

Vulkanised 2023

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Implementing a Vulkan decoder

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Platinum Sponsors:





gstreamer

Amazon EC2



FFmpeg



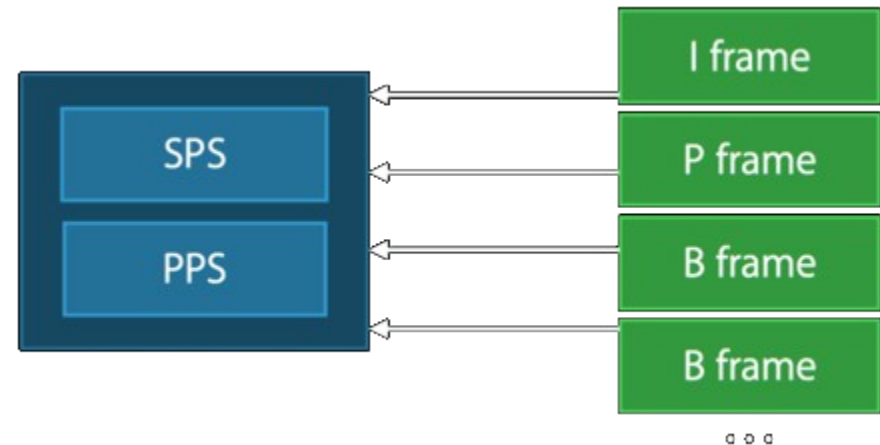
API Overview

- Semi-stateless
- Low level
- Fine grained
 - Each driver implementation can operate differently
 - Verbose
- Big specification



Stream Parameters Sets

- Create a session parameters object
- Add new parameters
- Destroy session parameters object

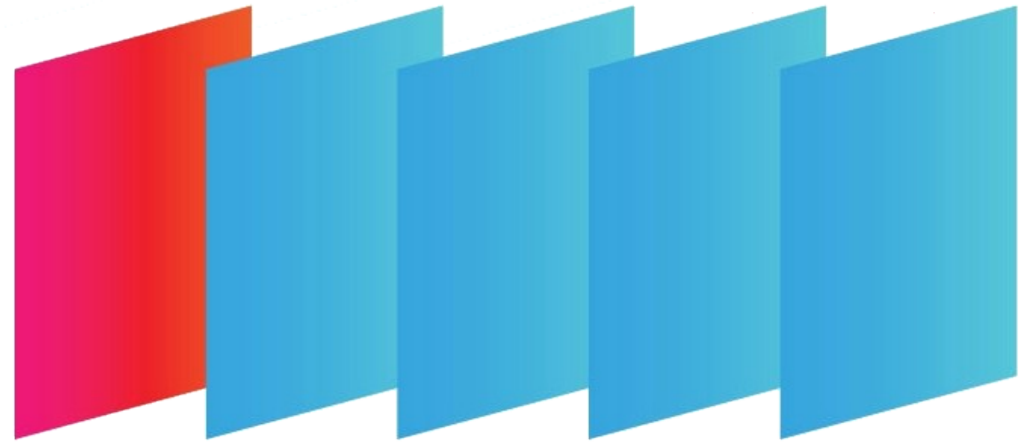


This approach is very different from current parsers.



Picture references (DPB)

- References and output coincide
- Distinct references and output sets
 - references are a set of images
 - references are in a single multi-layered image

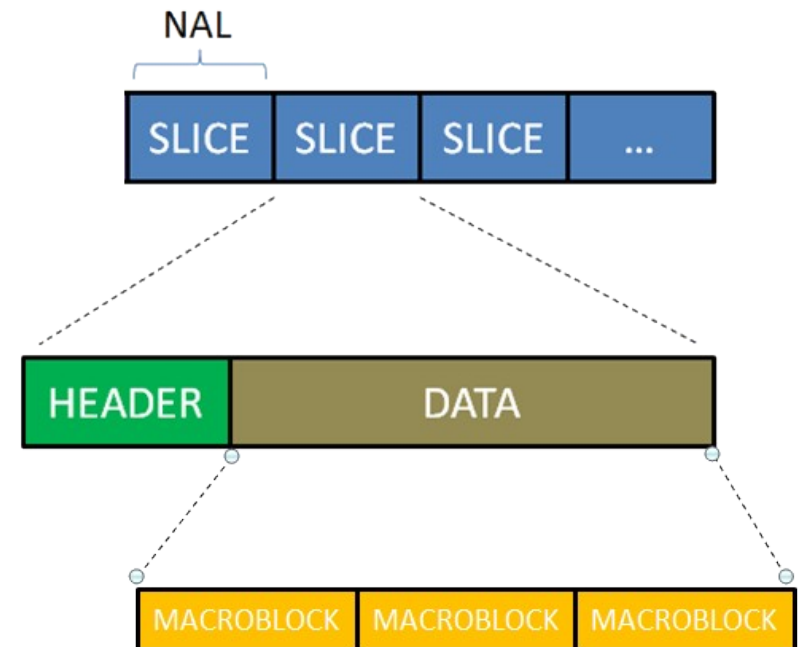


General use implementation should manage each case.



Bitstream buffers

- Upload **all** slices
 - Extra memory copies
 - `VK_EXT_external_memory_host`
- Prepend codec start-code



Multiplanar Images

- `VK_FORMAT_G8_B8R8_2PLANE_420_UNORM` → NV12
 - YUV420 2 planes in single image
- Currently, multiplane images are emulated with separate images per-plane

Y1	Y2	Y3	Y4	Y5	Y6
Y7	Y8	Y9	Y10	Y11	Y12
Y13	Y14	Y15	Y16	Y17	Y18
Y19	Y20	Y21	Y22	Y23	Y24
U1	V1	U2	V2	U3	V3
U4	V4	U5	V5	U6	V6

GStreamer format mapping issue:
2 Vulkan image layouts = 1 GStreamer format



GStreamer Capabilities template

- At element registering time
 - Query all possible decoding devices
 - Query all profiles each device is capable
 - Query all color formats each device/profile can output

```
Pad Templates:
  SINK template: 'sink'
  Availability: Always
  Capabilities:
    video/x-h264
      profile: { (string)progressive-high, (string)constrained-high, (string)high, (string)constrained-baseline, (string)main, (string)baseline }
      width: [ 1, 4096 ]
      height: [ 1, 4096 ]
      alignment: au
      stream-format: { (string)avc, (string)avc3, (string)byte-stream }

  SRC template: 'src'
  Availability: Always
  Capabilities:
    video/x-raw
      width: [ 1, 4096 ]
      height: [ 1, 4096 ]
      format: NV12
    video/x-raw(memory:VAMemory)
      width: [ 1, 4096 ]
      height: [ 1, 4096 ]
```

