# CITS3003 Graphics & Animation
# Part 2 - Project Report
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## Testing
All testing should be done within a Mac OSX environment.

## Functionality
After exporting the model and applying the animations, everything worked as expected.

## Development Process & Issues

### Modelling
During the modelling process, creating the initial mesh object proved to take the majority of the time. This is largely due to the learning process of an entirely new modelling environment, and the number of tools and features available to make use of.

The initial model was created using Blender's side view alongside a background image set behind to trace around. After a 2D mesh was made, the model was extruded out along the Y axis and a mirror modifier added.
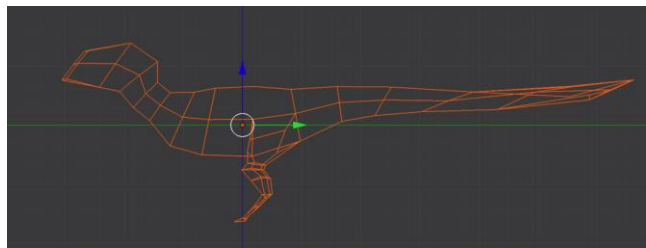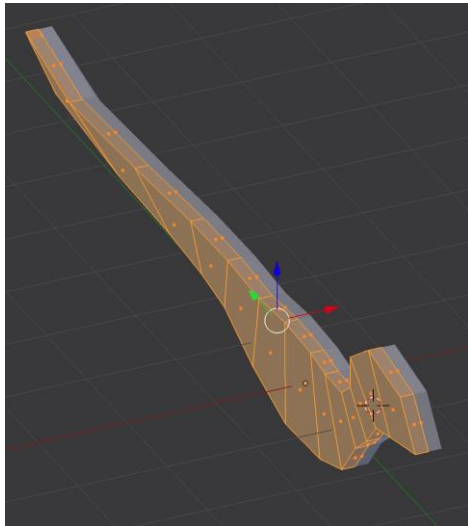


Using a combination of the knife tool, loop-cut tool, and face/vertex modelling, a 3D mesh was made to resemble the shape of a dinosaur/raptor.

Bones were then added to the legs, and a root bone added above the body. After some tweaking with the inverse kinematics modifier, a logical bone movement was created. The bones were then duplicated along the X-axis and moved to the other legs.

Weight painting was used to allow for realistic movement in parts of the body that weren't moving (tail, head, etc.) and a rest position was established.

An animation was created by inserting location/rotation key-frames at evenly-spaced intervals for a smooth transition between frames.

The model was then subdivided for a smoother look, and exported to a .x file.
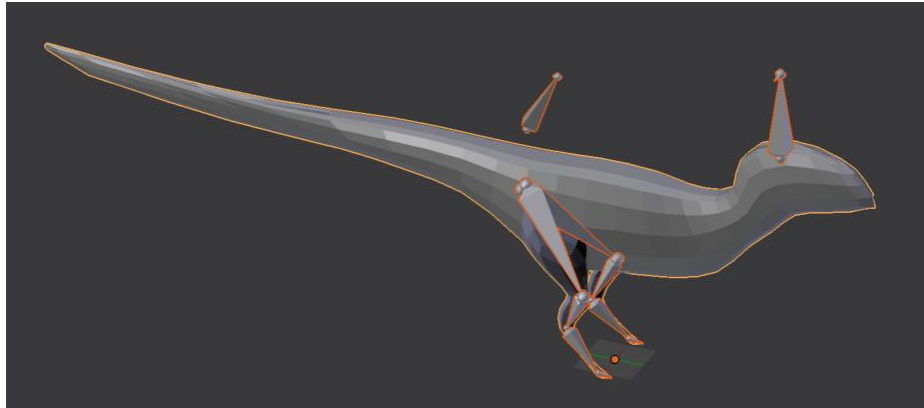


### Addition to the scene editor

Once animations were working in the scene I worked on the movement of the objects over the course of the animation. I firstly made the object move back and forward (regardless of orientation) using an alternating sequence $(-1)^n$. In order to have the movement of the object respect the orientation I copied the code from drawMesh that sets the model matrix. The object now moved backwards and forwards with each animation cycle in the direction the object was facing. The move distance was set by the moveDistance attribute in the scene obj. In order to vary the move duration as described in the project description we had to change the alternating sequence to use a sine curve for direction. This allowed for smoother movement and a varied speed/distance. Lastly I added a new menu item to allow for moveTime and moveDistance to be varied using the mouse.

### Issues

- Working in a new environment
  - Simply learning the environment within Blender took some time to get used to. Before any meshing was started. Getting used to the keyboard shortcuts, camera rotation, selections, and transformations proved challenging.
- Following modelling guides/tutorials
  - While online tutorials and guides helped, it was difficult adapting certain techniques to suite the shape of the model being made. In particular, creating a realistic bone structure for a dinosaur needed to be done fairly free-hand, since most tutorials use simple figures like humans for demonstration sake.
- Weight Painting
  - A subdivision modifier was initially added before any weight painting was done. As a result, it made it much harder to achieve realistic movement. Eventually, it seemed more sensible to revert back to an older revision of the model and specify the weight painting before any subdivisions were made.

# Personal contributions

As this section of the project required two models to be made, each model was made individually by the respective group member, as well as the implementation into the scene editor.

# Reflection

Despite being a completely new environment, this section of the project proved rewarding in the end. Seeing an animation through right from the beginning, to implementing it into the scene editor felt worthwhile. It gives a good basic understanding of the initial modelling/animation process of a figure, and how animations can be exported and implemented into other platforms.