body's lateral movements, the closed **mouth** and the open **eyelids**, and so on:



The first phase of the walk cycle animation is almost done

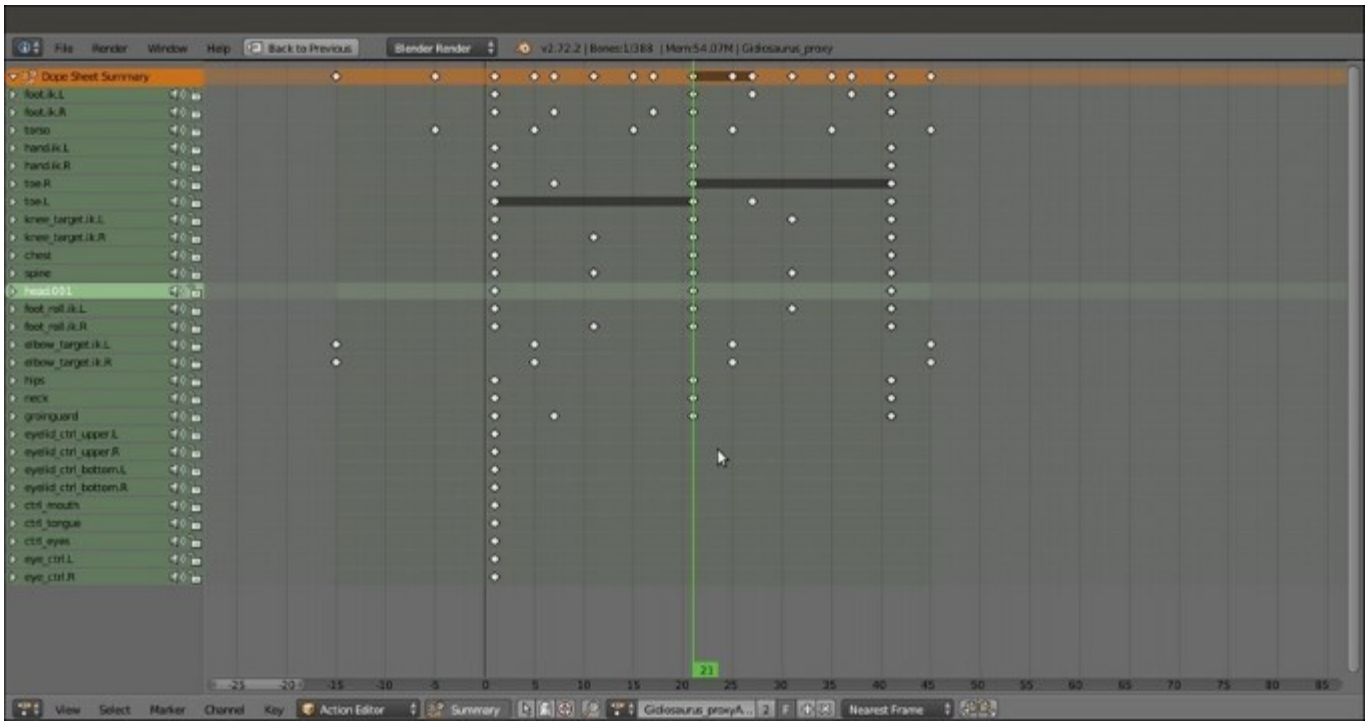
The animation cycle, at this point, looks really stiff and *robotic*. This is simply because everything *happens at the same time*, that is, in the same frame, as you can easily see in the **Action Editor** window (to enlarge a window, put the mouse cursor inside it and press *Ctrl* + Up Arrow; to go back, press *Ctrl* + Down Arrow):



The maximized Action Editor window with the walk cycle action

To make the animation look more realistic and natural, we must offset some of the keys to make the different actions *happen at different times;* for example, the **torso** bone goes down a few frames later than the **foot** touching the ground, and goes up a few frames later as well, the same for the **head** swinging, and so on.

29. To offset the affected keys, simply select and/or *Shift*-select and move them for the required frames, forward or backward in the **Action Editor** window. Here, a bit of testing is needed to reach the right number of frames (usually in the range of **3-5** frames, by the way).
30. Where a *hole* happens at frame **1** in the action channel for a bone because of the dislocation of the keys, simply duplicate the last right side key of that bone and move it to the appropriate **negative frame** position. That is, to the left side of frame **0**, and be sure that the relative item, **Allow Negative Frames**, is enabled in the **Editing** tab of the **User Preferences** panel, as you can see in the following screenshot for the **torso** and for the **elbow_target_ik** bones:



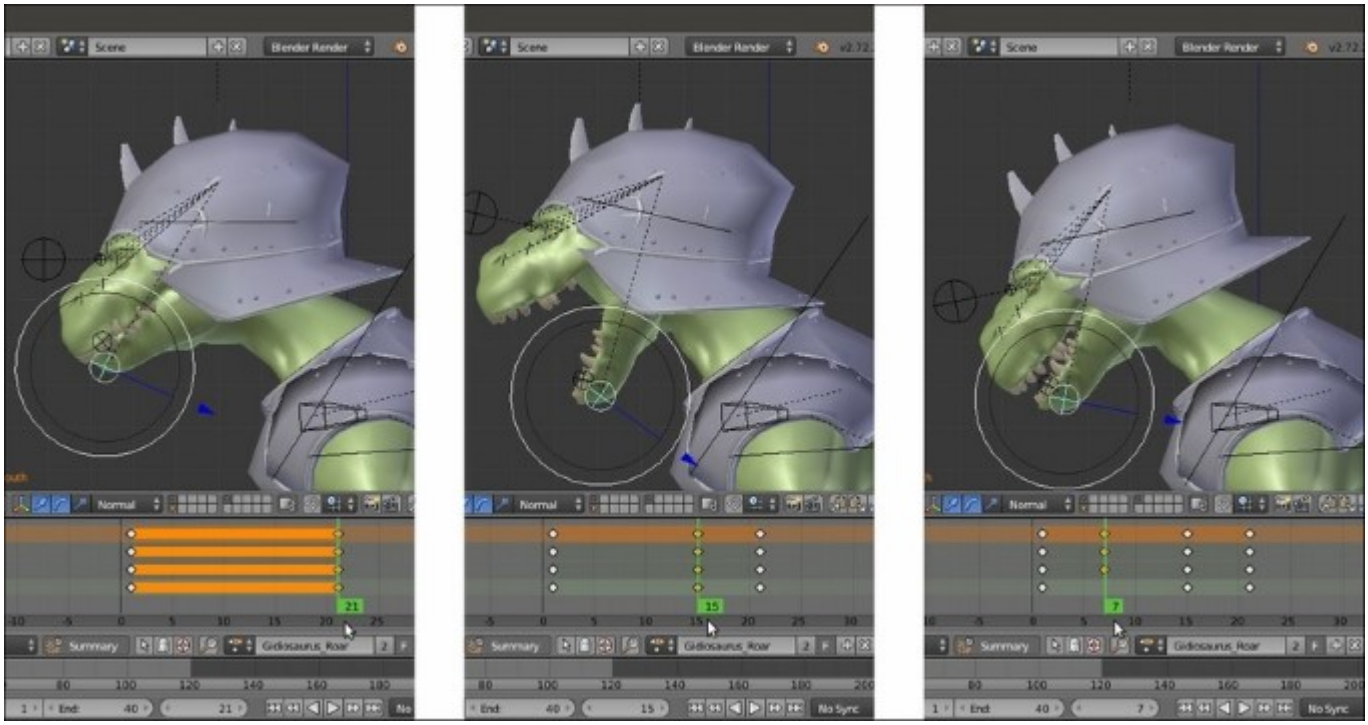
Duplicated keys moved to the Negative Frames space

31. Rename the action `Gidiosaurus_Walkcycle`. To better check the playing animation, go to the **Timeline** toolbar to set the end frame for the total length of the animation to **40** frames, because frame **1** and frame **41** are the same poses.
32. Save the file.

    At this point, we have made our first action with the **Gidiosaurus** character, and it's a **41** frame-long walk cycle meant to be repeated in loops for longer animations.

    Because in the next recipe we are going to use the **Non Linear Action Editor** (**NLA Editor**) to re-use the **action datablocks** to build the final animation, we need now to create some more actions to be mixed with the walk cycle one.
33. Activate the **Fake User** for the **Gidiosaurus_Walkcycle** action by clicking on the **F** icon button to the side of the action datablock on the **Action Editor** toolbar, then click on the **X** icon button to unlink the action datablock.
34. Put the mouse cursor in the 3D viewport and press the *A* key to select all the control bones, then press *Alt* + *G*, *Alt* + *R*, and *Alt* + *S* to clear any position, rotation, or scale and restore the rig default pose (actually, the only control bones using the **scale** operator for the animation are the **fingers**, which we haven't animated so far).
35. Be sure to be at frame **1** and zoom to the character's **head**, select the **head.001** and **neck** bones, and assign a rotation key, then select the **ctrl_mouth** bone and assign a position key.
36. Rename the action `Gidiosaurus_Roar`, then enable the **Fake User**; use *Shift* + *D* to duplicate the keys and move the duplicated ones to frame **21**.

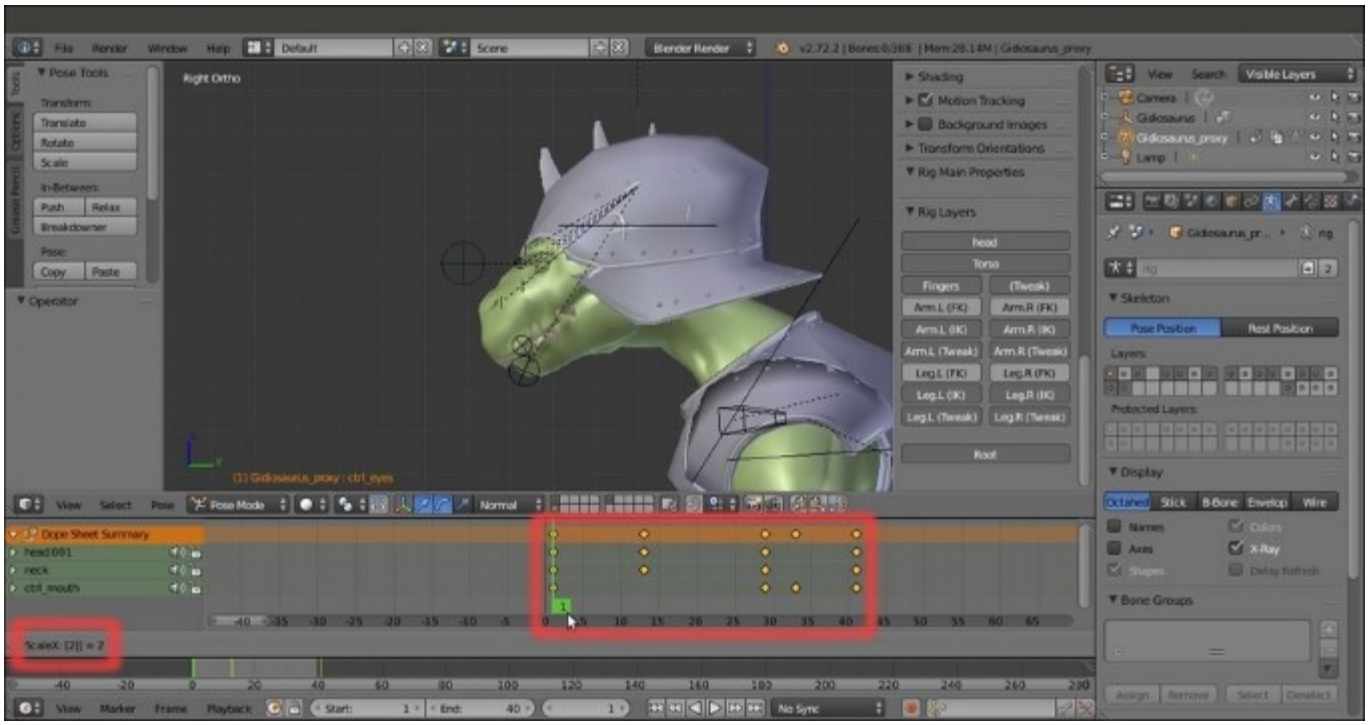
37. Go to frame **15** and rotate the **head.001** and **neck** bones clockwise to raise the **head**, then open the **mouth** wide by moving the **ctrl_mouth** bone down.
38. Go to frame **7** and rotate the **head.001** and **neck** bones counterclockwise a bit to lower the **head**:



The Gidiosaurus_Roar action

We have now built a roar action for the **Gidiosaurus**, but it happens in only **21** frames, so it's really too fast. Although it is possible to scale any action strip in the **NLA Editor** window, in this case it's better to do it directly in the basic action itself.

39. In the **Action Editor** window, put the **Time Cursor** to frame **1**, then press the *A* key to select all the keys of the action. Press *S* | *X* | **2** | *Enter* to scale the action of the double to frame **41**:



Scaling the action on the position of the Time Cursor

40. Now that the action length has been doubled, we can move some keys of a few frames and also animate the movement of the character's **tongue** a bit during the *roar*:

Animating the tongue

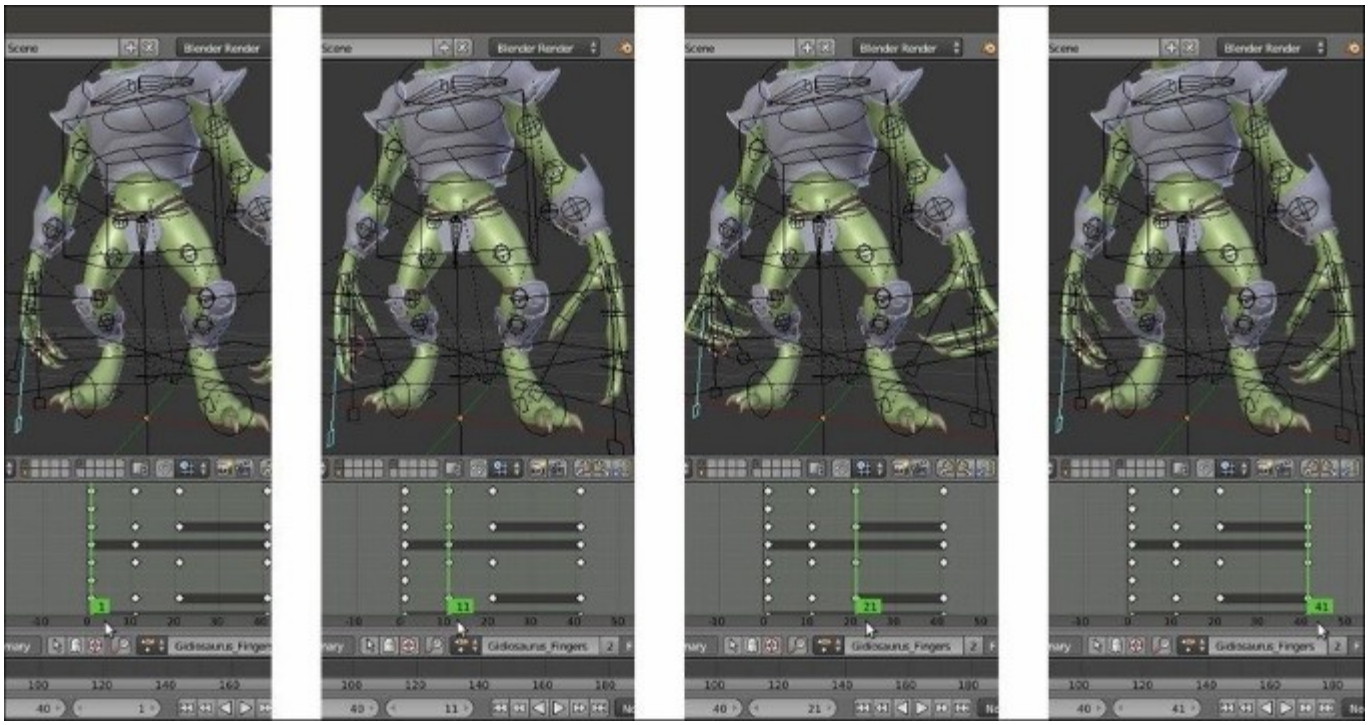
41. Again, click on the **X** icon button to unlink the action datablock, select all the bones, then press *Alt* + *G* and *Alt* + *R* to clear the poses.
42. *Shift*-select the **thumb.R** and **.L**, **f_index.L** and **.R**, and **f_middle.L**, and **.R** control bones and add a **Scaling** key. Rename the newly created action `Gidiosaurus_Fingers` and enable the **Fake User**:

Renaming the fingers action and enabling the Fake User

43. Now *Shift*-select for both the **.L** and **.R** bones, **thumb.01**, **thumb.02**, and **thumb.03**, **f_index.01** and **f_index.02**, **f_middle.01** and **f_middle.02**, and the **palm** control bones, then add a **Rotation** key:

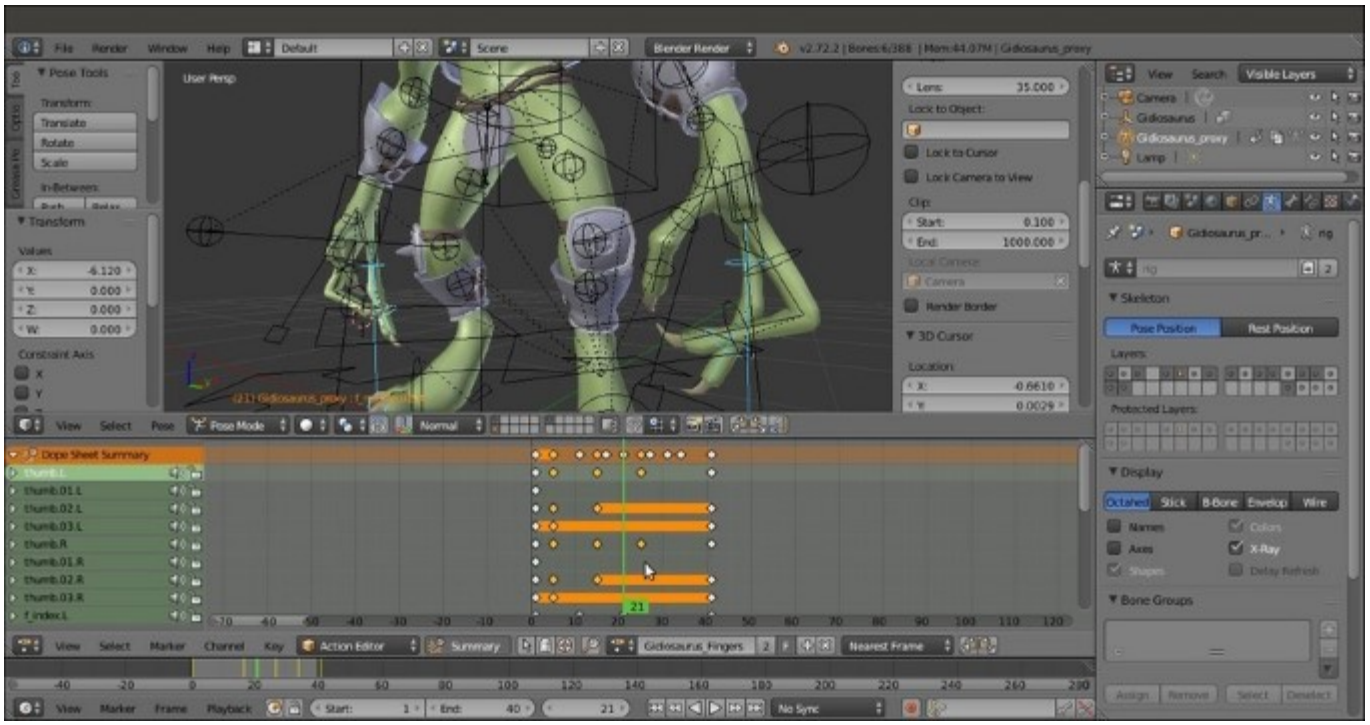
Adding a first rotation key for all the fingers at the same time

44. Now that we have all the finger bones' names in the **Action Editor** list-tree to the left (the **Channel Region**), start to click on the bone names to highlight them, for example, click on the **thumb.L** item, then press *Shift* + *PageUp* keys to move it to the top of the list.
45. Then highlight the **thumb.01.L** bone and by pressing the *PageUp* arrow, move it right after the **thumb.L** bone (press *Shift* + *PageUp* to eventually go directly to the top). Repeat with the **thumb.02.L** and the **thumb.03.L** bones, then go to the **thumb.R** bone, and so on. To move an item downward in the list-tree, simply press the *PageDown* key instead (or *Shift* + *PageDown* to go directly to the bottom).
46. Repeat the ordering until you have *grouped* the bones' names *by finger* in the list-tree, to make it easier to individuate them in the **Action Editor** window, then use *Shift* + *D* to duplicate all the keys and move the duplicated ones to frame **41**.
47. Go to frame **21**, select **thumb.L**, **.R**, **f_index.L**, **.R**, **f_middle.L**, and **.R** bones and press *S* to scale them to **0.900**. Assign a **Scaling** key, then select and rotate the other control bones, and assign **Rotation** keys (be aware that the previous scaling bones can also be rotated). Also, by using the *Copy/Paste* technique already shown, build a kind of *creepy hands* animation:



The "creepy hands" animation made by rotating and scaling the bones controls

48. When you are done, thanks to the re-ordering we made in the **Channel Region**, go to the **Action Editor** window and move groups of keys based on their finger group; in short, to avoid the *everything-at-the-same-time* issue, dislocate the timing of one finger with respect to the others:



Offsetting the finger' keys

49. After this, click on the *Display number of users of this data* button to create a new copy of the action and change the name to **Gidiosaurus_Fingers.L**. In the **Channel Region**, *Shift*-select all the **.R** bones items and delete them (*X* key), then enable the **Fake User**.
50. Click on the double arrows icon to the left side of the datablock name (*Browse Action to be linked*) and reselect the **Gidiosaurus_Fingers** action.
51. Again, click on the *Display number of users of this data* button to create a new copy of the action and change the name to **Gidiosaurus_Fingers.R**. *Shift*-select all the **.L** bones items and delete them. Enable the **Fake User** and click on the **X** icon button to unlink the action datablock.
52. Save the file.

To have a look at the completed walk cycle of the **Gidiosaurus** and the other actions, open the `Gidiosaurus_walkcycle_final.blend` file provided with this cookbook.

How it works…

An **Action** is a bones **F-Curves** datablock created at the same moment any animation key is added through the **Insert Keyframe Menu** (*I* key) or the **red button icon** (*Automatic keyframe insertion for Objects and Bones*) in the **Timeline** toolbar. The newly created **Action** automatically takes the name from the object itself (**Gidiosaurus_proxy** in this case) plus the **Action** suffix.

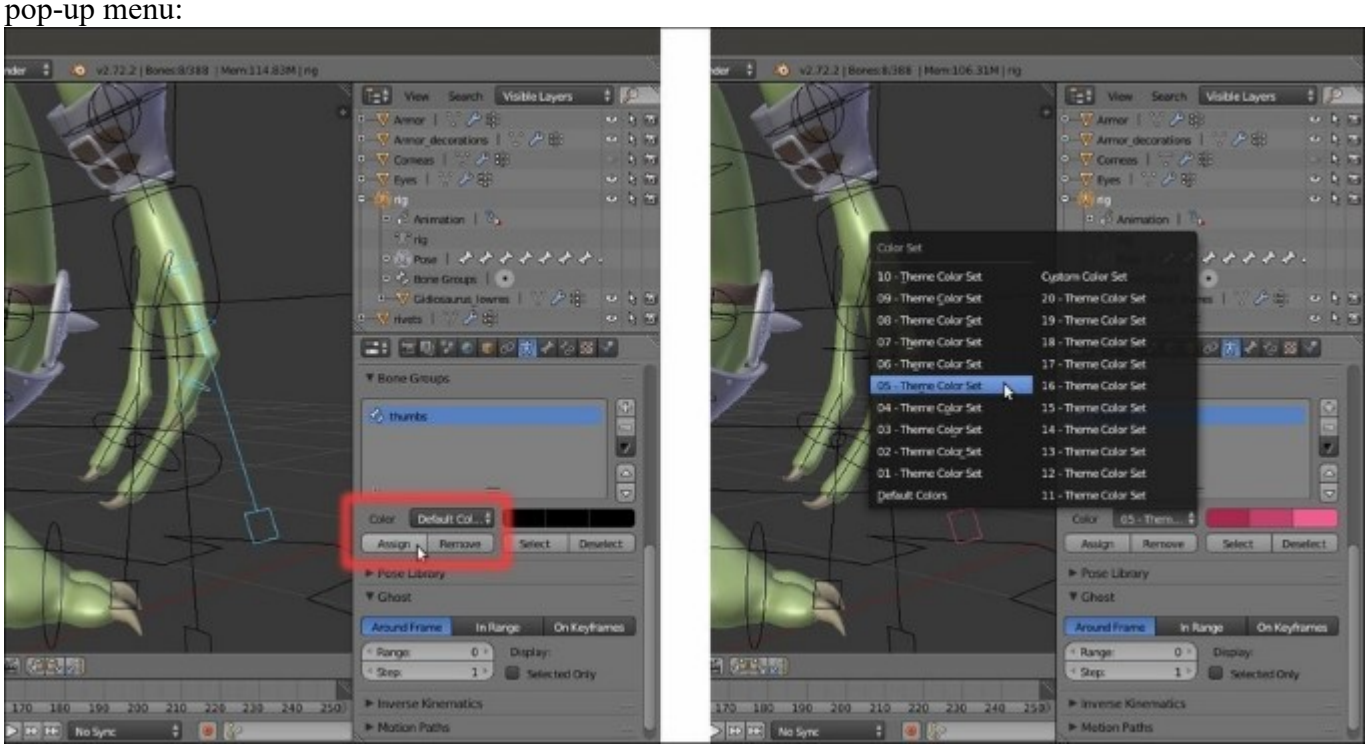
The **Actions** are stored inside the `.blend` file, but thanks to the **Fake User** they don't necessarily need to be linked to the rig to be preserved after saving and closing the file.

Note that the scaling operation for the selected keys of an **Action** in the **Action Editor** window (and the same for the **Graph Editor** and the **NLA Editor**) use the **Time Cursor** position as the pivot point. Also note that even though we did it in our recipe, it wasn't mandatory in this case to declare the *x* (horizontal) axis for the scaling.

There's more…

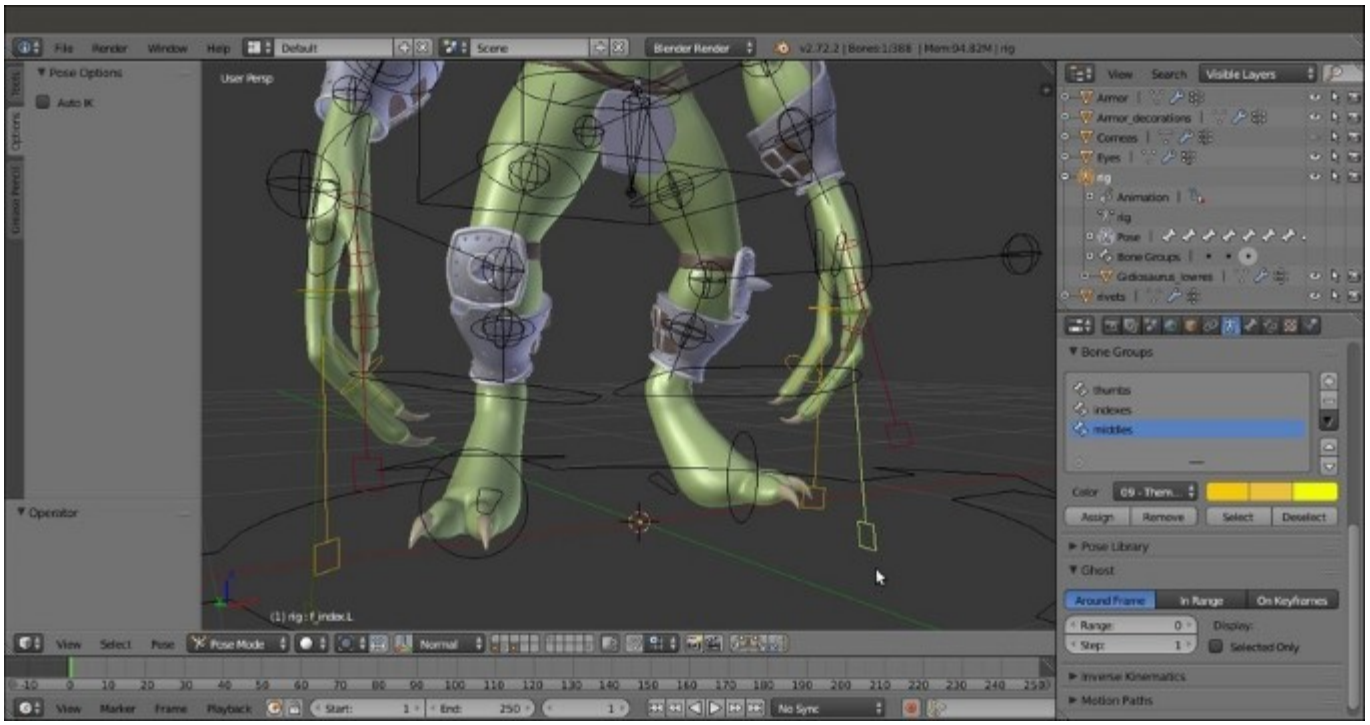
Organizing the bones' names in the list inside an action in the **Action Editor** window is a good way to quickly find the required item, but it can be improved even further by **Bone Groups**:

1. Open the `Gidiosaurus_library.blend` file and go to the **Outliner**; click on the eye icon to the side of the **rig** item to unhide it.
2. Select the **rig** and go to the **Object Data** window, then in the **Bone Groups** subpanel, click on the + icon to add a **bone group**.
3. Double click on it to rename it **thumbs**, then go into the 3D viewport and *Shift*-select all the **thumbs'** bones.
4. Click on the **Assign** button, then click on the **Color** slot to choose a **Theme Color Set** from the pop-up menu:



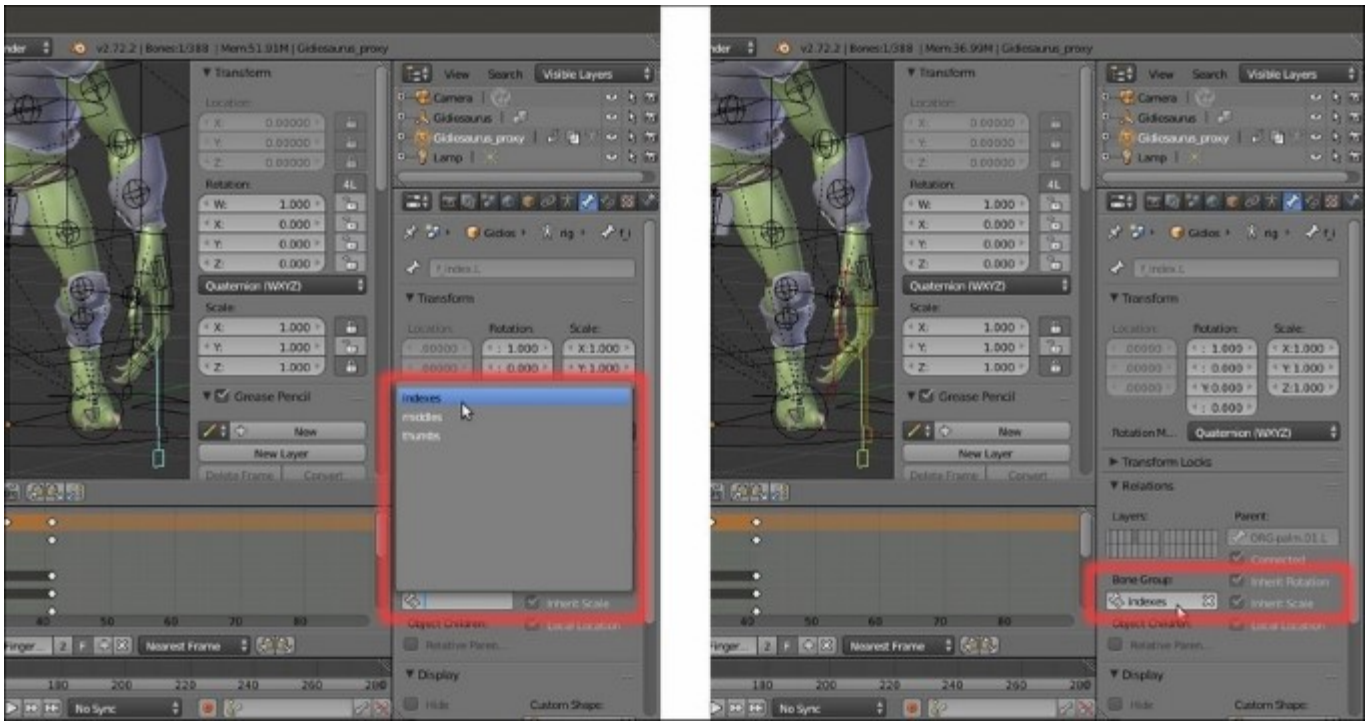
Choosing a Theme Color Set for the Bone Group

5. Repeat the steps from 2 to 4 for the other two fingers, thus creating the **indexes** and **middles** bone groups and selecting a different **Theme Color Set** option for each group:



Three different Bone Groups

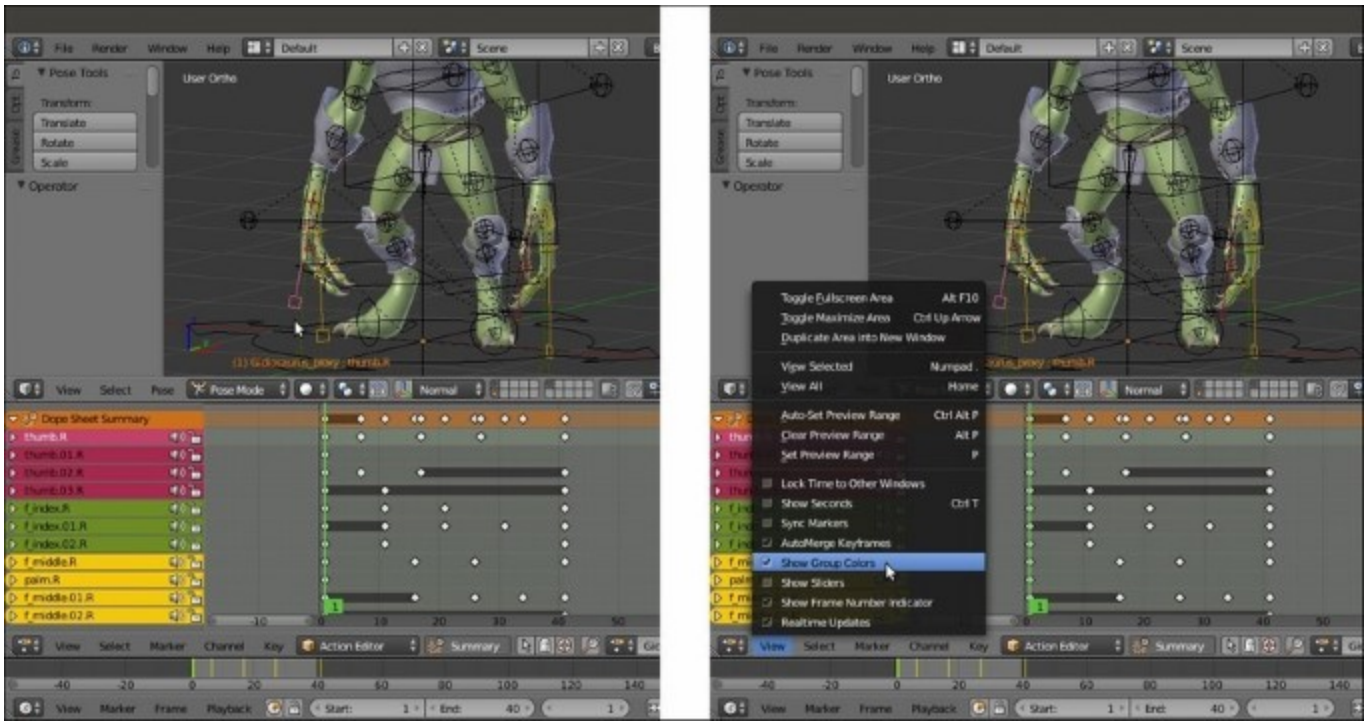
6. In the **Outliner**, hide the **rig** item again and save the file.
7. Re-open the `Gidiosaurus_walkcycle.blend` file; the colored bones don't show in the **proxified rig**, and this is because we had already proxified it and only later assigned the **bone groups** to the library file.
8. The solution to fix this is simply to select the affected bones one at a time and by going to the **Relations** subpanel under the **Bone** window, click on the **Bone Group** empty field to select the name of the appropriate group:



Reassigning the Theme Color Set to the proxified bones

By the way, it is always better to do the **Bone Groups** before the **proxy**, if possible.

The colors of the **Bone Groups** also show as *background color* for the bone channels inside the **Action Editor** window, making it a lot easier to select all the bones of a group; just be sure to have the **Show Group Colors** item enabled in the **View** menu on the **Action Editor** toolbar:



The Group Colors enabled for the bones

You can find the library with the colored fingers' control bones under the alternative file named `Gidiosaurus_library_colors.blend`.

See also

The walk cycle and the other actions we built in this recipe are, from an *animation point of view*, very simple and basic, not meant to teach you *how to animate* but only to show enough of Blender's tools for you to easily start animating a rigged character.

If you want to go deeper into the animation process, in Blender or not, here are some links to visit:

- http://www.fjasmin.net/walk_cycle_tutorial/index.html
- http://cgcookie.com/blender/2010/01/24/learning-basic-animation-and-a-walk-cycle/
- http://wiki.blender.org/index.php/Doc:2.6/Manual/Animation
- http://wiki.blender.org/index.php/Doc:2.6/Manual/Animation/Techs

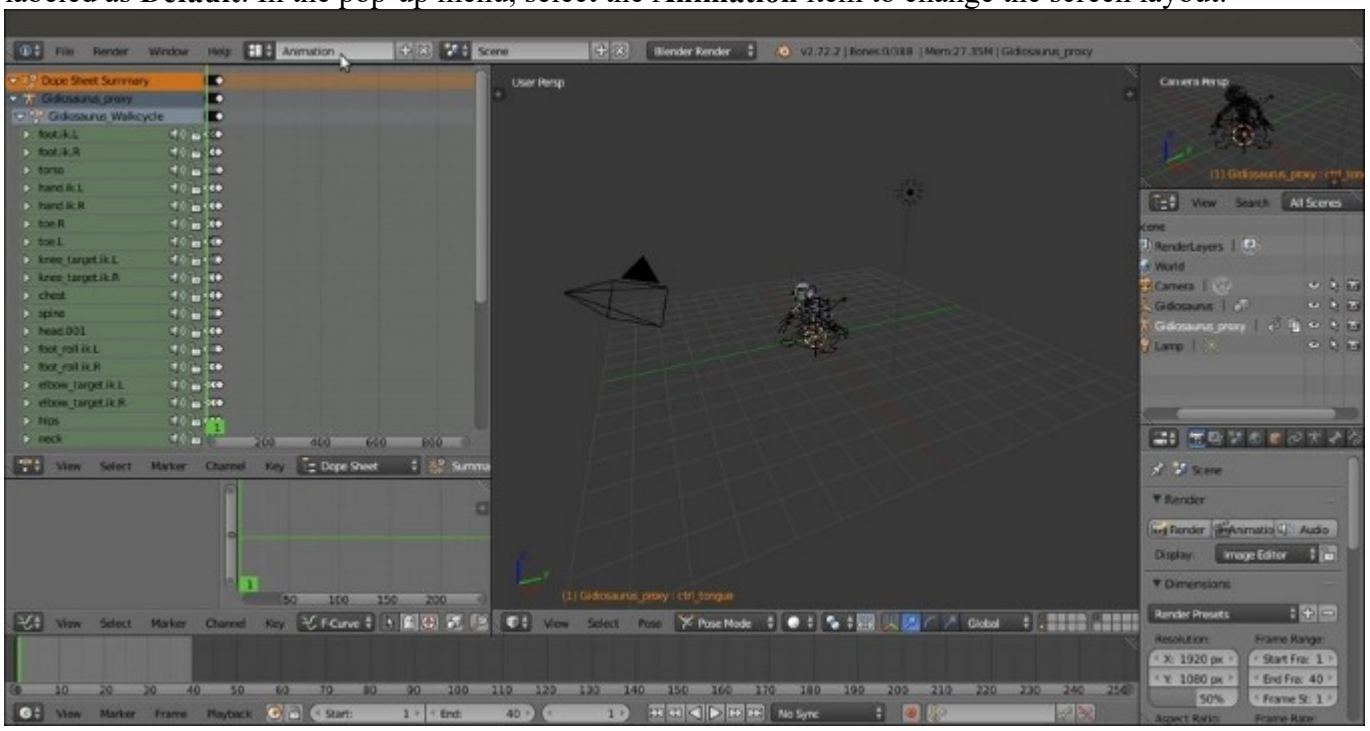
Tweaking the actions in Graph Editor

In the previous recipe, we built **Actions** by setting position, rotation, and/or scaling keys, which Blender **interpolates through F-Curves** to create the character's animation. In this recipe, we are going to see the **Graph Editor** window, a tool to modify these **F-Curves** to fix errors or fine-tune the movements of the animated character.

Getting ready

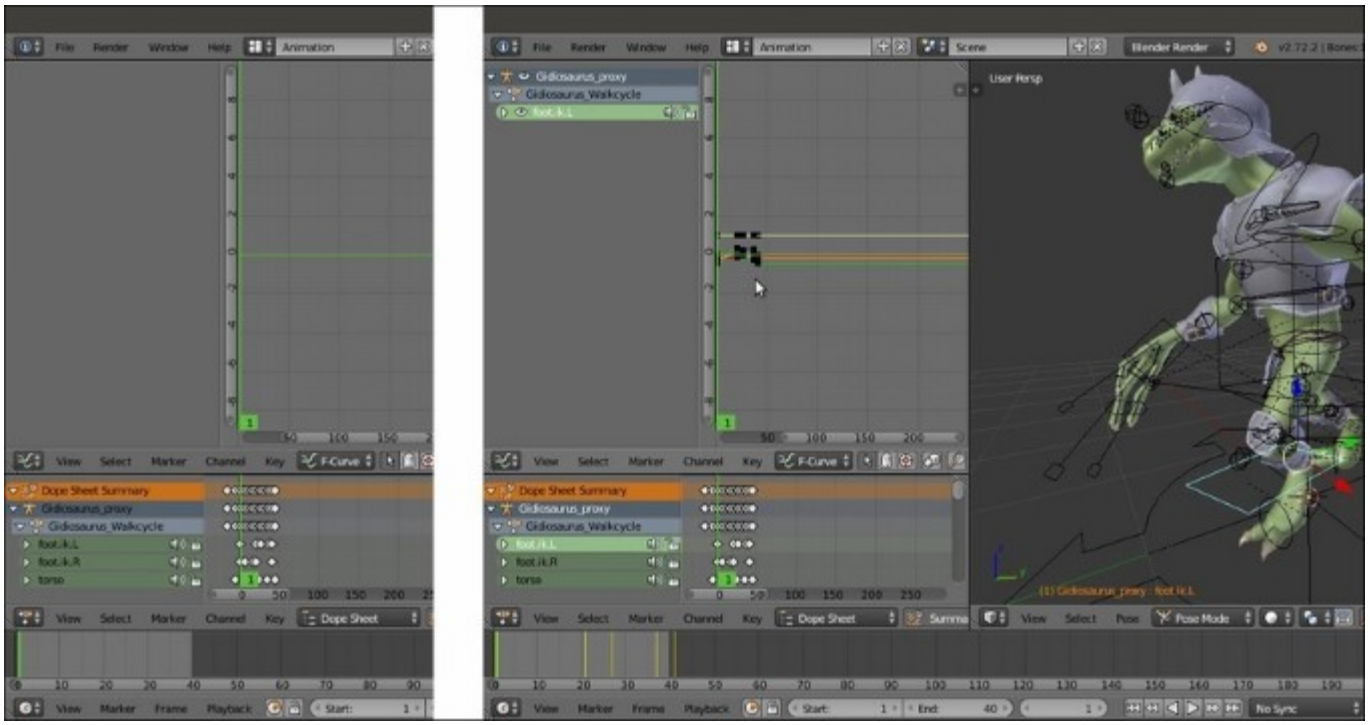
Open the `Gidiosaurus_walkcycle.blend` file.

1. If it's not already loaded, in the **Action Editor** window, load the **Gidiosaurus_walkcycle** action.
2. Go to the top main window header and click on the two little arrows to the left side of the button labeled as **Default**. In the pop-up menu, select the **Animation** item to change the screen layout:



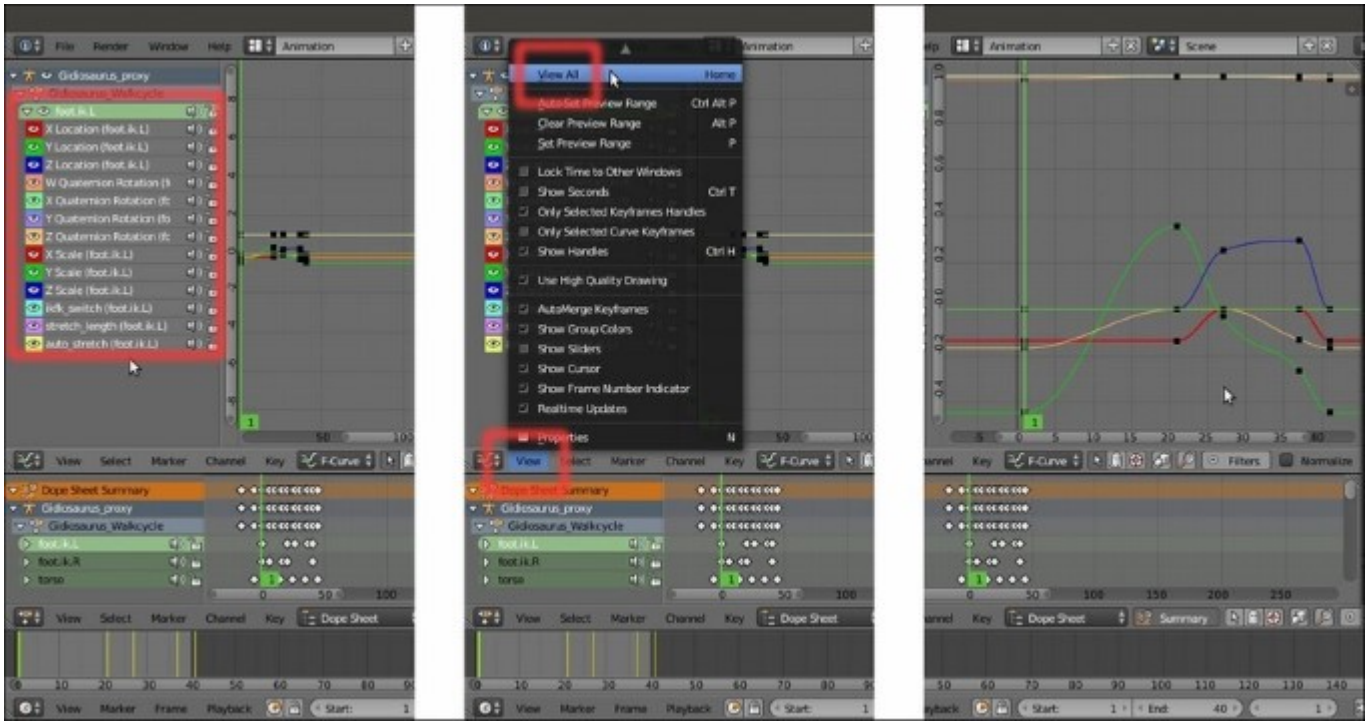
The premade Animation screen layout

3. Press the *Ctrl* key and left-click on the **top right corner** of the **Dope Sheet** window, then drag the mouse towards the **Graph Editor** window below to switch the two windows.
4. Go to the 3D viewport and zoom to the character to select the **foot_ik.L** bone; the **F-Curves** for the selected bone appear in the **Graph Editor** window:



The F-Curve of the animation keys of the selected bone in the Graph Editor window

5. Expand the **foot_ik.L** item in the **Graph Editor** list-tree by clicking on the little arrow to the side of the item itself, then click on the **View** item in the toolbar and select the **View All** item to better visualize the curves inside the **Curve Editor** area:



The list of the available F-Curves for the selected bone and the automatic zoom through the View All item

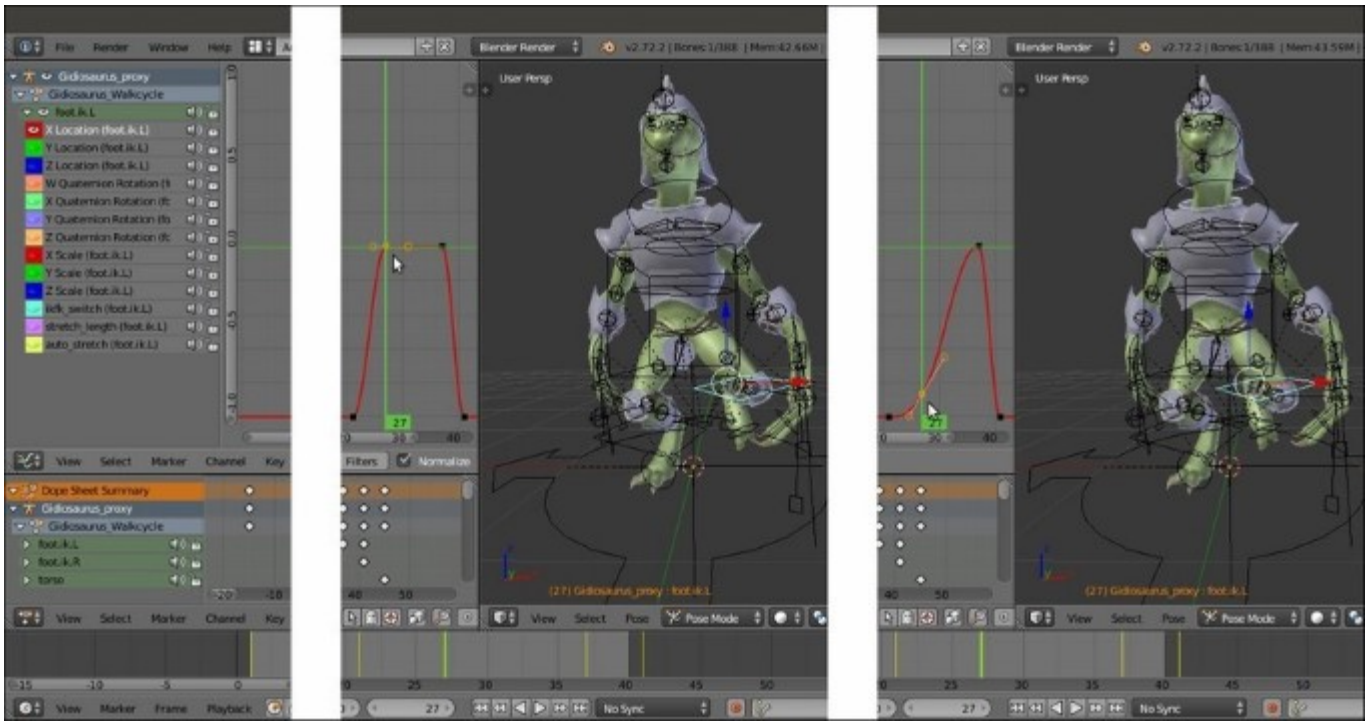
6. Hide (by clicking on the eye icon) and/or delete (select using left-click and the *X* key) the unnecessary curve items such as (at least in this case) **X Scale**, **Y Scale**, **Z Scale** or **ikfk_switch (foot_ik.L)**, and so on. Join the unnecessary windows together and adjust the size of the **Edit Area** (the part with the keyframes) in the **Dope Sheet** to make them more easily readable. Optionally, enable the **Normalize** item in the **Graph Editor** toolbar to show all the **F-Curves** in a normalized **-1** to **1** range.
7. Save the file as `Gidiosaurus_F-Curves.blend`:

The Animation screen with a bit of customization

How to do it…

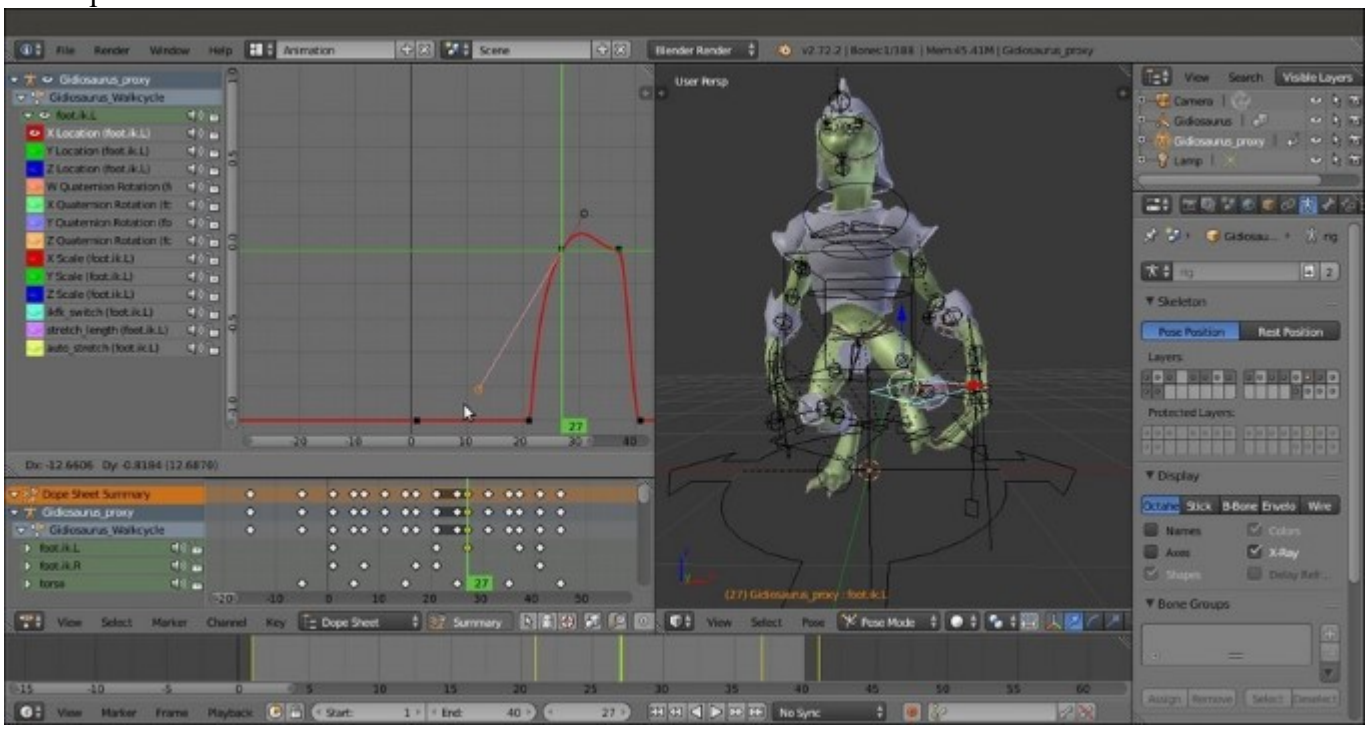
By selecting a curve name item and/or hiding the others in the **Graph Editor** list-tree, we can concentrate on one curve at a time. For example, what if we want to change the position of the **right foot** at frame **27** on the global *x* axis, when it's high off the ground?

1. Just left-click on the **X Location (foot_ik.L)** item in the list to highlight it and/or simply hide the others. Right-click on the curve keyframe/control point at frame **27** to reveal the **handles**, then press *G* | *Y* to move the keyframe handles on the vertical axis and see the foot move accordingly in the viewport on the global *x* axis:



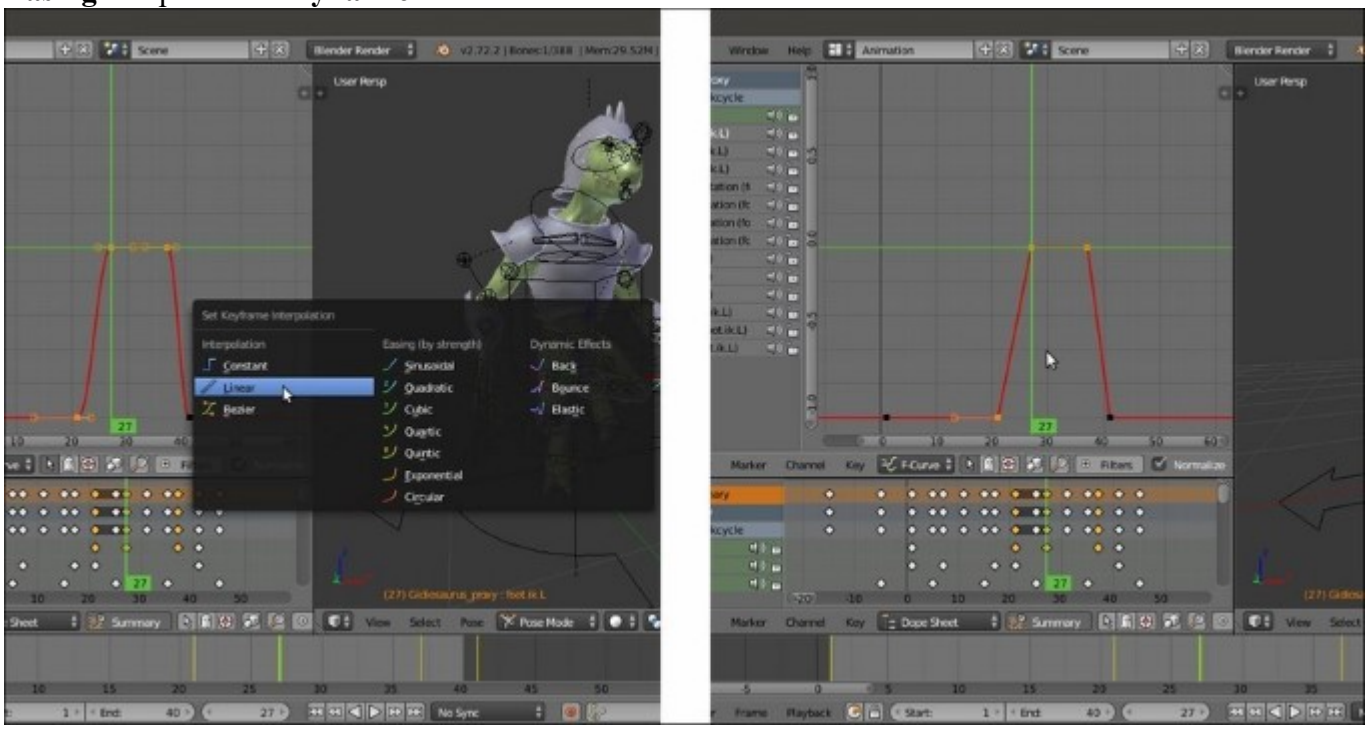
Editing the points of the F-Curve to tweak the bone's position

2. Or else, right-click only on one of the handles of the keyframe to move it and change the curve's envelope:



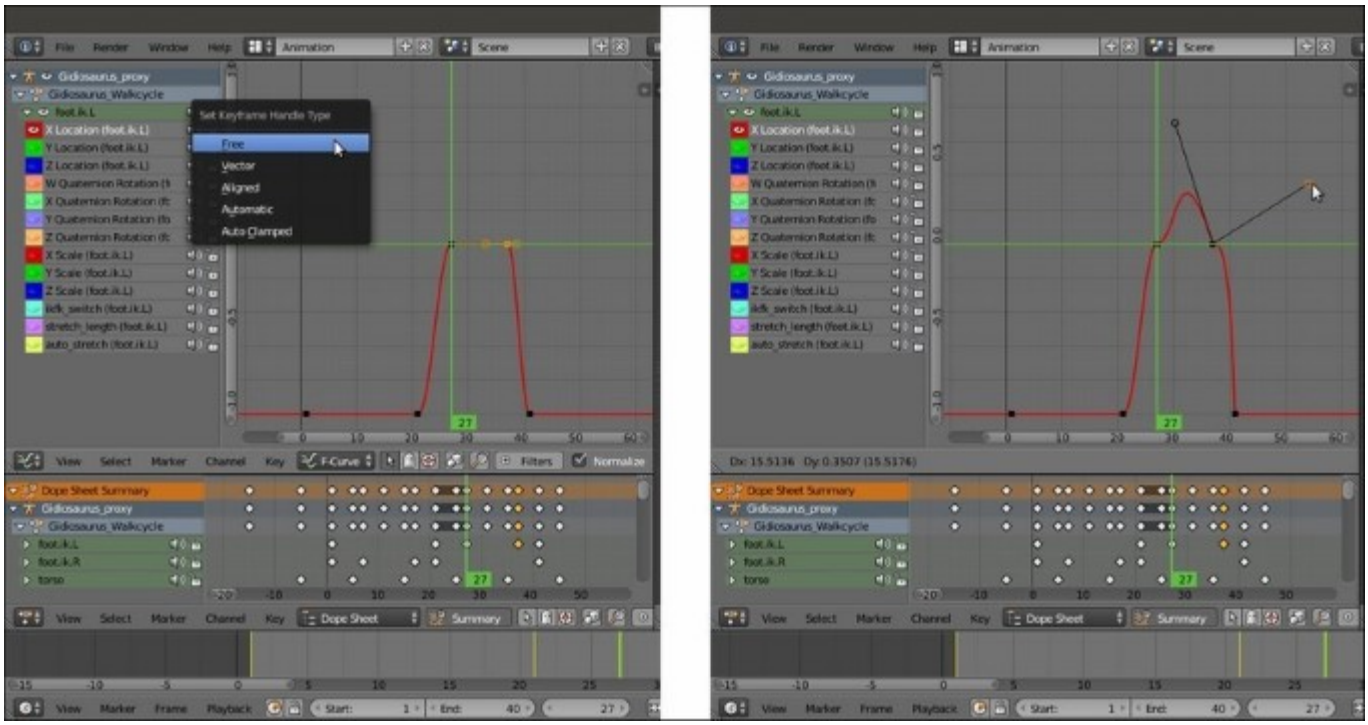
Changing the envelope of the F-Curve by modifying one of the point's handles

3. By *Shift*-selecting two or more keyframes of an **F-Curve** and pressing the *T* key, it is possible to set the **interpolation** type through the **Set Keyframe Interpolation** pop-up menu; by default the **F-Curves** are **Bezier**, but they can be switched to **Linear** or **Constant**. There are also **Easing** and pre-made **Dynamic** effects:



Changing the F-Curve Interpolation mode

4. Finally, the handles' type can also be set through the **Set Keyframe Handle Type** menu by pressing the *V* key; by default the handles are **Aligned**, but they can be set as **Free**, **Vector**, **Automatic**, and **Auto Clamped** too:



Changing the handle's type to further tweak the curve's envelope

See also

- http://wiki.blender.org/index.php/Doc:2.6/Manual/Animation/Editors/Graph

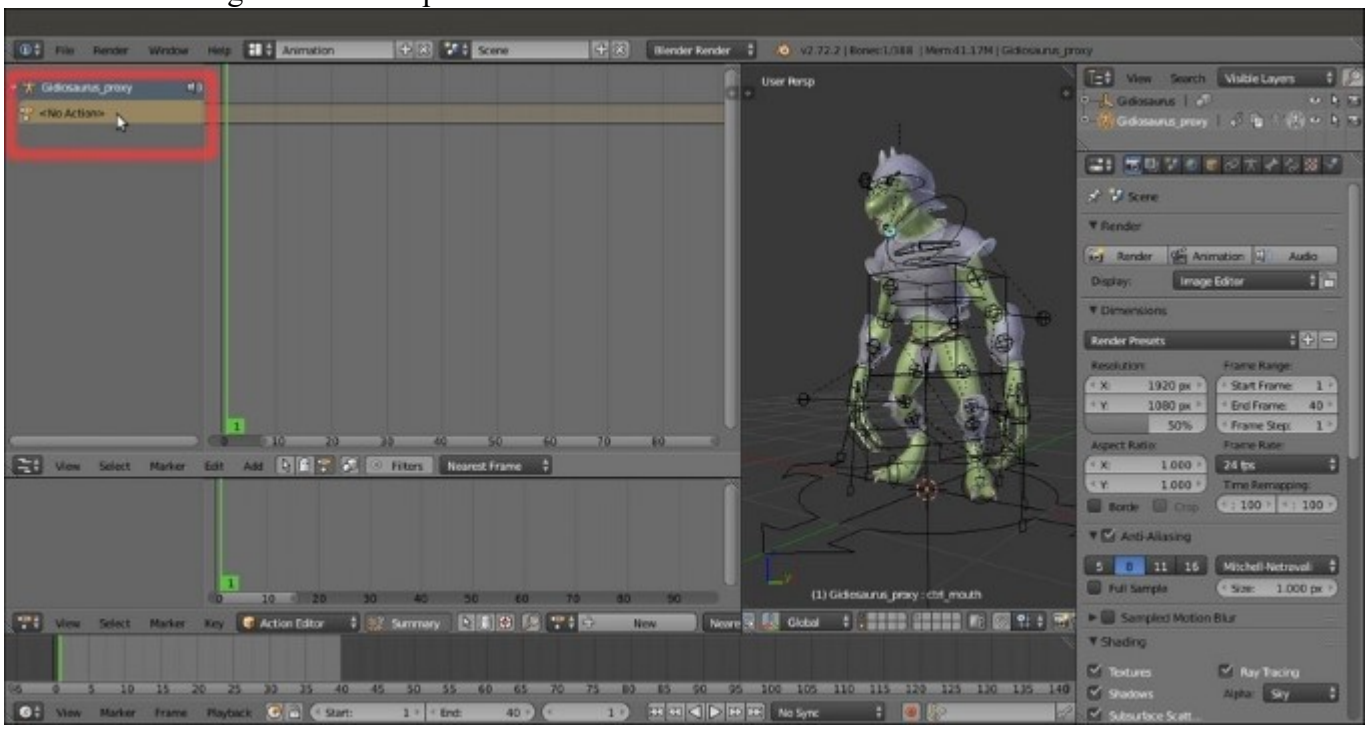
Using the Non Linear Action Editor to mix different actions

It's finally time to use the **NLA Editor** to compose a longer animation using the actions we built in the previous recipes.

Getting ready

As usual, first let's prepare the screen:

1. Start Blender and press *Ctrl* + *Alt* + *U* to call the **User Preferences** panel; in the **Editing** tab, enable the **Allow Negative Frames** item.
2. Click on the **Save User Settings** button and close the panel.
3. Load the `Gidiosaurus_F-Curves.blend` file and switch the **Graph Editor** to the **NLA Editor** window, and the **Dope Sheet** below it with the **Action Editor** window.
4. If necessary, click on the **X** icon button in the **Action Editor** window toolbar to unlink any action from the rig and clear the pose:



The Animation screen with the (still empty) NLA editor window

How to do it…

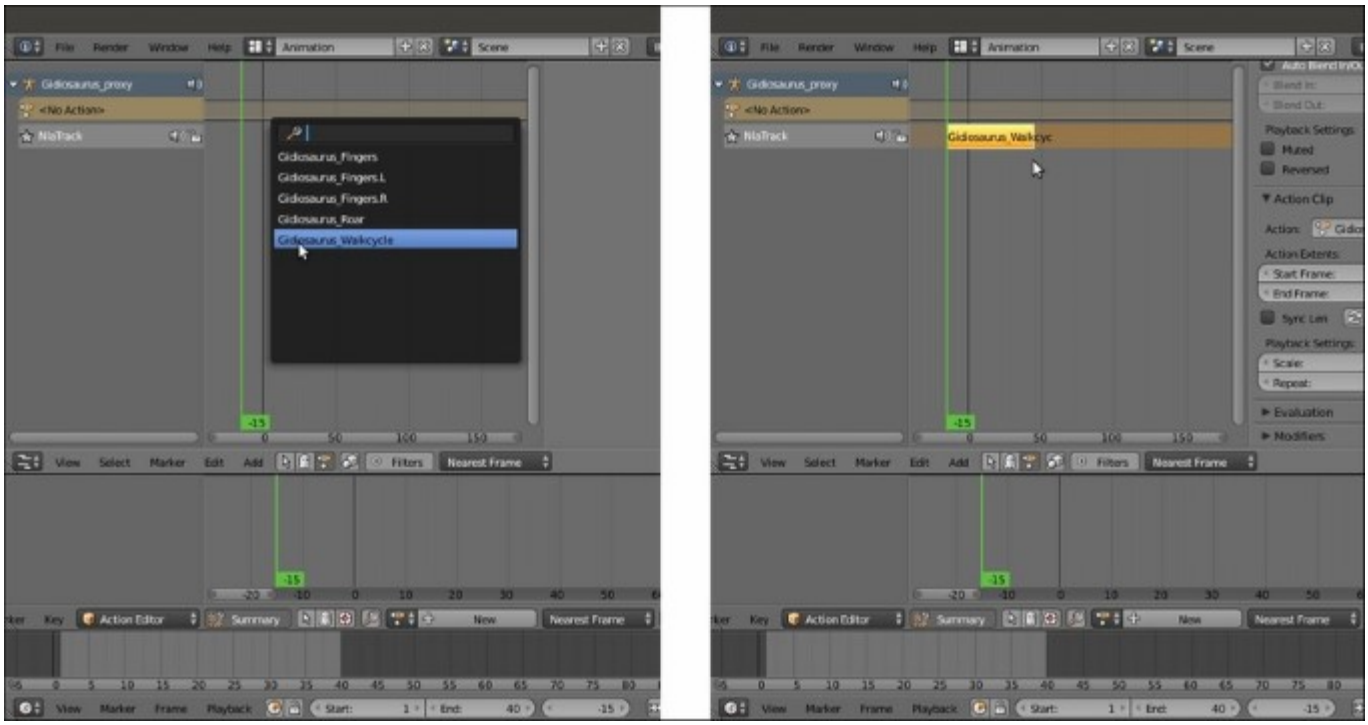
We are going to add **Action strips** to the **Gidiosaurus_proxy** rig, so it's mandatory to have at least one bone selected (any one, but in this case, it's the **ctrl_mouth** bone):

1. Put the mouse cursor in the **Track Region** (**NLA-stack**) of the **NLA Editor** window, right under where it shows **Gidiosaurus_proxy** | **<No Action>** items, and press *Shift* + *A* to add **a NlaTrack** channel:

Adding a first track to the NLA Editor window

Now, take a moment and load the **Gidiosaurus_walkcycle** action in the bottom **Action Editor** window to see the action extension; it starts at frame **-15** and ends at frame **45**.

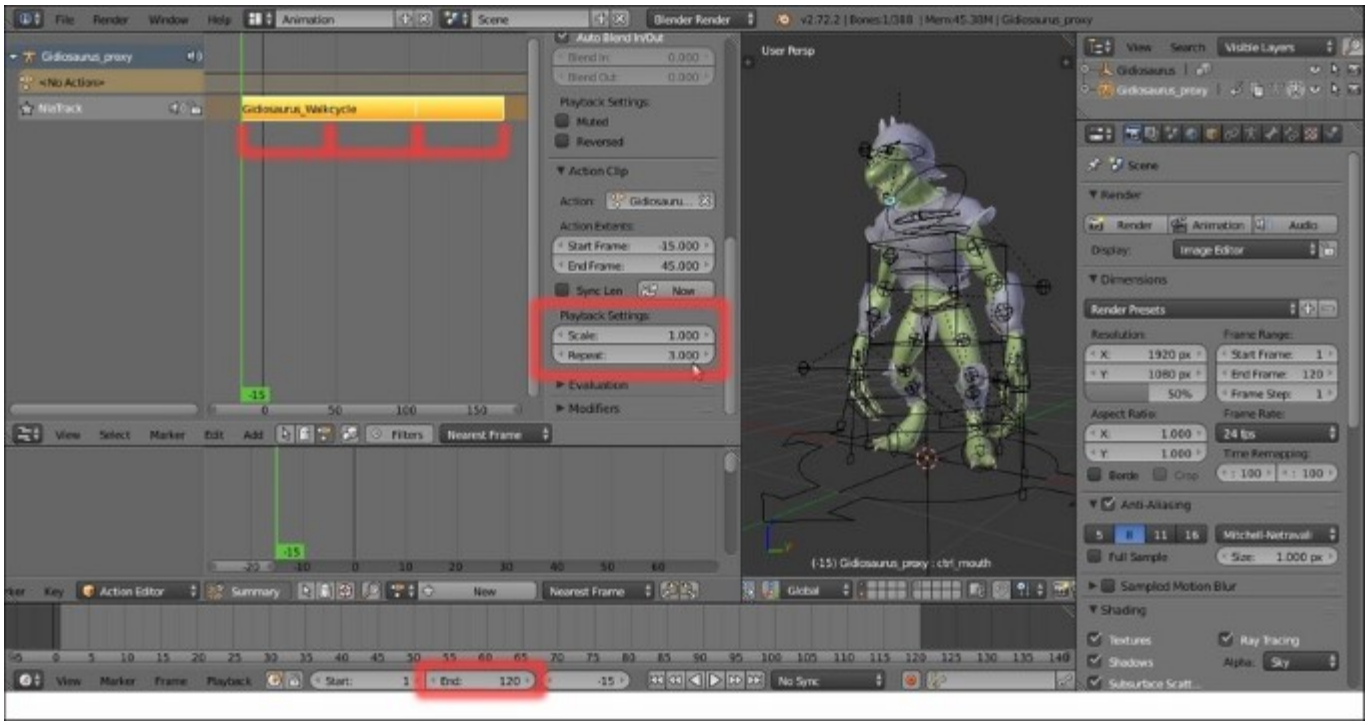
2. Unlink the action in the **Action Editor** and move the **Time Cursor** to negative frame **-15**; put the mouse cursor in the **Strip Edit** area to the right side of the **NlaTrack** item and again press *Shift* + *A*. From the pop-up menu, select the **Gidiosaurus_Walkcycle** item:



Loading the Gidiosaurus_walkcycle action into the track

A yellow action strip, with the **Gidiosaurus_Walkcycle** name superimposed, is added to the track at the **Time Cursor** location (the vertical green bar showing the frame number. If you now press the **Play** button in the **Player Control** on the **Timeline** toolbar, the animation starts at frame **1** and because the animation is only **40** frames long, it loops correctly, exactly as if the action was loaded in the **Action Editor** window.

3. If not already present, press the *N* key to call the **Properties** sidepanel of the **NLA Editor** window, right-click on the action strip to select it, and then go to the **Action Clip** subpanel. Under **Playback Settings**, set the **Repeat** value to **3.000**.
4. Click on the **End** button in the **Timeline** toolbar and change the frame value from **40** to **120** (**40** frames x **3**):

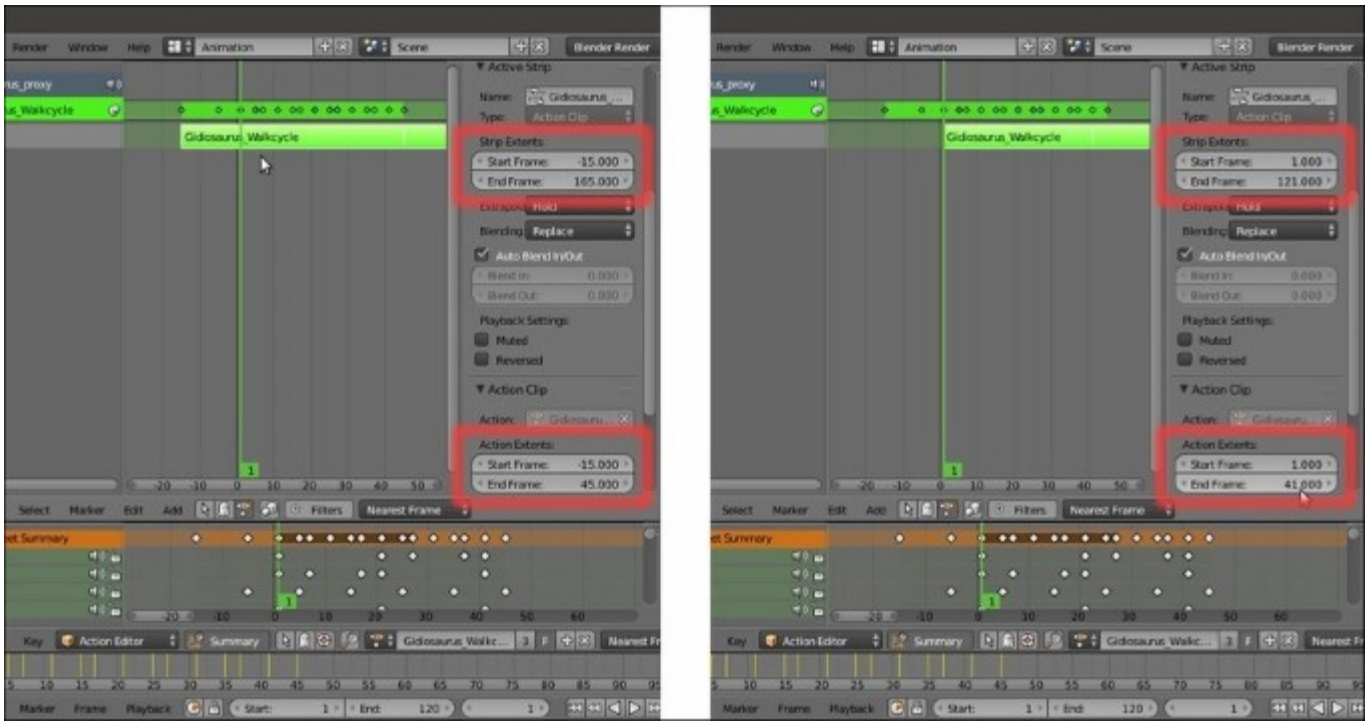


The Gidiosaurus_walkcycle action set to be repeated three times

If you press the **Play** button now, the animation is repeated **3** times *but* it doesn't loop correctly anymore because the **negative frames** keys are also included, in both the second and third repetitions. This is because we loaded the action at frame **-15**, so this is the **Start Frame** value for **Action Extents** (**Start Frame** = **-15**, **End Frame** = **45**).

Hence, some adjustment must be done to the action strip:

5. First, move the **Time Cursor** to frame **1**; with the strip selected, press the *Tab* key to go into **Edit Mode** and make the inner keys of the strip visible, both above the strip in the **NLA Editor** window, and as an **Action** in the **Action Editor** window. This way it's simpler to understand what keys are at what frame, and so on.
6. Second, go to the **Active Strip** subpanel and under the **Strip Extents** item, set the **Start Frame** value to **1.000**.
7. Go to the **Action Clip** subpanel and under the **Action Extents** item, set **Start Frame** to **1.000** as well and the **End Frame** value to **41.000**:

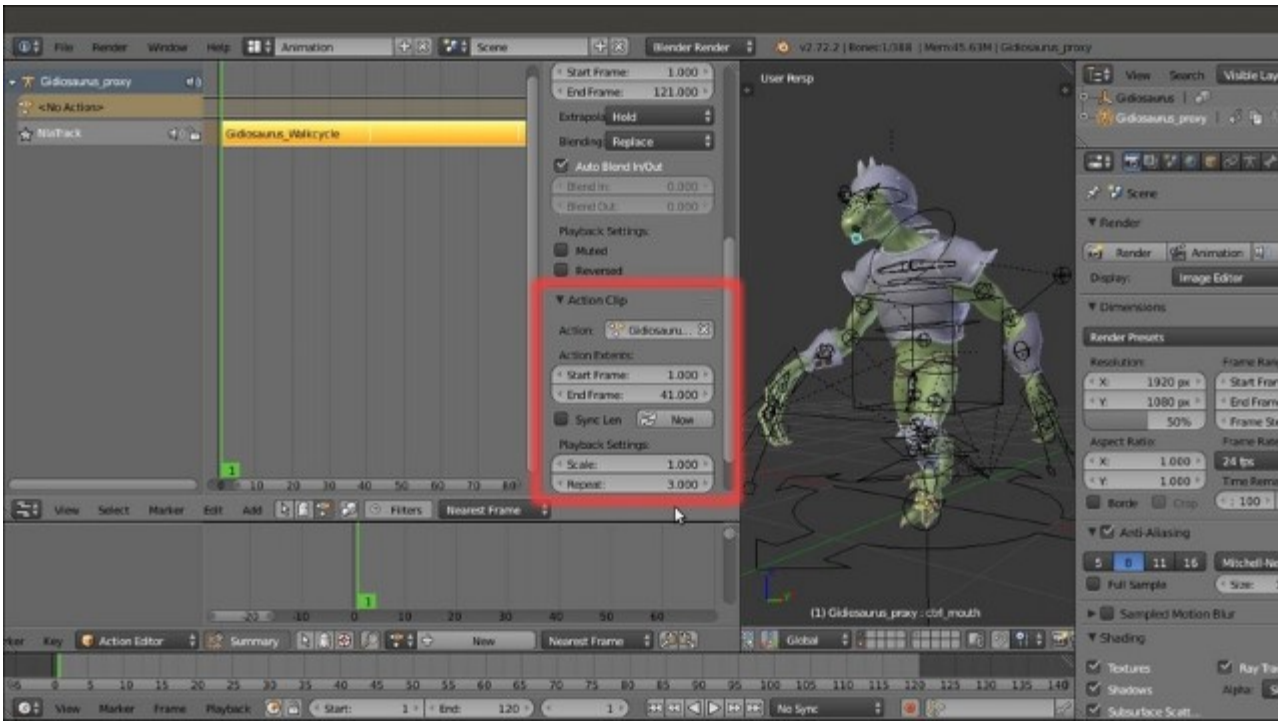


The action in Edit Mode and the Strip Extents and Action Extents values in the Properties subpanel of the NLA window

8. Press *Tab* to go out of **Edit Mode**.

   Now, the walk cycle animation loops correctly for all the **120** frames, and obviously it is also possible to loop it even more by raising the **Repeat** value.

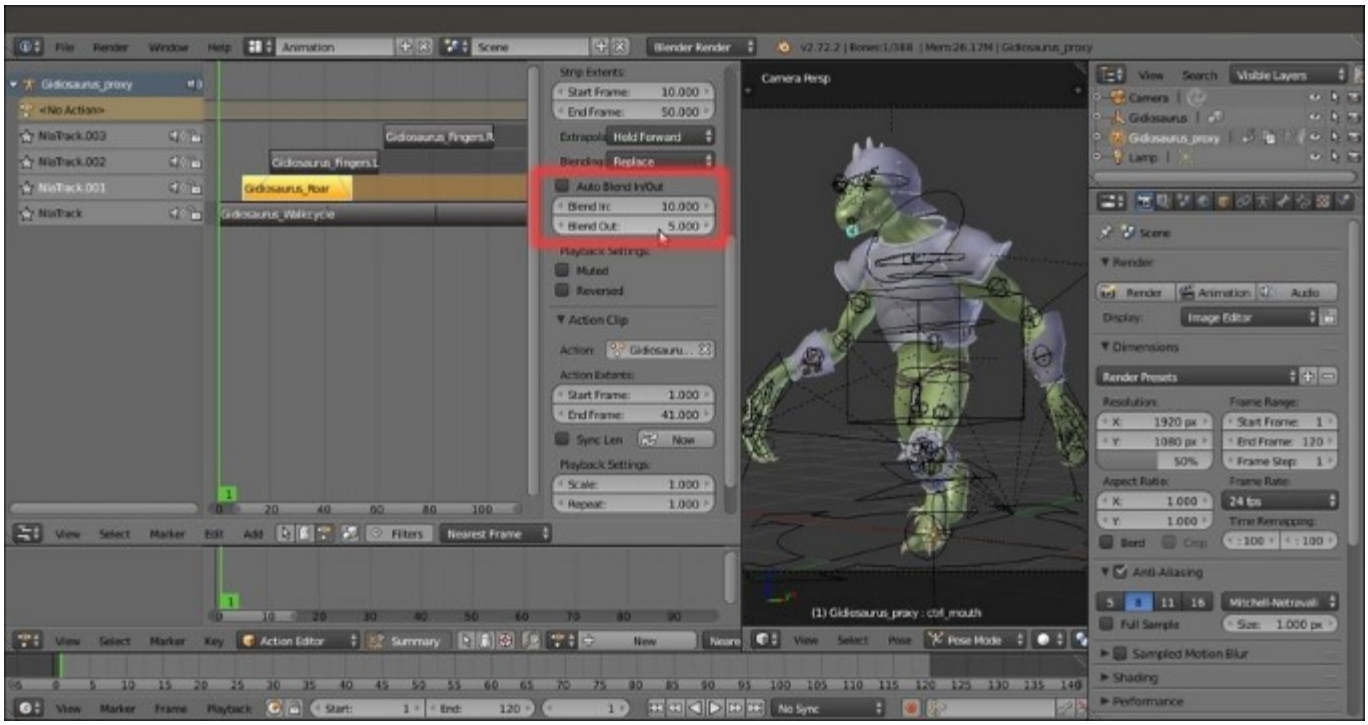
   So, the correct and fastest procedure would have been, from the start:
   1. At frame **1**, load the action strip in the **NLA Editor** window.
   2. In the **Properties** sidepanel, under the **Action Extents** item in the **Action Clip** subpanel, set the **Start Frame** value to **1.000** and the **End Frame** value to **41.000**.
   3. Under **Playback Settings**, set the **Repeat** value to **3.000** and the total length of the animation to **120** frames in the **End** button of the **Timeline** toolbar:



Recapitulating the action extents values to be set

Now, let's see how to add the other actions:

1. Put the mouse cursor under the **NlaTrack** item and press *Shift + A* to add a new track (**NlaTrack.001**); load the **Gidiosaurus_Roar** action strip and move it (*G* key) to start at frame **10**.
2. Select the **Gidiosaurus_Walkcycle** strip and in the **Active Strip** subpanel, disable the **Auto Blend In/Out** item but leave the values as **0.000**. Select the **Gidiosaurus_Roar** strip and disable the **Auto Blend In/Out** item as well, then set the **Blend In** value to **10.000** and the **Blend Out** value to **5.000**.
3. Add **two** more tracks, select the **NlaTrack.002** track and load the action strip **Gidiosaurus_fingers.L**, then select the **NlaTrack.003** track and load the action strip **Gidiosaurus_fingers.R**.
4. Select the **Gidiosaurus_fingers.L** strip and in the **Active Strip** subpanel, disable the **Auto Blend In/Out** item, and leave the values as **0.000**; repeat for the **Gidiosaurus_fingers.R** strip.
5. Move the two strips separately in different positions inside the **120** frames animation range.



Setting the Blend In and Blend Out values to mix the other actions

6. Press the **Play** button in the **Player Control** on the **Timeline** toolbar to watch the composited animation and save the file as `Gidiosaurus_NLA.blend`.

At this point it could be possible to start to render at least some **OpenGL** preview to see the result, but there are still several steps missing in our workflow before we reach the final goal, from the **texturing** to the **shaders**, **lighting**, and finally **beauty-rendering** and **compositing**; all stuff that we'll see in the next few chapters.

See also

- http://wiki.blender.org/index.php/Doc:2.6/Manual/Animation/Editors/NLA_Editor

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.