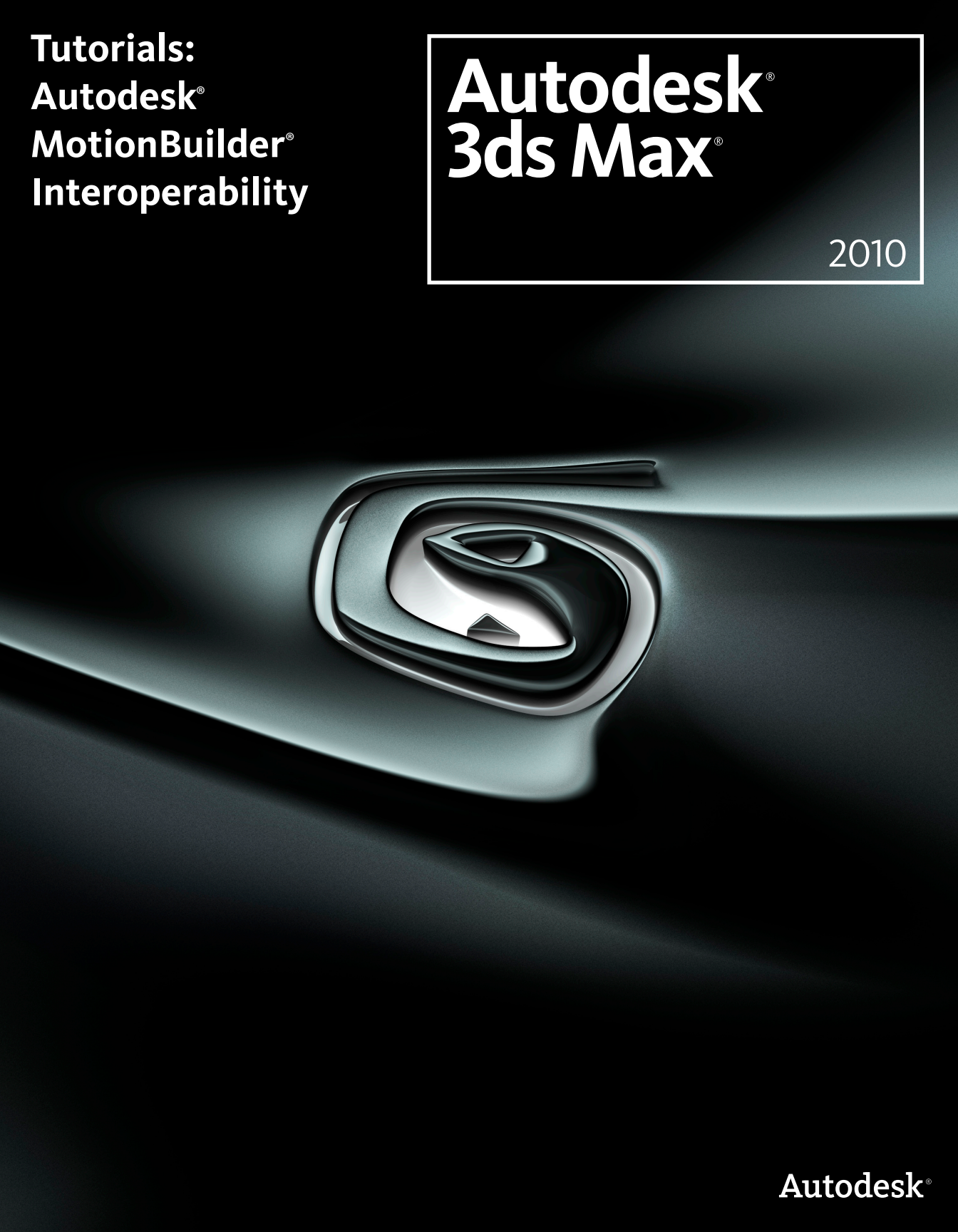
Tutorials: Autodesk® MotionBuilder® Interoperability

Autodesk® 3ds Max®

2010



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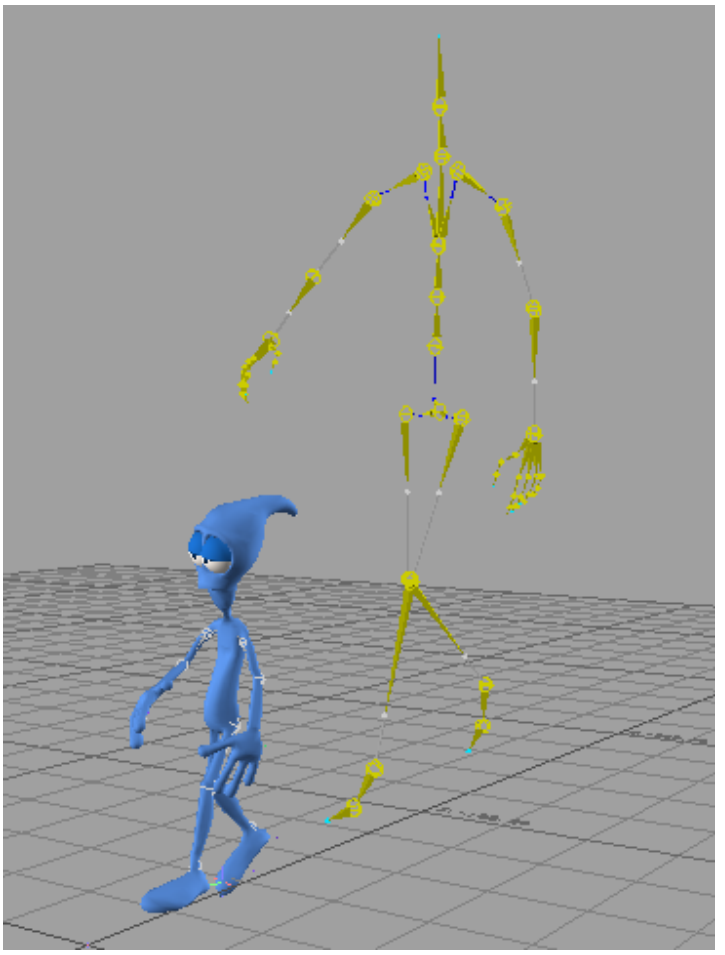
MotionBuilder Interoperability

Part of your development pipeline might take you to MotionBuilder, a powerful 3D character-animation suite. With MotionBuilder, you can quickly and easily rig characters, then set up their animation using a full-body FK/IK manipulation rig. You can also retarget animation data between characters, as well as blend, edit, and sequence tracks in a timeline editor, combining animation with cameras, digital video, and audio.

As you build your animation, MotionBuilder provides real-time playback of character performance. There is no need to preview or render your work.

This tutorial shows you how to import a character to MotionBuilder, add animation using both the FK/IK manipulation rig as well as data from a motion-capture file, then export your work back to 3ds Max as a fully editable animated character.



In this tutorial, you will learn how to:

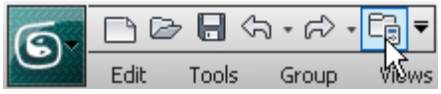
- Label 3ds Max biped skeletons for easy conversion to MotionBuilder
- Export a 3ds Max biped as an FBX file, then import to MotionBuilder
- Characterize skeletons in MotionBuilder for animation as a full FK/IK rig
- Use naming templates and scripts to quickly characterize skeletons
- Animate a character in MotionBuilder based on motion-capture data
- Use keyframes to fine-tune character movement
- Export character animation as an FBX file from MotionBuilder, then import to 3ds Max

- Fine-tune character animation in 3ds Max.

Skill level: Intermediate

Time to complete: 2 hours

Preparation for This Tutorial

- 

On the Quick Access toolbar, click Project Folder and set your current project to 3ds Max 2010 Tutorials.

Preparing 3ds Max Scenes for Export

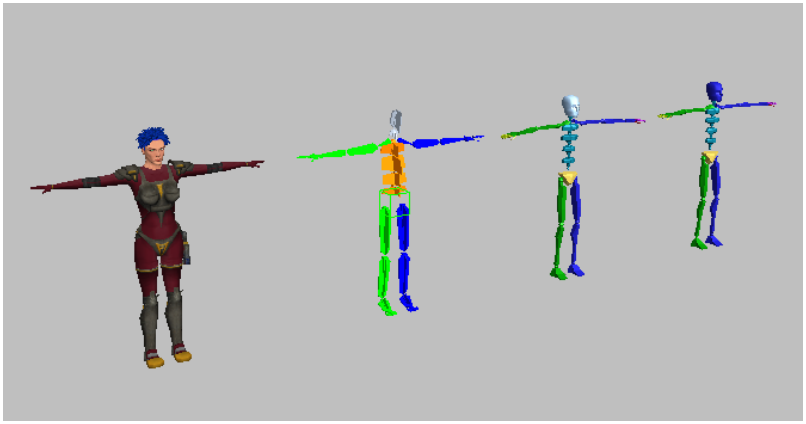
This lesson shows you how to take characters created in 3ds Max and prepare them for import to MotionBuilder.

View skeleton bone hierarchy and naming conventions:

1.  On the Quick Access toolbar, click the Open File button, navigate to *\scenes\interoperability\motionbuilder* and open *basics.max*.

   NOTE If your system units are set to anything other than Centimeters, a File Load: Units Mismatch dialog opens, prompting you to choose which unit scale to use. Turn on Adopt the File's Unit Scale and click OK.

   The scene contains, from left to right, a mesh character and three skeletons that can be used to drive the mesh.



Mesh and three skeletons

Left: Mesh

Second from left: Skeleton A

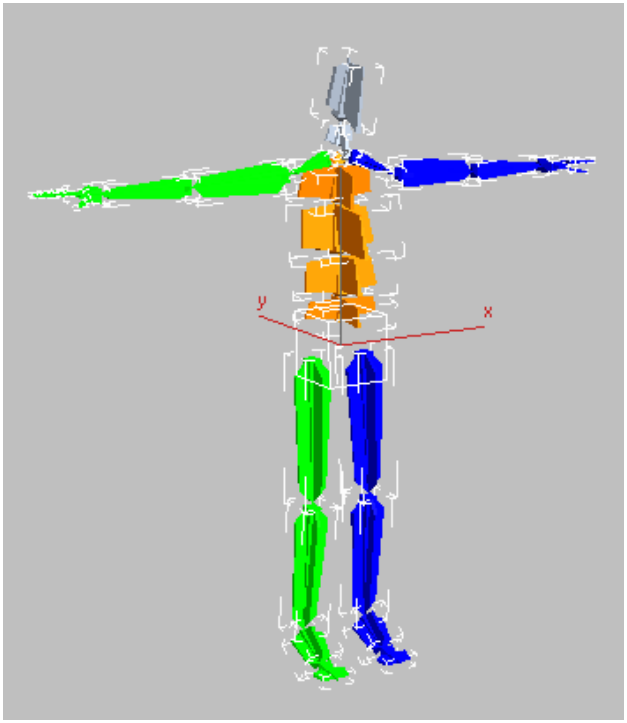
Third from left: Skeleton B

Fourth from left: Skeleton C

Skeleton A is made up of a conventional bone system. Skeletons B and C are 3ds Max Biped systems.

Before MotionBuilder can recognize a model as a character that can be animated, its skeleton bones must be *characterized*. A model can be characterized only if its bones are labeled in a specific way. You can rename character bones in MotionBuilder, but it is a good idea to rename them properly in 3ds Max whenever you can.

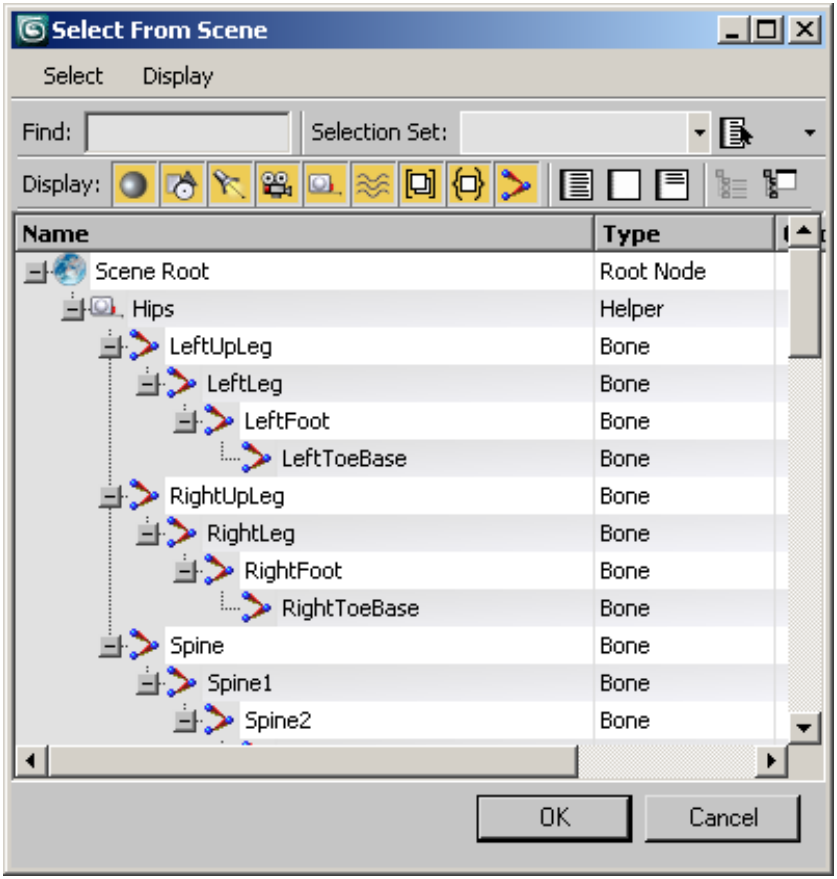
2  Region-select Skeleton A, then right-click and from the quad menu, choose Isolate Selection.



Skeleton created from a conventional bone system

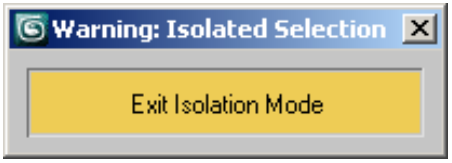
3  On the main toolbar, click Select By Name.

4 On the Select From Scene dialog, choose Display > Children and then Display > Expand All. Scroll the list to view the skeleton hierarchy and see how each bone is named.



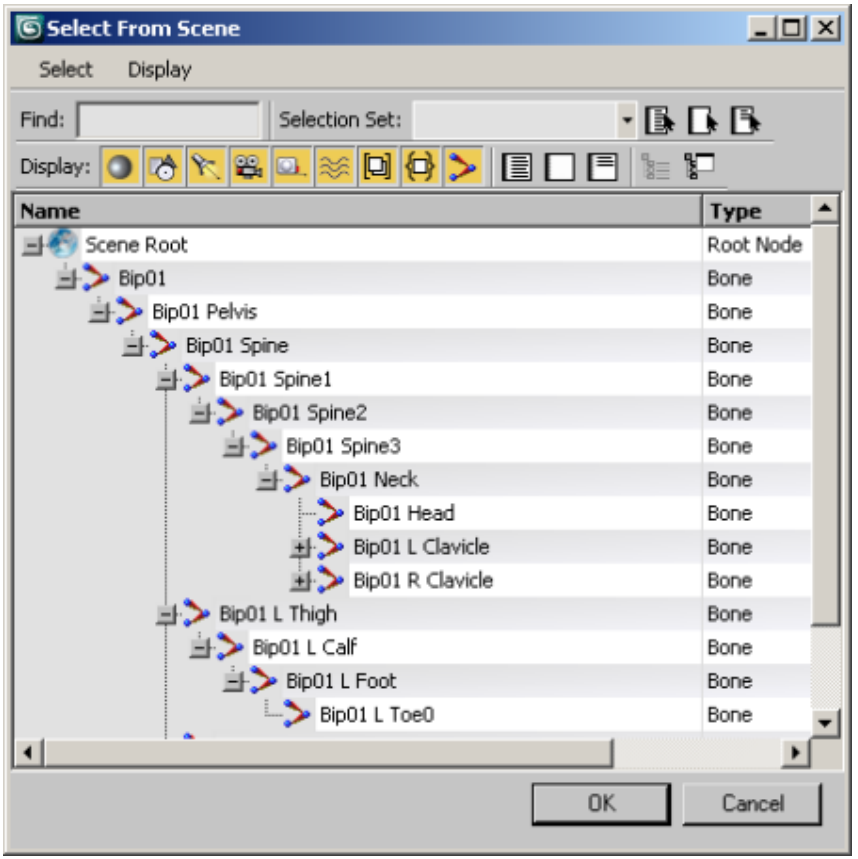
This is the naming convention recognized by MotionBuilder. If you name the skeleton bones this way, you can later characterize them in MotionBuilder with a simple click of the mouse.

5 Click Cancel to close the Select From Scene dialog, and then click Exit Isolation Mode to display the whole scene again.



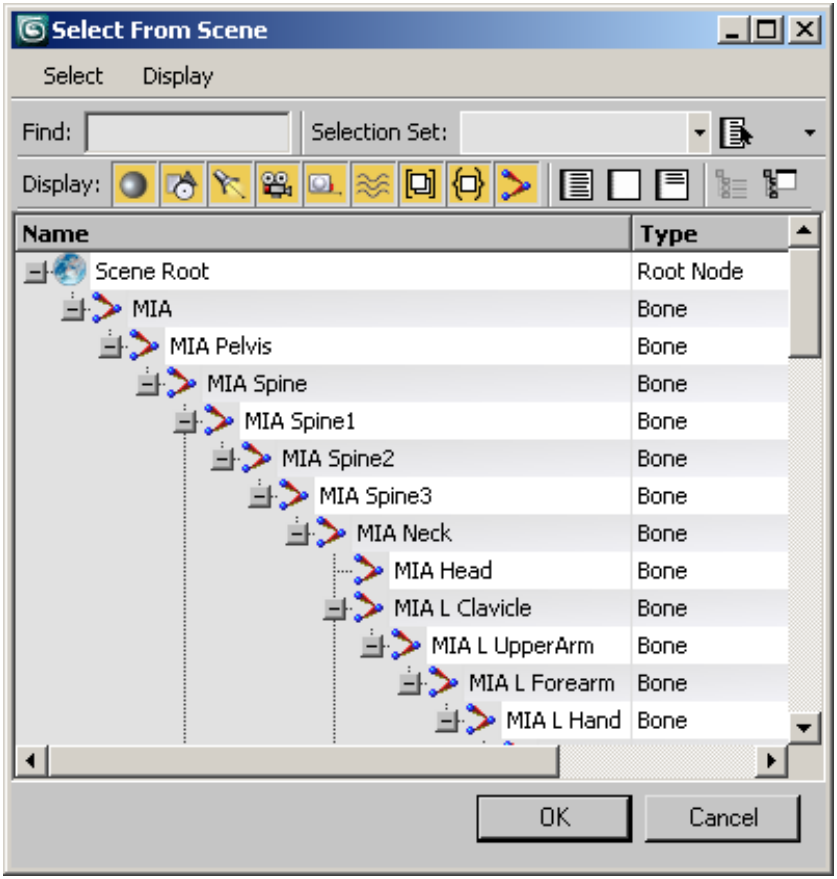
6  Region-select Skeleton B, then right-click and from the quad menu, choose Isolate Selection.

7  On the main toolbar, click Select By Name.



The Select From Scene dialog opens, showing the bone hierarchy of the Skeleton B and its identifying names. This naming convention is the default for Biped. While it is different from the convention used by Skeleton A, MotionBuilder also recognizes it, and it can be used to quickly convert skeletons for animation.

8 Repeat steps 5 through 7 to isolate Skeleton C and view its skeleton hierarchy.



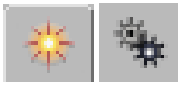
Even though the suffix of each bone name in Skeleton C is identical to the name suffixes in Skeleton B, the prefix to each bone name, "MIA," is different. MotionBuilder doesn't recognize this name prefix, so it can't characterize the bones automatically. Characterization is still possible, and you will carry this task out later on, but it will require more effort.

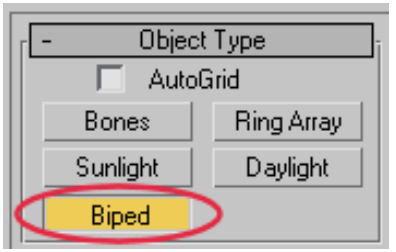
The next few steps provide a quick review on how to create and rename a biped. If you already know how to create and rename bipeds, proceed directly to the next lesson on page 1809.

9 Click Cancel to close the Select From Scene dialog, and then click Exit Isolation Mode to display the whole scene again.

Create a biped and rename it:

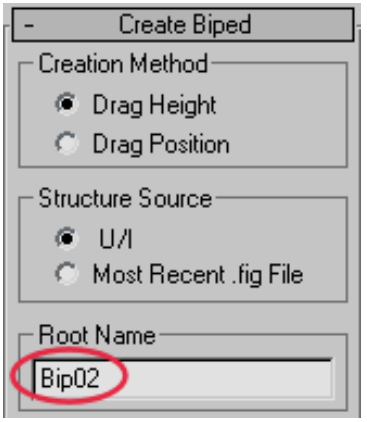
1  On the Quick Access toolbar, click New Scene. In the New Scene dialog, chose New All, and then click OK.

2  On the Create panel, click Systems and on the Object type rollout, click Biped.



3 Click the viewport and drag to create the Biped. Continue dragging until you reach the desired body height.

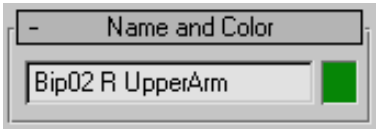
The Create Biped rollout > Root Name field displays the name of the new biped. This field is where you rename your Biped, if you need to.



NOTE Each time you create a Biped in a scene, its number increments by one (*Bip01, Bip02, Bip03,* and so on).

4  On the main toolbar, click Select Object, then select any bone on the new Biped.

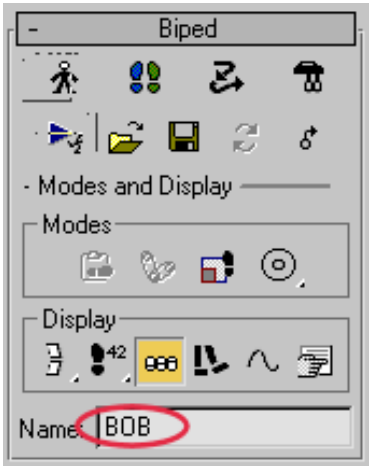
The Name And Color rollout displays the bone's name and its *Bip* prefix.



Remember, if the Biped has any prefix other than *Bip01,* more effort is required to characterize its bones in MotionBuilder.

If you wanted to rename a Biped any time after its creation, you can do the following.

5  Go to the Motion panel. On the Biped rollout expand the Modes And Display section. Type **BOB** in the Name field, and then press Enter.



6  On the main toolbar, click Select By Name.

The Select From Scene dialog opens, showing the bone hierarchy of your Biped. Each bone now displays the *BOB* prefix you specified in the previous step.

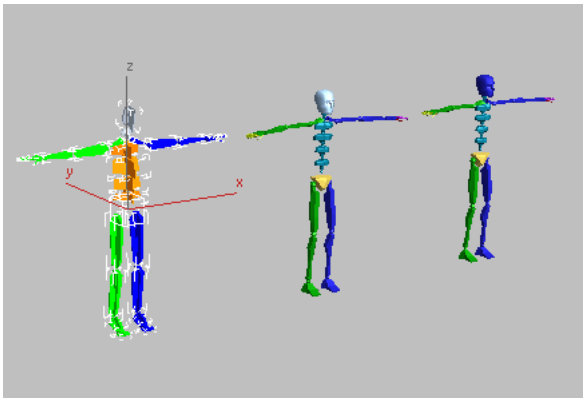
Exporting Scenes to MotionBuilder

This lesson shows you how to export 3ds Max scene data in *.fbx* format to MotionBuilder. You can export an entire scene, or only a portion of the scene containing selected elements.

Export skeleton A in FBX format:

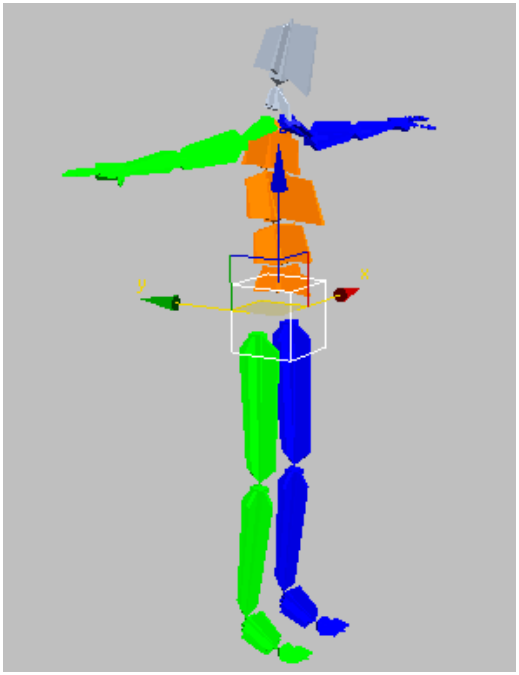
1  If you are continuing from the previous lesson, from the Application menu choose Reset, do not save any changes, then reopen *basics.max*.

2 Region-select all of skeleton A.



Notice that the skeleton has been positioned in a "T" pose, the stance commonly used by animators for skinning. You should always place your characters in this position before you export them to MotionBuilder.

Also, skeletons must be oriented in the minus Y axis direction. (All 3ds Max Biped systems are oriented this way when you create them.)



Skeleton A oriented in a minus Y direction

3  From the Application menu, choose Export > Export Selected.

4 In the Select File To Export dialog > File Name field, type **mybone-skeleton** and click Save.

The file is automatically saved in Fbx format to your project's Export folder. The FBX Export dialog opens. Here, you specify how to convert the 3ds Max scene information.

NOTE For conversion to take place properly, you must have the latest FBX driver installed. Installation instructions are provided at the beginning of this tutorial.

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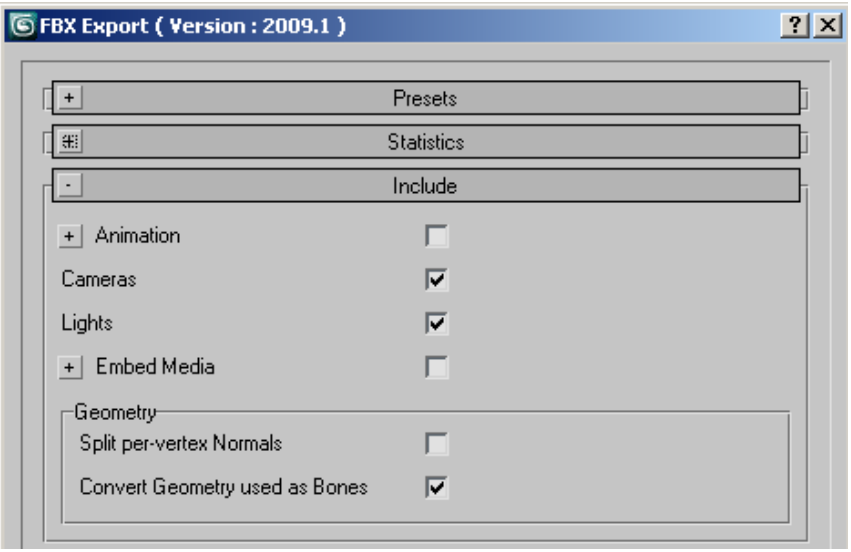
5 On the FBX Export dialog > Include rollout, turn off Animation.

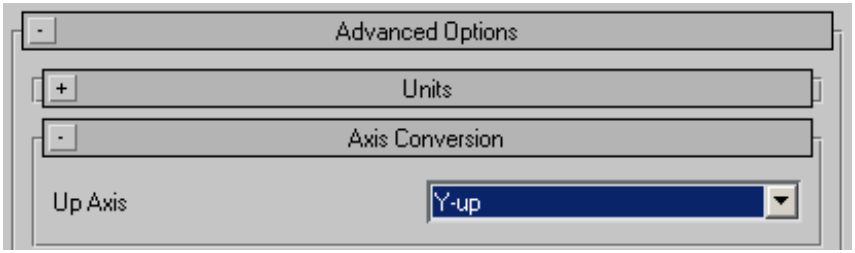


This option should be turned on only when the scene you want to export has animation.

6 Make sure Embed Media is also turned off.

If you were exporting a mesh with a character, the Embed Media option would embed in the FBX file any texture maps associated with the character. But since you are exporting a skeleton only, this option is not needed.

7 On the Advanced Options > Axis Conversion rollout, make sure Up Axis displays the Y-up option.



This setting assigns the exported character a Y-up axis, the orientation used by objects in MotionBuilder. This setting is required because objects created in 3ds Max use a Z-up orientation.

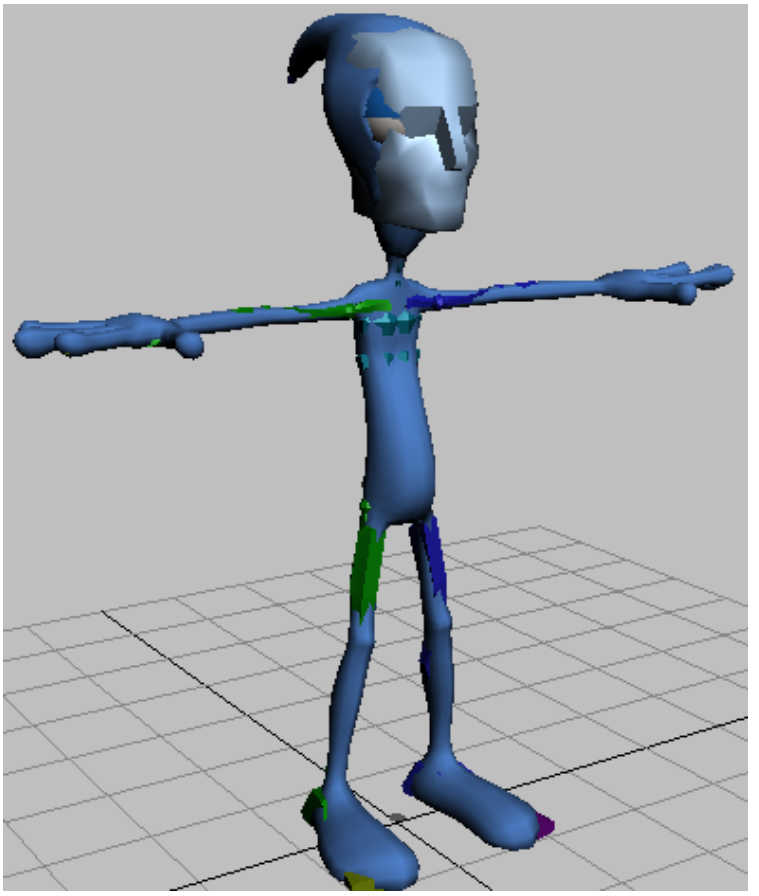
8 Click OK to export Skeleton A as an FBX file to your designated folder.

NOTE Typically, you would also export a mesh, properly skinned onto a skeleton.

Export the Pepe character:

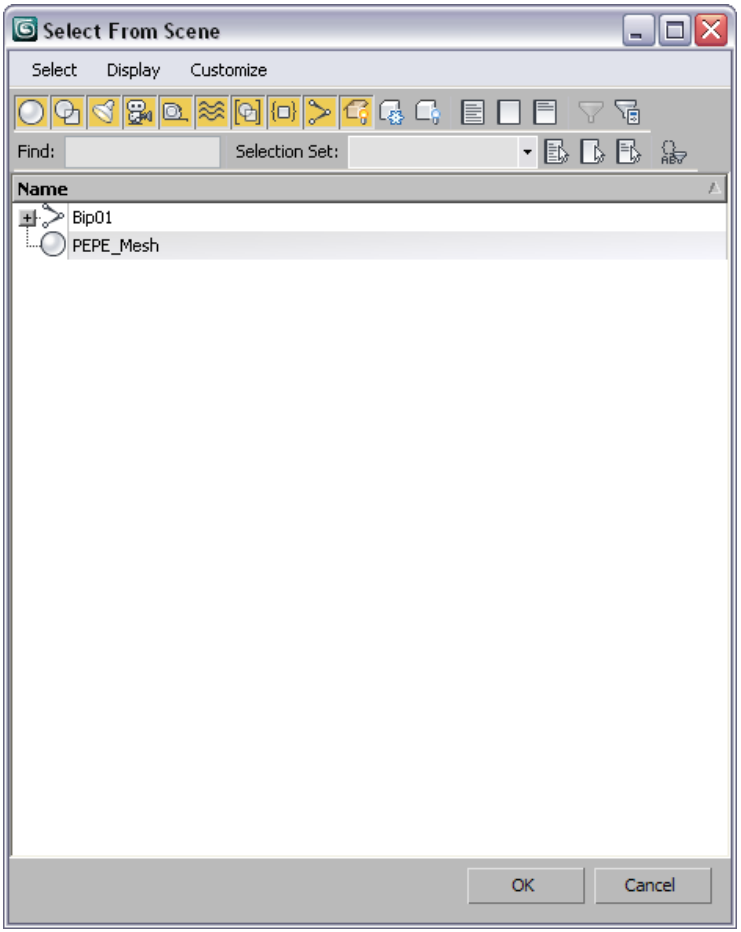
1  On the Quick Access toolbar, click Open File.

2 Do not save your scene file when prompted, and from the Open File dialog, choose *Pepe_biped.max*.



Scene consists of a biped skeleton inside a mesh

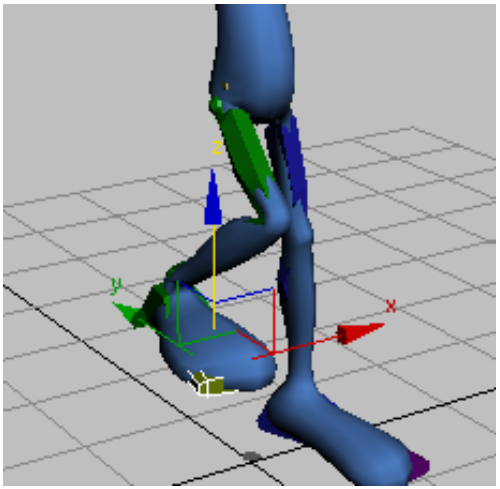
3  On the main menu, click Select By Name.



The Select From Scene dialog opens, showing both the mesh and the Biped. The Biped hierarchy uses a naming convention recognized by MotionBuilder.

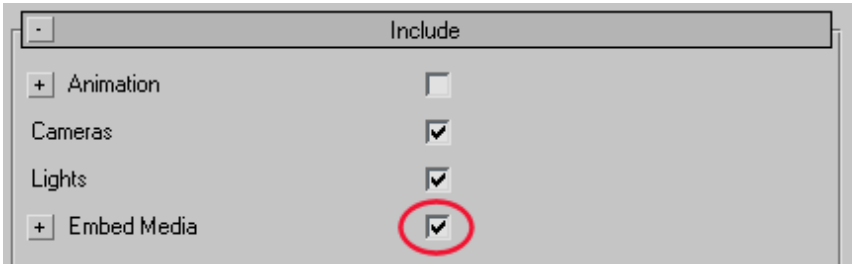
4  Click Cancel to close the dialog. On the main menu click Select And Move.

5 Select Pepe's right foot bone and move it in any direction to see how the skinning controls the character behavior.



6  From the Application menu, choose Export, and in the File Name field, type **my_pepe_biped01**.

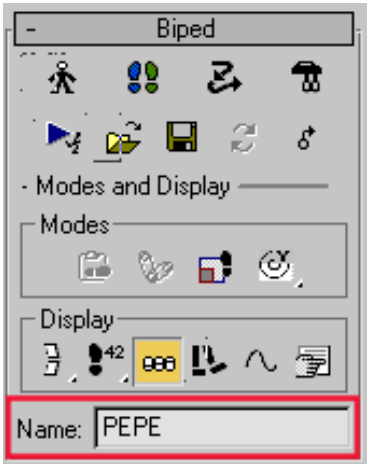
7 On the FBX Export dialog > Include rollout, turn on Embed Media, then click OK.



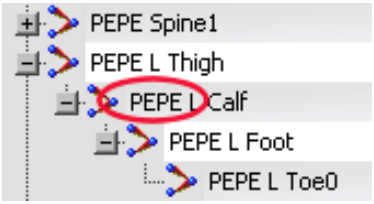
The Pepe character is exported as an .fbx file to the same folder as the biped skeleton you saved earlier.

8 In the viewport, select any bone in the Pepe skeleton.

9  Go to the Motion panel > Biped rollout, expand the Modes And Display group, and on the Name box, type **PEPE**.



10  On the main toolbar, click Select By Name.



The Select From Scene dialog displays the modified names of the character parts. Each bone is now identified by the *PEPE* prefix.

11 Export this modified scene as you did in step 6, but name the exported file **my_pepe_named**.

In the next lesson, you will use this FBX file to learn how to import custom-named characters into MotionBuilder.

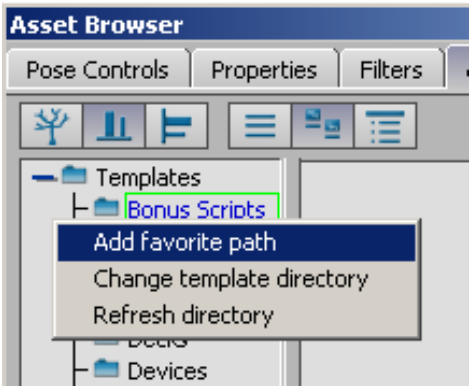
12 Save your scene in 3ds Max as **my_pepe.max**.

Importing Scenes to MotionBuilder

This lesson shows you how to import an FBX file to MotionBuilder and characterize the bones of the skeleton you need to animate. You will then assign the skeleton a control rig.

Import a Biped skeleton and assign it a control rig:

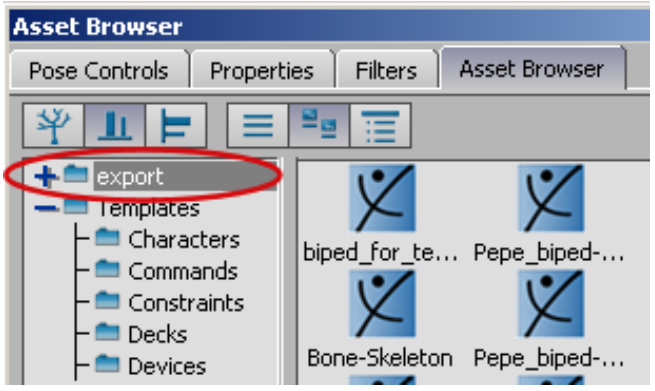
1. Open MotionBuilder and on the Asset Browser explorer panel, right click a blank area and choose Add Favorite Path.



2. On the Open Directory dialog, navigate to the *3dsMax 2010 Tutorials\export* folder. Highlight the folder and click OK.

   The folder displays as a shortcut in the Asset Browser

3. Click the folder name to expand it.



Now, you have fast access to the material you want to import to MotionBuilder. The folder contents display in the Asset Browser to the right.

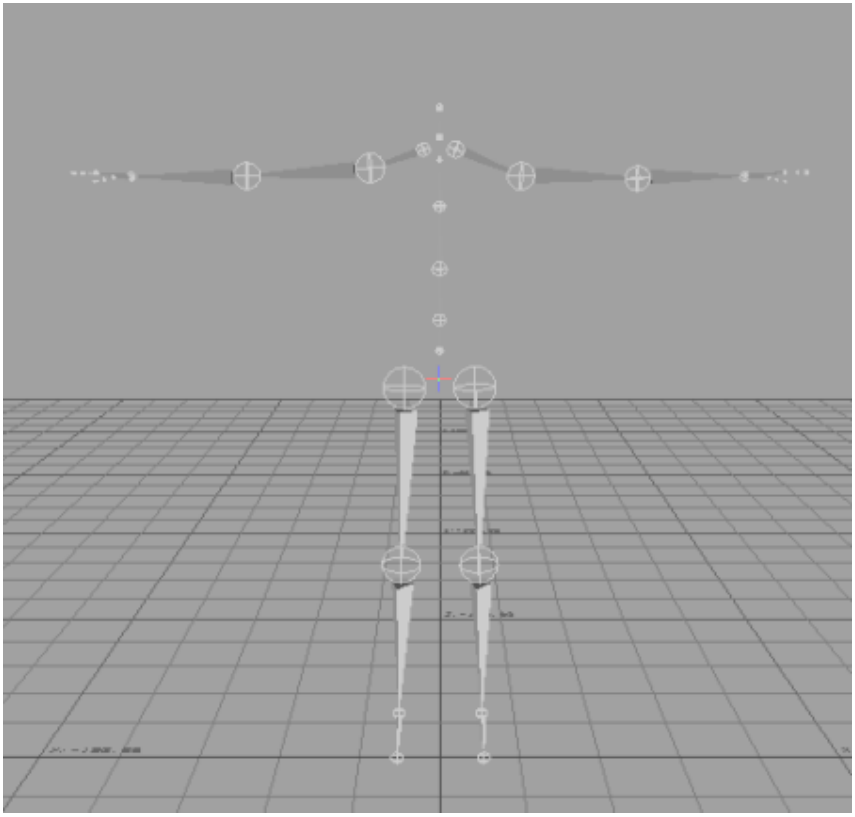
If you had saved your material in MotionBuilder instead of 3ds Max, you could have accessed them by simply dragging their file icon from the Asset Browser into the viewport.

Dragging the icons of files created in external applications, however, launches a series of dialoges that prompt you for more information. It is therefore preferable to import files created in 3ds Max through an Fbx Plug-in Import dialog.

4 From the main menu, choose File > Fbx Plug-in Import.

5 On the Open File dialog, navigate to the *3dsMax 2010 Tutorials\export* folder, highlight *bone-skeleton.fbx* and click Open.

6 On the Fbx Plug-in Import Options dialog, leave the default settings unchanged and click Open.



A skeleton displays in the viewport

Pause now and take a moment to try a few MotionBuilder navigation techniques.

7 Press Ctrl+Shift and drag to orbit around the scene.

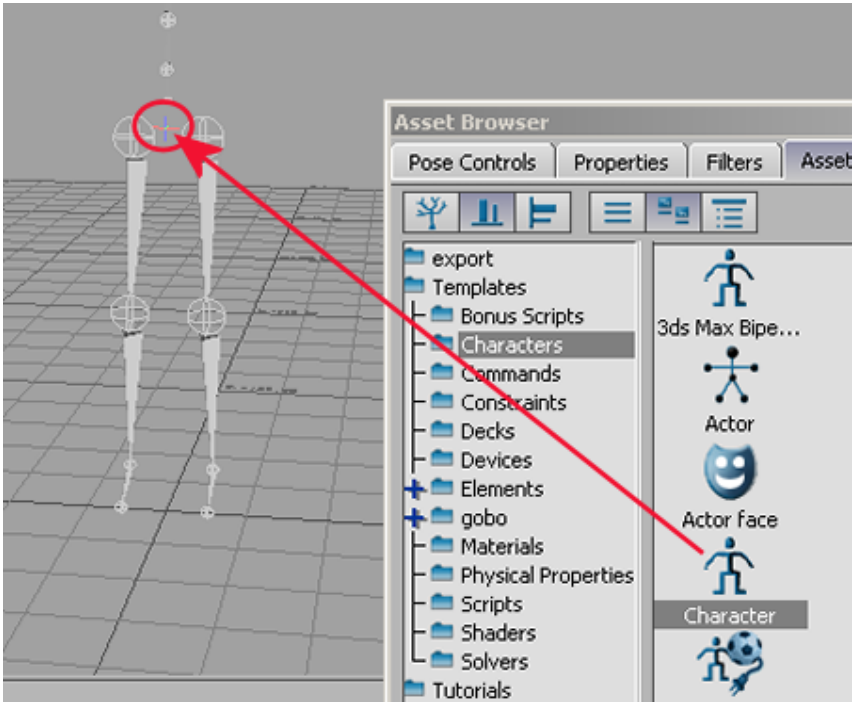
8 Ctrl+click and drag to zoom in and out of the scene.

9 Shift+click and drag to pan the scene.

The skeleton bones now need to be characterized before it can take on animation. Characterization is the way you rig a skeleton in MotionBuilder.

10 On the Asset Browser, click Templates > Characters.

11 Click and drag the Character tool to the skeleton's center of mass.



12 Click Characterize.

13 On the Character dialog, click Biped to indicate the type of rigging to apply to the character.

The dialog reminds you that the character must be in a "T" pose and be facing in the positive Z axis (the equivalent of the negative Y axis that you converted when exporting the *.max* file into *.fbx* format).

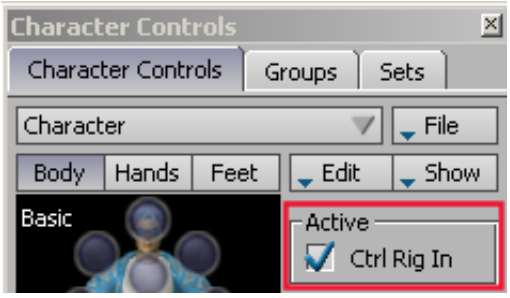
14 On the Character Controls window, choose Edit > Control Rig Input.

You must choose this setting if you intend to keyframe your character.

15 On the Create Control Rig dialog, click FK/IK.

FK/IK is the method commonly used to animate characters.

16 In the Character Controls window > Active group, turn on Ctrl Rig In.

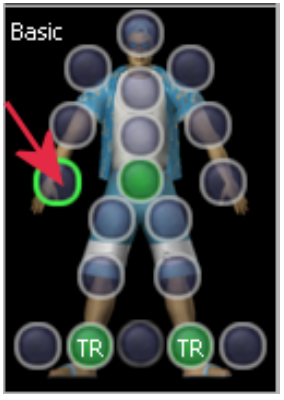


This setting activates the Character Controls gizmo to the left. The gizmo is an image of the biped skeleton and contains all the effectors you need to animate its control rig.

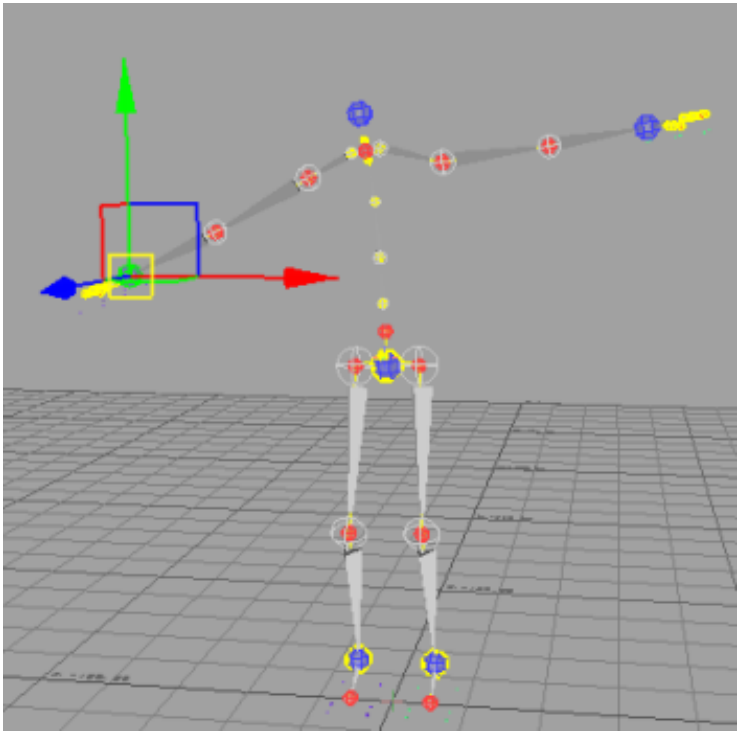
Your character is now rigged and ready to receive animation.

Because your character bones were properly labeled, it took just six steps to successfully rig your character. In 3ds Max, rigging a character using regular FK/IK constraints would have taken a great deal more effort.

17 On the Character Controls gizmo, select the skeleton's right hand effector.



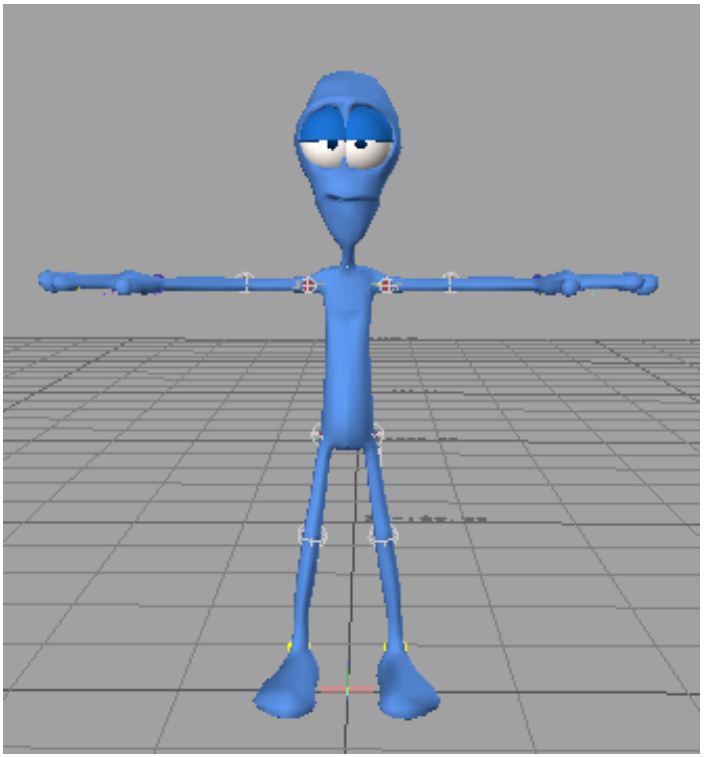
18 Click anywhere in the viewport, press T (translate), and move the hand down. As you continue to move the hand, the arm extends, and the rest of the body reacts in a natural movement.



Use a naming template to characterize a biped skeleton with a Bip01 prefix:

1. From the main menu, choose File > New. Do not save changes to your existing file.
2. Choose File > Fbx Plug-in Import.
3. On the Open File dialog, navigate to your Import > Motionbuilder Files folder, highlight *Pepe_biped-Bip01.fbx* and click Open. On the Fbx Plug-in Import dialog, leave the default settings unchanged and click Open.

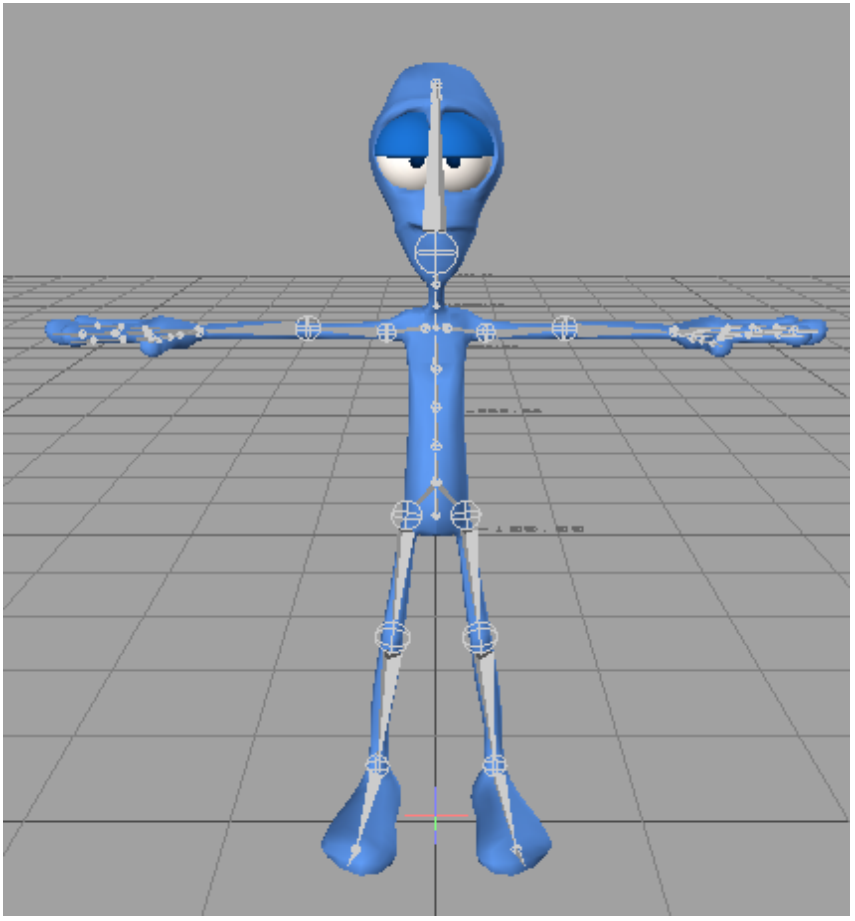
   The Pepe character mesh displays in the viewport.



4 Place the cursor anywhere inside the viewport and press A.

Pressing A is the equivalent of using Zoom Extents in 3ds Max. It zooms in to all visible objects in the viewport.

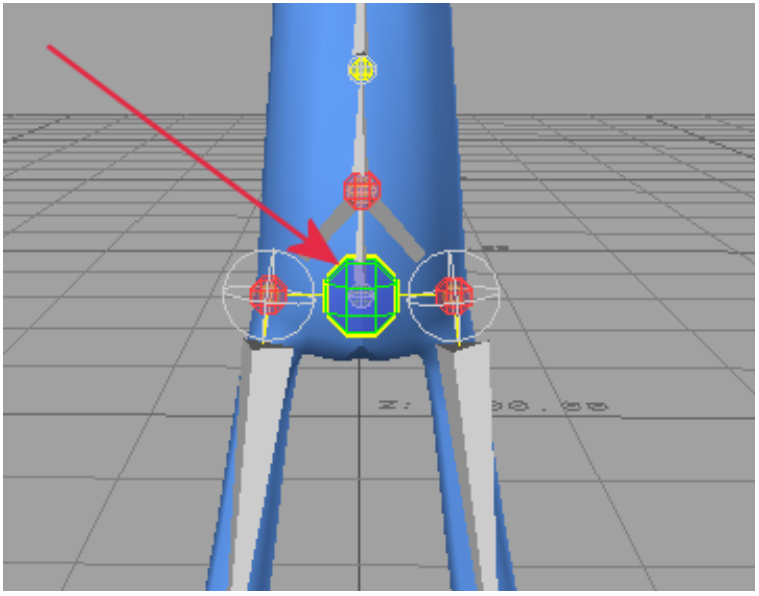
5 With your cursor still in the viewport, press Ctrl+A to obtain a skin-only view. Press Ctrl+A again to switch to X-ray mode.



Pepe character in X-ray mode

In this mode, you can view and select both the character mesh as well as the bones, either individually or by region selection.

6 Drag drag the Character icon from the Asset Browser into the viewport, then release the icon over the skeleton's center of mass, as shown in the next illustration.



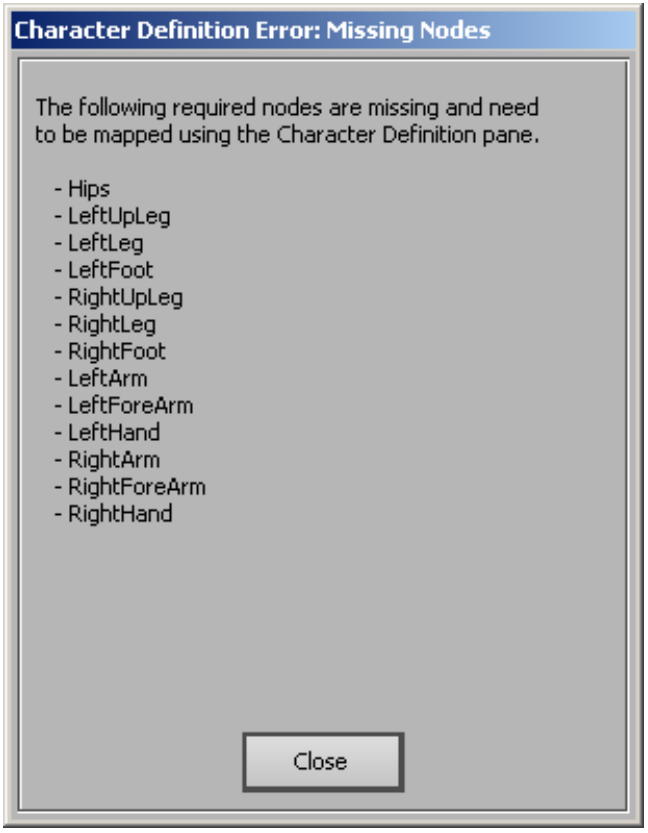
Pepe character center of mass

7 Click Characterize.

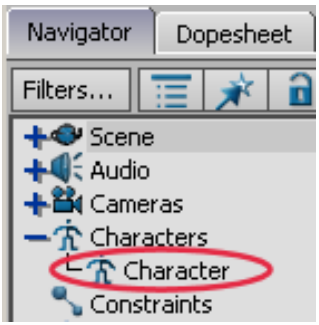
An error message displays, indicating that the characterization of the bones could not be completed. This is because MotionBuilder could not recognize the names that identify the Pepe character bone system.

8 Click OK.

A list displays all the bones MotionBuilder could not find.

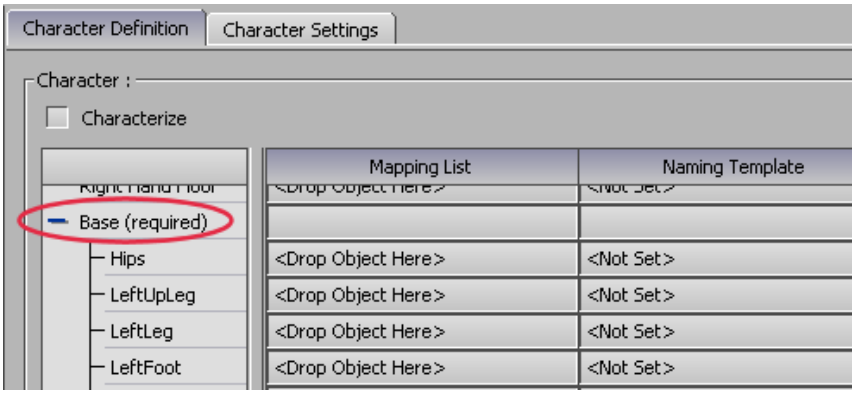


9 Click Close, then go to the Navigator window, expand Characters, and double-click on Character.



10 Click the Character Definition tab if it is not already active and from the left-hand column, expand Base (Required).

The Character Definition window mapping table shows all the skeleton components whose mapping conversion was not recognized by the MotionBuilder naming template.



11 On the Navigator window, highlight, then right-click the Character entry and click Delete.

12 On the Asset Browser, click the 3ds Max Biped Template and drag it to the Pepe character center of mass in the viewport.

This tool is similar to the Character tool you used earlier to characterize the bones of the model. It is designed to recognize the bones of a biped object created in 3ds Max (bones that have *Bip01* as a prefix and a the regular Biped link-naming convention for their suffix).

13 Click Characterize, then Biped.

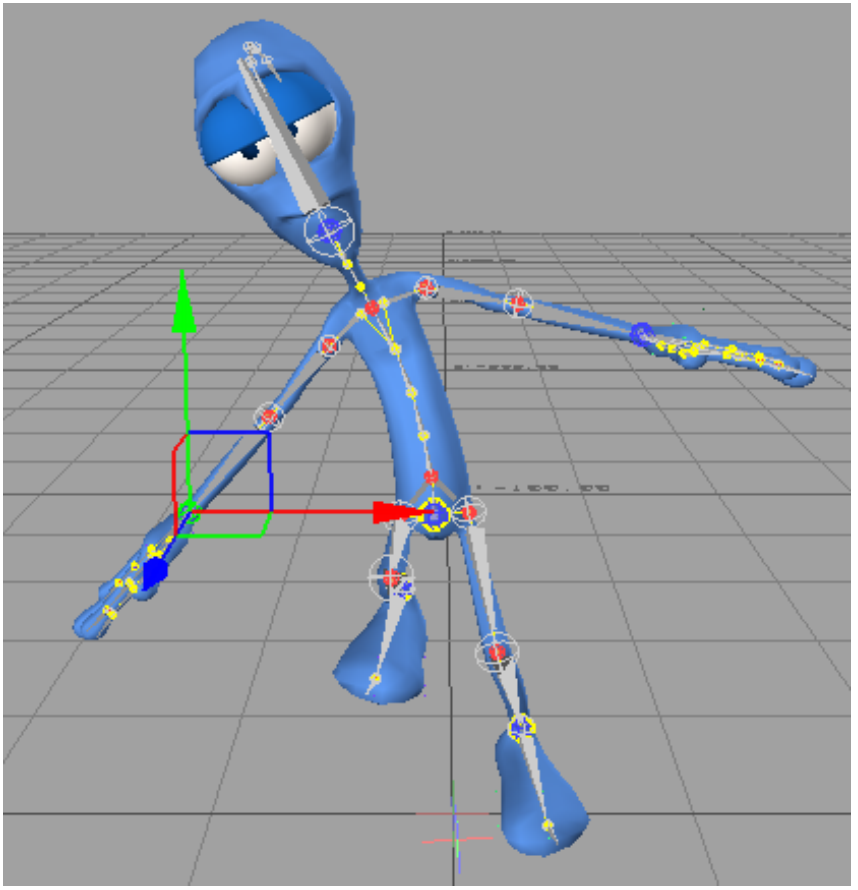
14 On the Character Controls window, choose Edit > Control Rig Input.

15 On the Create Control Rig dialog, click FK/IK.

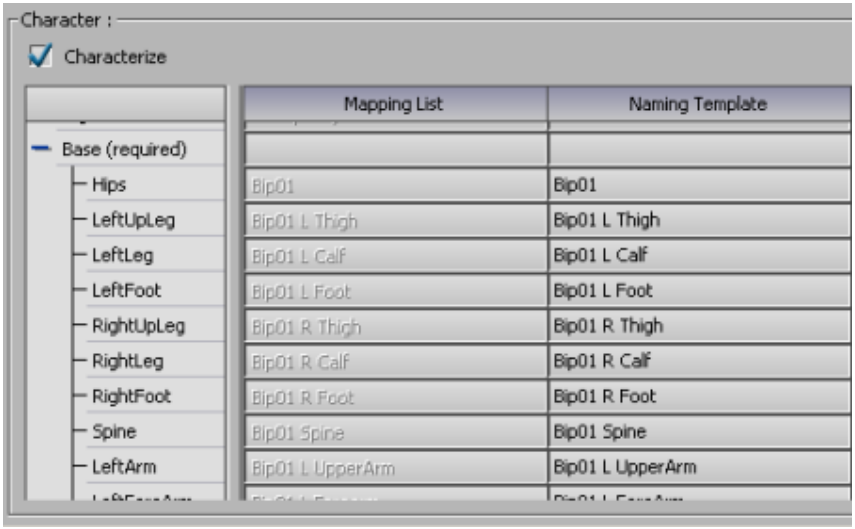
16 On the Active group, turn on Ctrl Rig In.

17 On the Character Control group gizmo, select Pepe's right hand effector, then click anywhere in the viewport, press T, and move the hand.

The Pepe skeleton is fully rigged.



18 Go to the Navigator window, double-click on 3ds Max Biped Template, and on the Character Definition window, expand Base (Required).



The Naming Template column (on the right) shows how the 3ds Max Biped Template tool has characterized the bones by mapping their conventional Biped names onto the default MotionBuilder naming convention, shown in the left-hand column.

Use a naming template to characterize a biped skeleton with another prefix:

1. From the main menu, choose File > New. Do not save changes to your existing file.
2. Choose File > Fbx Plug-in Import.
3. On the Open File dialog, navigate to your Export folder and double-click *Pepe_biped-PEPE.fbx*. On the Fbx Plug-in Import dialog, leave the default settings unchanged and click Open.

   The Pepe character mesh displays in the viewport.
4. With your cursor in the viewport, press A to zoom in and press Ctrl+A until you see the skeleton in the viewport.
5. Drag the 3ds Max Biped Template from the Asset Browser to the viewport, and drop it on the Pepe character's center of mass.
6. Click Characterize.

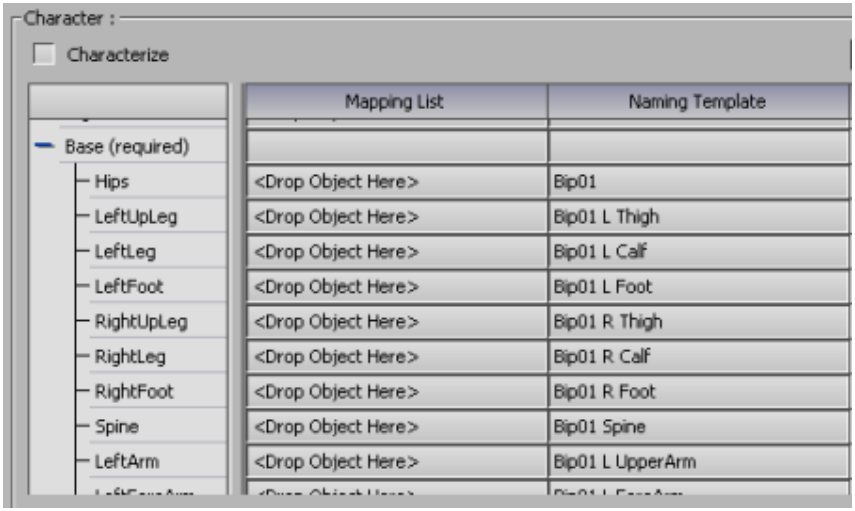
   An error message displays, indicating that the characterization of the bones could not be completed. This is because MotionBuilder could not

recognize the *PEPE* prefix that precedes each name in the Pepe character's bone system.

7 Click OK.

All the bones MotionBuilder could not find on the character displays in a list.

8 Click Close, go to the Navigator window, choose Characters and double-click on 3ds Max Biped Template.



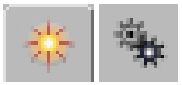
The mapping table shows that MotionBuilder could not recognize the character's bones, based on the 3ds Max naming template (*Bip01 L Thigh,* and so on) listed in the right-hand column.

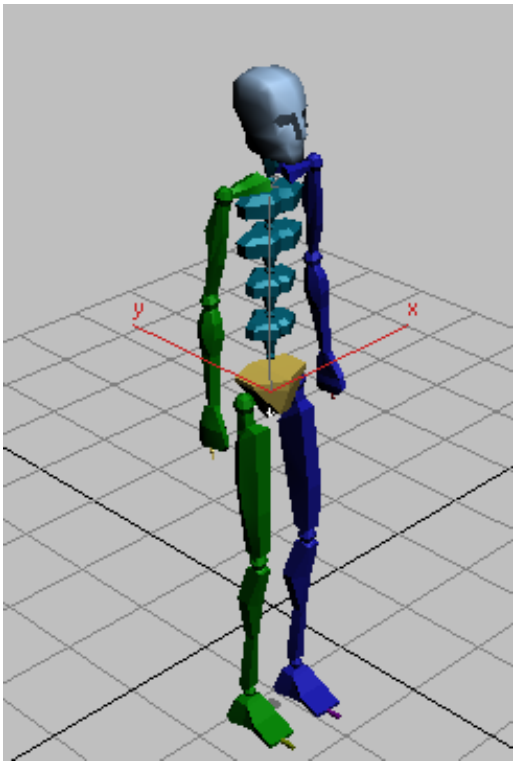
One way to solve this problem is to Alt+drag each bone from the character to the corresponding row in the Mapping List column. However, this is quite time-consuming. It is better to create a new naming template to suit any new characters you need to import to MotionBuilder. You will learn how to do this in the next lesson.

Creating Naming Templates

This lesson shows you how to create templates that let you take custom-named character bones and have them characterized automatically for use in MotionBuilder.

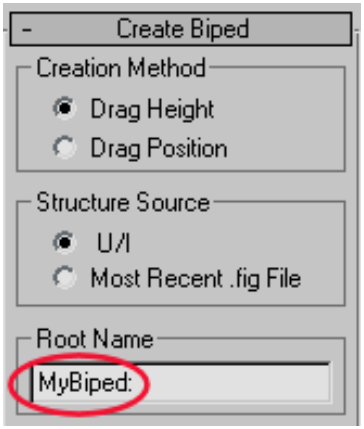
Create a biped in 3ds Max and export it to MotionBuilder:

1.  In 3ds Max, from the Application menu, choose Reset.
2.  On the Create panel, click Systems.
3. On the Object type rollout, click Biped.
4. In the Perspective viewport, click and drag to create a biped object.



The size of the biped is not important.

5. On the Create Biped rollout > Root Name group, type **MyBiped:** as the character name.



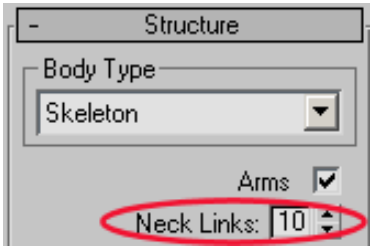
Be sure to add the colon (:) after the Biped name. This character instructs MotionBuilder to ignore all characters that precede it, thereby creating a template whose bone labels have no prefix.

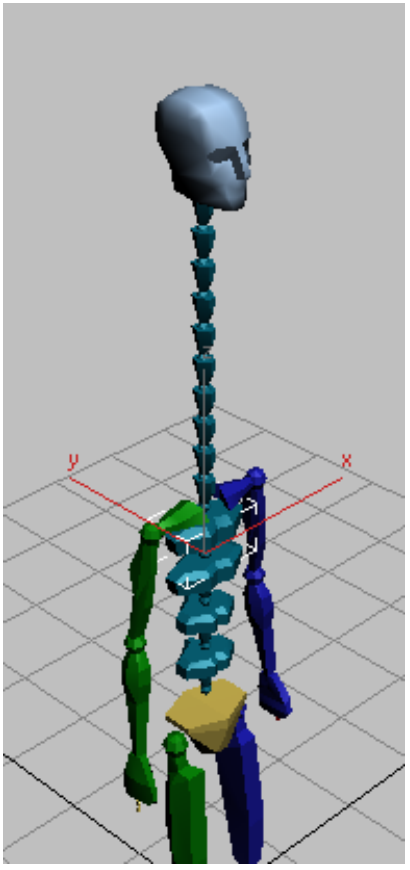
If for any reason you forget to add the colon, you can add it later by going to the Motion panel > Biped rollout, expanding the Modes And Display section, and adding the colon in the Name box.

NOTE Because you are creating this Biped to extract its naming information only, you do not need to give it a T-pose or position it in a negative Y axis.

6  Go to the Motion panel > Biped rollout, select any bone in the Biped, and click Figure Mode.

7 In the Structure rollout > Body Type group > Neck Links spinner, type **10** and press Enter.





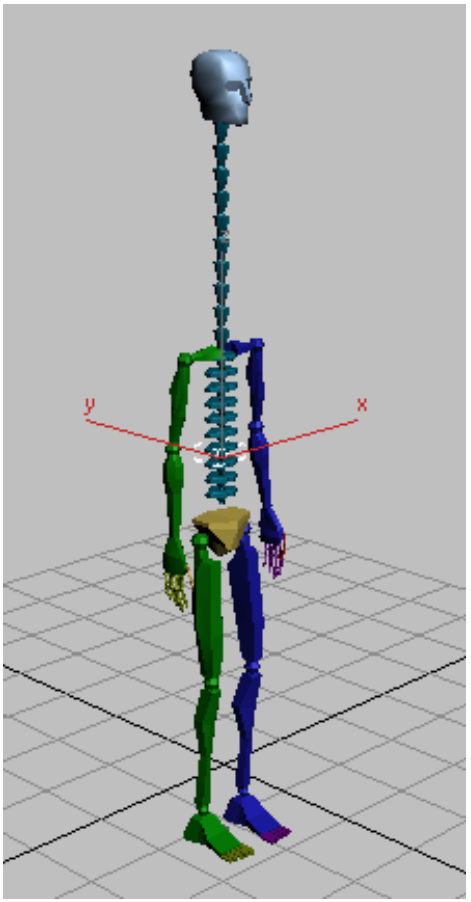
Biped with 10 neck links

The biped starts to look more like a giraffe, but the appearance of the model is not important. Because MotionBuilder has channels that provide for ten neck links, it is simply good practice to make them available when you create your biped.

8 Change other Figure Mode settings for the Biped as follows:

- Spine Links = **10**
- Fingers = **5**
- Finger Links = **3**
- Toes = **5**
- Make sure Toe Links = 3 (the default).

Press Enter after you change each value.



9  Click Figure Mode again to turn it off.

Export the geometry:

1  From the Application menu, choose Export.

2 In the Select File To Export dialog > File Name field, type **my_biped_for_template** and then click Save.

3 On the FBX Export dialog > Include rollout, turn off Embed Media, then click OK.

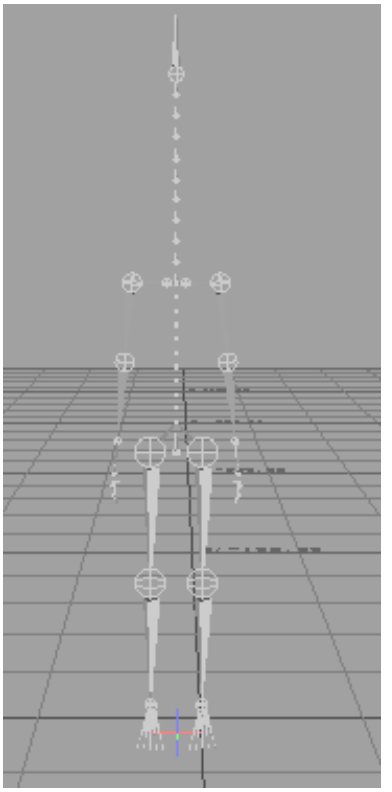
Import the Biped to MotionBuilder:

1 In MotionBuilder, create a new scene. If you still have *Pepe_biped-Bip01.fbx* open, do not save your changes.

2 From the main menu, choose File > FBX Plug-in Import.

3 On the Open File dialog, choose the Biped file you just created in 3ds Max, *my_biped_for_template.fbx*, click Open, then on the FBX Plug-in Import Options dialog, click Open again.

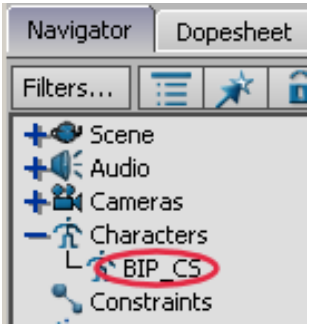
4 Place your cursor anywhere in the viewport and press A to zoom in to the Biped skeleton.



Next, you will create a naming template that you can reuse later on to automate the skeleton characterization process.

Begin to create the naming template by assigning nodes to the Mapping List:

1. On the Asset Browser, highlight Templates > Characters and click the Character tool.
2. Drag the Character tool to an empty area in the viewport.
3. On the Navigator panel, expand Characters and highlight Character.
4. Right-click, choose Rename, and type **BIP_CS**, then press Enter.

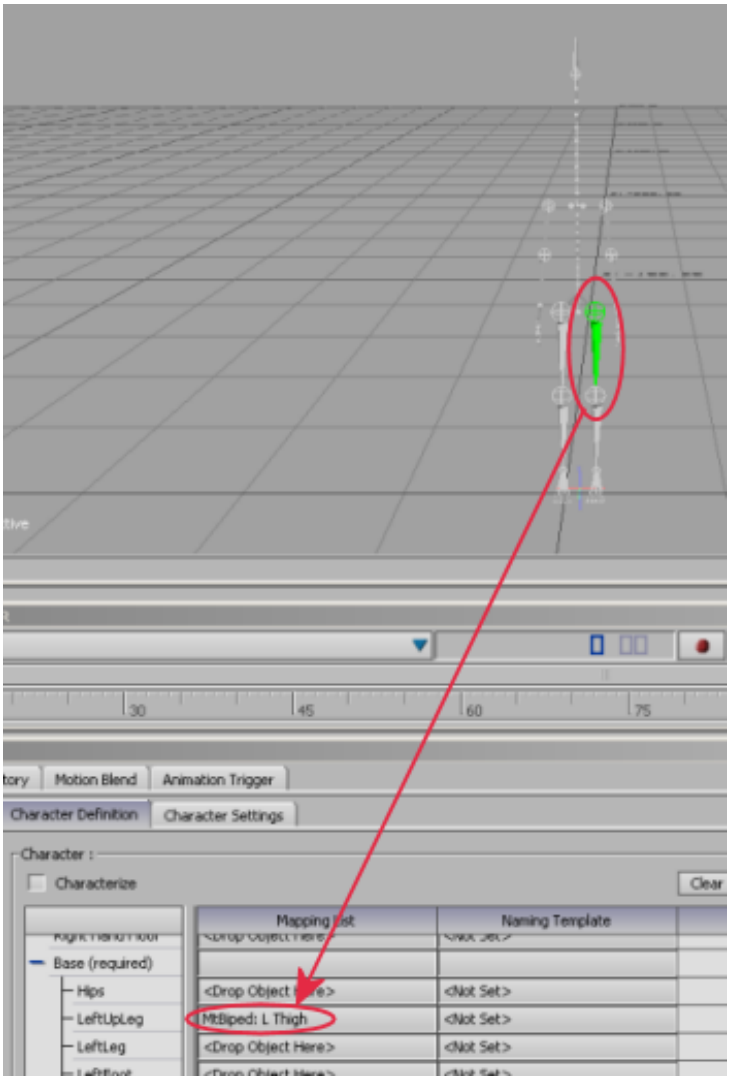


This is the name of the template you are about to create for your biped.

5 On the Character Definition tab > Character group, expand Base (Required) if it is not already displayed.

The left column lists all bones required to form a complete skeleton.

6 In the viewport, click to select the Biped's left upper thigh, and then Alt+drag it to the Mapping List column, next to the row called *LeftUpLeg*.



Alt+drag skeleton left upper thigh to the Mapping List.

This maps the bone label created in 3ds Max to the naming convention recognized by MotionBuilder.

7 Click to select the Biped's left calf, then Alt+drag it from the viewport to the Mapping List cell to the right of *LeftLeg*.

8 Click to select the Biped's left foot, then Alt+drag it from the viewport to the Mapping List cell to the right of *LeftFoot*.

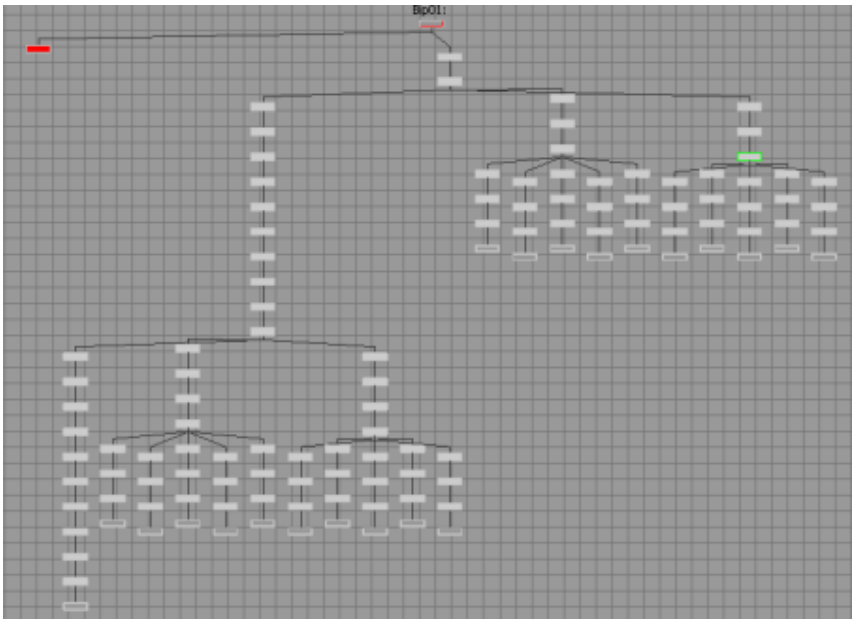
9 Repeat steps 6 through 8 for the Biped's right leg.

Use Schematic view to locate nodes:

1 Click an empty area in the viewport and press Ctrl+W to switch to Schematic view.

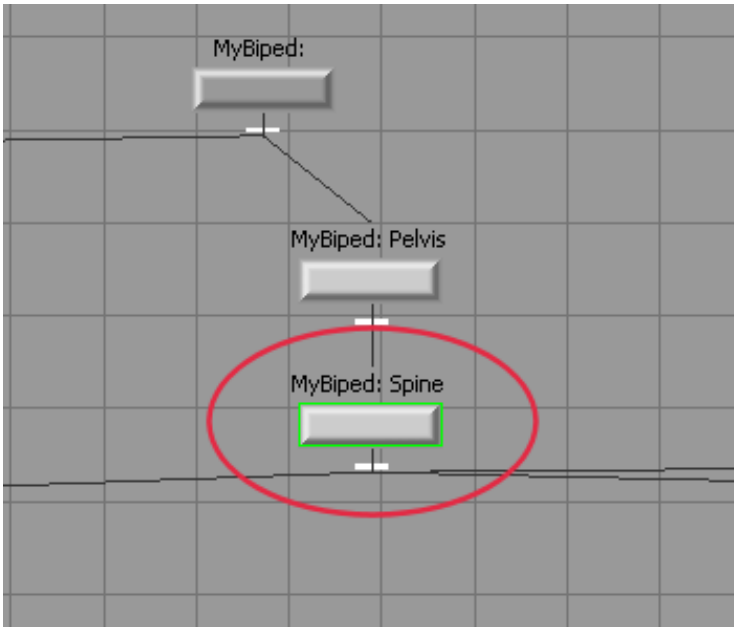
It is often easier to locate bones in this view.

2 Press A to zoom out to view all the nodes in the biped skeleton.



You can pan, zoom and navigate the viewport using the same navigation key combinations you tried earlier in Perspective view: Ctrl+drag to zoom, and Shift+drag to pan.

3 Locate the *MyBiped:Spine* node in the viewport.

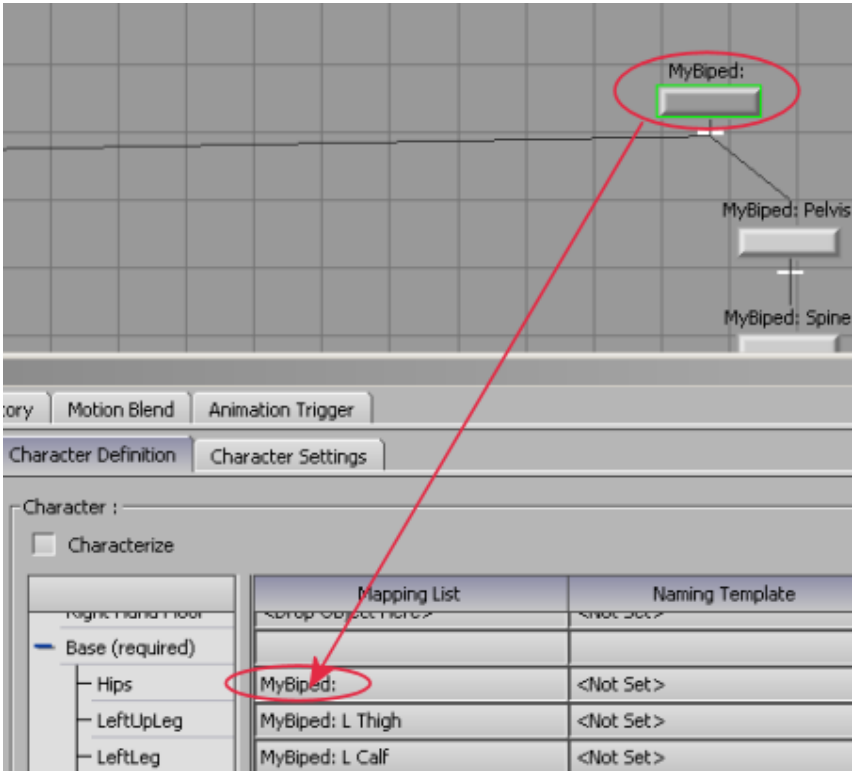


TIP You can also select one or more nodes and press F (fit) to instantly zoom in to your selection.

4. Click the *MyBiped: Spine* node to select it, then Alt+drag it to the Mapping List cell to the right of *Spine*.
5. Navigate the bone hierarchy until you locate the *MyBiped: L UpperArm* node. Click to select it, then Alt+drag it to the to the Mapping List cell to the right of *LeftArm*.
6. Repeat the previous step for the Biped's forearm and hand, then move on to do the same for the right arm, forearm, and hand.
7. Locate the *MyBiped: Head* node. Click to select it, then Alt+drag it to the bottom of the Mapping List, next to *Head*.

Map the Hip node:

➤ In the Schematic view, locate the *MyBiped:* node, at the top of the bone hierarchy, click to select it, then Alt+drag it to the Base (required) Mapping List cell to the right of *Hips*.

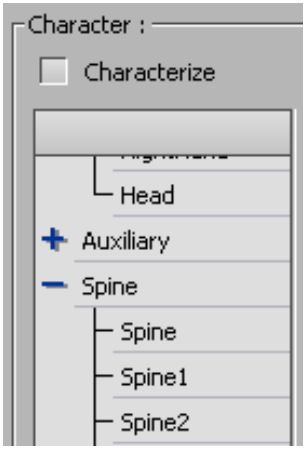


Intuitively, you might expect to drag the *MyBiped: Pelvis* node to the Hips entry instead. But because of the way bones are characterized in MotionBuilder, the Biped Center of Mass (COM) is the node you need to specify for hip bones of characters exported from 3ds Max.

The bones you have so far mapped to the naming template are required to successfully characterize a character skeleton. The bones you will map in the next procedure are optional, but they give you more control over the character.

Map optional nodes:

1. On the Character group > left column, expand the Spine group. Alt+drag *MyBiped: Spine 1* from the viewport to the Mapping List cell to the right of *Spine1*.



2 Repeat the previous step for spine links 2 to 9.

3 On the Character group > left column, expand the Neck group. Alt+drag *MyBiped: Neck* from the viewport to the Mapping List cell to the right of *Neck*.

4 Repeat the previous step for neck links 1 to 9.

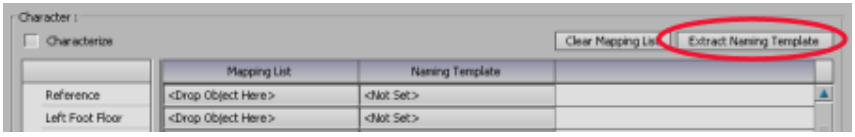
5 On the Character group > left column, expand the Auxiliary group. Alt+drag *MyBiped: L Clavicle* from the viewport to the Mapping List cell to the right of *LeftShoulder*.

6 Repeat the previous step for the right shoulder.

This completes the base subset of bones required for characterization. You are now ready to extract the template so it can be used to characterize the bones of future skeletons.

Extract the template:

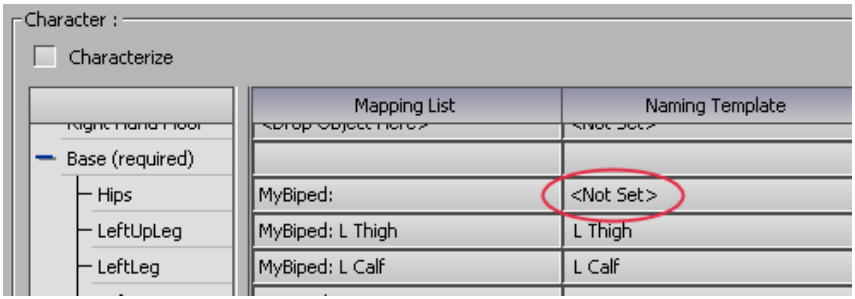
1 In the Character Definition window > Character group, click Extract Naming Template, then click OK to clear the message box.



The names of the bones you dropped into the Mapping List column are transferred to the Naming Template column. Because you added the

colon to the Biped skeleton names, only the suffix is transferred. This is the naming convention recognized by MotionBuilder.

The only bone not properly labeled at this point is *Hips*. You must set the *Hips* name manually each time you characterize a Biped with this template.



2. Click Clear Mapping List and then click OK.

   You need to clear the Mapping List column because this is where you drop the bones of future skeletons to be characterized.

3. On the Navigator window scene explorer, highlight *BIP_CS*. From the main menu, choose File > Save Selection.

   This saves the *BIP_CS* characterization template only, and not the biped skeleton you used as its reference.

4. On the Save File dialog, navigate to the Export folder and in the File name field, type **univ_bip_template**. Click Save, then click Save again.

   With this template created, it is now much easier to characterize a Biped whose bones do not start with the prefix *Bip01*.

Import the Pepe biped and use the BIP_CS naming template to characterize its skeleton:

1. Click an empty area in the viewport, and press Ctrl+E to return to Perspective view.

2. From the main menu, choose File > New. Do not save changes to the existing file.

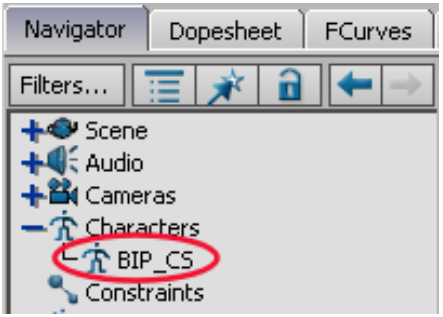
3. Choose File > Fbx Plug-in Import, navigate to the export folder and open the file called *Pepe_biped-PEPE.fbx*.

   As you saw earlier, this file contains a biped with a PEPE prefix for each of its bones. Conversion with the 3ds Max Biped template is not possible, since it can only handle skeletons whose bones have *Bip01* prefixes.

4 Zoom in to the Pepe character and press Ctrl+A until you reach X-ray mode.

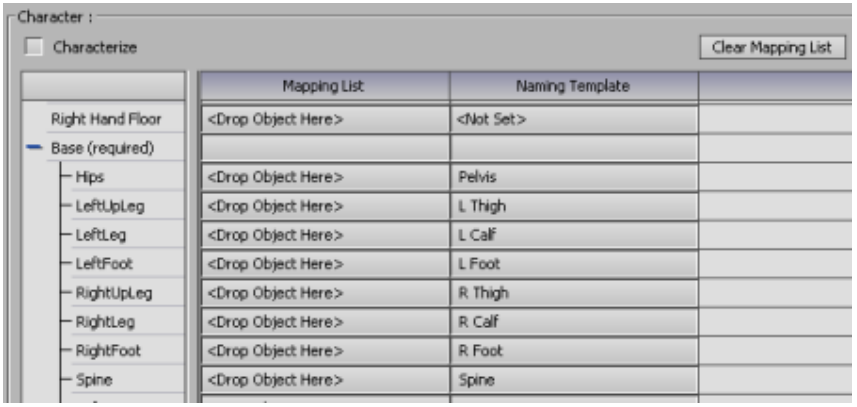
5 On the Asset Browser, highlight the export folder in which you saved *univ_bip_template*. Select the folder, then right-click and choose Refresh Directory.

6 Drag and drop *univ_bip_template* from the Asset Browser to an empty area in the viewport. Choose FBX Merge > <No Animation>.



The *BIP_CS* template displays in the navigator tab scene explorer, under Characters.

7 Double-click *BIP_CS* to display the Naming Template at the far right.



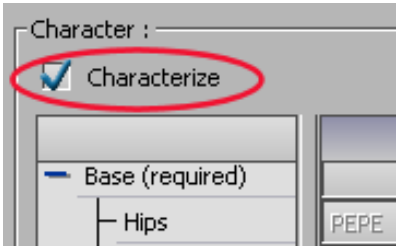
8 Region-select the Pepe character to select all his bones, then Alt+drag to the Mapping List column.

Each bone suffix is matched to the suffixes of the Naming Template, ready for characterization. The only step remaining is to manually specify the hips, since they could not be provided in the Naming Template.

9 Click an empty area of the viewport and press Ctrl+W to return to Schematic view.

10 Locate the Pepe character's center of mass node, called PEPE. Alt+drag it to the Mapping List cell to the right of the *Hips* entry.

11 In the Character Definition window > Character group, turn on Characterize, and then click Biped.



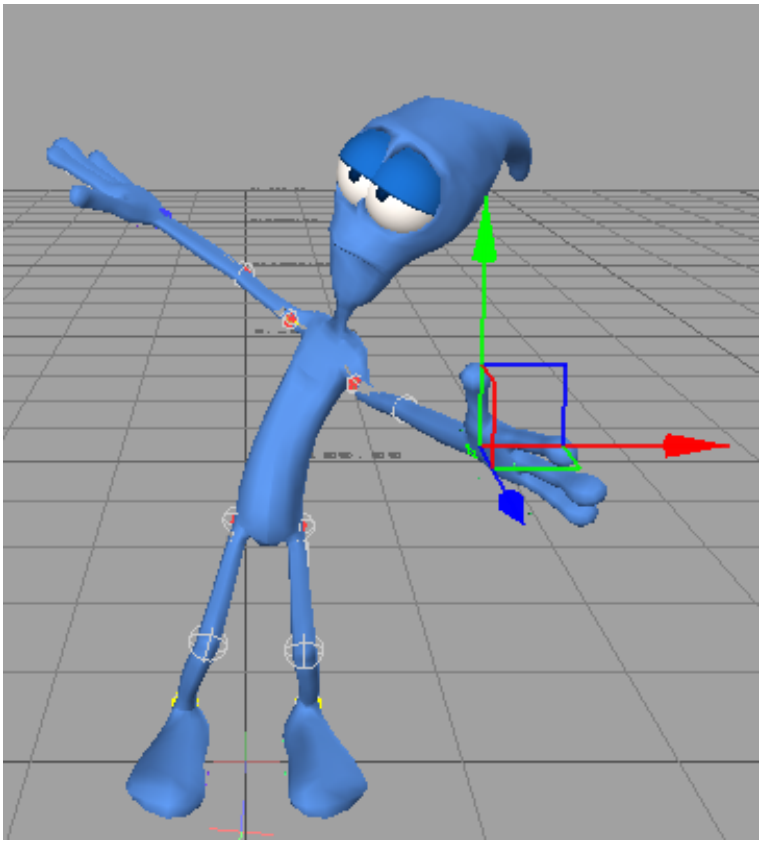
12 Press Ctrl+E to return to Perspective view.

13 From the Character Controls window > Character Controls tab > Edit menu, choose Control Rig Input.

14 On the Create Control Rig dialog, click FK/IK.

15 On the Character Controls window > Active group, turn on Ctrl Rig In.

16 On the Character Control gizmo, select Pepe's right hand, then click anywhere in the viewport, press T, and move the hand.



Fully-rigged Pepe character

The character is properly rigged, ready for keyframe animation.

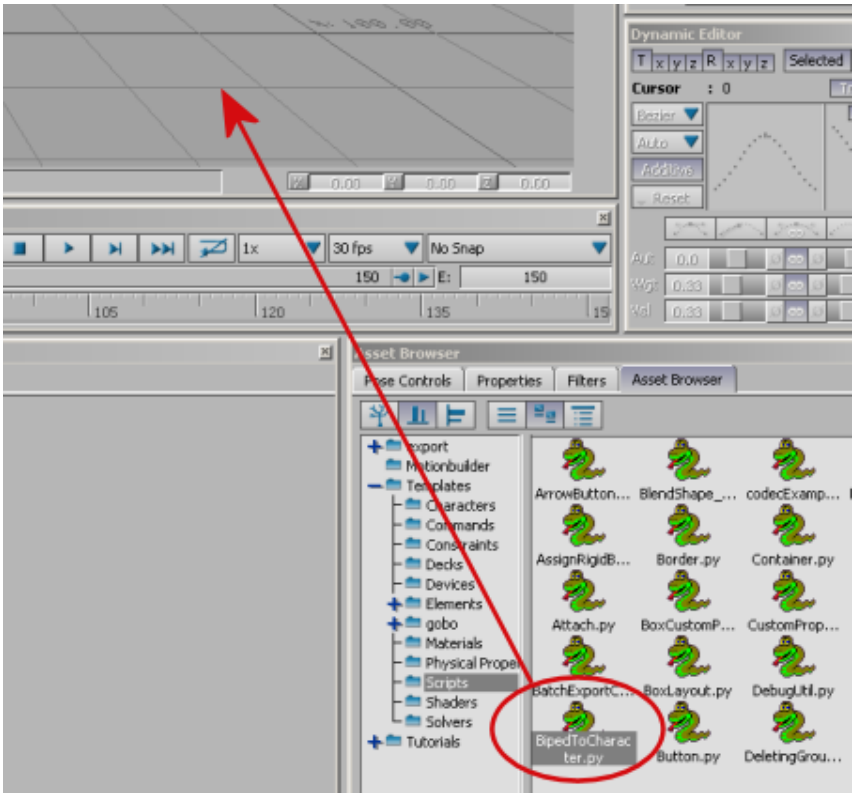
Now you can import to MotionBuilder any biped character created in 3ds Max with any prefix name. If you choose the *univ_bip_template* as the characterization tool, characterization is virtually automatic. The only bone you need to manually specify is the hip bone.

You can accomplish this task faster using a Python script, but it is important to understand the template creation process in case you need to perform the characterization manually.

17 Close the scene file and do not save your work.

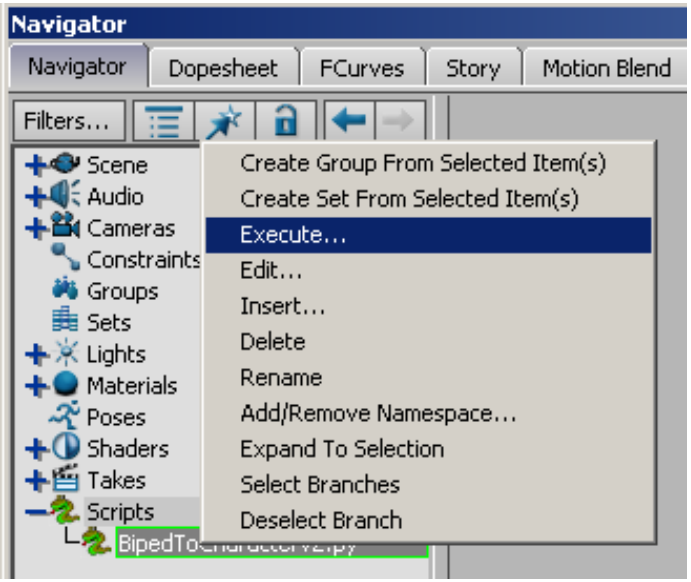
Import the Pepe biped using a Python script to characterize its skeleton:

1. From the main menu, choose File > New.
2. Choose File > Fbx Plug-in Import and open the file called *Pepe_biped-PEPE.fbx*.
3. Zoom in to the Pepe character and press Ctrl+A until you reach X-ray mode.
4. On the Asset Browser, open the Scripts folder.
5. Drag and drop the BipedToCharacter icon from the Asset Browser to an empty area in the viewport.



6. From the menu, choose Add To Scene.
7. Select the character's center of mass.

8 On the Navigator tab, expand Scripts, right-click BipedToCharacter and choose Execute.

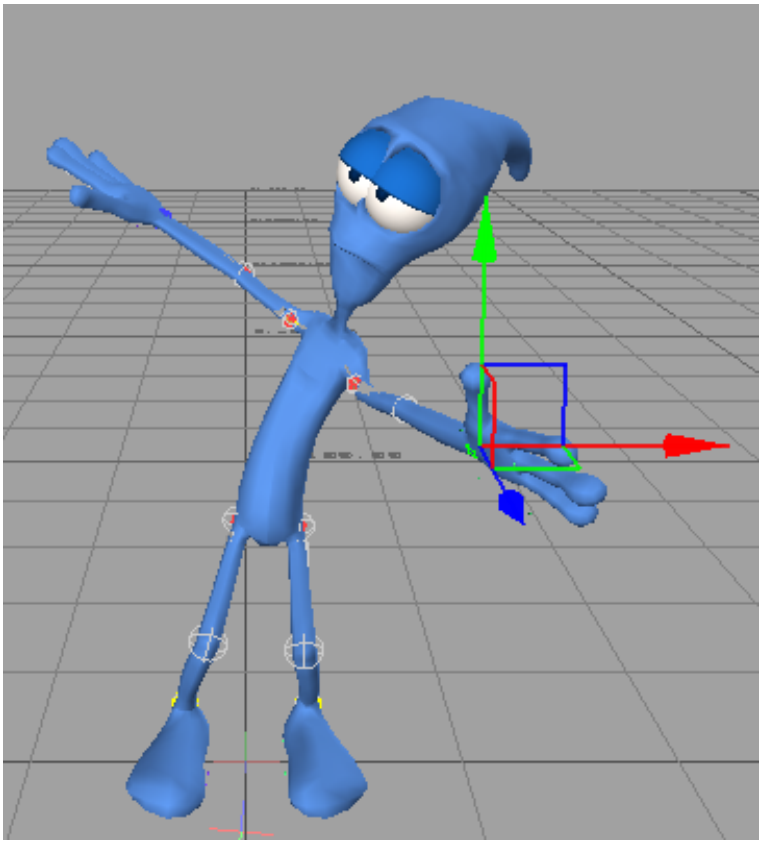


9 From the Character Controls window > Character Controls tab > Edit menu, choose Control Rig Input.

10 On the Create Control Rig dialog, click FK/IK.

11 On the Character Controls window > Active group, turn on Ctrl Rig In.

12 On the Character Control gizmo, select Pepe's right hand, then click anywhere in the viewport, press T, and move the hand.



Fully-rigged Pepe character

The character is properly rigged, ready for keyframe animation.

Animating Characters In MotionBuilder

In MotionBuilder, you can animate characters by setting keyframes manually or by using motion-capture data. This lesson shows you how to do both.

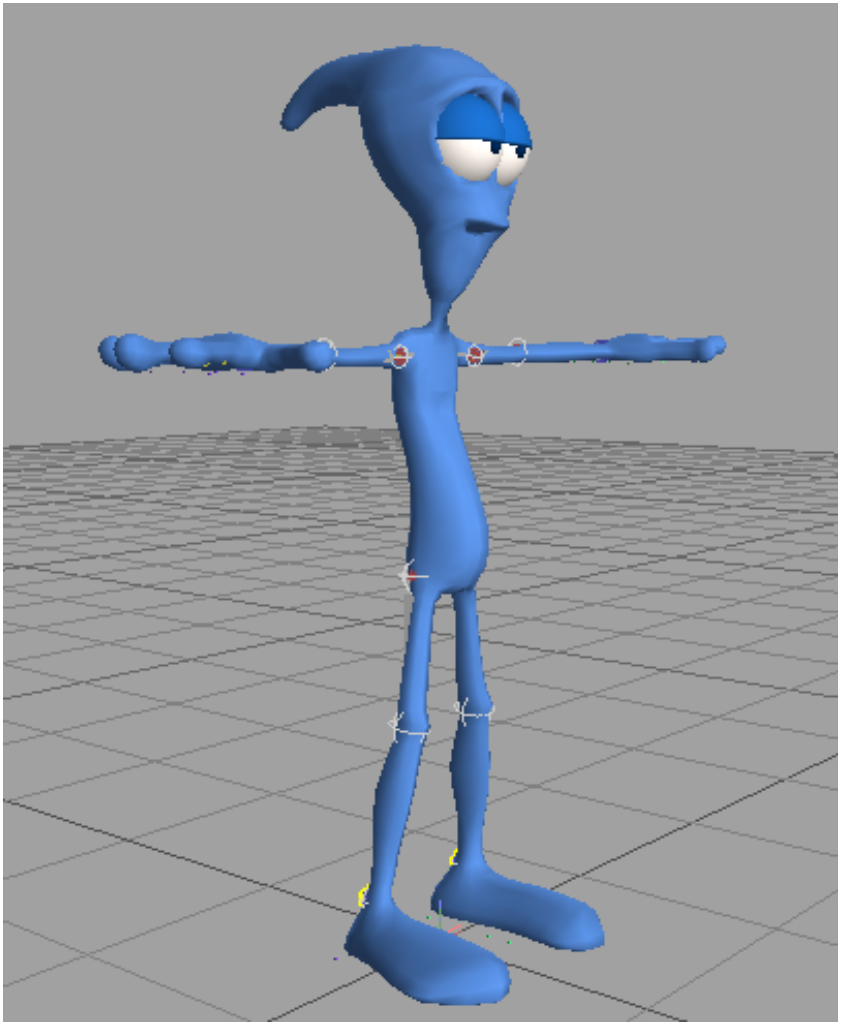
NOTE If you already know how to animate characters in MotionBuilder, you can skip this lesson and go to the next lesson on page 1857.

Animate the Pepe character using motion-capture data

1. In MotionBuilder, from the main menu, choose File > New. If you are continuing from the previous lesson, do not save your existing scene.
2. From the Asset Browser > Export folder, choose *Pepe_biped_characterized.fbx*.

   This file contains the Pepe character you worked on in the last few lessons. To speed things up, he has already been characterized and saved in MotionBuilder, so he is ready to receive animation.
3. Drag the file to the viewport.
4. Choose FBX Open > <All Takes>.

   MotionBuilder has the ability to store multiple animation "takes" or sequences within the same project, and this option would open all of them if they existed. Alternatively, you could choose No Animation or Take 001 as well.
5. Click an empty area in the viewport and press A to zoom in to the Pepe character.
6. Press Ctrl+Shift and drag to orbit until the right side of the character is in view.

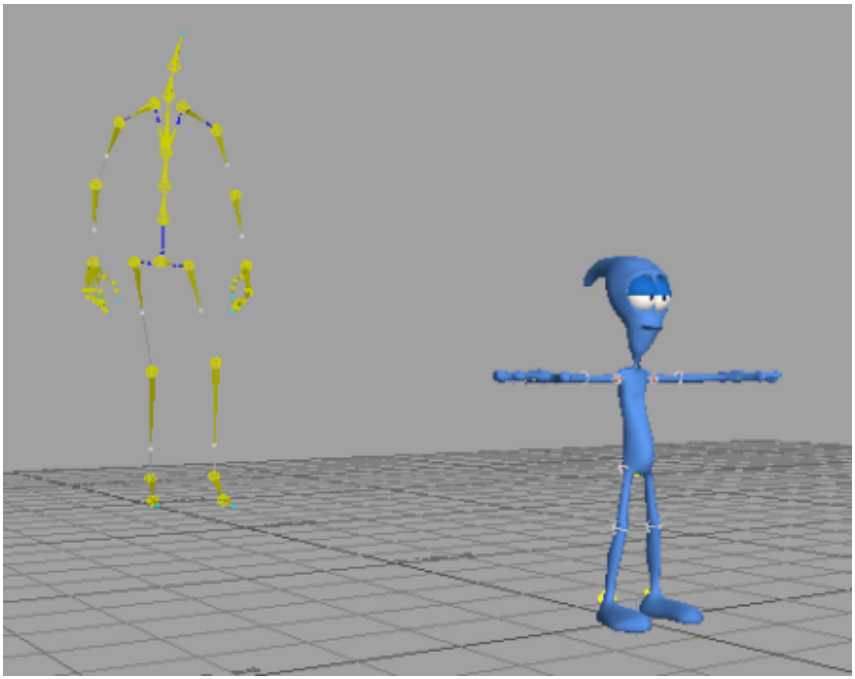


Pepe is ready to accept keyframe animation using control rig input from the Character Controls window. But in this case, you will retarget animation to Pepe from one of the motion-capture files that ship with MotionBuilder.

7 From the Asset Browser > Export folder, choose *IceSlip* and drag it to the viewport.

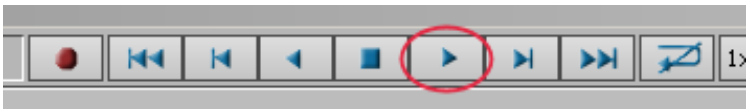
8 Choose FBX Merge > IceSlip, and zoom out until the yellow skeleton that represents the motion capture animation is visible.

NOTE If you do not see the yellow skeleton, place your cursor in the viewport and press Ctrl+A to exit Models Only mode.



Pepe with skeleton containing motion-capture information

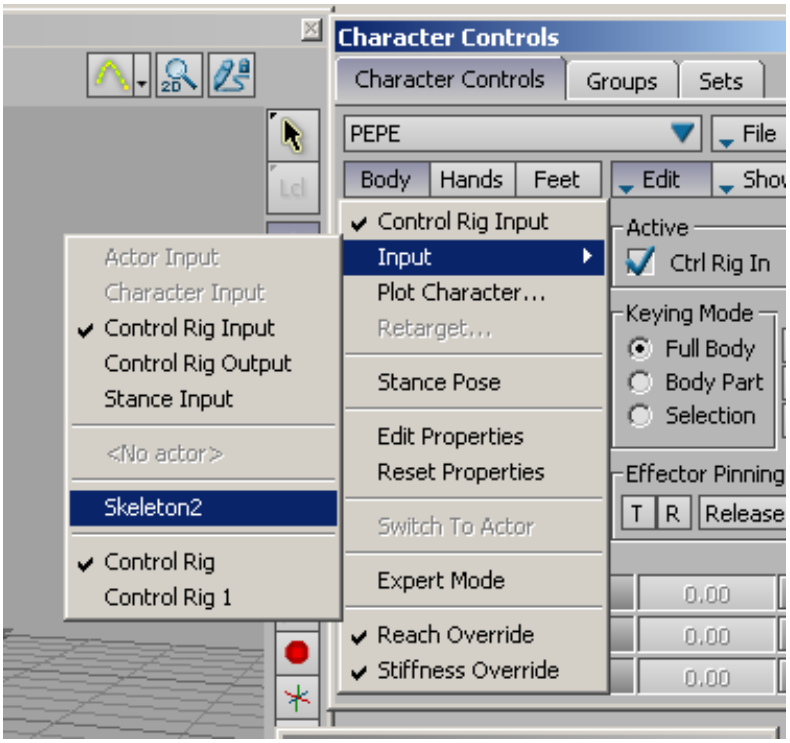
9 On the Transport Controls, click Play to view the animation.



You will now assign this movement to the Pepe character. This task is very easy to accomplish in MotionBuilder.

10 On the Character Controls panel > Character Controls tab, make sure PEPE is displayed in the character list.

11 Choose Edit > Input > Skeleton2, which is the yellow skeleton containing the motion-capture animation.

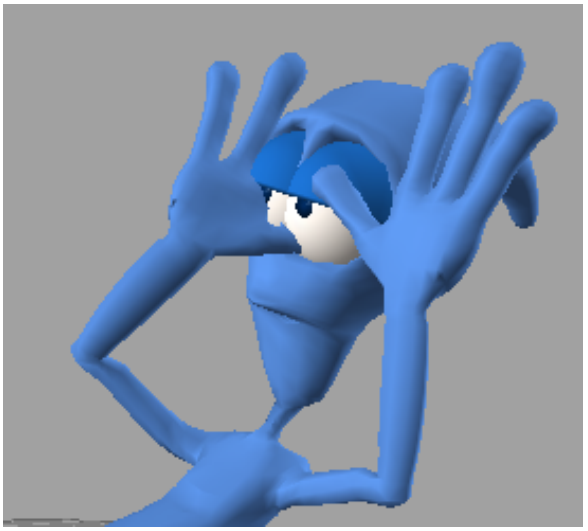


12 Scrub the animation either by dragging the animation slider bar, or by holding down the J key and dragging left or right in the viewport.

The skeleton's animation now drives the Pepe character.

13 Press Ctrl+A and repeat until only Pepe is visible, then go to frame 92 and zoom in on the Pepe character.

If you look carefully, you will see how one of Pepe's hands seems to pass though his face. You might need to rotate the character and scrub the animation a few times to see the problem.



Unwanted hand movement inherited from motion capture

This behavior occurred because the animation driving Pepe's bone movement is based on the skeleton, which has a very different physiology. (Pepe's head, hands and feet, for example, are much larger than the skeleton's, while his shoulders are much smaller.)

In the next procedure, you will correct Pepe's hand movement.

Fine-tune the animation:

1. On the Character Controls gizmo, click the left hand effector, then press T and try to move Pepe's hand in the viewport.

   Nothing happens because Pepe's animation is controlled by the skeleton, not the control rig. Before you can go any farther, you need to bake the skeleton animation onto the Pepe character control rig.

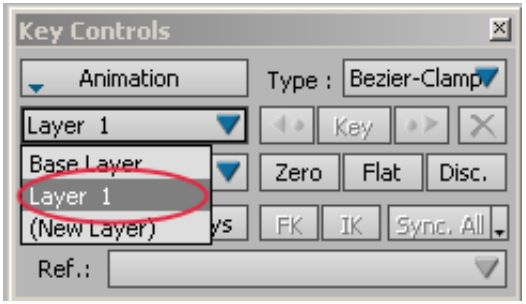
2. On the Character Control panel > Character Controls tab > Edit menu, choose Plot Character.

3. On the Character dialog, click Control Rig, then on the second Character dialog, leave the default values unchanged and click Plot.

You can now edit the Pepe character using his control rig.

The Plot command creates a key at every frame at the base layer of the animation track, making edits difficult. You will therefore edit the keyframing on a different layer.

4 On the Key Controls panel, click the Base Layer list and choose Layer 1.



The keyframes are hidden on the timeline, clearing your workspace.

5 Go to frame 80, which is the start of the problem hand movement. On the Character Control gizmo, click the right wrist effector, then on the Key Controls panel, click Key.

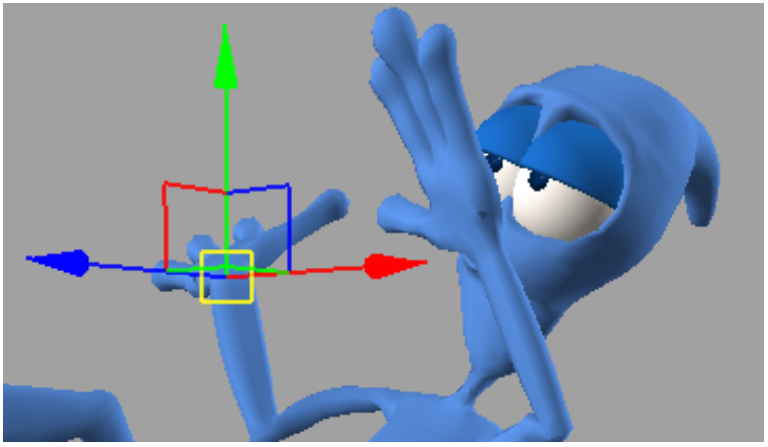
NOTE You can also create a key by placing your cursor anywhere in the viewport and pressing K.

6 Go to frame 105, the end of the problem hand movement, and click Key again.

All character movement before the first key and after the second will remain unchanged. Only the character movement between frames 80 to 105 will be modified.

7 Go to frame 94, the mid point between the two keyframes you set.

8 In the viewport, press T, move the hand away from Pepe's face on its X and Z axes, and create another key.

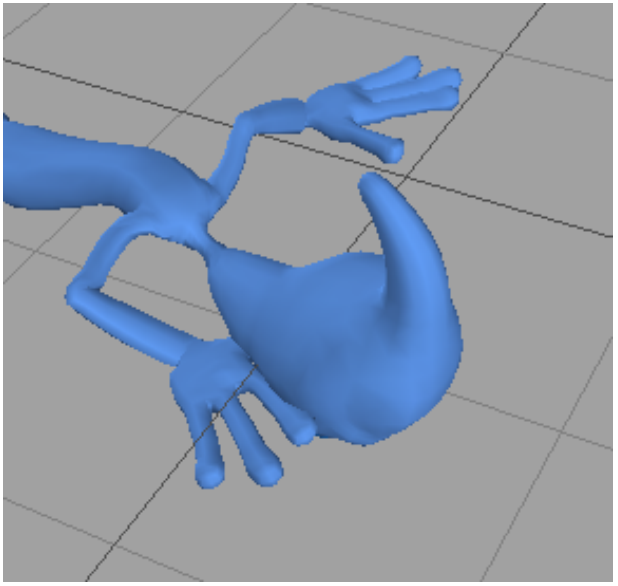


Left hand repositioned away from character's face

9 Press J, then drag back and forth to see how the hand reacts to the keys you just created.

10 Make any further adjustments to the hand movement as required, making sure you create a key after each adjustment.

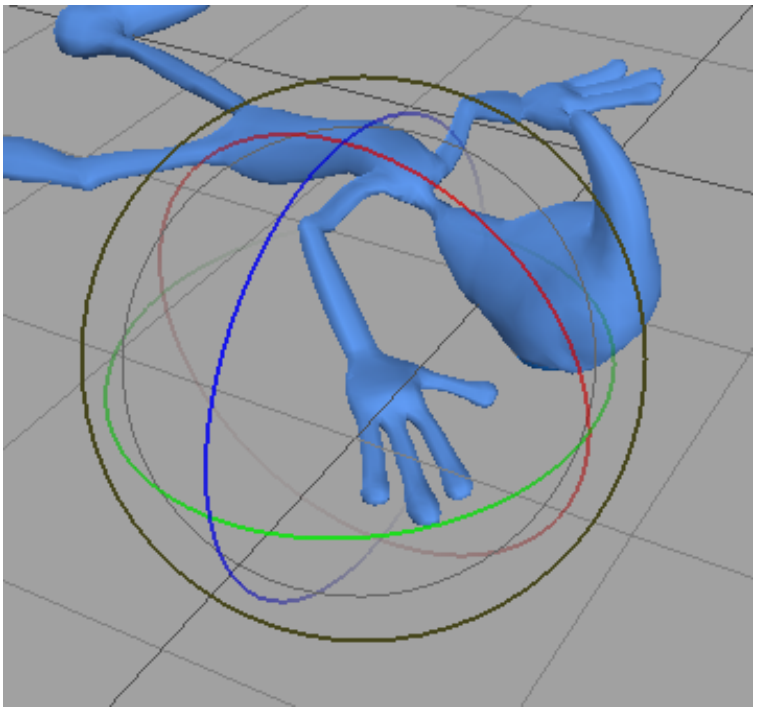
11 Advance to the last frame of the animation and adjust your viewpoint until you can see the right side of Pepe's body.



Right hand too close to character head

12 Move the hand away from the body and create a key.

13 Press R and use the rotate gizmo to modify the hand's position until it rests flat on the ground, then create another key.



Rotate gizmo used to reposition right hand

14 Go to frame 114 and position the right hand farther away from the head and create another key.

15 Play back the animation to see the result.

16 Make any further adjustments to the character's body position.

When you are satisfied with the animation, proceed to the next lesson. There, you will save your work and prepare it for import back to 3ds Max.

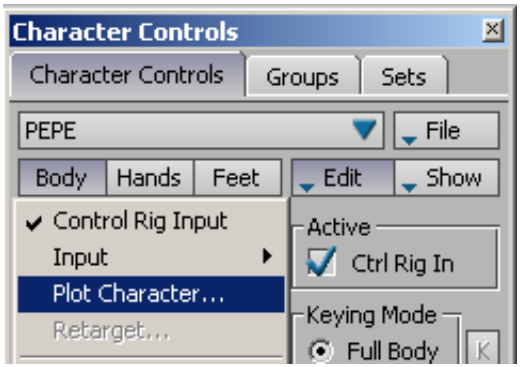
Preparing Animation for Export to 3ds Max

3ds Max cannot read the control rig information that defines character animation in MotionBuilder. For 3ds Max to recognize this animation, you need to plot, or "bake," the keyframe data into the character's skeleton.

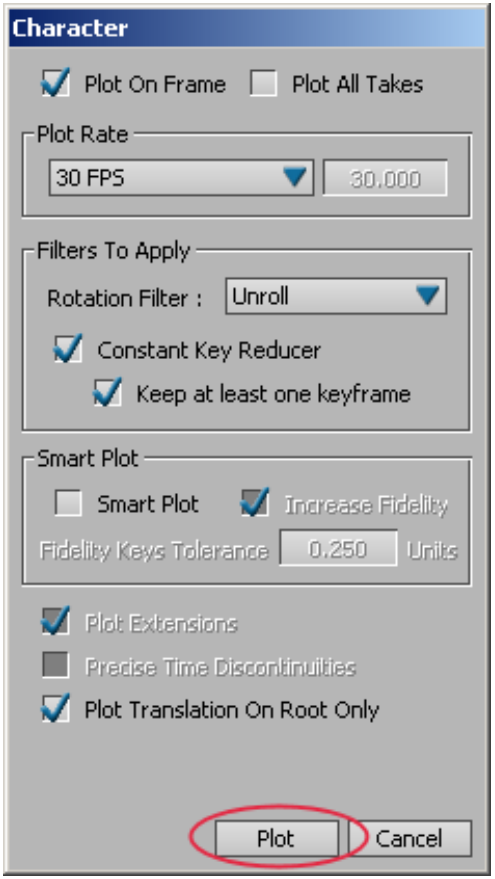
Bake animation onto the Pepe character skeleton:

1. In MotionBuilder, continue from the previous lesson, or from the main menu, choose File > New and from the Asset Browser > Export folder, open the file *Pepe_biped_unplotted.fbx*.

2. On the Character Controls panel > Character Controls tab > Edit menu, choose Plot Character.



3. On the Character dialog, click Skeleton; then on the second Character dialog, leave the default values unchanged and click Plot.



The character control rig is deactivated, but the Pepe character retains all animation information.

TIP If you need to edit the character's movement after its animation has been plotted, simply go back to the Character Control panel > Character Controls tab > Edit menu, and choose Plot Character > Control Rig again. When you are done, repeat steps 2 to 3 to bake the animation back onto the character skeleton.

Note that when you save your file, you will have not only the animated character Pepe in your scene, but the reference skeleton as well. You could delete the skeleton from the scene or select the Pepe character and save it to another file for import to 3ds Max, but this is not mandatory. As

you will see, you can just as easily strip out the skeleton during the import process to 3ds Max.

4 From the main menu, choose File > Save As, navigate to the MotionBuilder Files folder, then in the Save File dialog, type **Pepe_biped_plotted** and click Save.

Importing Animation to 3ds Max

You can choose to import the entire contents of scenes saved in MotionBuilder, or only those elements whose names match elements in your 3ds Max scene.

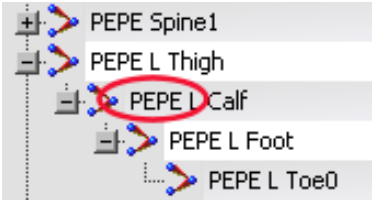
The animation you import from MotionBuilder is fully editable in 3ds Max.

Import the animated character to 3ds Max:

1  Start 3ds Max. On the Quick Access toolbar, click Open File. If the scene from the Creating Naming Templates lesson is still open, do not save your work.

2 Open the scene file called *Pepe_biped-PEPE.max*.

3  On the main toolbar, click Select By Name.



The skeleton bones have the same *PEPE* prefix as the character you exported to MotionBuilder.

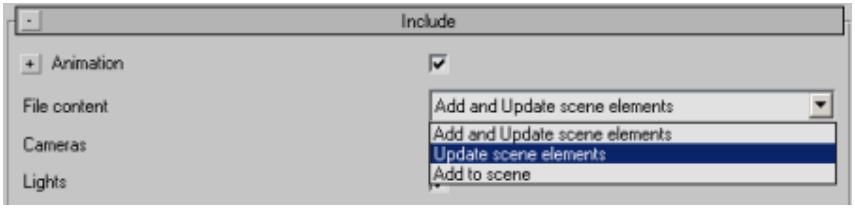
4  Close the dialog. From the Application menu, choose Import.

5 On the Select File To Import dialog, navigate to the MotionBuilder Files folder and open *Pepe_biped_plotted.fbx*.

6 On the FBX Import dialog, scroll down to the Include rollout.

The File Content list displays Add And Update Scene Elements by default. If left as is, this setting would import not only the Pepe character, but the yellow reference skeleton as well.

7 From the File Content list, choose Update Scene Elements.

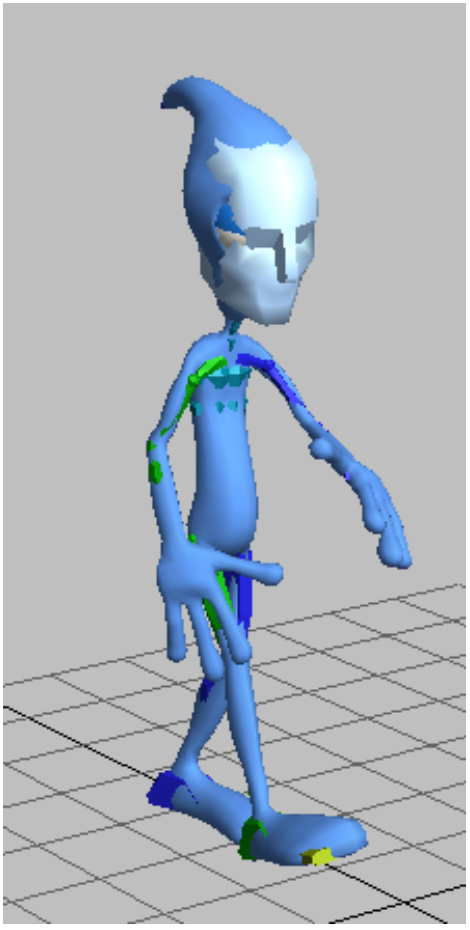


This option updates only the scene elements in 3ds Max that share the same name as those in the imported file. No new elements are imported. If you were importing animation from MotionBuilder to a new 3ds Max scene, you would instead choose the Add To Scene option.

8 Click OK, then OK again to clear the message informing you that the rotation limits of the characters in MotionBuilder and 3ds Max differ.

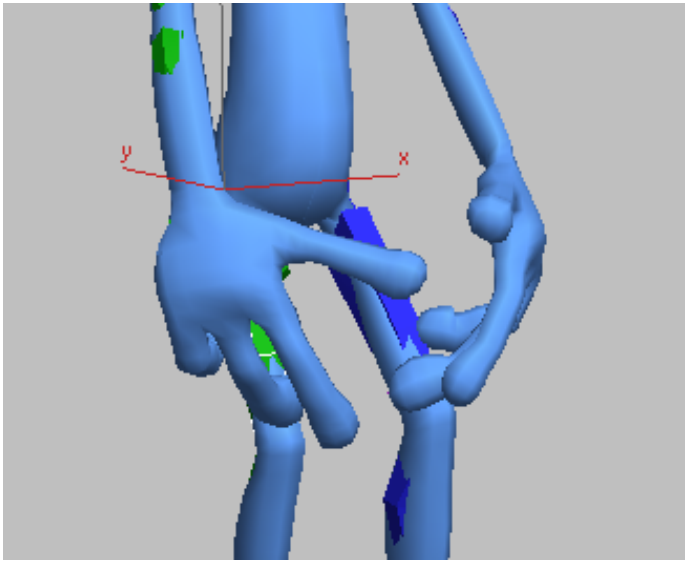
This disparity will not affect the animation.

9 Scrub the timeline to see how the MotionBuilder animation has been baked into the Pepe character bones.



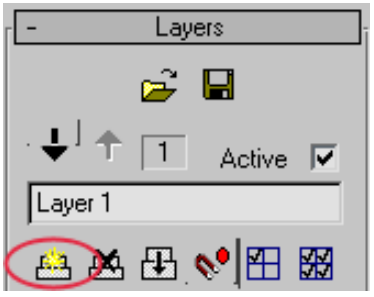
Fine-tune the animation in 3ds Max:

1 Go to frame 0 and zoom in and rotate around Pepe's hands.



Character fingers are too close to the thighs

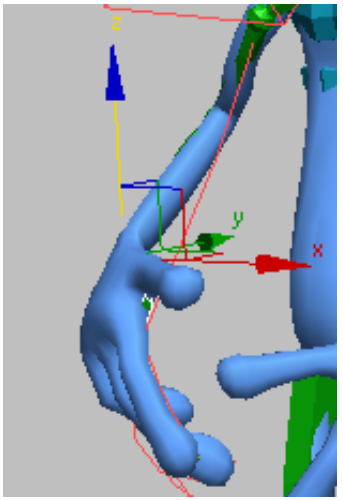
2  Expand the Motion Panel > Layers rollout and click Create Layer to create a new layer of animation.



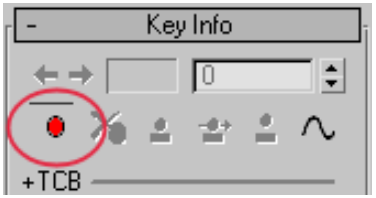
3  On the main toolbar, click Select By Name and select the *PEPE R Hand* bone.

4 Right-click in the viewport, and from the quad menu, choose Move.

5 Drag the hand away from Pepe's body on its X and Z axis.



6 Expand the Key Info rollout and click Set Key.



7 Expand the Track Selection rollout and click Opposite to select Pepe's right hand.

8 Repeat steps 5 and 6, then replay the animation to see the result of your edits.

Summary

In this series of lessons, you took a biped skeleton with a mesh called Pepe and exported it to MotionBuilder as an FBX file. There, you characterized the biped bones using templates and scripts, and animated the Pepe skeleton by

plotting it to another skeleton whose own movements were derived from motion capture. Then you baked the animation back to Pepe's control rig, made a few adjustments so that the motion better fit his cartoon-like dimensions, and baked the animation back into Pepe's skeleton for export to 3ds Max. Finally, you fine-tuned Pepe's body motion using the fully-preserved Biped edit functionality.