

Last month...

Things became a lot more dangerous as traps and deadly particles were added. It just wouldn't be the same without Mr.Green – so he's making his debut this month. As this has always been the plan, there's not a great deal of changes to the code, so this installment will be more about the whole process of animating a character for the game, and DBPro in general.

Character FX

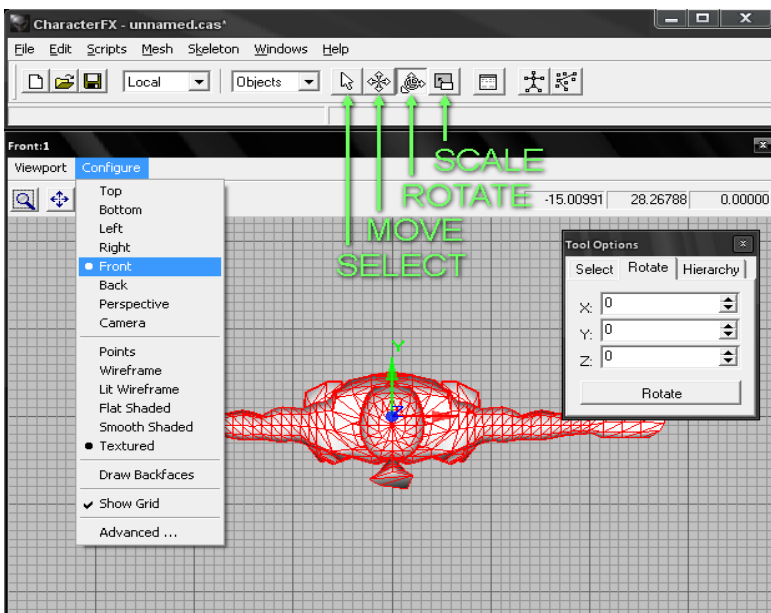
Free is everyone's favorite price, and that's what CharacterFX is now. I've used it for a few years, and despite spending good money on animation and modeling packages with a lot more features I always go back to it. The best way I can describe it is a WYSIWYG animation package for the DirectX Skin and Bones format, which DBPro simply loves.

Thanks to Insane Software for making the decision to gift us this great program.

<http://www.insanesoftware.de/index.php?page=cfx/downloads.php>

Source Media

Really it doesn't matter how you create a character mesh, as long as you can get it into the right format for CharacterFX. I tend to rely on 3D Studio Max's .3DS export format, which most modeling packages support. If you can't import your model as .3DS then Wavefront's .OBJ and Milkshape ASCII .TXT formats are also supported, however I find it's an idea to try and save the .3DS from another package. Once you have a textured .3DS model with its texture in a common format (.PNG or .BMP for example) it can be imported into CharacterFX.



I loaded up CharacterFX and selected Import from the File menu, then selected the model and using the rotate tool, will orientate the model so he's facing the front. Rotating by 90 on the X axis and 180 on the Y axis did the trick. Right click the rotate tool to bring up it's options then click the rotate tab to specify the angles.

As a default CharacterFX has only 1 viewpoint, you can clone the view through the Viewport menu. The display properties can also be set, it's usually a good idea to enable backfaces for when assigning vertexes.

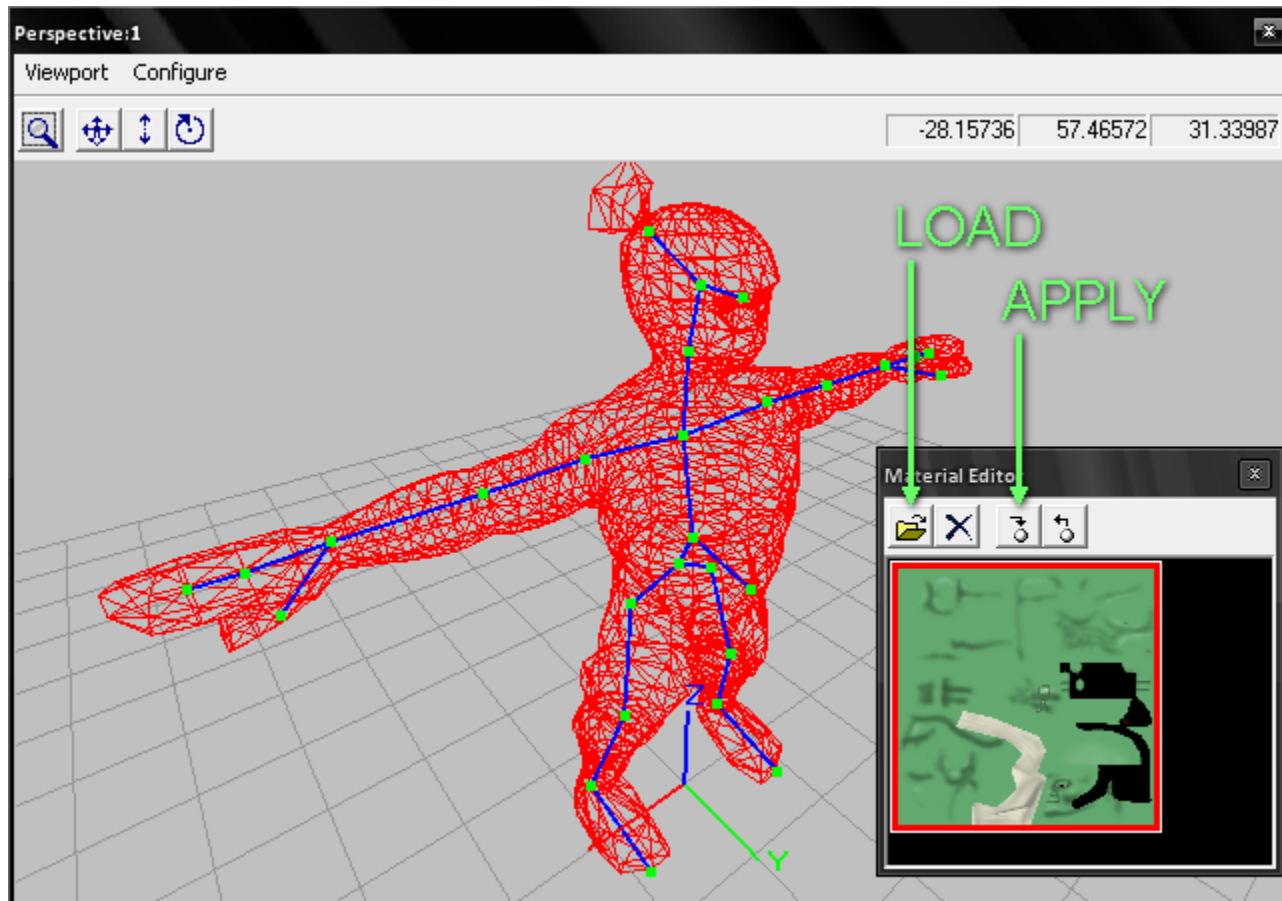
Texturing:

When importing a .3DS file, it won't automatically assign the texture to the model, this is something you have to re-do, depending on how you create the media. I tend to export the model with no texture assigned to it, then I make a UV map overlay and use Photoshop's

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PSD format. Texturing is a different sport altogether, I recommend Lithunwrap which has a free version online. I use Deep Exploration to preview the .PSD texture while I work, then I save the final version as a PNG image, which I assign to the model inside CharacterFX.

To assign a texture, select Material Editor from the Windows menu.

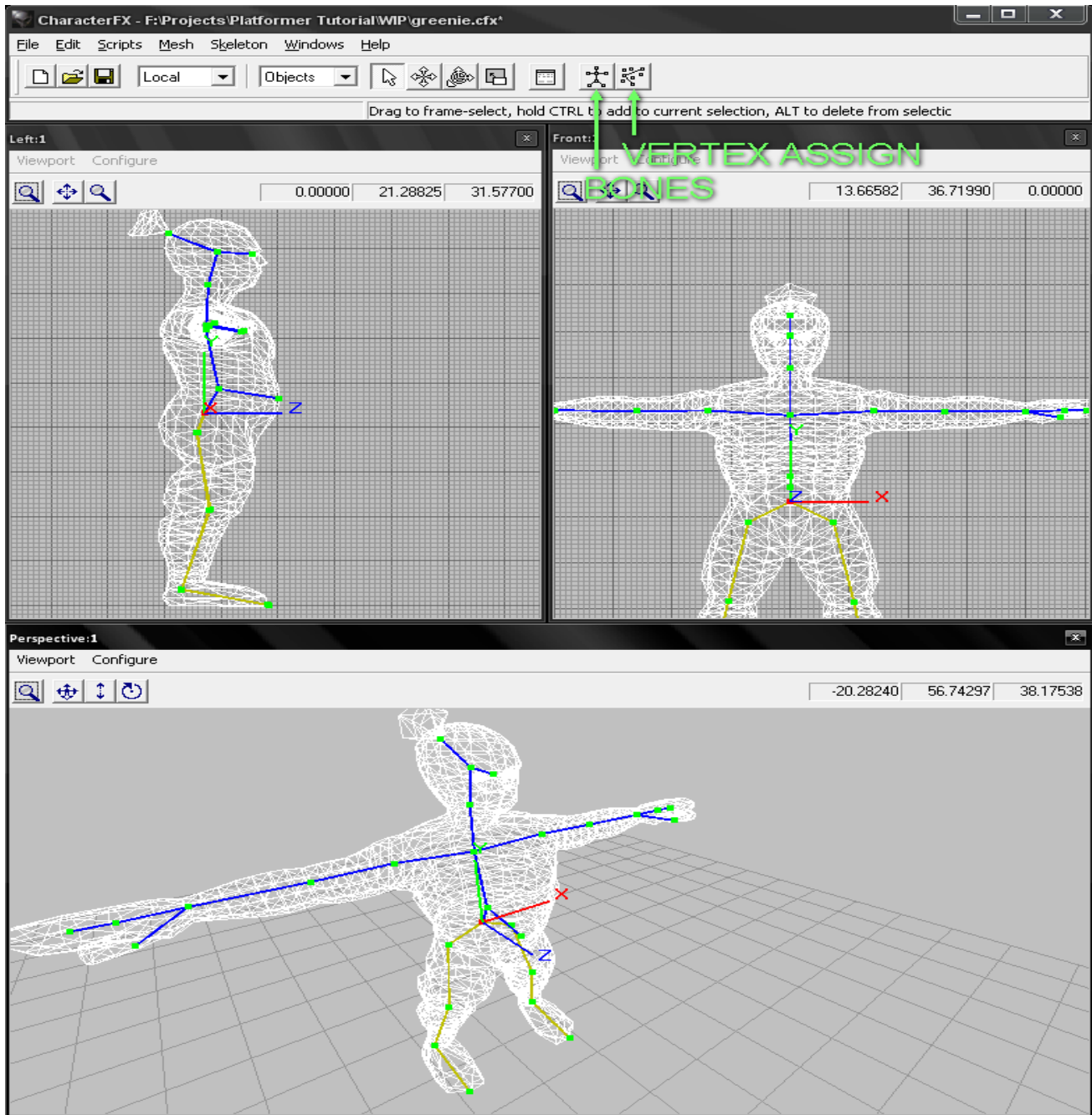


After selecting the model, the texture is loaded, then applied to the model. Selecting Textured from the Configure menu will show the model rendered pretty much exactly as it will look in DBPro.

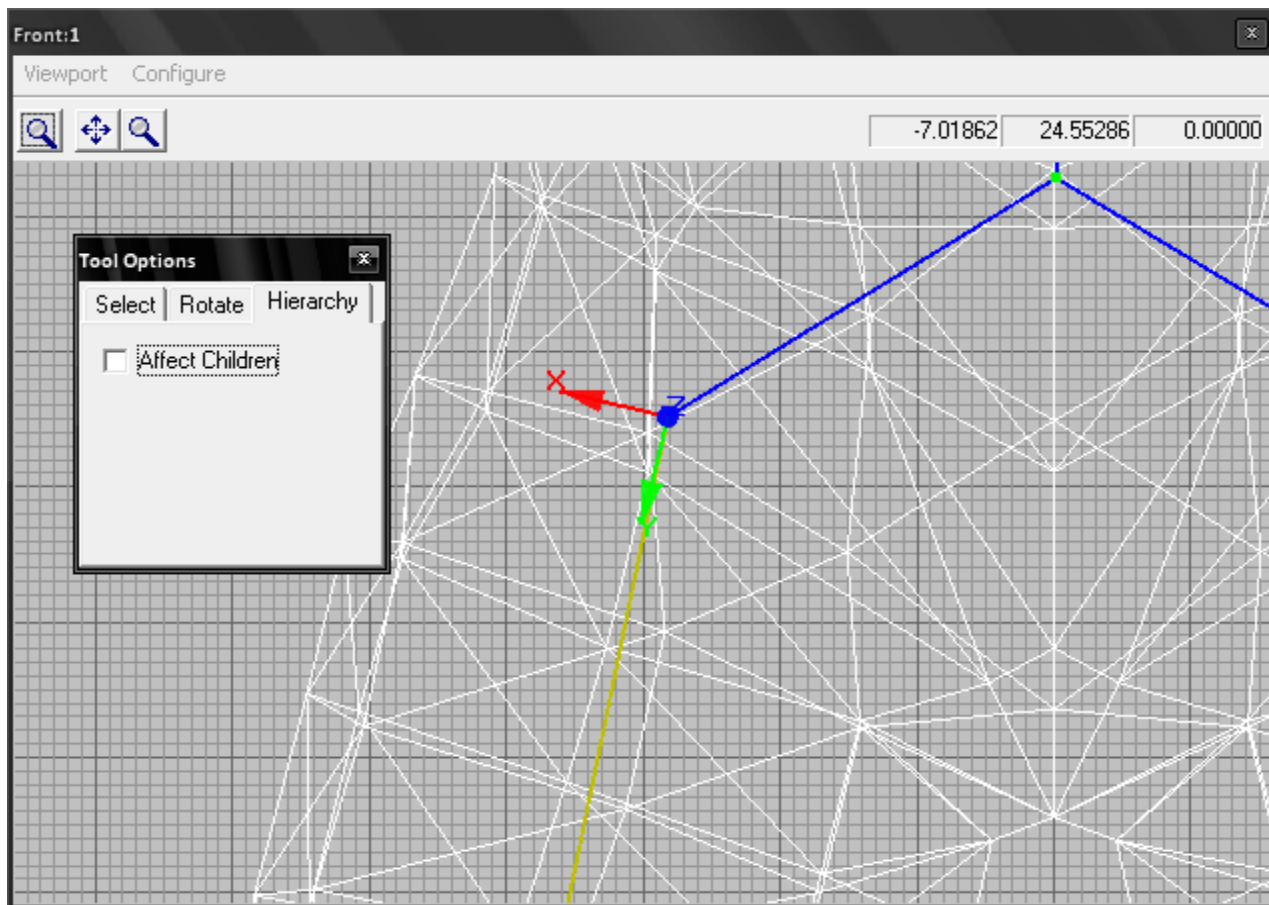
Bones:

After cloning the view twice and rearranging the layout, it's time to add the bone structure. Selecting the Bones tool will allow the creation of bone joints. Clicking the start bone location will drop in a joint, then clicking the next bone location will create the bone. The bones are created in sequence, and using the select tool, you can start a sequence from a desired bone. In Mr.Green, the first bone is just above the pelvis, around the waist area so it's around his center of gravity. From the first bone, the base of the spine links to the pelvis, which then links onto 2 bones for the hips. For the scale of this game the model is quite high poly, but the bone structure and complexity is fairly straightforward. The hands for example use only 2 bones for all the fingers. There is a bone jutting out so that vertexes on the belly can be assigned to it, and it can wobble when he moves. The eyes are also assigned to a bone so they can blink, this is done with code however.

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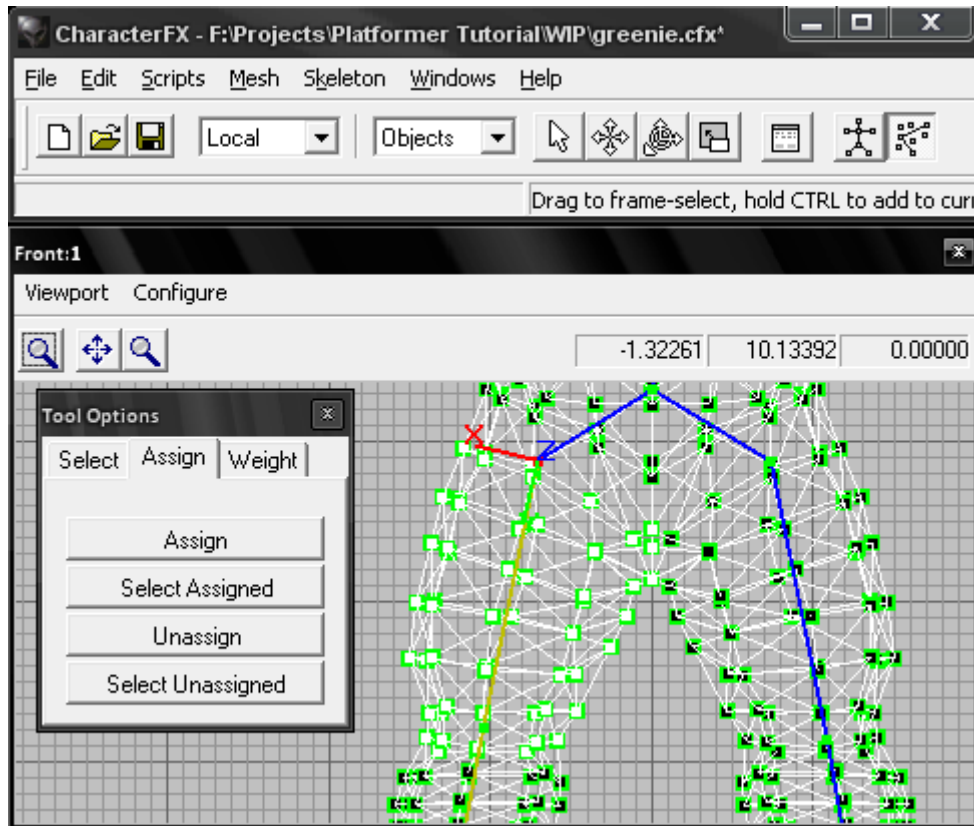
Once the bone structure has been laid out, each bone joint should be rotated to suit. Using the rotate tool, but right click it and select the Hierarchy tab, then untick Affect Children. If you leave the Affect Children option, rotating the bone will rotate and bone after it in the sequence. I tend to set the rotation of each bone joint to the closest axis, so the hip there is orientated on the Y axis, so when the hip is rotate on the X axis it will swing forward and backward.



Vertex Assign:

Each vertex in the model can be assigned to 1 or more bone joints. When the model is animated the vertexes will move according to the bones it is assigned to and the strengths it has assigned to them. The image shows the hip bone, typically the vertexes from the whole upper leg will be assigned to this, as the bone goes from the hip to the knee. The vertexes at the top of the leg would be assigned to the pelvis bone joint as well. This is really the most difficult and time-consuming part, but it's best to take your time on this stage.

Selecting the Vertex Assign tool will show all vertexes and selecting a bone will highlight any vertexes assigned to it. Right click the Vertex Assign tool open the tool options, then select the Assign tab. Click and drag to select vertexes, hold CTRL to add to the selection or ALT to remove from the selection. I tend to select big areas or even use the Select Unassigned tool, then deselect any vertexes I don't want assigned to a bone. The hip bone has the top of the leg assigned to it. It's possible to specify the strength of the bone assign but usually just using a strength of 1.0 is enough with lower polygon models. With Mr.Green I plan to use the normalize tool to automatically smooth out the bone strengths. The strength can be set by clicking the Weight tab on the tool options then setting the value between 0.0 and 1.0. The more time spent tweaking this, the smoother the mesh deform will be. Really the only way to get it right is to keep checking how it moves, so switching between Objects and Animation mode (drop down list under the Windows menu) and rotating the bones is the way to go.

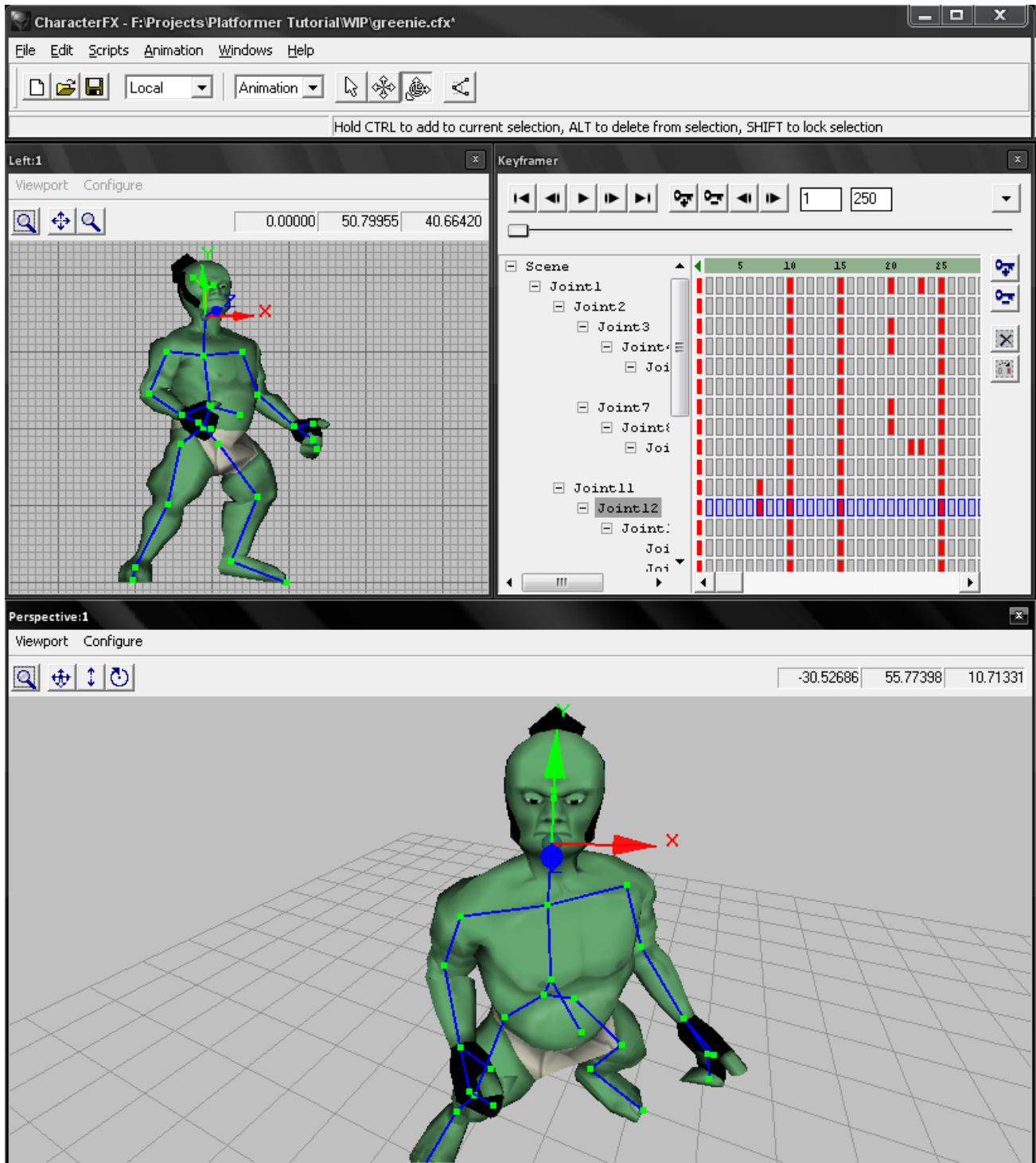


Animating:

Selecting Animation from the Objects/Animation drop down list will open the Keyframer window. Here the animation is broken into 250 frames, and each bone can have an offset and rotation setting for each keyframe. As a default, CharacterFX is set to Spline interpolation which means the movements are smoothed out, DBPro only supports Linear interpolation so to get a true WYSIWYG environment, select the Animation menu, then from the Keyframe Interpolation sub-menu, select Linear.

Spline mode can be useful however when you want to make movements more organic, for instance jumping – you can set a pose as the start and finish keyframes, then in between them adjust the height for the top of the jump using the first bone you added and the Translate (or move) tool. Then assigning keyframes for the first bone every second frame or so will mimic the smoother spline animation. For the way animate models being limited to linear interpolation is actually a blessing in disguise – it can be really tricky to use several animation sets in a single model because the idle pose is not guaranteed to be the same all the way through the animation.

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















After importing Mr.Green, setting the initial idle pose is first on the agenda as you have to assign vertexes and bones, most people will spread the arms out and keep the legs straight when modeling. Assigning a bone structure to a model already in a pose is far more time consuming and difficult to animate. The Keyframer is really straightforward once you get used to it. Select a bone, rotate it to suit, keep doing this until you have a nice idle

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frame, then click the Key+ button to set all the bones. Adjustments are only stored if you click the Key+ button. There are 2 Key+ button and Key- buttons, the black buttons at the top of the Keyframer window set all the bones, and the dark blue buttons at the right will set the selected bone only. It's very important to get an idle pose that you will stick with as it will be used in transitions between movements like running and getting up from an attack.

For clarity, this is a rundown of the buttons on the Keyframer window

Along the top:
right:

	Go to first frame		the
	keyframe for selected bone		Add
	Previous frame		
	Remove keyframe for selected bone		
	Play animation (Toggle)		
	Delete selected keyframes		
	Next frame		
	Move or Copy selected keyframes (Toggle)		
	Go to last frame		
	Add keyframe for all bones		
	Remove keyframe for all bones		

The number of frames can be set at the top right of the Keyframer window. For most of the actions the character can do, the idle frame is used as a transition in order to keep the animation fluid.

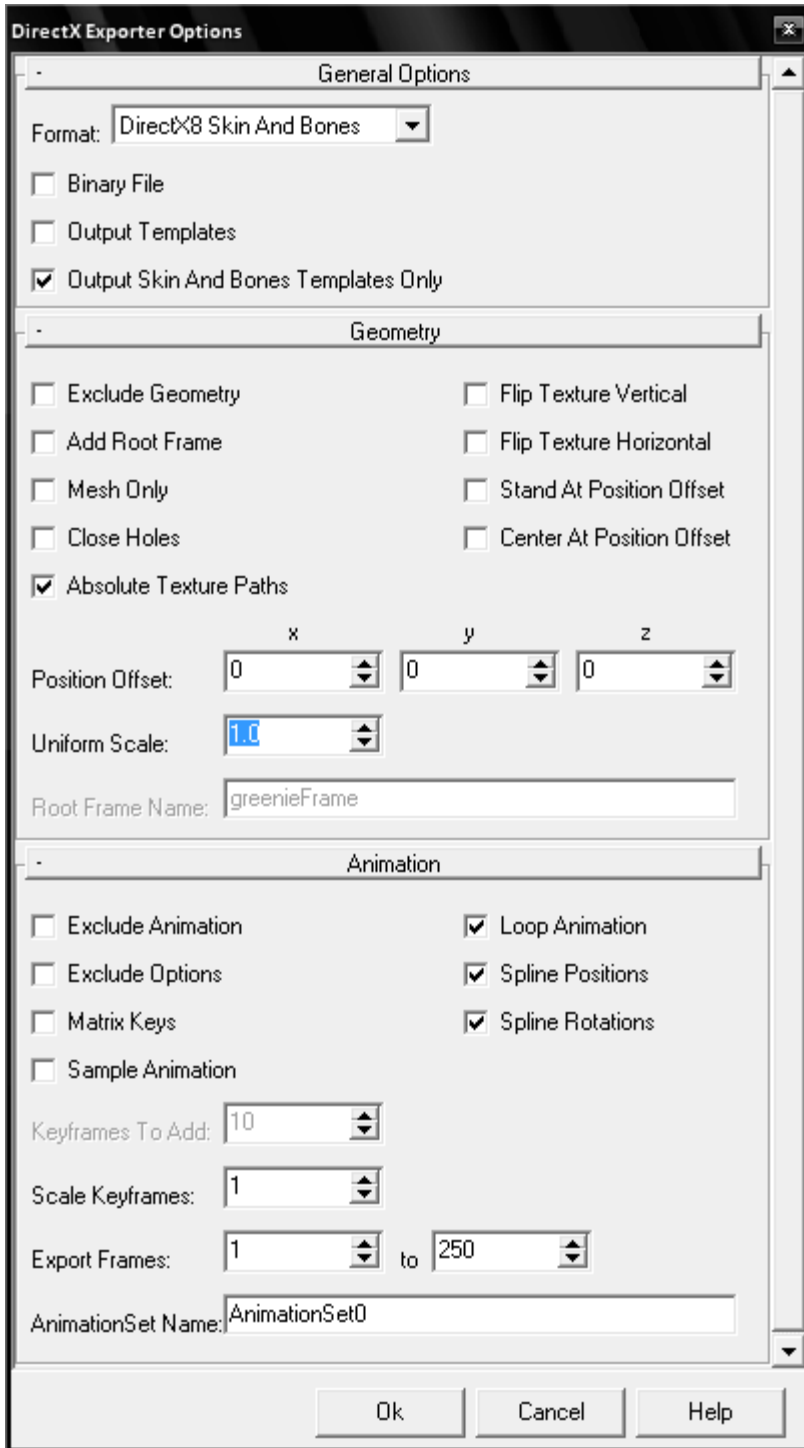
Rotating and offsetting the bones could not be simpler, select a bone, then click and drag the desired axis arrow, in the image I rotated the neck bone on the Y axis and the X axis so he's looking into the camera.

I've used frame 1 and frame 10 as an idle loop, simply a copy of the idle pose in each frame, then rotated the chest up a little and made some adjustments inbetween frames 1 and 10, with only the affected bones being set. You can highlight bone settings by dragging a selection box around them, setting the Move or Copy toggle button will allow the selection to be dragged onto a new frame.

I then used frames 10 to 15 as a transition into the running loop, so frame 15 is really the first running frame, and the frames in-between can often be left alone as the bones will interpolate into the running pose. Frame 25 is similar to the first running frame except the limbs are switched around, then frame 35 has a copy of the first running frame. This way, looping frames 15 to 35 gives a seamless running animation which can also smoothly return to the idle pose. It's best to limit setting the whole pose to transition frames, then set individual bones in-between the loop frames to fine tune it. Mr.Green's running animation is not as bouncy as Bruce or Ninja's, he's bigger and slower, so in frames 20 and 30 he rises up a little and has a sort of scissor pose. The look of the game does not warrant a very realistic animation technique – in fact I cheated by re-using Bruce's bone structure and animations as a start point, keeping things as standard as possible can save a lot of time.

Exporting for DBPro:

Once you are happy with your animation, or want to test it – select Export from the file menu, select the DirectX (.X) format from the list and give the model a name, then click save. This will open the DirectX Exporter Options window.



Don't be alarmed! – you don't really need to know what it all means, the only thing I have to change in these options from the defaults is the Uniform Scale. For some reason 0.1 is the default scale, I always set this to 1.0. Then pressing ok will export the .X file, ready to be loaded into DBPro.

Code Changes:

The code to incorporate Mr.Green is really just a few tweaks here and there, the animation setup is the same as Bruce, so he uses the same update player function as Bruce and Ninja. I have added a controls element to the character type. Now it's possible to set the controls for each player, WASD and left control, cursor keys and right control, and joystick. To allow the characters to have unique animations or just an easy way to have different speeds for different characters, the char_anim type has been expanded on. It always had allowances for each character to have their own animation setup, but as the animations are fairly standard, they shared character 0's animation set. After the initial setup, the set is cloned for each character, then in the case of Mr.Green, his running animation speed is slower, so it is set after cloning. A boss character for example will most likely have a unique animation set, in the original game there's a dragon on the end screen spitting out fireballs at you. It's really easy to get past, so maybe we'll mix things up a bit this time round.

Next Month:

The code will go through a major bug hunt, as the games level layout will take form a lot of the niggles will have to be ironed out. The engine will soon be ready to be split off into a game source without the editor code, so with any luck it will be ready for creating a demo version.