Foundations of 3D Computer Graphics
Key Frame Animator (Part II)

Assignment Objectives

In this second part of the keyframe animation system you will substitute the linear interpolation used in the first part with Catmull-Rom interpolation. This will allow for smooth animation.

The previous assignment included a system for creating, deleting, editing, and reading/writing keyframes. There was also a hotkey for playing the full animation from the first keyframe to the last at small increments of time using simple linear interpolation to generate frames in between keyframes.

In this assignment you will replace in your linear interpolation code with Catmull-Rom interpolation.

Remember that:

- You will need at least 4 key frames for this to work. Between 2 keyframes, you will use the one following and one previous key frame (total of 4) to create Bezier controls using the Catmull-Rom rule.
- The above means that the animation will begin interpolating from the second keyframe and ending in the second-to-last keyframe, advancing in small time increments similarly as was done in assignment 5. This is the reason that in assignment 5, we ask you to assume the key frames to be numbered -1, 0, …, n, and the valid range for the time parameter is only $[0, n-1]$.
- You will have one `Cvec3` spline for each RBT's translation component and one `Quat` spline for each each RBT's rotation component.

During the animation, you will create intermediate states by evaluating the Bezier curves at intermediate times, and then use these intermediate states to display an intermediate frame. For the orientations you will need to use quaternion splines.