Изображение выглядит как снимок экрана, Красочность, графический дизайн, Графика

Контент, сгенерированный ИИ, может содержать ошибки.

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| ***LEVEL 2 SUBMISSION – REPORT*** |

**OVERALL**

The outdoor 3D scene is an extension of the Level 1 submission with several enhancements.

The first change is the terrain modification, creating a proper foundation for the river. The water system has been implemented with waves, a riverbed, and realistic shores to enhance the natural appearance of the environment.

For reflections, the stencil test technique and double rendering have been used to create a relatively realistic effect. Multiple transparency layers are applied to improve reflection quality and provide better control over its appearance. The dimming effect is used to make the water appear less transparent, transparency is adjusted by passing variables into the shader program and apply opacity for two layers dimmer and riverbed. However, since the reflection is purely a secondary render it remains unaffected by waves, which is a notable drawback

Another addition is the character and movement system. A Mixamo-rigged character with a rigid body is integrated into the scene. The character has two animations—idle and run—which smoothly blend based on speed. Additionally, a gradual slow-down effect has been implemented for a more natural stopping motion.

Post-processing effects have been introduced to enhance the world's colors. However, enabling post-processing causes an issue where the second sky sphere disappears for an unknown reason.

* **Water System:** Includes waves, a detailed riverbed, and realistic shores to create a natural-looking river environment.
* **Planar Reflection:** Achieved using the stencil test technique and double rendering, with multi-layered transparency control.
* **Character & Movement:** Mixamo-rigged character with rigid body, idle/run animation blending, and smooth deceleration.
* **Post-Processing Effects:** Enhances colors but causes an issue with the second sky sphere.

**TECHNICAL**

**Code divided into several files**

* **globalVar.cpp –** hold all variables
* **init()** – initialize all of the variables and techniques needed.
* **keyboardAndMouseActions –** all keyboards handler + **OnReshape()** function
* **LightAndSkyBox –** Directional light and sky box rendering and calculation. + **setMatrix()** function
* **Main.cpp –** rendering**,** Stencil test, post processing and player render and move functions.

**Multiple shader –** shaders are structured based on their purpose. Aside from the base shader, which handles lighting, terrain, and rigid bodies. 😊

1. **basic** – responsible for light, terrain, rigged body, Stencil test
2. **water** – for water and waves creation and update.
3. **effect** – post processing only

**INTERACTION WITH THE WORLD: (COPY PASTE from assignment 1, but good for testing)**

* N – increase time
* M – Reset world back to speed 1
* 1 & 2 – Are responsible for manual lamp controls, 1 works for all lamps from the left and 2 for all from the right side of the road, each switch has 3 stages {AUTO, ALLWAYS ON, ALLWAYS OFF}.
* 9 ENABLE POST PROCESSING

**IMPORTANT INFO:**

**As I mentioned before -** OnReshape() and setMatrix() are definitely not in the correct file, but as it’s from level 1 submission pretty sure it doesn’t matter

**Animation loading bug** – no idea why but when I try to load animation only second one is loaded

* player.loadAnimations(&idle);
* player.loadAnimations(&run);

will load only idle – which make sense.

Not sure I did something wrong, but anyway I fix it by this simple but stupid approach

* player.loadAnimations(&idle);
* player.getAnimData(0, time, transformsidle);
* player.loadAnimations(&run);
* player.getAnimData(0, time, transformRun);

**If statement to do a shore –** another great peace of code, as I was too lazy (no time) instead of moving terrain into separate shader to apply shore properly only on terrain, I literally created a bool variable and turn it on only for terrain to render and then switch it off. Master peace I would say!!

**Post processing** – I thought it will be my 3rd technique (after deleting all my work on shadow maps of course), but it turns out that when I turn it on my second sky box disappears, I have slight idea why (but no time) so I introduced rigged character movement instead. **But it is still there, you must press 9 to toggle Boolean for rendering it.**

**Player movement** – at the moment, to calculate should player go up or down camera position is used instead of player position, its one think to fix in future... Also, when the camera rotated up and down the player model appears very thin

**Riverbed and dimmer –** it’s might be confusing as I used the same model (terrain which is basically black image of size of the map) to render water dimmer and riverbed in PlanareReflectioOringBaseRender() and it’s called waterUnderlayers – not the best idea probably, but I didn’t want to create separate object for that.

**Reflection –** I probably needed to rotate the skybox on the x axis to get the mirror image right, but I'm not sure.