

SSGMCE	SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGG.		LABORATORY MANUAL	
	PRACTICAL EXPERIMENT INSTRUCTION SHEET			
	EXPERIMENT TITLE : Installation of Java and Java 3D. Write a program in JAVA 3D to display cube.			
EXPERIMENT NO. : SSGMCE/WI/IT/01/8IT06/01		ISSUE NO. : 00	ISSUE DATE : 14.01.2023	
REV. DATE :		REV. NO. :	DEPTT. : INFORMATION TECHNOLOGY	
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1.0) AIM:

Installation of Java and Java 3D. Write a program in JAVA 3D to display cube.

2.0) SCOPE:

Demonstration of cube in Java3D

3.0) FACILITIES/ APPARATUS:

i) **Software:** JAVA & JAVA3D

4.0) THEORY:

Java is aimed at developing platform-independent applications for the Internet. Java was introduced in 1995 by Sun Microsystems. The famous slogan of Java is “write once, run anywhere.” To achieve this, Java uses Java byte codes and the Java Virtual Machine (Java VM). Java byte codes make up a platform-independent intermediate language generated by the compiler. Java VM is the implementation of an interpreter for the byte codes on any platform. The Java interpreter in a Web browser is a kind of Java VM. Thus, compilation is required once and the program can be executed in any platform if it has Java VM.

The Java platform is composed of the Java VM and the Java Application Programming Interface (Java API) [Sowizral et al., 2000]. The Java API is a collection of packages that groups relevant libraries. The Java API is divided into the core Java API and extensions. The core Java API includes core language, utility, I/O, network, graphical user interface (GUI), and security functions. The extended Java API provides additional functionality such as sounds, animation, video, and 3D graphics.

Java 3D is one of the Java standard extensions. Java 3D programming is based on Java programming and adds a 3D graphics capability to the program. The basic scheme of Java programming is required in Java 3D. For example, when we develop an application program for

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a virtual environment, the GUI is developed using Java API and the 3D scene is created using Java 3D.

Features of Java 3D

Java 3D was designed with several goals in mind, high performance being the most important one [Sowizral et al., 2000]. Therefore, Java 3D should support easy authoring of 3D worlds and provide a high-level object-oriented programming paradigm. The Java 3D API is the application programming interface designed to accomplish these goals.

There are several features for supporting these goals. First of all, Java 3D is based on a scene graph programming model. This scene graph programming helps users to create 3D worlds easily. It is a simple and flexible mechanism for representing and rendering scenes. The viewing model, which separates the physical device from the virtual environment, helps to provide easy mapping between the physical world and the virtual world. In addition, the Java 3D loader mechanism enables users to utilize arbitrary 3D file formats in Java 3D programming.

For high performance, Java 3D supports optimization at the scene graph level. It supports the following rendering modes, depending on the interactivities and the optimization: immediate mode, retained mode, and compiled-retained mode. Java 3D takes advantage of native, low-level APIs like OpenGL and Direct 3D inside to achieve high performance. Java 3D renders scenes depending on the available hardware. The programmer does not need to change the code for different hardware platforms, which is a definite advantage in today's heterogeneous VR technology environment.

At the time of execution of program jdk(1.8.0_361) and Java 3D(1.5.2) is used.

Install jdk(1.8.0_361), after installation java folder is created in program file folder.

install java 3d(1.5.2) (it must be install on java folder)

Set up Java and Java 3D programs on the computer.

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One needs to be careful in setting up programming environments. You need to change the PATH and the CLASSPATH for Java and Java 3D and check the correct setup by running demo programs for Java and Java 3D.

In java 3d-lib-ext(copy the path 3 files in class path

C:\Program Files\Java\Java3D\1.5.2\lib\ext\j3dcore.jar

C:\Program Files\Java\Java3D\1.5.2\lib\ext\j3dutils.jar

C:\Program Files\Java\Java3D\1.5.2\lib\ext\vecmath.jar

Also copy

C:\Program Files\Java\jre1.8.0_3

61\bin;C:\Program Files\Java\jre1.8.0_361\lib;C:\Program Files\Java\jdk1.8.0_361

\bin"

Program Detail

This is a Java program that creates a 3D scene using the Java 3D API.

The program begins by importing the necessary classes from the Java 3D and Java 2D libraries.

The Hello3d class defines a constructor method that creates a SimpleUniverse object, which is a high-level abstraction of the Java 3D universe. It also creates a BranchGroup object, which is a container for all the objects that will be added to the scene.

The next line of code adds a ColorCube object to the BranchGroup. A ColorCube is a pre-defined geometric shape in Java 3D that represents a cube with a solid color. The constructor of the ColorCube class takes a parameter that specifies the size of the cube. In this case, the cube has a size of 0.3 units.

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The program then sets the viewing platform of the SimpleUniverse to the default viewing transform. This sets the camera position and orientation to a standard position so that the scene is visible to the viewer.

Finally, the BranchGroup is added to the SimpleUniverse using the addBranchGraph method. This method adds the BranchGroup to the scene graph of the universe, which is a hierarchical structure of nodes that defines the objects and transformations in the scene.

The main method of the program sets a system property to prevent the background from being erased before rendering the scene. This is a performance optimization that avoids unnecessary rendering of the background.

When the program is executed, it creates an instance of the Hello3d class, which initializes the scene and displays a ColorCube in the center of the scene. The viewer can navigate the scene using the mouse and keyboard to explore the 3D space.

Program

```
import com.sun.j3d.utils.universe.SimpleUniverse;
```

```
import com.sun.j3d.utils.geometry.ColorCube;
```

```
import javax.media.j3d.BranchGroup;
```

```
public class Hello3d {
```

```
    public Hello3d()
```

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```
{
```

```
SimpleUniverse universe = new SimpleUniverse();
```

```
BranchGroup group = new BranchGroup();
```

```
group.addChild(new ColorCube(0.3));
```

```
universe.getViewingPlatform().setNominalViewingTransform();
```

```
universe.addBranchGraph(group);
```

```
}
```

```
public static void main( String[] args ) {
```

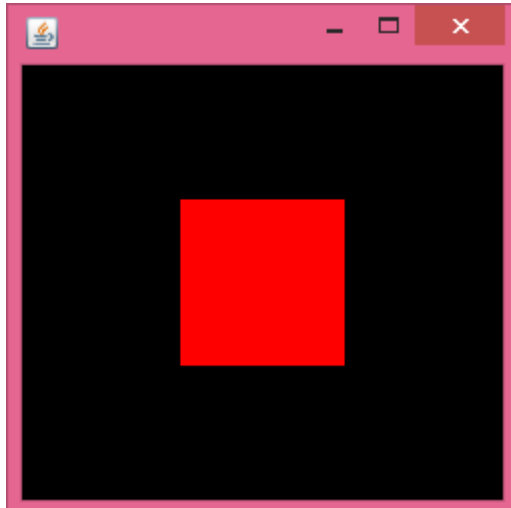
```
System.setProperty("sun.awt.noerasebackground", "true");
```

```
new Hello3d();
```

```
}
```

```
} // end of class Hello3d
```

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5.0) Conclusion:

Installed Java & Java 3D and successfully executed first java 3d program.