



Computer System

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CODE:

```
package test;

import javafx.application.Application;
import javafx.geometry.Insets;
import javafx.scene.Group;
import javafx.scene.PerspectiveCamera;
import javafx.scene.Scene;
import javafx.scene.control.Label;
import javafx.scene.control.Slider;
import javafx.scene.layout.VBox;
import javafx.scene.paint.Color;
import javafx.scene.paint.Material;
import javafx.scene.paint.PhongMaterial;
import javafx.scene.shape.Box;
import javafx.scene.transform.Rotate;
import javafx.scene.transform.Scale;
import javafx.scene.transform.Translate;
import javafx.stage.Stage;

public class Test extends Application {

    private static final int WIDTH = 800;
    private static final int HEIGHT = 600;

    private Box cube;
```

```
private Slider translateX;
private Slider translateY;
private Slider translateZ;
private Slider rotateX;
private Slider rotateY;
private Slider rotateZ;
private Slider scaleX;
private Slider scaleY;
private Slider scaleZ;

public static void main(String[] args) {
    launch(args);
}

@Override
public void start(Stage primaryStage) {
    primaryStage.setTitle("3D Transformation");

    Group root = new Group();
    Scene scene = new Scene(root, WIDTH, HEIGHT, true);
    scene.setFill(Color.WHITE);

    PerspectiveCamera cam = new PerspectiveCamera(true);
    cam.setNearClip(0.1);
    cam.setFarClip(10000.0);
    cam.translateZProperty().set(-1000);
```

```
root.getChildren().add(createCube());  
root.getChildren().add(createControls());  
  
scene.setCamera(cam);  
primaryStage.setScene(scene);  
primaryStage.show();  
}  
  
private VBox createControls() {  
    VBox controls = new VBox(10);  
    controls.setPadding(new Insets(10));  
  
    translateX = createSlider("Translate X", -200, 200, 0);  
    translateY = createSlider("Translate Y", -200, 200, 0);  
    translateZ = createSlider("Translate Z", -200, 200, 0);  
  
    rotateX = createSlider("Rotate X", -180, 180, 0);  
    rotateY = createSlider("Rotate Y", -180, 180, 0);  
    rotateZ = createSlider("Rotate Z", -180, 180, 0);  
  
    scaleX = createSlider("Scale X", 0.1, 2, 1);  
    scaleY = createSlider("Scale Y", 0.1, 2, 1);  
    scaleZ = createSlider("Scale Z", 0.1, 2, 1);  
  
    controls.getChildren().addAll(  
        translateX, translateY, translateZ,
```

```
    rotateX, rotateY, rotateZ,  
    scaleX, scaleY, scaleZ  
);  
  
return controls;  
}  
  
  
private Slider createSlider(String label, double min, double max,  
double initialValue) {  
  
    Label sliderLabel = new Label(label);  
  
    Slider slider = new Slider(min, max, initialValue);  
  
    slider.setShowTickLabels(true);  
  
    slider.setShowTickMarks(true);  
  
    slider.setMajorTickUnit((max - min) / 10);  
  
  
    slider.setPrefWidth(150);  
    slider.setPrefHeight(15);  
    slider.setStyle("-fx-font-size: 10px;");  
  
  
    slider.valueProperty().addListener((observable, oldValue,  
    newValue) -> applyTransformations());  
  
  
    VBox sliderBox = new VBox(5);  
    sliderBox.getChildren().addAll(sliderLabel, slider);  
  
  
    return slider;  
}
```

```
private Box createCube() {  
    cube = new Box(100, 100, 100);  
  
    PhongMaterial material = new PhongMaterial(Color.BLUE);  
    cube.setMaterial(material);  
  
    cube.setTranslateX(0);  
    cube.setTranslateY(0);  
    cube.setTranslateZ(0);  
  
    return cube;  
}  
  
private void applyTransformations() {  
    cube.getTransforms().clear();  
    cube.getTransforms().addAll(  
        new Translate(translateX.getValue(), translateY.getValue(),  
translateZ.getValue()),  
        new Rotate(rotateX.getValue(), Rotate.X_AXIS),  
        new Rotate(rotateY.getValue(), Rotate.Y_AXIS),  
        new Rotate(rotateZ.getValue(), Rotate.Z_AXIS),  
        new Scale(scaleX.getValue(), scaleY.getValue(),  
scaleZ.getValue())  
    );  
}  
}
```