SSGMCE	SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGG.		**LABORATORY MANUAL**
	PRACTICAL EXPERIMENT INSTRUCTION SHEET		
	EXPERIMENT TITLE : Write a program in Java3D to display Ball lit by red light		
EXPERIMENT NO. : **SSGMCE/WI/IT/01/8IT06/01**		ISSUE NO. : 00	ISSUE DATE : 14.01.2023
REV. DATE :	REV. NO. :	DEPTT. : INFORMATION TECHNOLOGY	
LABORATORY : Virtual and Augmented Reality (8IT06)		SEMESTER : VIII	PAGE: 1 OF 4

1.0) AIM:

Write a program in Java3D to display Ball lit by red light

2.0) SCOPE:

This Java program creates a 3D scene with a red ball and a directional light source.

3.0) FACILITIES/ APPARATUS:

i) Software: Java & Java3D

4.0) THEORY:

The way the light falls on an object provides us with the shading that helps us see shapes in three dimensions.

The sphere we created is white (the default), it appears red because of the colored light. Since it is a DirectionalLight, we also have to specify how far the light shines and in what direction. In the example, the light shines for 100 meters from the origin and the direction is to the right, down and into the screen (this is defined by the vector: 4.0 right, -7.0 down, and -12.0 into the screen).

We can also create an AmbientLight which will produce a directionless light, or a SpotLight if we want to focus on a particular part of your scene. A combination of a strong directional light and a weaker ambient light gives a natural-looking appearance to your scene. Java 3D lights do not produce shadows.

This Java program uses the Java 3D API to create a 3D scene consisting of a ball and a red directional light. The scene is displayed in a SimpleUniverse, which is a virtual 3D space that can be viewed from different angles.

The program begins by importing the necessary Java 3D classes and creating a Ball class. Inside the Ball class, a SimpleUniverse is created, which will serve as the container for the 3D scene. A BranchGroup is also created, which will contain the objects to be rendered in the scene.

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SSGMCE/FRM/32-B		
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LABORATORY : Virtual and Augmented Reality (8IT06)		SEMESTER : VIII	PAGE: 2 OF 4

Next, a Sphere object is created using the constructor that takes a radius as an argument. This sphere is added to the BranchGroup using the addChild() method.

A red directional light is also created using a Color3f object to specify its color and a Vector3f object to specify its direction. A BoundingSphere object is created to specify the area of the scene that the light will illuminate. The DirectionalLight object is then created using these parameters and added to the BranchGroup. The setInfluencingBounds() method is used to specify the bounds of the light's influence.

The viewing transform is set to look towards the ball using the setNominalViewingTransform() method of the SimpleUniverse's ViewingPlatform.

Finally, the BranchGroup is added to the SimpleUniverse using the addBranchGraph() method. The main() method of the Ball class simply creates a new instance of the Ball class and sets a system property to prevent background erasure artifacts.

Overall, this program creates a simple 3D scene consisting of a ball and a directional light, demonstrating the basics of creating and rendering 3D objects using the Java 3D API

Program

```java
import com.sun.j3d.utils.geometry.*;

import com.sun.j3d.utils.universe.*;

import javax.media.j3d.*;

import javax.vecmath.*;

public class Ball {

public Ball() {

   // Create the universe

   SimpleUniverse universe = new SimpleUniverse();
```

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```java
    // Create a structure to contain objects
    BranchGroup group = new BranchGroup();
    // Create a ball and add it to the group of objects
    Sphere sphere = new Sphere(0.5f);
    group.addChild(sphere);
    // Create a red light that shines for 100m from the origin
    Color3f light1Color = new Color3f(1.8f, 0.1f, 0.1f);
    BoundingSphere bounds =
    new BoundingSphere(new Point3d(0.0,0.0,0.0), 100.0);
    Vector3f light1Direction = new Vector3f(4.0f, -7.0f, -12.0f);
    DirectionalLight light1
       = new DirectionalLight(light1Color, light1Direction);
    light1.setInfluencingBounds(bounds);
    group.addChild(light1);
    // look towards the ball
    universe.getViewingPlatform().setNominalViewingTransform();
    // add the group of objects to the Universe
    universe.addBranchGraph(group);
  }
  public static void main(String[] args) {
    System.setProperty("sun.awt.noerasebackground", "true");
    new Ball();
  }
```

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}

Output
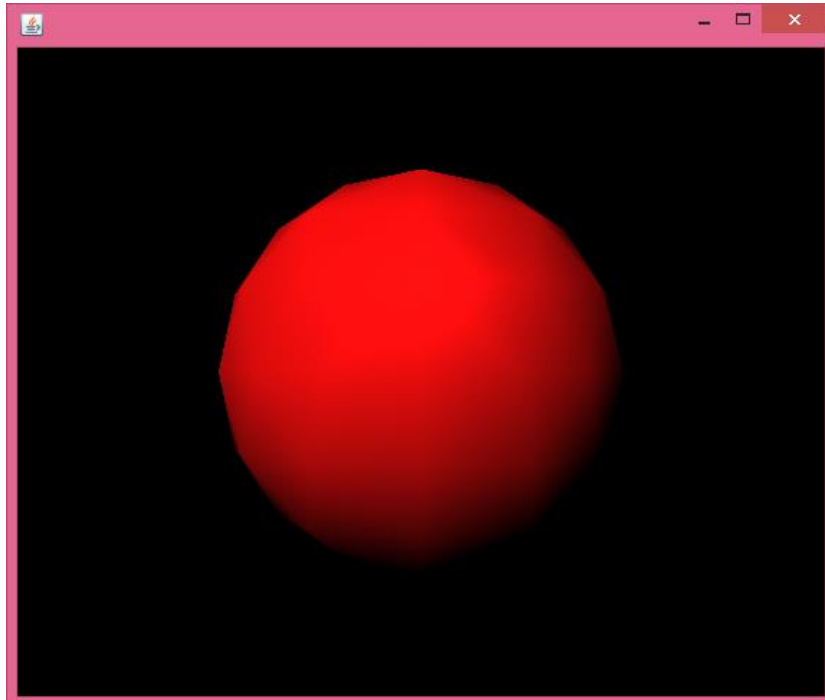
5.0) Conclusion:

Created 3D scene with a red ball and a directional light source.

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