**Group 12**

CP Code:

import glfw

from OpenGL.GL import \*

from PIL import Image

import numpy as np

import math

import imgui

from imgui.integrations.glfw import GlfwRenderer

def load\_texture(path):

    img = Image.open(path)

    img = img.transpose(Image.FLIP\_TOP\_BOTTOM)  # Flip the image vertically

    img\_data = np.array(list(img.getdata()), np.uint8)

    texture = glGenTextures(1)

    glBindTexture(GL\_TEXTURE\_2D, texture)

    glTexParameteri(GL\_TEXTURE\_2D, GL\_TEXTURE\_MIN\_FILTER, GL\_LINEAR)

    glTexParameteri(GL\_TEXTURE\_2D, GL\_TEXTURE\_MAG\_FILTER, GL\_LINEAR)

    glTexImage2D(GL\_TEXTURE\_2D, 0, GL\_RGBA, img.width, img.height, 0, GL\_RGBA, GL\_UNSIGNED\_BYTE, img\_data)

    return texture

def main():

    if not glfw.init():

        return

    window = glfw.create\_window(1000, 800, "Layered Animation", None, None)

    if not window:

        glfw.terminate()

        return

    glfw.make\_context\_current(window)

    imgui.create\_context()  # Initialize ImGui context

    renderer = GlfwRenderer(window)

    # Load background texture

    background\_texture = load\_texture("background2.png")

    # Load cloud texture

    cloud\_texture = load\_texture("cloud2.png")

    # Load boat texture

    boat\_texture = load\_texture("boat2.png")

    # Load tree texture

    tree\_texture = load\_texture("tree2.png")

    # Load water texture

    water\_texture = load\_texture("water2.png")

    glEnable(GL\_BLEND)

    glBlendFunc(GL\_SRC\_ALPHA, GL\_ONE\_MINUS\_SRC\_ALPHA)

    cloud\_position = 0.0

    cloud\_speed = 0.00005

    boat\_position\_y = 0.0

    boat\_amplitude = 0.008  # Adjust amplitude of boat wobble

    boat\_speed = 1  # Adjust speed of boat wobble

    tree\_position\_x = 0.0

    tree\_amplitude = 0.008  # Adjust amplitude of tree movement

    tree\_speed = 1.0  # Adjust speed of tree movement

    water\_position\_x = 0.0

    water\_amplitude = 0.008  # Adjust amplitude of water movement

    water\_speed = 1.0  # Adjust speed of water movement

    while not glfw.window\_should\_close(window):

        glfw.poll\_events()

        renderer.process\_inputs()

        # Rendering

        glClear(GL\_COLOR\_BUFFER\_BIT)

        glLoadIdentity()

        imgui.new\_frame()

        imgui.begin("Speed Controls")

        # Cloud Speed Control

        \_, cloud\_speed = imgui.slider\_float("Cloud Speed", cloud\_speed, 0.0, 0.0001)

        # Boat Speed Control

        \_, boat\_speed = imgui.slider\_float("Boat Speed", boat\_speed, 0.0, 2.0)

        # Tree Speed Control

        \_, tree\_speed = imgui.slider\_float("Tree Speed", tree\_speed, 0.0, 2.0)

        # Water Speed Control

        \_, water\_speed = imgui.slider\_float("Water Speed", water\_speed, 0.0, 2.0)

        imgui.end()

        # Draw background (water)

        glEnable(GL\_TEXTURE\_2D)

        glBindTexture(GL\_TEXTURE\_2D, background\_texture)

        glBegin(GL\_QUADS)

        glTexCoord2f(0.0, 1.0); glVertex2f(-1.0, 1.0)

        glTexCoord2f(1.0, 1.0); glVertex2f(1.0, 1.0)

        glTexCoord2f(1.0, 0.0); glVertex2f(1.0, -1.0)

        glTexCoord2f(0.0, 0.0); glVertex2f(-1.0, -1.0)

        glEnd()

        glBindTexture(GL\_TEXTURE\_2D, 0)

        # Draw cloud

        glBindTexture(GL\_TEXTURE\_2D, cloud\_texture)

        cloud\_position = (cloud\_position + cloud\_speed) % 1.0

        glBegin(GL\_QUADS)

        glTexCoord2f(0.0, 1.0); glVertex2f(cloud\_position - 1, 0.7)  # Adjust height here

        glTexCoord2f(1.0, 1.0); glVertex2f(cloud\_position, 0.7)     # Adjust height here

        glTexCoord2f(1.0, 0.0); glVertex2f(cloud\_position, 0.2)     # Adjust height here

        glTexCoord2f(0.0, 0.0); glVertex2f(cloud\_position - 1, 0.2)  # Adjust height here

        glEnd()

        glBindTexture(GL\_TEXTURE\_2D, 0)

        # Draw tree

        glBindTexture(GL\_TEXTURE\_2D, tree\_texture)

        tree\_position\_x = math.sin(glfw.get\_time() \* tree\_speed) \* tree\_amplitude

        tree\_size\_x = 1  # Adjust tree width

        tree\_size\_y = 1  # Adjust tree height

        glBegin(GL\_QUADS)

        glTexCoord2f(0.0, 1.0); glVertex2f(-tree\_size\_x + tree\_position\_x, tree\_size\_y)  # Adjust tree size and position here

        glTexCoord2f(1.0, 1.0); glVertex2f(tree\_size\_x + tree\_position\_x, tree\_size\_y)   # Adjust tree size and position here

        glTexCoord2f(1.0, 0.0); glVertex2f(tree\_size\_x + tree\_position\_x, -tree\_size\_y)  # Adjust tree size and position here

        glTexCoord2f(0.0, 0.0); glVertex2f(-tree\_size\_x + tree\_position\_x, -tree\_size\_y) # Adjust tree size and position here

        glEnd()

        glBindTexture(GL\_TEXTURE\_2D, 0)

        # Draw water

        glBindTexture(GL\_TEXTURE\_2D, water\_texture)

        water\_position\_x = math.sin(glfw.get\_time() \* water\_speed) \* water\_amplitude

        water\_size\_x = 1  # Adjust water width

        water\_size\_y = 1  # Adjust water height

        glBegin(GL\_QUADS)

        glTexCoord2f(0.0, 1.0); glVertex2f(-water\_size\_x + water\_position\_x, 1)  # Adjust water size and position here

        glTexCoord2f(1.0, 1.0); glVertex2f(water\_size\_x + water\_position\_x, 1)   # Adjust water size and position here

        glTexCoord2f(1.0, 0.0); glVertex2f(water\_size\_x + water\_position\_x, -1.0)  # Adjust water size and position here

        glTexCoord2f(0.0, 0.0); glVertex2f(-water\_size\_x + water\_position\_x, -1.0) # Adjust water size and position here

        glEnd()

        glBindTexture(GL\_TEXTURE\_2D, 0)

        # Draw boat

        glBindTexture(GL\_TEXTURE\_2D, boat\_texture)

        boat\_position\_y = math.sin(glfw.get\_time() \* boat\_speed) \* boat\_amplitude

        boat\_size\_x = 1  # Adjust boat width

        boat\_size\_y = 1  # Adjust boat height

        glBegin(GL\_QUADS)

        glTexCoord2f(0.0, 1.0); glVertex2f(-boat\_size\_x, boat\_size\_y + boat\_position\_y)  # Adjust boat size and position here

        glTexCoord2f(1.0, 1.0); glVertex2f(boat\_size\_x, boat\_size\_y + boat\_position\_y)   # Adjust boat size and position here

        glTexCoord2f(1.0, 0.0); glVertex2f(boat\_size\_x, -boat\_size\_y + boat\_position\_y)  # Adjust boat size and position here

        glTexCoord2f(0.0, 0.0); glVertex2f(-boat\_size\_x, -boat\_size\_y + boat\_position\_y) # Adjust boat size and position here

        glEnd()

        glBindTexture(GL\_TEXTURE\_2D, 0)

        glDisable(GL\_TEXTURE\_2D)

        imgui.render()

        renderer.render(imgui.get\_draw\_data())

        glfw.swap\_buffers(window)

    glfw.terminate()

if \_\_name\_\_ == "\_\_main\_\_":

    main()

Output:

