

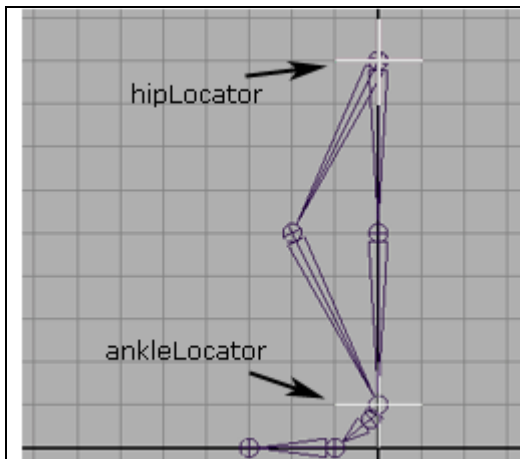
Elastic Foot Set-Up

Cartoon animation looks great with some squash and stretch. To be able to 'stretch' bones you need a set-up that can handle 'elasticity'.

This tutorial shows how to build an elastic foot using expressions.

You need a fair knowledge of Maya and how to work with the hypergraph

	<p>Bones Create the REAL bones using the grid.</p> <p>hipREAL->kneeREAL->ankleREAL in position (0,9 - 2,5 - 0,1) relative to the grid.</p>
	<p>IK and ELASTIC Bones Create IK bones by duplicating the REAL ones.</p> <p>hipIK->kneeIK->ankleIK</p> <p>Create the ELASTIC bones using the grid.</p> <p>hipELASTIC->kneeELASTIC->ankleELASTIC in position (0,9 - 0,5 - 0,1)</p> <p>Create an ikRPsolver form hipIK to ankleIK Name the IK handle: ikHandle</p>
	<p>More Bones Create the REAL foot</p> <p>ankle2REAL->ballREAL->toeREAL</p> <p>The ankle2REAL is used for skinning purposes so that the foot doesn't stretch when it's in elastic mode. That's why it should be close to the ankleREAL.</p> <p>Parent ankle2REAL to ankleREAL to connect the foot to the leg.</p>



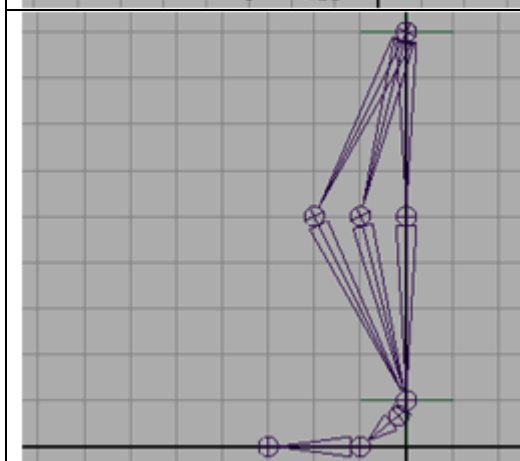
Locators

Create a locator and place it on the same position as the hips (0,9).

locatorHip

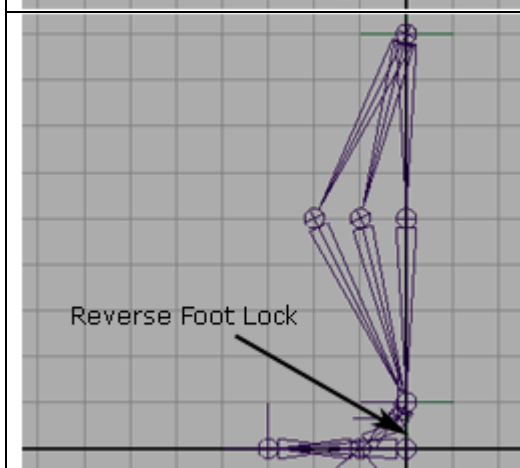
Create another locator and place it on the same position as the ankle (0,1).

locatorAnkle



Constrains

Point constrain all the hips to **locatorHip**.
 Point constrain **ankleREAL**, **ankleELASTIC** and **ikHandle** to **locatorAnkle**.
 Point constrain **kneeREAL** to both **kneeIK** and **kneeELASTIC**.
 Point constrain **kneeELASTIC** to both **hipLocator** and **ankleLocator**. (this way the **kneeELASTIC** will always be half way between the locators).
 Orient constrain **hipREAL** to **hipIK** and **kneeREAL** to **kneeIK**.



Reverse Foot Lock

Create a reverse foot lock. (see Reverse Foot Lock tutorial)

Compensate by creating an additional **ankle2RF** for the extra ankle joint.



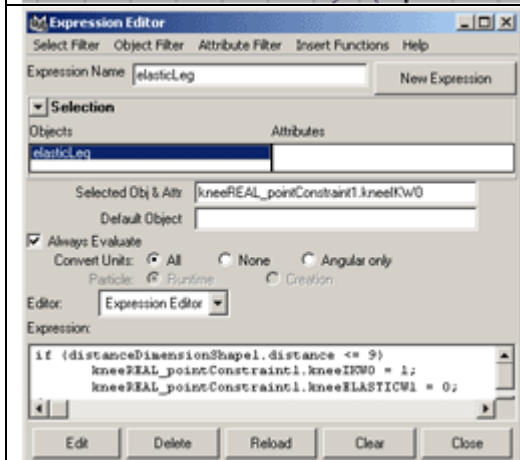
Measure Distance

Create a distance tool.

Point constrain **locator1** (from the distance tool) to **hipLocator** and **locator2** to **ankleLocator**.

Because we used the grid to create the bones, the distance tool show measure 8 units. When the knee is straight, the distance will be 9 units long.

(If you didn't use the grid, you must find out what the distance is when the leg is stretched)

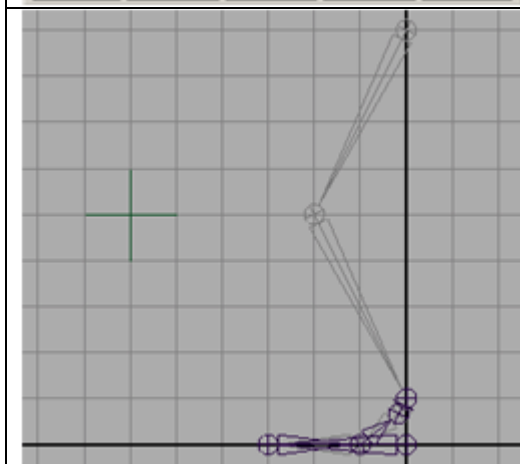


Expression

If the distance between the **hipLocator** and **ankleLocator** is less than 9, then the IK leg should be driving the **REAL** leg, otherwise the **ELASTIC** leg should be driving the **REAL** leg.

For this we need an expression:

```
if (distanceDimensionShape1.distance <= 9) {
    kneeREAL_pointConstraint1.kneeIKW0 = 1;
    kneeREAL_pointConstraint1.kneeELASTICW1 = 0;
} else {
    kneeREAL_pointConstraint1.kneeIKW0 = 0;
    kneeREAL_pointConstraint1.kneeELASTICW1 = 1;
}
```



Done

What's left to do is just clean the hypergraph so that everything is nice and tidy.

Now, grab the Reverse Foot Lock and move the foot around.