FIT2102 Assignment 1

Pong Game

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Pong game is a classic arcade game originally released in 1972 and manufactured by Atari. It is based on table tennis and is very similar, except it is in 2D. For our first assignment, we had to make a pong game using Javascript with Rxjs library which has been thought on week 5. We also had to try using FRP style of coding to make the game.

First, we need to make changes to the html file provided for the assignment. We need to add score, description of the game, and a place holder for the result of the game. This can be done by just adding a couple of html elements to the default html file. To ensure that we follow the FRP style, the code make use observables for the game flow or timer. I also use method such as filter to handle conditional things. The movement of the paddle is also an event-driven from keyboard keys.

The main code will have declaration for 3 SVG Elements (2 square and 1 circle). The circle will have an extra attribute called speedx and speedy. Those attributes will be used to determine the velocity of the ball when traversing the canvas. An observable will also be created for the purpose of watching the current score of the game. This will be used to stop the game when the maximum score or winning score is reached by either of the side.

For the paddle control, *fromEvent<keyboardEvent>* is used as an observable. The 'W' and 'S' Key is used to move the paddle up and down respectively. The idea is taken from week 5 lab exercise. And since it is not specified in the assignment specification, I assumed that the player would always be playing as the left paddle and the AI will be on the right. I also specify a boundary within the canvas such that the paddle will not go through the boundary of the canvas.

The main functionality of the game is in the *engine()* function. Inside the *engine()* there will be another observable that will be used as the main "game timer" for the pong game, where the ball and both of the paddle, and AI is subscribed to it. That observable will dictate the flow of the game. Once the stop observable's condition (filter) is fulfilled, the game will be stopped. There will be three function inside the engine, two of them are moveAI() behavior and moveBall(). The winLose will use two observables to observe respective scores of the player. If either of the player reach 7 points first, the observables will then change the placeholder in html into an information of who wins the game.

For the AI, the movement of the AI is solely based on the y coordinate of the ball and speed of the ball. This can be done by constantly getting the y and speedy attribute of the ball. However, to make sure we can win against the AI, we had to set a handicap. Which is why the speed of the AI is gradually decreased overtime.

The moveBall() is where most of the calculation or core aspects of the game is located. First, we can subscribe a function to the main observable to move the ball on the canvas by adding the speed of the ball to the coordinates of the ball. Three new observables are also created for the purpose of

keeping the coordinates of each object (two paddles and 1 ball). Since to do the bounce calculation we need the coordinates of the ball and the paddle at the same time, flatMap is used to map the ballCoordinate observable into the right and left paddle coordinate observable. From there, we can filter the coordinate observable such that when the ball y-coordinate is between the y coordinate of the bottom and top of the paddle (by using the height of the paddle plus the y coordinate). While the x coordinate of the ball determines whether it bounce of the right or left paddle. There are also function for reversing the direction of the ball. This can be done by multiplying negative one with the speedx or speedy attribute of the ball. Lastly two observables will also be introduced such that when the ball x-coordinates reaches 0 or 600, this will be considered a goal (score) and will increase the score of the player or AI accordingly. This will also return the right paddle and the ball to the default position.