3D Computer Graphics and Animation
Group 7

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Game: FROZEN FLAME

Introduction

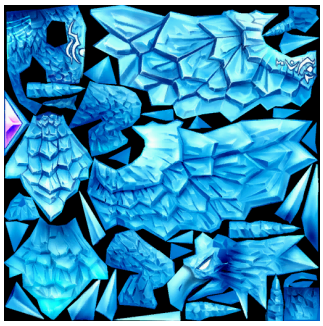
In this small report we will present the components of our game "Frozen Flame" (the code for this game can be found in `https://github.com/galib360/3DCGA_Project`).

Models

In our game we use four different models (see figures 1a, 2a, 3a and 4a). These models were found online and processed using "Blender", specifically we used UV mapping to apply the texture properly(see figures 1b,2b,3b and). For each model we created multiple animations. This was achieved by exporting several poses for each model from blender and interpolating between them in OpenGL.

Anivia

(a) Model of Anivia



(b) UV mapped texture

Figure 1: Model for Anivia and the texture applied on it

Minion

(a) Model of minion

(b) UV mapped texture

Figure 2: Model for the minion and the texture applied on it

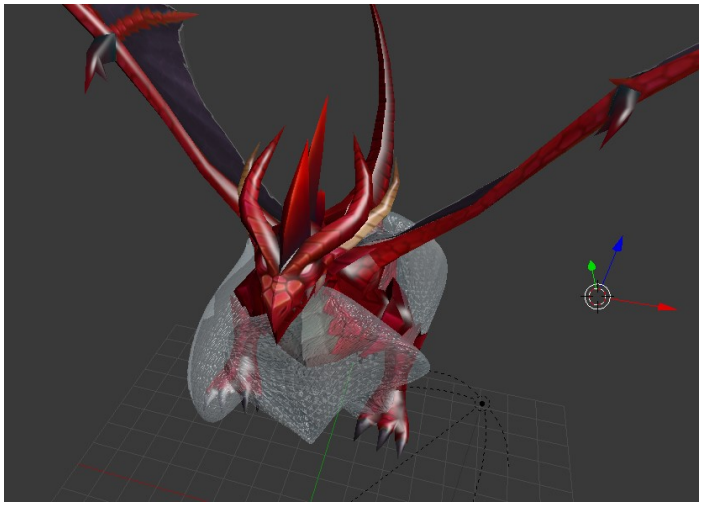
Boss

(a) Model of the boss

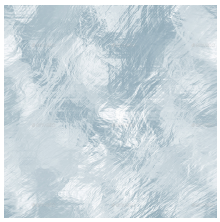
(b) UV mapped texture

Figure 3: Model for the boss and the texture applied on it

Boss hit by icicles



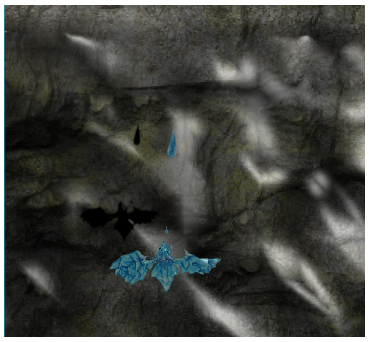
(a) Model of the boss when he is hit



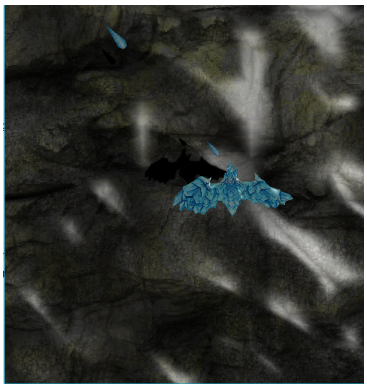
(b) UV mapped texture

Figure 4: Model for the boss and the texture applied on it

Weapon Creation and Rotation



(a) Anivia's weapon is an icicle



(b) New icicle being formed when the first one has been shot

Figure 5: Figures a and b show the icicle following the mouse cursor

Boss's attack

(a) The boss attacks by throwing flames

(b) The boss attacks at timed intervals

Figure 6: The boss's attack is a textured quad

3D Height Field

The terrain is a grid of textured quads and the illusion of infinite terrain is achieved by appending the first row of the grid at specific time intervals which ensures optimized performance.

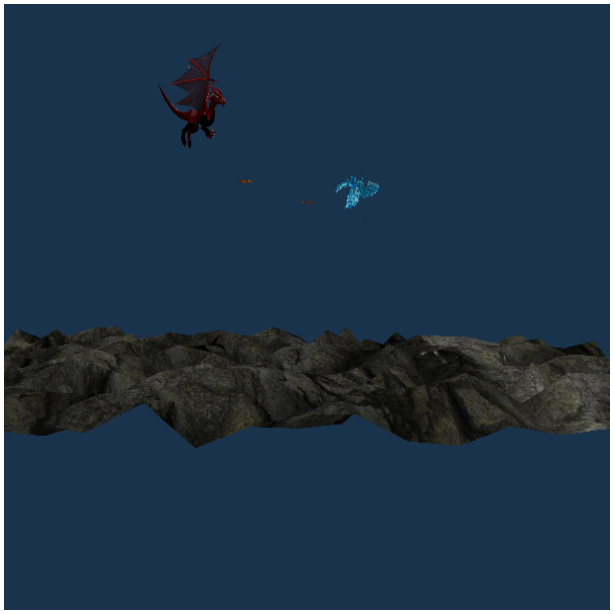
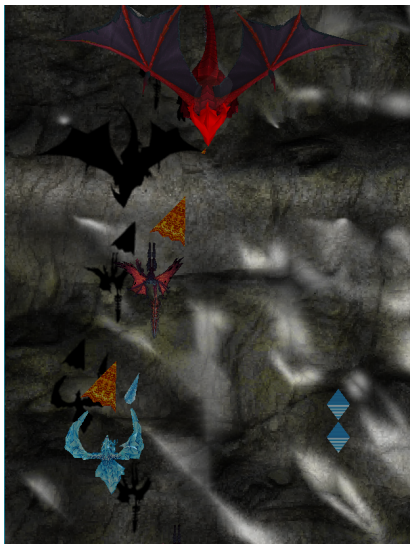


Figure 7: Our game is placed in a 3d height field

Shadow Mapping

(a) Figure showing the shadow of anivia, the boss and the icicle's



(b) Figure showing the shadow of minions and the boss's flame

Figure 8: Figures depicting the shadow mapping in our game

Shadow Pre-Computation

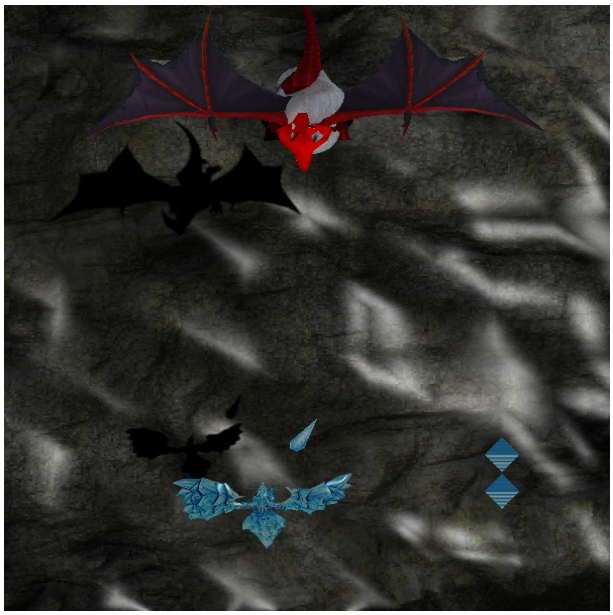


Figure 9: Shadows of the terrain are precomputed and used during the game

Phong Model

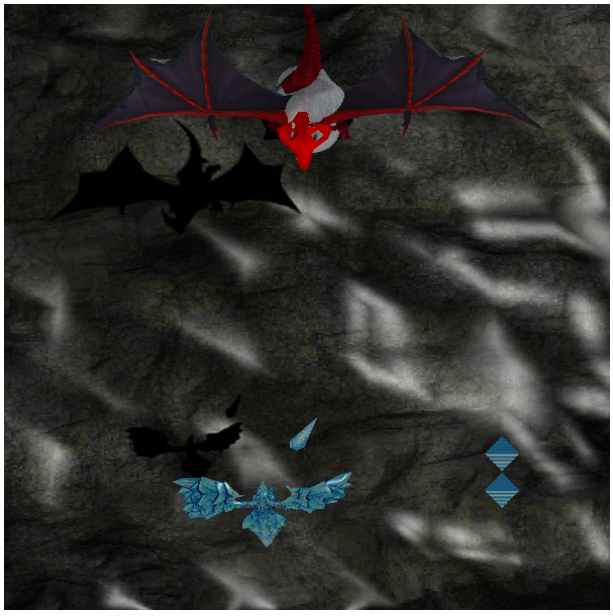
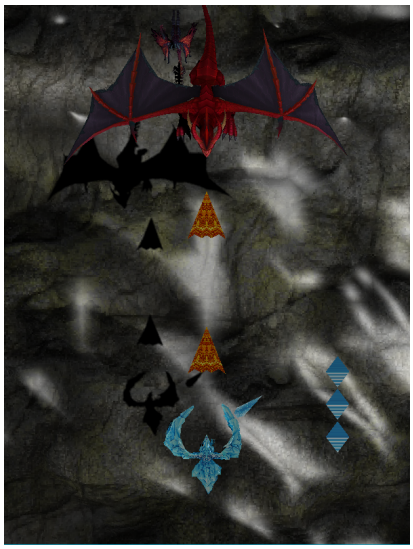


Figure 10: The phong model is used for shading and we can see some specularity on the peeks of our terrain

Several animated components

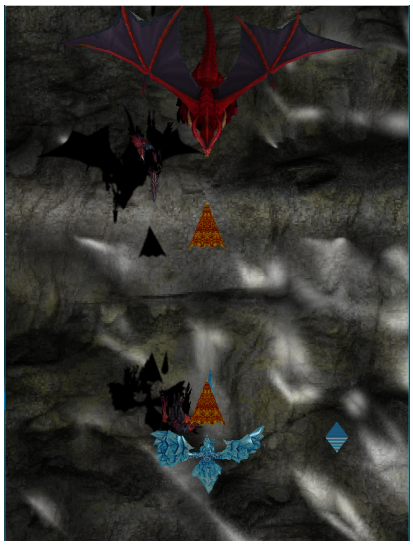
(a) Anivia's wings are stretched



(b) Anivia's wings close around her

Figure 11: Figures a and b show the movement of anivia's wings at different moments

(a) The boss's wings are stretched

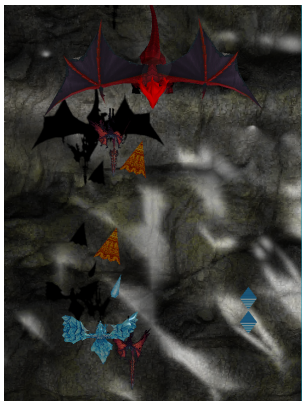


(b) The boss's stretch back when he attacks

Figure 12: Figures a and b show the movement of the boss's wings at different moments

Voxel grid simplification

(a) The boss before he is hit



(b) Boss is hit once with an icicle and the head is simplified

(c) The boss is hit twice by icicles and the head is simplified further. The boss starts becoming encased in ice

Figure 13: Figures a, b and c show the simplification procedure step by step

Optimization

We managed to implement fixed frames per second and specifically we have 60 fps. Some of our animations are triggered per frame whereas others are triggered by time.