Date: 23rd August 2022
Word count: 2,999

Project supervisor:
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Moving Train Scenery

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Contents

1 Abstract

The project was conducted in IDE(Integrated Development Environment) "CodeBlocks" using C++ language with OpenGL.As OpenGL is used for Graphics rendering. OpenGL helps to create images,high-quality color images composed of geometric and image primitive very easily.OpenGL has built-in functions that help to make the work much more easier.GL(Graphics Library)for 2D and 3D drawing primitives and opertaions.GLU (GL Utilities): Miscellaneous functions dealing with camera set-up and higher-level shape descriptions.GLUT (GL Utility Toolkit): Window-system independent toolkit with numerous utility functions, mostly dealing with user interface.OpenGL has callback function which is function passed into another function as an argument, which is then invoked inside the outer function to complete some kind of routine or action. OpenGL primary function is rendering.It can render geometric primitives,bitmap and images.In our project we tried to show what can be achieved using OpenGL by the use simple 2D images and geometric primitives to create images and animations that can be made by OpenGL.

2 Introduction

In our project we tried to show a scenery of a moving train and with it's other views around it using OpenGL using 2D features that are provided by OpenGL.We added a train moving a house and some trees behind the train.Birds flying through the clouds above the house in a sunny day with blue sky,additional a flying plane moving through the clouds.At night time the scenery becomes different shiny small stars appears.No birds are seen in the night.The sky from blue to dark navy blue for night effect.The sun turns into moon during the night.The windows and door of the house turns into light effect.The green grass becomes dark. These all were done using OpenGL and the tools it provides functions for geometry shapes and color that helped to build our scenery.

3 Methodology

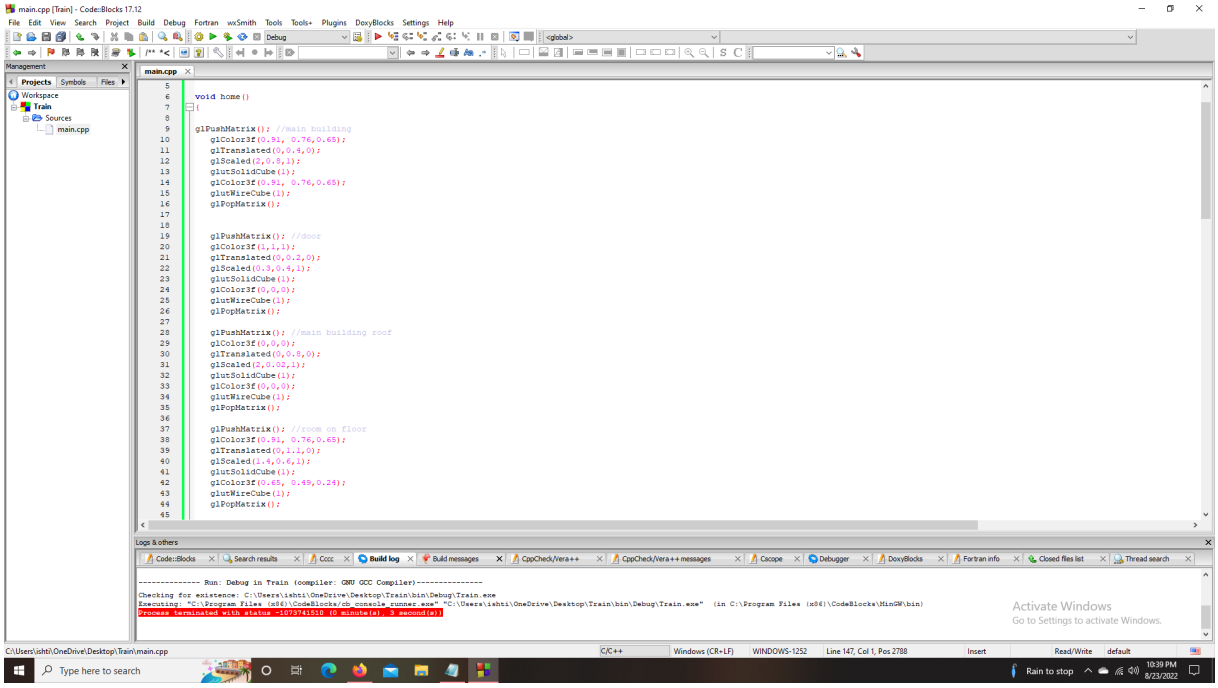
OpenGL provides many functions a brief description will be given on how and what functions were used to built the project with the help of OpenGL.

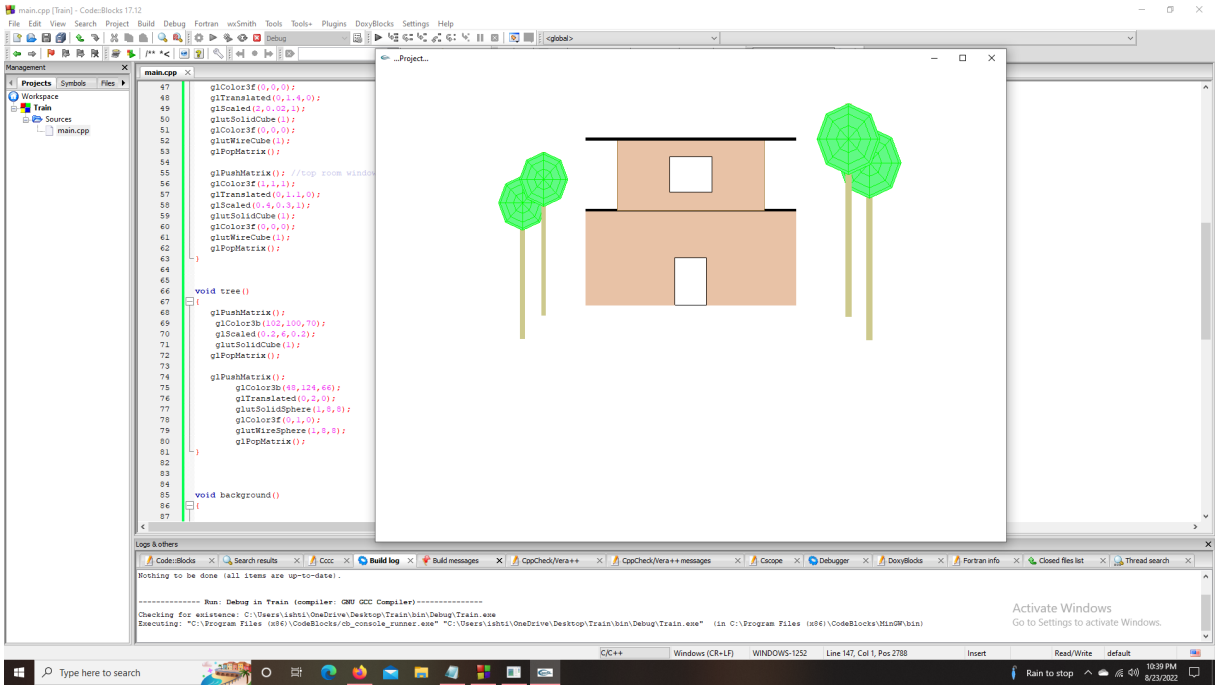
For each objects different geometric and bitmap functions were used. Some of the common functions that were used are creating each objects are:

- glColor() = This function is used for generating RGB colors.
- glVertex2d() = The glVertex function commands are used within glBegin/glEnd pairs to specify point, line, and polygon vertices.
- glTranslate() = The glTranslatef function produces the translation specified by (x, y, z). The translation vector is used to compute a 4x4 translation matrix.
- glScaled() = glScale produces a nonuniform scaling along the x, y, and z axes. The three parameters indicate the desired scale factor along each of the three axes.
- GL Lighting = It is diffuse lighting that best defines the shape of 3D objects. SPECULAR - as with diffuse lighting, the light comes from a point souce, but with specular lighting, it is reflected more in the manner of a mirror where most of the light bounces off in a particular direction defined by the surface shape.
- glutKeyboardFunc() = glutSpecialFunc sets the special keyboard callback for the current window. The special keyboard callback is triggered when keyboard function or directional keys are pressed.

For example for creating house and trees some these functions were use to create it:

glColor function was used for coloring the house and trees.glScaled was use for the object of house and trees for non-uniform scaling.glutSolidCube,glutWireCube etc was used for object specific geometric shape for the object to be created.By these methods we were able to build each objects for our Project.


main.cpp [Train] - Code::Blocks 17.12
void home()
{
glPushMatrix(); //main building
glColor3f(0.91, 0.76,0.65);
glTranslated(0,0.4,0);
glScaled(2,0.8,1);
glutSolidCube(1);
glColor3f(0.91, 0.76,0.65);
glutWireCube(1);
glPopMatrix();
glPushMatrix(); //door
glColor3f(1,1,1);
glTranslated(0,0.2,0);
glScaled(0.3,0.4,1);
glutSolidCube(1);
glColor3f(0,0,0);
glutWireCube(1);
glPopMatrix();
glPushMatrix(); //main building roof
glColor3f(0,0,0);
glTranslated(0,0.8,0);
glScaled(2,0.02,1);
glutSolidCube(1);
glColor3f(0,0,0);
glutWireCube(1);
glPopMatrix();
glPushMatrix(); //room on floor
glColor3f(0.91, 0.76,0.65);
glTranslated(0,1.1,0);
glScaled(1.4,0.6,1);
glutSolidCube(1);
glColor3f(0.65, 0.49,0.24);
glutWireCube(1);
glPopMatrix();
Logs & others
Build log
---------- Run: Debug in Train (compiler: GNU GCC Compiler)----------
Checking for existence: C:\Users\ishti\OneDrive\Desktop\Train\bin\Debug\Train.exe
Executing: "C:\Program Files (x86)\CodeBlocks/cb_console_runner.exe" "C:\Users\ishti\OneDrive\Desktop\Train\bin\Debug\Train.exe" (in C:\Program Files (x86)\CodeBlocks\MinGW\bin)
Process terminated with status -1073741510 (0 minute(s), 3 second(s))
Activate Windows
Go to Settings to activate Windows.
C:\Users\ishti\OneDrive\Desktop\Train\main.cpp
Type here to search
Rain to stop
10:39 PM
8/23/2022


main.cpp [Train] - Code::Blocks 17.12
...Project...
glColor3f(0,0,0);
glTranslated(0,1.4,0);
glScaled(2,0.02,1);
glutSolidCube(1);
glColor3f(0,0,0);
glutWireCube(1);
glPopMatrix();
void tree()
{
glPushMatrix();
glColor3b(102,100,70);
glScaled(0.2,6,0.2);
glutSolidCube(1);
glPopMatrix();
glPushMatrix();
glColor3b(48,124,66);
glTranslated(0,2,0);
glutSolidSphere(1,8,8);
glColor3f(0,1,0);
glutWireSphere(1,8,8);
glPopMatrix();
}
void background()
{
Logs & others
Build log
Nothing to be done (all items are up-to-date).
---------- Run: Debug in Train (compiler: GNU GCC Compiler)----------
Checking for existence: C:\Users\ishti\OneDrive\Desktop\Train\bin\Debug\Train.exe
Executing: "C:\Program Files (x86)\CodeBlocks/cb_console_runner.exe" "C:\Users\ishti\OneDrive\Desktop\Train\bin\Debug\Train.exe" (in C:\Program Files (x86)\CodeBlocks\MinGW\bin)
Activate Windows
Go to Settings to activate Windows.
Type here to search
Rain to stop
10:39 PM
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4 Conclusion

Thus with the help of OpenGL libraries we were able to create our project and bring some our objects to live by using C++ conditions bool variable and algorithms.Each of our Group members were given objectives to create each indivitual objects that were instructed by them and at the end all the codes were merged to create the scenery