

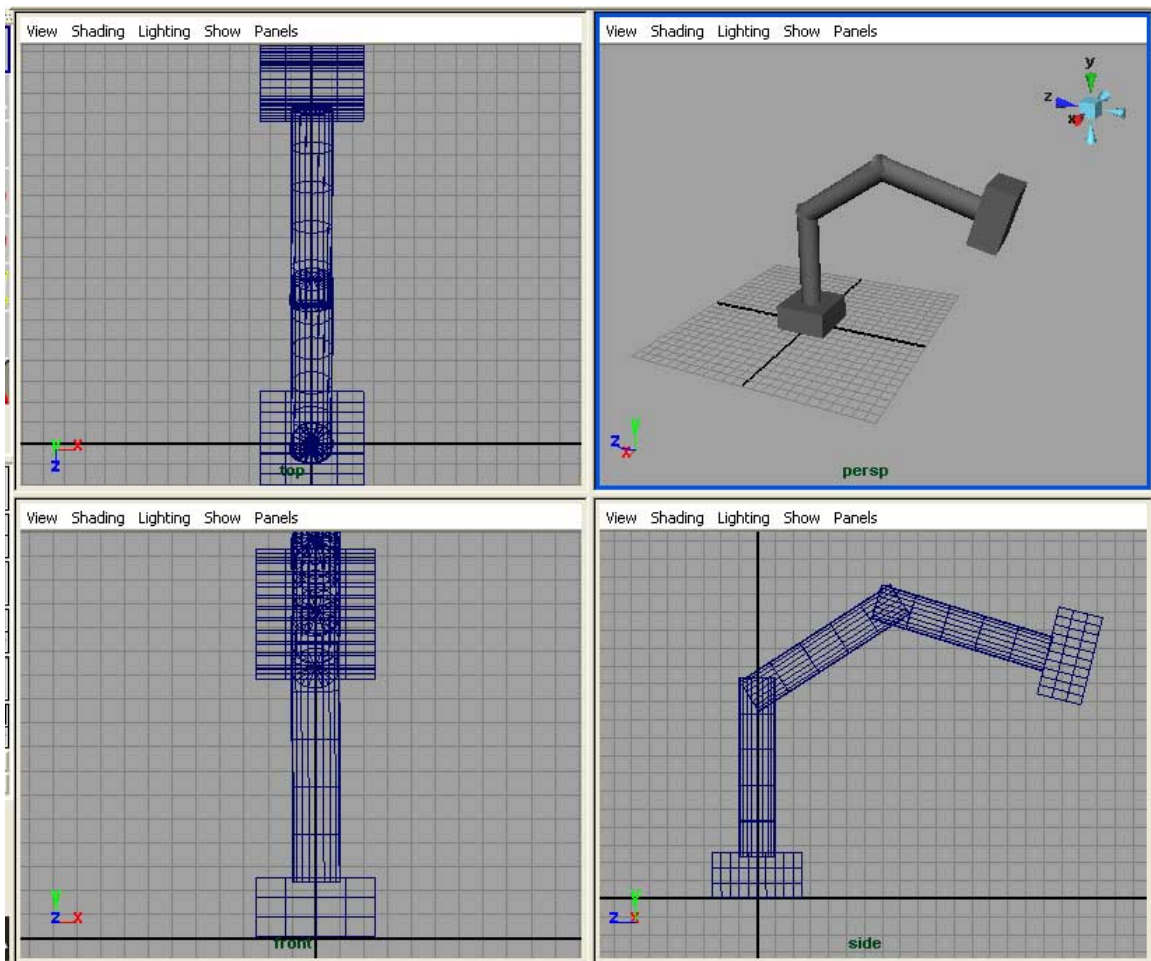
Other Animation Techniques

Beyond the character skinning and forward kinematics we covered in the last lecture there are a couple other common animation techniques of which I just want to briefly take note.

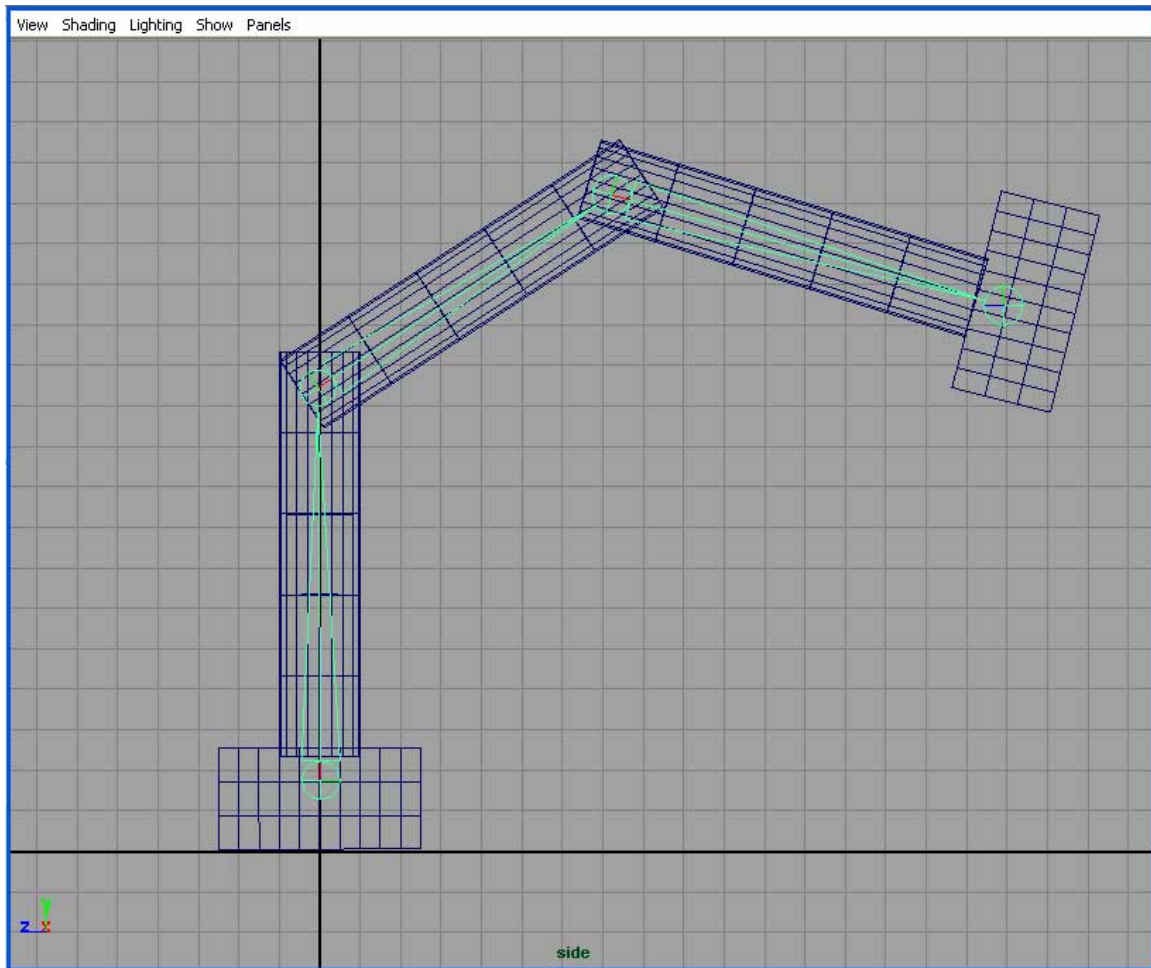
Inverse Kinematics

Maya defines kinematics as: "a method of simulating body mechanics by setting up and animating skeletons." We've already looked at forward kinematics which is keyframing minutely specified poses. Another technique that can be helpful in animating complex limb structures is Inverse Kinematics which is: "a method of posing a joint chain by specifying the location in space you want the joint chain to reach," and then letting maya calculate the required positions of the constituent joints. This concept is best appreciated in practice to which end...

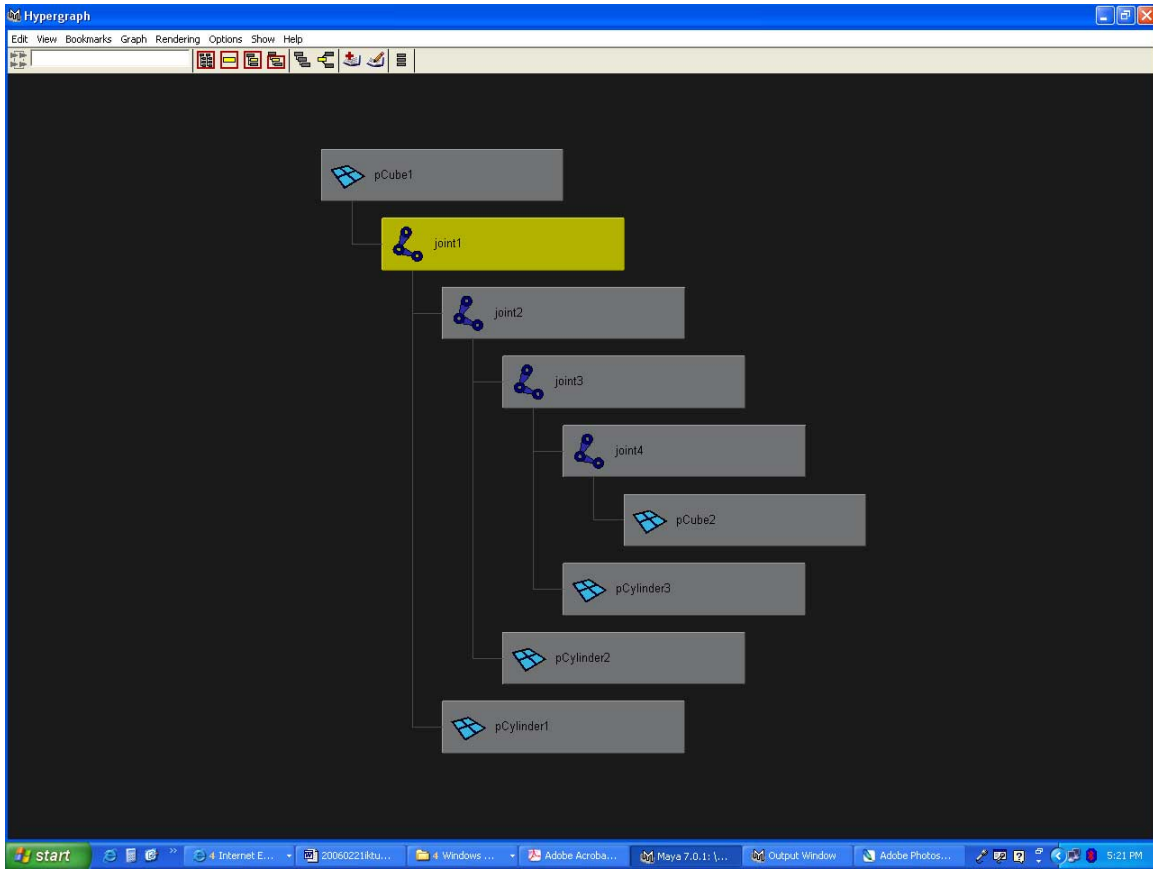
Start in Maya by creating a series of 2 boxes and 3 cylinders and configure them as depicted below to form a primitive robot arm:



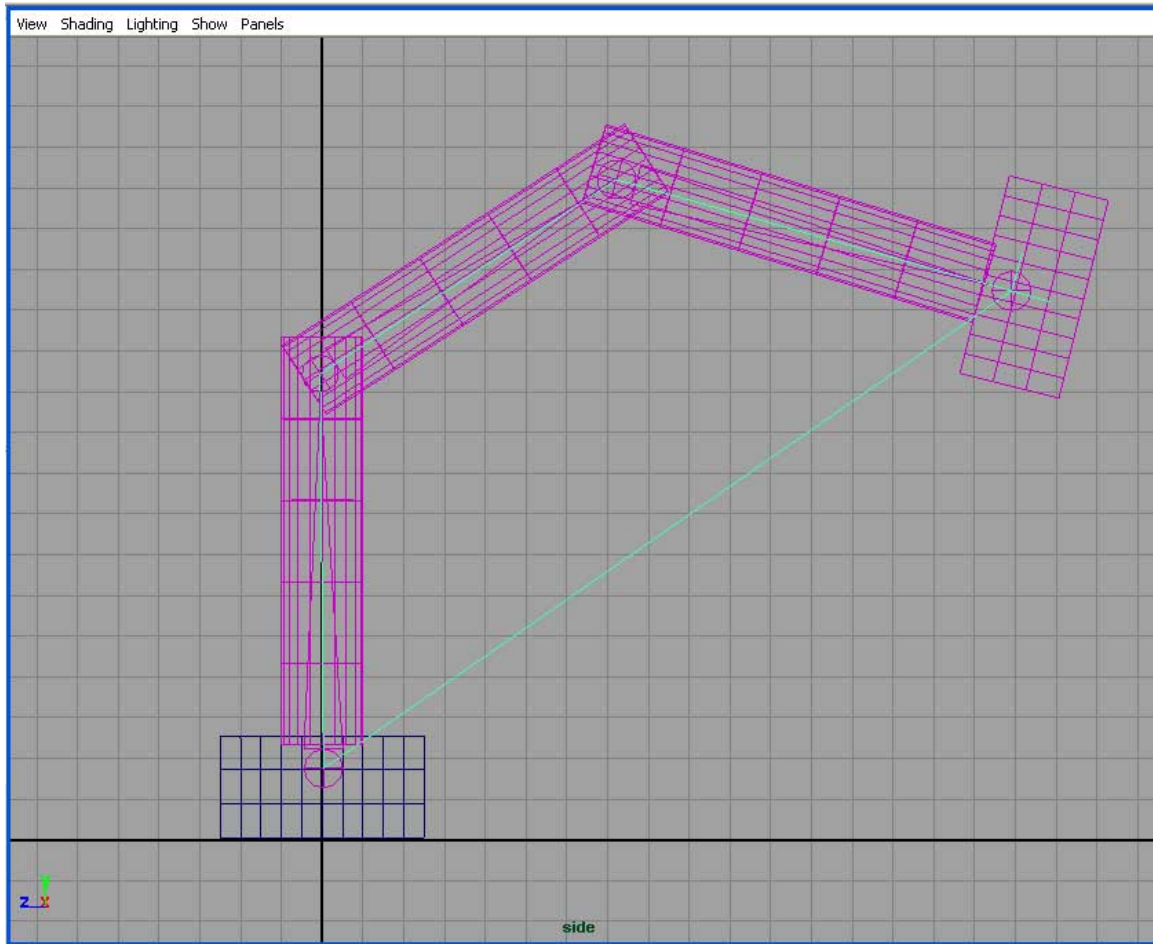
Then, as covered in this week's lecture notes, make sure you're in animation mode, select Skeleton -> Joint Tool, and create a 3 bone skeleton starting at the base and reaching the second cube.



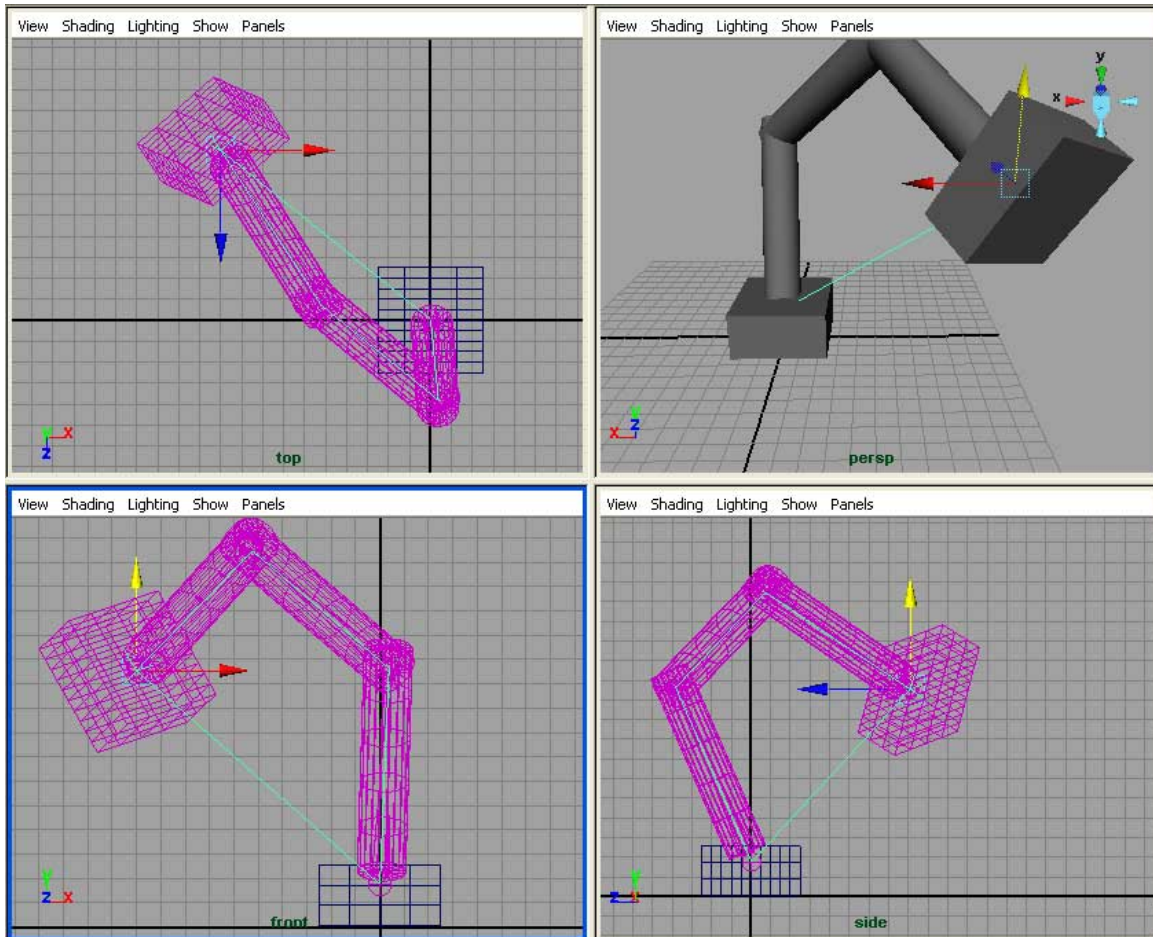
Now, rather than skinning this like we did to our character, we're going to just parent the arm segments to the various joints. So open up your Hypergraph (Window -> Hypergraph) and MMB-drag pCube2 onto Joint4. You should see pCube2 become a child of Joint4 in the hierarchy. Drag cylinder3 onto Joint3 and so on until you have all the segments of the arm as children of their corresponding joints. Finally parent the whole joint structure to pCube1, so that it looks like this:



Finally, click Skeleton –IK Handle Tool []. Take the default settings with the exception that you want to choose the ikSCS solver. This is an IK solving algorithm that will attempt to keep your joints in a single plane, whereas the ikRPSolver will allow them to twist. Then click Joint1 (the base joint) and then Joint 4 (the tip of your joint chain). You should see a new line connecting them and a sort of vertex which is your IK Handle.



Now, with that that handle selected, select the move tool, and you'll see that wherever you move it, the joints of the arm reconfigure appropriately. Feel free to take a moment reinstall your face (that was obviously rocked off by the foregoing revelation).

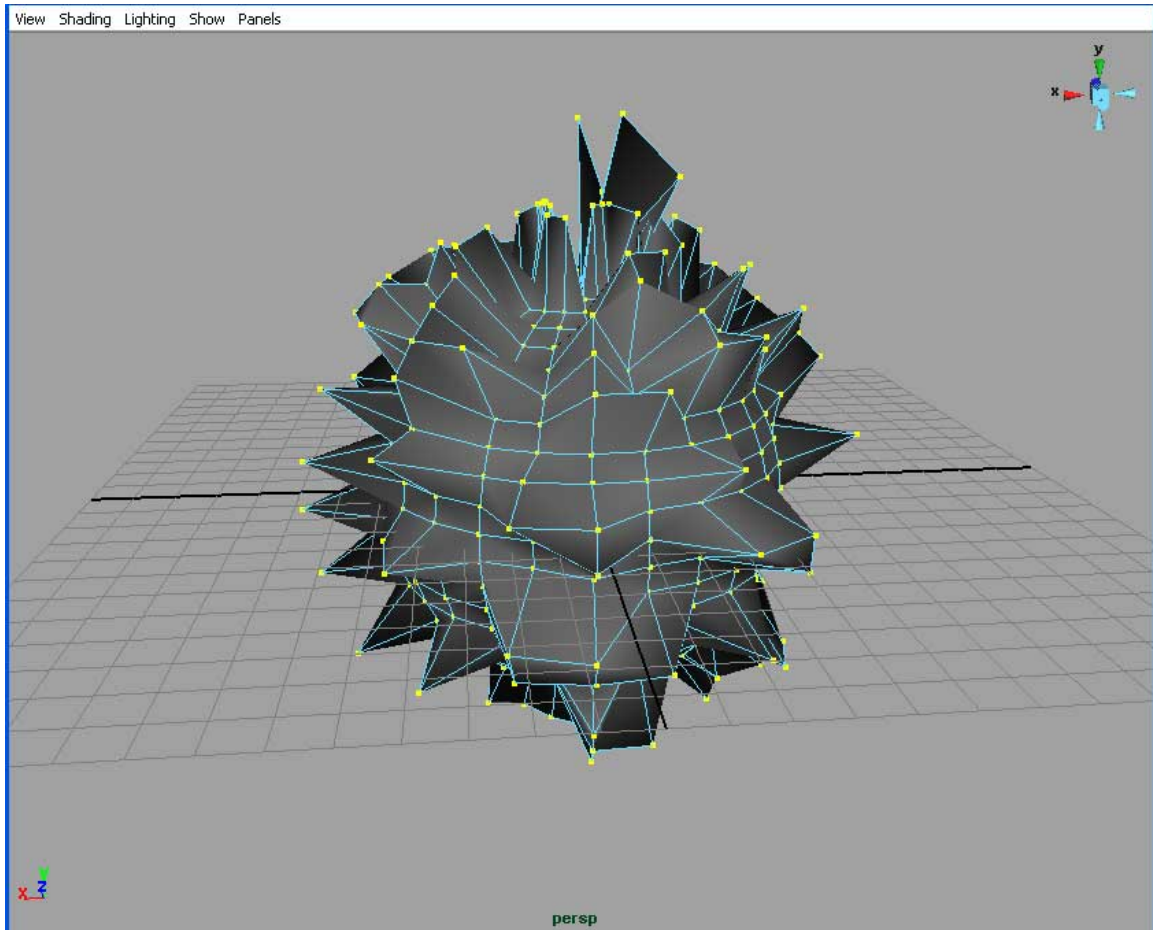


Please note: as described above, IK is a technique that can help create keyframe poses in Maya. While your skeleton structure and animations will export to Virtools, your IK handles won't. If you want to use procedural IK animation principles in Virtools, you have to use its IK building block (which operates according to the same principles).

Morphing

Morphing describes an animation technique wherein you are setting keyframes based on the manipulation of the shape of an object. Generally speaking you are animating changes in the position of an object's vertices, while keeping the number of vertices constant.

For example, let's start with a sphere. Select all of it's vertices and set a key frame at frame 1. Move yourself to frame 60. Then select Edit Polygons -> Sculpt Geometry Tool, and Pull the vertices of your sphere into a weird pufferfish shape like this:



Make sure all the vertices are selected, and then set another key. Watch your animation, and behold the power of MORPHING!

Also do note, that while you can export morphing animations into Virtools, you can also do procedural morphing in Virtools, assuming you have multiple versions of an object.