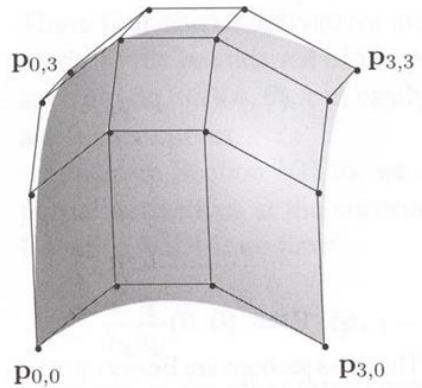


Programming Assignment #7 (Optional)

In this assignment you will implement an application to model a cubic Bezier surface by editing its 16 control points.

$$\mathbf{q}(u, v) = \sum_{i=0}^3 \sum_{j=0}^3 \mathbf{p}_{i,j} B_{i,3}(u) B_{j,3}(v)$$



Requirements:

Requirement 1 (30%) – User Interface

Your program should start with the needed 16 control points already placed in suitable initial positions. Represent the control points as small spheres and make it so you can change the 3D position of each control point with the mouse. Note: you will need to use the mouse callback function and do picking to determine if the user clicked on a sphere.

The entire surface should be re-generated every time a control point changes its position. The user should be able to modify the position of each of the control points with the mouse and instantly see the respective changes of the surface.

Requirement 2 (40%) – Surface Evaluation

Given any configuration of the control points, you will then evaluate the surface for several (u,v) points in order to generate a polygonal approximation of the surface in triangles.

Include keys to allow the user to change the resolution of the surface approximation, i.e., to increase or reduce the number of triangles generated to draw the surface.

Requirement 3 (30%) – Surface Rendering

Finally, you will also need to render the surface in four modes: wireframe, flat shading, smooth shading, and textured. For the textured version you just need to correctly map any

image onto the entire surface of the Bézier patch. Use the following keys to activate each mode:

- z – flat shading,
- x – smooth shading,
- c – textured smooth shading.

Submission:

Please follow the instructions in parules.txt (uploaded to CatCourses). In particular: please do not include any third-party support code and do not forget to Clean Solution before preparing your project for submission! Also, check for hidden folders (such as .vs) which can sometimes balloon to hundreds of megabytes!

Deadline lab for presentation and submission: your last lab.