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المملكة العربية السعودية

Ministry of Education

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Adham University College

الكلية الجامعية بأضم

Computer Science Department

قسم الحاسب الآلي



CS
Department

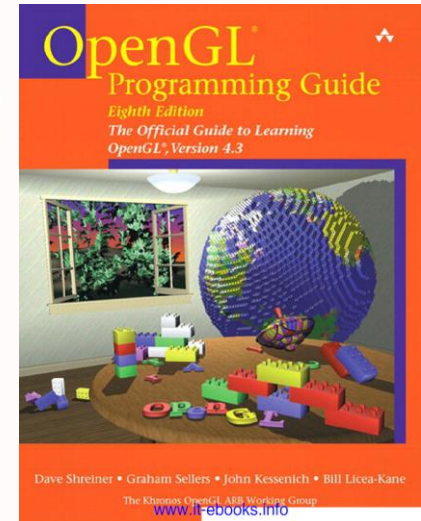
Computer Graphics Course, 3-6803430



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References

- Lab Lectures, Computer Graphics, Taif University, Faculty Of Computers And Information Technology, TA. Maha Thafar &TA. Haifa Alshehri, TA.Sohair Soliman & L.Shakila Bano.
- OpenGL Programming Guide: The Official Guide to Learning OpenGL, Versions 4.3, 8th edition, Dave Shreiner, Graham Sellers, John Kessenich, Bill Licea-Kane & The Khronos OpenGL ARB Working Group, Addison-Wesley.



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Lecture Seven

Translating Objects Programs Using OpenGL

Computer Graphics
Course, 3-6803430

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1. Modeling Transformations
2. Translate 3D Object Program Using OpenGL

Computer Graphics
Course, 3-6803430

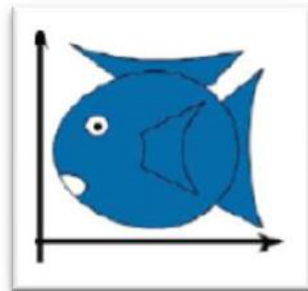
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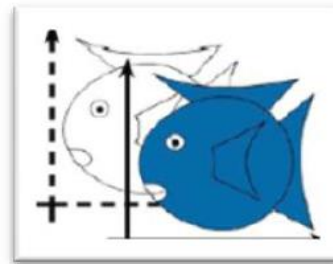
Modeling Transformations

- Before applying modeling or viewing transformations, need to set
`glMatrixMode(GL_MODELVIEW)`
- Rotation, translation, and scaling are performed by functions that change the values of the modelview matrix.
 - Move object (**Translate**).
 - **Rotate** object around axis.
 - **Scale** (stretch or shrink).
 - Mirror object (**Reflection**).

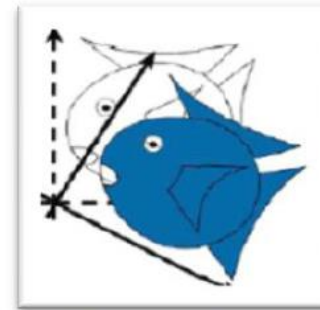
Modeling Transformations



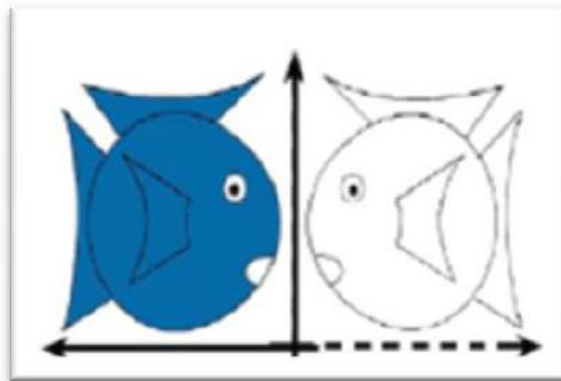
IDENTITY



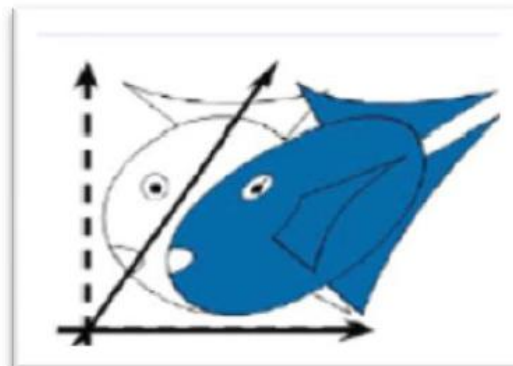
Translation



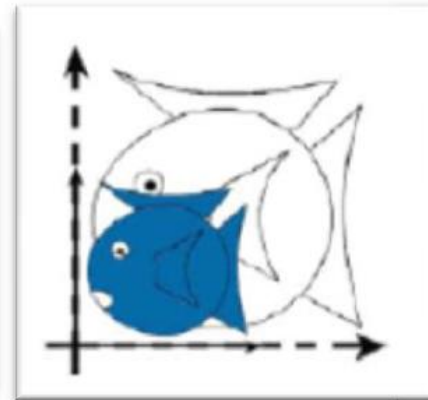
Rotation



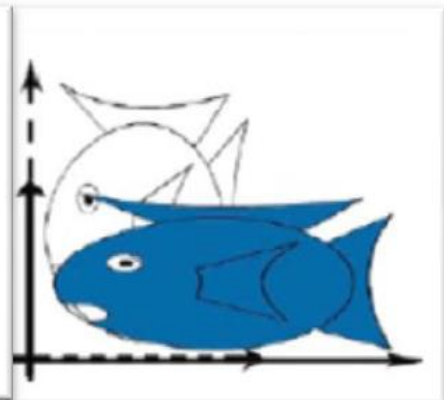
Reflection



Shear



Scaling



Translate the Objects

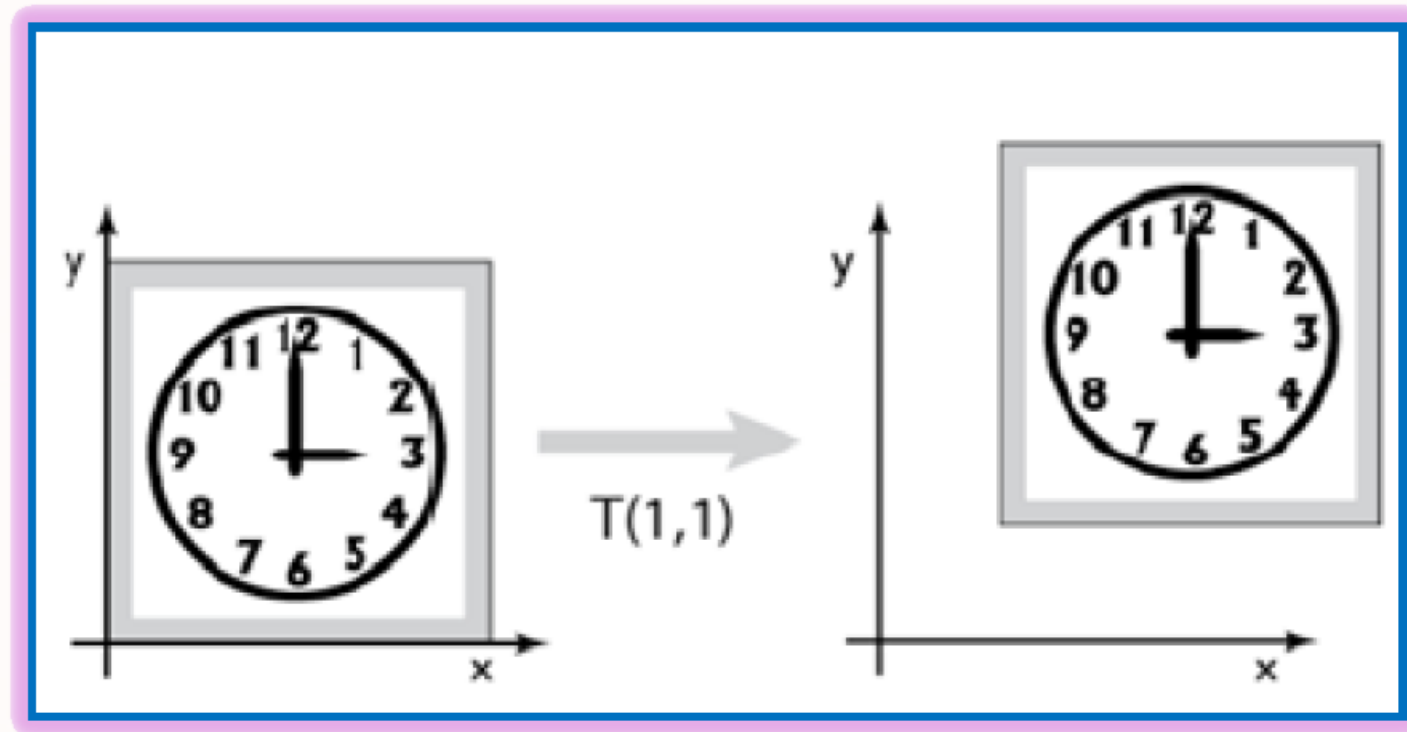
- In order to move the object
- You translate the coordinate system.
- And then draw the object in the translated coordinate system
- The function of translate: `void glTranslatef(x , y , z)`
- **Example:** `glTranslatef(5 ,0 ,0) ;` //move the object 5 units in the x direction.

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Translate the Objects

2D



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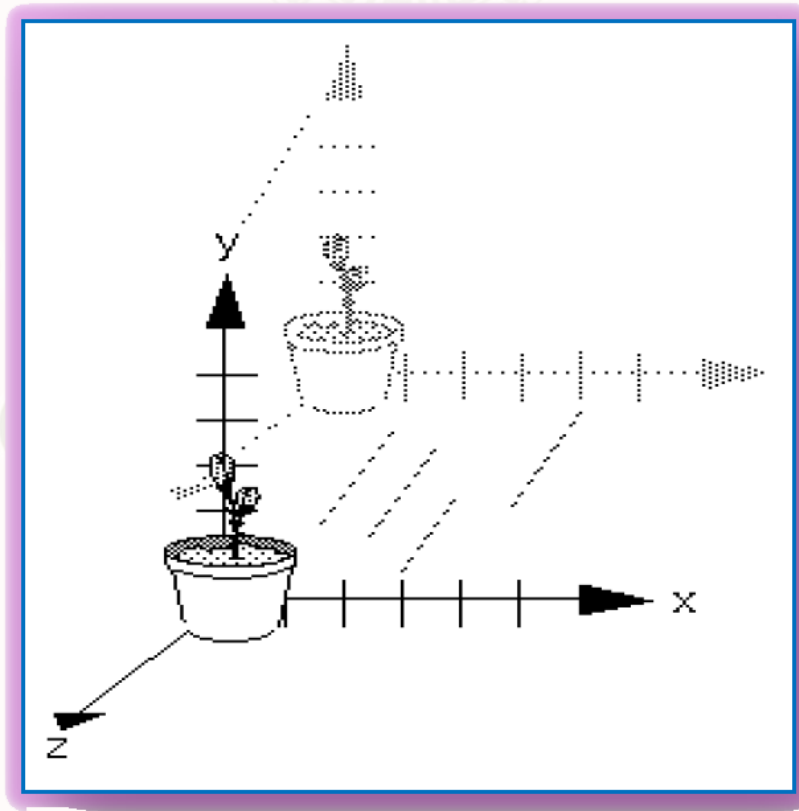
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Translate the Objects

3D



Translate 3D Object Program Using OpenGL

```
#include<windows.h>
#include<GL/glut.h>
void Draw() {
    glClear(GL_COLOR_BUFFER_BIT);
    glTranslatef(0.0, 0.0, -100.0);
    glColor3ub(255, 178, 178); //Pink Color
    //void glutSolidSphere (GLdouble radius, GLint slices, GLint stacks);
    glutSolidSphere(10.0, 30, 40); //Draw a big sphere
    glTranslatef(20.0, 0.0, 0.0); //Second Translate
    glColor3ub(250, 136, 136);
    glutWireSphere(3.0, 30, 40);
    glTranslatef(0.0, -20.0, 0.0);
    glColor3ub(253, 1, 1); //Red Color
    glutWireSphere(3.0, 30, 40);
    glutSwapBuffers(); //Swap Buffers (Double Buffering)
}

void init() {
    glClearColor(1.0,0.8,0.8, 0);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluPerspective(45, 1.0, 10.0, 200.0);
    glMatrixMode(GL_MODELVIEW); //Select the Modelview Matrix
}

int main() {
    glutInitDisplayMode(GLUT_RGB | GLUT_DOUBLE);
    glutInitWindowSize(500, 500);
    glutInitWindowPosition(0,0);
    glutCreateWindow("Draw Some Spheres");
    init();
    glutDisplayFunc(Draw);
    glutMainLoop();
    return 0;
}
```

Translate 3D Object Program Using OpenGL

Object] - Code::Blocks 17.12

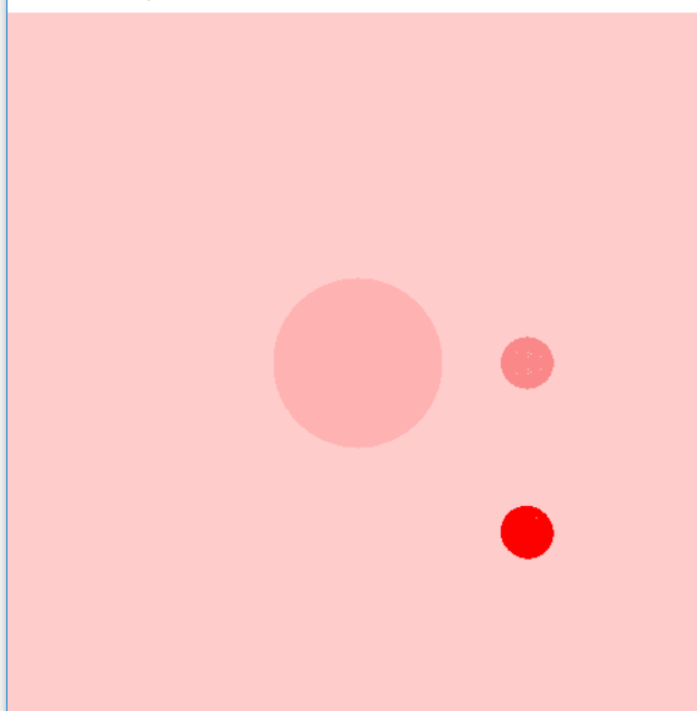
Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help

Debug

Translate3DObject.cpp

```
2  #include<GL/glut.h>
3  void Draw() {
4      glClear(GL_COLOR_BUFFER_BIT);
5      glTranslatef(0.0, 0.0, -100.0);
6      glColor3ub(255, 178, 178); //Pink Color
7      //void glutSolidSphere(GLdouble radius, GLint slices, GLint stacks);
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19     glClearColor(1.0,0.8,0.8, 0);
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26 int main() {
27     glutInitDisplayMode(GLUT_RGB | GLUT_DOUBLE);
28     glutInitWindowSize(500, 500);
29     glutInitWindowPosition(0,0);
30     glutCreateWindow("Draw Some Spheres");
31     init();
32     glutDisplayFunc(Draw);
33     glutMainLoop();
34     return 0;
35 }
```

Draw Some Spheres



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Exercise

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- Draw a Cube using the built in functions then change the object's place by translating it in into other place.

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وصلى الله وبارك على نبيينا محمد

The End Summary of Lecture Seven

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