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**GLFW**



**Oregon State University**  
Mike Bailey  
mjb@cs.oregonstate.edu



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GLFW.pptx

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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 Unix-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, there are [alternatives](#).



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## Setting Up GLFW

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```

#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 );
}

```

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## You Can Also Query What Vulkan Extensions GLFW Requires

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```

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



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## GLFW Keyboard Callback

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```

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);
        }
    }
}

```



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## GLFW Mouse Button Callback

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```

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
    }
}

```



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## GLFW Mouse Motion Callback

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```

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;
}

```



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## Looping and Closing GLFW

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```

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



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## Looping and Closing GLFW

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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( );
```

