Lebanese American University
School of Arts and Sciences
Department of Computer Science and Mathematics

CSC458– Game Programming - Homework Assignment 1

Date assigned: Tuesday 8th of February 2022 – 11:00 PM
Date Due: Tuesday 15th of February 2022 at 11:59 PM.

Objectives:

To test students' knowledge on topics such as:

- Movement and rotation via the transform component/Movement and rotation via the Physics Rigidbody component.
- Collisions and Triggers.
- Instantiating and Destroying game objects.
- User Input from the Keyboard and the Mouse.
- Serialization of variables.

General Rules

- Late submissions are not allowed. This is an individual assessment.
- **Cheating or copying** other students' work will get all involved students a zero grade. I do not care if someone copied your work or who copied from whom. The homework assignment should be unique. It is statistically impossible that two students in the class would end up doing the same assignment or have the same code.
- **Any form of plagiarism or academic misconduct is prohibited (zero tolerance)**. Copying code found elsewhere or changing it and then claiming it to be yours will get you a zero grade immediately. **Using anything which you did not create yourself, MUST be cited and/or credited adequately** in a separate MS Document which you include in your submitted Unity project zip file. Using a game asset, any form of code (small or big in size), pseudocode, ideas, techniques, from any public or private source, online or in any other form, from a video on YouTube or from a Udemy/Coursera/Skillshare course or similar platforms etc… without citing the exact source adequately in your accompanying report **will get you a zero on the homework.** This is literally the definition of plagiarism.
- The **Unity code/project submitted should not appear elsewhere**, **nor should be a previous submission to a different or to the same course in previous semesters,** nor should be a project done elsewhere in the industry, nor done for a client, nor made before for any other reasons. If we discover this is the case, you will get a zero grade immediately and an expulsion from the entire course on first offence.
- Please refer to the student code of conduct in the syllabus.

When done, zip the Unity project folder, rename the zip file as follow: FirstName-LastName.zip and upload to blackboard. **NB**: If the homework assignment size is large & cannot be uploaded to BB, please upload it to One Drive/Google Drive or similar services and share the link only with the lecturer before the deadline.

Please read the requirements slowly and carefully. Your homework assignment 1 MUST adhere to the following requirements to get the full grade – each point is assigned a certain weight of the total grade. **NB:** I did not specify dimensions when talking about game objects and things like that. So use what you find convenient in terms of dimensions.

Requirements

- You are asked to develop a small prototype game. It should contain a plane with different primitives on it (cubes, capsules, spheres, Cylinders etc…). The primitives should be scattered the way you want on the plane but make sure that you scatter them in a way to allow your player to navigate smoothly between them and rotate smoothly in different directions around them. You need to create some flattened large cubes that are at a higher level than the plane. The player can jump on these cubes and jump back from them to the plane. So, you need to implement a jump functionality. Please put high walls (they shoukd be primitives) around the plane so that the player can not jump above them nor fall in the abyss! 😊 Remember you can do awesome stuff with only primitives. This requirement would help you practice your scene navigation skills: panning, zooming in etc… No need to bring any assets from Unity Asset store or similar places in this homework.
- Please follow standard input keys used by players for navigation and jumping in games. In other words, Jump is the space key. WASD keys or the arrows keys should be used for movement in the corresponding directions.
- Your player can only be a primitive for this assignment only: a cube, a capsule, a sphere etc... You can use either Rigidbody physics system (i.e. methods such as AddForce or AddTorque etc..) or the transform methods (transform.Translate() etc….) for movements and rotations.
- The player movements/rotations must be frame rate independent. Make sure you think clearly which update method to use.
- When you click the left mouse, you should be able to shoot small cubes from the player that are destroyed after 4 seconds. Hint: To make a bullet cube: make a small cube and add the adequate functionality scripts and components to it (such as rigidbody and collider) then prefab it to use it in your shooting mechanism. Make sure the cubes are destroyed after they're instantiated (4 seconds delay).
- If the cubes that are shot hit any primitive on the plane, that primitive should be destroyed after 6 seconds. **Hint:** Consider implementing a code for detecting collisions from bullets. Maybe you can utilize the concept of tags.
- Serialize any variable which you find necessary so that we can change their values in the Inspector. Examples: MovementSpeed, BulletSpeed, the bullet prefab etc…

Remember a homework assignment such as this aims also to teach you things that might not be covered yet in class.

Additional Help: Bullets should have speed. Now as a free hint: the rigidbody object has a velocity vector which you can change in code. The velocity vector of the rigidbody represents the rate of change of Rigidbody position. Please have a look and see how you can utilize this.

Bonus grades: (+10%): implement a follow camera, that follows the player where she goes.

Remember everything that you did not create yourself has to be cited adequately: code, algorithms, techniques etc…in a separate MS Document included in the zipped project folder.

Good Luck!