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Class:SE1

Batch:SE1

Assignment No.:13

Code:

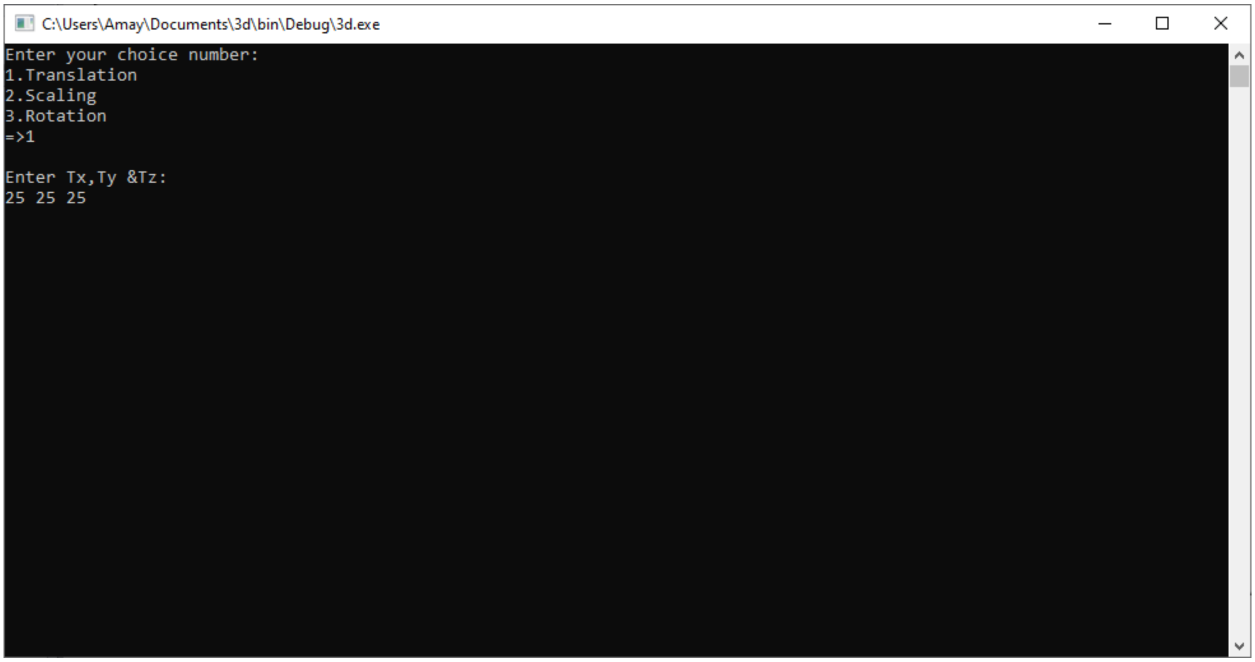
```
#include<iostream>

#include<math.h>

#include<GL/glut.h>

using namespace std;


typedef float Matrix4 [4][4];


Matrix4 theMatrix;

static GLfloat input[8][3]=

{

   {40,40,-50},{90,40,-50},{90,90,-50},{40,90,-50},

   {30,30,0},{80,30,0},{80,80,0},{30,80,0}


};


float output[8][3];

float tx,ty,tz;

float sx,sy,sz;

float angle;
```

```
int choice;

void setIdentityM(Matrix4 m)
{
for(int i=0;i<4;i++)
    for(int j=0;j<4;j++)
        m[i][j]=(i==j);
}

void translate(int tx,int ty,int tz)
{

for(int i=0;i<8;i++)
{
output[i][0]=input[i][0]+tx;
output[i][1]=input[i][1]+ty;
output[i][2]=input[i][2]+tz;
}
}
void scale(int sx,int sy,int sz)
{
    theMatrix[0][0]=sx;
    theMatrix[1][1]=sy;
    theMatrix[2][2]=sz;
```

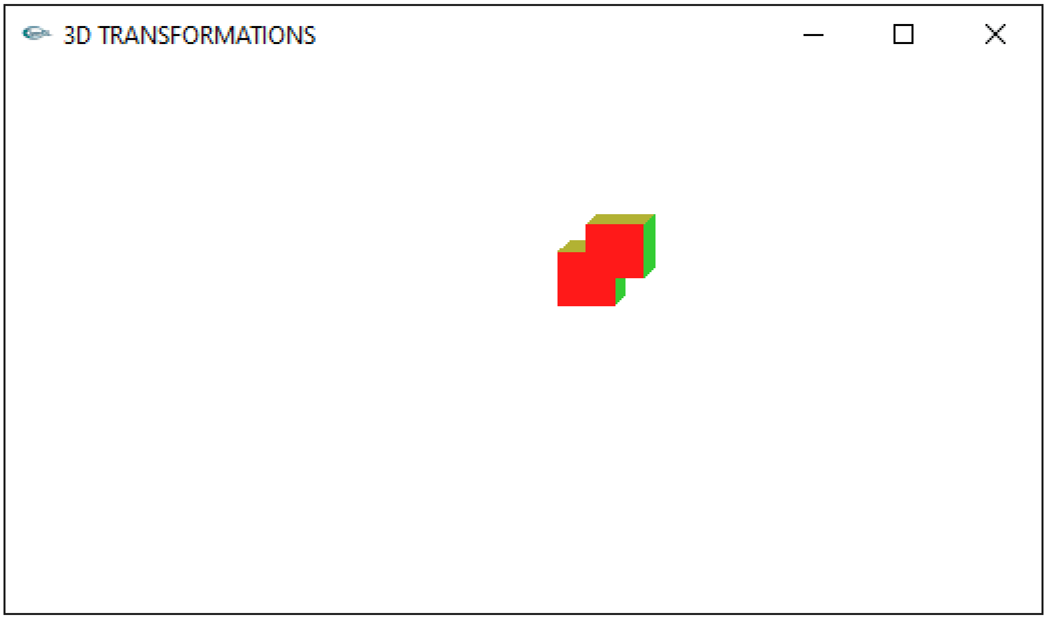
```
}


void RotateZ(float angle) //parallel to z

{


 angle = angle*3.14/180;

 theMatrix[0][0] = cos(angle);

 theMatrix[0][1] = sin(angle);

 theMatrix[1][0] = -sin(angle);

 theMatrix[1][1] = cos(angle);


}


void multiplyM()

{

//We Don't require 4th row and column in scaling and rotation

//[8][3]=[8][3]*[3][3] //4th not used

for(int i=0;i<8;i++)

 {

    for(int j=0;j<3;j++)

    {

        output[i][j]=0;

        for(int k=0;k<3;k++)

        {

            output[i][j]=output[i][j]+input[i][k]*theMatrix[k][j];
        }
    }
}

}

void draw(float a[8][3])
{


    glBegin(GL_QUADS);
     glColor3f(0.7,0.4,0.5); //behind
    glVertex3fv(a[0]);
    glVertex3fv(a[1]);
    glVertex3fv(a[2]);
    glVertex3fv(a[3]);

    glColor3f(0.8,0.2,0.4);  //bottom
   glVertex3fv(a[0]);
   glVertex3fv(a[1]);
   glVertex3fv(a[5]);
   glVertex3fv(a[4]);

   glColor3f(0.3,0.6,0.7); //left
  glVertex3fv(a[0]);
  glVertex3fv(a[4]);
  glVertex3fv(a[7]);
  glVertex3fv(a[3]);

  glColor3f(0.2,0.8,0.2);  //right
 glVertex3fv(a[1]);
 glVertex3fv(a[2]);
 glVertex3fv(a[6]);
 glVertex3fv(a[5]);

 glColor3f(0.7,0.7,0.2); //up
glVertex3fv(a[2]);
glVertex3fv(a[3]);
glVertex3fv(a[7]);
glVertex3fv(a[6]);

glColor3f(1.0,0.1,0.1); //front
glVertex3fv(a[4]);
glVertex3fv(a[5]);
glVertex3fv(a[6]);
glVertex3fv(a[7]);

glEnd();
}
```

```
void init()

{

   glClearColor(1.0,1.0,1.0,1.0); //set backgrond color to white

   glOrtho(-454.0,454.0,-250.0,250.0,-250.0,250.0);

   // Set the no. of Co-ordinates along X & Y axes and their gappings

   glEnable(GL_DEPTH_TEST);

    // To Render the surfaces Properly according to their depths

}


void display()

{

glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);


glColor3f(1.0,0.0,0.0);

draw(input);

setIdentityM(theMatrix);

switch(choice)

{

case 1:

   translate(tx,ty,tz);

   break;

 case 2:

   scale(sx,sy,sz);

multiplyM();

   break;
 case 3:

       RotateZ(angle);

multiplyM();

    break;

}


draw(output);

glFlush();

}


int main(int argc, char** argv)

{

    glutInit(&argc,argv);

    glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB|GLUT_DEPTH);

    glutInitWindowSize(1000,500);

    glutInitWindowPosition(0,0);

    glutCreateWindow("3D TRANSFORMATIONS");

    init();

    cout<<"Enter your choice number:\n1.Translation\n2.Scaling\n3.Rotation\n=>";

    cin>>choice;

    switch (choice) {

    case 1:

        cout<<"\nEnter Tx,Ty &Tz: \n";

        cin>>tx>>ty>>tz;

        break;
    case 2:

        cout<<"\nEnter Sx,Sy & Sz: \n";

        cin>>sx>>sy>>sz;

        break;

    case 3:


            cout<<"\nENter Rotation angle: ";

            cin>>angle;

            break;

    default:

        break;

    }

    glutDisplayFunc(display);

    glutMainLoop();

return 0;

}
```

Output:



```
Enter your choice number:
1.Translation
2.Scaling
3.Rotation
=>1

Enter Tx,Ty &Tz:
25 25 25
```


3D TRANSFORMATIONS