

Chapter 1: C++ Concepts

The image shows the Visual Studio IDE website at <https://visualstudio.microsoft.com/vs/>. The page features the Visual Studio logo, the title "Visual Studio IDE", and the description "Fully-featured integrated development environment (IDE) for Android, iOS, Windows, web, and cloud". Below this, there are buttons for "Windows" and "macOS". A prominent blue button says "Download Visual Studio" with a download icon. Underneath, there are three white buttons: "Community 2017", "Professional 2017", and "Enterprise 2017".

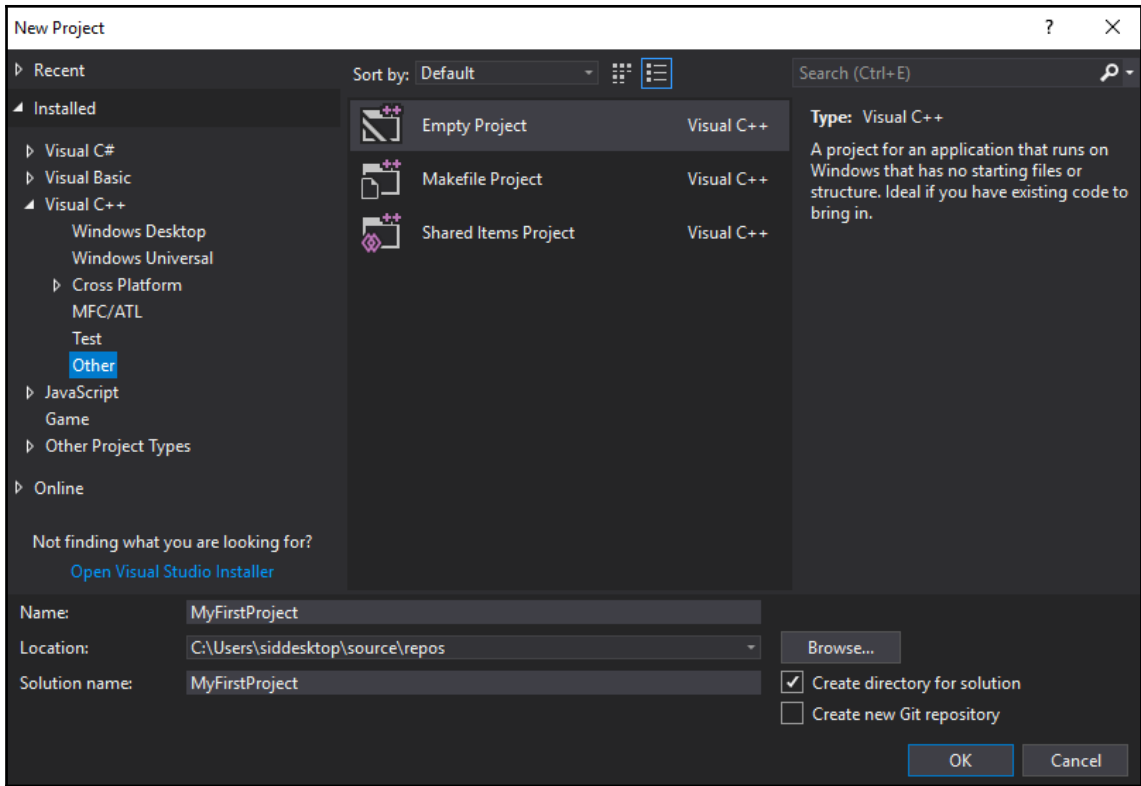
Overlaid on the right side of the website is a screenshot of the Visual Studio IDE interface. The title bar reads "ProjectArchive - Microsoft Visual Studio". The menu bar includes "File", "Edit", "View", "Project", "Build", "Debug", "Team", and "Tools". The toolbar shows icons for "Zoom In", "Reset Zoom", "Clear Selection", "Debug", and "Any". The main window displays a diagnostics report for "Report20171020-1300.diagsession" for the file "MainWindow.xaml.cs". The diagnostics session duration is "24 seconds (1547 s selected)".

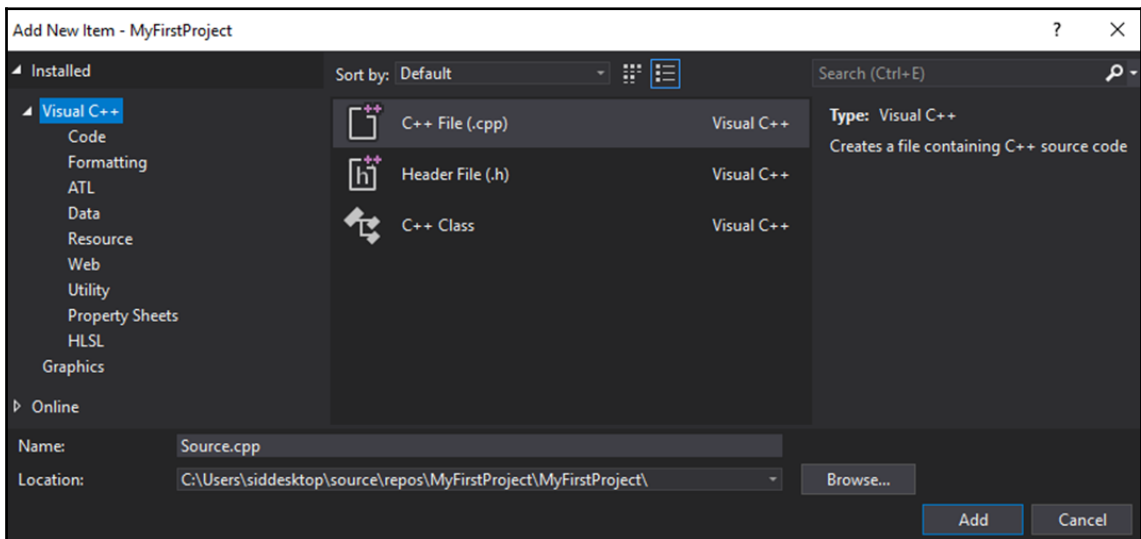
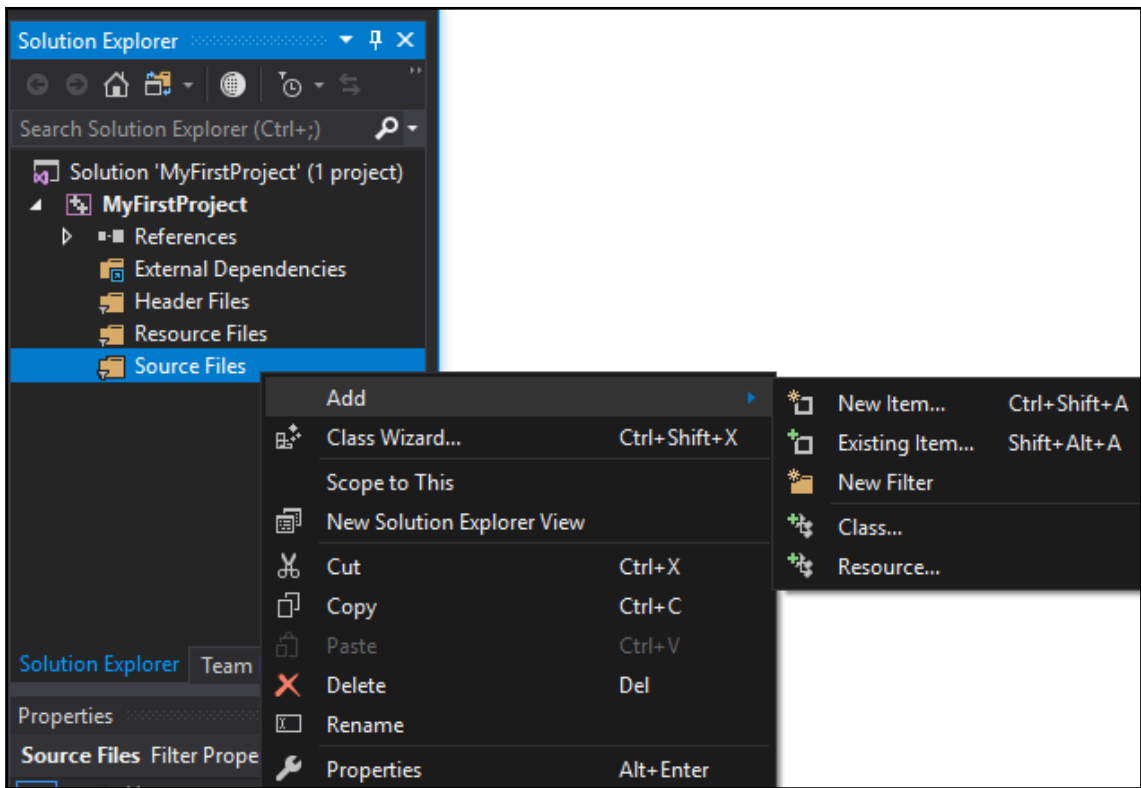
The diagnostics tool shows two graphs:

- UI thread utilization (%):** A bar chart showing utilization over time, with a peak near 100%.
- Visual throughput (FPS):** A line graph showing frames per second, fluctuating between approximately 30 and 60 FPS.

Below the graphs is a "Timeline details" table:

Event name	Duration
Application Startup	
Parsing (MainWindow)	136ms
Render	
Layout (136)	
Garbage collection	
Layout (30)	
Layout (2)	
Render	
Layout (1)	
Render	





```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Hello, World.
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Value of n is: 42
-
```

```
C:\Users\siddharthMacbookPro\Documents\
Value of a is : 0
Value of b is : b
Value of c is : 3.1416
Value of d is : 4294967214
```

```
Value of a is : 0
Value of b is : b
Value of c is : 3.1416
Value of d is : 82
-
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
My name is: The Dude
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Value of a + b is : 20
Value of x + y is : 20.1804
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Value of a + b is : 41
Value of a - b is : 31
Value of a * b is : 180
Value of a / b is : 7
Value of a % b is : 1
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Value of ++a is : 37
Value of --b is : 4
Value of a is : 37
Value of b is : 4
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
Value of a++ is : 36
Value of b-- is : 5
Value of a is : 37
Value of b is : 4
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
36 is greater than 5
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
28 is greater than 2
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
28 is equal to 28
-
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
value of n is: 0
value of n is: 1
value of n is: 2
value of n is: 3
value of n is: 4
value of n is: 5
value of n is: 6
value of n is: 7
value of n is: 8
value of n is: 9
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
value of n is: 0
value of n is: 2
value of n is: 4
value of n is: 6
value of n is: 8
-
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
value of n is: 0
value of n is: 2
value of n is: 4
value of n is: 6
value of n is: 8
-
```

Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe

```
value of n is: 0  
value of n is: 1  
value of n is: 2  
value of n is: 3  
value of n is: 4  
continue  
value of n is: 6  
value of n is: 7  
value of n is: 8  
value of n is: 9
```

■

Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe

```
value a is out of range
```

■

Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe

```
Sum of 28 and 12 is 40
```

■

Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe

```
Sum of 28 and 12 is 40  
Value returned by multiply function is: 384
```

■

C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe

```
Sum of 28 and 12 is 40  
Value returned by multiply function is: 384  
Value returned by multiply function is: -103.272
```

■

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
Element at the 0th index 12  
Element at the 4th index 9
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
Element at the 0th index is: 12  
Element at the 1th index is: 6  
Element at the 2th index is: 18  
Element at the 3th index is: 7  
Element at the 4th index is: 9
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
2 8 10 -5  
15 21 22 32  
3 0 19 5  
5 7 -23 18
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
Hello, World !
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
00AFFA00
```

```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
```

```
00AFFA00
```



```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
12
6
9
6
-
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
student 0 age: 17 height: 39.45
student 1 age: 12 height: 29.45
student 2 age: 8 height: 13.45
-
```

```
Select C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
The weekend is here !!!!
-
```

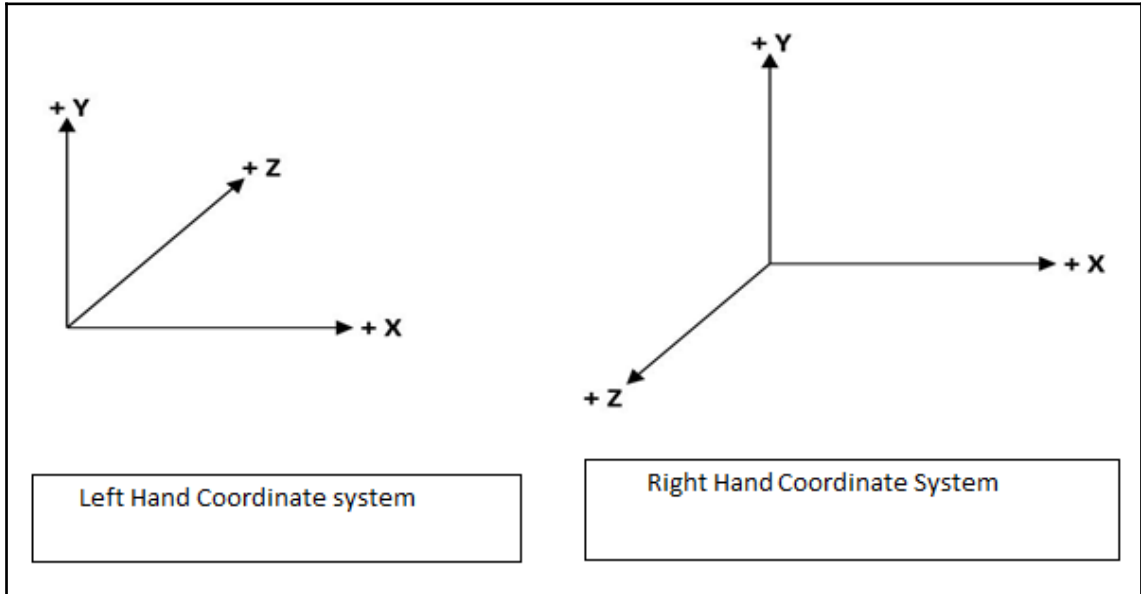
```
C:\Users\siddesktop\source\repos\MyFirstProject\Debug\MyFirstProject.exe
length is: 8 breadth is: 8
Area is: 64
length is: 12 breadth is: 20
Area is: 240
-
```

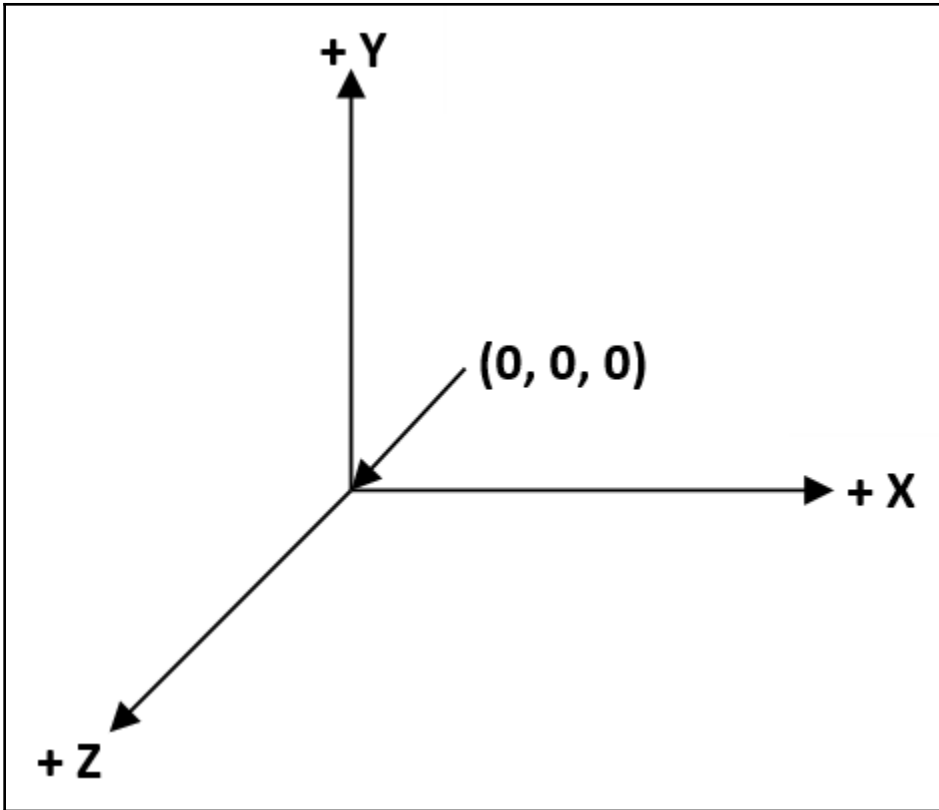
```
D:\Users\siddharth.shekar\source\repos\myFirstProject\Debug\myFirstProject.exe
length is: 8 height is: 12
Area is: 96
length is: 3 height is: 23
Area of a Triangle is: 34.5
```

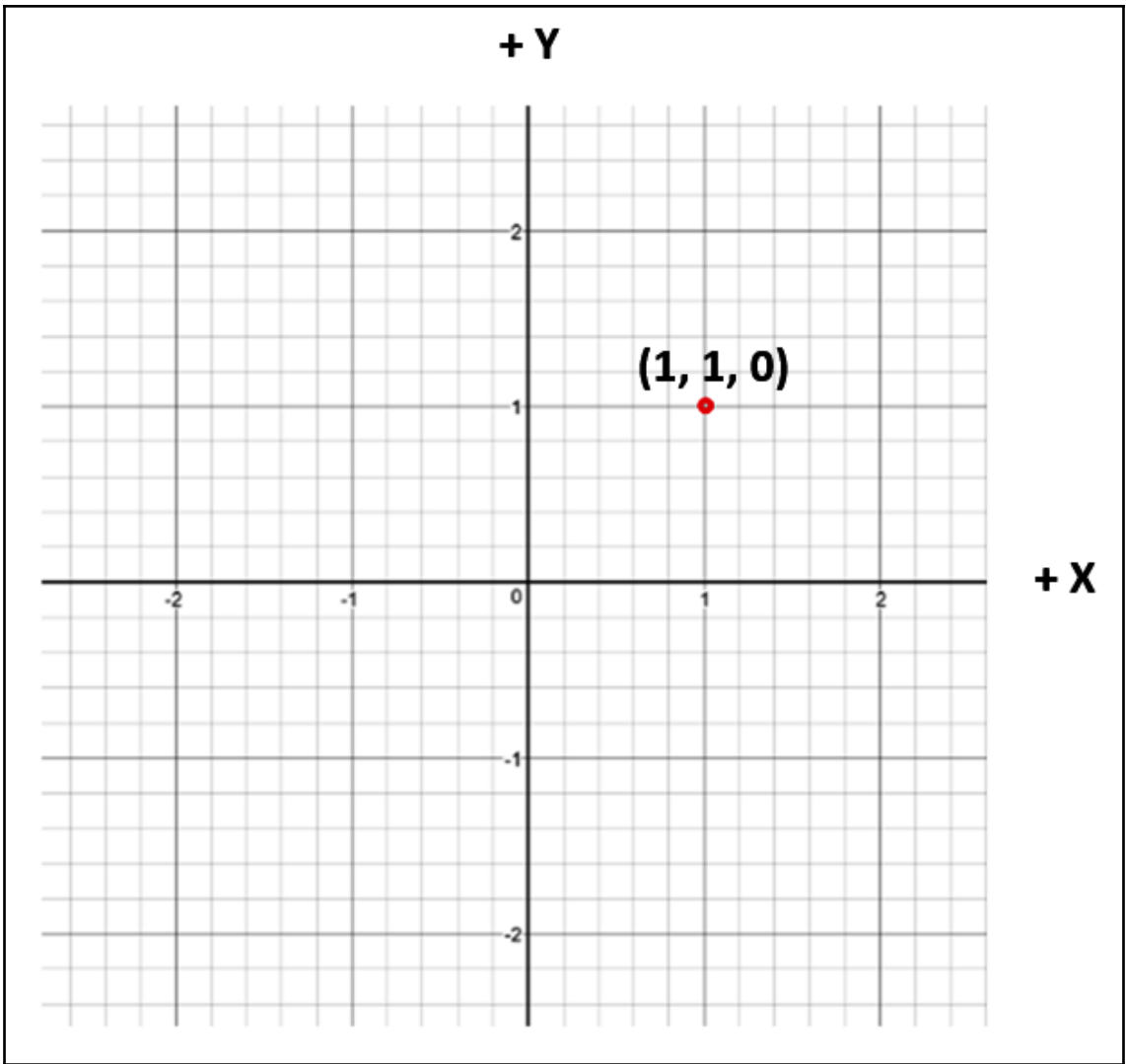
D:\Users\siddharth.shekar\source\repos\myFirstProject\Debug\myFirstProject.exe

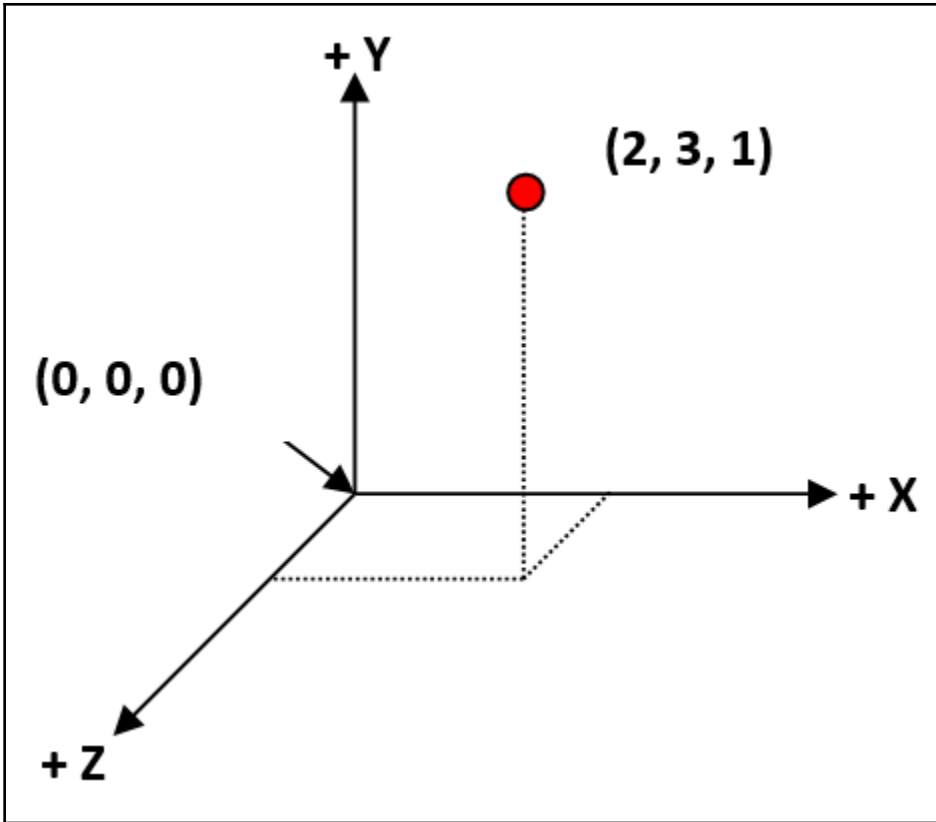
```
length is: 8 height is: 12  
Area is: 96  
length is: 3 height is: 23  
Area of a Triangle is: 34.5  
Area of a Circle is: 3.62017e+16
```

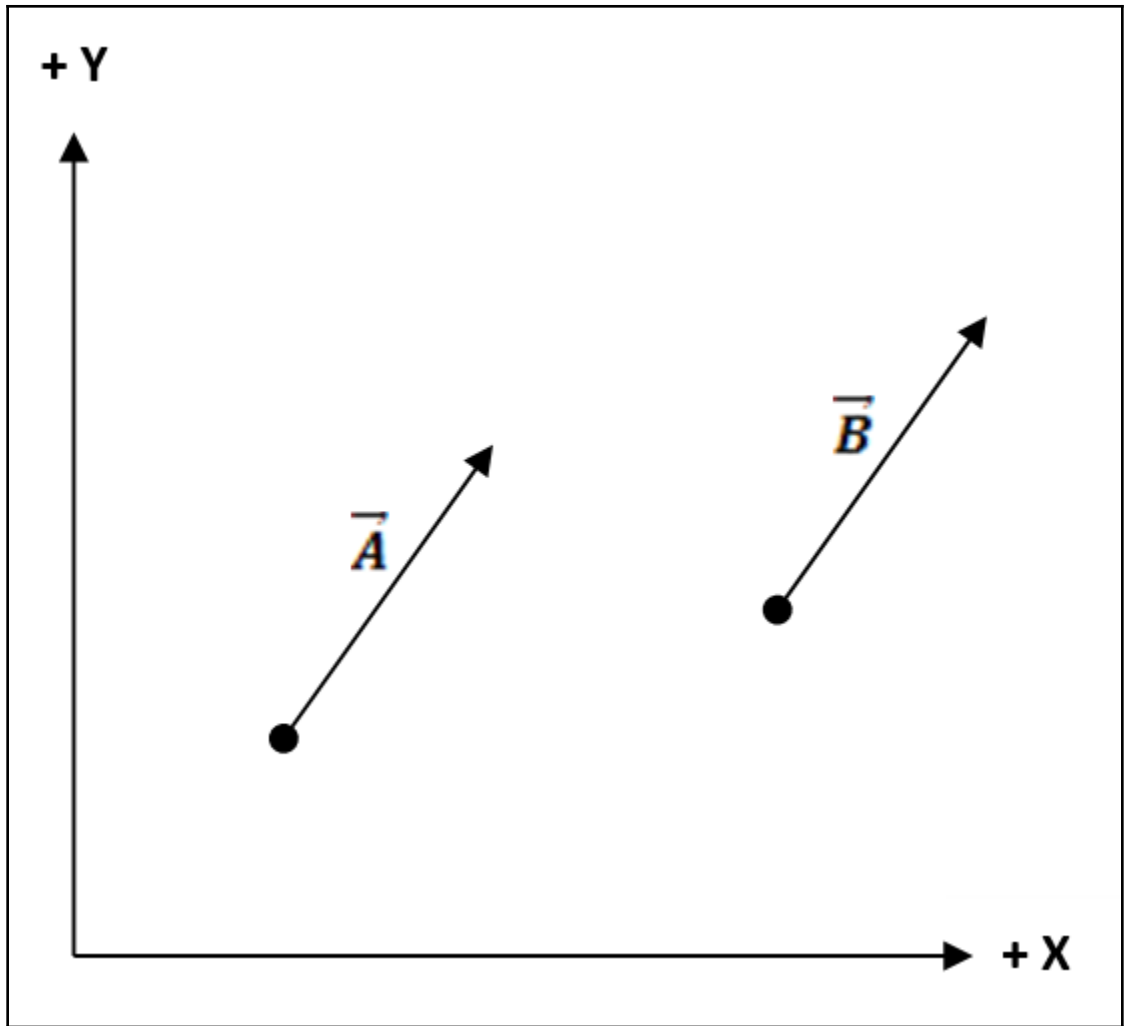
Chapter 2: Mathematics and Graphics Concepts

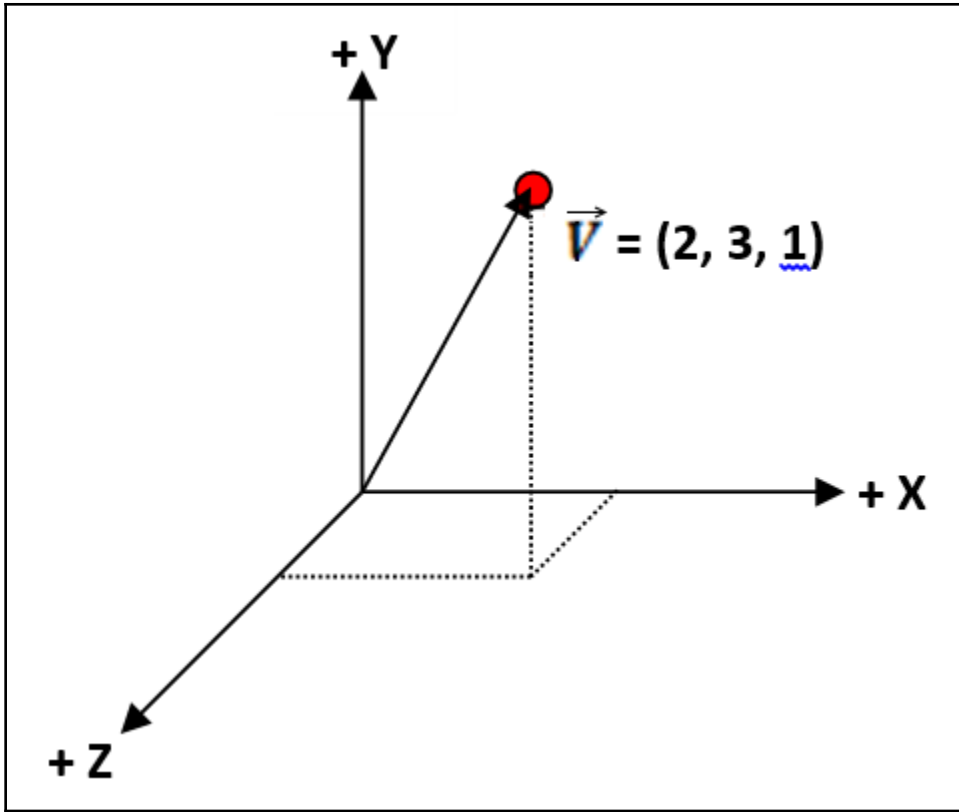


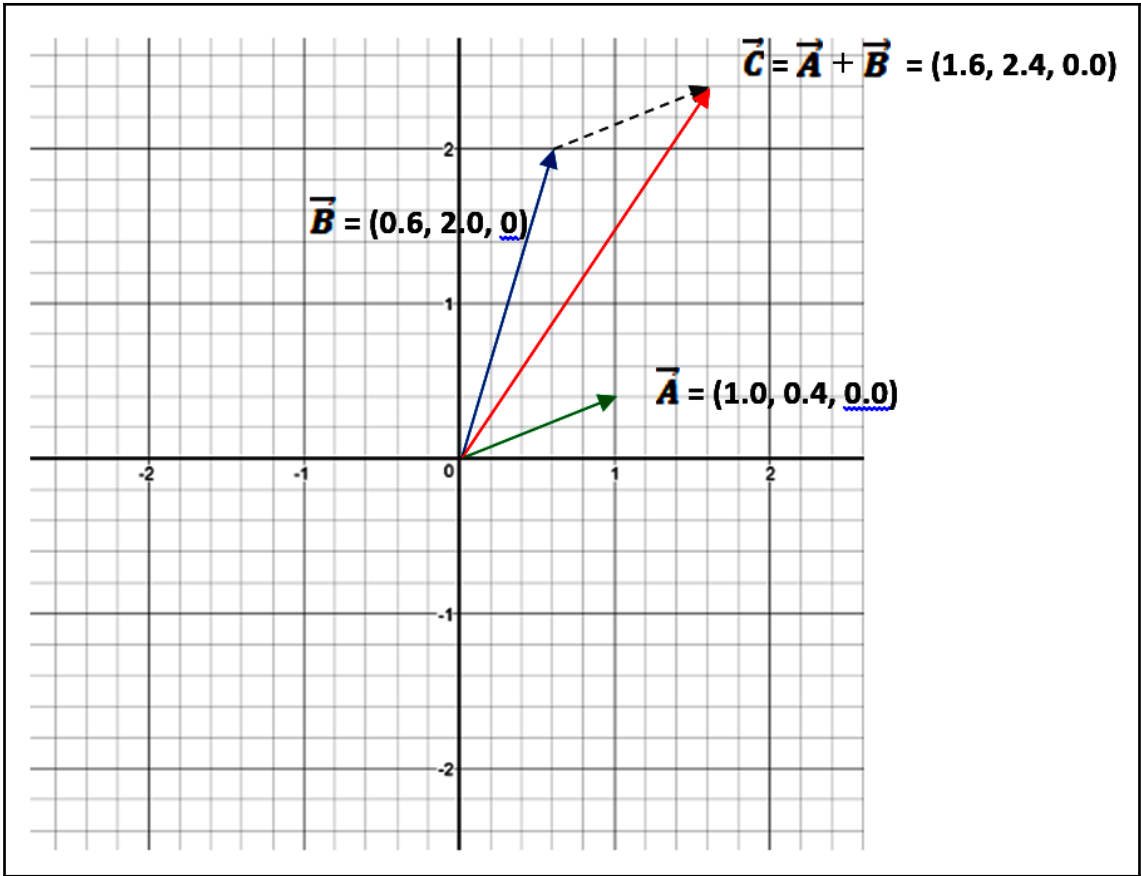


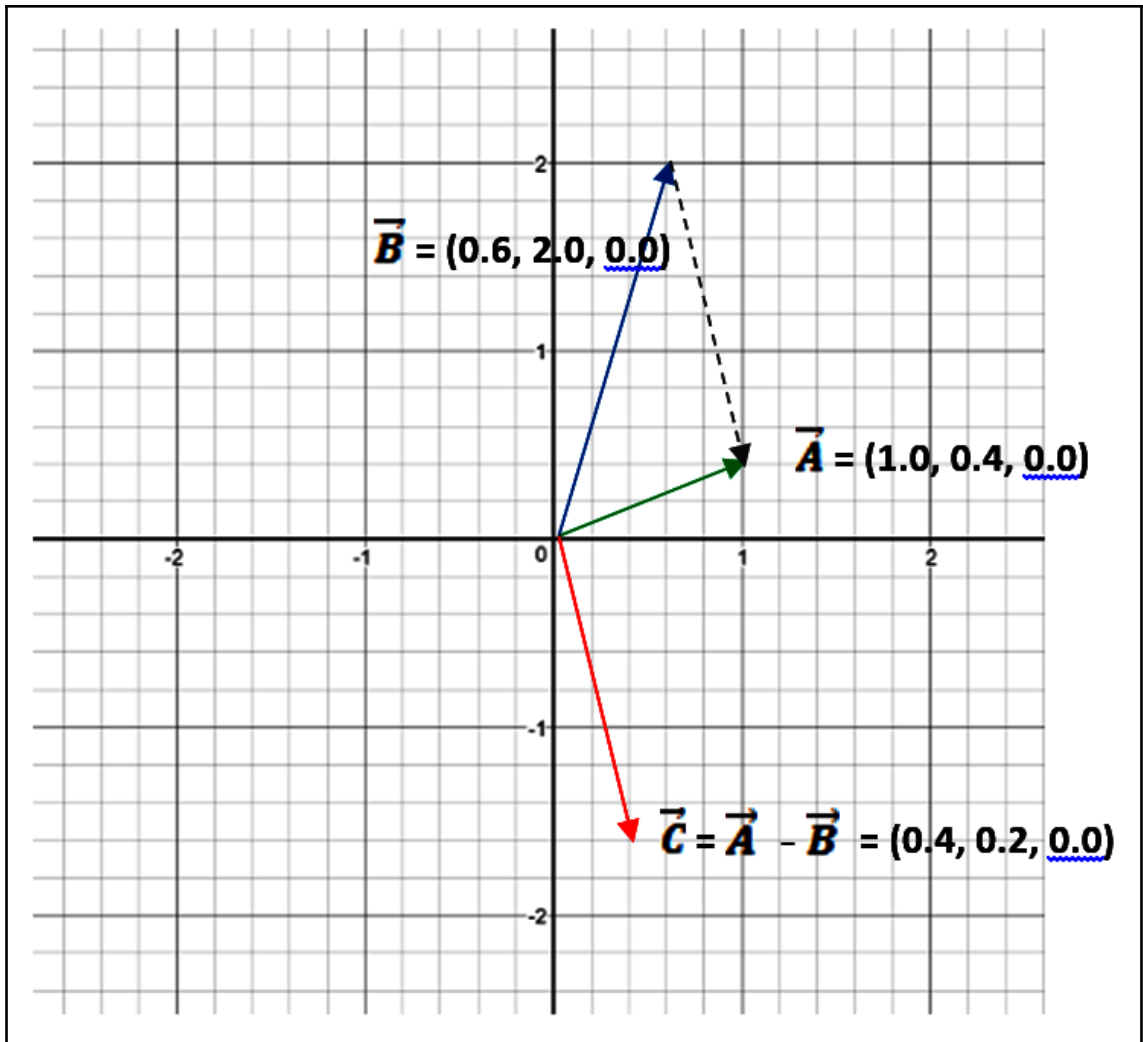


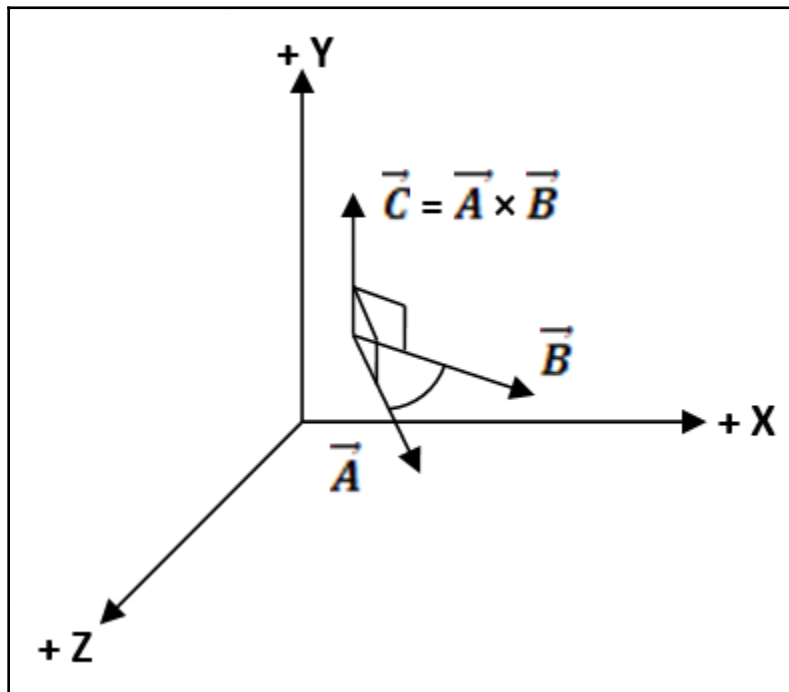
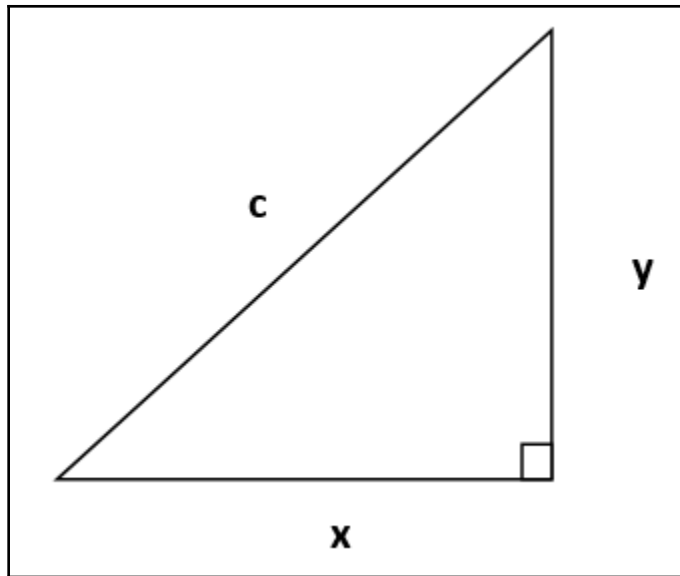













← → ↻ https://glm.g-truc.net/0.9.9/index.html ☆

GLM
0.9.9 0.9.8 0.9.7 0.9.6 0.9.5 0.9.4 0.9.3 0.9.2 0.9.1



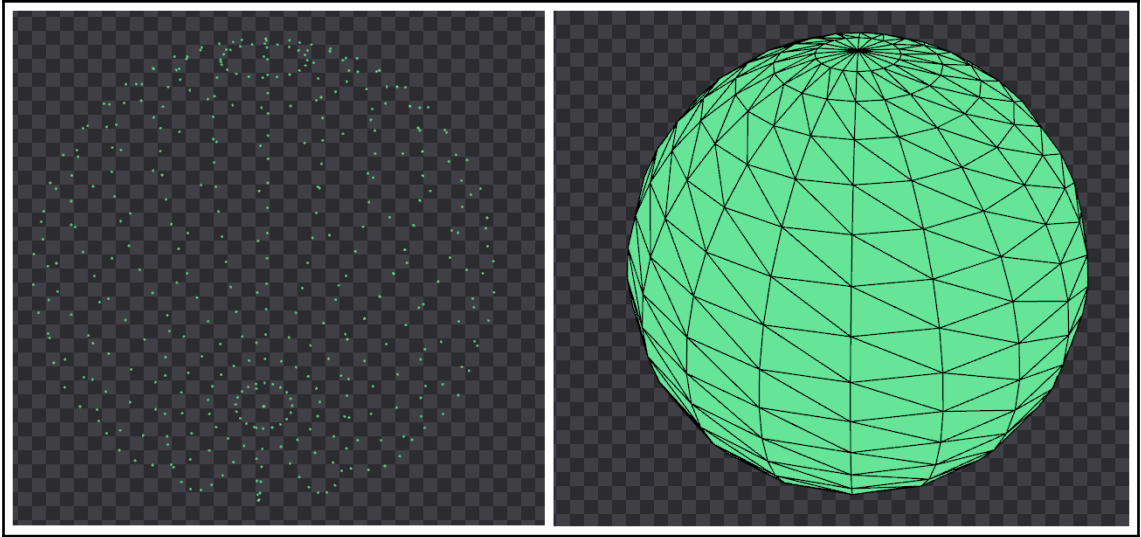
OpenGL Mathematics

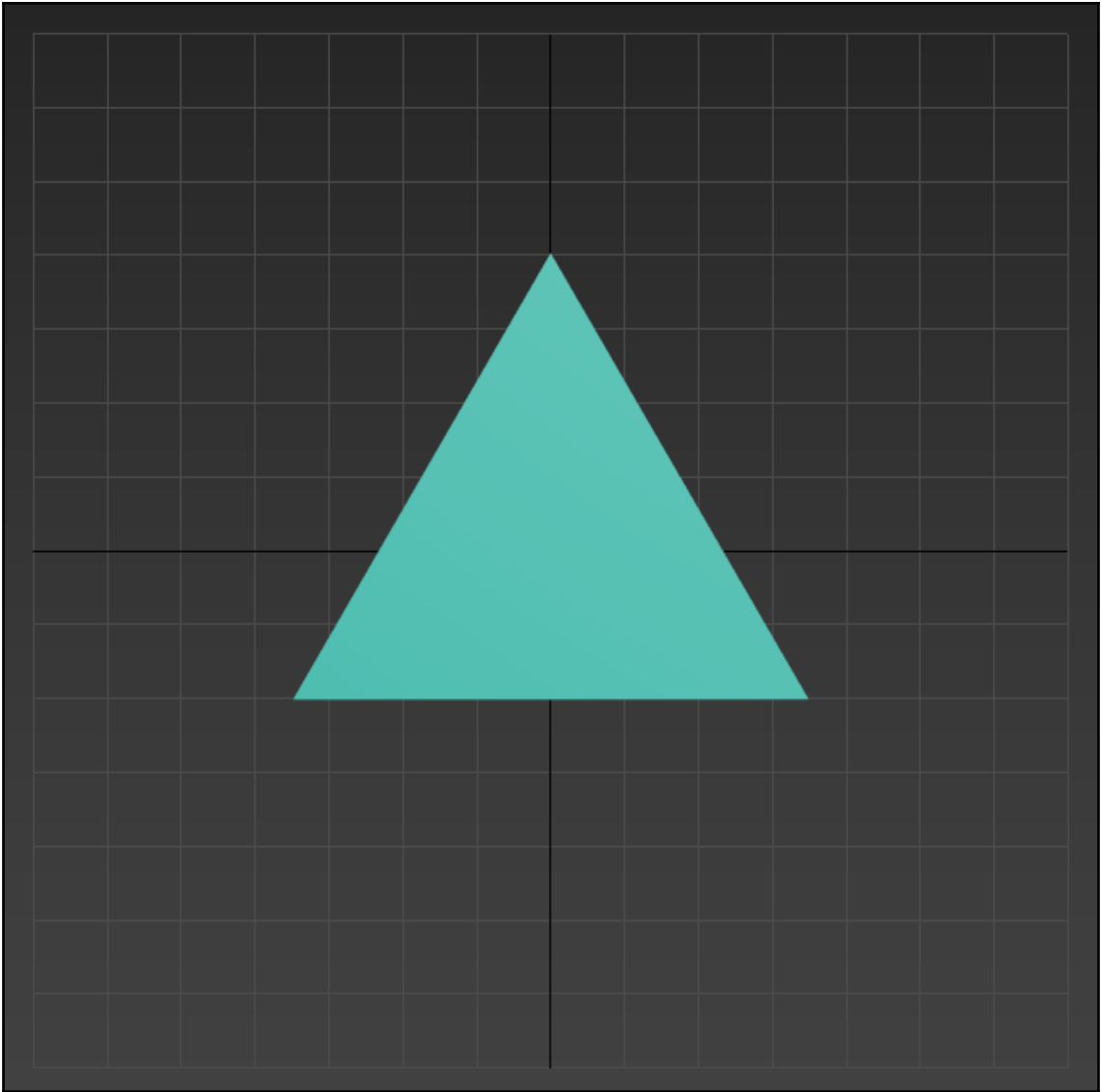
GLSL + Optional features = OpenGL Mathematics (GLM)
A C++ mathematics library for graphics programming

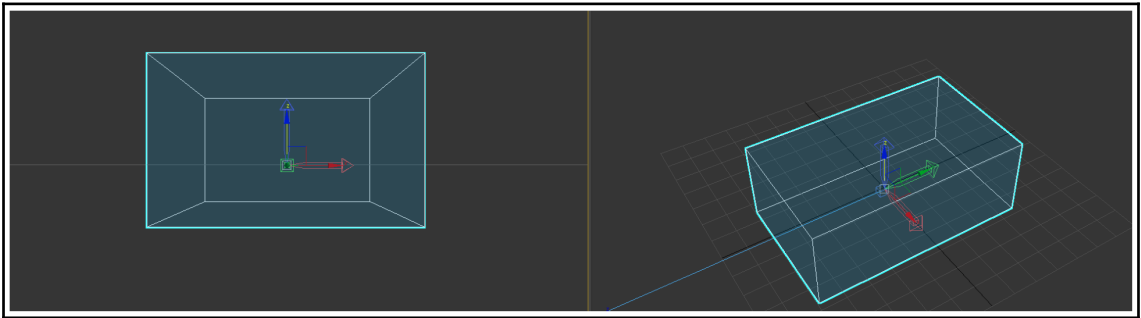
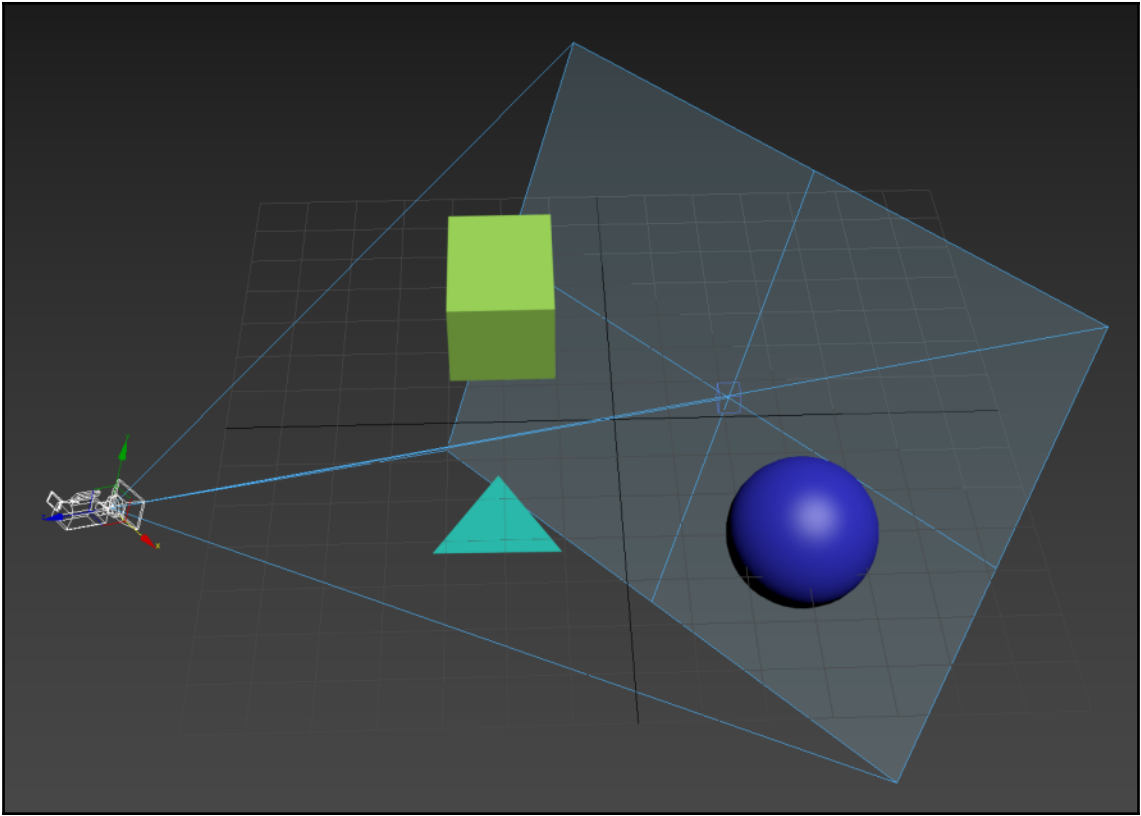
Download GLM 0.9.9.3
2018-10-31

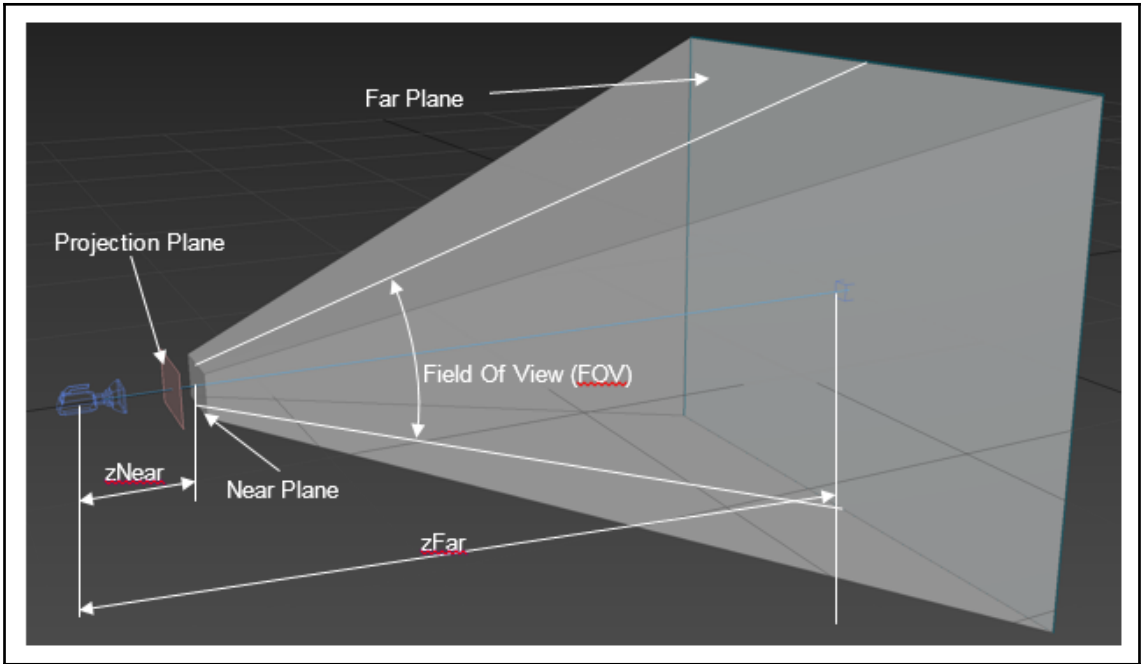
OpenGL Mathematics (GLM) is a header only C++ mathematics library for graphics software based on the [OpenGL Shading Language \(GLSL\)](#) specifications.

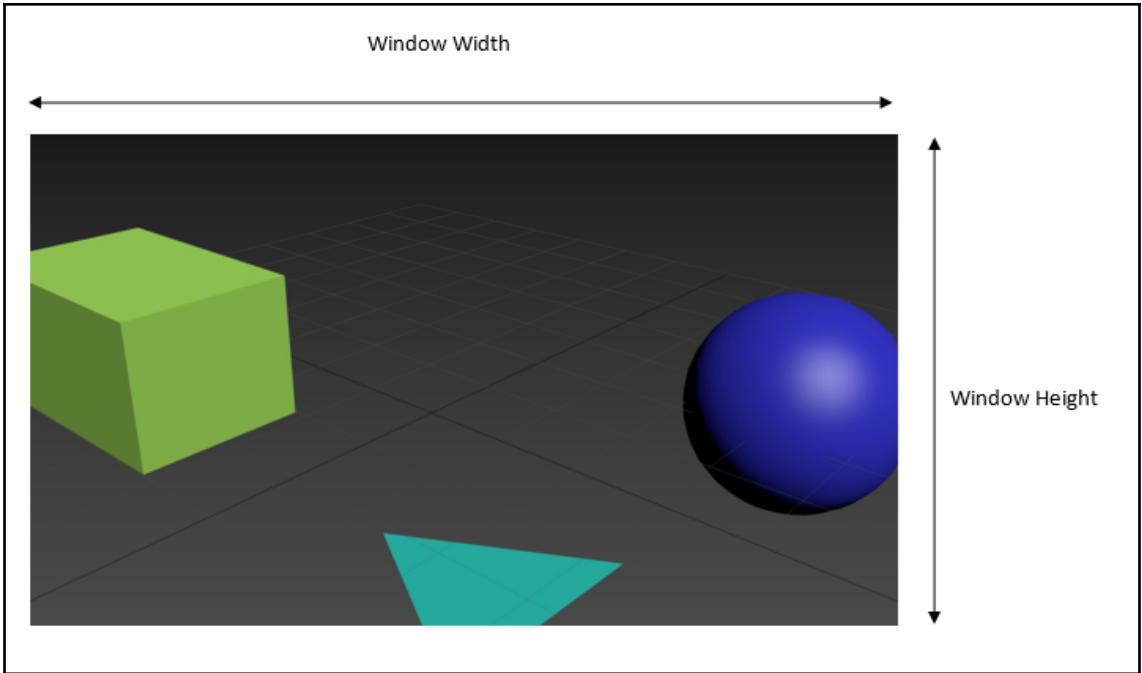
C Type	Bitdepth	Description	Common Enum
GLboolean	1+	A boolean value, either <code>GL_TRUE</code> or <code>GL_FALSE</code>	
GLbyte	8	Signed, 2's complement binary integer	<code>GL_BYTE</code>
GLubyte	8	Unsigned binary integer	<code>GL_UNSIGNED_BYTE</code>
GLshort	16	Signed, 2's complement binary integer	<code>GL_SHORT</code>
GLushort	16	Unsigned binary integer	<code>GL_UNSIGNED_SHORT</code>
GLint	32	Signed, 2's complement binary integer	<code>GL_INT</code>
GLuint	32	Unsigned binary integer	<code>GL_UNSIGNED_INT</code>
GLfixed	32	Signed, 2's complement 16.16 integer	<code>GL_FIXED</code>
GLint64	64	Signed, 2's complement binary integer	
GLuint64	64	Unsigned binary integer	
GLsizei	32	A non-negative binary integer, for sizes.	
GLenum	32	An OpenGL enumerator value	
GLintptr	<i>ptrbits</i> ¹	Signed, 2's complement binary integer	
GLsizeiptr	<i>ptrbits</i> ¹	Non-negative binary integer size, for memory offsets and ranges	
GLsync	<i>ptrbits</i> ¹	Sync Object handle	
GLbitfield	32	A bitfield value	
GLhalf	16	An IEEE-754 floating-point value	<code>GL_HALF_FLOAT</code>
GLfloat	32	An IEEE-754 floating-point value	<code>GL_FLOAT</code>
GLclampf	32	An IEEE-754 floating-point value, clamped to the range [0,1]	
GLdouble	64	An IEEE-754 floating-point value	<code>GL_DOUBLE</code>
GLclampd	64	An IEEE-754 floating-point value, clamped to the range [0,1]	

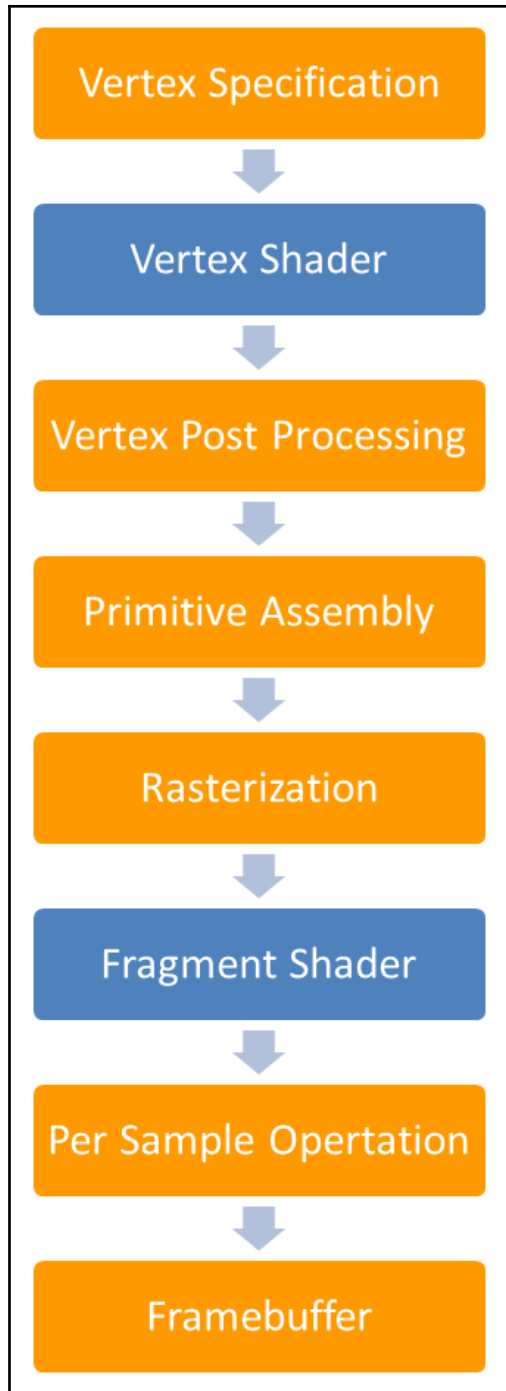


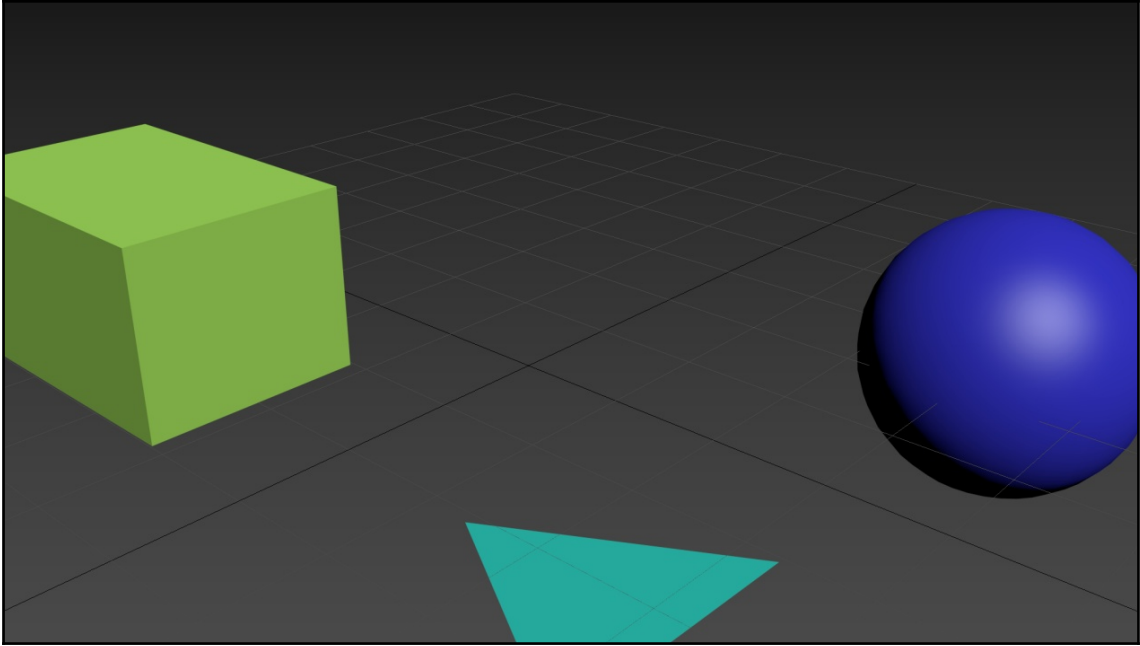


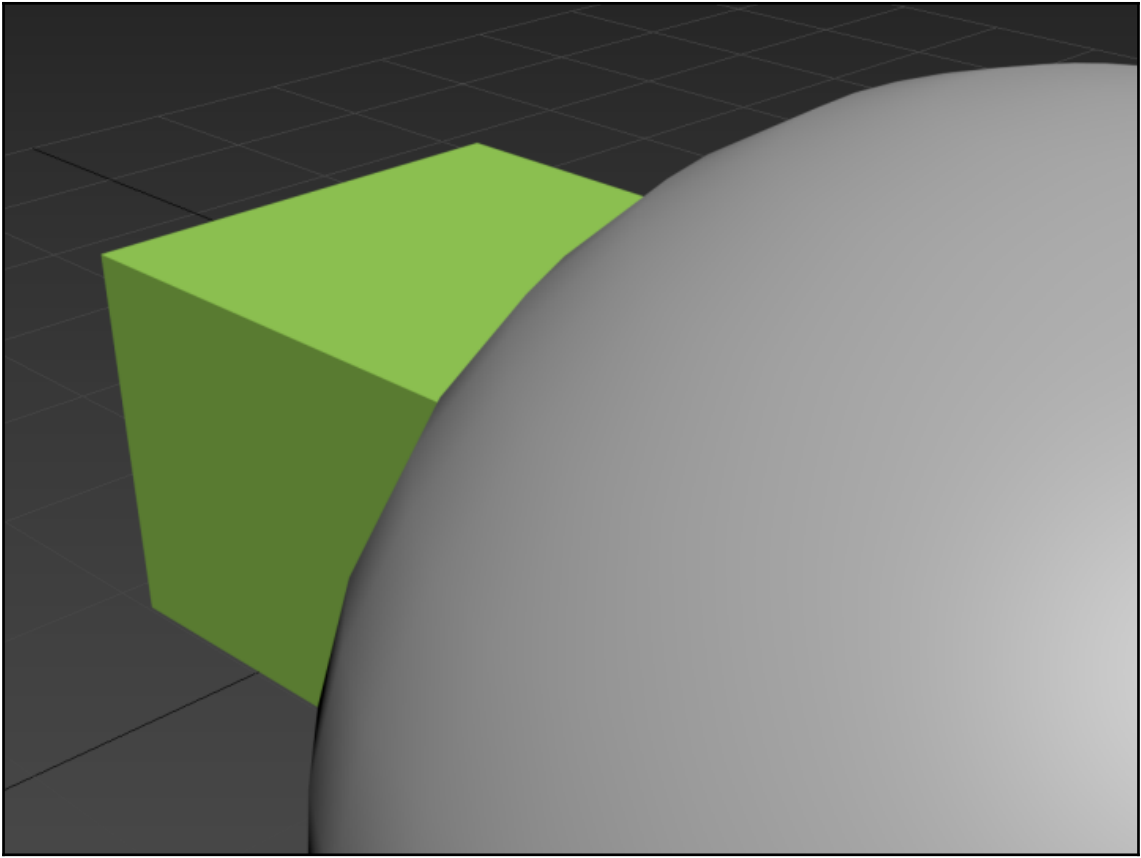


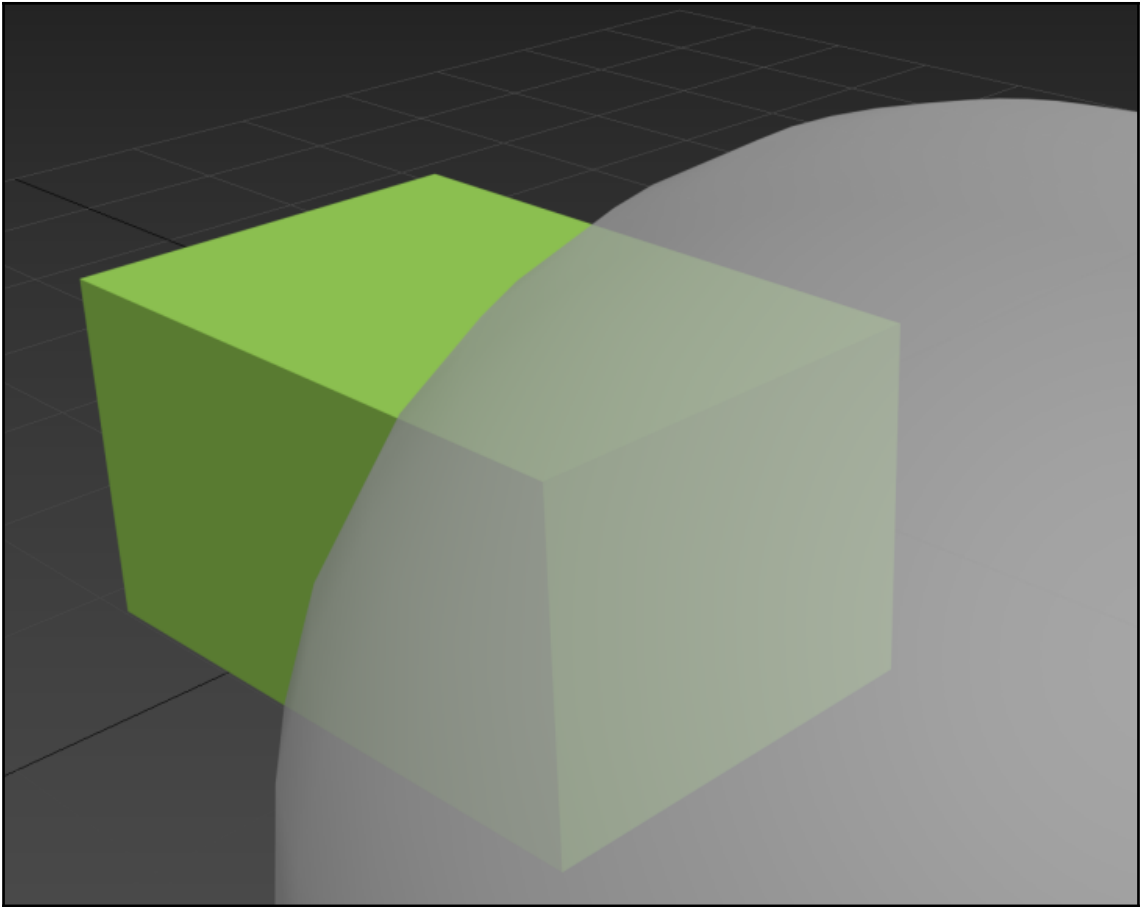




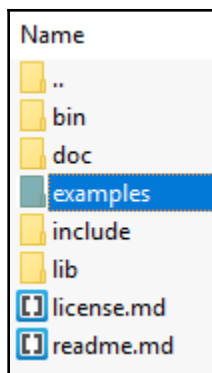
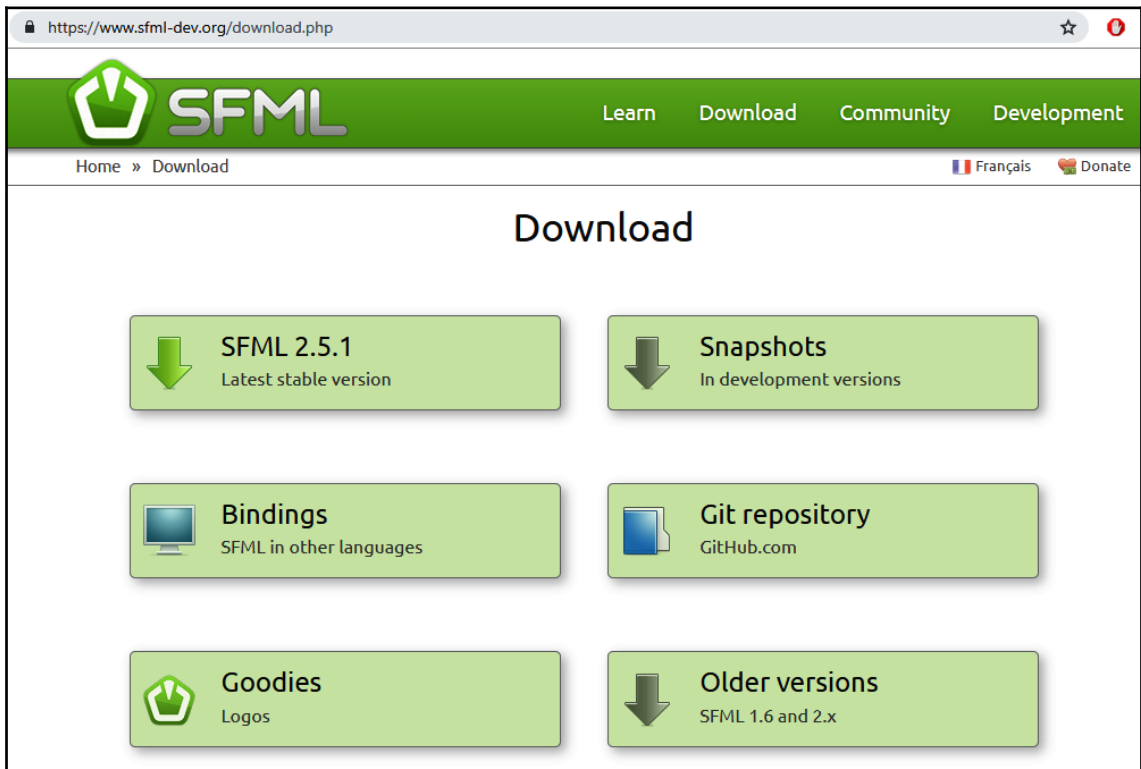


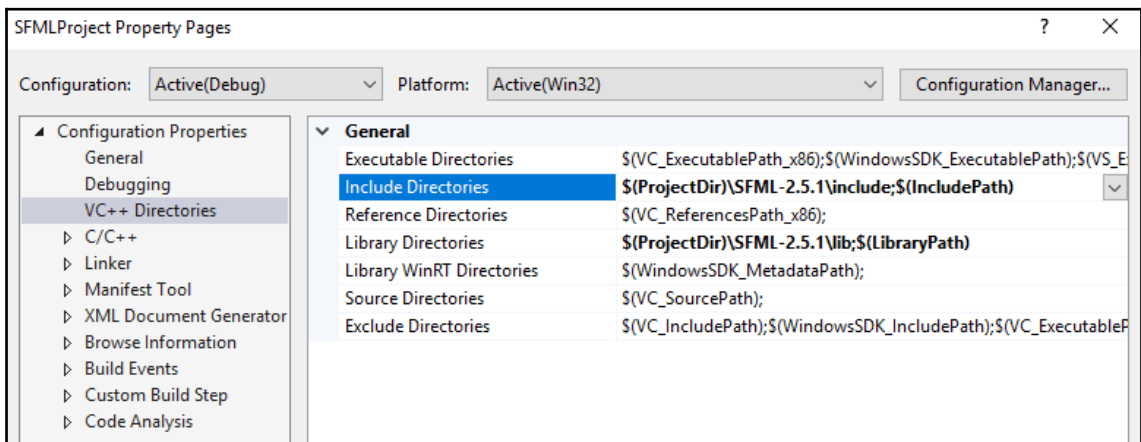
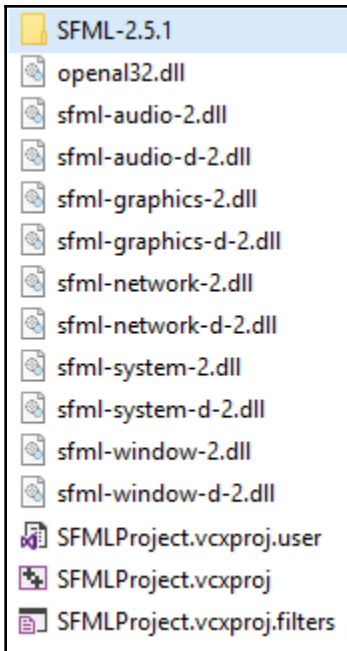


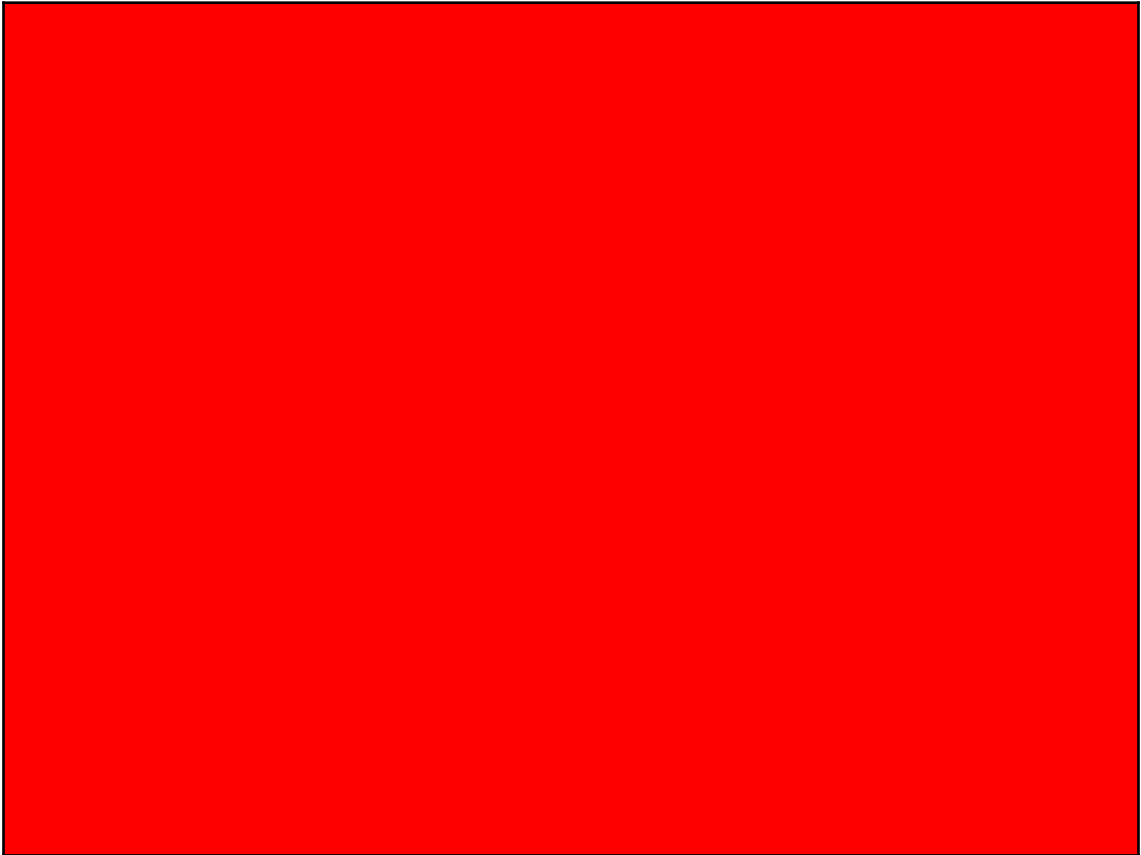
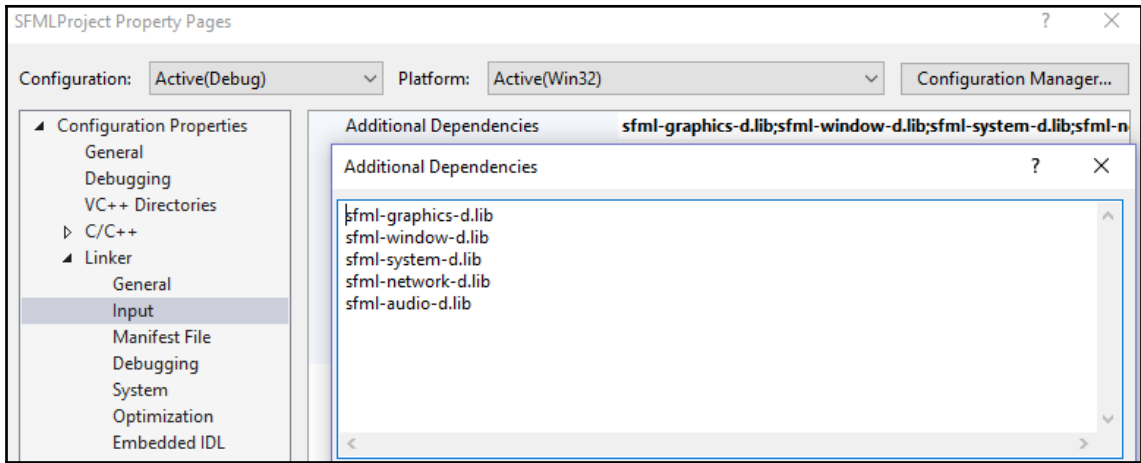


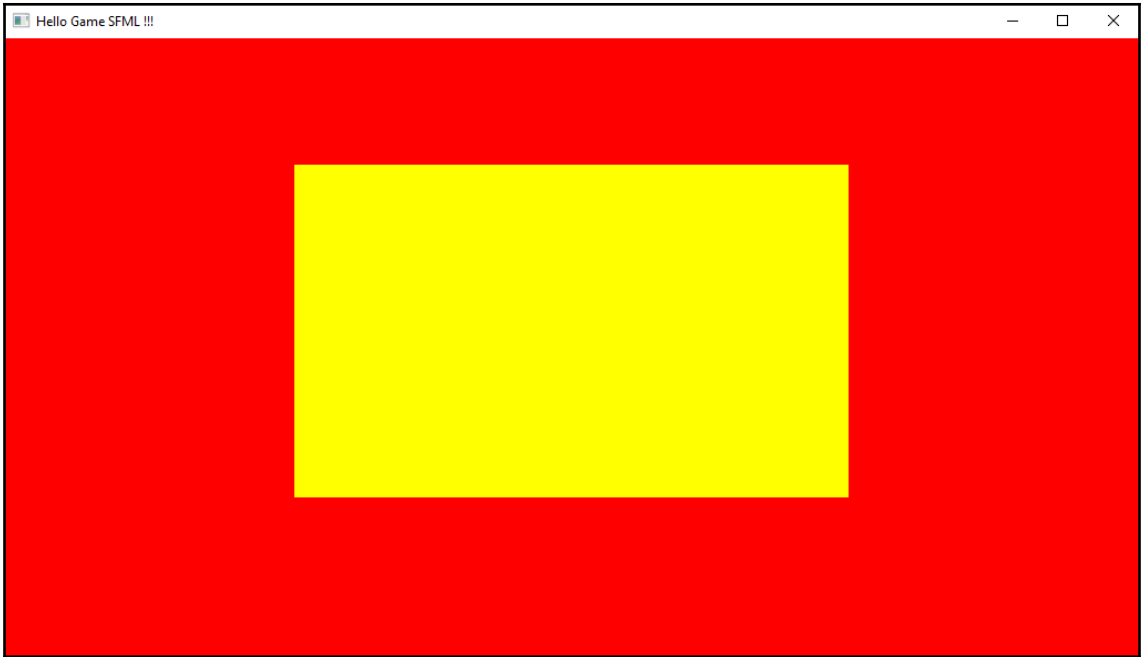


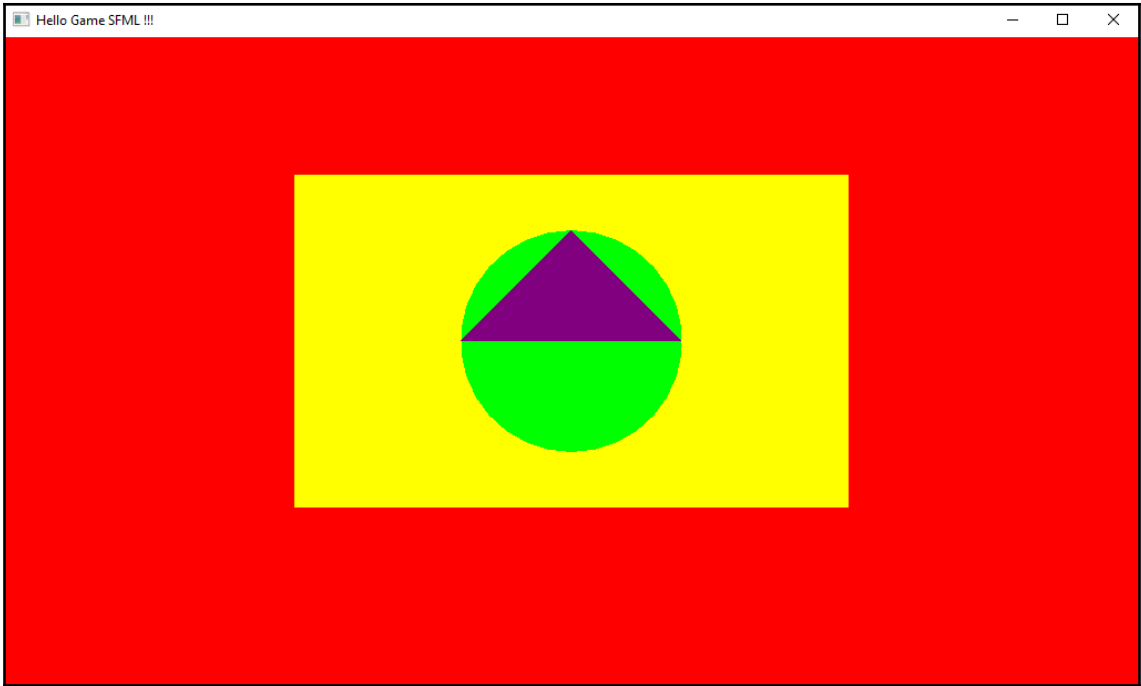
Chapter 3: Setting Up Your Game

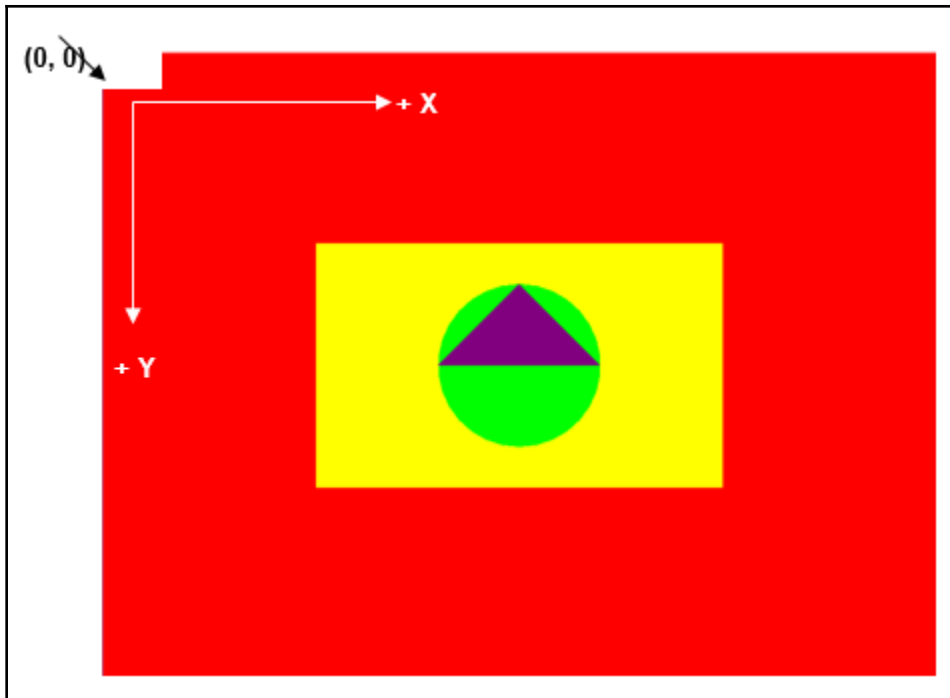
















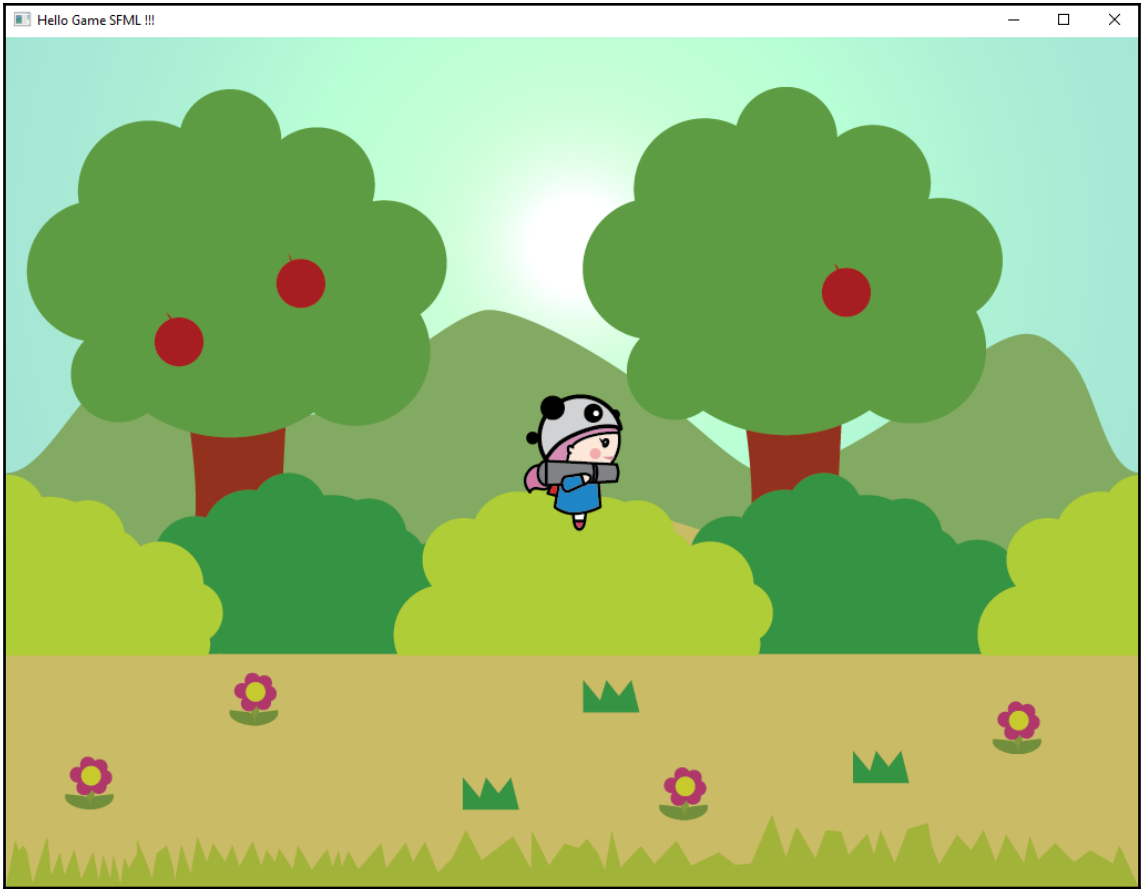


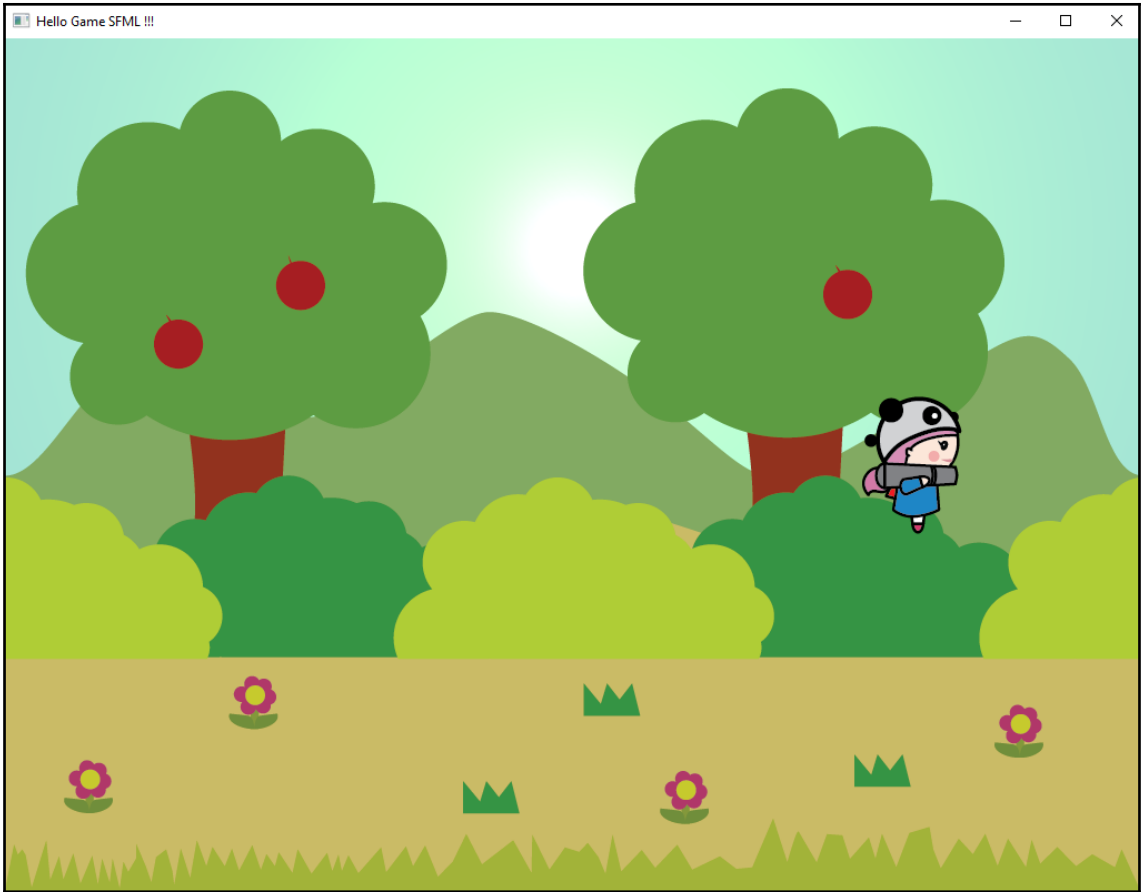


Name	
	Assets
	Debug
	SFML-2.5.1
	opengl32.dll
	sfml-audio-2.dll
	sfml-audio-d-2.dll
	sfml-graphics-2.dll
	sfml-graphics-d-2.dll





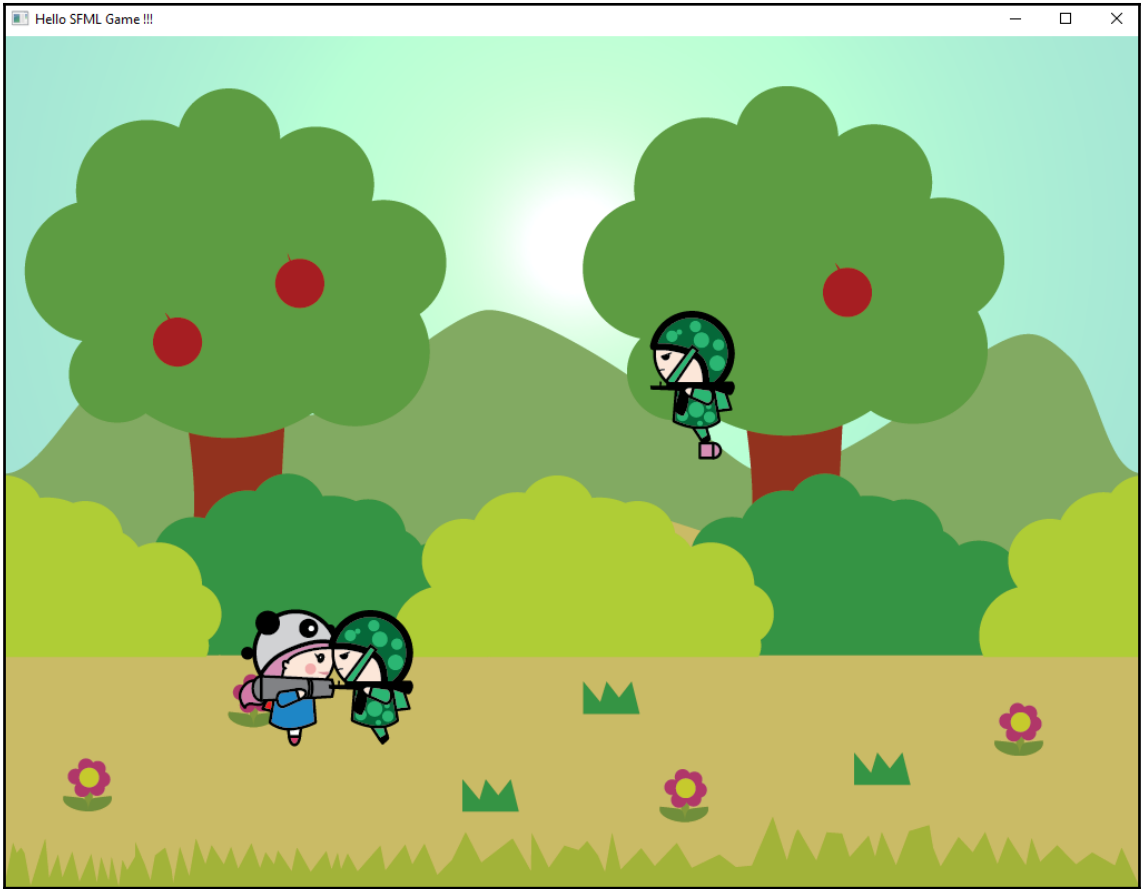




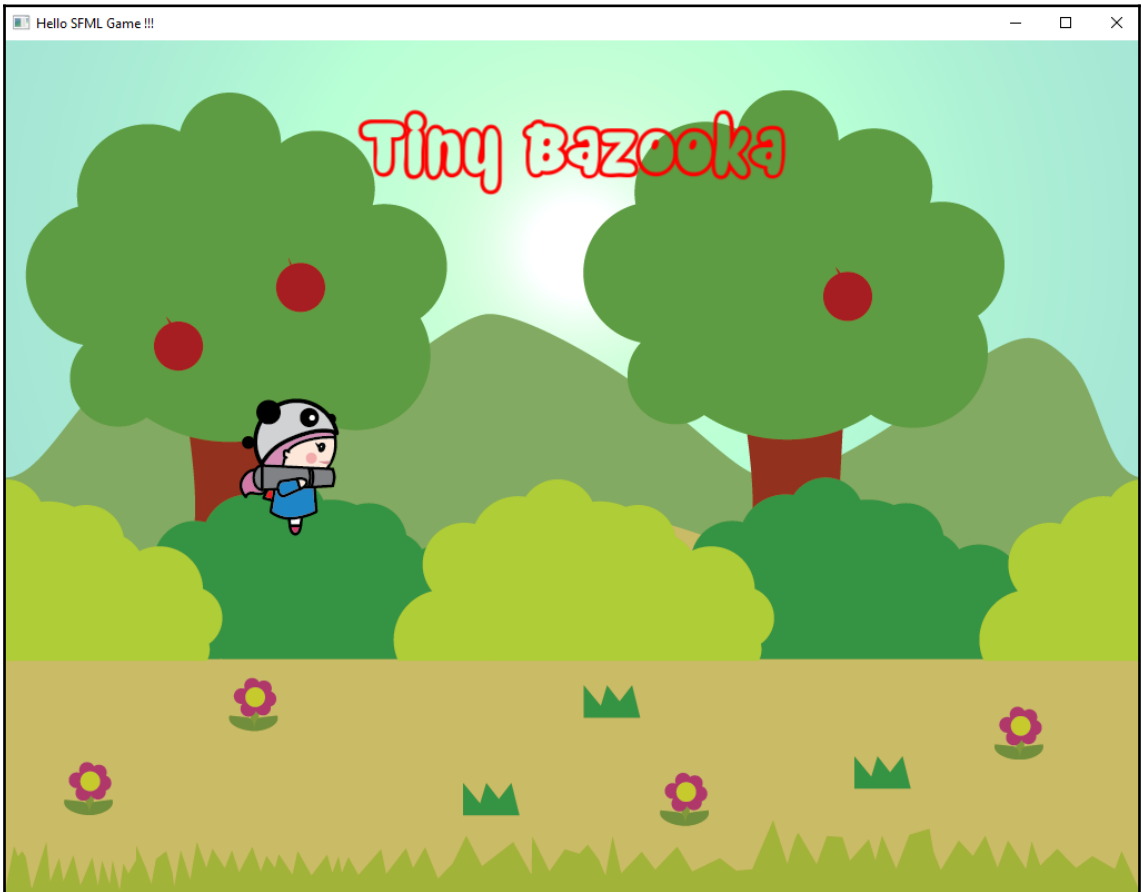
Chapter 4: Creating Your Game

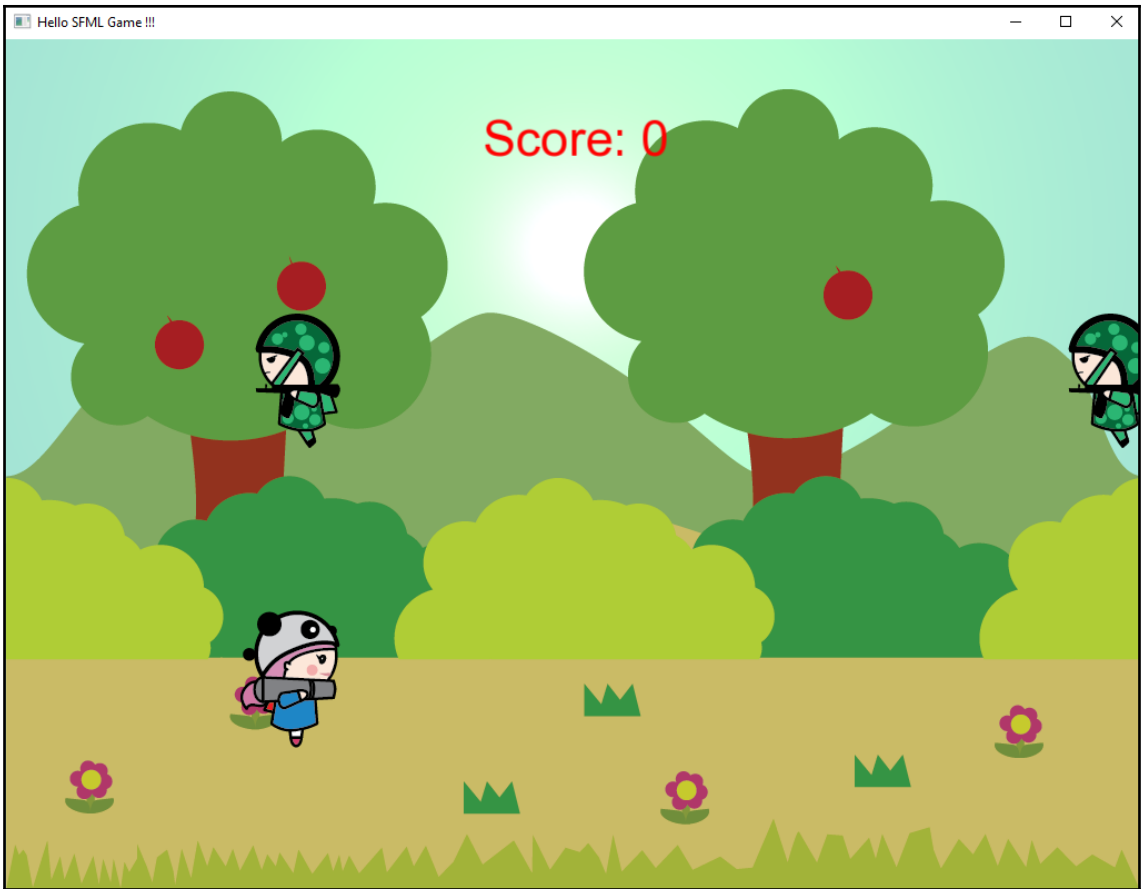




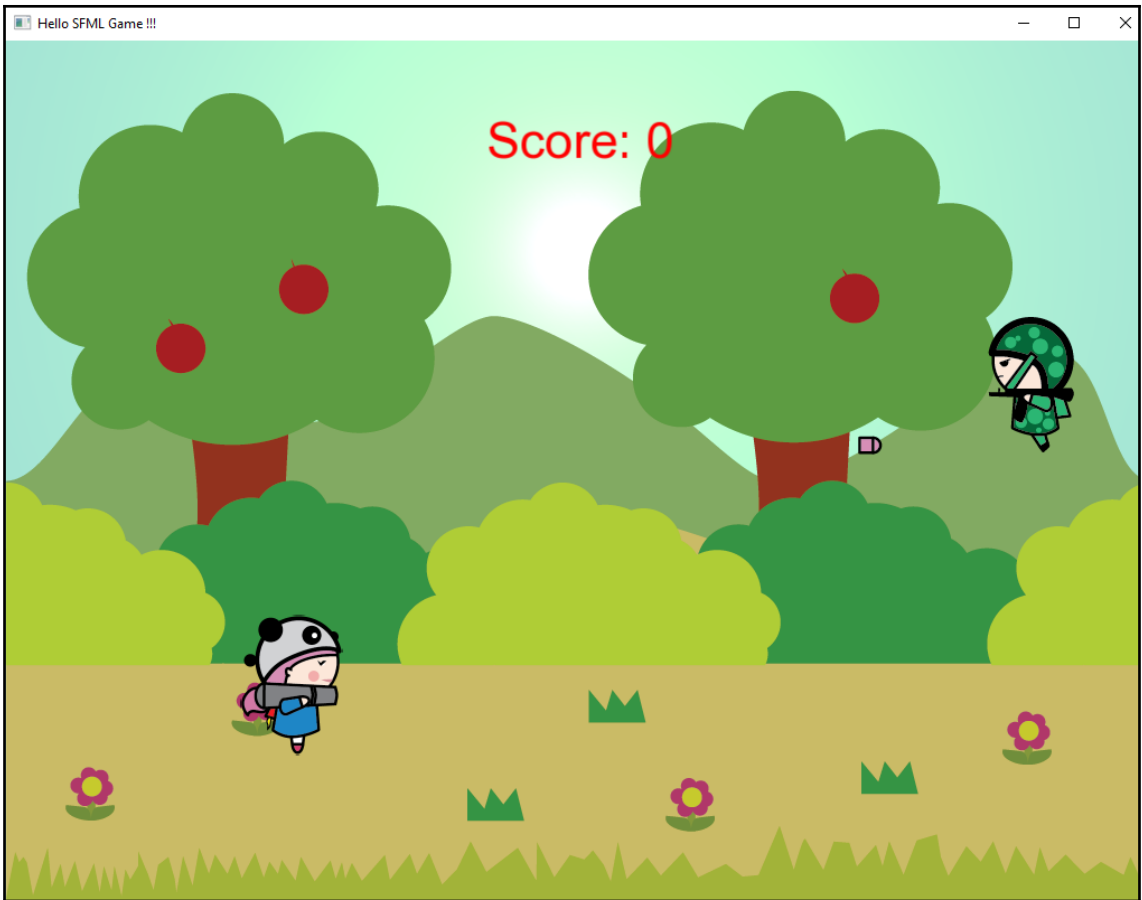


Chapter 5: Finalizing Your Game









Chapter 6: Getting Started with OpenGL

Downloads

GLEW is distributed as source and precompiled binaries.
The latest release is [2.1.0\[07-31-17\]](#):

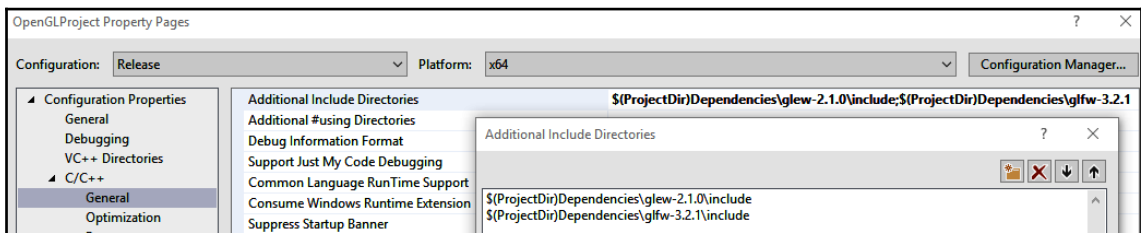
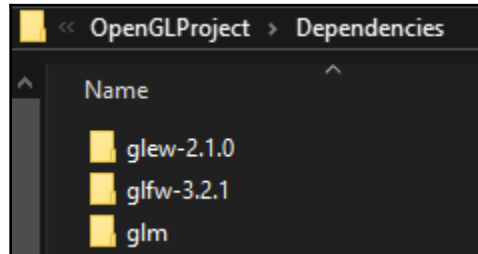
Source [ZIP](#) | [TGZ](#)
Binaries [Windows 32-bit and 64-bit](#)

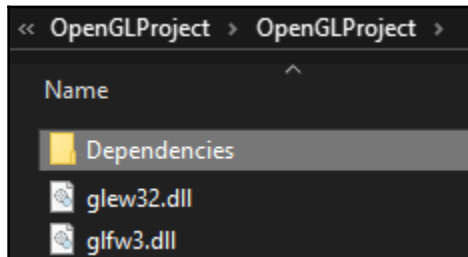
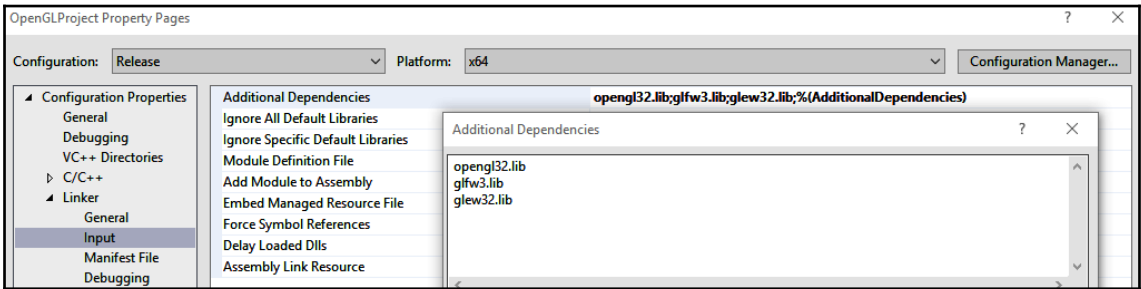
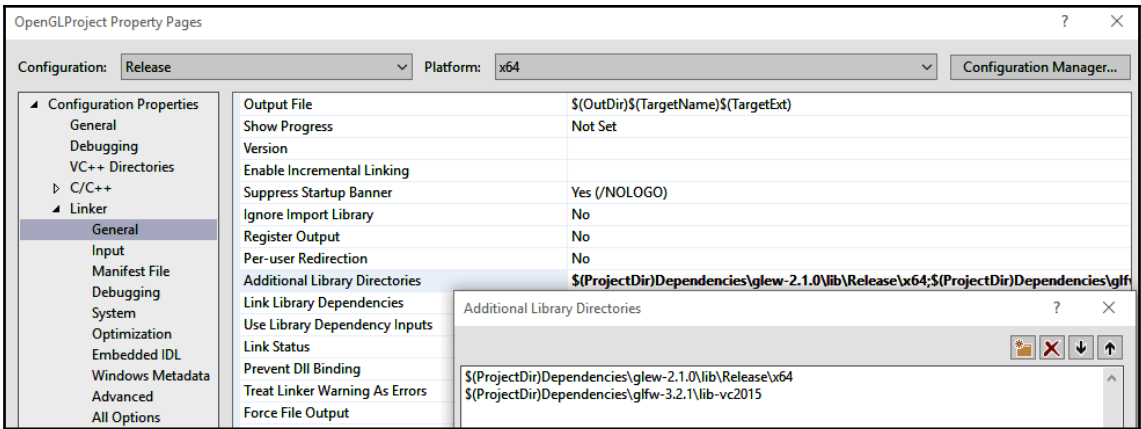
Windows pre-compiled binaries

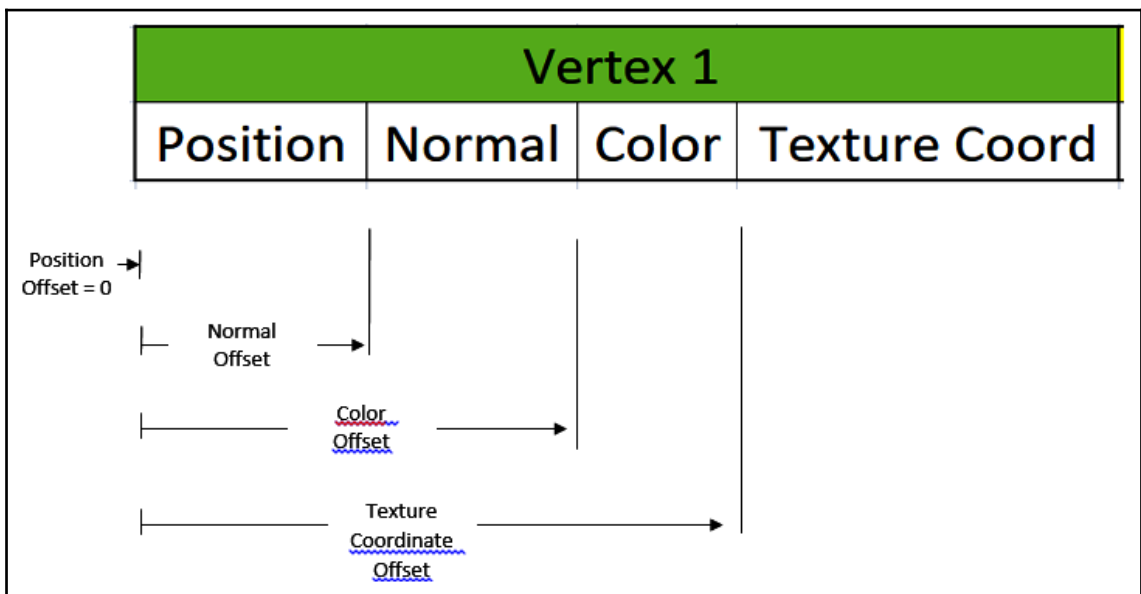
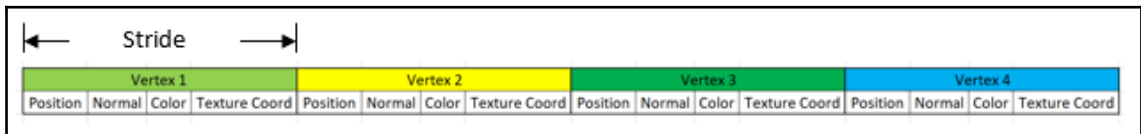
These packages contain complete GLFW header file, [documentation](#) and release mode DLL and static library binaries for Visual C++ 2010 (32-bit only), Visual C++ 2012, Visual C++ 2013, Visual C++ 2015, MinGW (32-bit only) and MinGW-w64.

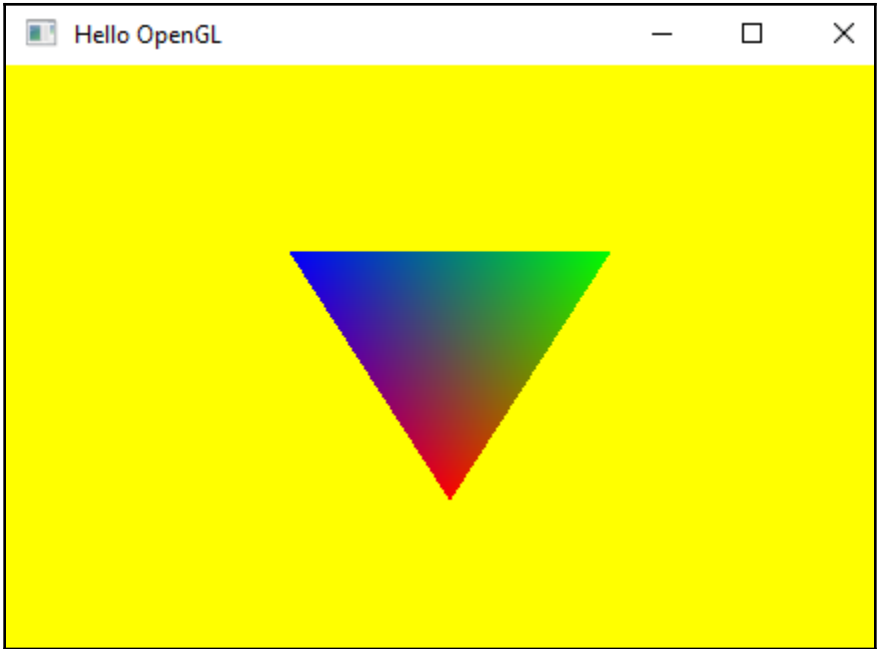
[32-bit Windows binaries](#)

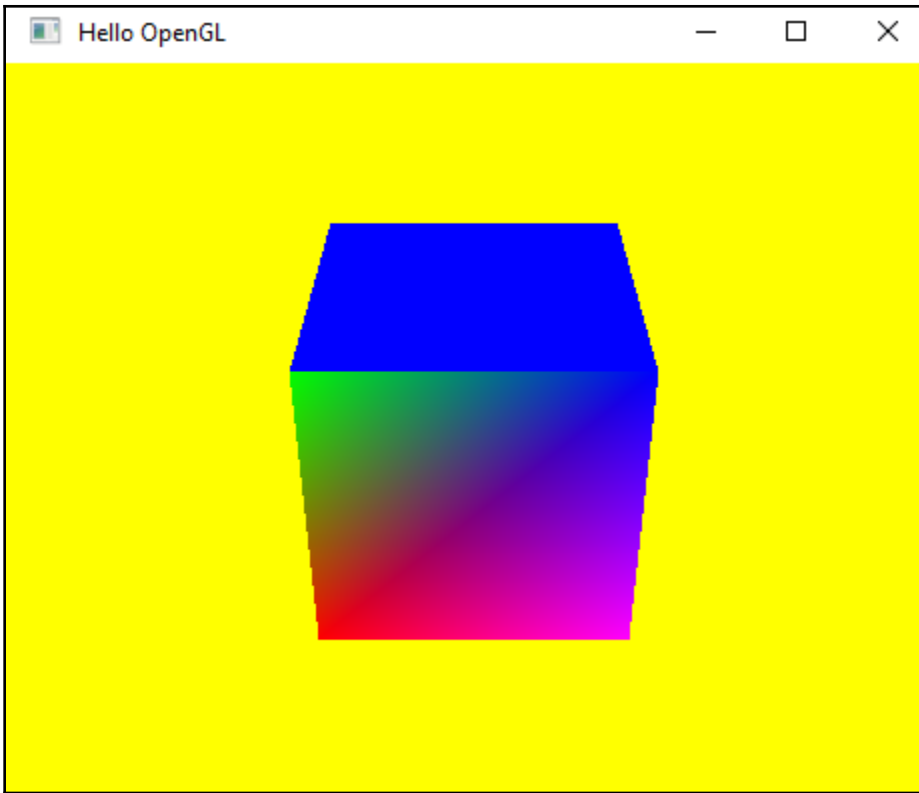
[64-bit Windows binaries](#)

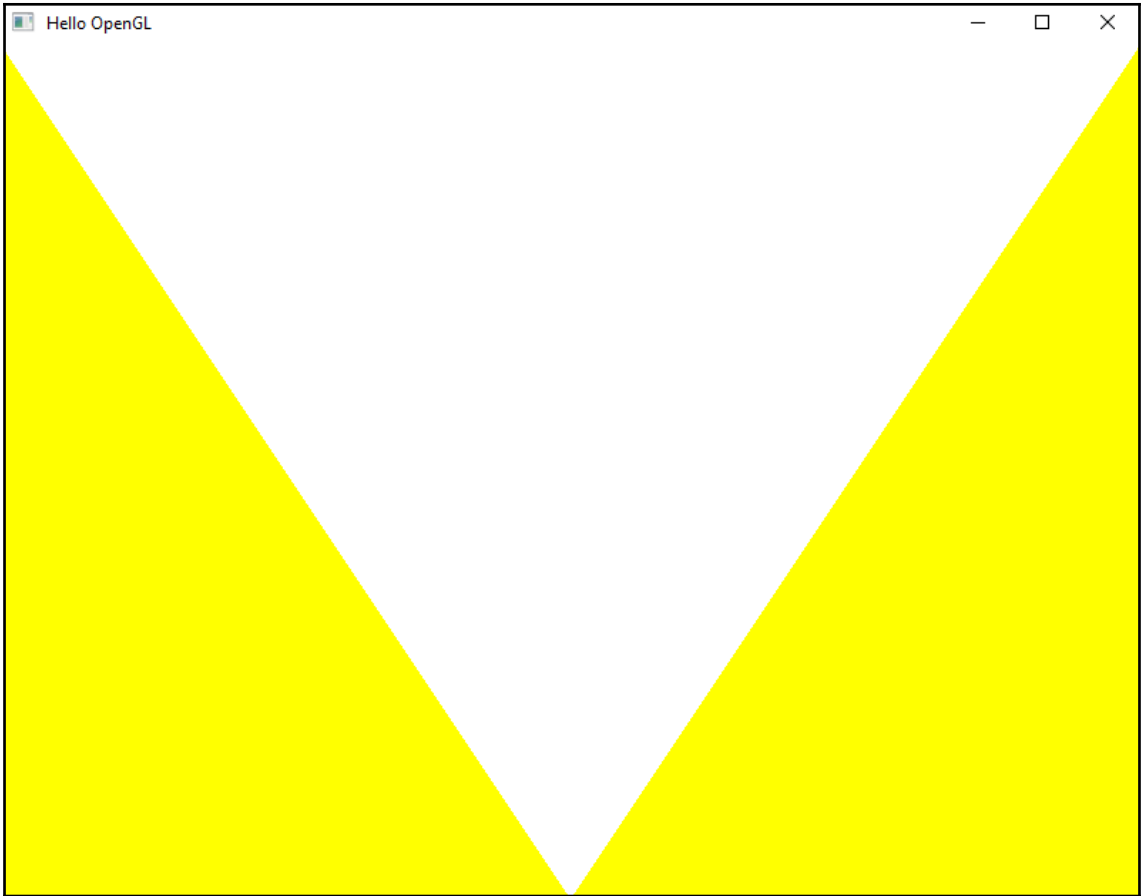










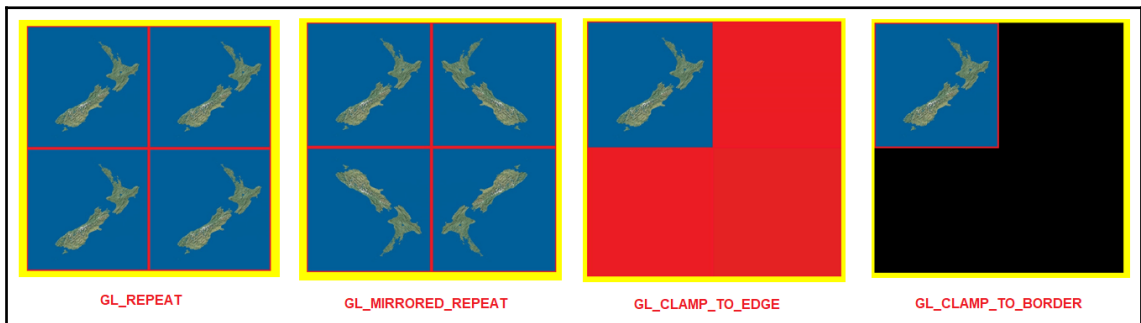
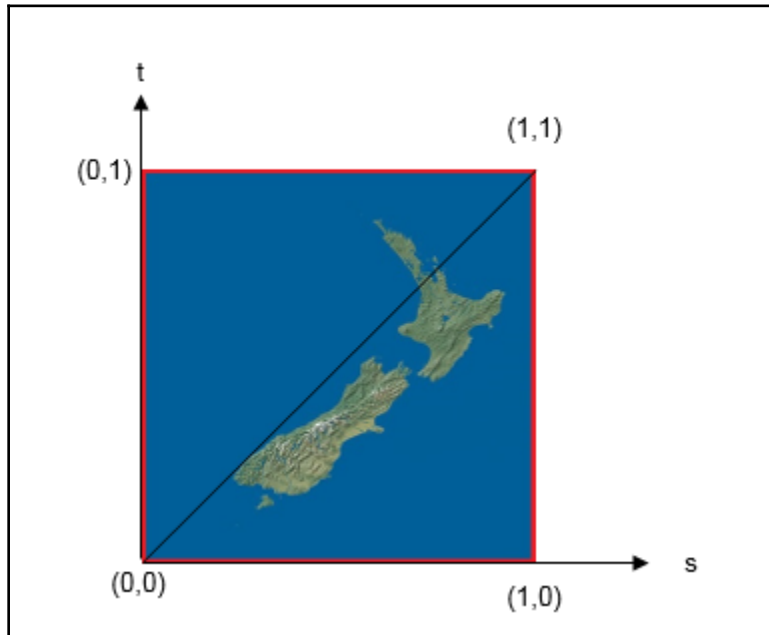


```
ERROR compiling shader: vertex shader
ERROR: 0:2: '' : incorrect GLSL version: 450
WARNING: 0:3: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version
WARNING: 0:3: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version
WARNING: 0:4: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version
WARNING: 0:4: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version
WARNING: 0:4: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version
WARNING: 0:5: 'GL_ARB_explicit_attrib_location' : extension is not available
current GLSL version

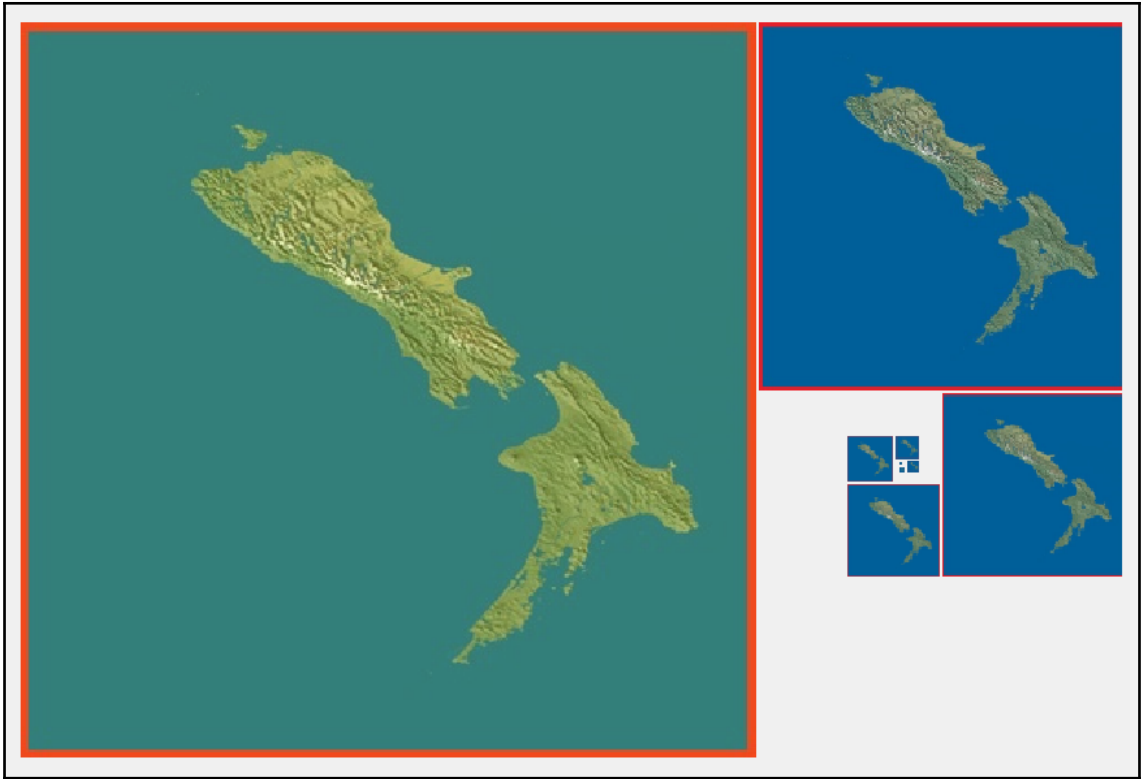
ERROR compiling shader: fragment shader
ERROR: 0:2: '' : incorrect GLSL version: 450

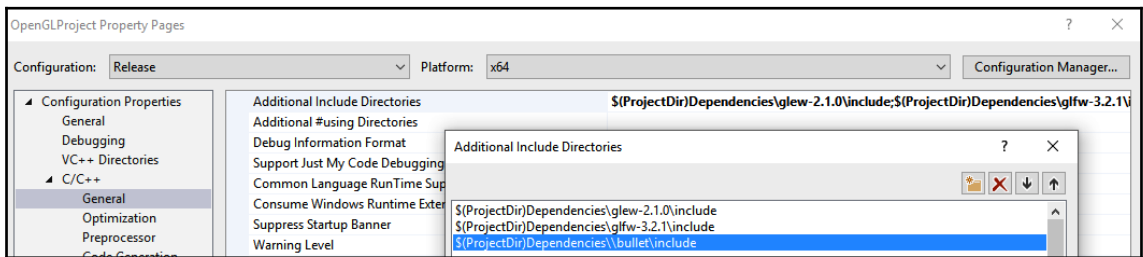
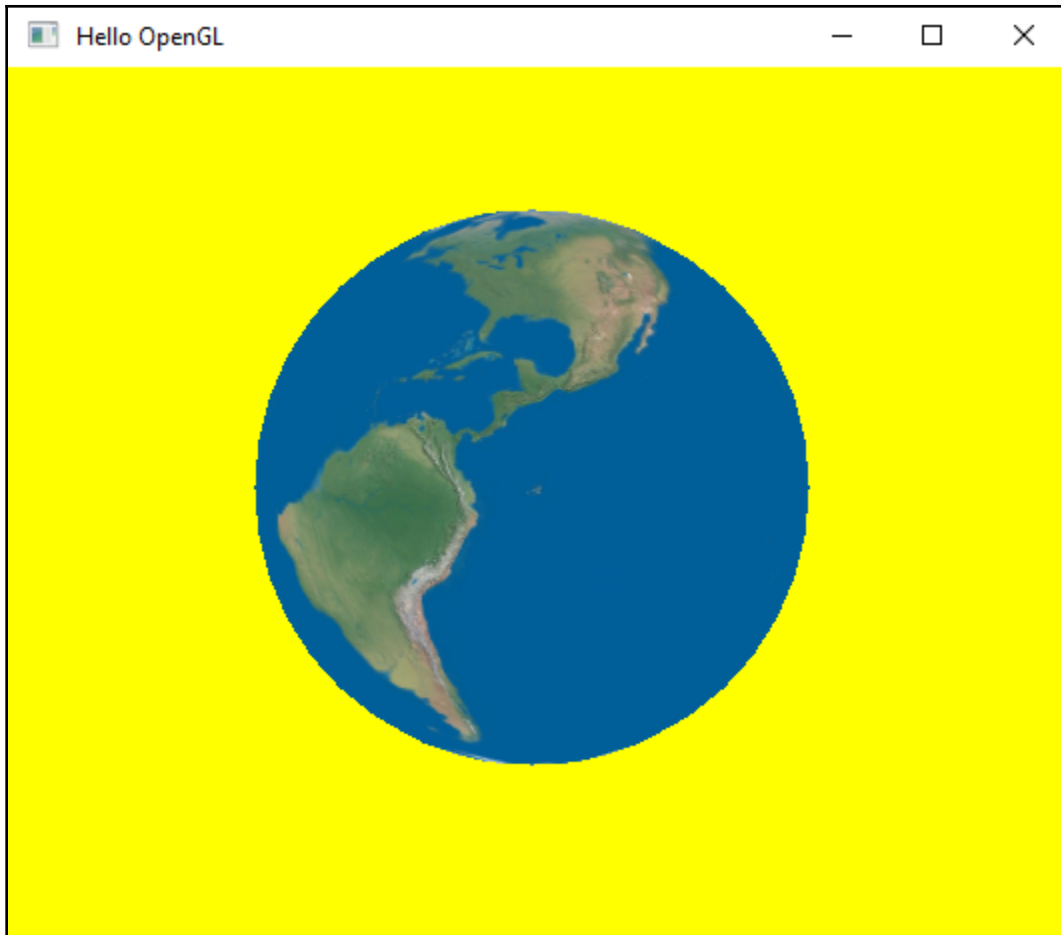
Shader Loader : LINK ERROR
Link called without any attached shader objects.
```

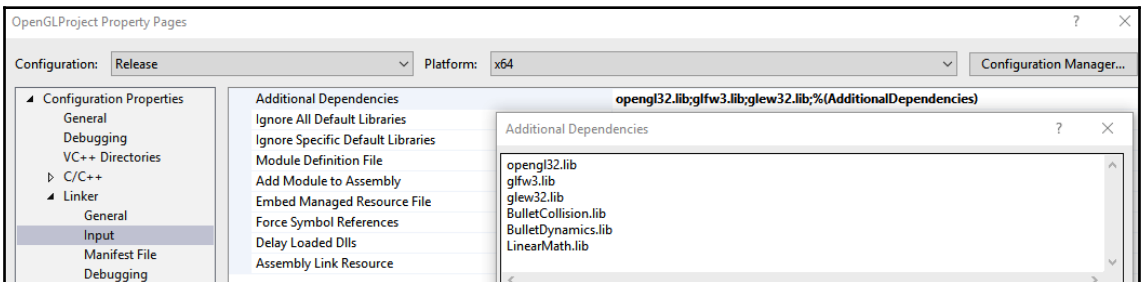
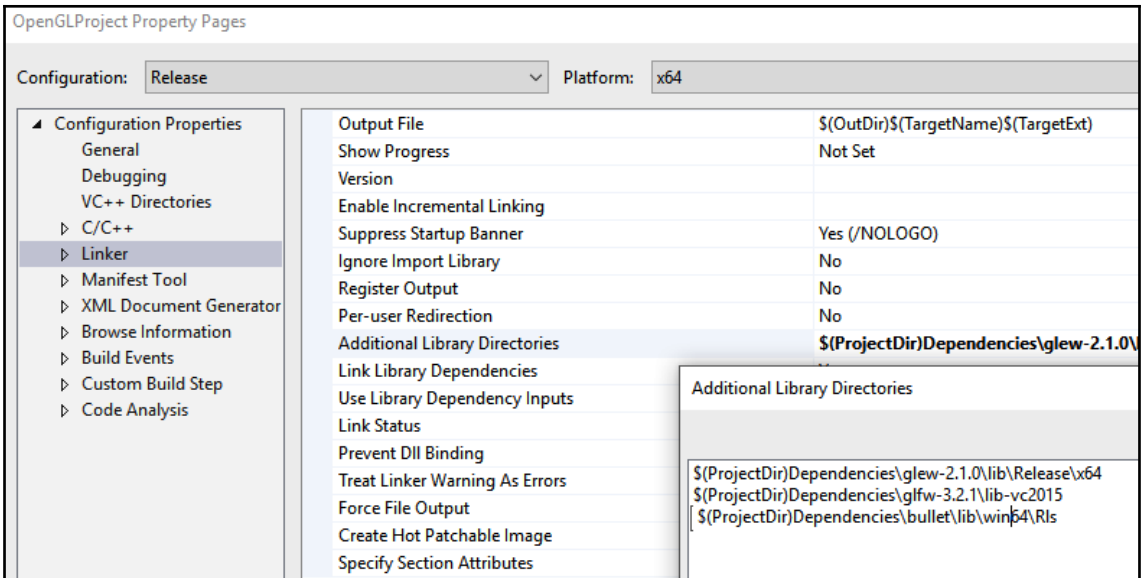
Chapter 7: Building on the Game Objects

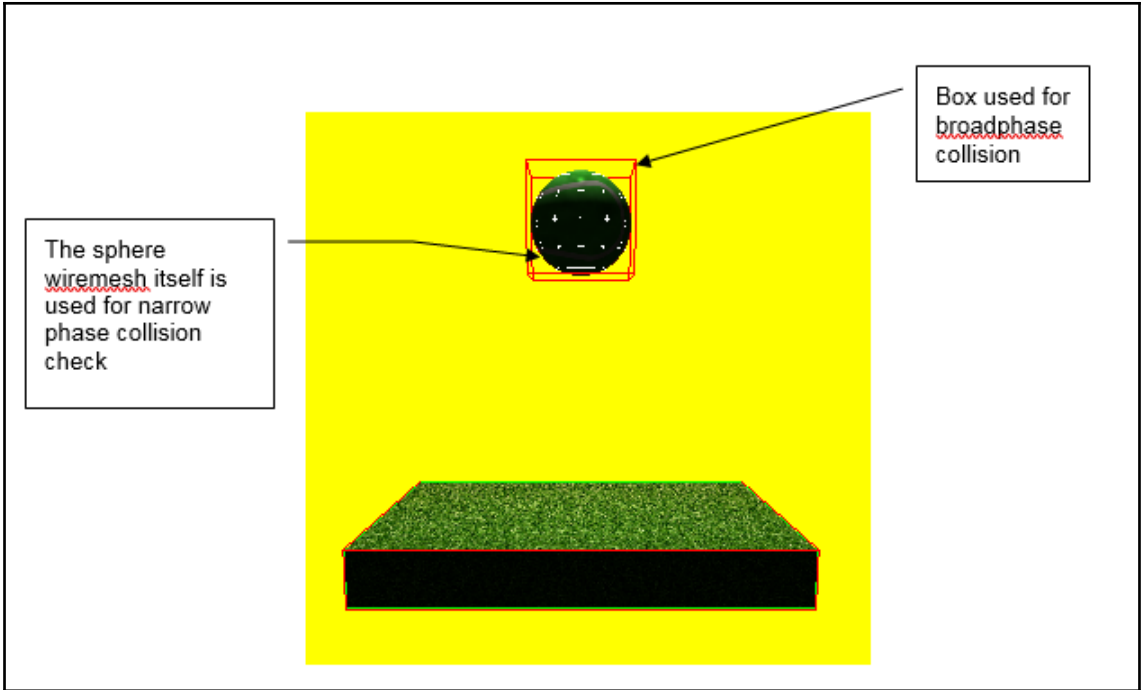


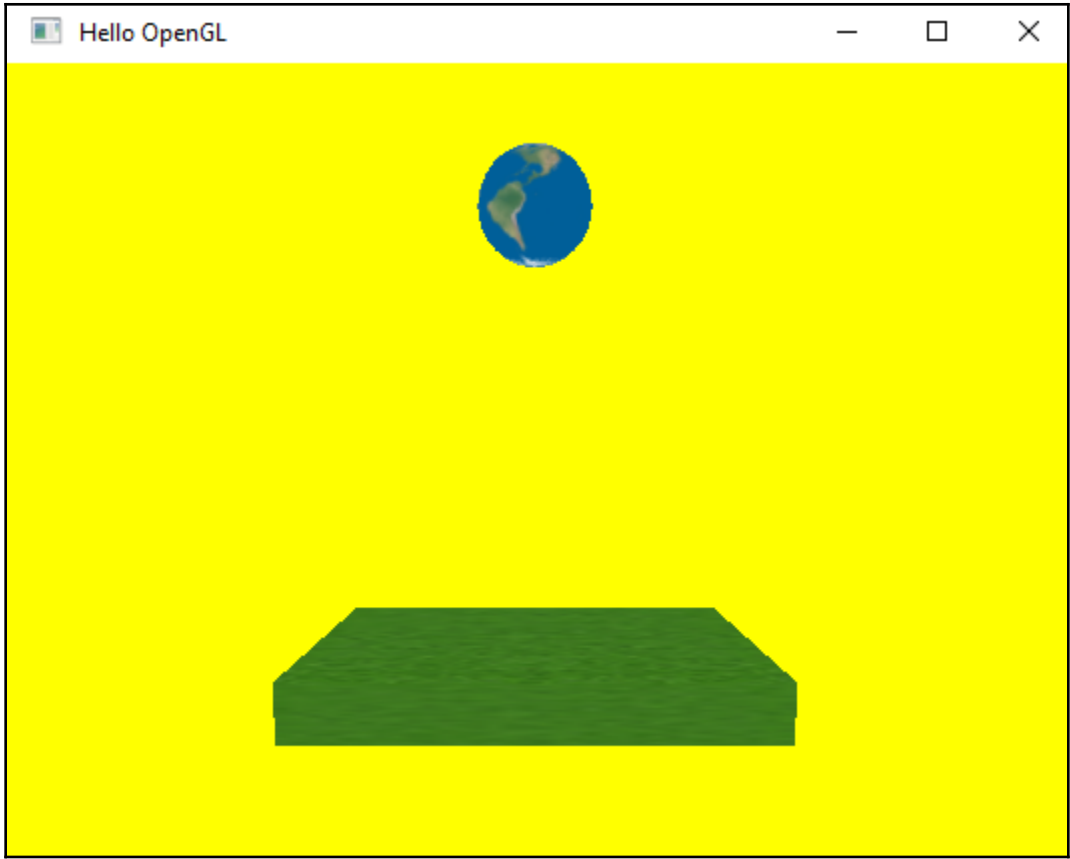




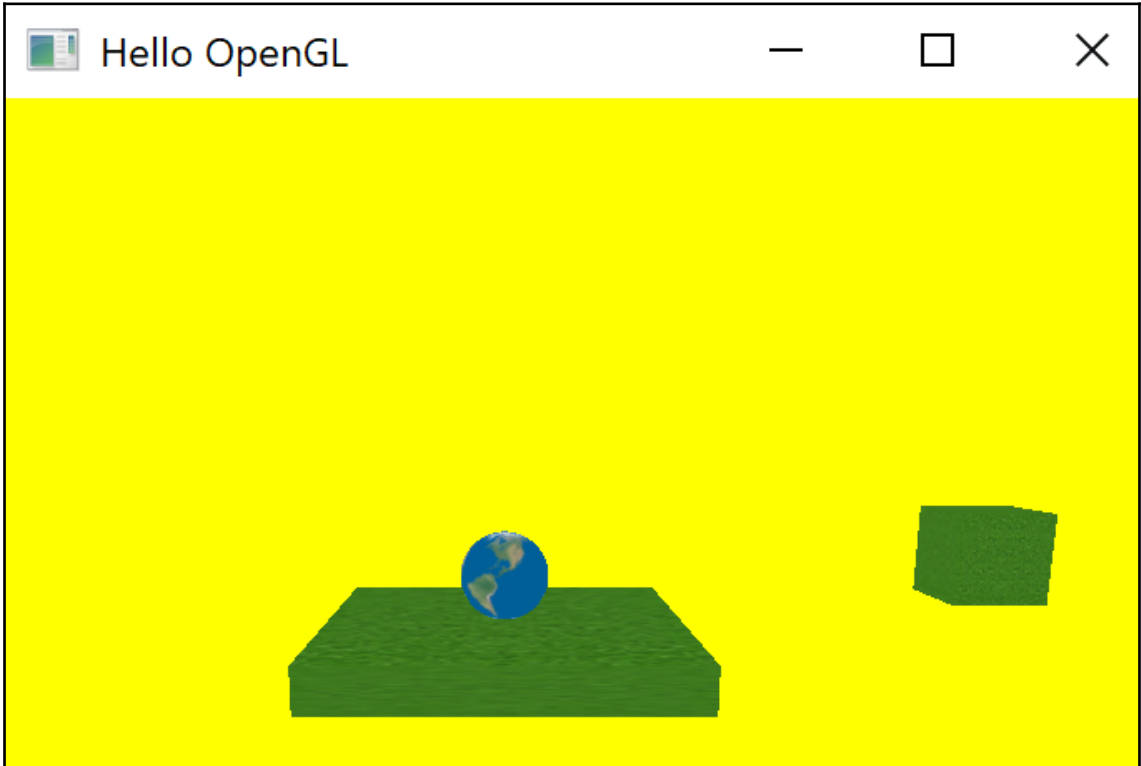


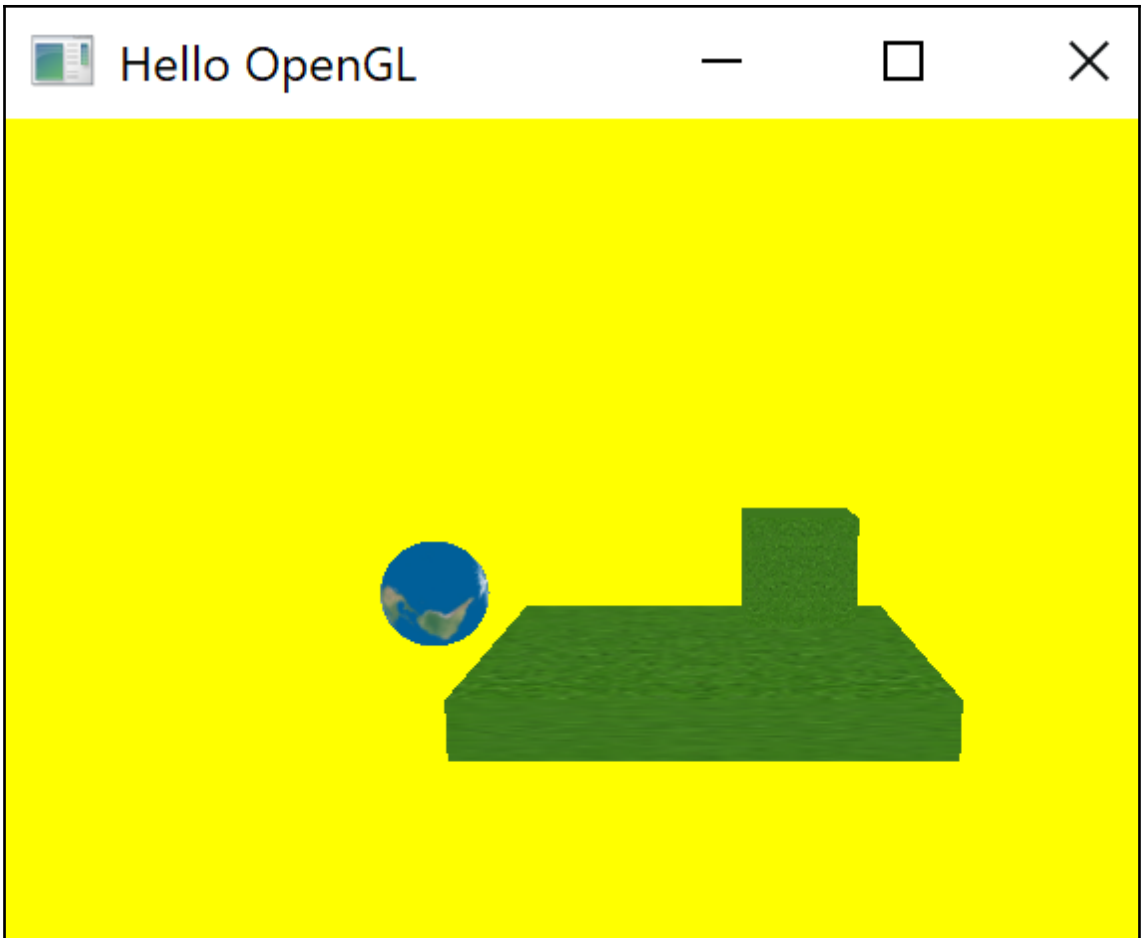


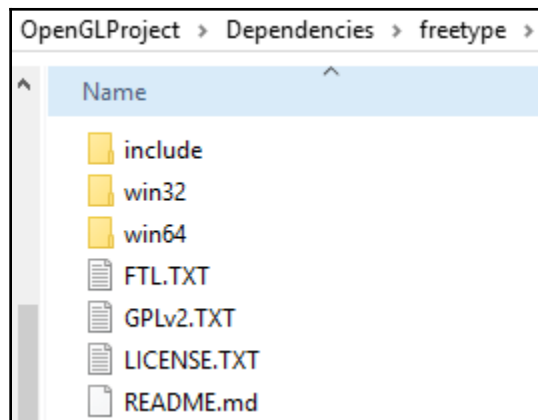


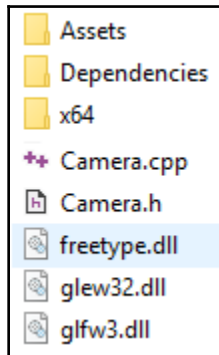
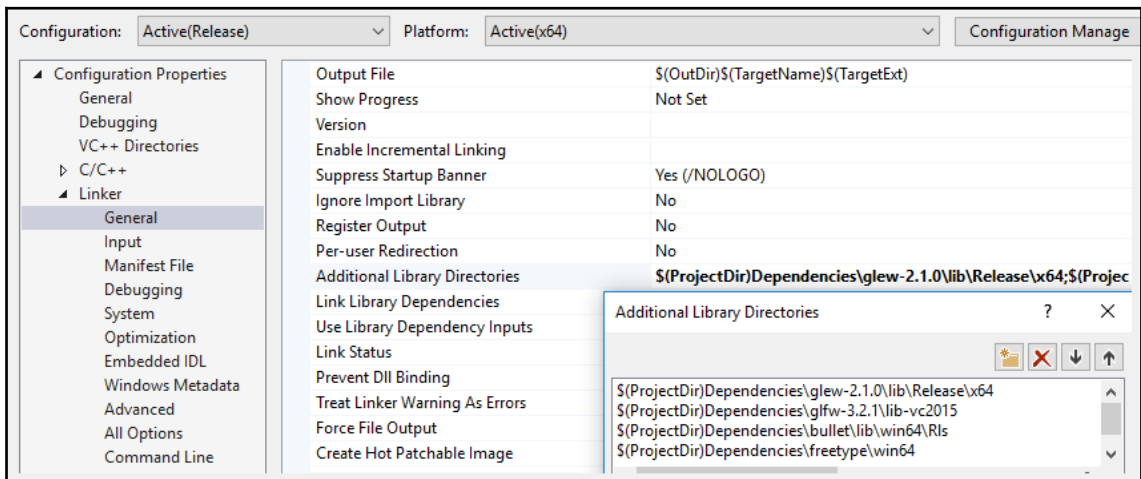
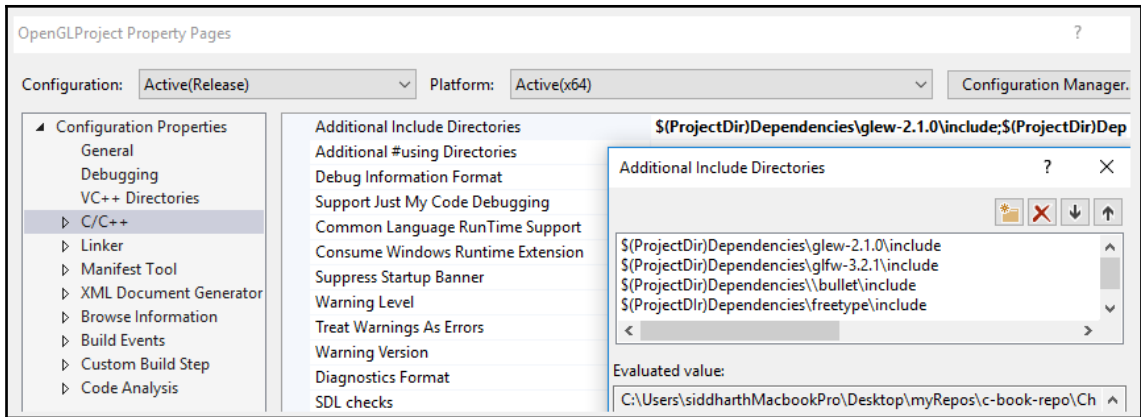


Chapter 8: Enhancing Your Game with Collision, Loop, and Lighting

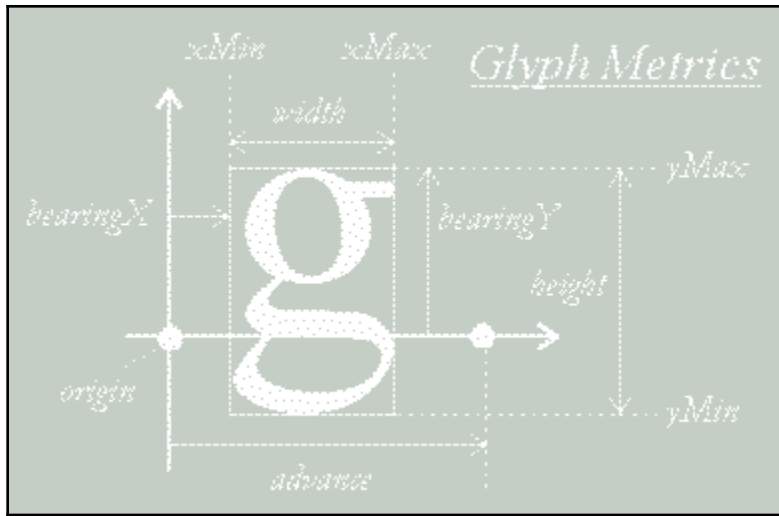


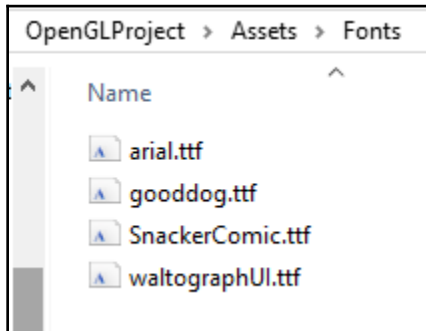
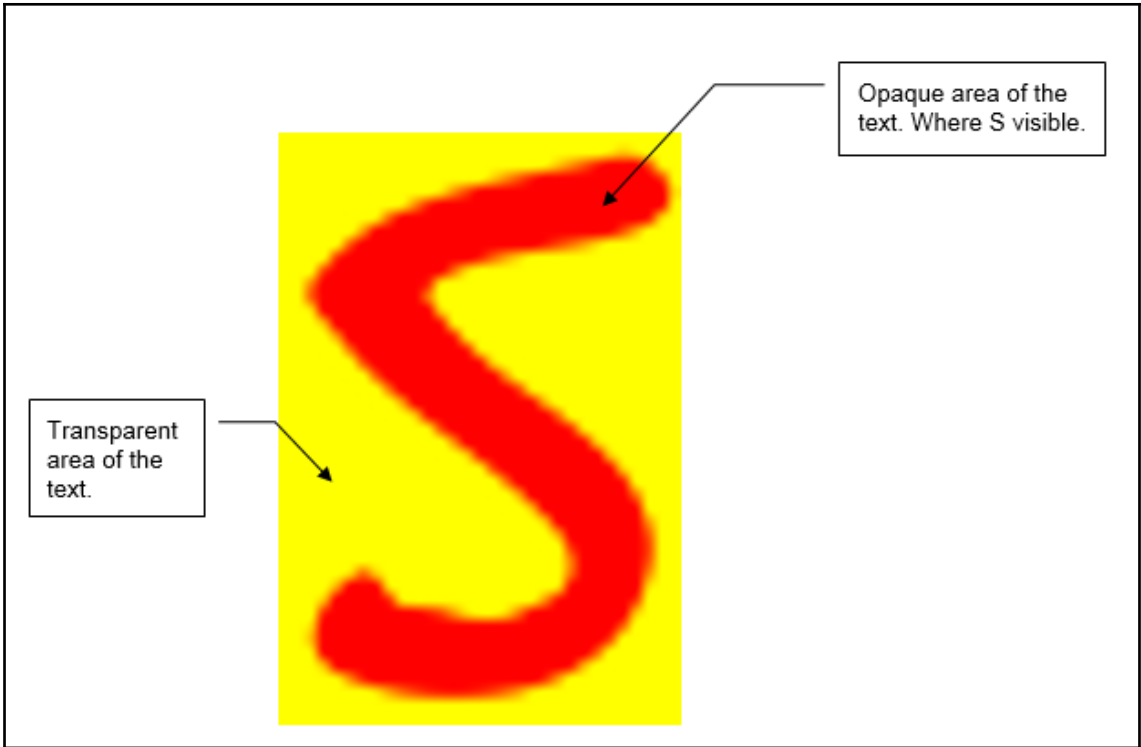


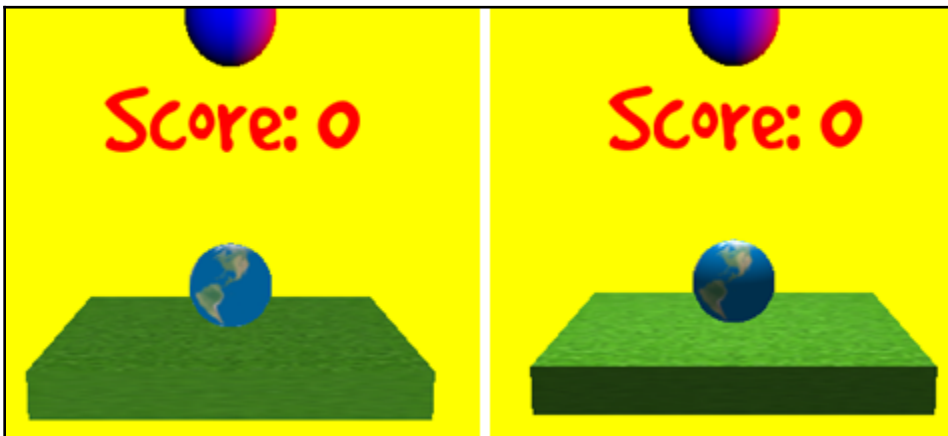


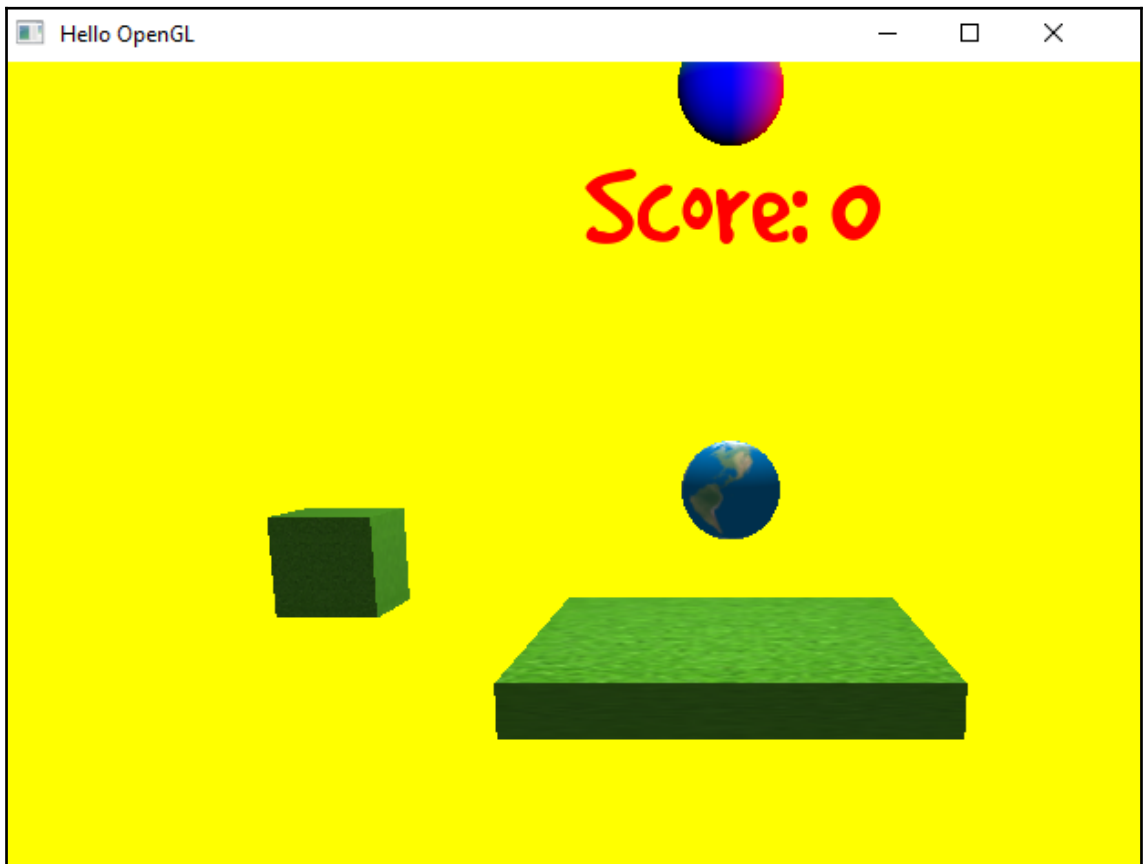
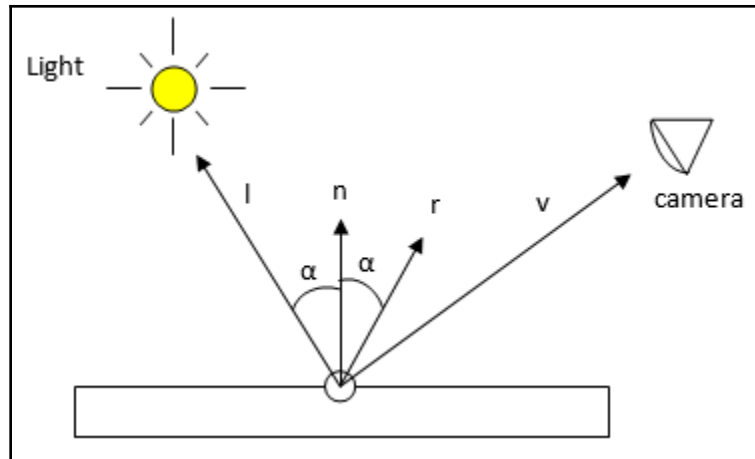









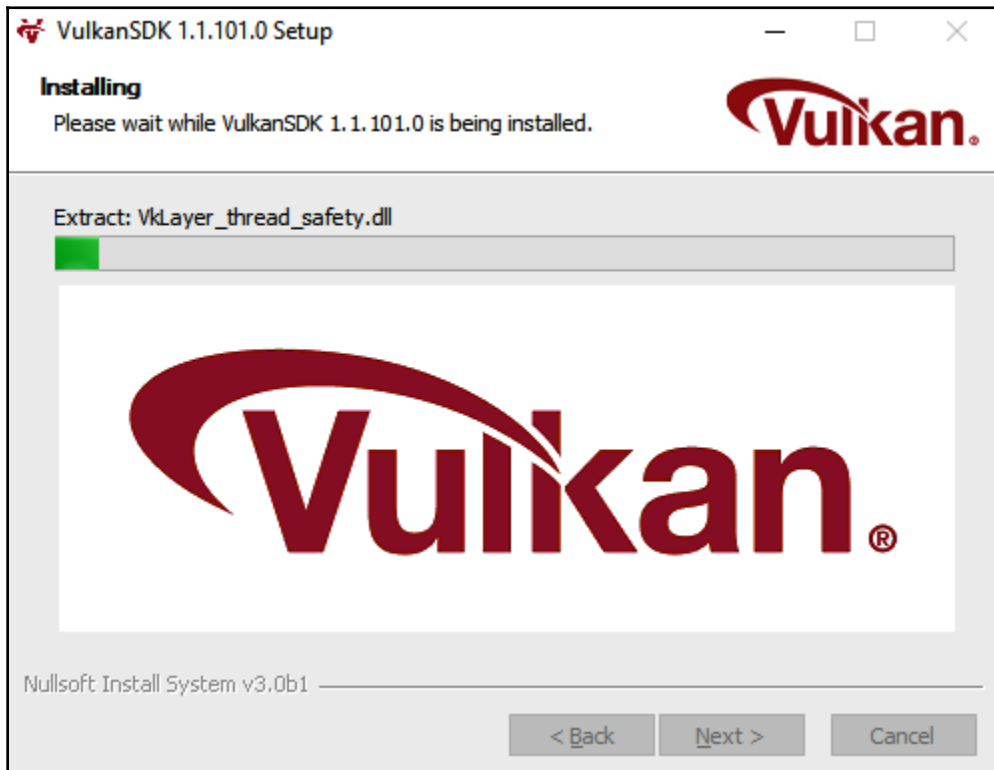


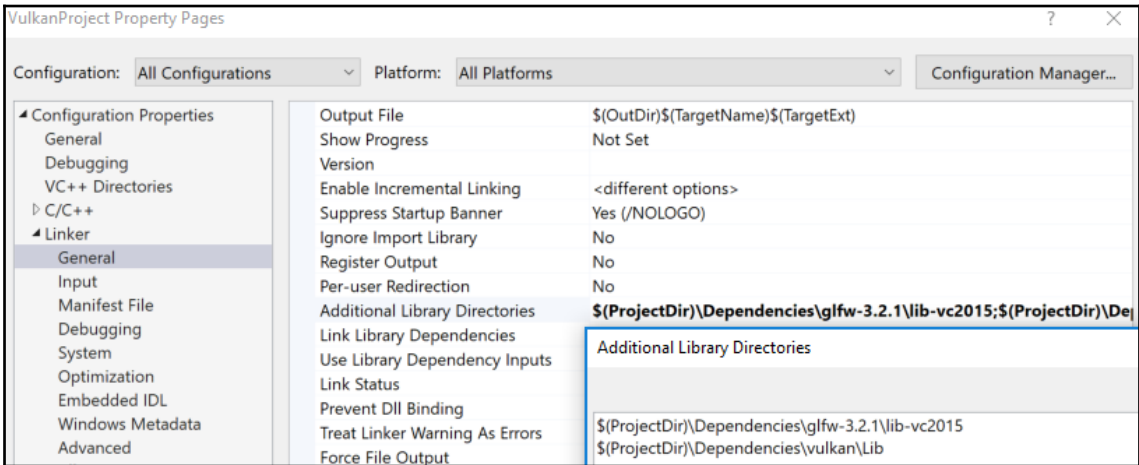
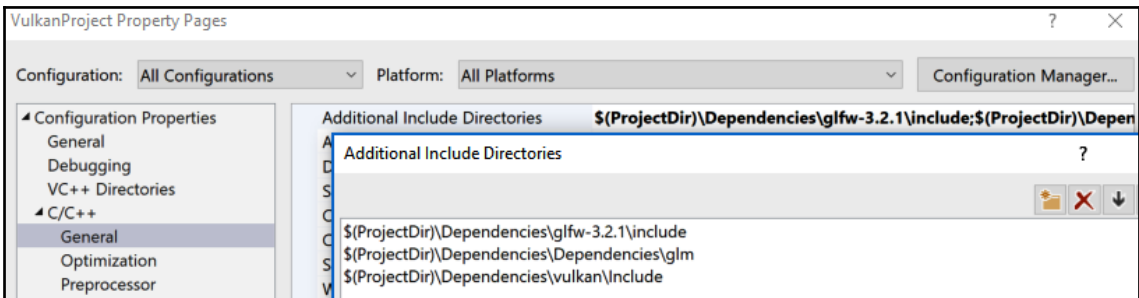
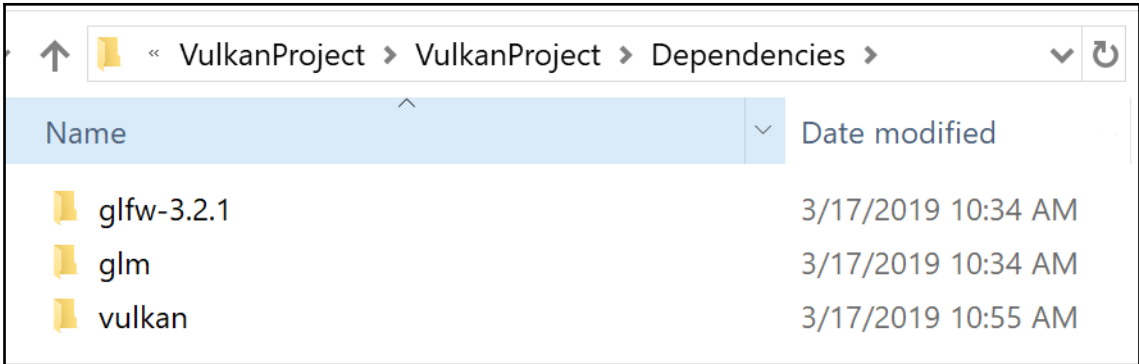


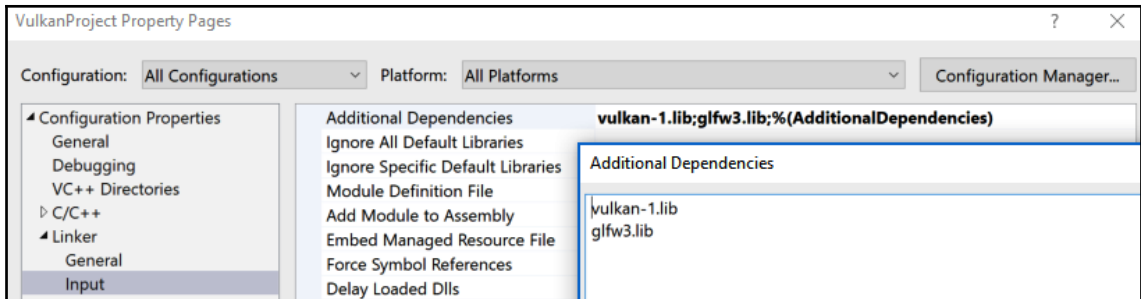


Chapter 9: Getting Started with Vulkan

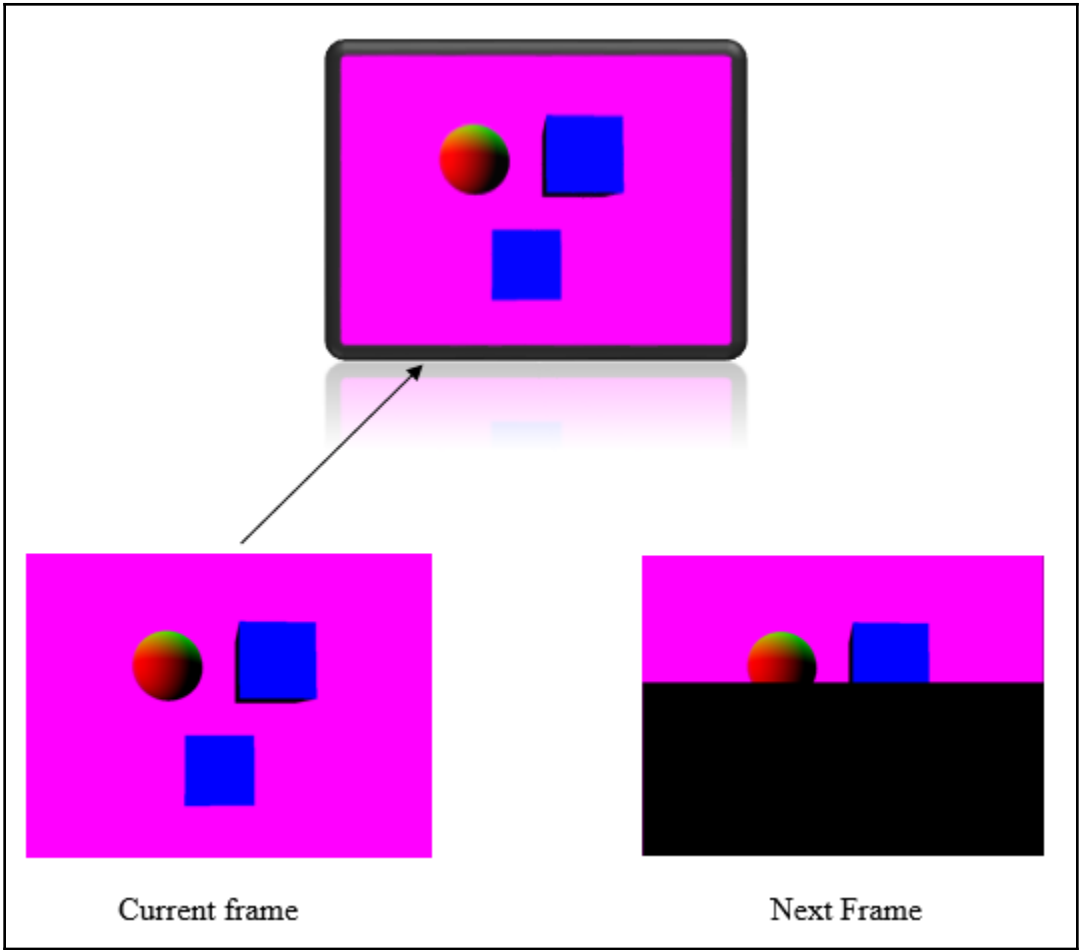
Windows	
Version / Released	File / SHA 256
1.1.101.0 <i>01-Mar-2019</i>	 VulkanSDK-1.1.101.0-Installer.exe (351MB) 9161e719d23967592601eb385ef58ac7f4d9c18892dc8dbc1d431cb5a3957673  VulkanRT-1.1.101.0-Installer.exe (0MB) 9923373a182c04b3a6742de09df5d53efe82210a8d5475123c61b1f663dac0b9
1.1.97.0 <i>23-Jan-2019</i>	 VulkanSDK-1.1.97.0-Installer.exe (442MB) c46584e9df78b40dd3cddda006ebace9917be25353961472f479c7bd0abd13ee







setup call back



```
queueFamilies { size=3 }
├── [capacity] 3
├── [allocator] allocator
├── [0] {queueFlags=15 queueCount=16 timestampValidBits=64 ...}
├── [1] {queueFlags=4 queueCount=1 timestampValidBits=64 ...}
├── [2] {queueFlags=2 queueCount=8 timestampValidBits=64 ...}
└── [Raw View] {...}
```

```
availableExtensions { size=73 }
├── [capacity] 73
├── [allocator] allocator
├── [0] {extensionName=0x000001fc8c7b6ee0 "VK_KHR_8bit_storage" specVersion=1 }
├── [1] {extensionName=0x000001fc8c7b6fe4 "VK_KHR_16bit_storage" specVersion=1 }
├── [2] {extensionName=0x000001fc8c7b70e8 "VK_KHR_bind_memory2" specVersion=1 }
├── [3] {extensionName=0x000001fc8c7b71ec "VK_KHR_create_renderpass2" specVersion=1 }
├── [4] {extensionName=0x000001fc8c7b72f0 "VK_KHR_dedicated_allocation" specVersion=3 }
├── [5] {extensionName=0x000001fc8c7b73f4 "VK_KHR_descriptor_update_template" specVersion=1 }
├── [6] {extensionName=0x000001fc8c7b74f8 "VK_KHR_device_group" specVersion=3 }
├── [7] {extensionName=0x000001fc8c7b75fc "VK_KHR_draw_indirect_count" specVersion=1 }
├── [8] {extensionName=0x000001fc8c7b7700 "VK_KHR_driver_properties" specVersion=1 }
├── [9] {extensionName=0x000001fc8c7b7804 "VK_KHR_external_fence" specVersion=1 }
├── [10] {extensionName=0x000001fc8c7b7908 "VK_KHR_external_fence_win32" specVersion=1 }
├── [11] {extensionName=0x000001fc8c7b7a0c "VK_KHR_external_memory" specVersion=1 }
├── [12] {extensionName=0x000001fc8c7b7b10 "VK_KHR_external_memory_win32" specVersion=1 }
```

```
details.surfaceCapabilities {minImageCount=2 maxImageCount=8 currentExtent=}
├── minImageCount 2
├── maxImageCount 8
├── currentExtent {width=1280 height=720 }
├── minImageExtent {width=1280 height=720 }
├── maxImageExtent {width=1280 height=720 }
├── maxImageArrayLayers 1
├── supportedTransforms 1
├── currentTransform VK_SURFACE_TRANSFORM_IDENTITY_BIT_KHR (1)
├── supportedCompositeAlpha 1
├── supportedUsageFlags 159
```

```
details.surfaceFormats { size=2 }
├── [capacity] 2
├── [allocator] allocator
├── [0] {format=VK_FORMAT_B8G8R8A8_UNORM (44) colorSpace=VK_COLOR_SPACE_SRGB_NONLINEAR_KHR (0) }
├── [1] {format=VK_FORMAT_B8G8R8A8_SRGB (50) colorSpace=VK_COLOR_SPACE_SRGB_NONLINEAR_KHR (0) }
└── [Raw View] {...}
```

```
details.presentModes { size=3 }
├── [capacity] 3
├── [allocator] allocator
├── [0] VK_PRESENT_MODE_FIFO_KHR (2)
├── [1] VK_PRESENT_MODE_FIFO_RELAXED_KHR (3)
├── [2] VK_PRESENT_MODE_MAILBOX_KHR (1)
└── [Raw View] {...}
```

```
setup call back
Device Count: 1

DEVICE PROPERTIES
=====

Device name: GeForce RTX 2080
```

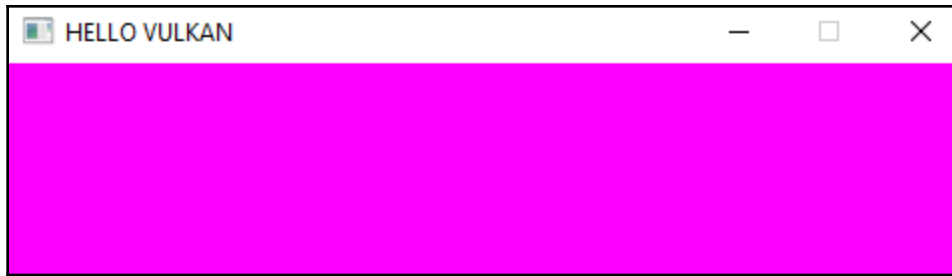
```
setup call back
Device Count: 1

DEVICE PROPERTIES
=====

Device name: Intel(R) Iris(R) Plus Graphics 650
-
```

Chapter 10: Preparing the Clear Screen

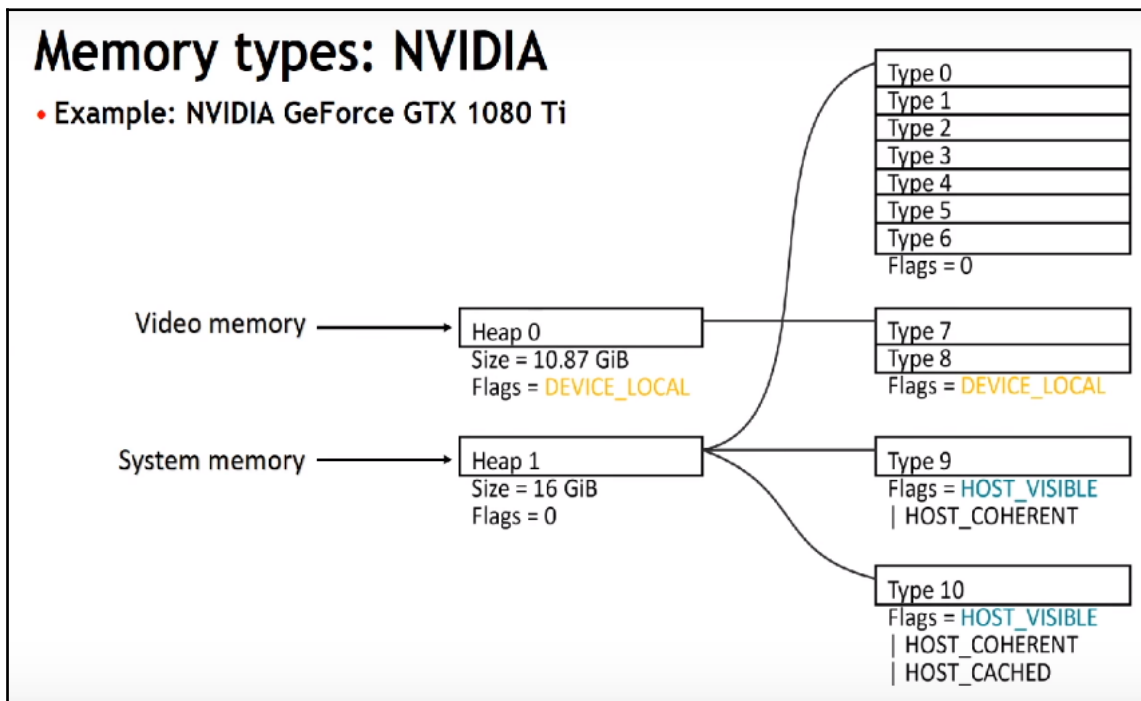
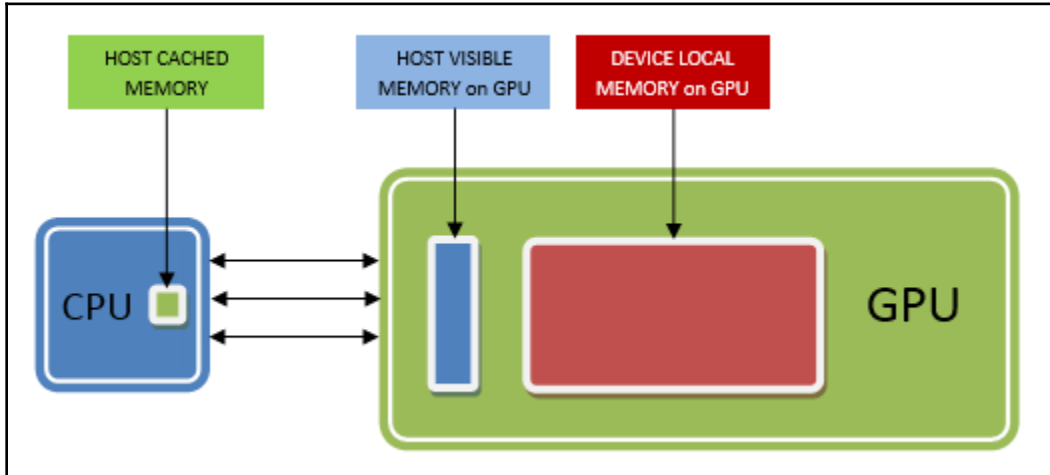


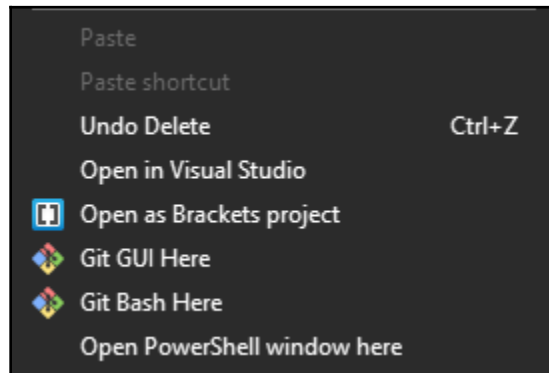
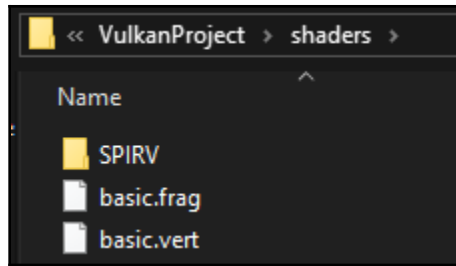


```
C:\Users\siddharthMacbookPro\Desktop\myRepos\c-book-repo\Chapters\First Draft\draft\Chapter 11\VulkanProject\64\Debug\VulkanProject.exe
setup call back
Device Count: 1

DEVICE PROPERTIES
=====
Device name: Intel(R) Iris(R) Plus Graphics 650
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1d4e3e17718 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1d4e3e17718 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1d4e3e17718 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1d4e3e17718 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
```

Chapter 11: Creating Object Resources








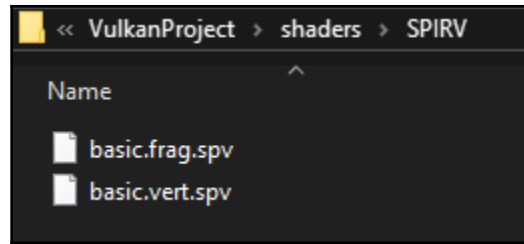


```
\VulkanProject\shaders> glslangValidator.exe -v basic.frag -o basic.frag.spv
```

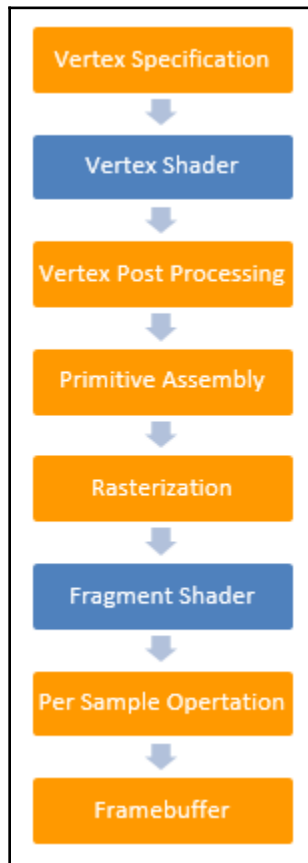
```
\VulkanProject\shaders> glslangValidator.exe -v basic.frag -o basic.frag.spv
```

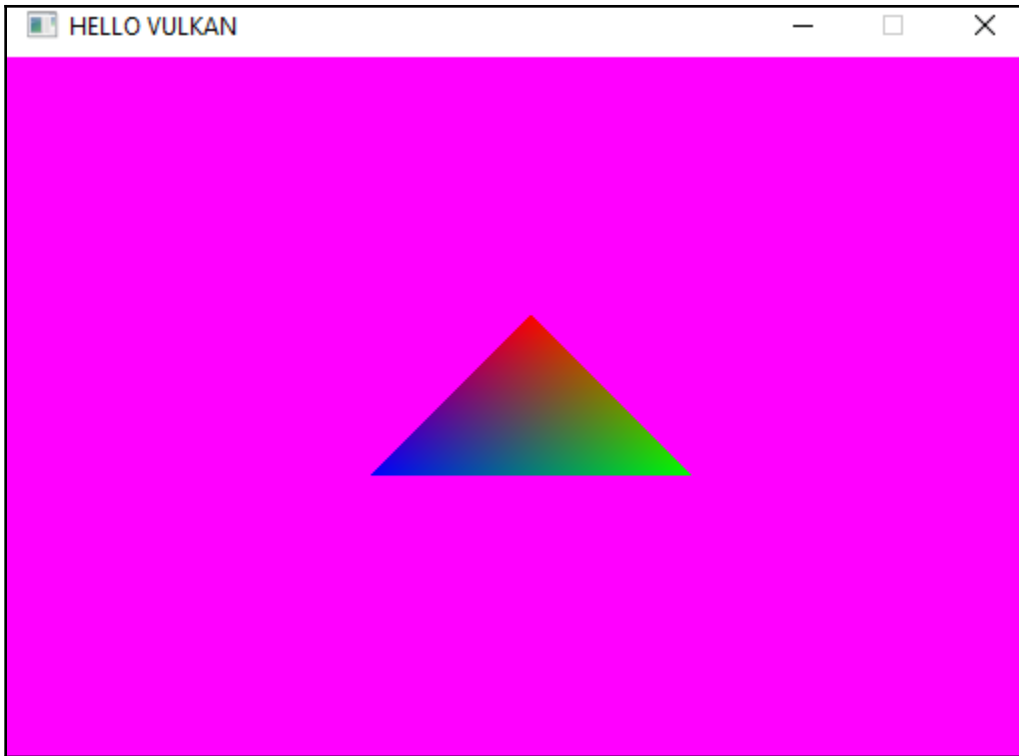
```
\VulkanProject\shaders> glslangValidator.exe -v basic.vert -o basic.vert.spv
```

Name	Date modified	Type	Size
 SPIRV	3/18/2019 5:12 PM	File folder	
 basic.frag	3/18/2019 5:16 PM	FRAG File	1 KB
 basic.frag.spv	4/1/2019 2:34 PM	SPV File	1 KB
 basic.vert	3/18/2019 5:12 PM	VERT File	1 KB
 basic.vert.spv	4/1/2019 2:34 PM	SPV File	3 KB

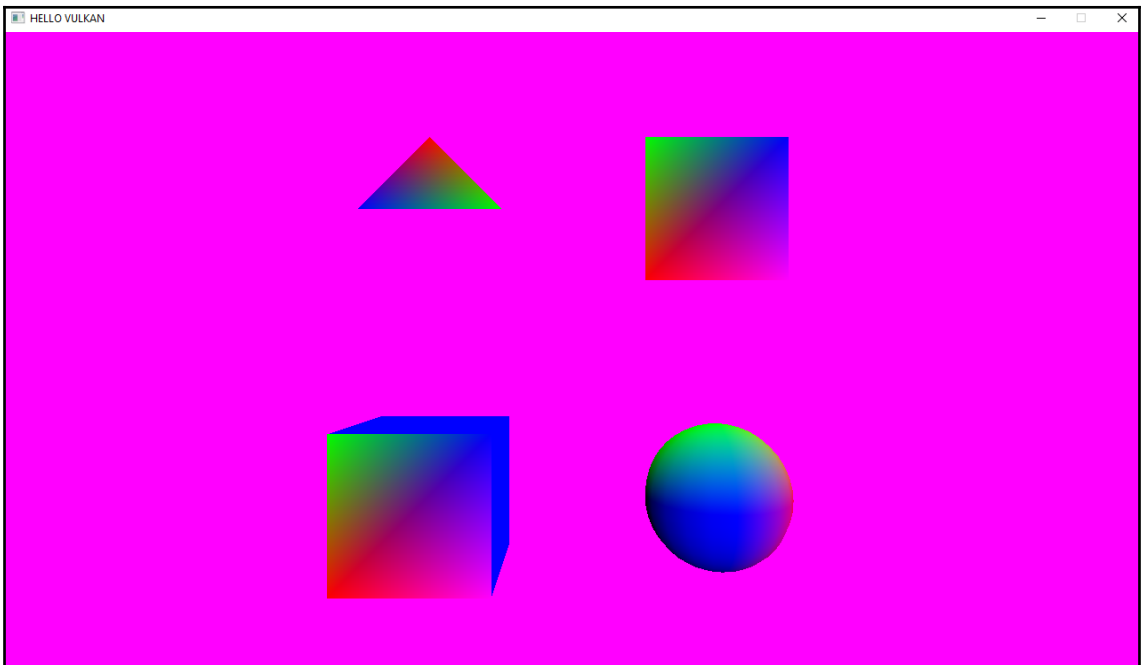
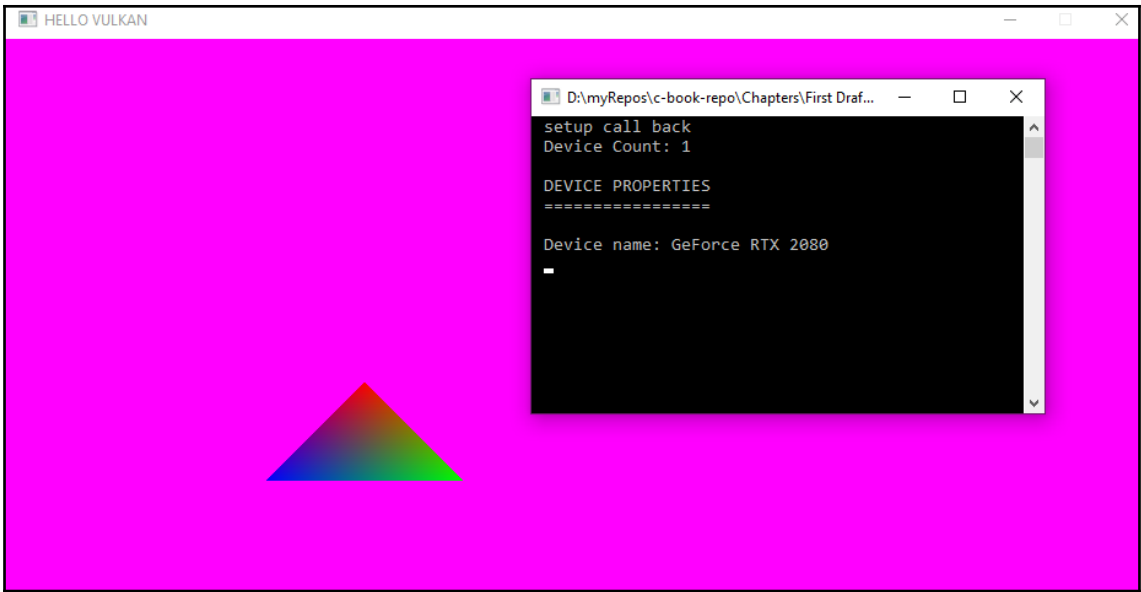


Chapter 12: Drawing Vulkan Objects





```
D:\myRepos\c-book-repo\Chapters\First Draft\draft\Chapter 13\13.VulkanProject\w64\Debug\VulkanProject.exe
HR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1b333189eb0 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
HR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1b333189eb0 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
HR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
validation layer: [ VUID-vkAcquireNextImageKHR-semaphore-01780 ] Object: 0x1b333189eb0 (Type = 3) | vkAcquireNextImageKHR: Semaphore and fence cannot both be VK_NULL_HANDLE. There would be no way to determine the completion of this operation. The Vulkan spec states: semaphore and fence must not both be equal to VK_NULL_HANDLE (https://www.khronos.org/registry/vulkan/specs/1.1-extensions/html/vkspec.html#VUID-vkAcquireNextImageKHR-semaphore-01780)
```



Vulkan Tutorial

- Introduction
- Overview
- Development environment
- > Drawing a triangle
- > Vertex buffers

Introduction

- [About](#)
- [E-book](#)
- [Tutorial structure](#)

About

This tutorial will teach you the basics of using the [Vulkan](#) graphics and compute API. Vulkan is a new API by the [Khronos group](#) (known for OpenGL) that provides a much better abstraction of modern graphics cards. This new interface allows you to better describe what your application intends to do, which can lead to better performance and less surprising driver behavior compared to existing APIs like [OpenGL](#) and [Direct3D](#). The ideas behind Vulkan are similar to those of [Direct3D 12](#) and [Metal](#), but Vulkan has the advantage of being fully cross-platform and allows you to develop for Windows, Linux and Android at the same time.

Vulkan DOOM 3 port based on DOOM 3 BFG Edition

vulkan
doom3
doom
3d-graphics
hardware-acceleration

📄 102 commits
🌿 7 branches
📦 5 releases
👤 6 contributors
📄 GPL-3.0

Branch: master ▾
New pull request
Find File
Clone or download ▾

DustinHLand Fix GLS_CULL_BITS ...

Latest commit `abe98fd` on Jul 3, 2018

base/renderprogs	VK: Fix heavy glass deformation.	2 years ago
doomclassic	Remove OpenGL	2 years ago
neo	Fix GLS_CULL_BITS	10 months ago
.gitignore	Setup .gitignore	2 years ago
LICENSE.txt	Add GPL LICENSE file.	2 years ago
README.md	Update README.md	2 years ago