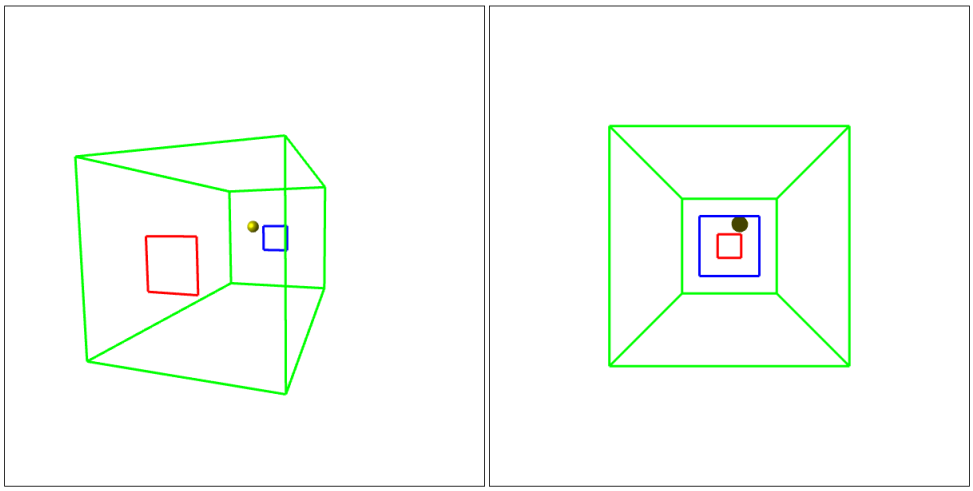
Assignment 1: A simple 3D pong game

The idea is to write a very simple pong game where the goal is to keep a ball within a box using rackets at the front and back sides of the box. The game can be played by a single player or by two players.



Requirements:

Single player mode

1. Create a box:
   (a) The front and back sides must be squares and the length larger than the height.
   (b) Only display the edges of the box (see the documentation of `THREE.EdgesGeometry`).
2. Add a small ball to the box:
   (a) Position the ball at a random point such that it is located entirely within the box.
   (b) Give the ball a random initial velocity, with the largest speed component along the length of the box.
   (c) Let it bounce off all the sides of the box except the front side. Use specular reflection for this and make sure that the ball stays entirely inside the box during the reflection process.
3. Add a red racket to the front side of the box:
   (a) Implement the racket as an `EdgesGeometry` made from a square shaped `PlaneGeometry`. The size of the racket should be significantly smaller than the front side of the box.
   (b) Position the racket initially at the center of the front side. The racket should be within the front side of the box.

   (c) Add arrow key events that move the racket within the front side plane of the box.
   (d) If the ball hits the racket it should be specularly reflected.

4. Stop the game when the ball leaves the box and report *Game Over!* when the ball leaves the box.

5. Position the camera such that a player can see how to move the red racket.

Double player mode

6. Add a flag in your program that can switch between single and double player mode.

7. Add a blue racket to the back side of the box:

   (a) Apart from the color it should look and work like the red racket.
   (b) Use the keys `w, a, s, y` to move the blue racket.
   (c) Make sure the ball gets reflected from the back side of the box only if it hits the blue racket.

8. Create a second canvas, a second renderer and a second camera. Position the second camera in such a way that a second player can see how to move the blue racket.

9. Stop the game when the ball leaves the box and report which player has won.

Adjust the size of the various objects and ball and racket speeds such that it makes sense to play the game.

Handing in the solution

- Hand in your *complete* solution (`html` and `js` files) no later than *1 week after the lab*, by email to `klaus.juenemann@haw-hamburg.de`.
- Stick to the coding style guide.