Name: 吳岱容 Student ID: 310551067 Assignment: 01

Email: azusa871227@gmail.com

THIS MUST BE YOUR OWN WORK! YES √ (Please Tick Yes)

*****BONUS: The best report(s) has at most 13 bonus points.**

[10%] Introduction (At least 100 words**)**

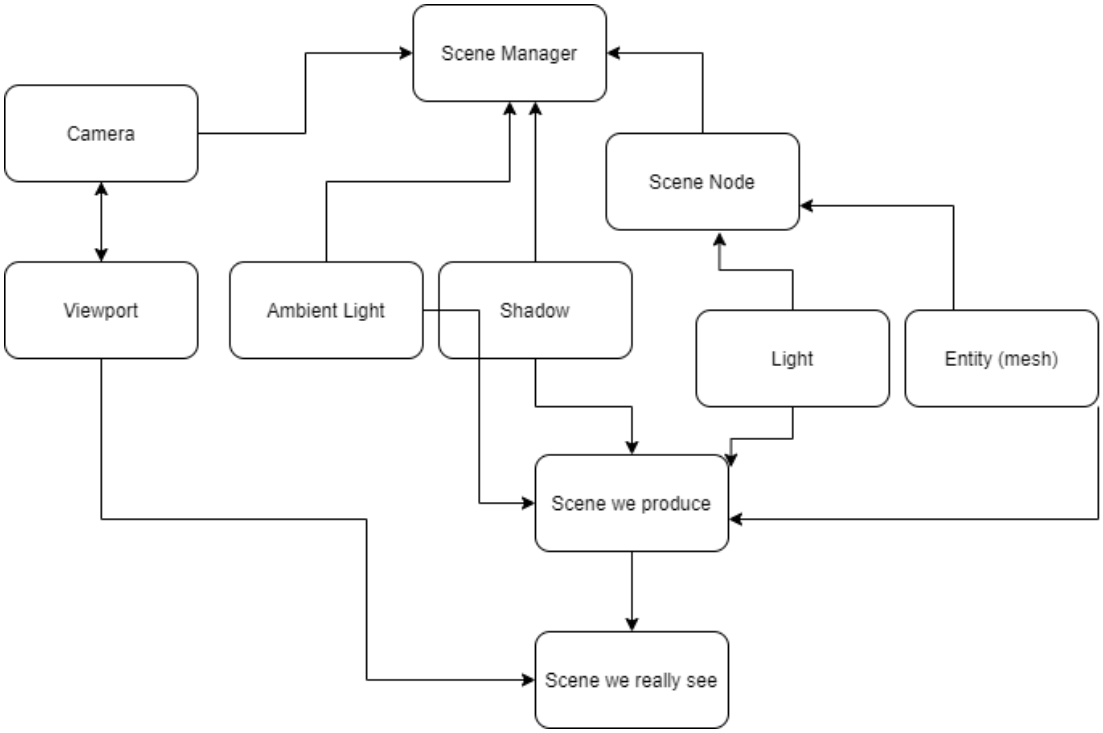
WORD COUNT: 118 words

This assignment is main for helping us understanding and being familiar with Orge 3D game engine. Most of the tasks in this assignment are about basic graphic showing function in Orge 3D.

In this assignment, we use scene manager to do many task and learned the structure between scene manager, camera, viewport, light, shadow, entity, ….and so on. Also, we learned how to use two different scene manager in order to manipulate two viewports and cameras, so that we can build two different scenes and show them in the same time in one window. Second, we also learn how to implement simple animation in framStarted function. Finally, we also learned how to use doxygen to document our code.

[10%] System architecture

-[5%] Draw a diagram of the system. At least FIVE components.



-[5%] Describe in words about the system. At least 50 words.

WORD COUNT: 64 words

We use scene manager to manage components of Orge 3D engine. Lights and Entities

are attached to the scene nodes, then it can be showed on the screen. Ambient light, shadow, lights and entities build the scene. Cameras decide how we will see the screen (direction, position, clip distance), and viewports output the camera image to become what we really see in the computer.

[30%] Methods (At least 300 words)
WORD COUNT: 464 words
For 1~3 in task one and 1~7 in task two, I just simply follow the instructions which I learn in class. Most of them are simply using the Orge 3D built-in functions, and some tasks in task two are almost the same in task one, so I think I don't have to explain them too much.
Start from 4 in task one, I implemented these tasks in function createScene_00. First, I created a plane mesh following the instructions, and made the plane an entity, then created two penguins on the plane, and made sure their scales, positions, directions are correct.
5 in task one, I used two for loops, one for creating the circle of cubes, and the other is for the cubes in front of two penguins.
6~7 in task one, I created two lights under createScene_00, attaching them two the child scene node of scene manager 0, and also enabled shadow of all entities.
8 in task one, I think it was done for us. If you want to show the cursor, you have to call showCursor function in createFrameListener (in BaseApplication.cpp).
9 in task one, I used ctrl + F to find the bar message, and found it was in BaseApplication.cpp (in function configure). I just modified the string message.
8 in task 2, I use VS code to edit the scripts, setting color to green.
9 in task two, I called setOverlaysEnabled, and set the value to false.
1 in task 3, I adjusted the key pressed events by filling in the space and setting the camera to the right position and direction.
2 and 3 in task 3, these two tasks are almost the same, but different in z order and the size and position setting. First I removed the viewports from cameras, and then created new ones in order to fit the correct setting, and attached viewports to the cameras.
4 in task 3, I created some global values. A bool value is set to test if it has to play the animation or not. If key P is pressed, it will turn to true value, and in frameStarted function we will test the flag to decide whether we play the animation. Some global variables are set to save the maximum speed, moving position, angular speed, and angular acceleration. I update these information using timeSinceLastFrame, calculating the right position each frame. I also set a condition to test the small penguins finishing a circle or not. The condition was set as a 1 degree region. If the

small penguin touched the region, it will turn another flag, and stop to run opposite direction (I multiply angular acceleration with -1.). Once the penguin leave the region, the flag will be back again, this flag is somehow like collision flag.

[40%] Discussion (At least 400 words)

WORD COUNT: 472 words

1. I see two penguins, cubes, a plane in the main viewport, and a cube and its shadow in the sub viewport. The shadows on the plane in main viewport seem to have two colors maybe because I use two different colors of lights in this scene. In secondary viewport, I see a cube and its shadow on the plane, most of the scene is blue, but the cube and its shadow it is black.

2. Before I modified the material script, I did see the light surface is blue, and it is the same to the light setting. I know the script is aim to change the cube to green color, but the result was a little different to what I imagined. I predicted that the light surface might become the color between green and blue because of the blue light and green material. Because of the strange result, I tried different light color to find out the reason. I guess that the engine is trying to modeling the light setting close to the real world. In real world, we see the color because of the light reflection. In this condition, the cube is green, which means it absorbs red light and blue light (That is why under these lights the cube become black.) but reflect green light (The cube is green under white light and green light.).

3. If we change the position to (0,350,0), we cannot see the cube, and the camera seems to point to a strange direction, although we meant it to look down along the y axis. However, if we slightly increase the z value, we will get the proper view. I am not very sure about why this happened. I guess we cannot set the camera position on axis.

4. I have tried some different parameters to test the tasks above. I changed the colors of two lights in the main scene. In the beginning I set all the lights' colors white, and saw black shadows, and then I change one light's color to green, and then I saw some shadows on the plane are black, and some are green. I think it is due to the green light setting. In the secondary scene, I didn't get the shadow at first. There was only a cube in the beginning, so I guessed it was because of the position and direction's relationship between the light and cube, and therefore, I rotated the cube, and successfully saw the shadow. To find out the answer of question 2, I have tried different colors of lights to test how the cube would look like. In white light, the light side looked green. In red light and blue light, it all looked black. Therefore, I guessed it was same as the real world condition (I have already mentioned in 3).

[10%] Conclusion (At least 100 words)

WORD COUNT: 172 words

In this assignment, I think I have learnt some basic Orge 3D, and understood the component structure. At least, I think I have the ability to build a scene.
During doing this assignment, I did encounter some problems. One of them is I am still not very sure about why camera position cannot be set (0,350,0). Another one is when I making the animation. The assignment hint tells us to use lookAt in order to make the penguins to look at each other, but after I used it, the penguins seemed to look at each other with their back. Therefore, I need to rotate it to make them face to face. Also, in the beginning, I had trouble detecting if the penguin finish a circle or not. The position may not be detected because the game updating is related frame rate and it is not static, so I came up with a thought. Rather than detecting the precise point, I set the condition to detect if the penguin enter a small region.