ASSIGMENT 2, AND EXERCISES 5, 6, AND 7

In assignment 2, students will use the Unity platform to develop a 3D game and all its components. It is the students' responsibility to choose and implement the game mechanics; however, they need to fulfill all requirements for this assignment (see below).

Assignment 2 will build on top of exercises 5, 6, and 7. Students' progress will be monitored in four laboratory classes (April 28th – May 19th). The goals for each of the exercises are described below. Students are encouraged to go beyond these goals and explore the capabilities of Unity.

Exercise 5: April 28th
Exercises 5 and 6: May 5th
Exercises 6 and 7: May 12th
Exercise 7: May 19th
Assignment 2: May 26th

ASSIGNMENT 2

The Assignment 2 is worth 45% of the final grade. Students **need to develop** the following game components and mechanics:

- A full **3D scene** including different spaces, configuration, textures and lights (2.5 pts);
- A **start screen** with a 'Start' button and an **end screen** with top scores and players (1 pts);
- A **Head-Up Display** with current score, lives, map, and inventory (1 pts);
- Game objects that illustrate different types of **collisions** (4.5 pts):
    - Character control: destroy/pick up objects, push objects (1 pts);
    - Change the environment of the scene based on trigger events (OnTriggerEnter/Stay/Exit). Examples include turn the lights on/off, change textures, and so forth (1 pts);
    - Have autonomous objects that move in a space defined by a collider (1.5 pts);
    - Have static "enemies" that shot projectiles towards the player (1 pts);
- **Game mechanics** need to fulfil the following requirements (2 pts):
    - Update score, inventory, and lives based on game elements, such as picking up objects, shooting targets, being shot, etc. (1 pts);
    - When the player loses or reaches the end of the game, it should display an end screen with the player's score (1 pts);
- Visual effects **using/programming shaders** - read Exercise 7 carefully (7 pts)
    - Bump Mapping; Environment Mapping, Lens flare (1,5 pts);
    - Particle systems to convey smoke, fog, fire, explosion, etc. (1.5 pts)
    - Global Illumination effects (2.5 pts)
    - High-Dynamic Range (HDR) bloom (1.5 pts).
- **Extra** functionalities, such as other global illumination visual effects, higher level of creativity and complexity on game mechanics, etc. (2 pts);

EXERCISE 5 – STARTING WITH UNITY AND GAME MECHANICS

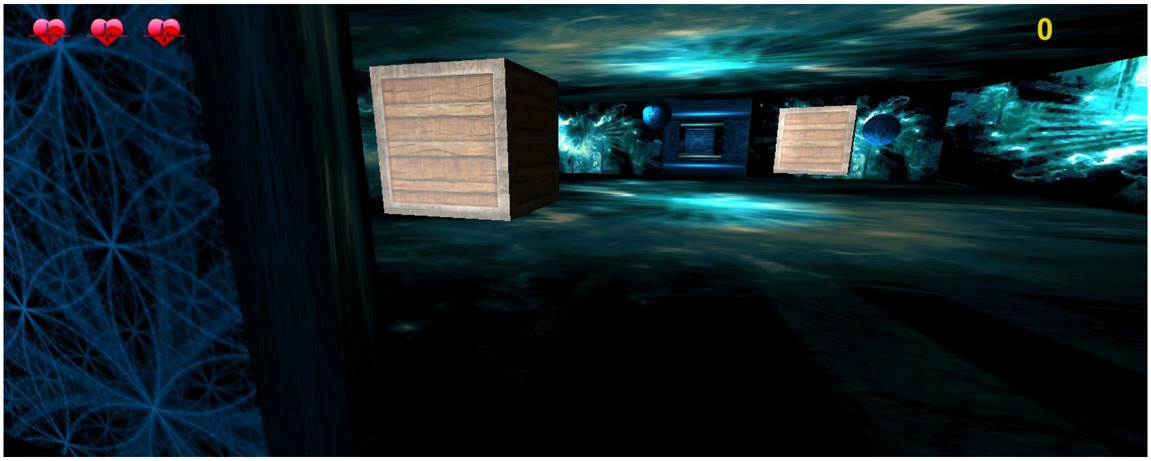
Students should **start practicing and exploring Unity 3D at home**. For those new to Unity, we highly recommend you to follow this tutorial: Tanks Tutorial. The topics covered in the tutorial will give you the foundations to work with the platform and develop your game; these include unity's interface, game objects and components, lights, materials, rigid bodies, scripting, input and character control, cameras, prefabs, colliders and triggers, UI, and building the game.

You should also use the following slides to help get you started: Unity 3D Introduction and Physics in Unity 3D available in the Course page.

In the lab you will focus on **deciding the mechanics** of your game (scoring, game elements, game play, and so forth). You should have an initial idea and discuss it with the teacher, making sure it will fulfill all the requirements for Assignment 2.

Until next lab you need to write a summary of your game mechanics (maximum 1 page) and send it by email to the teacher.

EXERCISE 6 – BUILDING THE SCENE



Exercise 6 has the following goals:

- Build your game's scene(s)/ world;
- Add obstacles (e.g. boxes, etc.);
- Finish the Head-Up Display (lives, score, map, etc.);
- Finish the start screen:
  - Create a new scene;
  - Use the method OnGui() and set a main camera;
  - Add background (GUI.DrawTexture()) and a start button (GUI.Button()). See the documentation for the Application.LoadLevel() method.
- Finish the end screen:

  - Same as the start screen, but use the GUI.Label() method to illustrates top players and scores.

EXERCISE 7 - USING/PROGRAMMING SHADERS IN UNITY 3D

Students are expected to use built-in shaders, or, if they wish, program new shaders to implement the various visual effects intended for their Unity 3D application:

- Bump Mapping; Environment Mapping, Lens flare
- Particle systems to convey smoke, fog, fire, explosion, etc.
- Global Illumination effects (eg. Ambient Occlusion, Lightmaps, Lighting -real-time, baked, - etc.). See https://docs.unity3d.com/Manual/GIIntro.html and https://learn.unity.com/tutorial/introduction-to-lighting-and-rendering
- High-Dynamic Range (HDR) bloom. For more details, see:
  - http://kalogirou.net/2006/05/20/how-to-do-good-bloom-for-hdr-rendering/
  - https://software.intel.com/en-us/articles/compute-shader-hdr-and-bloom
  - http://renderingwonders.wordpress.com/2011/01/25/chapter-09-%E2%80%93-advanced-buffers-beyond-the-basics-%E2%80%93-hdr-bloom-effect/

SUBMISSION

Immediately, after the Assignment 2 evaluation, each Group should submit in the **Fenix** system the Unity3D app, or if too large, provide a link to download it.

ATTENTION: A **report with 6 pages** at maximum and a **short Making-Off Video** should be delivered by email until one week later.

Late Penalty

You should submit your solution on time. Being late for one checkpoint could affect the time left for you to complete subsequent labs. All labs are due at the above specified due data, and there is a 20% penalty each day for up to 40%. After that, you get zero.

Grading Criteria

Grading of the labs will be based on the following:

- 85%: Correctness and adherence to assignment specification. Part of it will be checked on discussion and the demo provided by the Groups in the lab class regarding the checkpoint 2.
- 10%: Readability, structure of code, use of comments, adherence to lab procedures (submitting, naming conventions, etc.).
- 5%: Printed report and video.

Don't copy labs. Discussion of lab assignments is allowed and encouraged. However, you need to complete the lab all by yourself. Labs that are too similar will be properly handled by the teaching members of the discipline.