Easy Rigging of all Detail-Levels with Topology-Riggs

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First I refer to the Wiki:

http://www.zbrush.info/wiki/index.php/Rigging

http://www.zbrush.info/wiki/index.php/Topology

and my Tutorials about the yet undocumented feature of Zsphere-topology-based modelling and rigging and the hidden secrets in topology and rigging :

http://206.145.80.239/zbc/showthread.php?t=46117

and of course Plakkie's marvelous thread which started all:

http://206.145.80.239/zbc/showthread.php?t=44876&page=1&pp=15

The story behind this technique:

As you read in the Wiki, Pixologic currently only supports officially the creation of 'normal' riggs for your mesh-objects in the rigging-mode.

So far we explored some ways that worked, but had some major disadvantages. You can read about this in the forum topics (link above) and my Guide to hidden secrets-tutorial (link above)

Because I was not satisfied that we should end here in our rigging attempts, I made some thougths, some hours of frustating try-and-errors with countless Zbrush-Crashes, until I came to this:

Pixologic implemented the 'Convert to main' (and imagine, they say they have themselfes no idea what is all possible with it). Asyou might already know, you can use the converted topology as a surface-rig, but limited to low-poly meshes (otherwise, Zbrush => data-nirwana, you know this, don't ya ?).
So, I do software-programming for years, and thought because of the behavior of Zbrush, the reason for freezing and crashes might be a programming bug so that Zbrush 'looses' the surface from one point on and goes with its calculation into infinite. So why not show Zbrush the borders ?
So follow me with these .....

Step by step

1) Load or create a mesh-model in the subd-poly-level you want to pose (also the highest subdivision-levels are possible), draw it on the Canvas, press EDIT (if you not already did).

If you like to pose later with different subd-levels, it's a good idea to produce some clones of your master-model.
You do this by pressing Tool -> Clone while your mesh-model is active and in the desired subd-Level.

2) Choose a Zsphere as active tool (Go Tools -> and choose the Zsphere-symbol from the tool-palette)

Optional you can also have the Mesh-model selected, open Tool -> SubTool -> press Append and choose a Zsphere. Then you have to click on the eye-smbol of your mesh-model to hide it and click on the Zsphere in the SubTool-List.

Do how you like it. ;)

3) With active Zsphere you open the Tool -> rigging-panel, press Select and choose your mesh-model.
The goal is that you can choose any model with any subd-level you like.
If your model does not appear in the Select-dialog for some reason, try to clone your model. The clone should now appear in the list.

Now you should have something like this:

(May I introduce Jana ;), a lovely but already unfinished model I am currently working on. But somehow she looks a little bit stiff. So let's try to give her a nicer pose.....)

4) Now press 'Tool -> Topology -> Edit Topology' and you can start drawing an ordinary topology in the shape of your desired rig by simply LMB-clicking on your model. You can activate Transfom -> X and M for symmetry if you need it.

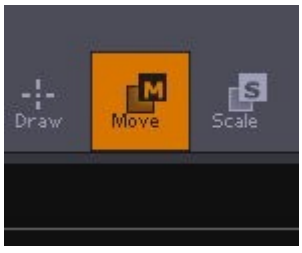
As you see, your topology is lokated onside the surface of your model as usual.

5) When you are satisfied with it, click first 'Tool -> Topology -> Convert to Main' and after that unpress 'Edit topology'

Now you should have this (well, maybe not exact this lovely sight of Jana's back, but your model and the created ZSphere-rig ;) .

Now comes the essential step:

6) Activate 'MOVE' and **move** all parts of your 'Convert to main'-'Pre'-rig **inside** the borders of your mesh-model.



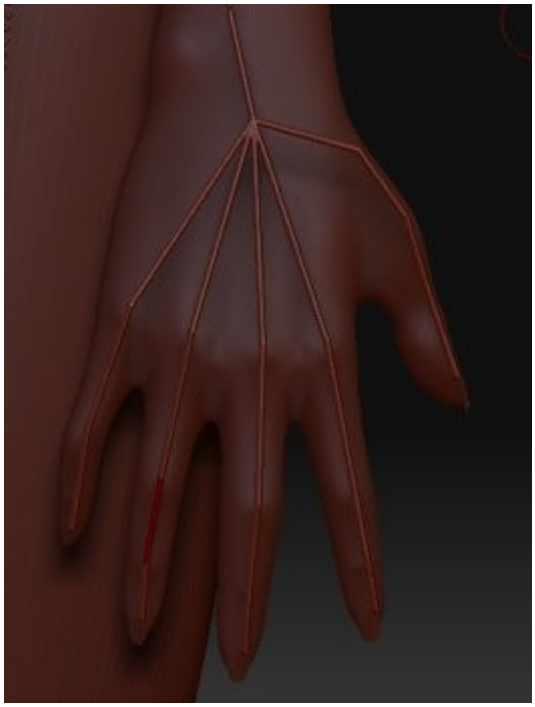
Then it should look like this:

7) Now press 'Bind' in the rigging-panel and enjoy a propper posing of your mesh.

Use the Move or Rotate-Buttons and play around with your rigged model to get a sense how it behaves.

This is a pose with a low-subd-level-clone of Jana.

The big advantage of this method is how quickly you can do even a complex setup, lets say f.i. hands and fingers.



Watch the hand posed on a subd-level 3-model:

On complex models and riggs Zbrush might need some time after you press the 'Bind'-button to calculate and seems to freeze for a minute or longer , but believe me, as long as you have moved your rig correctly before binding, it will work without crashes.

Improvements:

As overal rules or 'so-far-conclusions' I can say:

- Plan your rig smart, **keep it as simple as you can**.

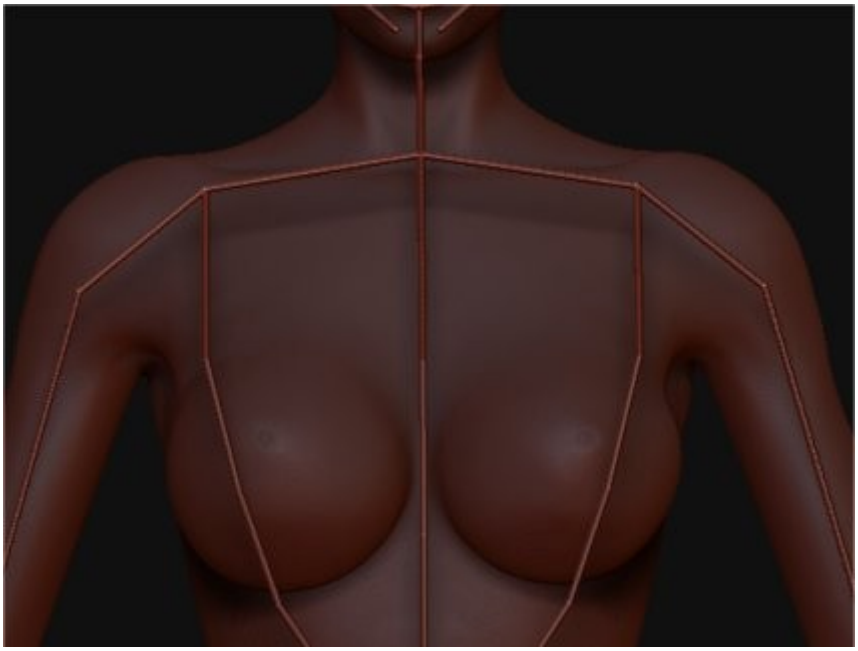
- Build the rig **from center to peripherie**.

  Every Line in the topo can act as a root for all the following (meaning it also moves the whole afterwards connected mesh, but that depends on if you grasp the micro-zsphere itself or its connection-line), and it does this in the same direction that you placed it in the chain at creation-time. So like bones in maya, C4D etc, the connection has a base where it's stable and an end where it moves.
  The whole thing is so far I see mainly like a FK-rig (Forward Kinematik). IK (Inverse Kinematik) seems not to me implemented yet. So its like the old rigging-systems of other apps from abaout 10 years ago or so.

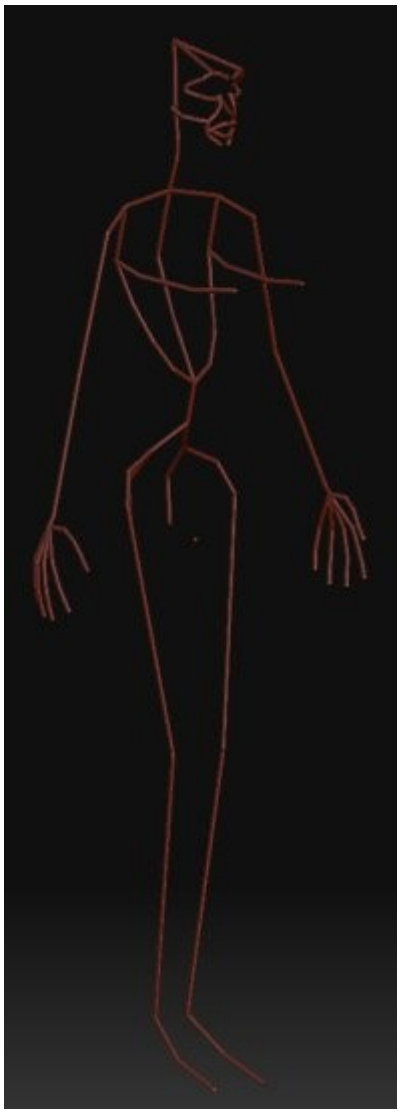
  So it's very important for an easy and right workflow in your posing that you constructed your topo-rig with that in mind.
  Say you build a Character-biped-rig, then place the first root-Zphere near the center of your body (a little bit below the belly). Beginning from and being in a constant and unbroken chain connected with this center, build the spines up to the head, Ctrl+LMB then on the Micro-zsphere in height of your shoulder-axis, build out the shoulders and then in a continous line the arm-rig from shoulder down to the hands, at the fingers use the wrist-point as base and draw connect via Ctrl + LMB-click all the fingers from it, always from the wrist down in each beiing one chain from the wrist-base-point to the finger-tips.
  Do the same thing to the legs, begin to create the pelvis by Ctrl+LMB-Click on the first Root-Zsphere to make it the base and the do it as like you did at the shoulders and arms.
  Keep all parts of the rig connected together and build by this 'from center to peripherie'-rule.
  Then there should be no more wired behaviors when later posing them

- **Of course you can work with clones of different subd-Levels** to avoid changes on your master-mesh, simply unpress 'Bind' and select another Subd-level-clone.

- As it is not yet possible to scale the micro-zspheres (I didn't find a way) to vary the amount of mesh they influence later, you currently have to **spread your rig** on parts where other rig-parts may have an unwanted influence. (f.i. When the arms-angles of your model are very close to the body)



- For easy handling in moving for preparing for bind (see step 6) and later for easy and proper posing, **make an completely connected rig**, meaning that although you can topologize discontinously, its better to have all micro-zspheres connected. Then you have always a base Zbone that acts as a root for all that are afterwards connected and you can move or rotate all (and so the connected mesh) with this single bone. Otherwise posing can be real pain when you turn a head and loose a non-connected face-rig-part.



- As long as you move most of the rig inside the mesh-borders before you bind, Zbrush will also tolerate parts of the rig that remains mostly on the outer surface. So a **combination of full rigging with surface-rigging is possible** with this method, and this on high-subd-levels as well.

- It is a good idea to **store a copy of your topology** with mesh-model being rigging-selected **before** you convert into Main, so you can later reload it if you need to change something.
  After having pressed the 'Convert to main'-button, there are later no more changes possible that doesn't either don't work or cause crashes. So you can start with a simple rig, try it out and refine it as needed on the reloaded Topo. When you cannot see a newly added topology-line on your reloaded Topo-model, unpress 'Edit topology, press 'Delete' in the rigging panel (you will now see only your topo-rig) and reselect the mesh-model (maybe you need to load the previous original master-mesh-model.) in the rigging panel. Then press 'Edit topology' again, be sure that you're in DRAW-mode and add new topo-lines. You should now see them correctly added to your topo-rig.
  But keep the above descriped 'center to preripherie-rule' in mind and watch out in which direction and from what base connected you draw the lines.

- Once you have a desired pose press 'a' (preview) and you can **store Morph** and make another one and so on, then you can use the slider to obtain intermediate posing and Morph Differences.
  (this topic was originally posted by **Andreseloy**, thank you)
  Zbrush seems to store Morph-targets automatically when you press 'a', so the MT-store-button may be grayed out in the menue.

- **Don't use the UNDO-command** after you have binded the rig to your model. Zbrush will jump instantly into data-nirwana.
  If something goes totally wrong with your posing, either unpress 'Rigging -> Bind' or you are a lucky one and have stored a morph-target (see above).

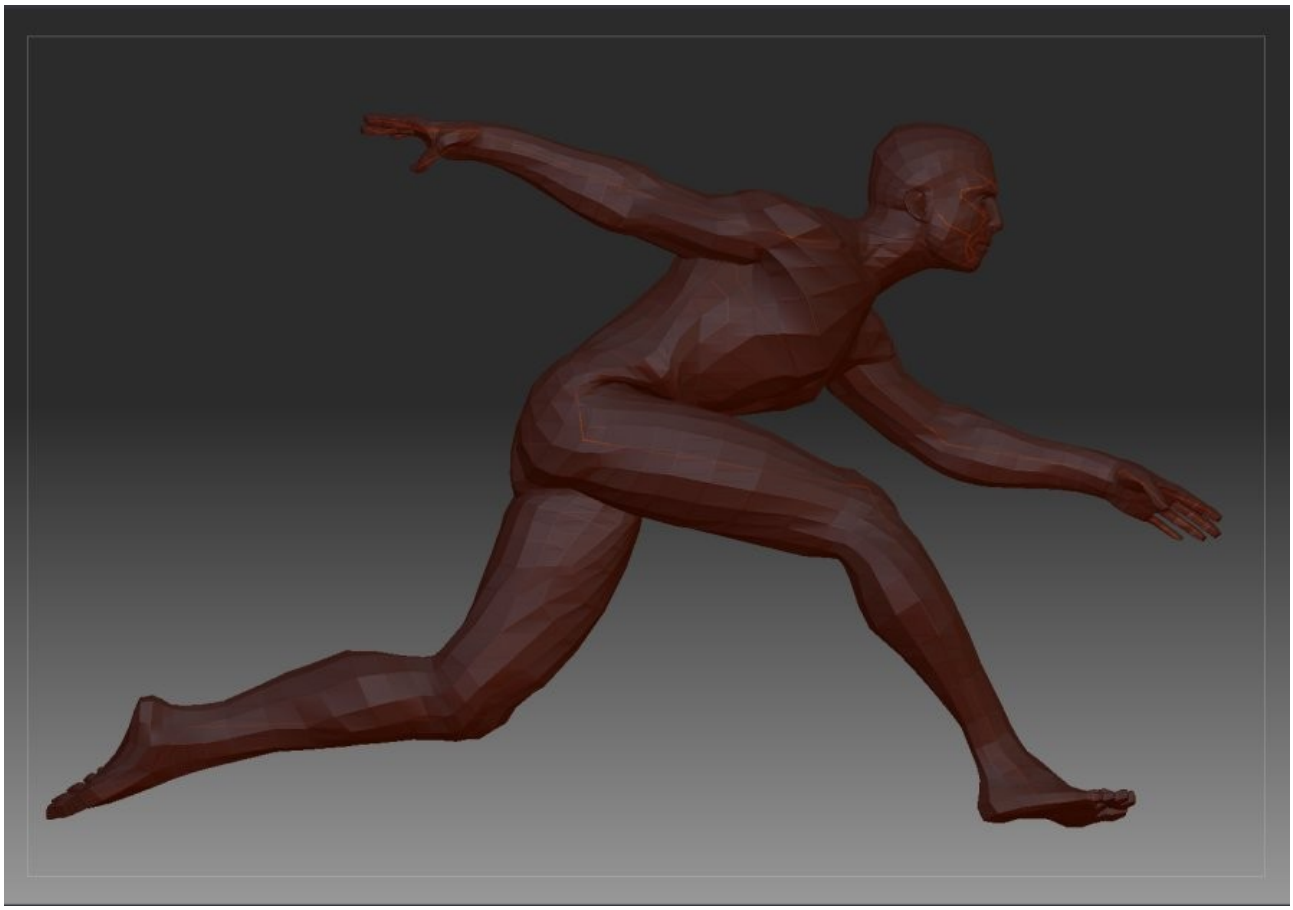
- In case you cannot move your mesh to position it before binding, you have masked microzspheres . Also a dark mesh-model indicates that.
  To solve this simply **Ctrl + LMB-Klick-drag on a clear place of the canvas** to unmask all and it will work fine.

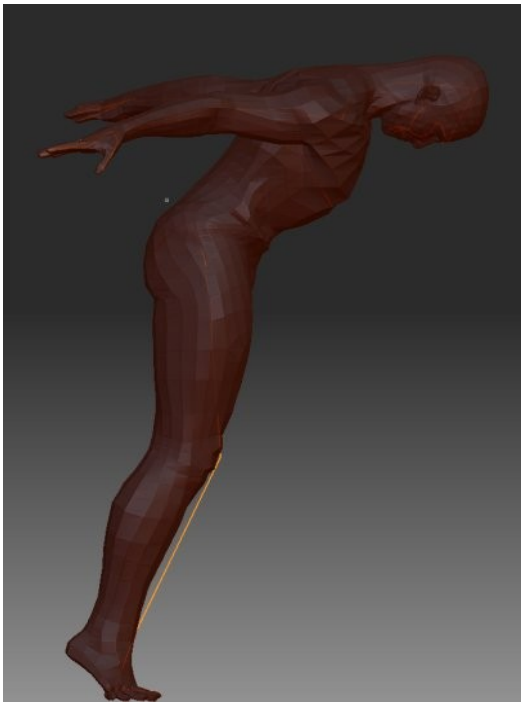
- If you have problems to see your rig inside your mesh-object, activate Mesh-Transparency by pressing '**Transform -> Transparency**'.

This kind of rig works with totally different mesh-models, even those on which it wasn't created.
So you can also make a master-rig and siply adjust it to different models.

You find my tutorial for adapting master-riggs on other meshes under the link above and below.

This is SuperAverageMan adapted to Jana's rig





Jana posed with an more improved rig:

Some playing around

As in every version of Zbrush before, Pixologic also layed in their ZB3-features an enourmous potential for combinations and variations, some usefull, some only leads to a note that it is possible to do that.

- This comes out when I combine a topo-rig binded to Jana with a normal Zsphere-rig binded to a clone of jana and placed as a subtool to the topo-rig:

Jana peels her skin off ;)

As I say, this works also with the high-poly-levels, but deppending on your computer-power posing in high-level is a little bit tricky because of the delay between your command and the displayed result.

Some rest-problems with unwanted area-affektion while posing can be solved by refining and splitting your riggs. One problem with high-poly-models are wrinkles of the surface when you bend a joint. I am currently working on this.

Because in the moment nearly all few hours something new is discovered and added to this overview, I recommend to periodically check my source-post for new versions of this Tutorial, because other links might refer to already deleted versions of this files.

You find it here:

http://206.145.80.239/zbc/showthread.php?t=46117

Happy ZBrushing,

Ralf

Appendix

Quick posing with high-subd-Levels

As you might already noticed, so easy and fluid the work with low-subd-models goes, posing high-subd-level-models can be a hard thing depending on the power of your system.
Pixologic officially doesn't support Topo-Rigging yet and prefer the Transpose-mode , therefore the algorythms of the topo-rig for calculating the changes of the pixol-positions when you pose your model seems not to be as elaborated as they are for the transpose-mode.
So you have the problem of a more or less significant delay in the display of posing high-subd-models that you don't have when using low-subd-levels.

I tried some ways to bypass this , but didn't come to a result so far, unless **Marcus_Civis** posted a good solution for that:

- First make sure you rig a copy of your model.
- Create your rig at the lowest subdiv level; bind and pose the rig.
- When your happy with a pose, create an Adaptive Skin, making sure that the Adaptive Skin: Density slider is at 1, so that the resulting mesh has the same number of polys as the lowest level of your model.
- Select the new Adaptive Skin posed version and export as an OBJ.
- Switch to your original unrigged model (remember, you made a copy?) and import the OBJ at the lowest subdiv level (you can create 3D Layers for importing multiple poses).
- Go up the subdiv levels and admire your work.

With that, you should be able to easily and quickly pose your model in a low-subd-level and change it later into a high-subd-level.

Thanks to Marcus for this great help.

Posing

So far we have already seen that Topo-Rigging can handle a FK (Forward-Kinematik) - like Posing-system.
But it also hides a way to pose in IK (Inverse-Kinematik) as you will soon see.

Although we have in ZB3 a ZSphere-system and not a Bone-based rigging-system, the behaviour of the micro-zspheres and their connection-lines can be principally compared with joints and bones of an traditional rigging system.

So I speak of **ZBones** and **Zjoints**.

As like in a traditional rigging-system of other apps, you should also build up your rig in a continous way. I recommend my 'from center to peripherie'-rule to get proper results while posing.

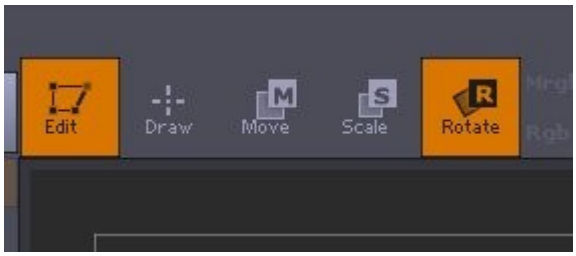
Keep that in mind in case you don't get similiar results in your attempts.

Forward Kinematik (FK)

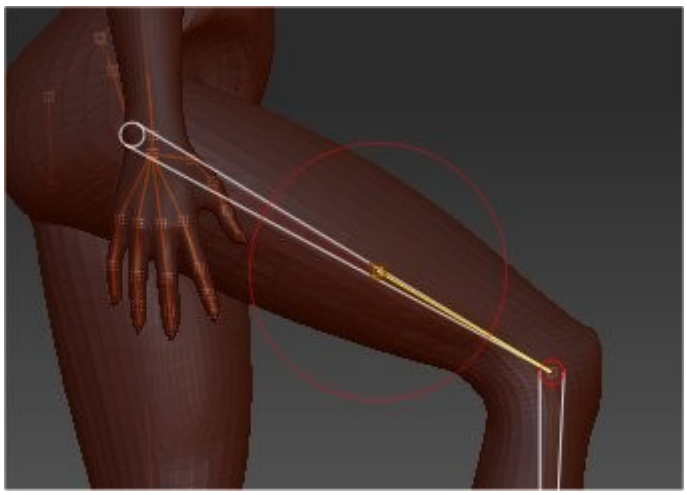
Forward Kinematik generally means that if you grab f.i. the upper-leg-bone and move it, all downwards-attached joints and bones (lower-leg, foot) will follow.

FK-posing is the older way and has advantages and disadvantages. It mostly takes a few drags more to pose your model than IK, but you also have more control where your upper-parts of the bone-hierarchy will be.

FK-Posing is done in ZB3 in activating the **'Rotate'-mode** after you have bind your model to the rig.



Now you can pose your Zbone-chain by dragging the zbone or rotate around the length-axis by dragging the zjoint.



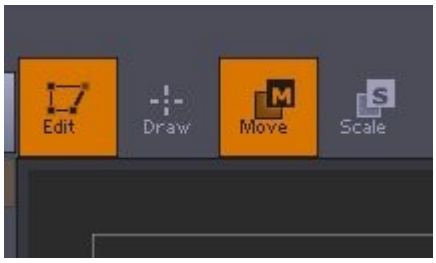
Inverse Kinematik (IK)

Inverse Kinematik generally means that if you grab f.i. the foot-bone or joint and move it, all upwards-attached joints and bones (lower-leg, upper-leg) will follow.

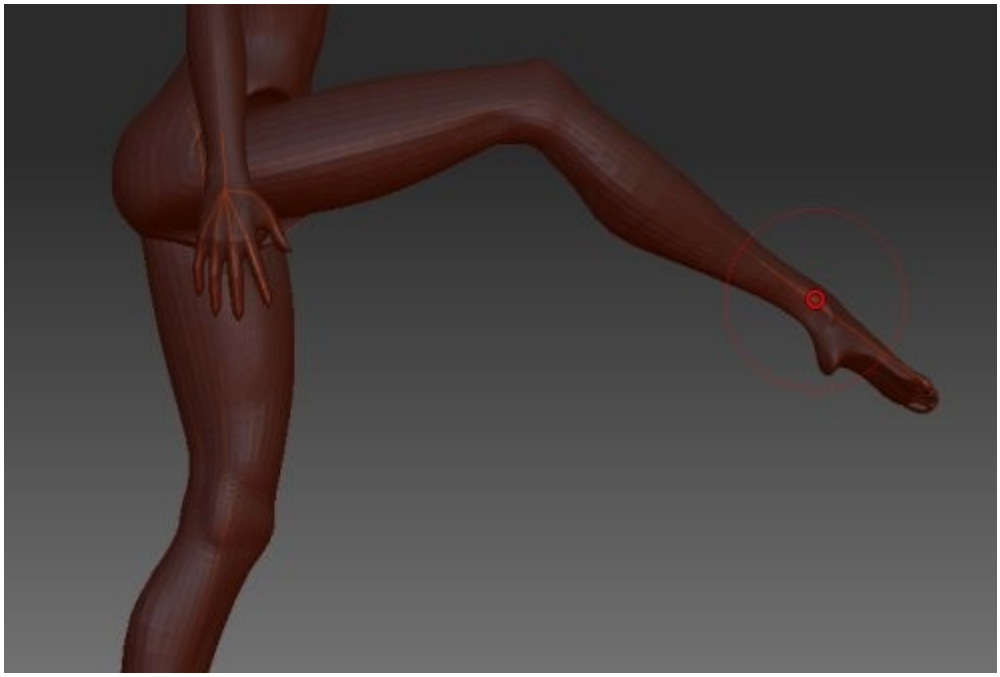
IK-posing is the newer way and has also advantages and disadvantages. It is a little quicker because you can move the end of a whole bone-chain directly to the desired position, but has the disadvanteage that you have less control uppon your upper parts of the chain.

Marcus_Civis posted this new way of IK-posing first, again a big thank to Marcus for that.

IK-Posing is done in ZB3 in activating the **'Move'-mode** after you have bind your model to the rig.



Now you can pose your Zbone-chain by **pressing ALT +** dragging the zbone or better a Zjoint in this case.



You have like in the IK-systems of other apps a little less control over rotations than you have with FK (Rotate-mode), but it is usually quicker for bringing the end of a zbone-chain to its desired position.

For corrections of the upper parts, you can then switch to Rotate-mode and pose them in FK-manner.