

To use Java for the examples in this book, you will need both the JRE (Java Runtime Environment) and the JDK (Java Development Kit). To install them, use Oracle's download site, <http://www.oracle.com/technetwork/java>, and click the "Java SE (Standard Edition) link under "Software Downloads." From there you can find instructions for downloading the latest JDK, which includes both the Java compiler and the JRE. It is assumed that the reader is experienced with programming in Java. At the time of this writing, the current version of Java is version 8.

1.1 Installing Java

1.2 INSTALLATION AND CONFIGURATION

graphics3D was first developed in 2005 by John Clevenger at California State University Sacramento, and is maintained by the authors.

graphics3D provides classes for basic math functions related to graphics concepts, such as *vector*, *matrix*, *point*, *vertex*, and *quaternion*. It also contains a few utility classes for storing frequently used 3D graphics structures, such as a stack of spheres, such as a sphere and a torus.

In this book, we use a Java library called `graphics3D`. For example, the popular OpenGL Superbible [SW15] utilizes a C library called `glut`. This reason, use of OpenGL is greatly facilitated by accompanying it with a function library or class package to support common mathematical functions.

1.3 graphics3D

JOGL first appeared in 2003, published on the website java.net. Since 2010 it has been an independent open source project, and part of a suite of Java bindings maintained by *JOGL* [JO15], an online community of developers. *JOGL* maintains JOAL and JOCL bindings for OpenGL and OpenCL, respectively. New versions of OpenGL and/or Java are released, new versions of JOGL are developed to support continued compatibility. *JOGL* also maintains a short reference user's guide that includes valuable guidelines for installing and using JOGL. This book assumes at least version 2.3 of JOGL.

1.4 JOGL

1.2.2 Installing OpenGL / GLSL

It is not necessary to "install" OpenGL or GLSL, but it is necessary to ensure that your graphics card supports at least version 4.3 of OpenGL. If you do not know what version of OpenGL your machine supports, you can use one of the various free applications (such as GLView [GV16]) to find out.

1.2.3 Installing JOGL

To install JOGL, visit <http://jogamp.org>. As of this writing, the current version of JOGL is in the "Builds/Downloads" section—look under "Current" and click on [zip]. This displays the latest stable JOGL files in a folder named "/deployment/jogamp-current/archive". Download the following:

```
jogamp-all-platforms.7z
jogl-javadoc.7z
```

Unzip these files into the folder on your machine where you would like to store the JOGL system. A typical location in Windows could be, for example, in a folder at the root of the C: drive.

The unzipped "jogamp-all-platforms" file contains a folder named "jar", which contains two important files that will be used by your applications:

```
jogl-all.jar
joggen-rt.jar
```

Add the full path name of each of these two files to your CLASSPATH environment variable.

In the jogl-javadoc folder, double-click the file named index.html. This opens the JOGL javadocs in a browser, which you should then bookmark.

1.2.4 Installing graphicslib3D



To install graphicslib3D, download the graphicslib3D.zip file from the textbook support website or the accompanying disc. Unzipping this file produces a folder containing the following two items:

[GV16] GLView, realtech-vr, accessed July 2016, <http://www.realtech-vr.com/glview/>

[JO16] Jogamp, accessed July 2016, <http://jogamp.org/>

[JU16] JOGL Users Guide, accessed July 2016, <https://jogamp.org/jogl/doc/userguide/>

[OR16] Java Software, Oracle Corp., accessed July 2016, <https://www.oracle.com/java/index.html>.

[SW15] G. Sellers, R. Wright Jr., and N. Haemel, *OpenGL SuperBible: Comprehensive Tutorial and Reference*, 7th ed. (Addison-Wesley, 2015).

References

the JOGL Javadoc.

Open the `index.html` file in the javadoc folder, and bookmark it as you did for

Add the full path name of the `jar` file to your `CLASSPATH` environment variable.

location in Windows could be, for example, in a folder at the root of the C: drive.

Move these files to wherever you would like to store `graphicslib3D`—a typical

- A file named `graphicslib3D.jar`
- A folder named `javadoc`