- Simple 3D Projections using OpenGL -

Goal:
After working with simple OpenGL programs across different platforms, here we focus on initial 3D experiments, animations and projections.

Exercise 16.1: Rotating Planets program
You can continue to use the Makefile project of exercise 15. Copy the file `spheres_01.c` from the quickstart folder of exercise 16 into the `src`-directory of your project. Compare the structure of this program with the example `rect_02.c`. Most parts are very similar. What is new? Can you identify the code responsible for the animation?

Now create a new make target named `spheres_01_host` to build the executable `spheres_01` for the host. Construct the executable and an appropriate run configuration. Run your program locally on the host from within Eclipse.
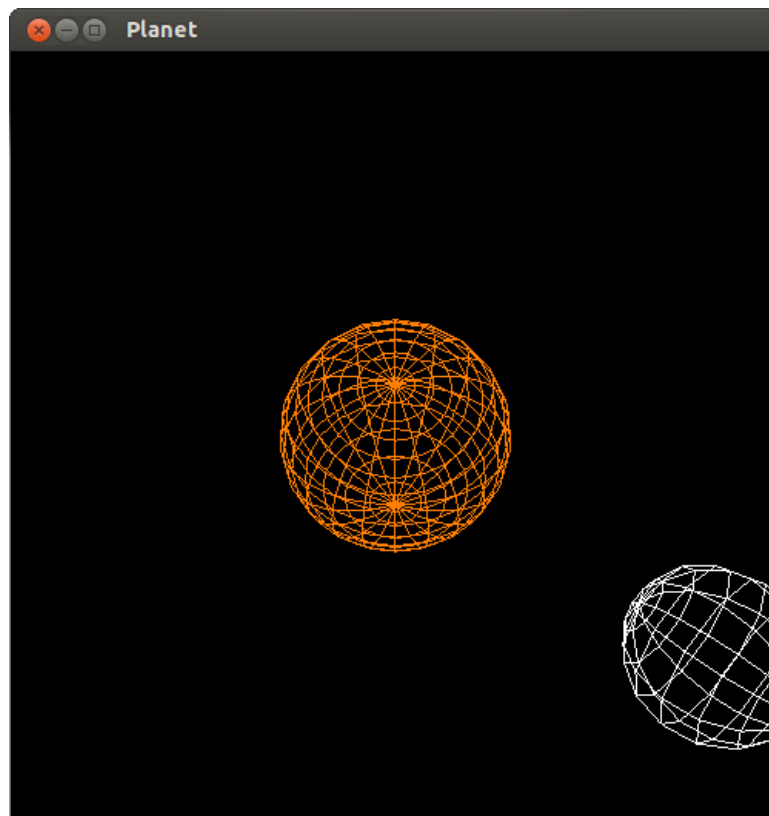

Fig.: Spheres Primitives as a Wireframe model in GLUT

Exercise 16.2: Same Procedure for the Target
Now create another make target named `spheres_01_target` to create the ARM-based executable for the target. After building it and checking with the `file`-command, we need an appropriate remote run configuration for the target. Do not forget to add the parameter `-display :0`. Now execute both on host and target.

Lab

Exercise 16   „Platforms for Embedded Systems"   Prof. Cochlovius

How can we place another wire-frame sphere inside the planet in the middle? How can we extend our program to not only one planet circulating around, but a complete solar system?

Exercise 16.3: Not just wide angle → we need new perspectives!
Notice, that objects, which move away from the camera position, shrink in size very rapidly (e.g. circulating planet). This is typical for the wide angle perspective we have chosen, but may be wrong for many other applications. Sometimes, we need a more "stable" perspective. Here we need, what is called orthographic or **parallel projection** (s. Wikipedia).

Copy and modify the source file **spheres_01.c** into a new file **spheres_02.c** . Now replace the central perspective by the orthographic projection as discussed in the lecture. Create another make target and run configurations. Execute and verify both on host and on your target.

After **spheres_02** is running correctly, we now want to reduce the size of the frustum until the circulating planet is cut whenever it reaches the nearest and the farest point. To accomplish this, you modify the near- and the far plane of the orthographic projection.

Fig.: Spheres Primitives using Orthographic Projection and Reduced Frustum