Brick Breaker

Project 2 : Part 1 *(30% weightage)*

Deadline: Tuesday, 15^{th} May 2018, **4:00 PM**

Instructions

Note: You can form a group of MAX 2 students. Read the following description VERY CAREFULLY.

For this part of the project you need to analyze the game description given below. *You are then required to identify classes, attributes, behaviors, and relationships between the classes.* Neatly draw all of these things as a class diagram on a large piece of blank printer paper or white chart.

1 Game Description

1.1 Game Objectives

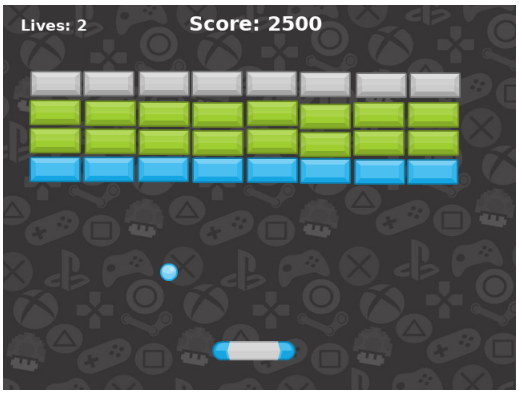
The breakout game has a paddle (our player) which is controllable through keyboard keys. The goal of the game is deflect a bouncing ball to break the bricks above. The ball will be deflected from the left side, the right and the top. But IF the ball touches the bottom side then the player loses a life and the ball is placed at a default reset position.

Lose: If the player depletes all his lives then he loses the game.

Win: If the player manages to destroy all of the bricks then he wins the game.

1.2 Game Design

Your final game will look pretty much like the following:



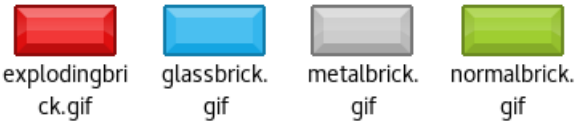
Pretty much everything in this game is a "game object". The background you see is a game object, the bricks are game objects, the ball is a game object and even the paddle (player) is also a game object.

Every game object has a position (which can be represented with a Vector object). The game object knows how to draw itself.

The brick is a game object. There are four types of bricks:

- Glass brick *(the ball destroys it in only one hit)*
- Normal brick *(it takes two hits to get destroyed)*
- Metal brick *(it takes seven hits to get destroyed)*
- Exploding brick *(it takes four hits to get destroyed. But when it does it also destroys ALL of its immediate neighbors. They are also quite rare in the game, maybe 2-3 placed randomly.)*

Following figure shows different types of bricks:



The power-ups are also game objects. There are three types of power-ups. The life increases the life of the player by 1. The fast paddle makes the movement speed of the player paddle faster. Finally the crazy ball makes the ball move really fast.

Both the life and fast paddle have a reference to the player because they need to modify the player somehow. The crazy ball has a reference to the ball.

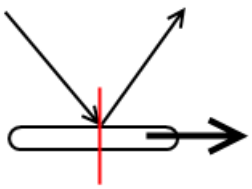
After every 30 seconds a power-up is randomly created at the top of the screen and it glides down towards the bottom. If the player catches it then effects of that power-up are applied. These effects remain for 5 seconds.

Following figure shows different types of power-ups:

The type of the game objects that move (such as player, ball, power-ups) also have velocity in addition to position. Just like position you can also represent the velocity using a Vector object.

The ball is a game object. As mentioned above, it moves ! The ball can collide with the bricks, the sides and top of the screen and the paddle itself. If the ball touches the floor then player loses a life and the ball resets itself to some starting position.

When the ball collides with something then it is bounced backed with an equal angle with which it collided:



Our player is also a game object. It has position and velocity. Player has finite amount of lives. As soon as its lives are depleted the player dies and the game is over.

Two labels are shown at the top. One for score and the other one for remaining lives.

Then we have our game which is actually the heart of the project. The game has a list of all game objects visible on the screen. The game draws the objects and tracks for left and right keys. It also runs game logic. The game needs to check collision between game objects so that it can take appropriate action.

Game needs to check win/lose conditions. When the player wins the game needs to display a message box congratulating the player. Otherwise a game lost message should be displayed.

Finally the the game window actually draws the window on the screen and attaches a canvas to it. It also manages user input and a timer that ticks every one second.

2 Submission Instructions

Draw the class diagram (very neatly) on a white sheet and submit the hard copy to:

- Section A: Ms Amber *[ambernadeem@fccollege.edu.pk]*
- Section D: Mr Ammar *[ammarsaqib123@gmail.com]*

by 4:00 PM on Tuesday 15^{th} May 2018.

15% marks for neatness
85% marks for the overall design

Good Luck !!!