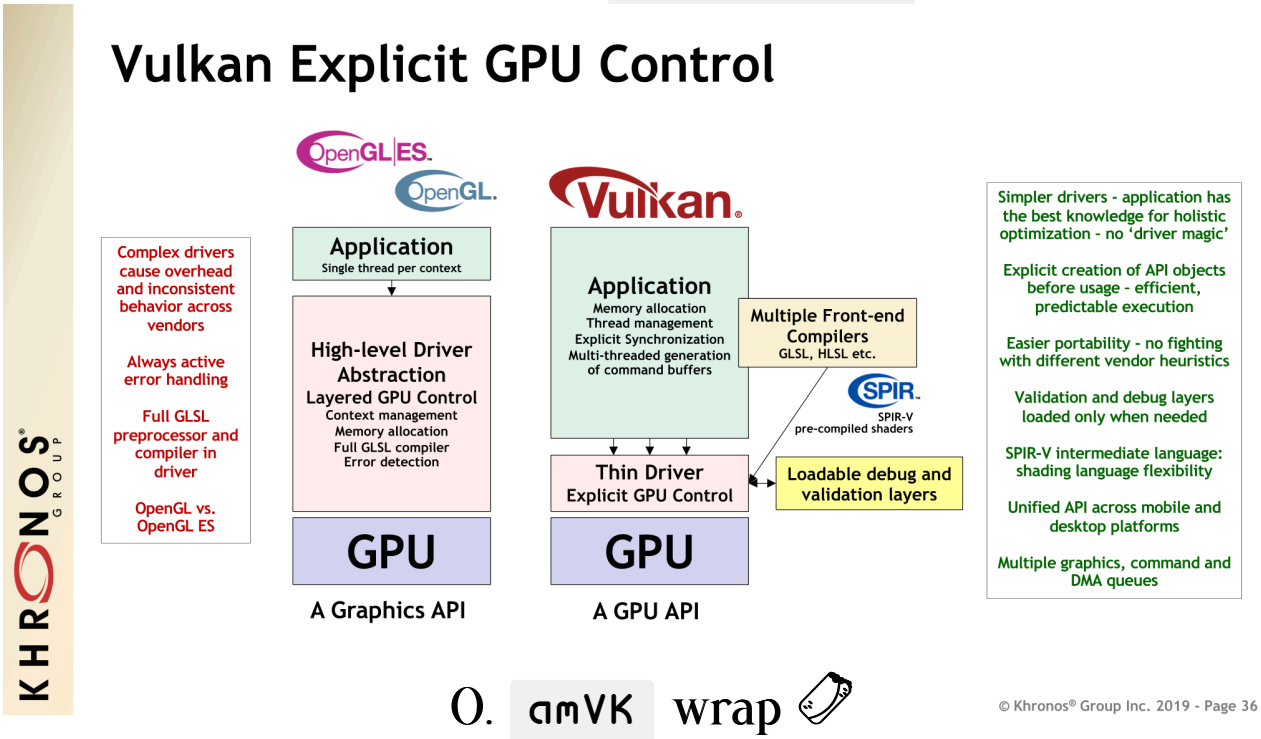
The Real "Adventure" begins here!

[well, not really. I believe the real adventure is in SHADERs and Algorithms!]

Chapter 1: `VkInstance`



0. `amVK` wrap

```
#include "amVK_Instance.hh"
    // TwT
amVK_Instance::AppInfo              // VkApplicationInfo        [public]
amVK_Instance::CI                   // VkInstanceCreateInfo     [public]
    // You can modify these as you wish 😊
amVK_Instance::CreateInstance();    // initializes amVK_HEART
```

1. Notes on `Notes`

2. `VkApplicationInfo`

- https://vkdoc.net/man/VkApplicationInfo
  - `.sType` --> *VK_STRUCTURE_TYPE_APPLICATION_INFO*
  - `.pNext` --> *NULL*
  - `.pApplicationName` --> *null-terminated UTF-8 string*
  - `.applicationVersion` --> `uint32`
  - `.pEngineName` --> *null-terminated UTF-8 string*
  - `.engineVersion` --> `uint32`
  - `.apiVersion` --> `uint32`

So the first thingy is gonna be the link to the Documentation website 💁 for the `VkStruct`

Under that,
there's gonna be items/elements of that `VkStruct`
-> Tried to keep them Short & Sorted as per the `vulkan.h` *header Declaration*

Now I won't copy paste literally every element all the time 💁
`.sType` *&* `.pNext` *is common*
(explained them below)

do remember to check the `Valid Usage` *section* 😉 *in vkdoc.net*
(i kinda always check that section first, before reading other parts / diving deep)

- **REY_DOCs**
  - `.apiVersion`
    - `lowest Vulkan API version` *Your APP "can run" on.*
      - *[*clarification needed:- lowest or highest]*
  - `.engineVersion`
    - *and the* `version` *of the* `engine` *(if any) used to create "Your APP".*
    - *This can help* `vulkan driver implementations` *to perform "ad-hoc" optimizations.*
      - *e.g. like if a Triple-A [AAA] game used, for say,* `Unreal Engine Version 4.1.smth` *idk* 🤷
  - *REFs:- 1. minerva*

Sometimes
these items/elements/members
are gonna need some explanation 💁
-> That's exactly why this `REY_DOCs` *section exists!*

made with affine.pro [+ Screenshot of my `4.guide.CH0.pdf` *]*

The `VkApplicationInfo` structure is defined as:

C Rust

```c
typedef struct VkApplicationInfo {
    VkStructureType sType;
    const void* pNext;
    const char* pApplicationName;
    uint32_t applicationVersion;
    const char* pEngineName;
    uint32_t engineVersion;
    uint32_t apiVersion;
} VkApplicationInfo;
```

- ***https://vkdoc.net/man/VkApplicationInfo***
  - `.sType` :-
    - ▨ *almost every* `VkStruct` *is gonna have this field/member* 💁
    - *must be*
      - `VK_STRUCTURE_TYPE_APPLICATION_INFO` *for* `VkApplicationInfo`
      - `VK_STRUCTURE_TYPE_INSTANCE_CREATE_INFO` *for* `VkInstanceCreateInfo`
      - `VK_STRUCTURE_TYPE_DEVICE_CREATE_INFO` *for* `VkDeviceCreateInfo`
      - *and so on... (you get the idea)*
  - `.pNext` :-
    - ▨ *almost every* `VkStruct` *is gonna have this field/member* 💁
    - *Mostly* `NULL` 💁
    - *but it has an interesting use case:-*
      - *https://vkdoc.net/man/VkDeviceCreateInfo#VUID-VkDeviceCreateInfo-pNext-pNext*
      - *you can kinda like pass in pointer to* `VkStructEXT` *when you need those Extension features* 💁
  - `.pApplicationName` --> *null-terminated UTF-8 string*
  - `.applicationVersion` --> `uint32`
    - *you as the developer of your application can set it to arbitrarily anything you want it to* 💁*, say*
      - *101*
      - *005*
      - *1*
      - *2025*
  - `.pEngineName` --> *null-terminated UTF-8 string*
  - `.engineVersion` --> `uint32`
  - `.apiVersion` --> `uint32`

- ***again.... yeah, do remember to check the*** `Valid Usage` ***section*** ☺

- ***There's a alternative to vkdoc.net***
  - *https://github.com/ivirtex/vulkan-hover-docs/tree/master/vscode_ext/vulkan_man_md_pages/VkInstanceCreateFlagBits.md*
  - *it is also available as an extension in* `vscode` --> `ivirtex.vulkan-hover-docs`

- ***Symbols***
  - ▨ :- *kinda means nothing*
    - *i kinda used to like make it look like a bit pattern-ish iguess* 😂 🤔
  - ▨ :- *"Yellow Card"*
    - *it means, you don't need to hesitate about this thingy right now* 💁 *we will focus on this element later* 🤔
  - ▨ :- *"Orange Card"*
    - *it means, this element is probably never gonna be 'necessary' for vulkan applications* 💁
  - *[The extended list can be found in* 🔗 ***Chapter3.14****]*

2. 🛠 `VkApplicationInfo`

- ***https://vkdoc.net/man/VkApplicationInfo***
  - `.sType` ▨ `VK_STRUCTURE_TYPE_APPLICATION_INFO`
  - `.pNext` ▨ `NULL`
  - `.pApplicationName` *--> null-terminated UTF-8 string*
  - `.applicationVersion` 🏷 `uint32`
  - `.pEngineName` *--> null-terminated UTF-8 string*
  - `.engineVersion` 🏷 `uint32`
  - `.apiVersion` 🏷 `uint32`
- 📜 *REY_DOCs*
  - `.apiVersion`
    - `lowest Vulkan API version` *Your APP* ***"can run"*** *on.*
      - *[*clarification needed:- lowest or highest]*
  - `.engineVersion`
    - *and the* `version` *of the* `engine` *(if any) used to create* ***"Your APP"****.*
    - *This can help* `vulkan driver implementations` *to perform* ***"ad-hoc"*** *optimizations.*
      - *e.g. like if a Triple-A [AAA] game used, for say,* `Unreal Engine Version 4.1.smth` *idk* 🤷
  - *REFs:- 1. minerva*

- ***yes, what are you waiting for*** 🤷 ***go go, shooo.... (***🥹***)***
  i. `#include <vulkan/vulkan.h>`
  ii. *take an instance of that* `Struct` *-> Fill it up [*😉*][have the vkdoc.net as assist]*

3. 🛠 `VkInstanceCreateInfo`

- ***https://vkdoc.net/man/VkInstanceCreateInfo***
  - `.sType` ▨ `VK_STRUCTURE_TYPE_INSTANCE_CREATE_INFO`
  - `.pNext` ∅ `NULL`
    - ∅ *: "Extensions"*
    - *Some intresting ones actually* 😉 *(will talk about them later)*
  - `.flags` ☐ `VkInstanceCreateFlagBits`
    - *https://vkdoc.net/man/VkInstanceCreateFlagBits | ivirtex-github*
  - `.pApplicationInfo` ▨ 🤦 *Duh!*
  - `.ppEnabledLayerNames` ▨ *ChapterZZZ*
  - `.ppEnabledExtensionNames` ▨ *Chapter4.2*
    - *Don't hesitate about* `EnabledLayer` *&* `EnabledExtensions` *right now*
      - *come back and add them when you need to* 😉
      - *This is what I would mean, when i would point smth to a later chapter*
      - *I will add the* ▨ *("Yellow Card") too!*
- 📜 *REY_DOCs*
  - *Nothing that I need to add, in this section*
  - *Tho if this section gets big, I will create a separate* `.md` *file for that thingy*

4. A 😎 Cool `vscode` / `visual-studio` extension if you want 🧑‍🎤

- `vscode extension name` --> `ivirtex.vulkan-hover-docs`
  - *https://github.com/ivirtex/vulkan-hover-docs*

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5. 🏷 `VkInstance m_instance = nullptr;`

- ***https://vkdoc.net/man/VkInstance***

6. 🎁 `vkCreateInstance(CI, nullptr, &m_instance)`

- ***https://vkdoc.net/man/vkCreateInstance***
  - `param pCreateInfo` ▨ 👩‍🎨 *Duh!*
  - `param pAllocator` ▨ `nullptr`
  - `param pInstance` ▨ `&m_instance`
- 📜 *REY_DOCs*
  - `param pAllocator`
    - `VkAllocationCallbacks` ▨ ChapterZZZ
      - *I will make a chapter on this* 😳 *[https://vkdoc.net/chapters/memory#memory-allocation]*
    - *Vulkan provides applications the opportunity to perform host memory allocations*
    - *If this feature is not used*
      - *the implementation will perform its own memory allocations.*
    - *Since most memory allocations are off the critical path, this is not meant as a performance feature. Rather, this can be useful for certain embedded systems, for debugging purposes (e.g. putting a guard page after all host allocations), or for memory allocation logging.*

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7. 🕵 Error Handling / Checking / ⚠ Logging

- ***check out my*** `amVK_log.hh`
  - *uses REY_LoggerNUtils inside amGHOST*
  - *has a simple* `stackTracer()` *that i basically stripped from blender3D codebase* 😎

8. 🎥 `So far, The result` :- *4.guide.chapter1.hh*

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9. The Unused ones

1. `vkEnumerateInstanceExtensionProperties()` --> ▨ *Chapter4.2*
   - *https://vkdoc.net/man/vkEnumerateInstanceExtensionProperties*
2. `Add_InstanceEXT_ToEnable(const char* extName)` --> ▨ *Chapter4.2*
   - *this is a* ***amVK/REY*** *Custom Function*