Vulkan

GLFW

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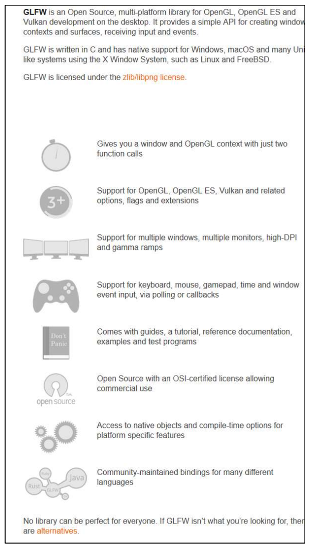
http://www.glfw.org/



GLFW is an Open Source, multi-platform library for OpenGL, OpenGL ES and Vulkan development on the desktop. It provides a simple API for creating window contexts and surfaces, receiving input and events.

GLFW is written in C and has native support for Windows, macOS and many Uni like systems using the X Window System, such as Linux and FreeBSD.

GLFW is licensed under the zlib/libpng license.

Gives you a window and OpenGL context with just two function calls

Support for OpenGL, OpenGL ES, Vulkan and related options, flags and extensions

Support for multiple windows, multiple monitors, high-DPI and gamma ramps

Support for keyboard, mouse, gamepad, time and window event input, via polling or callbacks

Comes with guides, a tutorial, reference documentation, examples and test programs

Open Source with an OSI-certified license allowing commercial use

Access to native objects and compile-time options for platform specific features

Community-maintained bindings for many different languages

No library can be perfect for everyone. If GLFW isn't what you're looking for, ther are alternatives.

Setting Up GLFW

```
#define GLFW_INCLUDE_VULKAN
#include "glfw3.h"
        . . .

uint32_t                    Width, Height;
VkSurfaceKHR            Surface;
        . . .

void
InitGLFW( )
{
        glfwInit( );
         if(  ! glfwVulkanSupported( )  )
         {
                fprintf( stderr, “Vulkan is not supported on this system!\n” );
                exit( 1 );
         }
        glfwWindowHint( GLFW_CLIENT_API, GLFW_NO_API );
        glfwWindowHint( GLFW_RESIZABLE, GLFW_FALSE );
        MainWindow    =  glfwCreateWindow( Width, Height, "Vulkan Sample", NULL, NULL );
        VkResult result = glfwCreateWindowSurface( Instance, MainWindow, NULL, OUT &Surface );

        glfwSetErrorCallback( GLFWErrorCallback );
        glfwSetKeyCallback( MainWindow,                  GLFWKeyboard );
        glfwSetCursorPosCallback( MainWindow,      GLFWMouseMotion );
        glfwSetMouseButtonCallback( MainWindow, GLFWMouseButton );
}
```

You Can Also Query What Vulkan Extensions GLFW Requires

```
uint32_t count;
const char ** extensions = glfwGetRequiredInstanceExtensions  (&count);

fprintf( FpDebug, "\nFound %d GLFW Required Instance Extensions:\n", count );

for( uint32_t  i = 0; i < count; i++ )
{
        fprintf( FpDebug, "\t%s\n", extensions[ i ] );
}
```

```
Found 2 GLFW Required Instance Extensions:
        VK_KHR_surface
        VK_KHR_win32_surface
```

GLFW Keyboard Callback

```
void
GLFWKeyboard( GLFWwindow * window, int key, int scancode, int action, int mods )
{
        if( action == GLFW_PRESS )
        {
                switch( key )
                {
                        //case GLFW_KEY_M:
                        case 'm':
                        case 'M':
                                Mode++;
                                if( Mode >= 2 )
                                        Mode = 0;
                                break;

                        default:
                                fprintf( FpDebug, "Unknow key hit: 0x%04x = '%c'\n", key, key );
                                fflush(FpDebug);
                }
        }
}
```

GLFW Mouse Button Callback

```
void
GLFWMouseButton( GLFWwindow *window, int button, int action, int mods )
{
        int b = 0;              // LEFT, MIDDLE, or RIGHT

        // get the proper button bit mask:
        switch( button )
        {
                case GLFW_MOUSE_BUTTON_LEFT:
                        b = LEFT;               break;

                case GLFW_MOUSE_BUTTON_MIDDLE:
                        b = MIDDLE;             break;

                case GLFW_MOUSE_BUTTON_RIGHT:
                        b = RIGHT;              break;

                default:
                        b = 0;
                        fprintf( FpDebug, "Unknown mouse button: %d\n", button );
        }

        // button down sets the bit, up clears the bit:
        if( action == GLFW_PRESS )
        {
                double xpos, ypos;
                glfwGetCursorPos( window, &xpos, &ypos);
                Xmouse = (int)xpos;
                Ymouse = (int)ypos;
                ActiveButton |= b;              // set the proper bit
        }
        else
        {
                ActiveButton &= ~b;             // clear the proper bit
        }
}
```

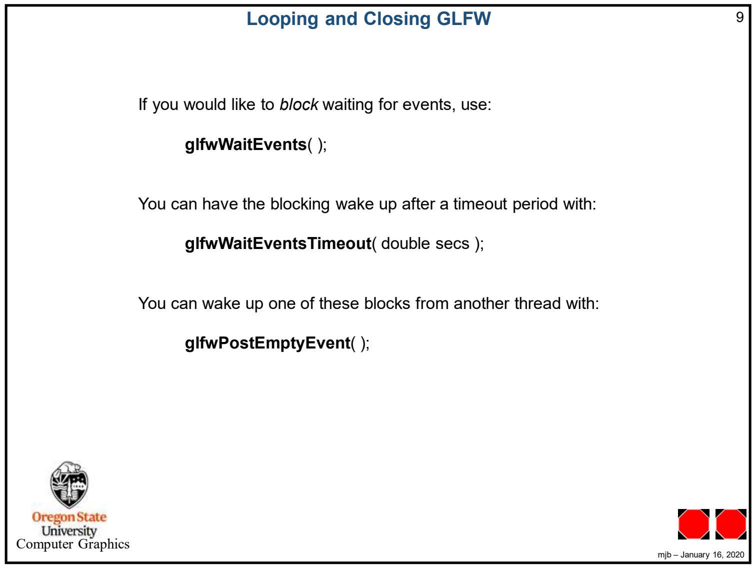
GLFW Mouse Motion Callback

```
void
GLFWMouseMotion( GLFWwindow *window, double xpos, double ypos )
{
        int dx = (int)xpos - Xmouse;            // change in mouse coords
        int dy = (int)ypos - Ymouse;

        if( ( ActiveButton & LEFT ) != 0 )
        {
                Xrot += ( ANGFACT*dy );
                Yrot += ( ANGFACT*dx );
        }

        if( ( ActiveButton & MIDDLE ) != 0 )
        {
                Scale += SCLFACT * (float) ( dx - dy );

                // keep object from turning inside-out or disappearing:

                if( Scale < MINSCALE )
                        Scale = MINSCALE;
        }

        Xmouse = (int)xpos;                     // new current position
        Ymouse = (int)ypos;
}
```

Looping and Closing GLFW

```
while( glfwWindowShouldClose( MainWindow ) == 0 )
{
        glfwPollEvents( );
        Time = glfwGetTime( );          // elapsed time, in double-precision seconds
        UpdateScene( );
        RenderScene( );
}

vkQueueWaitIdle( Queue );
vkDeviceWaitIdle( LogicalDevice );
DestroyAllVulkan( );
glfwDestroyWindow( MainWindow );
glfwTerminate( );
```

Does not block – processes any waiting events, then returns



Looping and Closing GLFW

If you would like to *block* waiting for events, use:

glfwWaitEvents( );

You can have the blocking wake up after a timeout period with:

glfwWaitEventsTimeout(double secs);

You can wake up one of these blocks from another thread with:

glfwPostEmptyEvent( );