Exercise 02561-12 **Volume Visualization using 2D Texture Mapping**

Readings On-line note, help slides. Watt chap. 13 (general information)

Introduction Volume visualization has for some time been feasible on commodity graphics hadware. In this exercise, you will explore one of the oldest and simplest methods for texture based volume visualization. The basic idea is to render the volume as a stack of slices which partly occlude each other. When rendered back to front, this creates a plausible visualization of the volume. However, we must maintain three stacks, and pick the stack that is appropriate for a giving viewing direction. This exercise text does not describe everything in detail, but refers to the on-line notes.

Part 1 Implement texture based volume visualization. The volume is loaded and stored in an appropriate data structure by the exercise program. Your tasks are to

- Create textures for each slice in each of the three directions.
- Bind the slices to textures
- Draw the textured slices back to front. Remember to pick the stack of slices appropriate for the viewing direction.

Questions: Try to explain why the volume looks shaded although no shading has taken place. What artefacts do you see when interactively viewing the volume? Can you think of another method that does not have these problems?

Part 2 Z Picking
To select a point on the volume rendered object, we must be able to click on a pixel and get its object coordinates. This is done by finding the x,y and depth of the pixel where the user clicks. This position is then unprojected. Implement this in the zpick function.

Part 3 Volume Manipulation
Simply by changing voxel values, we can perform simple sculpting operations. Implement this as described in the note.

Question: Discuss the manipulations you have implemented – how do they differ?

Delivery Hand in source code and images showing an edited and an unedited volume. Answer the questions.