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Making realistic game characters: rigging and body deformation

By Victoria Lewin - 11 Jun, 2019 - Maya , MotionBuilder

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Designing compelling 3D characters for your video game is one thing; making sure they look an behave realistically is another. From leveraging motion capture data and retargeting animation with Maya, to choosing an A-pose over a T-pose during development, Santa Monica Studio wer the extra mile to ensure that their characters look, feel, and act real. Here are a few best practic from a GDC 2019 presentation by the studio's Lead Character Technical Artist, Axel Grossman, fo making realistic game characters.

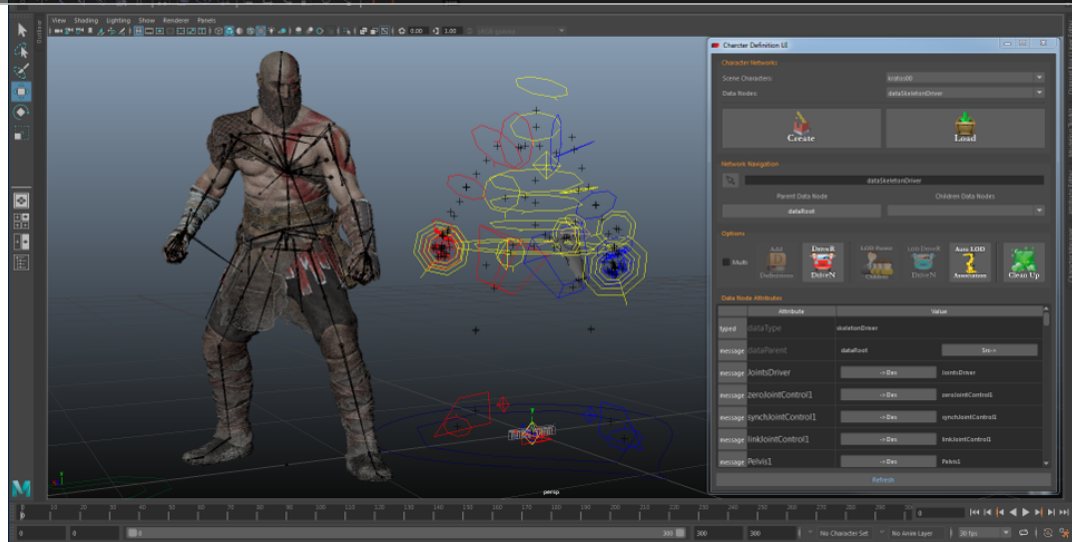## Producing animation with mocap

Use motion capture

Image courtesy of Santa Monica Studio

In getting your characters ready for battle, nothing beats motion capture instead of hand-keying movements. In the case of *God of War*, MotionBuilder was used for its speed and ability to use real-time camera work. A transfer-rig matching Maya's coordinates was utilized, allowing for objects baked in MotionBuilder to be imported directly onto nodes in Maya, allowing for scenes to be built in MotionBuil
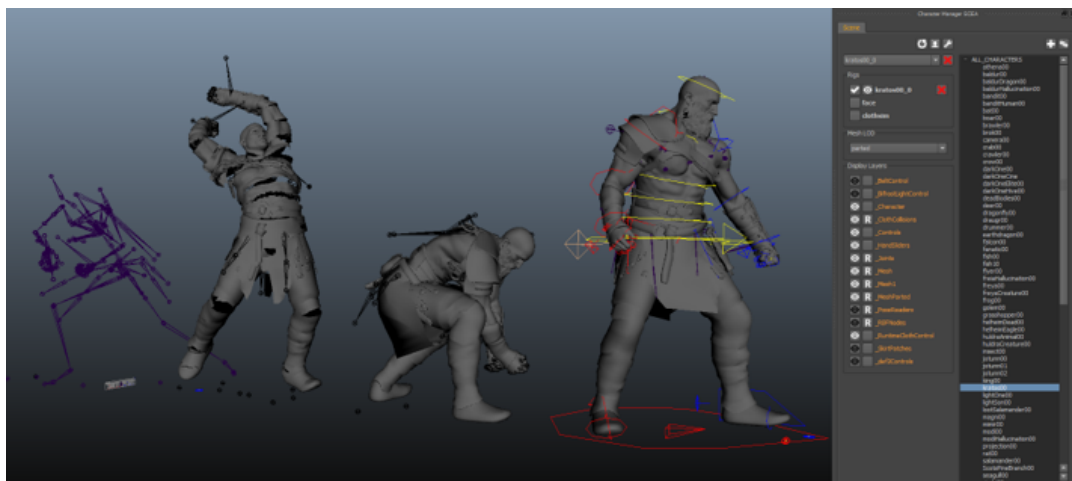
Make use of animation retargeting

Image courtesy of Santa Monica Studio

Animating character cycles one by one? Ain't nobody got time for that! One tool you can take advantage to speed up this process is an animation retargeter, which allows you to swap out characters and maint the same animation cycle.

Striking a realistic pose

Using Pose Space Deformation (PSD) and Radial Basis Functions (RBF)

For your character to feel real, they need to act out the part in each of their movements. Simply choosing A-pose over a T-pose can have an impact on how realistic your character's movements are, with A-pose making for a more natural appearance and proper shoulder height. Pose Space Deformation (PSD nodes) uses Radial Basis Functions (RBF) to ensure that poses are properly blended from movement to movement.
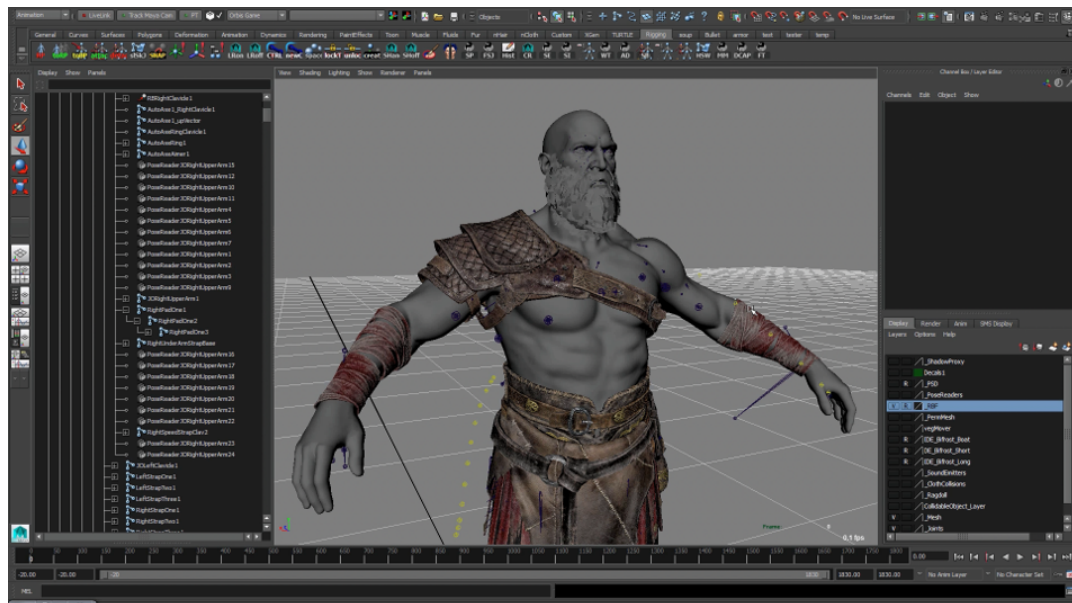

Image courtesy of Santa Monica Studio

For the making of *God of War* at Santa Monica Studios, PSD was used primarily for muscle corrections for Kratos and Baldur, facial fixups and corrections. RBF, on the other hand, is about correcting poses, moving joints around. In the case of God of War, it was used for armor deformation on Kratos and other heavily armored characters, such as The Traveler, some props and environment rigging, and Freya's hair.

Rigging and body deformation

Remember driver coverage

When it comes to making sure that props and objects in your environment act according to your character movements, you'll want to keep driver coverage in mind. Drivers are basically our way of representing the field on which the poses play. Without proper driver coverage, you can fall out of your pose space and get pops and visual glitches. Using a ROM (range of movement), you can determine all the spaces where something can move.
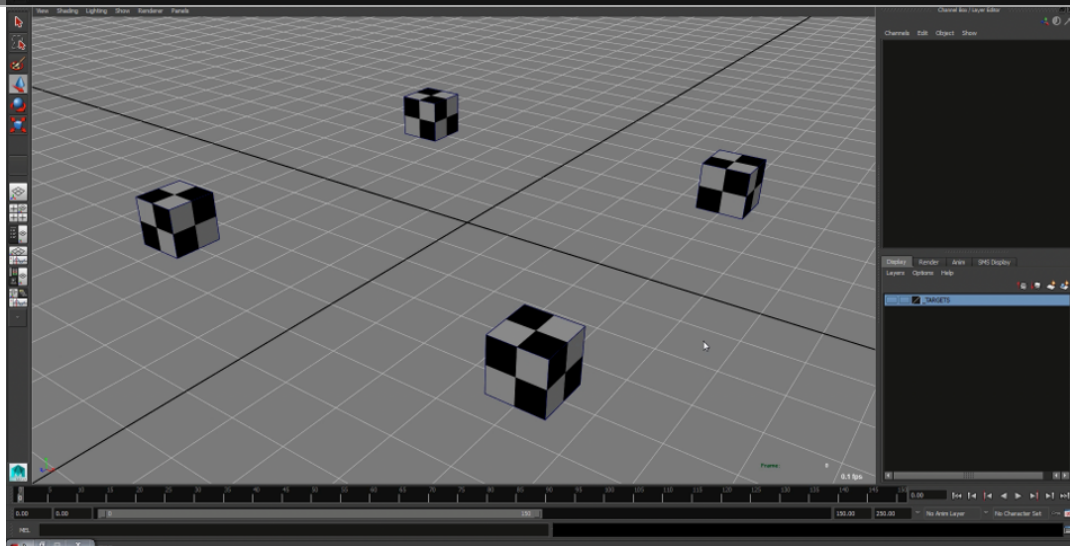
Image courtesy of Santa Monica Studio

Without proper driver coverage, you risk running into problem areas on your characters.

Build dependencies for body deformation

You'll want a system or hierarchy in place for body deformation so that all your world space matrices all for your character to easily call up their poses. This might involve deforming by clavicle first, then hume then clavicle and humerus together.
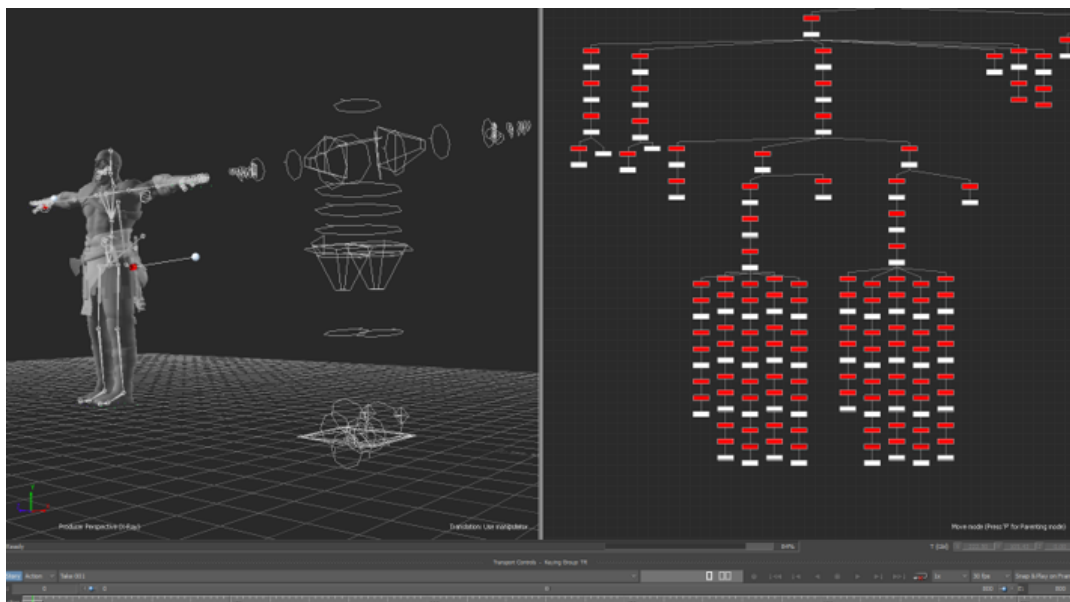

Image courtesy of Santa Monica Studio

Traditional skeletal hierarchies combined with linear skinning lose volume. When it comes to body deformation, keeping your character in its pose space becomes an increasingly greater challenge. Linea skinning can cause things like a peck or deltoid popping out and becoming fat and round when it shoul thinning out during a movement of the clavicle.
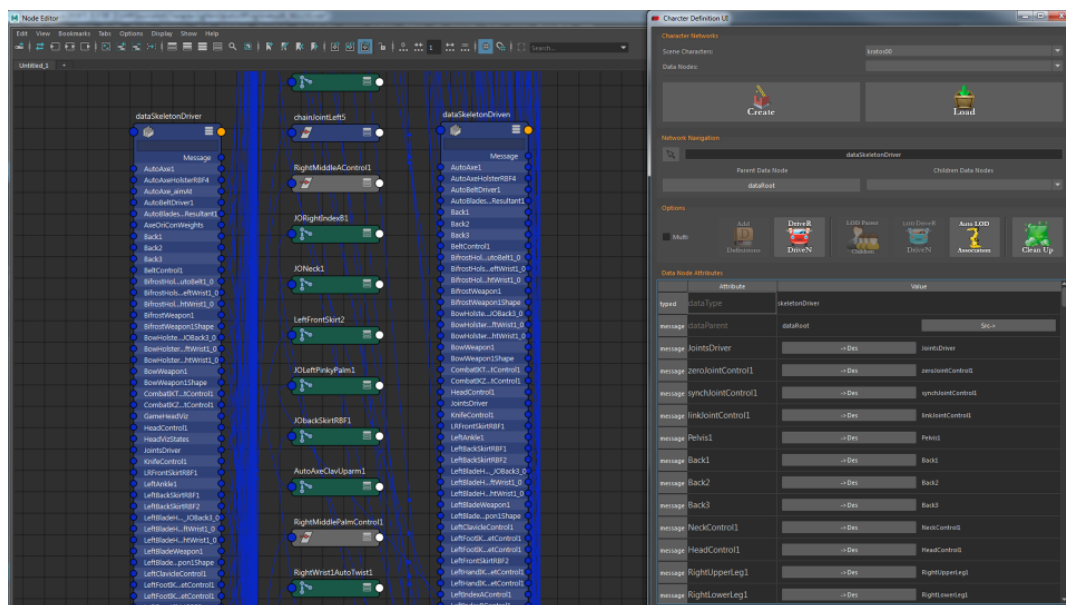
Image courtesy of Santa Monica Studio

Focus on areas most visible to the camera

When rigging your character, you'll want to pay extra attention to areas that undergo a high degree of rotation, for example, twisting along bone axes such as the shoulder (where you can get the candy-wra effect) and other areas most visible to the camera, like the neck.

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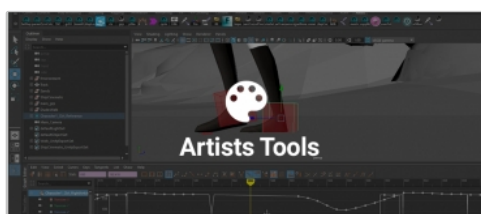
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