Assignment 5

CS 381: Game Engine Architecture
Spring 2022
Max Score: 100

Assignment

Reproducing Assignments 1 - 4 (85 points)

You will reproduce As4 in Unity. To do this, you will do (implement) all the tutorials listed below in order in Unity. The tutorials for doing this assignment are available on the ECSLLAB youtube channel, are on our Canvas course under `Pages->Unity Tutorials`, and are listed below.

1. How to make an ocean using the Standard Assets package from Unity. Please note that when making an ocean and importing standard assets, if you import all standard assets, you will have a gigabyte plus project. In addition, Unity has stopped updating standard assets so we will also provide these files in our course files.

   Instead, as shown in this mini tutorial, get the Standard Assets package from Canvas and just import enough to have an ocean.

2. Create a cube and use simple physics to make it move

3. Create multiple cubes, impement tab selection, create a selection decoration, and control multiple cubes with keyboard keys

4. Create multiple ships (two ships) and implement tab selection

5. Implement oriented 2D Physics for the two ships plus pointers on testing and debugging the code

6. Implementing keyboard control for ship selection and movement. Finishing this implementation in Unity and extending to 5 ships (see below) completes this assignment (As5).

Ship models for Unity are available on our canvas web page under `Files->UnityPackages`. I used `ShipModels.unitypackage` for my tutorials. As part of your assignment, you are to

import `CivilianShipsPackage.unity` and add three more ships from that package to your finished implementation of item 6 above. This completes the assignment. The grading rubric is the same as for As4

Camera control (14 points)

You will now control the camera with the WASD and QEZXRG and C keys.

W forward motion in the direction the camera is currently pointed.

S backward motion relative to the direction the camera is currently pointed.

A left motion relative to the direction the camera is currently pointed.

D right motion relative to the direction the camera is currently pointed.

R up motion relative to the direction the camera is currently pointed.

F down motion relative to the direction the camera is currently pointed.

Q and E Yaw the camera relative to the direction the camera is currently pointed

Z and X Pitch the camera relative to the direction the camera is currently pointed

C Toggle between real-time strategy and third person views

Quitting (1 point)

Hitting the escape key should shuts down your running application. This will only work on your build, not within UnityEditor. Unity Documentation: Application.Quit

Extra Credit

- Implement selection circles, squares, or triangles to indicate selected entities (easy)
- Add flying entities (a class that inherits from entities) and make the flying entity a subclass of the class of flying entities. Make the entity fly (medium).
- Add mouse selection (medium)
- Add shift-selection, where pressing the left-shift-key and tab key, adds the next entity to the list of selected entities. User control applies to all selected entities (hard)
- Add a specific selection sound for each different type of entity. For example, when an entity of type, say, destroyer gets selected, it says `Ready to destroy` while when the frigate gets selected it says `Let's go`. Nothing obscene please (medium).
- Add background music (medium).

- Add group mouse selection (hard)
- Add the ability for selected entities to intercept another entity. Use right-mouse click to indicate the target ship to be intercepted (insane)
- Add wakes to all entities (hard)

Turning in your assignment

Assume that this format will be used for the rest of your assignments this semester unless otherwise specified.

1. Make a movie of your working program. In the running movie, demonstrate
   (a) Tab selection
   (b) Camera movement (all the keys specified)
   (c) That your ships move in the direction they are pointed
   (d) That your ships turn smoothly when using keyboard controls
   (e) That you can toggle between third person and RTS views and can move the camera in both views using the same keys
   (f) That you have five ships and that all five ships can be controlled
   (g) That you can quit
2. Before 1pm, submit the assignment using canvas
   (a) Make a subdirectory in your workspace named `as5`.
   (b) Place all your project files in as5
   (c) Place your movie file in this folder or upload to youtube (if you have an account) or to box.unr.edu and place a document in your folder with the link
   (d) Tar and gzip or Zip the entire folder and submit using Canvas

Ask me (sushil@cse.unr.edu) if you have questions.

Objectives

- Demonstrate (again) that you can identify, formulate, analyze,and solve complex game engine architectural problems by applying principles of computing, engineering, science, and mathematics.
- Demonstrate (again) that you can apply computer science theory and software development fundamentals to design and integrate the components of a game engine and build a scene with interacting movable entities.

Assignment objectives

- Demonstrate that you can learn Unity quickly having studied the architecture common to all game engines and having implemented significant portions of a game engine using this architecture. Demonstrate that you know simple 2D oriented physics and can implement in a game engine.