

The Vulkan® SDK

Updates since Siggraph 2024

Karen Ghavam

LunarG CEO and Engineering Director

LUNAR)G[®]
POWER YOUR SUCCESS

KHRONOS[®]
GROUP
CONNECTING SOFTWARE TO SILICON



Who am I?



Karen Ghavam, CEO
LunarG, Inc.

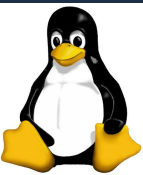
LUNAR)G[®]
POWER YOUR SUCCESS

Who is LunarG?

- An Independent, private company with Khronos membership
 - GPU Software Specialists
- Developing Vulkan Ecosystem components since 2015
 - Generous sponsorship from Valve and Google
- Vulkan Ecosystem Projects
 - Vulkan SDK
 - Vulkan Loader
 - Vulkan Validation Layers
 - Vulkan Profiles Toolset
 - Vulkan Extension Layer
 - GFXReconstruct
 - glslang
 - ...

The Vulkan® SDK (One Year Ago)

License
Registry



Ubuntu
Packages

Tarball

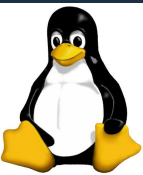
 Windows

 Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VK VIA
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM

The Vulkan® SDK (October 2024)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKVA
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM

Addition of slang - an
alternative shading
language and compiler



slang

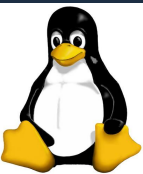
Slang - Shading Language and Compiler

- Overseen by the Khronos® Group Slang™ Initiative
- Based on 15+ years of collaboration between researchers
 - Nvidia, Carnegie Mellon University,
 - Stanford, MIT, UCSD
 - University of Washington
- Widely adopted in production projects across the industry
- Generates code for a wide variety of targets
 - D3D12, Vulkan, Metal, D3D11, OpenGL, CUDA

The Vulkan® SDK (October 2024)

Synchronization Validation for
VK_KHR_timeline_semaphore

License
Registry



Ubuntu
Packages

Tarball

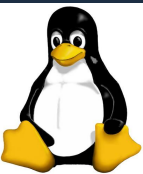
Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

The Vulkan® SDK (January 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version
Spec

Vulkan

vkconfig

Validation

SPIR-
Optim

shade

DXC

SPIR-
Cros

MoltenVK

SPIR-V
Visualizer

SDL

Monitor

GLM

slang

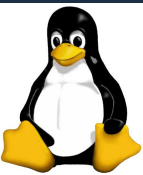


KHRONOS
GROUP

LUNAR
POWER YOUR SUCCESS

The Vulkan[®] SDK (January 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

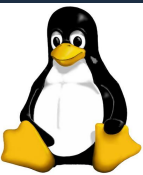
SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKIVA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

Automatic Install of
latest Vulkan Loader



The Vulkan® SDK (January 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

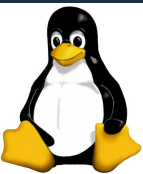
Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

ABI Definition. Enabled
shared library version
of glslang

The Vulkan® SDK (January 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

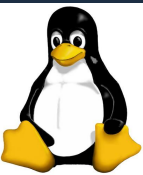
Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	Windows: Removal of all 32 bit libraries	
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

Exception: 32 bit Vulkan RT

The Vulkan® SDK (January 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

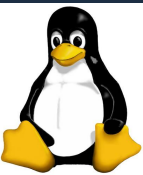
Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

GFXReconstruct
Supported on macOS

The Vulkan[®] SDK (February 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKIVA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

Portable Ray tracing
and Buffer Device
Address Support

What is Portable Ray tracing in GFXR?

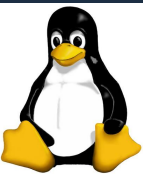
- Tracking at capture time, then translated at replay time for device independence:
 - Buffer Device Addresses
 - Shader Group Handles
 - Acceleration Structures
- How is this useful for the Vulkan application developer?
 - Bug-reporting across different vendors/drivers
- White Paper:
<https://www.lunarg.com/portable-raytracing-with-gfxreconstruct/>

Buffer Device Address Portability in GFXR

- What Are Buffer Device Addresses?
 - Writing of device addresses and dereferencing them in shaders
 - Powerful feature; Introduces major portability challenges
 - When replaying captured workloads on different hardware
- GFXR BDA support
 - Builds upon the Portable Ray Tracing techniques
 - Apply similar translation strategies to general-purpose device addresses
- White Paper:
<https://www.lunarg.com/improving-replay-portability-initial-support-for-buffer-device-address-rebinding-in-gfxreconstruct/>

The Vulkan® SDK (February 2025)

License
Registry



Ubuntu
Packages

Tarball

 Windows

 Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	Vulkan Configurator Version 3	
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

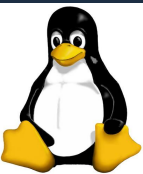
Vulkan Configurator - Version 3

- Improved Ease of Use GUI
- Improved diagnostics: Easier troubleshooting
 - Vulkan Physical Devices present on system
 - Vulkan Loader settings (API version, found Vulkan layers and locations, ...)
 - Vulkan Configurator settings
 - ...
- Vulkan Loader logging support
 - Logging outside of the application launcher
 - Logging message type selection (warnings, errors, info, debug, ...)
- Improved layer loading and selection
 - Multiple versions of the same layer
 - Per-layer enabling of layer settings
 - Ordering of all layers by the application

The Vulkan[®] SDK (February 2025)

Antora Specification
Build!

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKZIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

Slow Vulkan® Spec Load Times are Gone!

- SDK Validation Layer Error Messages
 - Linking to specific violated VUID in the specification
 - Referencing the HTML single file version
 - **SLOW to LOAD in your browser!**

SDK Validation Error:

VUID-VkImageViewCreateInfo-pNext-pNext(ERROR / SPEC): msgNum: 151814321 - Validation Error: [VUID-VkImageViewCreateInfo-pNext-pNext] | MessageID = 0x90c80b1 | vkCreateImageView(): pCreateInfo->pNext chain includes a structure with unexpected VkStructureType VK_STRUCTURE_TYPE_IMAGE_CREATE_INFO. This error is based on the Valid Usage documentation for version 304 of the Vulkan header. It is possible that you are using a struct from a private extension or an extension that was added to a later version of the Vulkan header, in which case the use of pCreateInfo->pNext is undefined and may not work correctly with validation enabled.

The Vulkan spec states: Each pNext member of any structure (including this one) in the pNext chain must be either NULL or a pointer to a valid instance of VkExportMetalObjectCreateInfoEXT, VkImageViewASTCDecodeModeEXT, VkImageViewMinLodCreateInfoEXT, VkImageViewSampleWeightCreateInfoQCOM, VkImageViewSlicedCreateInfoEXT, VkImageViewUsageCreateInfo, VkOpaqueCaptureDescriptorDataCreateInfoEXT, or **VkSamplerYcbcrConversionInfo** (<https://vulkan.lunarg.com/doc/view/1.4.304.0/linux/1.4-extensions/vkspec.html#VUID-VkImageViewCreateInfo-pNext-pNext>)

VUID-VkFenceCreateInfo-sType-sType(ERROR / SPEC): msgNum: 913590280 - Validation Error: [VUID-VkFenceCreateInfo-sType-sType] | MessageID = 0x36744808 | vkCreateFence(): pCreateInfo->sType must be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO.

The Vulkan spec states: sType must be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO (<https://vulkan.lunarg.com/doc/view/1.4.304.0/linux/1.4-extensions/vkspec.html#VUID-VkFenceCreateInfo-sType-sType>)

HTML Single File Spec:

Table of Contents

1. Preamble
2. Introduction
 - 2.1. Document Conventions
3. Fundamentals
 - 3.1. Host and Device Environment
 - 3.2. Execution Model
 - 3.3. Object Model
 - 3.4. Application Binary Interface
 - 3.5. Command Syntax and Duration
 - 3.6. Threading Behavior
 - 3.7. Valid Usage
 - 3.8. VkResult Return Codes
 - 3.9. Numeric Representation and Computation
 - 3.10. Fixed-Point Data Conversions
 - 3.11. String Representation
 - 3.12. Common Object Types
 - 3.13. API Name Aliases
4. Initialization
 - 4.1. Command Function Pointers
 - 4.2. Instances
5. Devices and Queues
 - 5.1. Physical Devices

Valid Usage (Implicit)

- VUID-VkFenceCreateInfo-sType-sType
sType **must** be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO
- § VUID-VkFenceCreateInfo-pNext-pNext
Each pNext member of any structure (including this one) in the pNext chain **must** be either NULL or a pointer to a valid instance of VkExportFenceCreateInfo or VkExportFenceWin32HandleInfoKHR
- VUID-VkFenceCreateInfo-sType-unique
The sType value of each struct in the pNext chain **must** be unique
- VUID-VkFenceCreateInfo-flags-parameter
flags **must** be a valid combination of VkFenceCreateFlagBits values

```
// Provided by VK_VERSION_1_0
typedef enum VkFenceCreateFlagBits {
    VK_FENCE_CREATE_SIGNALED_BIT = 0x00000001,
} VkFenceCreateFlagBits;
```

- VK_FENCE_CREATE_SIGNALED_BIT specifies that the fence object is created in the signaled state. Otherwise, it is created in the unsignaled state.

```
// Provided by VK_VERSION_1_0
```

Slow Vulkan® Spec Load Times are Gone!

- SDK Validation Layer Error Messages
 - Now referencing Antora build of Vulkan specification

SDK Validation Error:

VUID-VkImageViewCreateInfo-pNext-pNext(ERROR / SPEC): msgNum: 151814321 - Validation Error: [VUID-VkImageViewCreateInfo-pNext-pNext] | MessageID = 0x90c80b1 | vkCreateImageView(): pCreateInfo->pNext chain includes a structure with unexpected VkStructureType VK_STRUCTURE_TYPE_IMAGE_CREATE_INFO. This error is based on the Valid Usage documentation for version 304 of the Vulkan header. It is possible that you are using a struct from a private extension or an extension that was added to a later version of the Vulkan header, in which case the use of pCreateInfo->pNext is undefined and may not work correctly with validation enabled.

The Vulkan spec states: Each pNext member of any structure (including this one) in the pNext chain must be either NULL or a pointer to a valid instance of VkExportMetalObjectCreateInfoEXT, VkImageViewASTCDecodeModeEXT, VkImageViewMinLodCreateInfoEXT, VkImageViewSampleWeightCreateInfoQCOM, VkImageViewSlicedCreateInfoEXT, VkImageViewUsageCreateInfo, VkOpaqueCaptureDescriptorDataCreateInfoEXT, or VkSamplerYcbcrConversionInfo.

<https://vulkan.lunarg.com/doc/view/1.4.304.1/linux/antora/spec/latest/chapters/resources.html#VUID-VkImageViewCreateInfo-pNext-pNext>

VUID-VkFenceCreateInfo-sType-sType(ERROR / SPEC): msgNum: 913590280 - Validation Error: [VUID-VkFenceCreateInfo-sType-sType] | MessageID = 0x36744808 | vkCreateFence(): pCreateInfo->sType must be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO.

The Vulkan spec states: sType must be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO

<https://vulkan.lunarg.com/doc/view/1.4.304.1/linux/antora/spec/latest/chapters/synchronization.html#VUID-VkFenceCreateInfo-sType-sType>

Antora build specification:

Vulkan Specification / Synchronization and Cache Control

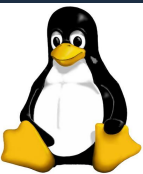
Valid Usage (Implicit)

- VUID-VkFenceCreateInfo-sType-sType
sType must be VK_STRUCTURE_TYPE_FENCE_CREATE_INFO
- VUID-VkFenceCreateInfo-pNext-pNext
Each pNext member of any structure (including this one) in the pNext chain must be either NULL or a pointer to a valid instance of VkExportFenceCreateInfo or VkExportFenceWin32HandleInfoKHR
- VUID-VkFenceCreateInfo-sType-unique
The sType value of each struct in the pNext chain must be unique
- VUID-VkFenceCreateInfo-flags-parameter
flags must be a valid combination of VkFenceCreateFlagBits values

```
// Provided by VK_VERSION_1_0
typedef enum VkFenceCreateFlagBits {
    VK_FENCE_CREATE_SIGNALED_BIT = 0x00000001,
} VkFenceCreateFlagBits;
```

The Vulkan® SDK (March 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VKIVA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

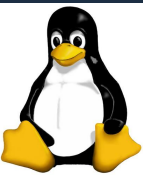
Improved Error
Messages

Improved Validation Layer Error Messages

- Warnings are on by default
- Clunky list of Objects at the top of the message is more dense and easier to read
- New format:
 - First line is VUID, object list, other meta data
 - Second line is the "real message"
 - Third line is the specification text URL
- New option to output in JSON format

The Vulkan® SDK (May 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

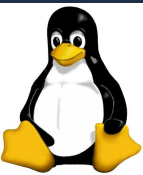
SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer		
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers	slang
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK	Vulkan Runtime
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	VK VIA	
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA	
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM	

VK VIA Removed

The Vulkan® SDK (May 2025)

Windows X64/ARM Cross
Compiling

License
Registry



Ubuntu
Packages

Tarball

 Windows

 Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	Vulkan Runtime
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	slang
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM

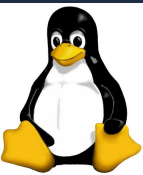
Cross Compiling Enhancement

	Windows X64 SDK Location	Windows ARM SDK Location
Windows X64 dlls/libs		Lib-X64 and Bin-X64 directories
Windows ARM dlls/libs	Lib-ARM64 and Bin-ARM64 directories	

- Enables cross compiling, linking, and packaging of applications on both platforms.

The Vulkan® SDK (July 2025)

License
Registry



Ubuntu
Packages

Tarball

Windows

Windows
arm

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	Vulkan Runtime
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	slang
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM

SPIRV-remapper
moved to SPIR-V
Optimizer

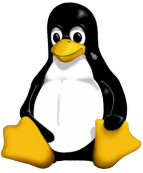
Moving spirv-remap to SPIRV-Tools

- glslang spirv-remap utility ported to SPIRV-Tools as an optimization pass
- glslang version being deprecated and will be removed from glslang in the next SDK
- Why?
 - Community request
 - spirv-remap is an optimization pass. Put it with other optimization passes
 - Reduces repository dependencies for apps
 - Before move: Apps needed both spirv-tools and glslang
 - After move: Apps only need spirv-tools

The Vulkan® SDK (July 2025)

Ubuntu Packages
Removed

License
Registry



Ubuntu
Packages

Tarball

SDK version'd Spec	Vulkan Loader	vkconfig	Validation Layer	Vulkan Runtime
SPIR-V Optimizer	SPIR-V Tools	Crash Diagnostic Layer	vulkaninfo	Emulation Layers
shaderc	SPIR-V Validator	Profiles Toolset	GPUInfo	VOLK
DXC	SPIR-V Reflect	apidump	GFX Reconstruct	slang
SPIR-V Cross	glslang	Vulkan-HPP	Screenshot	VMA
MoltenVK	SPIR-V Visualizer	SDL	Monitor	GLM

Windows

Windows
arm

Removal of Ubuntu Packages

- Lower usage rate
- Tarball can provide necessary functionality
- Helps with limited SDK resources workload
- Previously released packages will exist for 2 years
 - Then they disappear

LunarXchange (vulkan.lunarg.com)



[+ Signup](#) [Signin](#)

[SDK](#)

[Issues](#)

[Docs](#)

[Licenses](#)

[Khronos](#)

[Sponsored by](#)


[Developed by](#)


[Delivered by](#)


DOWNLOAD DEVELOPER TOOLS FOR



SDK version query and download API

Windows

Version	File
1.4.321.1 18-Jul-2025	SDK - SDK Installer vulkansdk-windows-X64-1.4.321.1.exe (244MB) baaa47ca11ed3d82aa1c102b21208915489bbaa473088c763daa425cca498bd
	SDK Config - Config.json config.json (0MB) 00de10e23b010e1a33ca9a9a84e6c0b621799e2abd259629ea17049c92bd995
1.4.321.0 15-Jul-2025	SDK - SDK Installer vulkansdk-windows-X64-1.4.321.0.exe (244MB) 14ebc59e981e03a292adadd2559b9bfc02d89ec157f0f0f0d59f0cb40042a9
	SDK Config - Config.json config.json (0MB) d3dce5fc0c0bfaa298f01f70911a942b27331145f05c877d10484ee882785cae
	Runtime - Runtime Installer VulkanRT-X64-1.4.321.0-Installer.exe (20MB) 194612d1f5a9b8de9b3b7988a78d5e34610873402d3f91e1e4a2598a49d959b
	Runtime zip - Zip file of the runtime components. VulkanRT-X64-1.4.321.0-Components.zip (14MB) f8ba79303face4b72a2f032f1a40e8c918995b54bf6240cd0f3c3d4f525dca

Linux

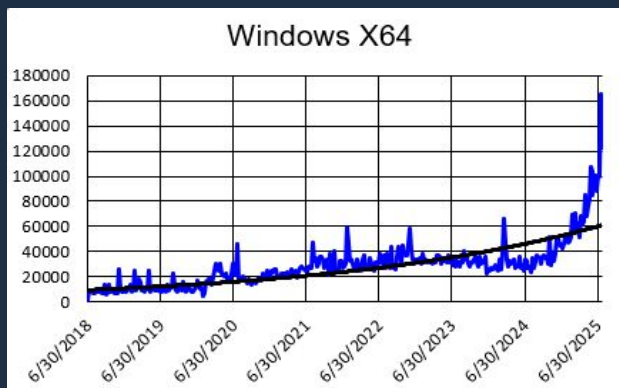
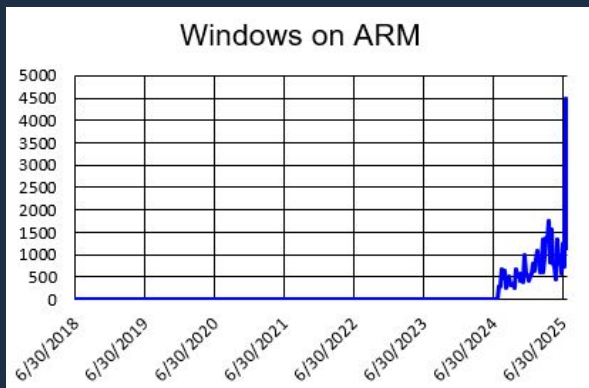
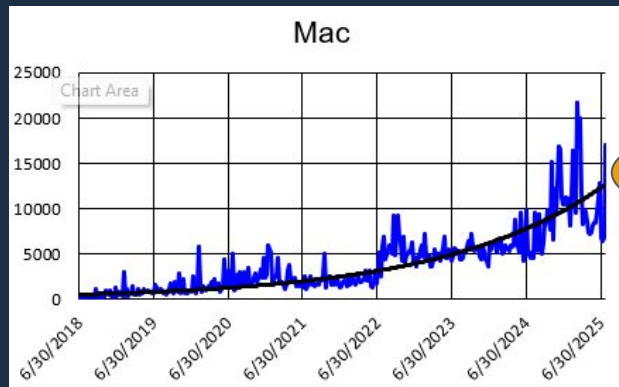
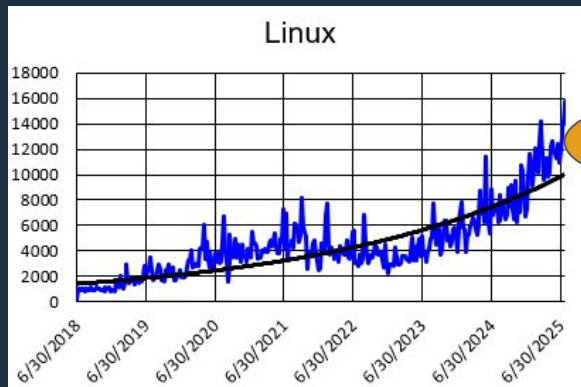
Version	File
1.4.321.1 18-Jul-2025	SDK - SDK Installer vulkansdk-linux-x86_64-1.4.321.1.tar.xz (291MB) 122a3625bd4d7a32e7a0d928ace1bd5278c149e938dac63cecd0053762bcbf73
	SDK Config - Config.json config.json (0MB) bec0ff3e913bd9f7ae27aa05d3b14232271a13ef129ef78913d62010b6bcb97
1.4.321.0 15-Jul-2025	SDK - SDK Installer vulkansdk-linux-x86_64-1.4.321.0.tar.xz (291MB) a90c30209108148ac9f9b9cc20d851e5577ef7b7e2d57f387b7bcd9a545a8
	SDK Config - Config.json config.json (0MB) 81ce0de4989034b05834c7487b85a74d9e8328bc039f832f8a187428be5308c
1.4.313.0 06-May-2025	SDK - SDK Installer vulkansdk-linux-x86_64-1.4.313.0.tar.xz (325MB) 4e9b7b99ade8e5eeae95912aa7e3b45aa94db373c58a5eaeef82229c71445c2
	SDK Config - Config.json config.json (0MB) d71d303bd8e2b999e43098ced0cd7ea72d50cbb44238884ccad9a4b5961cc0d

Mac

Version	File
1.4.321.0 15-Jul-2025	SDK - SDK Installer vulkansdk-macos-1.4.321.0.zip (325MB) d873c43acacae1e3330fb530daf541aa5d8a5728575a98a3f70ca505fc203db
	SDK Config - Config.json config.json (0MB) 81ce0de4989034b05834c7487b85a74d9e8328bc039f832f8a187428be5308c
1.4.313.1 26-May-2025	SDK - SDK Installer vulkansdk-macos-1.4.313.1.zip (327MB) 69b0bd8dbf7e93b40f1b553b7b3e458a8f3cbe368582b56470ba780cd682aa3
	SDK Config - Config.json config.json (0MB) f61954a8d9b9db09909aa5372a816745bd2014e95a6363001eff67807dad32d0
1.4.313.0 06-May-2025	SDK - SDK Installer vulkansdk-macos-1.4.313.0.zip (327MB) 782a9b9e4d5d8acaa933f45215d2e34f298d9f9077270202218110dc20
	SDK Config - Config.json config.json (0MB) d71d303bd8e2b999e43098ced0cd7ea72d50cbb44238884ccad9a4b5961cc0d
1.4.309.0 11-Mar-2025	SDK - SDK Installer vulkansdk-macos-1.4.309.0.zip (325MB)



SDK Download Rates



Coming Soon: KosmicKrisp

- A Vulkan® on Metal® Mesa 3D Graphics driver
- Supports only Apple Silicon (M1, M2, M3, ...)
 - No plans for older hardware
- Will be Vulkan conformant
 - Eliminating need for Vulkan® Portability™



Under
Development

Coming Soon: KosmickKrisp

- Inspiration

- Alyssa Rosenzweig's Honeykrisp Linux driver
 - Demonstrated Vulkan 1.3 conformance on Apple hardware
 - Why can't we do that with a Vulkan® -> Metal® driver?
 - So LunarG investigated some more...

- Why the name KosmickKrisp?

- The Cosmic Crisp® apple is the remarkable result of 20 years of study and research by Washington State University's world-class tree fruit breeding program. Classically bred and grown in Washington State, the Cosmic Crisp® apple is a cross of the Enterprise and Honeycrisp varieties.



Under
Development

Coming Soon: KosmicKrisp

- Why do KosmicKrisp?

- Achieve Vulkan Conformance
 - Eliminating need for Vulkan® Portability™
- Enable faster driver development; keep up with Vulkan
 - Use Mesa NIR optimizing compiler stack
 - SPIRV-cross -> MSL (used by MoltenVK) isn't a compiler stack
 - Cleaner to add instructions, rewrite input/output layouts, ...
 - Remove dependency upon external project
 - Leverage Mesa Vulkan driver framework
 - Leverage HoneyKrisp utilities when emulation needed
 - Leverage Mesa test suites for CI regression testing
 - Access to broad community of Mesa developers
 - Everything is in-tree and MIT licensed



Under
Development

Coming Soon: KosmicKrisp

Sponsored by Google

"Google is committed to providing Android developers with exceptional tools across all platforms, including strong support for Vulkan. We're excited about how KosmicKrisp will enhance the Vulkan developer experience and make the Android Emulator even more powerful."

- Serdar Kocdemir - Senior Software Engineer at Google | Tech Lead for Graphics on the Android Emulator



Under
Development

Coming Soon: KosmicKrisp

- MacOS SDK plans?
 - Will include both MoltenVK and KosmicKrisp
 - MoltenVK required for older Apple hardware
 - Expect KosmicKrisp to move forward as Vulkan moves forward



Under
Development

Coming Soon: KosmicKrisp

- Very close to 1.3 conformance
- Lots of content is running
 - See Demo at LunarG table
 - Talk to Aitor – a primary developer of the driver
- Expecting fall timeframe public release
 - Public MR to Mesa once 1.3 conformant



Under
Development

Gratitude for Their Support

VALVE

Google

SAMSUNG

Qualcomm

arm

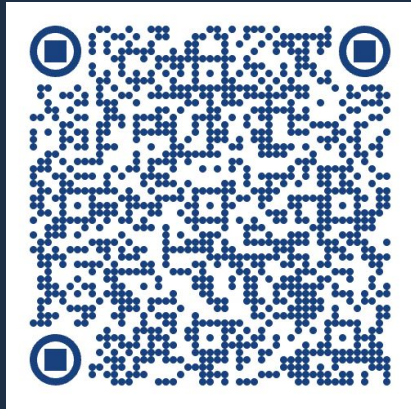
AMD

KHRONOS
GROUP

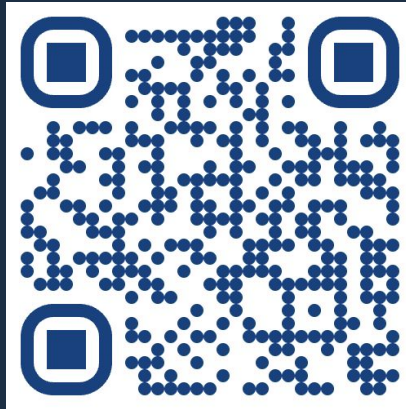
LUNAR
POWER YOUR SUCCESS

THANK YOU!

Download LunarG
Presentations



LunarG
Website



BLOG Post

