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Programming of Graphics

Introduction to LWJGL

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LWJGL Overview

Lightweight Java Game Library https://www.lwjgl.org

What is LWJGL?

- Java library that enables cross-platform access to popular native APIs. Useful
 - for graphics (OpenGL)
 - for audio (OpenAL)
 - for parallel computing (OpenCL)
- It is a high performance, user-friendly wrapper library
 It is designed to create 2D and 3D graphics applications coded in Java

LWJGL Overview

- LWJGL is an enabling technology and provides low-level access.
- It is cross platform
- It is not a framework and does not provide higher-level utilities than what the native libraries expose
 - It is not a real game engine
- LWJGL is open source

Installation

System Requirements

- Java SE Development Kit: version 1.8 or above
- Video Card that supports at least OpenGL version 1.1

Configure Environment

- **PATH** and **JAVA_HOME** environment variables should be set:
 - <u>PATH:</u> typically java_install_dir/bin
 - E.g.: C:\Program Files\Java\jdk1.8.0_144\bin\
 - o <u>JAVA_HOME</u>: java_install_dir
 - E.g.: c:\Program Files\Java\jdk1.8.0_144

Download LWJGL https://www.lwjgl.org/download

HOME GET STARTED DOWNLOAD CUSTOMIZE

Download LWJGL 3All official releases are available for download
from GitHub:You can customize your LWJGL build or use the
latest stable & nightly releases:Or you can browse and download individual
LWJGL artifacts:C Download from GithubI customize LWJGL 3Browse LWJGL files

LWJGL modules

- LWJGL is organized in modules.
- Each module is packaged as a collection of artifacts
 - where each artifact has the same name but a different classifier.
- The artifact name for the LWJGL core module is just lwjgl.
- The artifact name for a binding module is

lwjgl-<binding>

- For example the OpenGL module is Lwjgl-opengl
- You only need to download the modules that are needed for your project.

Release

Latest official release

3.1.3 build 16

Sep 21, 2017, 23:37:42 UTC

Presets

None

O Custom

Addons

Everything

Getting Started

Minimal OpenGL

Minimal Vulkan

JOML v1.9.4

Minimal OpenGL ES

LWJGLX/debug v1.0.0

steamworks4j v1.6.2

Mode

- ZIP Bundle
- Maven
- Gradle
- Ivy

Options

- Show descriptions
- Include source
- Include JavaDoc

Natives

- 🖸 📢 Windows
- 🛑 🗯 macOS
- 🛑 🔬 Linux

Stable

Beta quality, verified to work 3.1.4 SNAPSHOT build 1 Sep 26, 2017, 19:10:21 UTC

Contents LWJGL core Assimp bindings bgfx bindings EGL bindings GLFW bindings JAWT bindings jemalloc bindings LMDB bindings NanoVG & NanoSVG bindings Native File Dialog bindings Nuklear bindings **OpenAL** bindings OpenCL bindings OpenGL bindings OpenGL ES bindings OpenVR bindings OVR bindings par_shapes bindings rpmalloc bindings SSE bindings stb bindings

- Tiny OpenEXR bindings
- Tiny File Dialogs bindings
- Vulkan bindings
- xxHash bindings
- Yoga bindings

Nightly

Bleeding edge, possibly broken

3.1.4 SNAPSHOT build 4

Oct 4, 2017, 09:05:59 UTC

Setup LWJGL in Eclipse...

Create New Project



Create New Project

Conte a Java Project	a address I be at the	
Create a Java project in the workspace or in a	n external location.	/
Project name: FirstLWJGLDemo		
Use default location		
Location: E:\eclipse\workspace\FirstLWJG	Demo	Browse
JRE		
• Use an execution environment JRE:	JavaSE-1.8	~
O Use a project specific JRE:	jre1.8.0_144	
O Use default JRE (currently 'jre1.8.0_144'))	Configure JREs
Project layout		
Project layout O Use project folder as root for sources a O Create separate folders for sources and	nd class files class files	Configure default
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LWJGL external libraries

Create a new folder named lib in the project folder

- Copy the (proper) files into the lib folder:
 Example in case of Windows 64 bit:
 - lwjgl-glfw.jar
 - lwjgl-jemalloc-natives-windows.jar
 - lwjgl-jemalloc.jar
 - lwjgl-natives-windows.jar
 - lwjgl-opengl-natives-windows.jar
 - lwjgl-opengl.jar
 - lwjgl-stb-natives-windows.jar
 - lwjgl-stb.jar
 - lwjgl.jar

Add libraries to build path

O w

File

workspace - Java - Ec	lipse	
File Edit Source Ke	ractor Navigate Search Project Run Window	нер
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Package Explorer		
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🛓 lwjgl-op 🔬 lwjgl-op	Open F3 Show In Alt+Shift+W	>
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	Team	>
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Jogl in Eclipse

To make all .jar files available to other projects

• Go to main menu, select Window > Preferences

In preferences window:

- in the drop down menu on the left hand side, follow the hierarchy- Java → Build Path → User Libraries.
- Click on "New..." button.
- It opens up a dialog box. Enter the library name. E.g.: LWJGL3
- Add jar files using button "Add External JARs...".
- It creates a new user library named LWJGL3

LWJGL in Eclipse

We can start developing OpenGL based applications !

Create a Hello World LWJGL application...

1) Create a new package

workspace - Java - Eclipse File Edit Source Refactor Navigate Search Project Run Window Help 📑 • 🗐 🐚 🔌 🎋 • 🚺 • 🏰 🐨 📽 🎯 • 🎥 🖨 🛷 • 🖗 - 🖓 • 🖗 - - - - -~ - -ES B 🛱 Package Explorer 🔀 129 > 😹 AssemblyManager [java_material master] 唐 src New > 19 Java Project 3 2 Project... Open in New Window **Open Type Hierarchy** Package F4 H? Show In Alt+Shift+W > Class C 5 5 Interface G Сору Ctrl+C P Enum G°. Copy Qualified Name P Annotation 00 Ctrl+V Paste B Source Folder AY. 22 Delete Delete Java Working Set 13 Ctrl+Alt+Shift+Down Remove from Context 3 CŶ. Folder VB **Build Path** > 19 File Source Alt+Shift+S > Untitled Text File Refactor Alt+Shift+T > EŶ JUnit Test Case Import... Û Task 225 2 Export... 19 Example... Ro Refresh F5 Other... Ctrl+N 1 Assign Working Sets... Run As > 📋 Ga Debug As > > 2 > Validate Restore from Local History... ns 🛷 Search 📮 Console 🔀 🍵 History > Maven s to display at this time. Team 5 Compare With > Properties Alt+Enter

• E.g.: com.lwjgl.demo

🖨 New Java P	ackage	10	51		Х
Java Package				ď	
Create a new J	ava package.				
Creates folders	corresponding to packages.				
Source folder:	FirstLWJGLDemo/src			Browse	
Name:	com.lwjgl.demo]		
?		Finish		Cance	:

• Create a new class



• E.g.: LWJGLHelloWorld

New Java Class			×			
Java Class Create a new Java	class.	C				
Source folder:	FirstLWJGLDemo/src	Brows	;e			
Package:	com.lwjgl.demo	Brows	e			
Enclosing type:		Brows	e			
Name: Modifiers:	LWJGLHelloWorld • public • package • private • protected • abstract • final • static • final • static • final • fi					
Superclass:	java.lang.Object	Brows	e			
Interfaces:		Add				
		Remo	ove			
Which method stubs would you like to create?						
?	Finish	Cano	el			



Get sample your first sample code from LWJGL website:

https://www.lwjgl.org/guide

 Copy the code into your class, replace class name and run

GAME OVER