

Character Animation Tutorial

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Note: When creating animations, you should be very careful what you do with the FloorRef. When walking or running, the character should stay at a constant height from the FloorRef object. When jumping, the Character should increase it's distance from the FloorRef object to give the appearance of translation away from the floor. Characters should ALSO have a "stationary root" that only moves relative to the floor reference (e.g. for walking, jumping etc.) but that does not move constantly (i.e. in an idle animation the root should not move). This is **very important** if you wish to **use your Characters with the Virtools Multuser Pack**, or the dead reckoning algorithm used for predicting distributed objects will not work correctly. In short:

- Make sure the (stationary) root element does not move at all when the character is in its default ('wait' or 'idle') animation.
- For other animations make sure the root moves a minimum; in a walk animation along the Z axis for example, make sure that the root moves along the Z axis only - there should be no movement on the X or Y axes.



Note: Ensure the animations you create are 'real' in the sense that the Character actually performs them and does not 'pretend' to perform them - e.g. for a walk animation you should ensure that your character actually moves (translates) in your modeling application, and does not perform the animation in situ ("on the spot" or "in place").

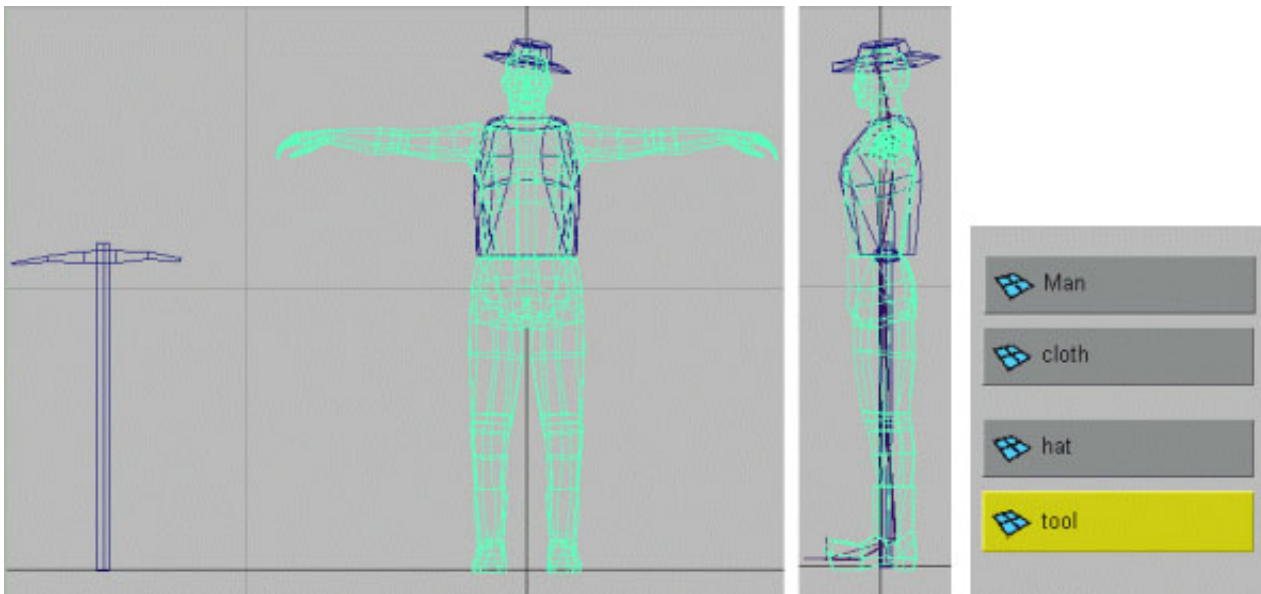
Overview

This tutorial is designed to show you the exporting data process from Maya to Virtools for a character animation scene. It uses the Maya to Virtools plug in. Even though this is a basic multi animation scene, you are bound to have a working knowledge of Maya's joint, IK and texturing tools, as it is not a 'how to use Maya' tutorial. Before exporting, it helps you in the understanding of this sample scene. You will see what kind of entities are animated and exported, then how different animations will be combined in Virtools on a single character.

Modelling

In the beginning, you must use a polygonal definition of your character.

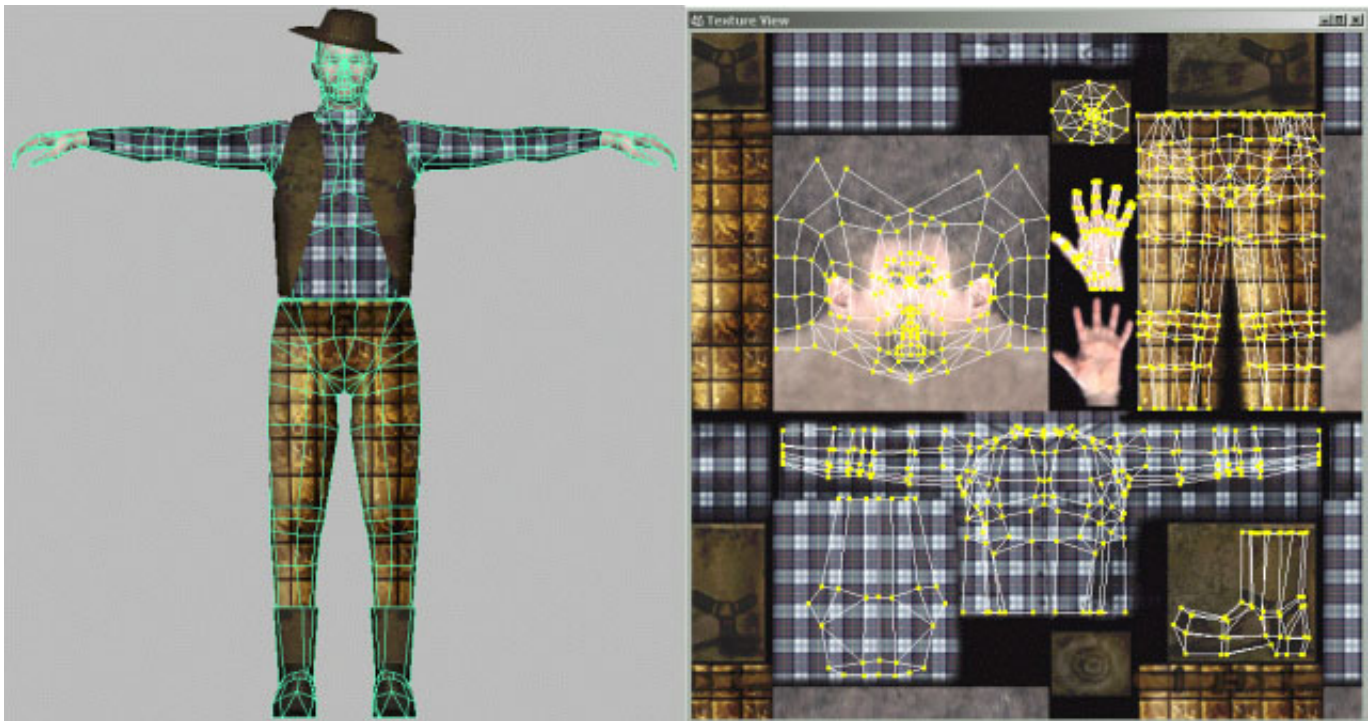
This Character is generally one block designed as it is skinned to a skeleton. Although, you are able to skin other parts in the same time or parent others directly to a joint too.



"Man" is the principal mesh but "cloth" will also be skinned to the root joint. You see "hat" and "tool", two polygon models which will be simply parented to the joints.

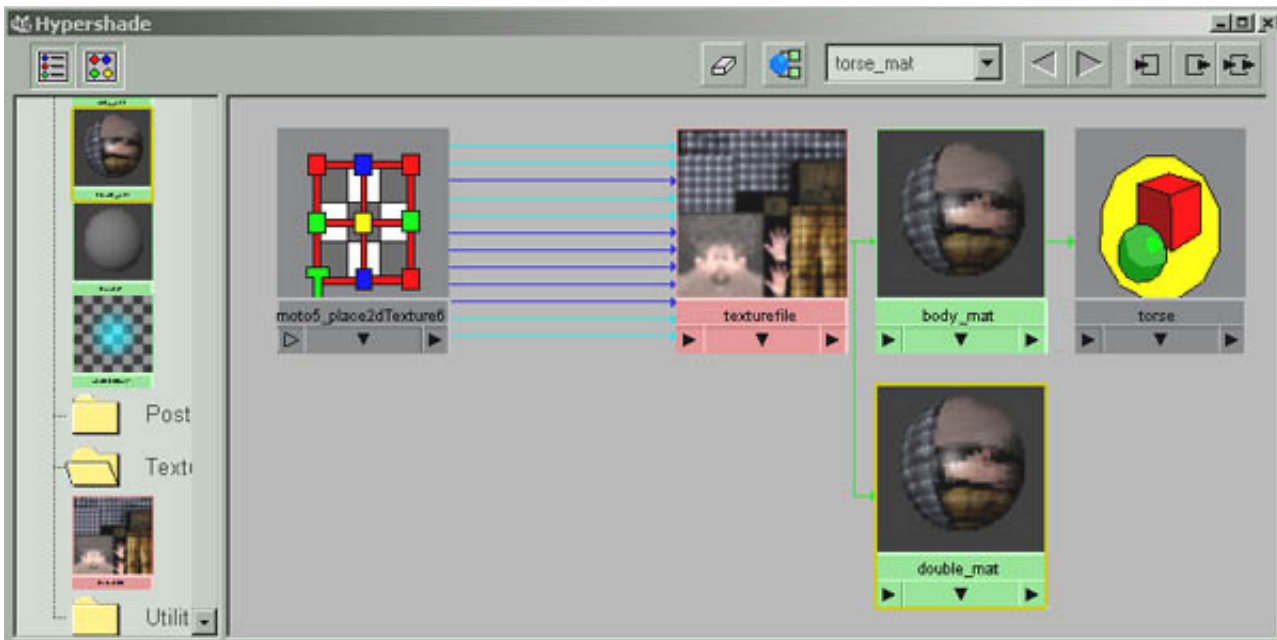
Texturing

To dress the character, a planar mapping is just created in the front view, on the mesh "Man". Same thing for the others meshes. Notes that hands (parts of the "Man" model are mapped with a **Y planar projection** like the "hat", though the main body with "cloth" and "tool" uses a **Z planar projection**. But every objects in this scene uses a single texture image. Then **Cut Texture** operations and UV transformations achieve the UV management in the **Texture view**.



This texture compilation is a 256x256 image map where all UVs are precisely positioned.

In your **Hypershade**, you must notice that the image map is attached to the material by a **Place2DTexture** node. It's the normal way to make a projection in order to write the mapping coordinates in the UV. If you experiment mapping projection for data real time exporting, don't use **Place3DTexture** and **Projection** nodes as they don't affect UV. Moreover be very careful not to change any values inside the **Place2DTexture** node. For the UV tweaking, only the UV manipulations achieved in the **Texture View** are really saved during the exporting process.



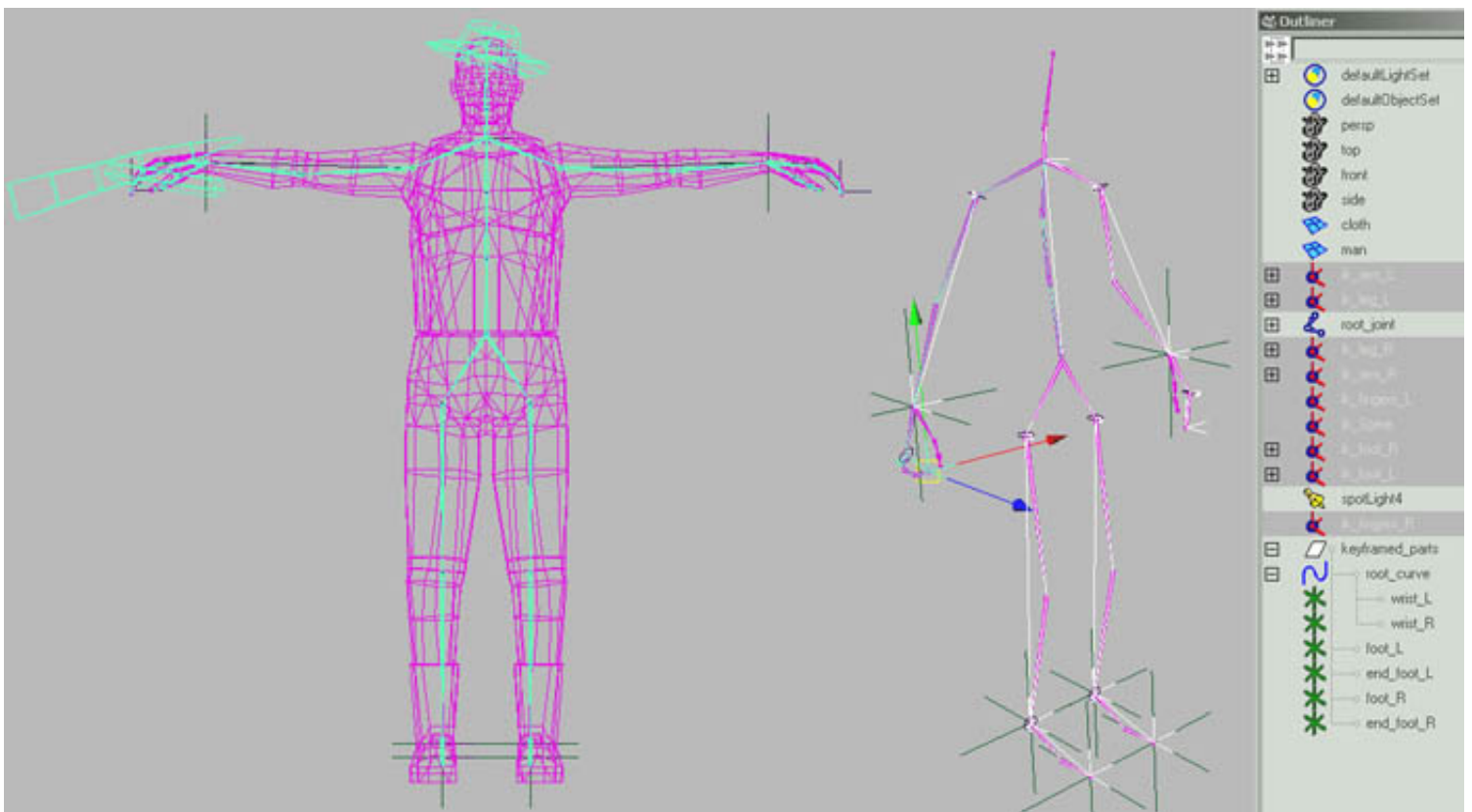
In this **Hypershade** view, you can see 2 materials, using the same texture file. The first one "body_mat" is for the objects "Man", "hat" and "tool". The second one "double_mat" is only for the open object "cloth", and you will assign a **Double Sided** flag, later in Virtools, to this material. Indeed, this mesh must be viewed from inside and outside, so faces need to be set to double side.

Skeleton and IKs

To set up a character animation for real time animation, you must know that more the skeleton will be complex, and keys set, more the animation file will be heavy. Several methods can be used, depends of the character, but generally, make it as simple as possible.

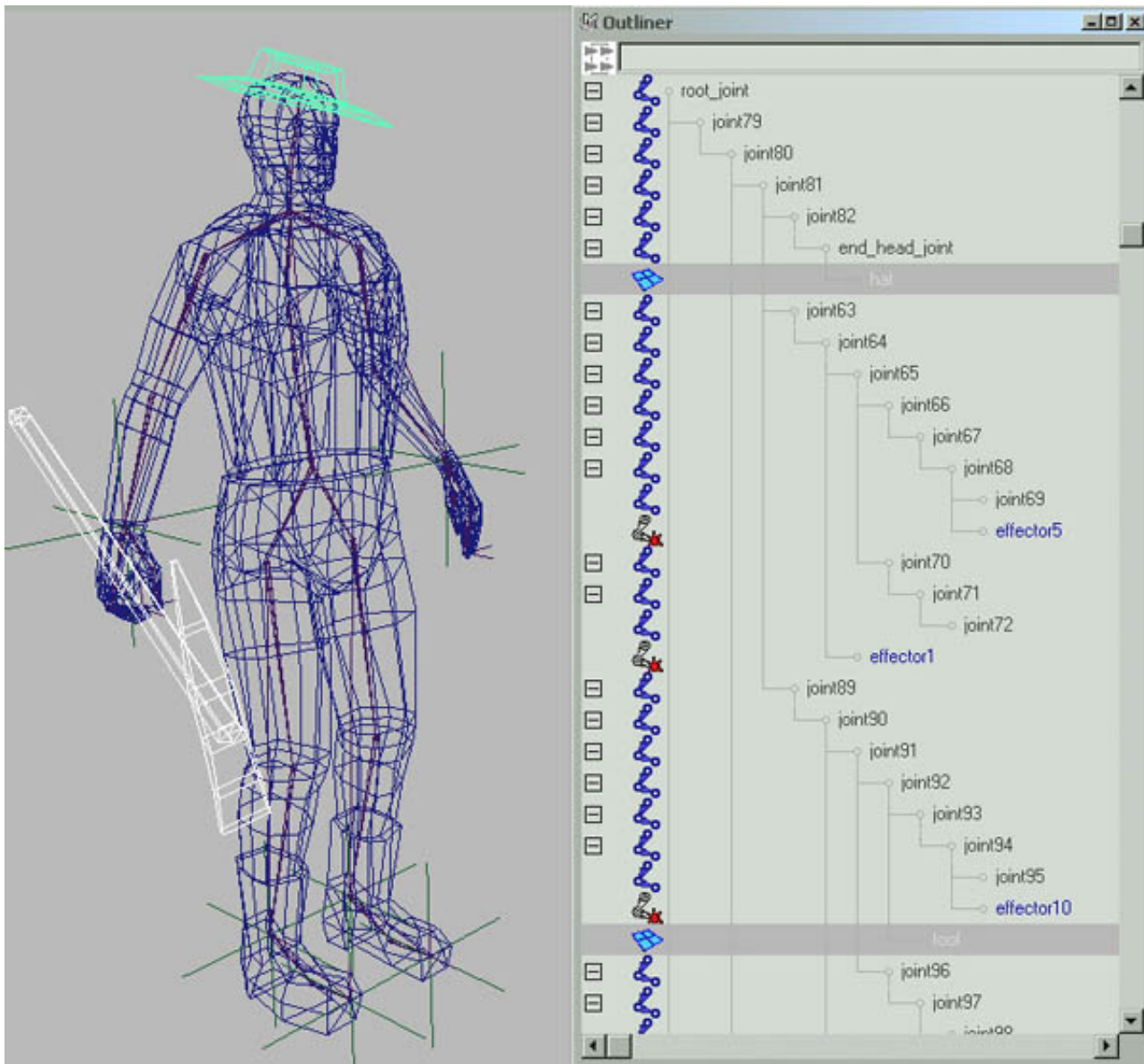
The Virtools exporter allows you to conserve keys on **Joints, Ikhandles, IkSplineHandles, locators**. Examine this Maya scene to discover how the character is structured.

- First, the skeleton is build in this modelling and texturing pause.



- **IKhandles** are created , "Man" and "cloth" are both skinned on the skeleton with the **Smooth Skin** method.

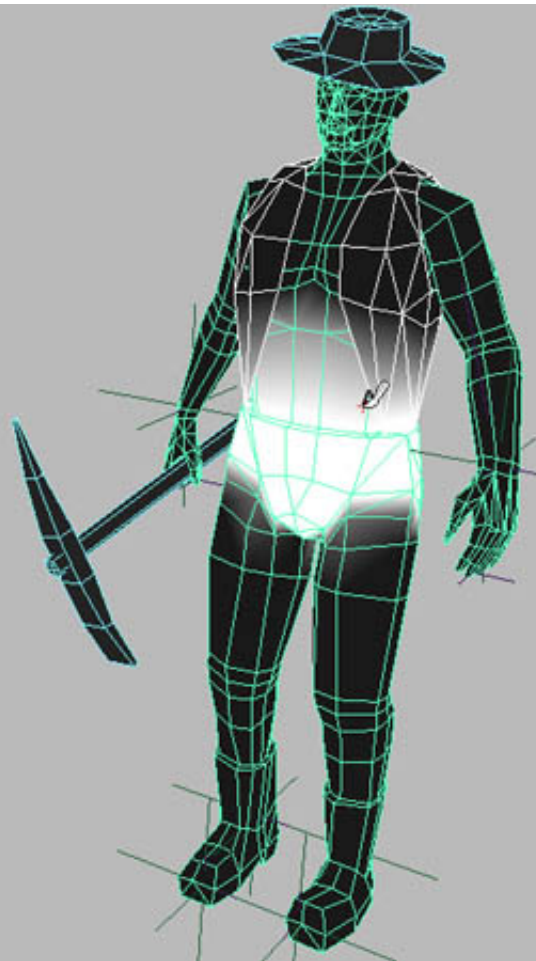
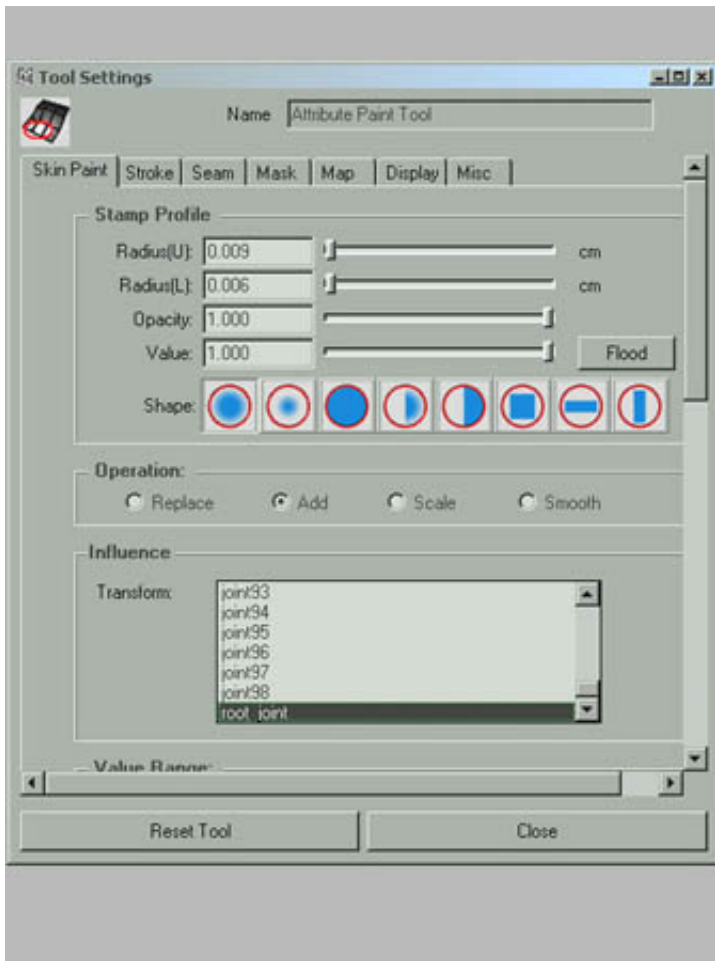
- Objects like "hat" and "tool" are parented to their specific joints.



- **Locators** and **Constraints** are created, so these handles could be constrained to the locators. Then you will set keys directly on locators.

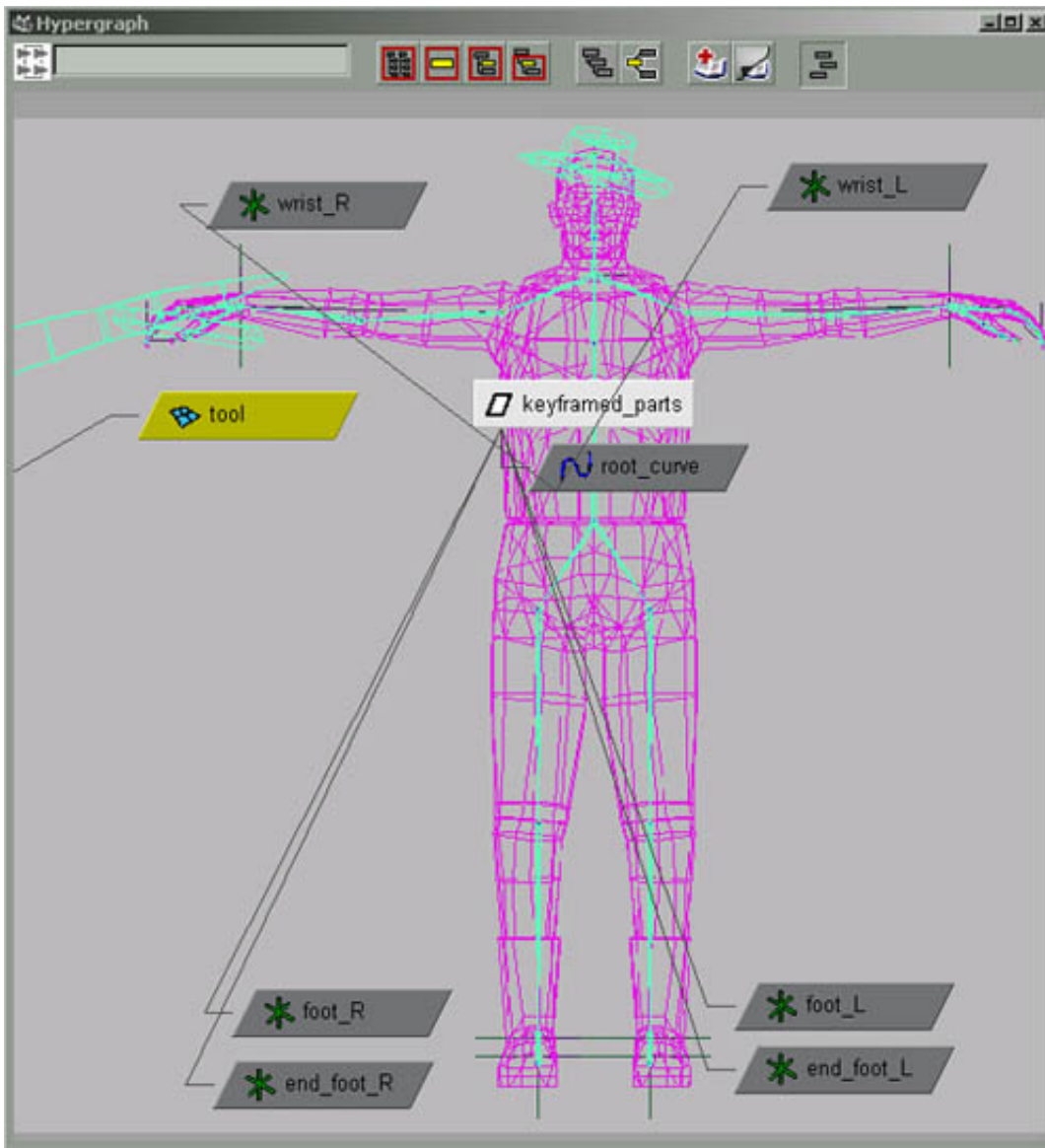
- To control the spine's joints an **IKSpline Handle** is used and keyframed.

Then, the **Paint Skin Weights Tool** menu is used to fine tune the skin assignments. In order to do this it can be interesting to put your character in a normal stand position, then try some natural moves to see the result of your assignments.



We put the **Locators**, the **Ikspline** curve, and the 'tool' under a group named "keyframed" parts

In the **Hypergraph** they are organized over the character image, these entities will be keyframed to animate the character. It's easier now to select in this group the entity to animate.



Keys

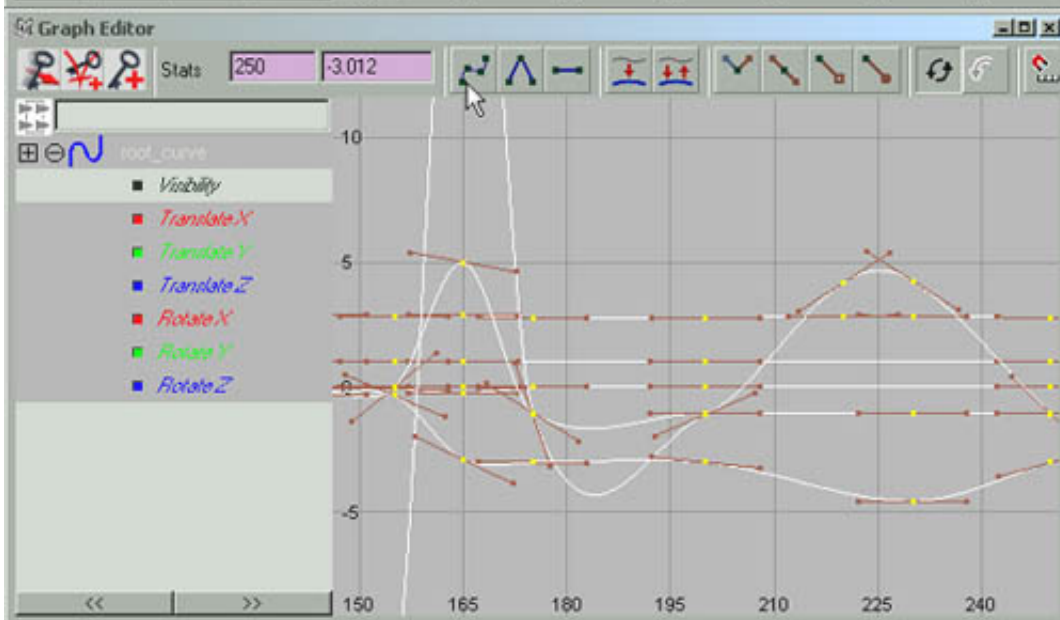
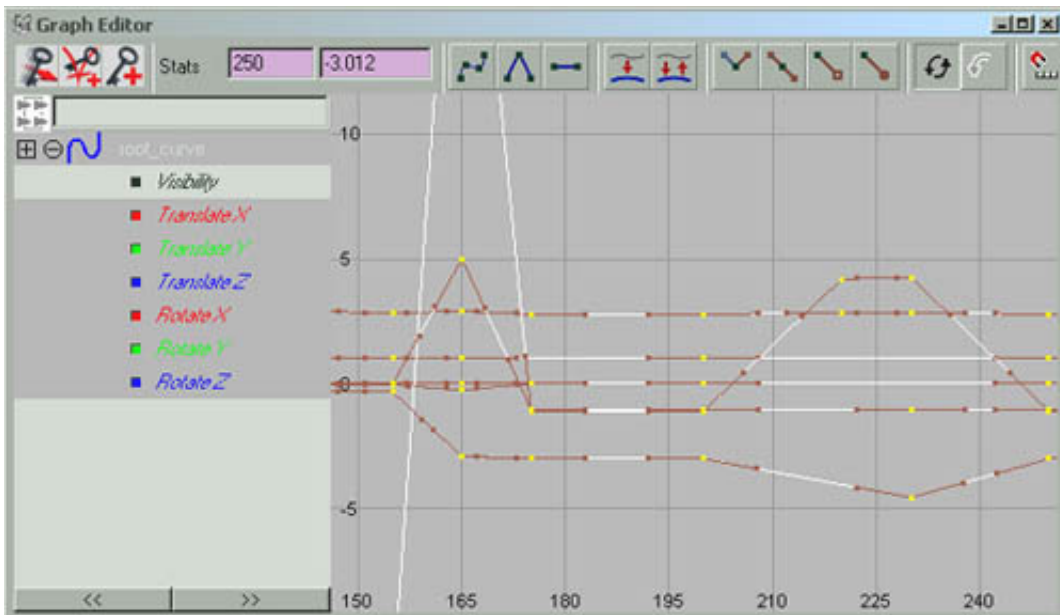
The animator can have plenty of methods to animate. The plug in can export in two ways : in **keys** or in **sampling**.

In "keys", you can't use any deformer or expression. Only key values on the plug in supported entities are considered and written in the exported animation file. Then Virttools will interpolate between these keys.

(Only keys on **Joints, IKs, and Ikspline** curves)

In "Sampling", everything is scanned (joints, deformers, expressions...) and transformed to obtain the final mesh. So you can use any Maya functionality for your animation set up process. Controlled by the "step" sampling value, each key where a scan occurs, an entire mesh is generated. With no doubt, this method is a bit heavy but fully conservative. To minimise the weight file, try different sampling step values.

For the moment, the plug in only export keys in Linear format. That means if you set keys in **Spline Tangeant** mode, only key points will be kept without considering in between values given by tangeants (in key export mode). So It's better to configure your Maya in the Linear tangeant mode or remember to convert with the **Graph Editor** all **Splines Tangeants** in **Linears** to see in maya the real effect of the future exported moves.



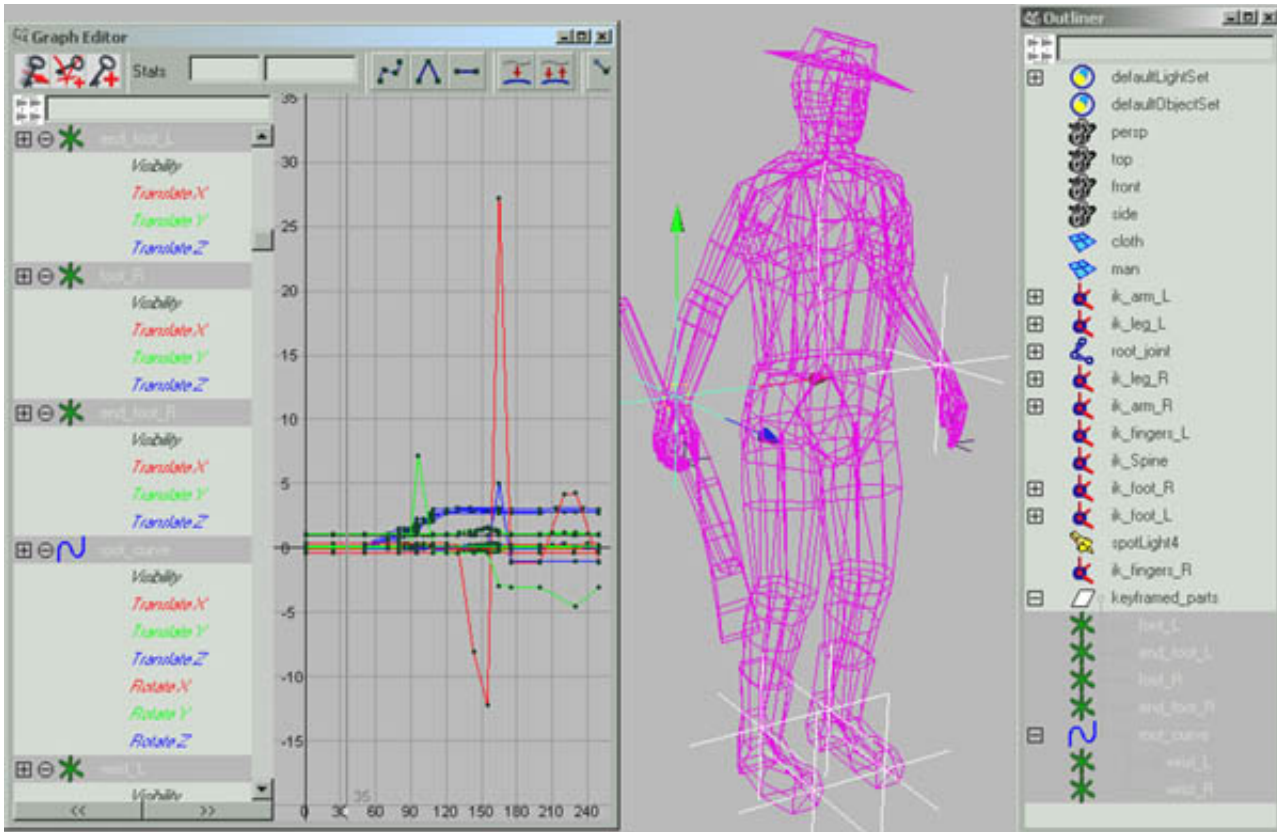
Linear Tangent (exactly exported)

Spline Tangent (exported like Linear)

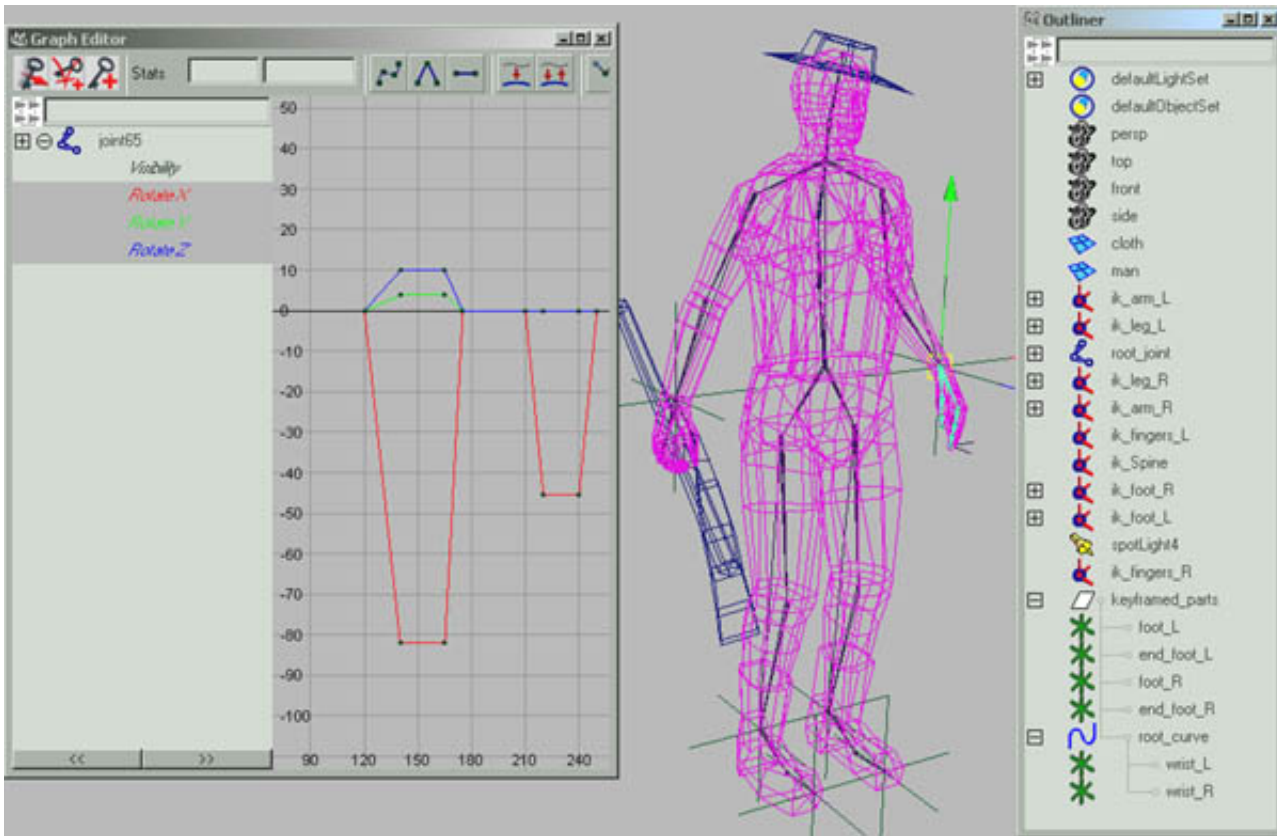
In this Maya scene, you find 4 animation sequences:

- "Stand" animation, frame 1 to 50
- "Walk" animation, frame 80 to 109
- "Action1" animation, frame 120 to 175
- "Action2" animation, frame 200 to 250.

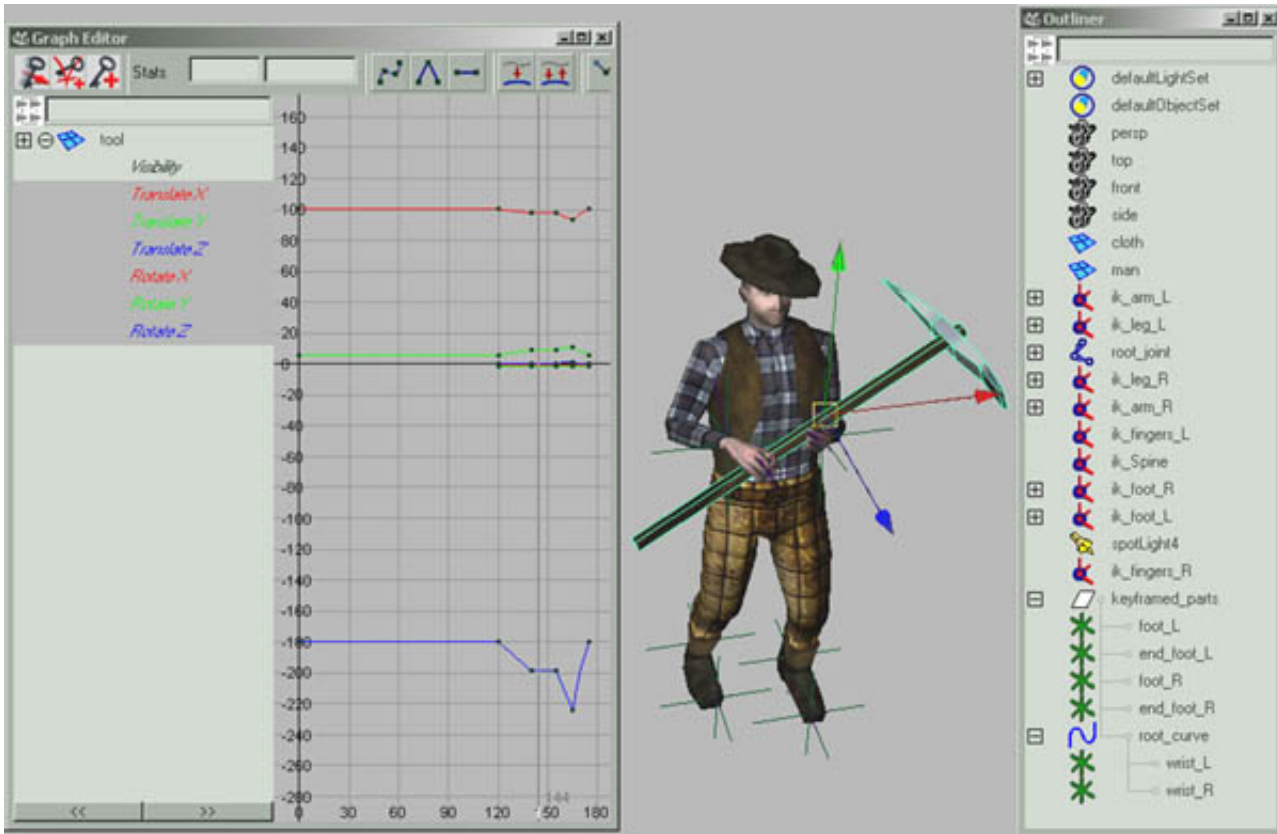
Entities under the "keyframed_parts" group have keys.



Through, in the sequences "action 1" and "action 2" other entities have keys like this one, "joint65" which control the wrist rotation.



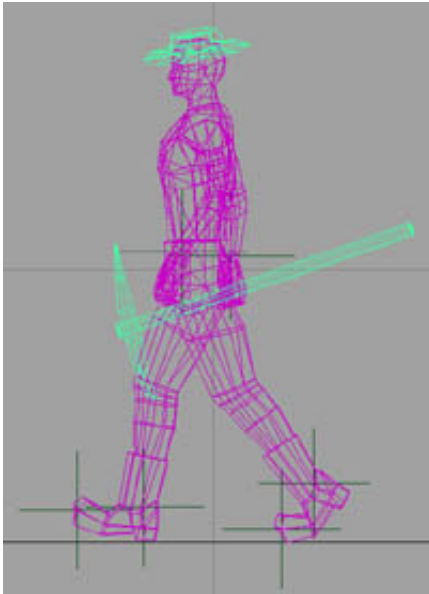
In the "action 1" sequence the object "tool" is also animated.



As you are about to export, just have a look at the "Walk" animation.

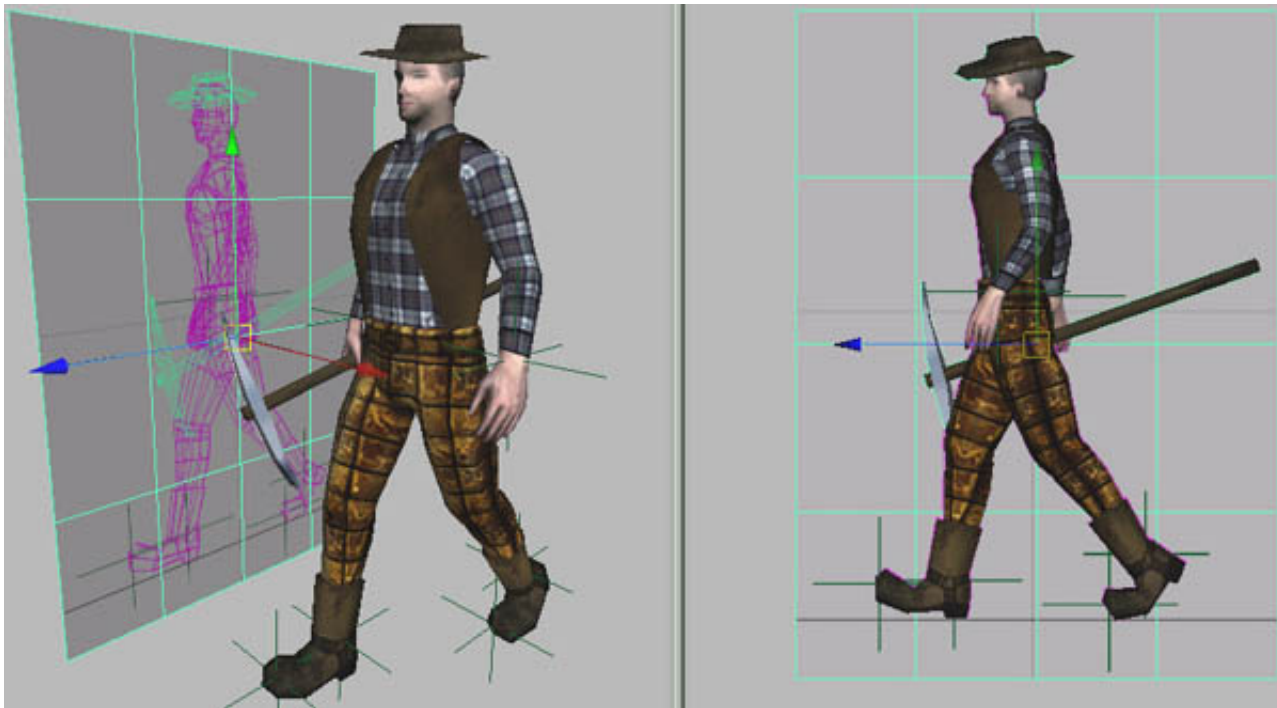
This sequence from frame 80 to 109 is a complete cycle, that is to say frame 109 has exactly the same pose than the one in frame 80. For this reason you will only export from frame 80 to 108. Now a trick to ensure frame 109 exactly match frame 80. Keys on frame 80 have been copied then pasted on frame 109.

A snapshot of frame 80 in the side view has been taken and will be used to adjustment.



snapshot of the frame 80.

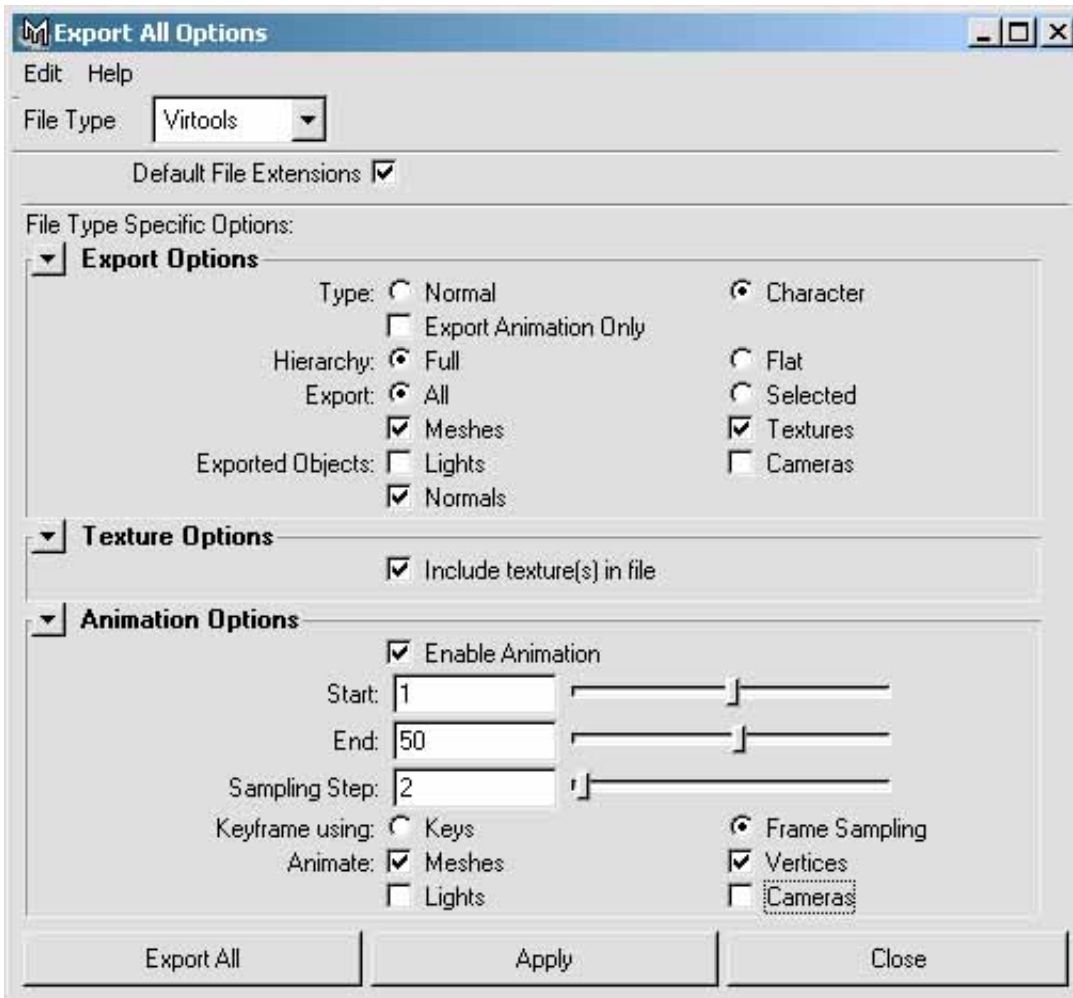
The snapshot is mapped on a plane which has the same dimensions of the picture. The plane is first scaled and positioned in the background side view to match exactly frame 80. Then the plane is translated on Z in frame 109 to allow you the exact tuning of this frame 109.



Export the character and its animations

- First you will export the character itself with its primary animation attached.

Select **File/Export All/[]** to open the option box.



Put parameters like in this window. **Export as Character**, frame **[start 1 end 50 step 2]**.

As it is a stand animation a step of 2 is enough, in this case no more precision is really needed.

You export as **Frame Sampling**. click **Export All** and name the file "man_stand_sampl". The export plug in will scan the scene and create the **.nmo** file.

-Then you must export the secondary animations.

Select **File/Export All/[]** to open the option box.

This time select **Export Animation only** and frame **[start 80 end 109 step 1]**, as you want only exporting the animation without the character mesh. click **Export All** and name the file "man_walk_sampl". The export plug in will scan the scene and create the **.nmo** file. Put this file in your Virtools database in Characters/animations.

- Do the same for the two other secondary animations, name them "action1" **[start 120, end 175, step 1]** and "action2" **[start 200, end 250, step 1]**. Put these two files in your Virtools database in Characters/animations.

It's time to go in Virtools, load the files and merge them.

Load the character in Virtools

Each animation files are given in this tutorial in the "Virtools_scenes&files" directory. You should have at this time the following files in your Virtools database :

in Characters : "man_stand_sampl.nmo"

in Characters/animations : "man_walk_sampl.nmo", "man_action1_sampl.nmo", "man_action2_sampl.nmo".

Otherwise put the files given by the tutorial at the correct places and follow the next steps.

- Run Virtools, and click **Ressources/Import File As / Character**.

- Load "man_stand_sampl.nmo", the character appears in the Level View under the directory **Default Level / Global / Characters**.



- In the **3DLayout top bar**, open the **camera** menu and select the "persp" camera to view your character correctly.

You have loaded the character itself with its primary animation attached.

Before to merge other animations you will adjust and verify materials et textures.

Material & texture tuning

- Materials:

In **Default Level / Global / Materials** you should find "body_mat" and "double_mat".

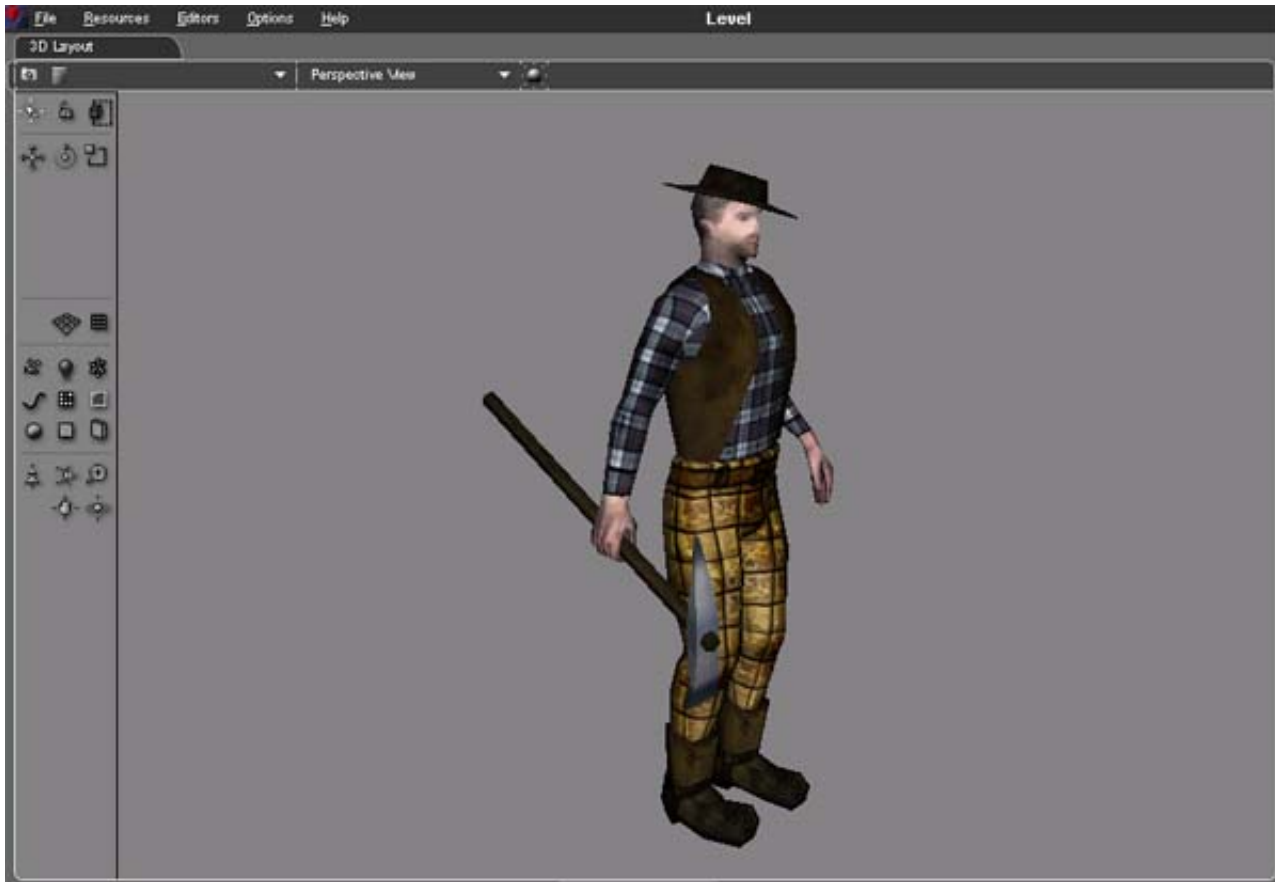
In their **Material setup** sections, set their **Ambient** and; **Diffuse** to **<255,255,255>**.

Set the **Double Sided** flag to **[off]** for "body_mat", this flag keeps **[on]** for "double_mat".

- Textures.

Remember to select a correct value from the **Video Memory Format**, from **<1555>** to **<888>**.

You should see this in the **3D Layout**;now :

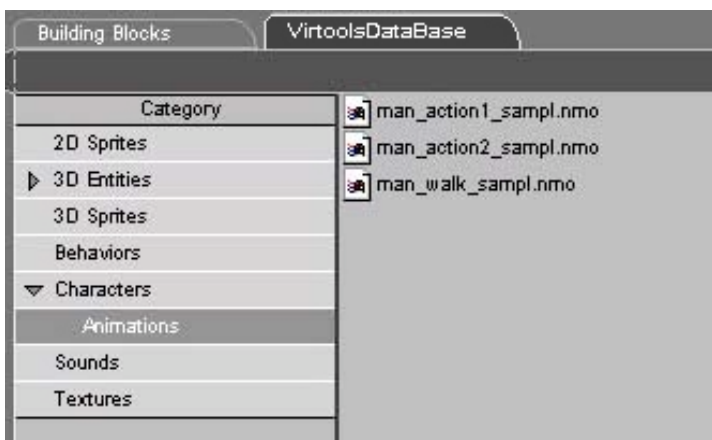


Merge animations & add Behavior Building Blocks

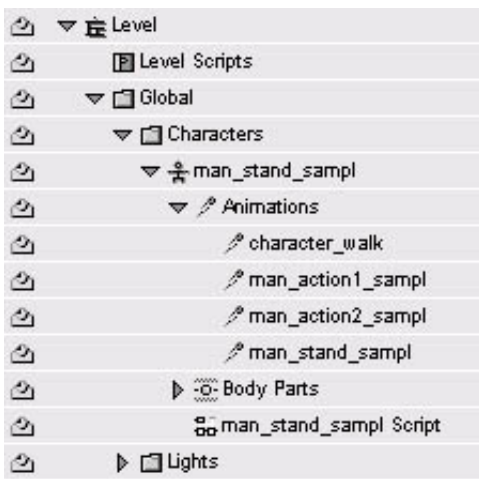
You are about to merge the secondary animations.

Open your Virtools database where you have saved the Maya animations.

Under **character / animations** you must find your 3 **.nmo** files.



Drag & drop these files in the **3DLayout** over the character. They will be auto attached to it and you would also see them appear in the **Level View** under **Default Level / Global / Characters / Animations** with the first one "man_stand_sampl.nmo".

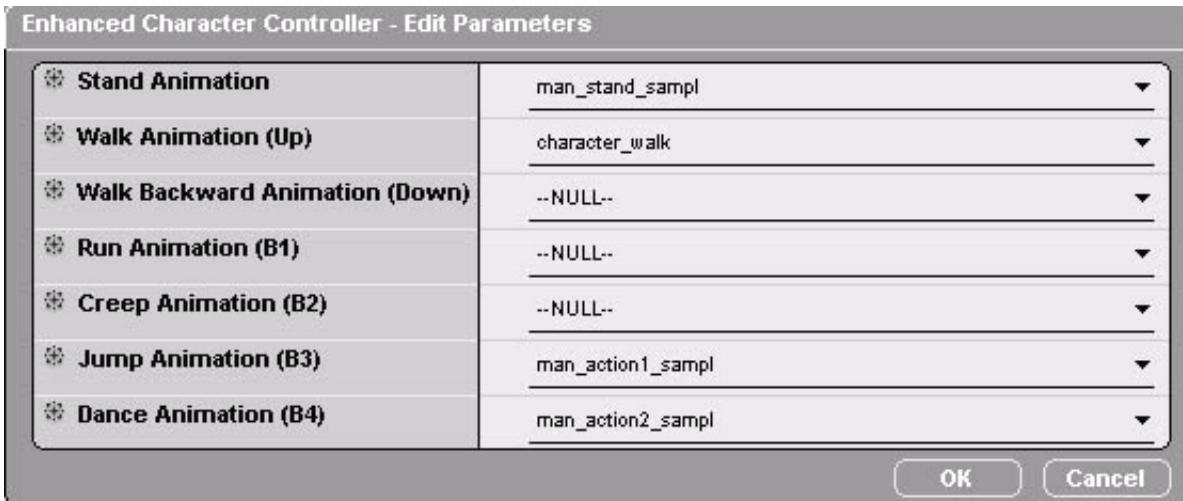


To see the character playing its different animations you must add some Building Blocks.

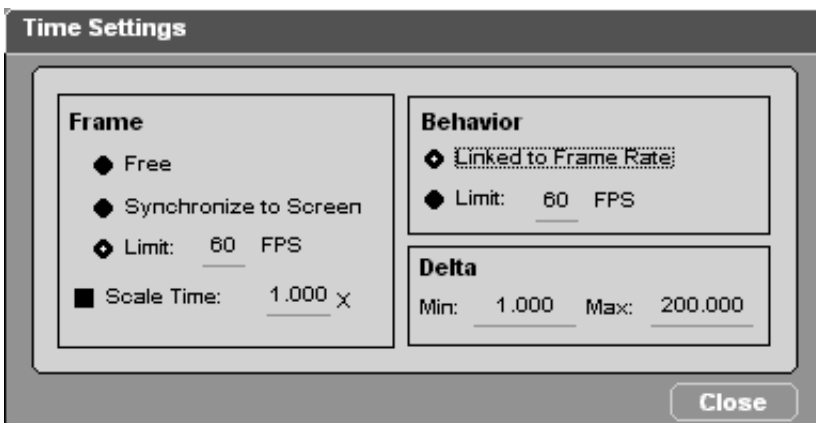
From **Controllers / Keyboard** drag & drop the **Keyboard Controller** BB over the Character.

From **Characters / Movement** drag & drop the **Enhanced Character Controller** BB over the Character.

A parameters window opens where you can link the animations to the character actions like this :



Before you see the result, just click (right mouse button) on the **Play** icon to open the **Times Settings** and set the **Frame Rate to Limit** at **60** Fps



Your character can walk, reacts when **[suppr]** and **[Page UP]** keys are pressed, and has a stand animation when nothing appends.



Save your Virtools composition and name it "Cowboy.cmo".

This final file is also given with the tutorial under "Virtools_scenes&files".

Conclusion

You can now merge this scene with "mountains.nmo" from the scene tutorial.

Before to do this, delete the spotlight and the camera of your cowboy scene as "mountains.nmo" still have ones.

Then open the man_stand_sampl setup in the **Level View** under **Default Level / Global / Characters** and change its position to <0, 1.3, -20>so the character will be directly in the right place. Try BBs to set up collision detection, have fun !

[Comments](#)