

V4L2 on Steroids

The Request API

Embedded Linux Conference 2016
San Diego

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Video 4 Linux 2

Media Controller

Problems

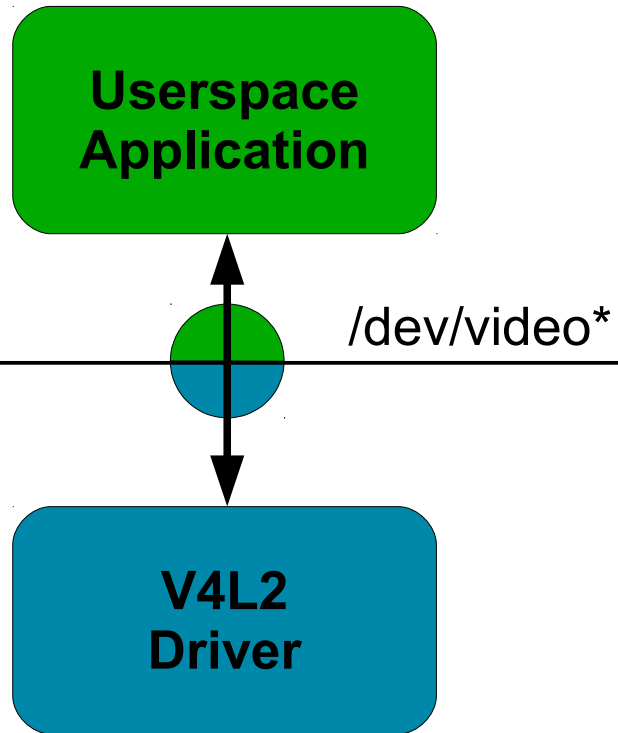
The Request API

Implementation

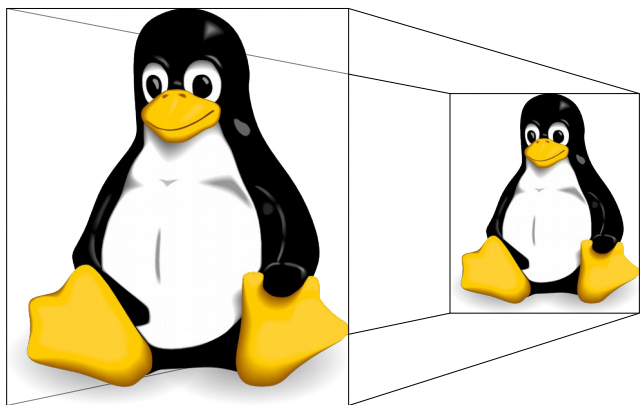
Next



V4L2 On Steroids – The Request API

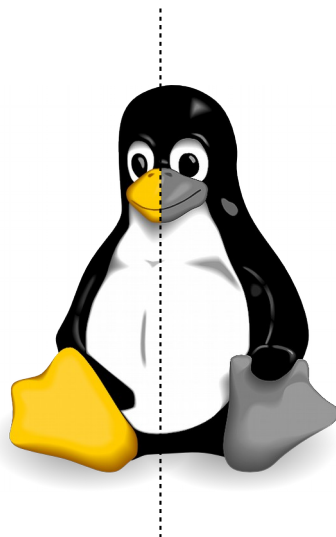


V4L2



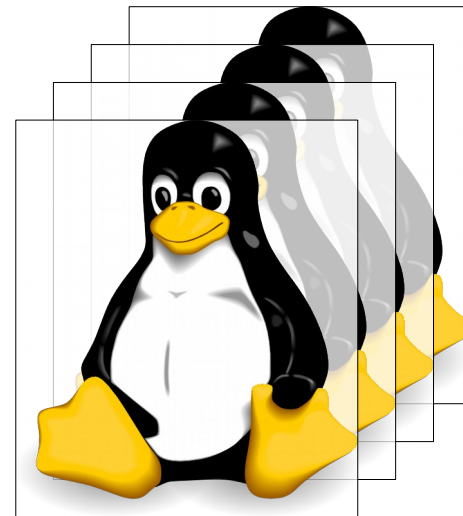
**Configure
Formats**

Format, Crop, Compose



**Set
Controls**

175 Standard Controls
Many Custom Controls



**Allocate
Buffers**

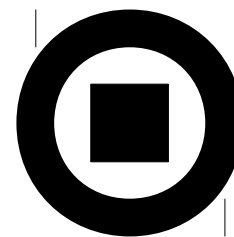
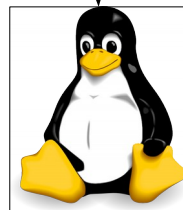
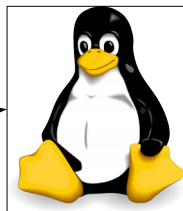
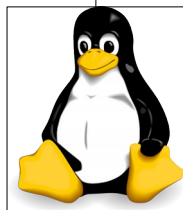
3 Memory Models
DMA BUF



V4L2



Start Video Stream

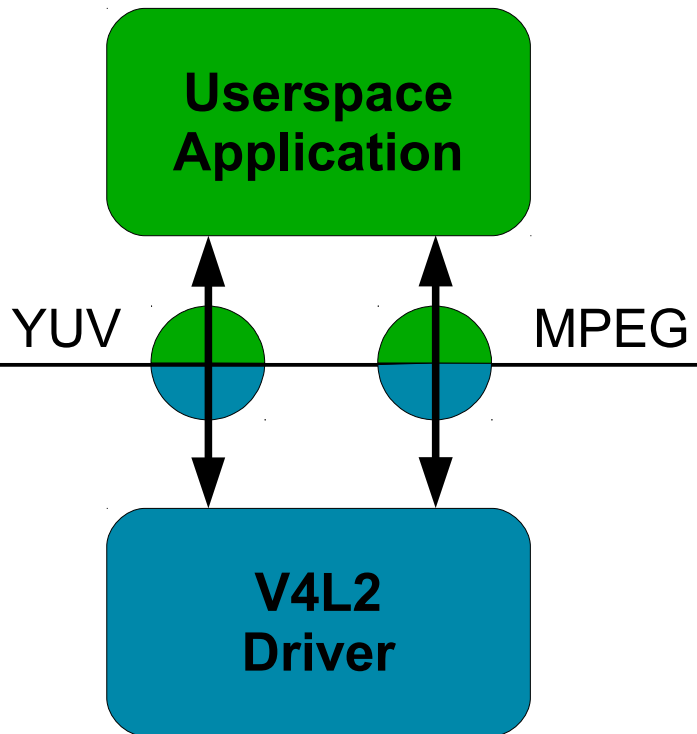


Stop Video Stream

Queue / Dequeue
Blocking & Non-Blocking
Event Notifications

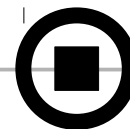
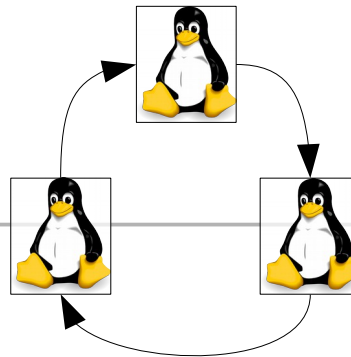
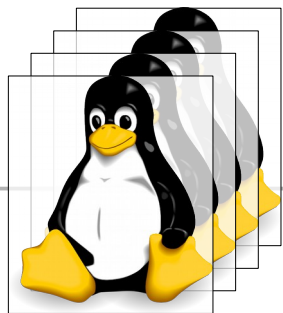
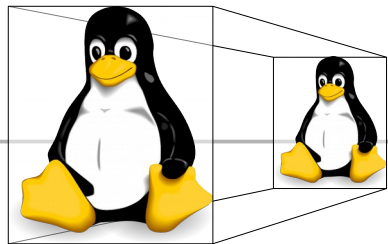


V4L2

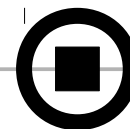
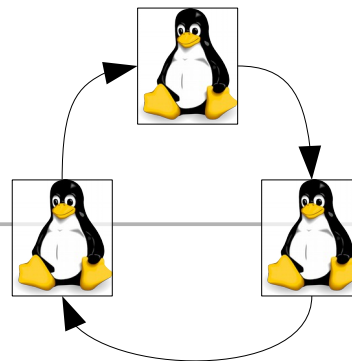
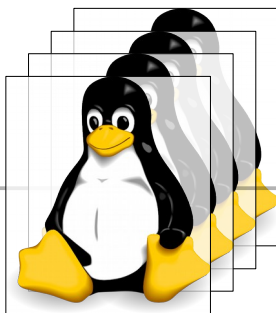
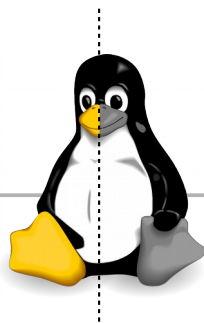


V4L2

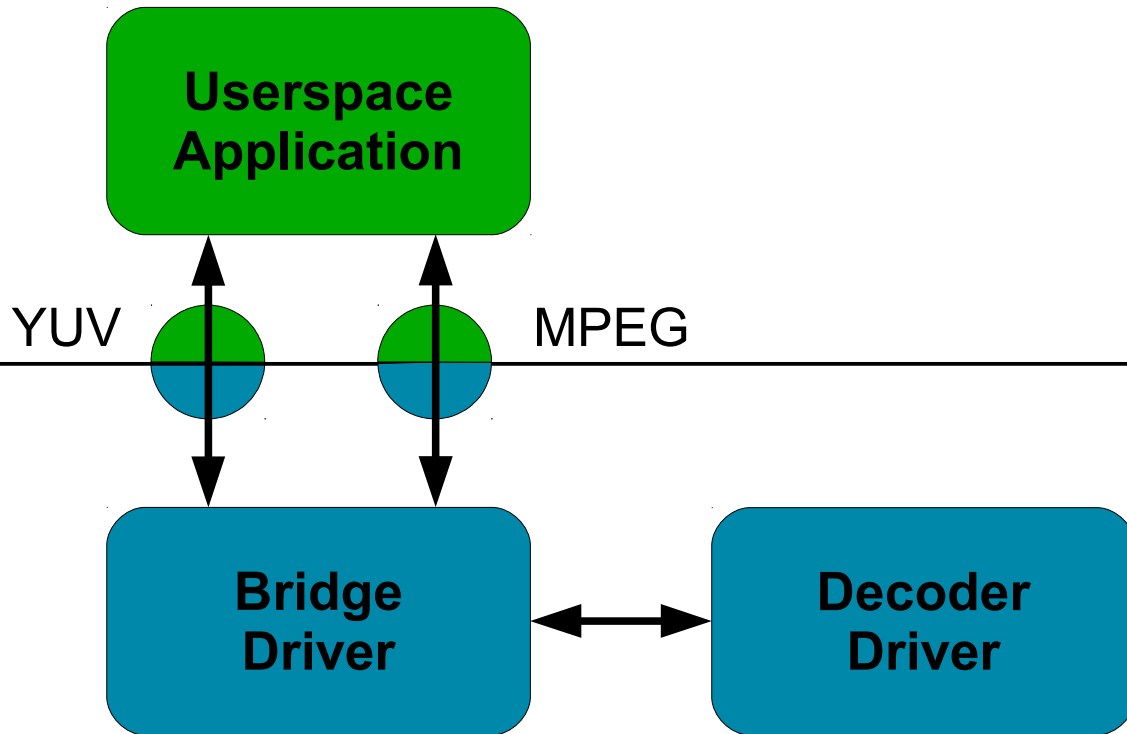
 YUV



 MPEG

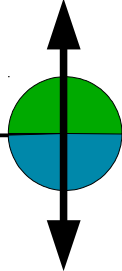


V4L2



V4L2 + Sub-devices

V4L2 call (Set Format)



Bridge Driver

`v4l2_subdev_call(video::s_fmt)`

Success ?

return

Failure ?

Configure the
bridge scaler

Decoder Driver

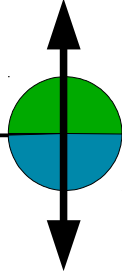
Configure the decoder scaler



V4L2 + Sub-devices

V4L2 call (Set Format)

+ Set Control, Start/Stop Streaming, ...



Bridge Driver

`v4l2_subdev_call(video::s_fmt)`

Success ?

return

Failure ?

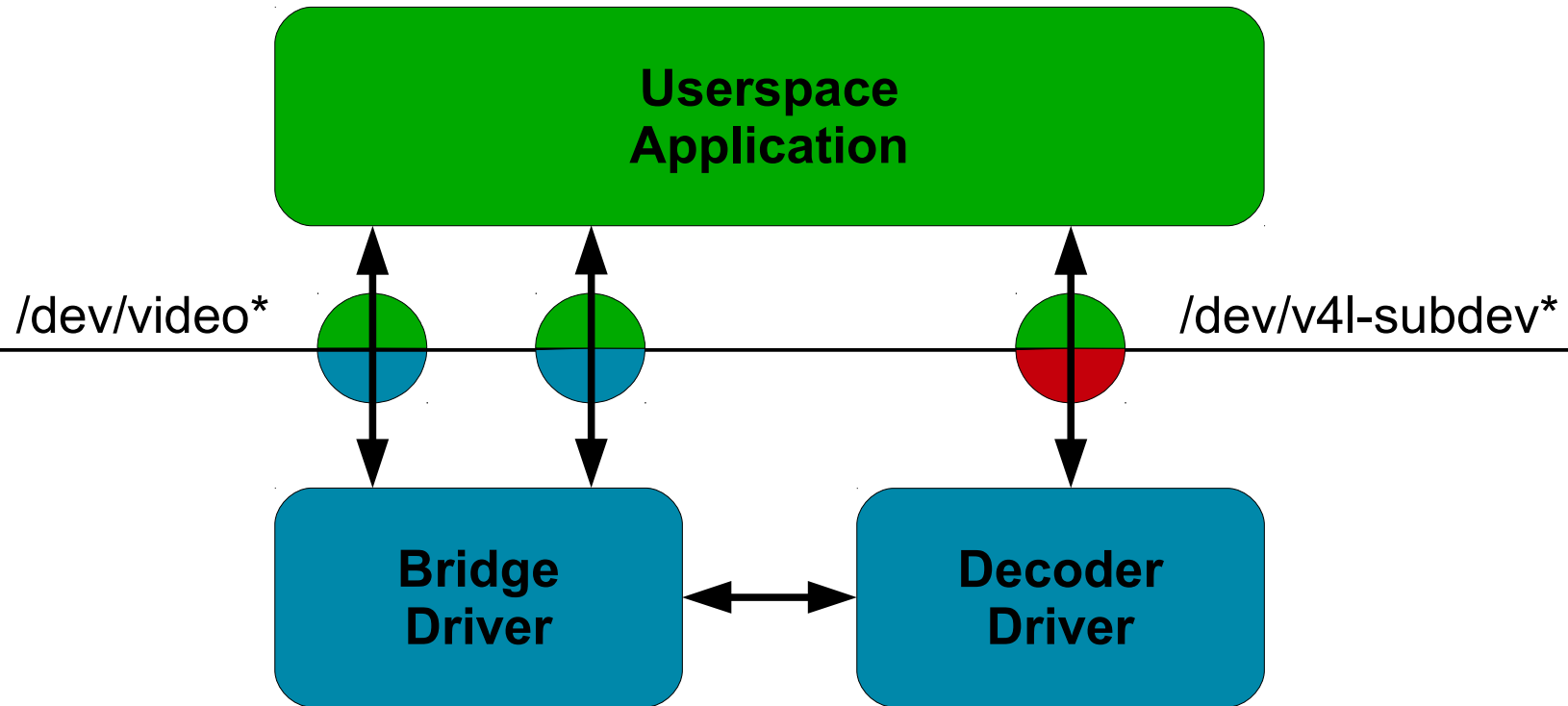
Configure the
bridge scaler

Decoder Driver

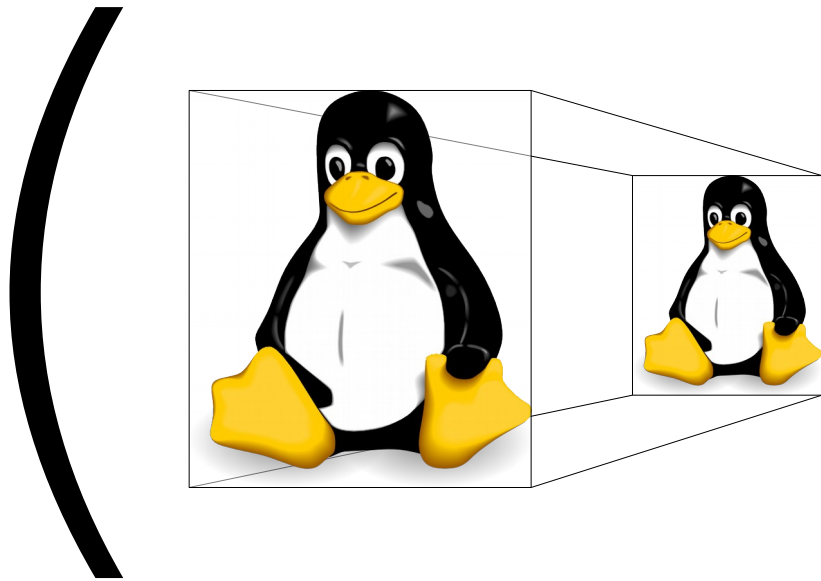
Configure the decoder scaler



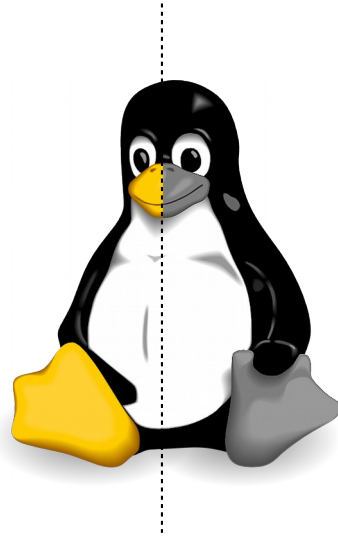
V4L2 + Sub-devices



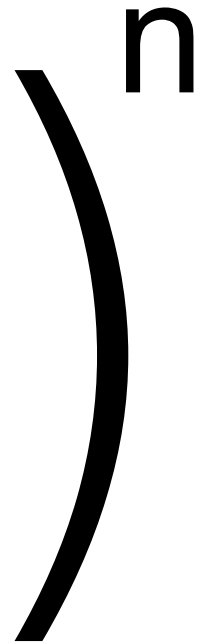
V4L2 + Sub-devices



Configure
Formats



Set
Controls



V4L2 + Sub-devices

Video 4 Linux 2

Media Controller

Problems

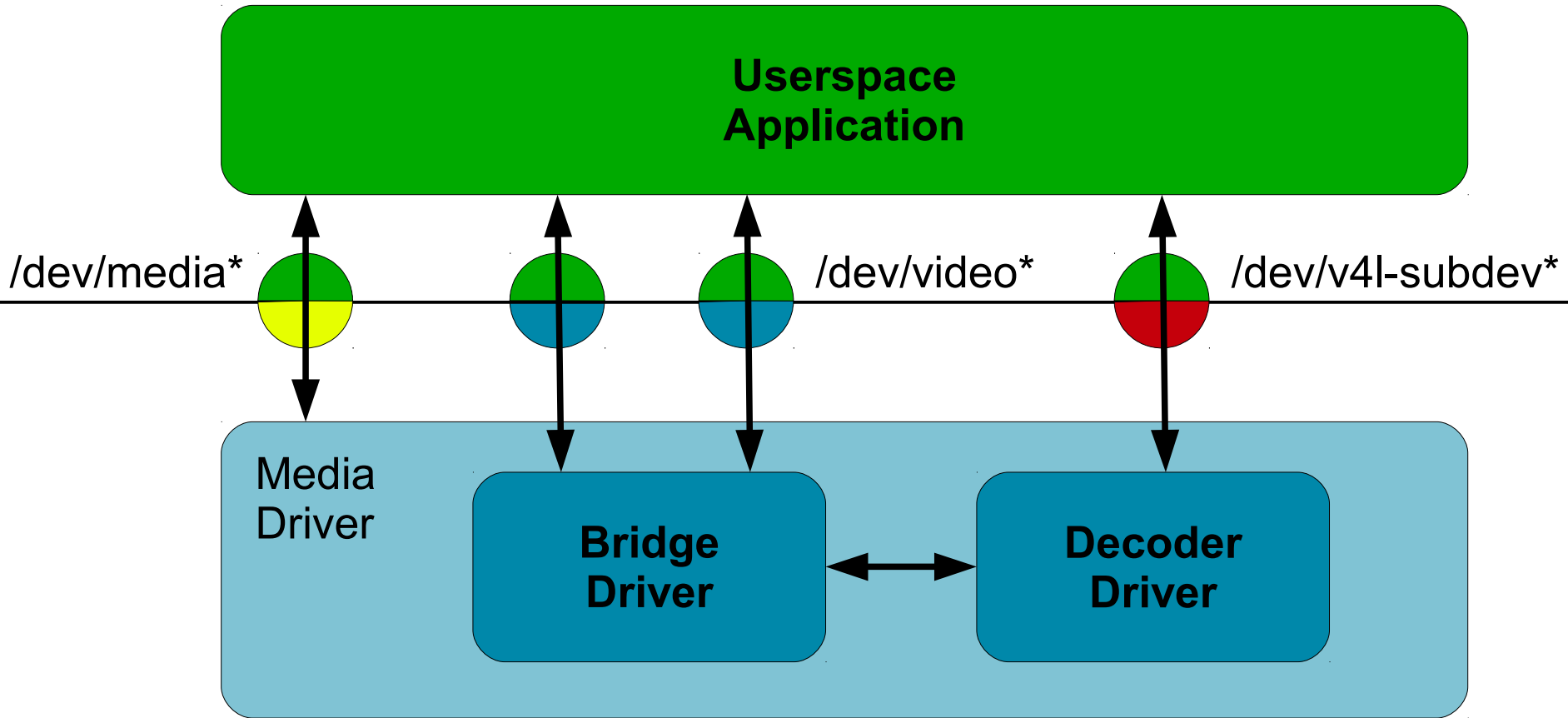
The Request API

Implementation

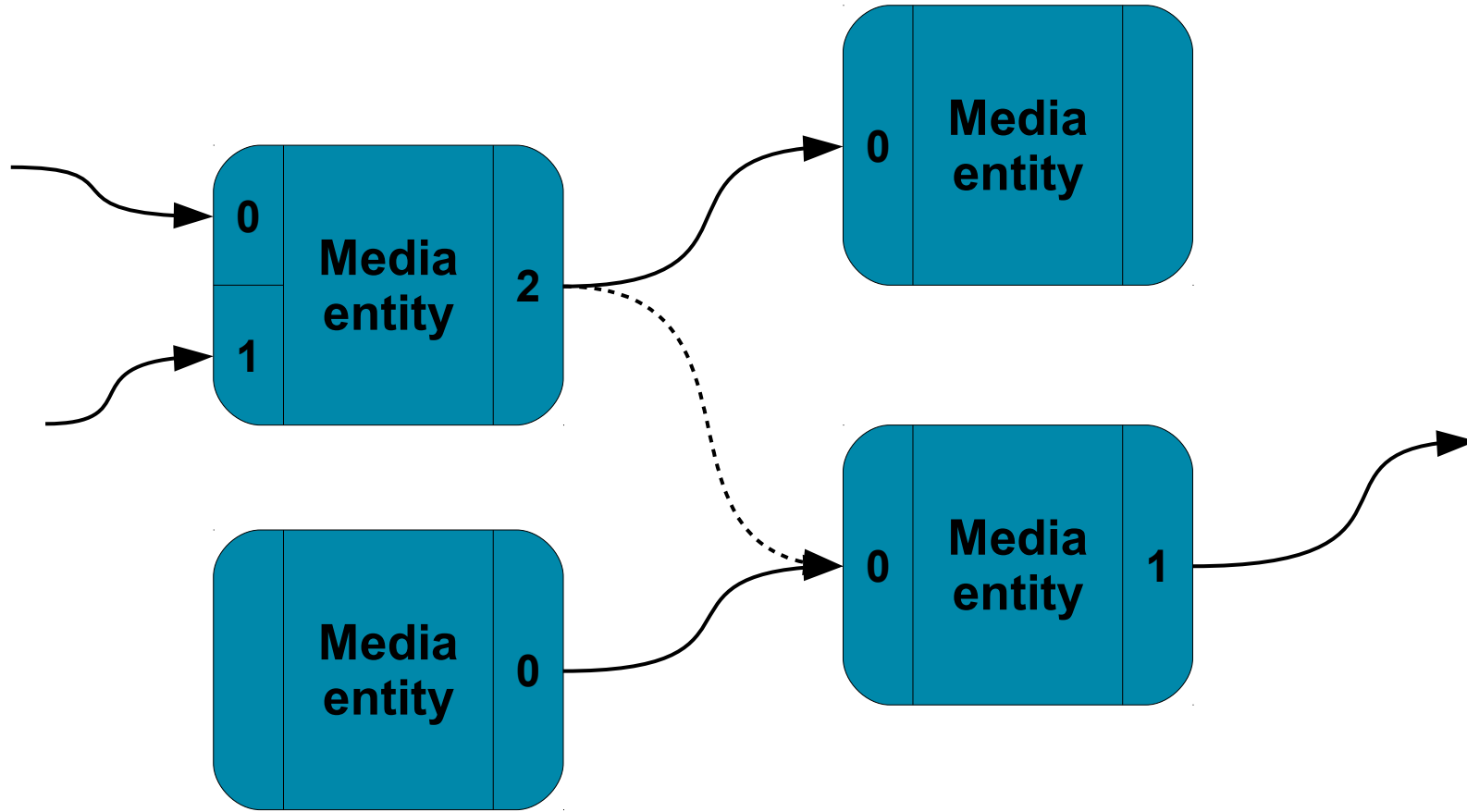
Next



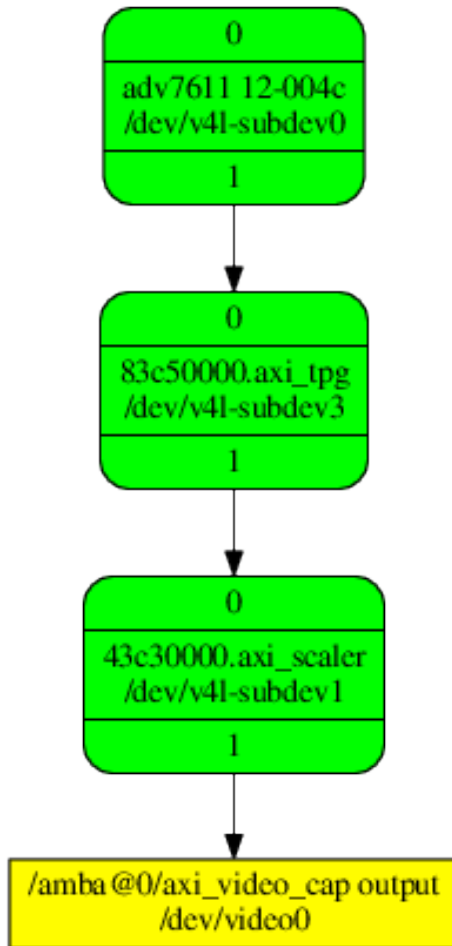
V4L2 On Steroids – The Request API



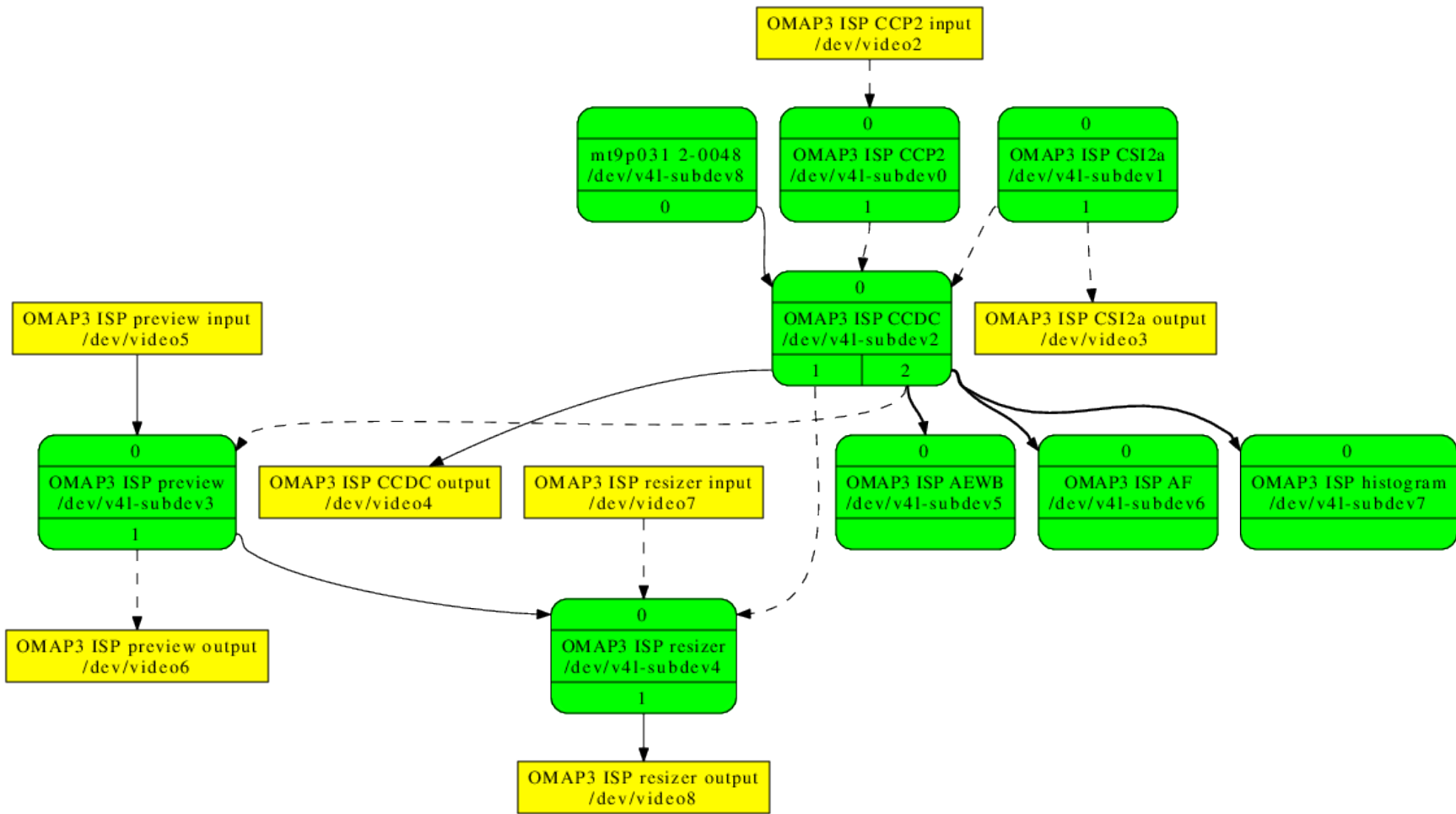
V4L2 + Sub-devices + Media Controller



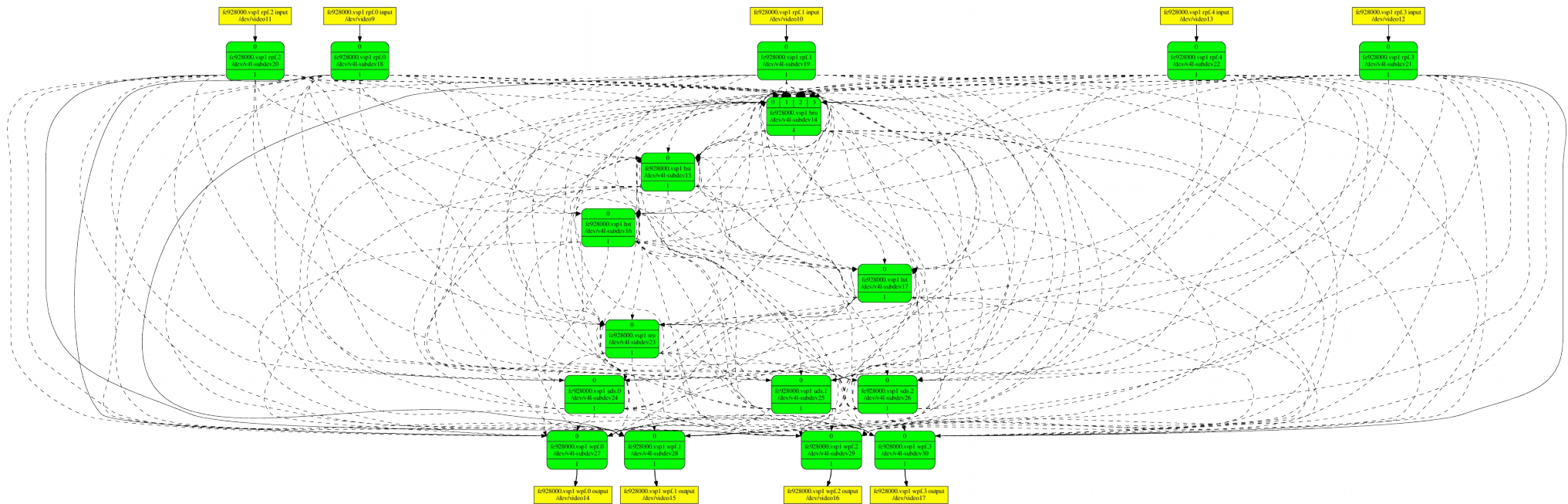
Device Model



Media Device



Media Device



Media Device

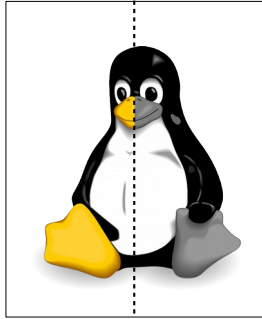
Video 4 Linux 2
Media Controller

Problems

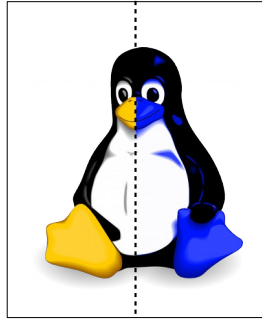
The Request API
Implementation
Next



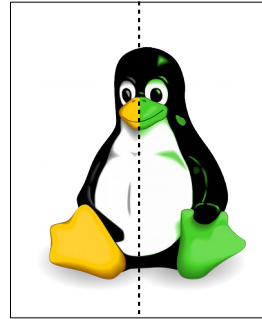
V4L2 On Steroids – The Request API



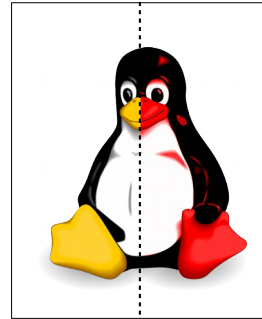
1



2



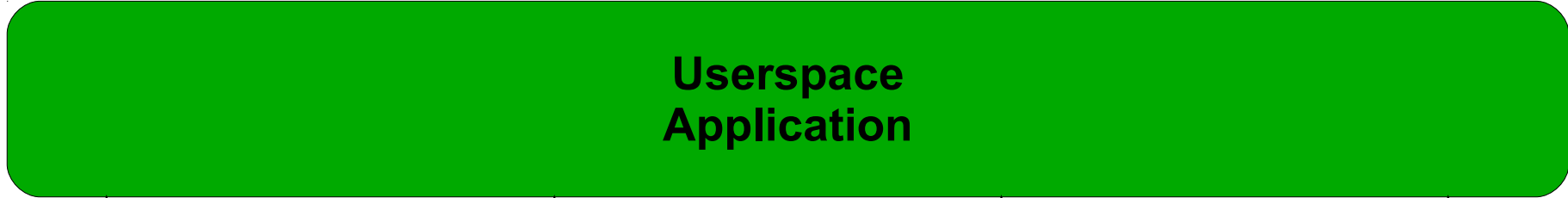
3



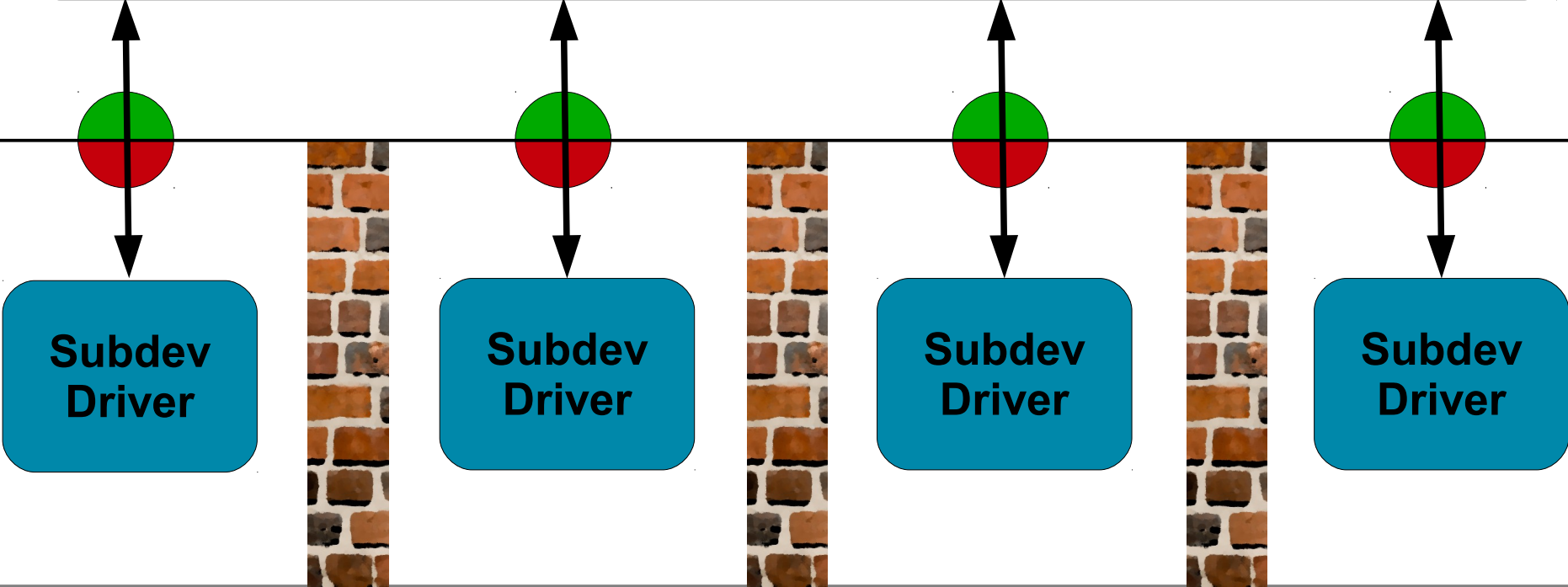
4



Problems



Userspace
Application



Subdev
Driver

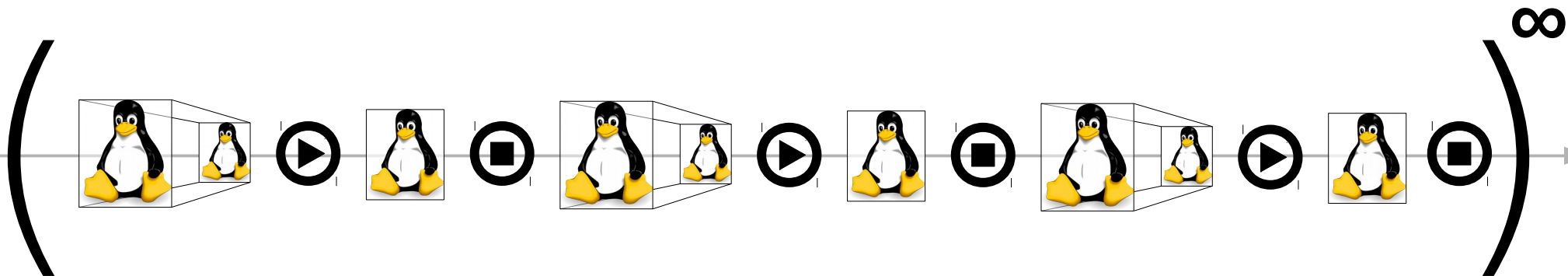
Subdev
Driver

Subdev
Driver

Subdev
Driver



Problems



Problems

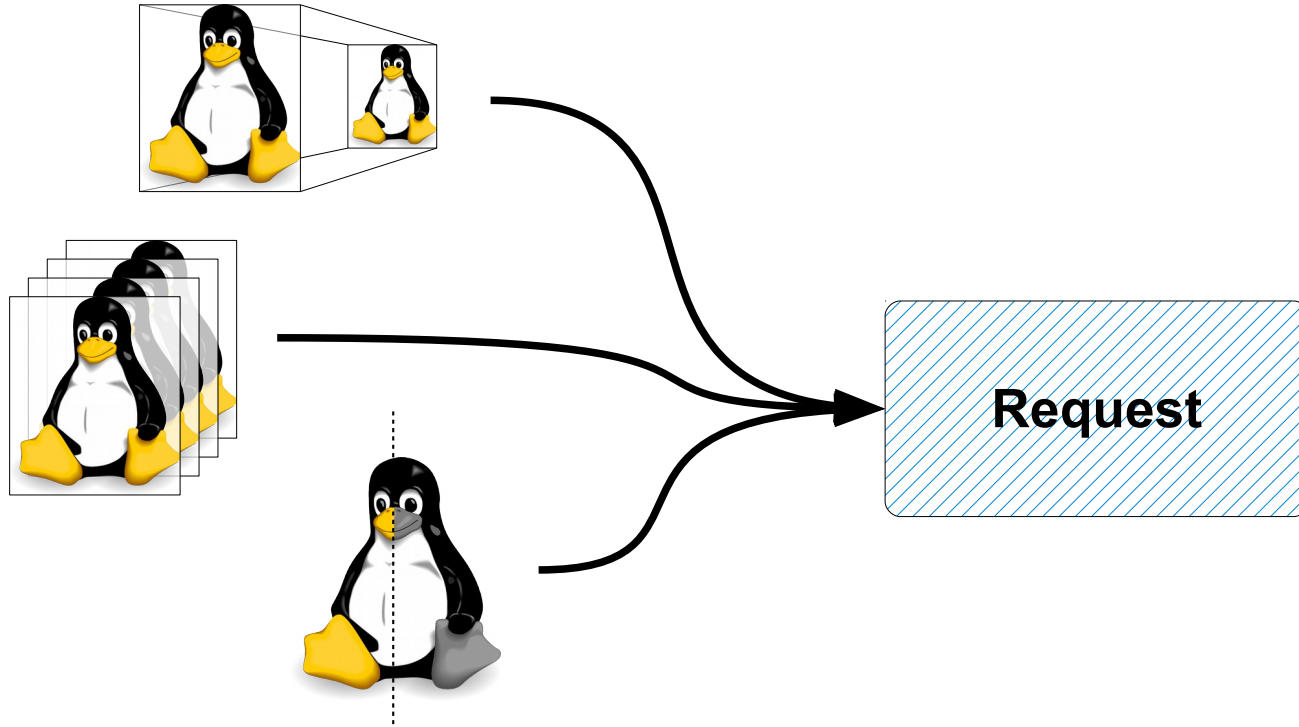
Video 4 Linux 2
Media Controller
Problems

The Request API

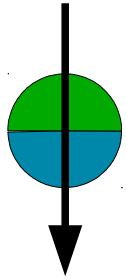
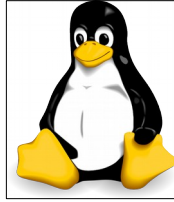
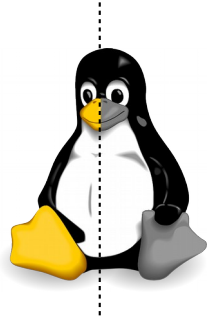
Implementation
Next



V4L2 On Steroids – The Request API

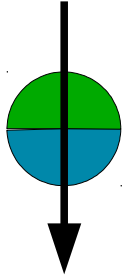


Requests



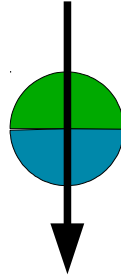
S_EXT_CTRL

1



QBUF

2

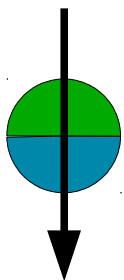
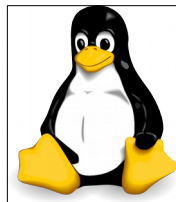
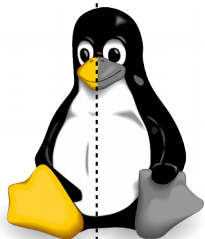
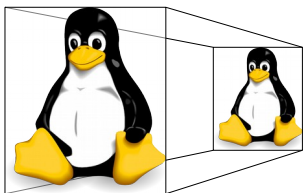


CMD_REQ
(QUEUE)

3

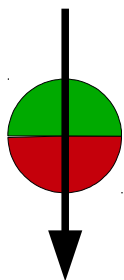


Requests



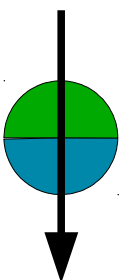
CMD_REQ
(BEGIN)

1



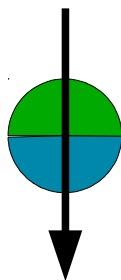
S_FMT

2



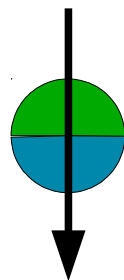
S_EXT_CTRL

3



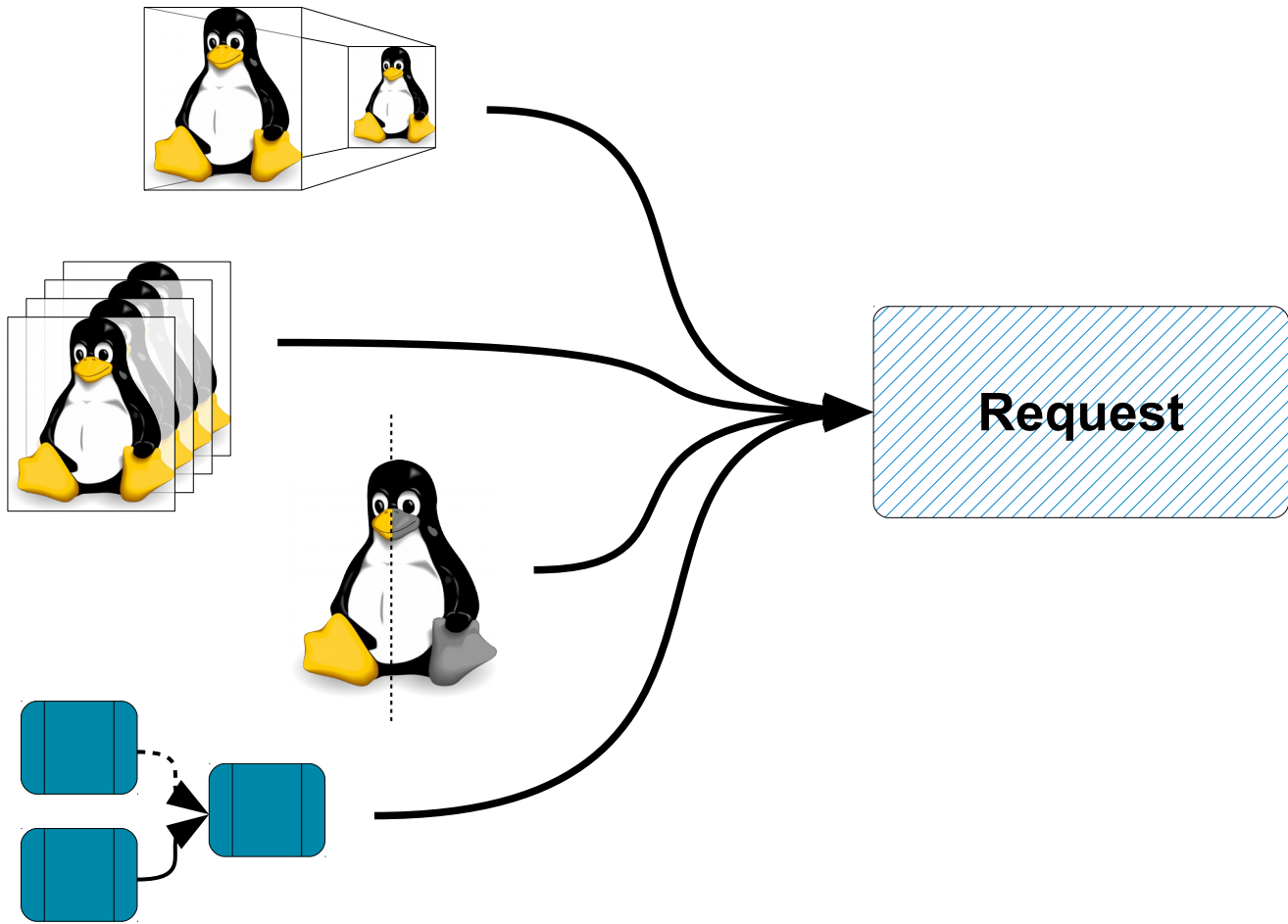
QBUF

4

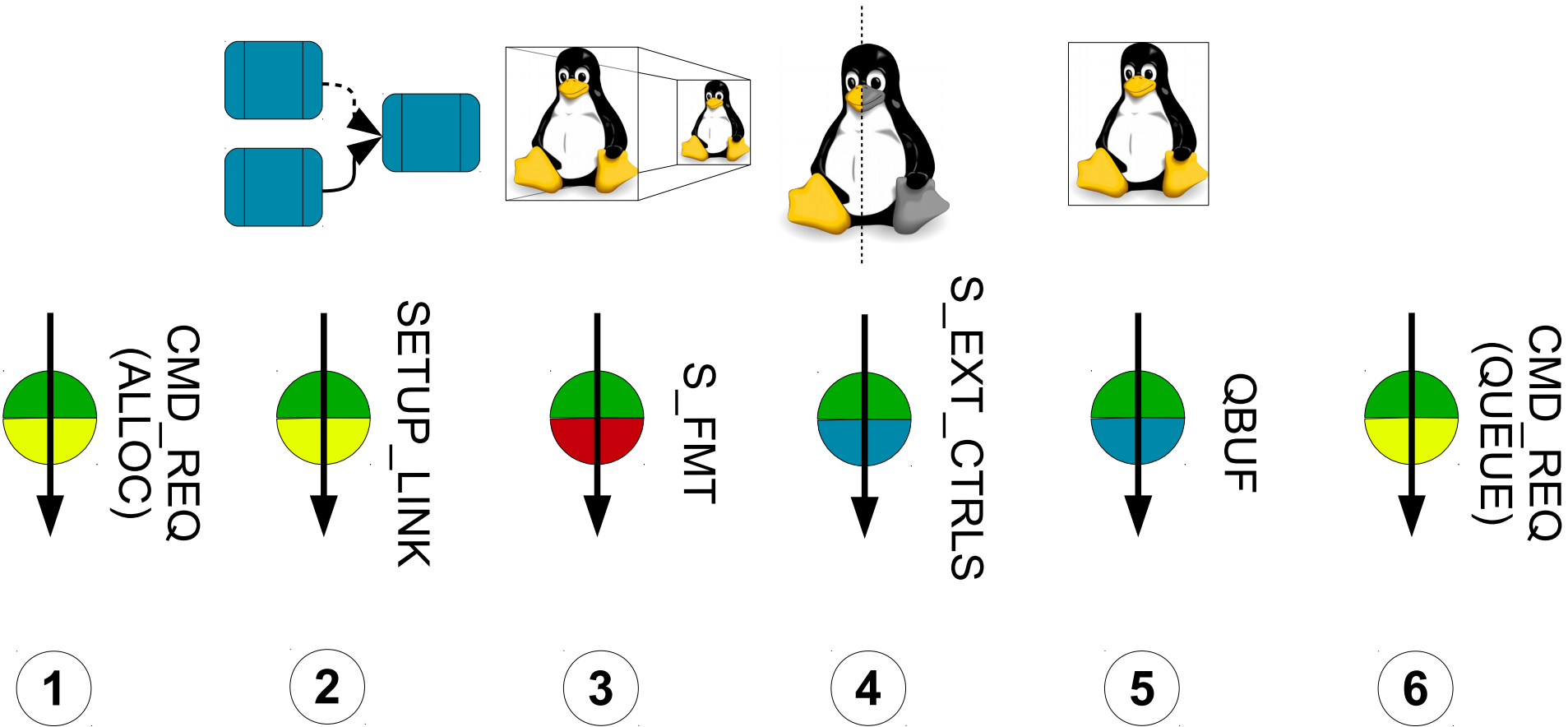


CMD_REQ
(QUEUE)

5



Requests

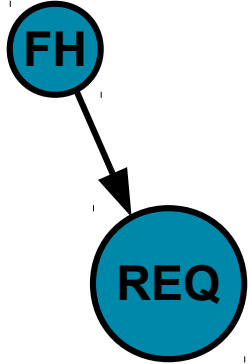


Requests

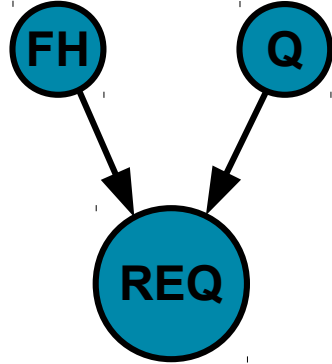
Video 4 Linux 2
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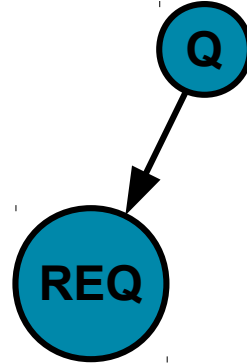
V4L2 On Steroids – The Request API



ALLOC



QUEUE



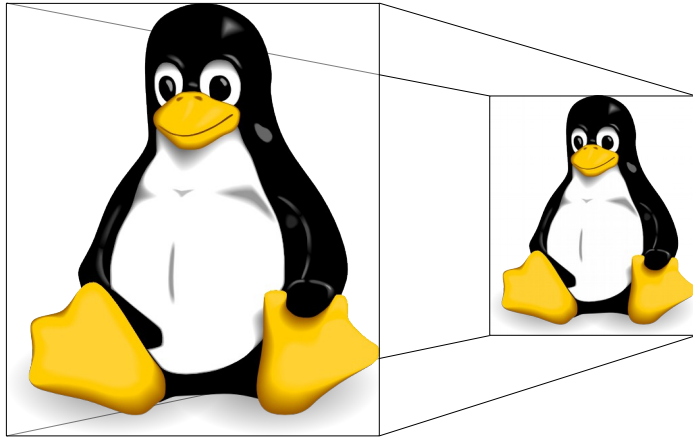
DELETE



Complete



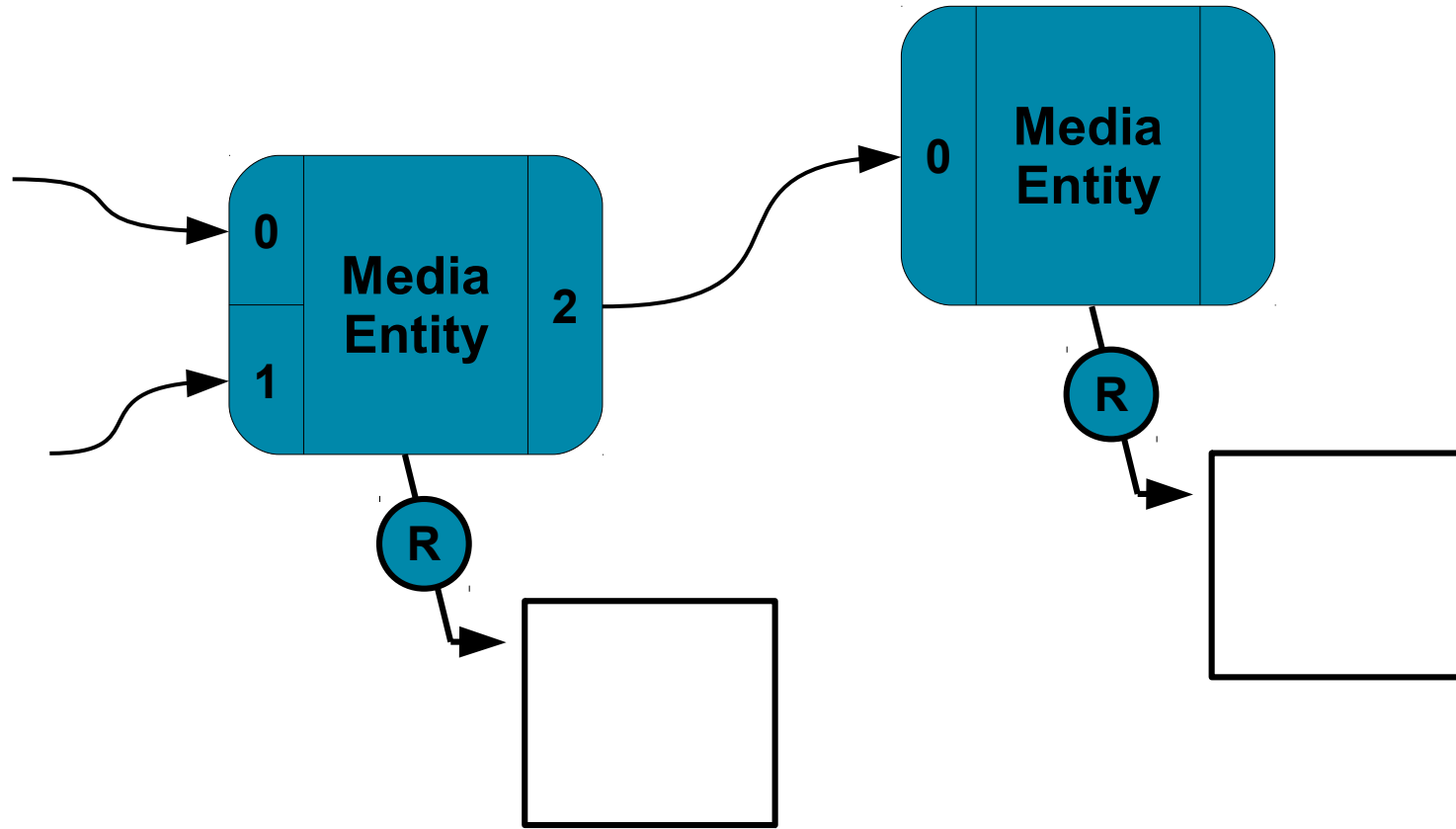
Requests Lifetime Management



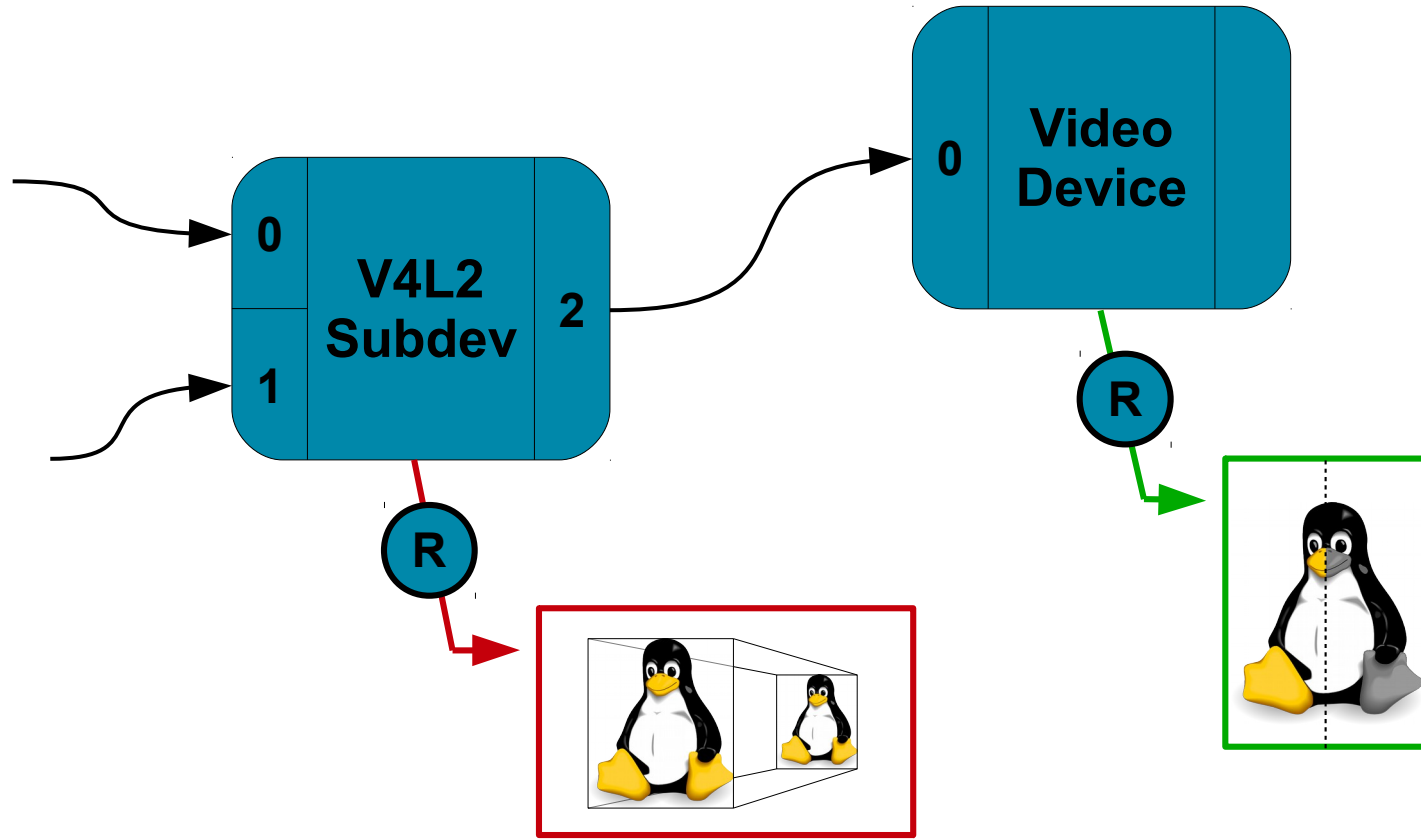
= [width, height]
+
[left, right, top, bottom]



Formats as Controls



Entity Request Data

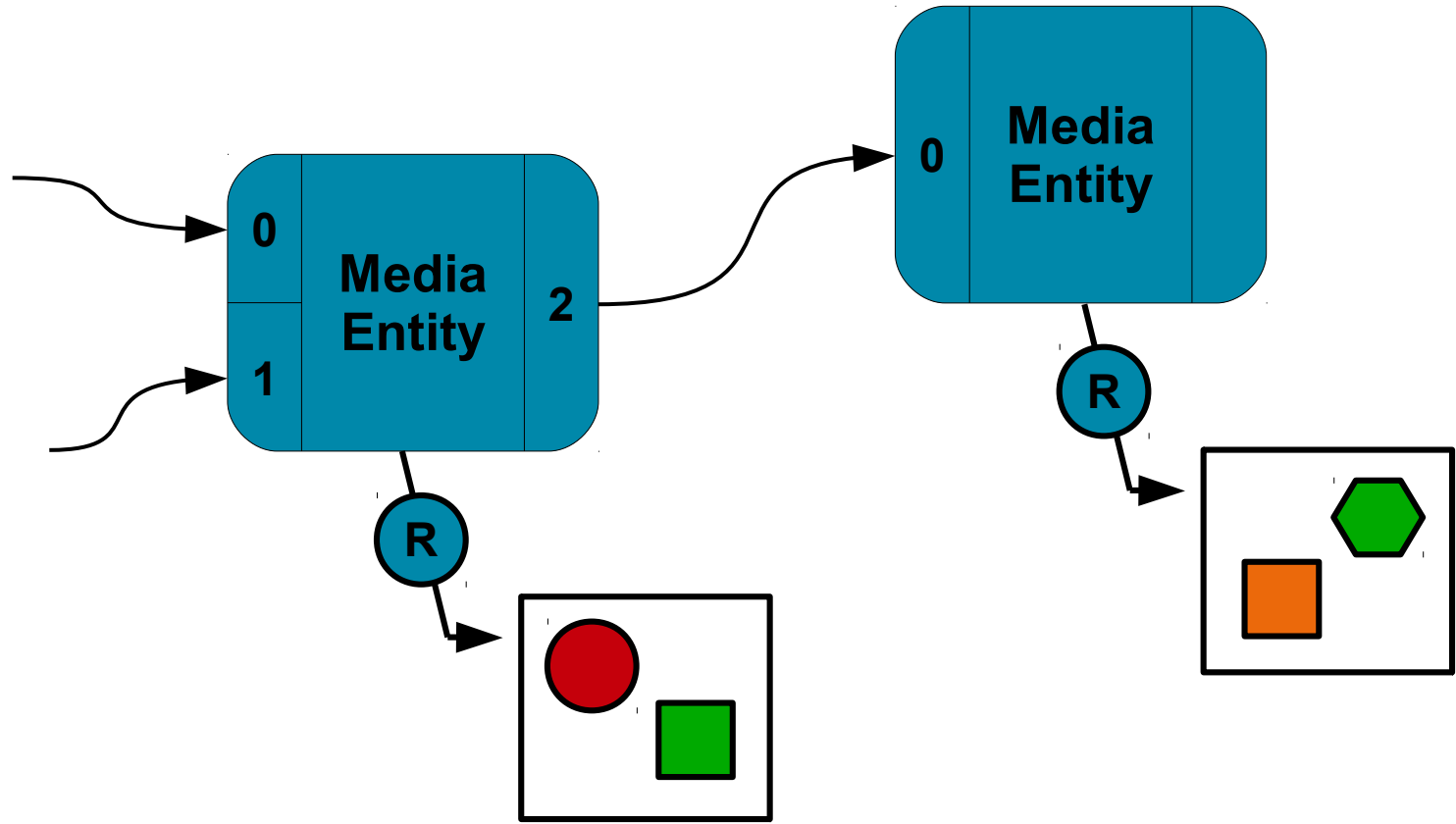


Entity Request Data

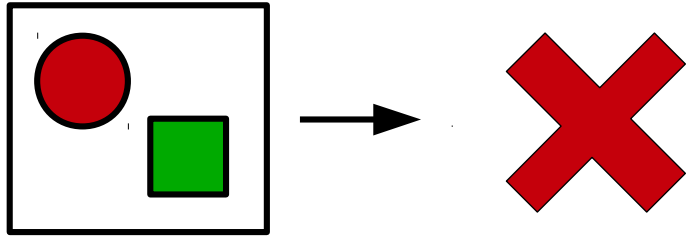
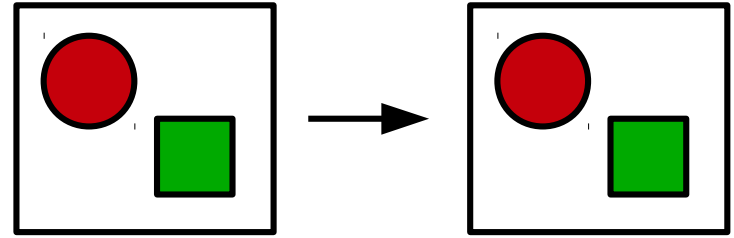
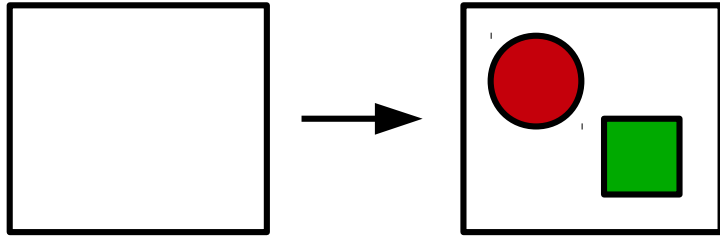
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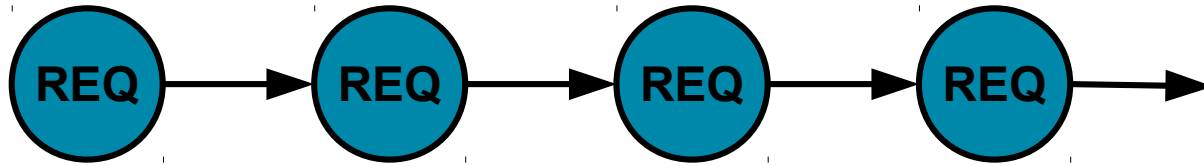
V4L2 On Steroids – The Request API



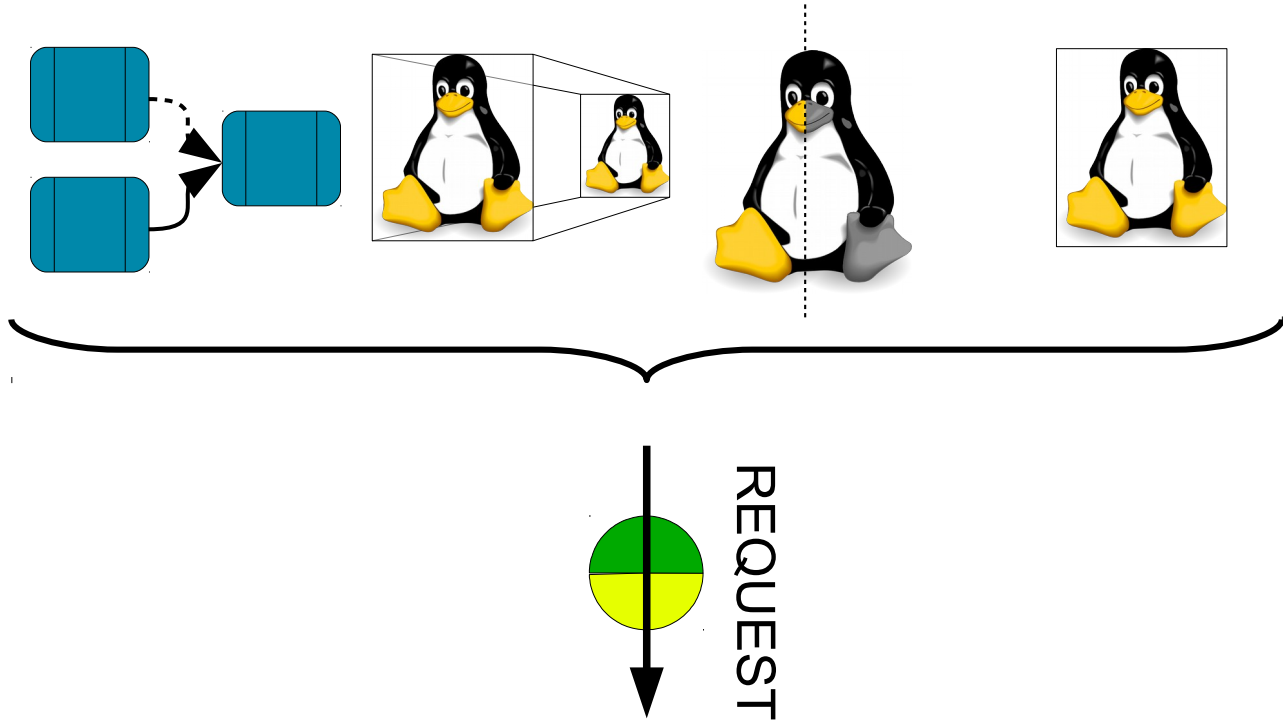
Entity State



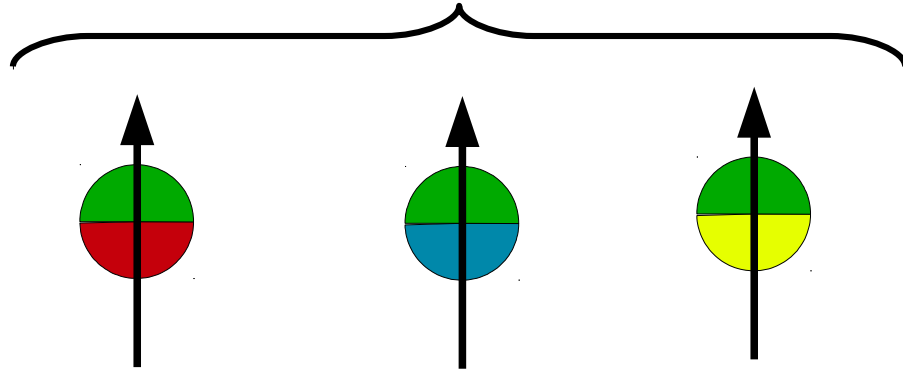
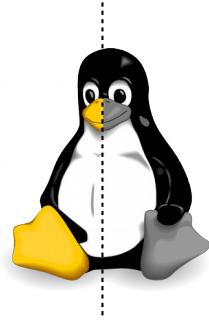
Entity State



Requests Sequence



Requests API



Meta-data

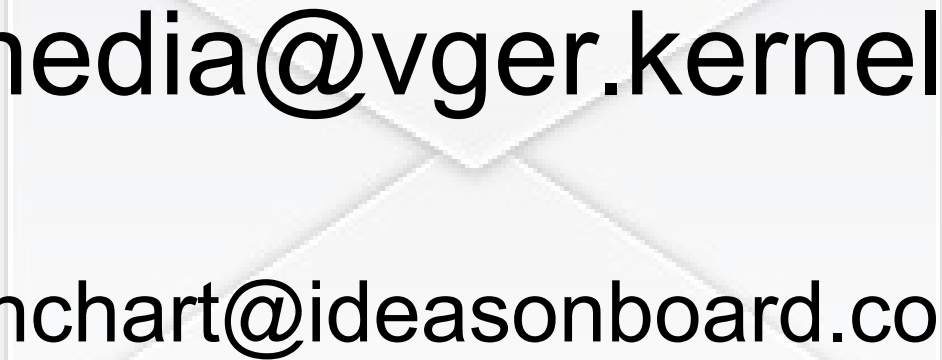
?

!

- Request API and proof-of-concept implementation
<https://lwn.net/Articles/668726/>
- Git development branch
<http://git.linuxtv.org/pinchartl/media.git/log/?h=drm/du/vsp1-kms/request>



Resources

- 
- linux-media@vger.kernel.org
 - laurent.pinchart@ideasonboard.com



Contact

?

!

thx.

