

Real-time Graphics Assignment 2

Date Published: November 8th 2017, Date Due: November 15th 2017, 11:44

- The assignments have to be done in groups of 2 students.
- Hand in the solutions to the exercises via L²P.
- You are only allowed to change code inside the marked strips (STUDENT CODE BEGIN/END)!
- Any questions? → L²P discussion forum or rtg@cs.rwth-aachen.de!

If not done yet, obtain the (publicly accessible) exercise framework and assignments from <https://www.graphics.rwth-aachen.de:9000/Teaching/rtg-ws17-assignments/>.
Use **git pull** to fetch the newest changes of the framework (including the code for this exercise).

The **only** files that you should modify and **upload**:

- Assignment02.cc

Each subtask corresponds to a code strip with more detailed comments and hints. A short primer on GLM (the vector math framework that we use) can be found at the beginning of Assignment02.cc.

Exercise 1 Simple Pong Game [1+1+2+1+2 = 7 Points]

In this task you will write a simple Pong game.

- Implement the position update for all `TransformComponents` in `updateMotionSystem(...)`.
- Add a dynamic `CollisionComponent` in `spawnBall(...)` (second strip).
- Query the player input keys and move the player paddles in `updatePaddleSystem(...)`.
The paddles must not leave the playing field whose height ranges from 0 to `mFieldHeight`.
- In `updateRegionDetectionSystem`, check if the dynamic object is within the critical region, i.e. inside the currently tested half-plane. If so, send a message with appropriate content.
- In `processMessages(...)`, third strip, handle `RegionDetection` messages that indicate that one player scored a point. Remove the ball and spawn a new one if it was the last.

Exercise 2 Improving Pong Gameplay [1+1+1 = 3 Points]

In this task you will improve the gameplay of the simple Pong game from task 1.

- In `spawnBall(...)`, first strip, create a more elaborate initial ball velocity:
 - the velocity should point towards one of the two sides within a random $\pm 20^\circ$ cone.
 - the length of the velocity vector should be picked randomly between 300 and 400.
- In `processMessages(...)`, first strip, make the ball 20% faster when a paddle is hit, but no faster than `speedLimit`.
- In `processMessages(...)`, second strip, spawn an additional ball when a paddle is hit at max speed but no more than once per 5 seconds. (The variable `mMultiBallCooldown` can be used as a countdown.)