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DESIGN OF COMPUTER 3D GAME WITH POSSIBILITY OF CONSTRUCTION BY BLOCKS

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In this article, we will look at the process of designing a computer 3D game in the sandbox genre with the possibility of construction by blocks. The aim of the game is to develop spatial thinking and creative skills among the players.

Now there are many educational games in the sandbox genre with construction elements. However, in such games there is a large number of game mechanics which distract from the construction process (quests, survival mechanics, etc.), or provide a small set of tools for construction without the possibility of creating their own tools. There was a need for a computer game, aimed only at construction and having a large set of tools for construction.

To solve the problem you must define the required set of features for the game by domain analysis and research of similar projects. The feature set is as follows:

– auto generation of the surrounding world;

– infinite world;

– smoothed landscape and objects of the surrounding world;

– realistic lighting;

– manual adjustment of world generation parameters: selection and changing of seasons, time of day, various biomes, selection of elevation (from plain to mountains);

– a set of various pre-installed construction blocks, including plants, light sources, special items, etc.;

– ability to add your own blocks;

– ability to add and delete objects on the landscape;

– ability to add and remove landscape blocks (terrain).

After the domain analysis, it is necessary to determine the requirements for the game as a product:

– fast landscape generation;

– saving and loading the previously generated world and all objects on it;

– seamless world;

– user-friendly interface;

– low requirements for computer resources;

– cross-platform (Windows, MacOS, Linux).

Based on the requirements and feature set for the game, it is necessary to determine the set of tools for the project implementation. The selection is made of three sets of: Unity + CSharp, C++ and OpenGL, Java + OpenGL. All three sets allow you to complete the task, but C ++ and OpenGL have more advantages, including:

– the highest performance among than the rest;

– OpenGL has a large set of methods for implementing a 3D game with landscape generation;

– cross-platform.

Next, you need to develop an interface and control in the game. Control will be carried out using a keyboard and a mouse. The interface will be the following:

– window with the Game Menu with settings and game mode selection;

– window of the game;

– first-person view;

– window with editing available objects (add, delete);

– window with a selection of construction blocks.

To implement the generation of the landscape, we chose the formal language of generator description of the three-dimensional landscape based on the compositions of harmonic functions [1]. This method of generating a landscape based on compositions of harmonic functions and the formal language descriptions of the landscape generator have expressiveness and allow creating optimized performance generators of unlimited reproducible terrain.

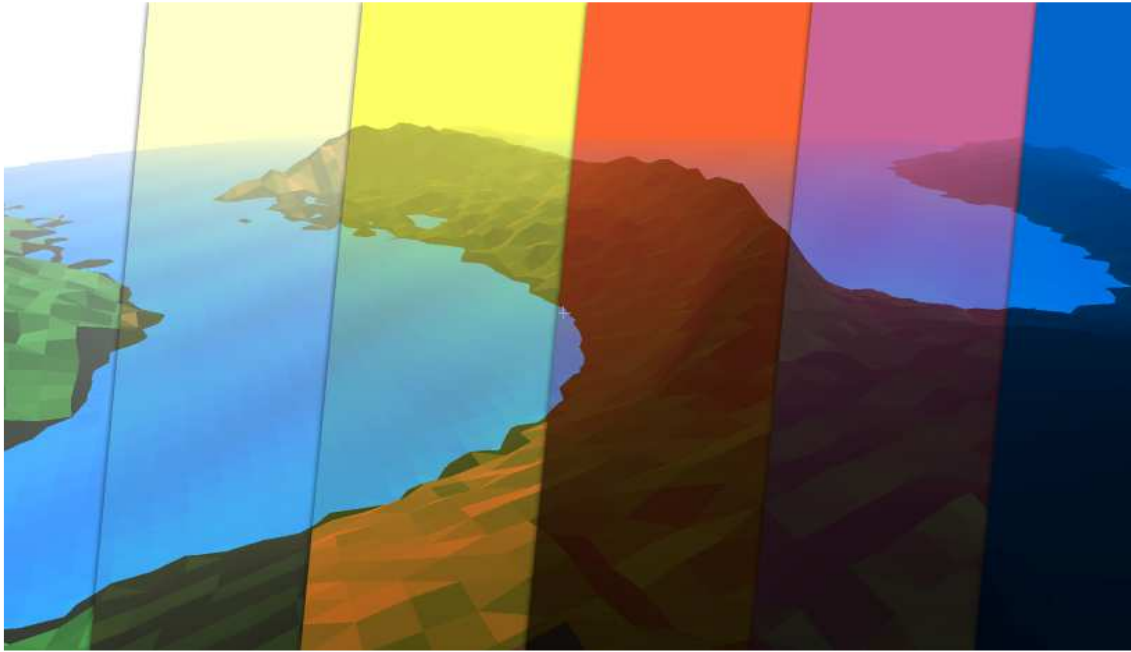Figure 1 shows changing the time of day in the game.

Figure 1. – Change of time of day in the game

Figure 2 shows the generated cave.

Figure 2. – Generated cave

This computer 3D game will allow players to develop their creative abilities by providing a wide range of construction tools and excellent graphics.

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