

## Fully Implemented

- **Camera controls**
  - “WASD” moves the camera based on the direction it is facing
  - “Q” and “E” for up and down based on the direction it is facing
  - with arrow keys for rotation
- **Light controls**
  - “Z” and “X” for left and right(Z-axis) based on world space
  - “C” and “V” for back and forward(X-axis) based on world space
  - Scroll wheel for up and down(Y-axis) based on world space
  - Light Toggle “L”
- **Five chosen features**
  - **Geometry shader**
    - I used the geometry shader on an upside-down pyramid to simulate a sink, and I opted to keep it white to simulate porcelain.
  - **Perlin noise**
    - I used the marble Perlin noise to create a frame for my mirror out of 4 rescaled cubes.
  - **Normal mapping**
    - I used the tile normal map from the book on the floor plane along with the grass texture to create a bathroom floor with shadows.
  - **Environment Mapping**
    - I used Environment mapping on a plane of my own creation to create a mirror for my bathroom sink.
    - I also used it on the toilet’s handle and the sink’s handles and facet to create a chrome effect and make them look more realistic.
- **Cube Mapping**
  - I created a sky box using the textures from the book
  - Skybox uses the OpenGL Cubemap
- **Shadow-Mapping**
  - Shadows are withing on most objects in the scene
  - Many Objects with special shadows do not receive shadows on their textures
- **At least 3 objects**
  - Each item in the scene consists of one or more objects
    - **sink** is 5
      - pyramid for the base
      - 2 pyramids for the handles
      - 2 cubes for the facet
    - **mirror** is 5
      - a plane for the mirror
      - 4 cubes for the frame
    - **Toilet** is 4

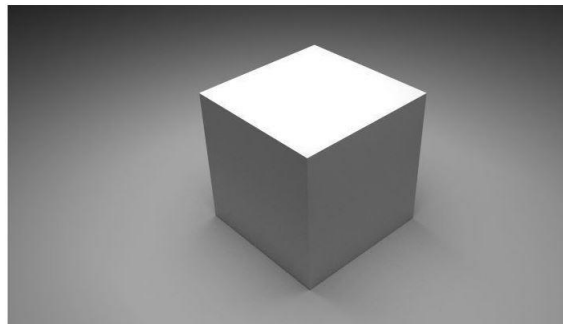
- A pyramid of the bowl
  - A cube for the base
  - A cube for the tank
  - A cube for the handle
- **Room** is 3
  - A grid(originally intended for use as a terrain)
  - And 2 planes for the walls
- **Skybox** is 1
- **At least 1 2D Texture**
  - The walls use the brick texture from the book
  - The floor uses the grass texture from the book


## Not Fully Implemented

- **Light controls**
  - I could not get my app to detect my mouse without freezing
- **Shaders**
  - I kept the shader separate, so I would be able to have more control over the objects, but I did not have time to fully integrate cross over features.
- **Normal mapping**
  - I had to hard code up at the tangent in my normal mapping for my grid.obj, because I ran into a bug where I couldn't get the tangents working correctly on the grid, so I need to go back and fix that.
- **Cube Mapping Textures**
  - I wanted to create a window facing a side of the cube map with an normal sky, and then use the rest of the sky to simulate a bathroom or use a second skybox to make my mirror seem more accurate, but I didn't have the time to follow through.
- **Shadows**
  - I wanted to get shadows on every object, but it proved to be difficult to implement it into every shader used, so I had to stop trying because of time constraints.
- **Stereoscopy**
  - I started to implement split screen, but I had to make time for features that I could more realistically implement in the limited time I had, so I only got as far as to start refactoring some off the method calls to implement the multiple perspective calls before I realized I wouldn't be able to understand it in time.

## Source information


- Grid/floor is from the book
- Pyramids are from the book
- Plane/walls/mirror is hand made
- Bronze and gold material from the book
- Ruby and Pearl material from:
  - <http://devernay.free.fr/cours/opengl/materials.html>
- Cube.obj is from(minor edits):
  - <https://www.cgtrader.com/free-3d-models/various/various-models/sicube-test>







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#### 3D model formats

OBJ (.obj, .mtl) (2 files)

Version: 1.2

Version: 1.3

## Scene

- Basic park bathroom
  - I would have liked to make it more of an at home bathroom, but I ran short on time



## Remote Machine used

- I use the ECS-HALFLIFE machine for my testing

