GStreamer
The road to 1.0

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- Reworked memory model
- Buffer Metadata
- Dynamic pipeline changes
  - Probes
  - Negotiation
  - Timing changes

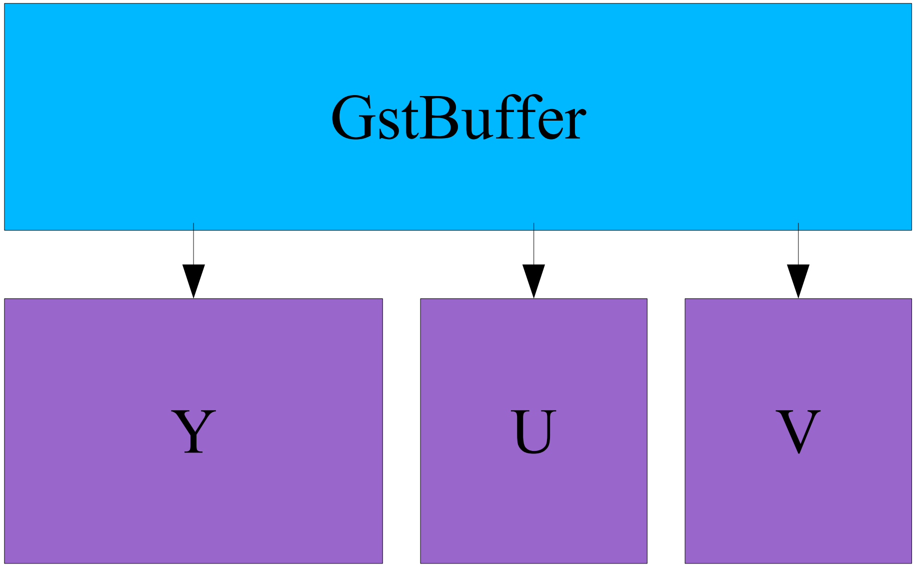
- First class GstMemory object
  - Refcounted block of memory
  - Resize/copy
  - Map/unmap

- GstAllocator makes those blocks
  - Can add new allocators
  - Identified with a string name

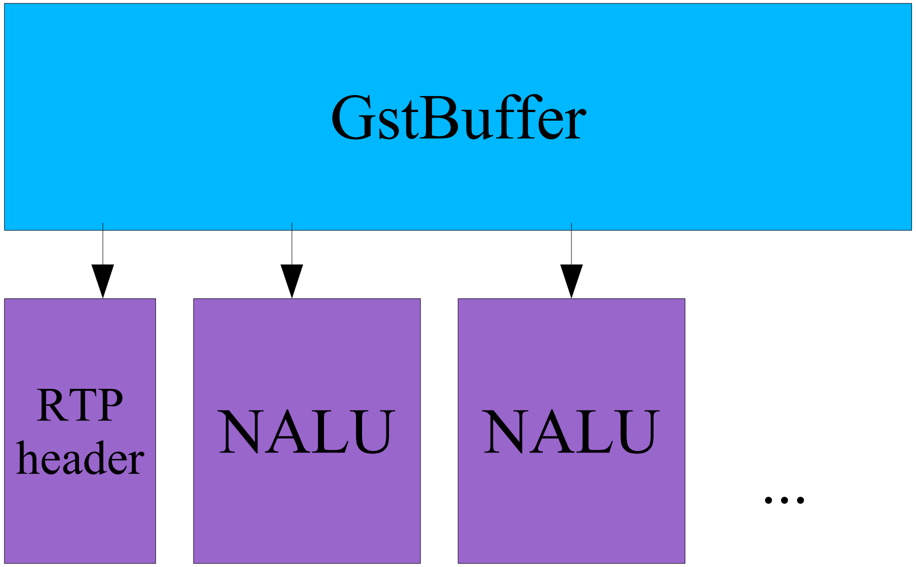
- GstBuffer has list of GstMemory objects
- Buffer operations operate on underlying memory objects
  - Copy/resize
  - Map/unmap

So what ?

- Some DSPs need to store video planes in different memory blocks



- Scatter gather buffer data



Why explicit map/unmap GstMemory ?

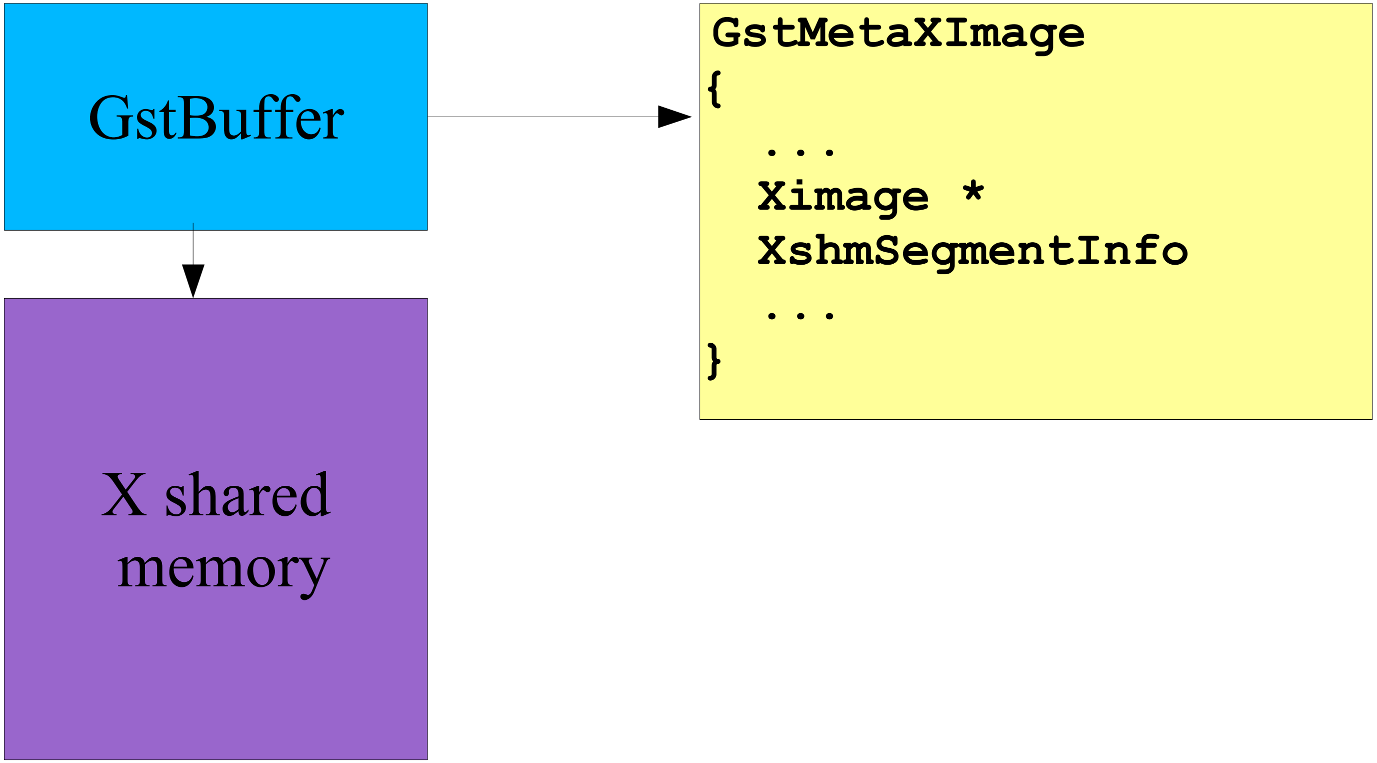
- GstMemory map/unmap to get access to the data
  - Keep track of who reads/writes
  - Cache flushes (between DSP/GPU)
  - Might actually do mmap/munmap or equivalent

- New memory model should improve
  - Integration with DSP/GPU
  - Integration with vaapi/vdpau
  - ...

- GstMeta
  - Attach arbitrary structures to buffers
  - Extra properties
  - Extra methods
  - Well defined API, multiple implementations possible

But.. we want examples !

XImage information associated with GstBuffer

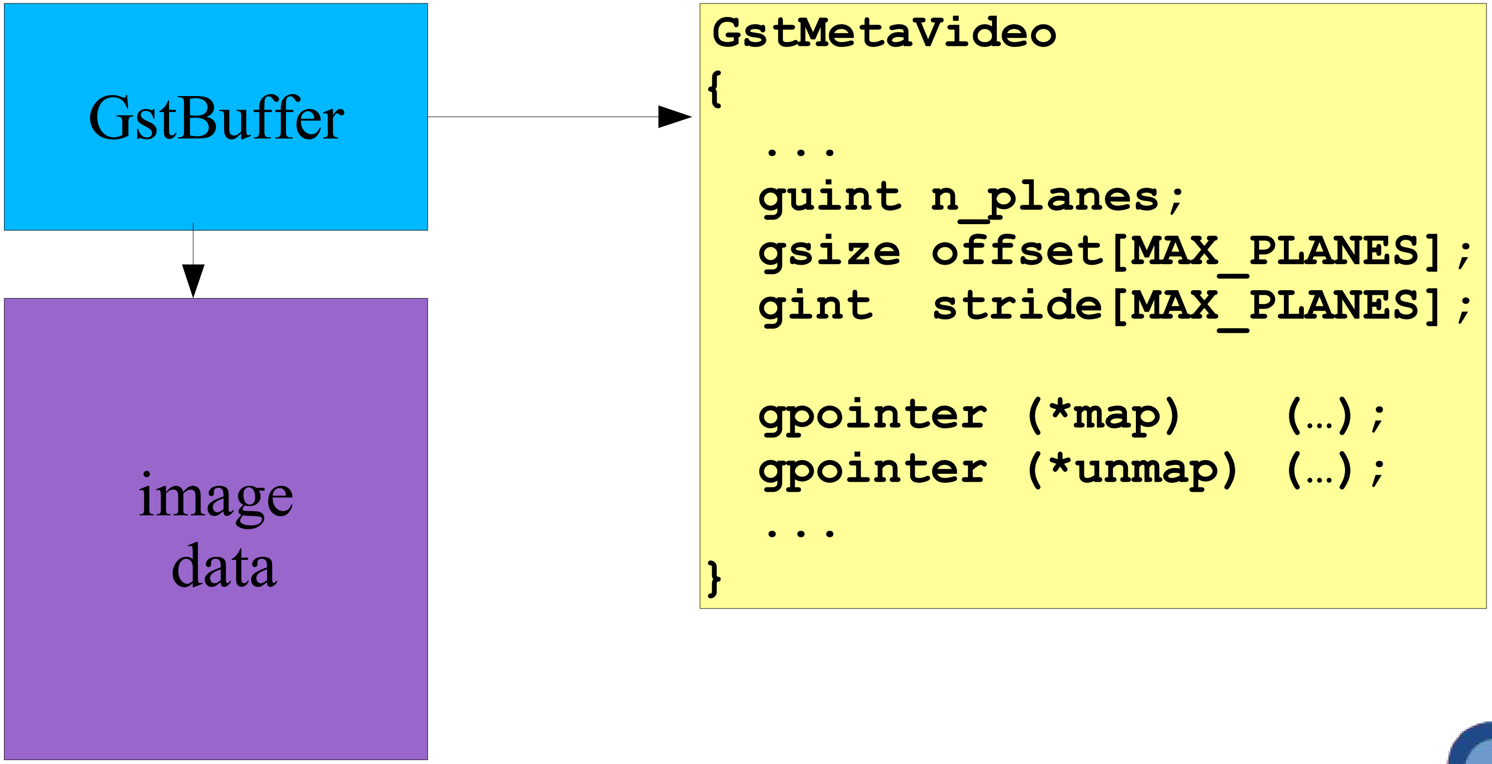


GstBuffer

X shared memory

```
GstMetaXImage
{
   ...
   Ximage *
   XshmSegmentInfo
   ...
}
```

GstMetaVideo describing video buffers



```
GstMetaVideo
{
  ...
  guint n_planes;
  gsize offset[MAX_PLANES];
  gint  stride[MAX_PLANES];

  gpointer (*map)   (…);
  gpointer (*unmap) (…);
  ...
}
```

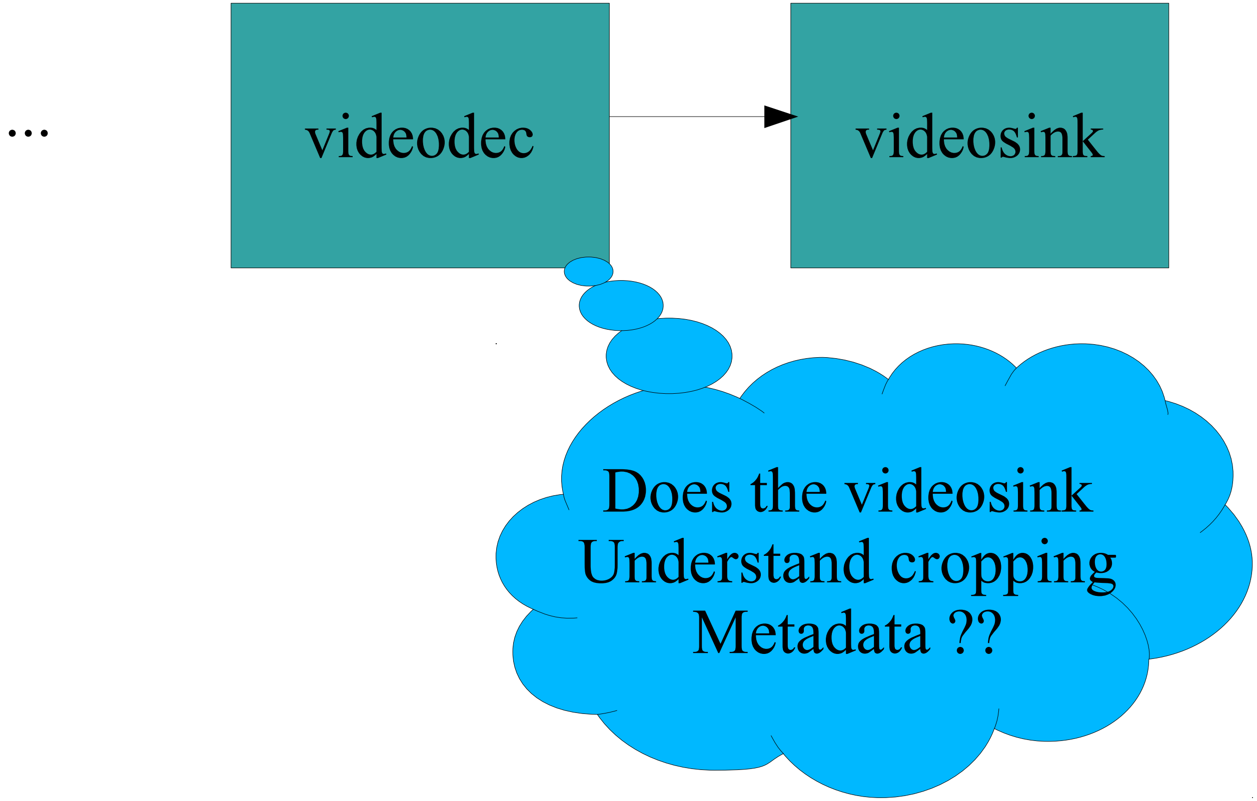
- GstMetaVideo also has API

```
gpointer gst_meta_video_map   (GstMetaVideo *meta,
                               guint plane,
                               gint *stride,
                               GstMapFlags flags);
gboolean gst_meta_video_unmap (GstMetaVideo *meta,
                               guint plane,
                               gpointer data);
```

- GstMetaCrop as an example of an operation
  - Instead of changing data, attach info about what to change and do the change later (maybe combined with other operations)

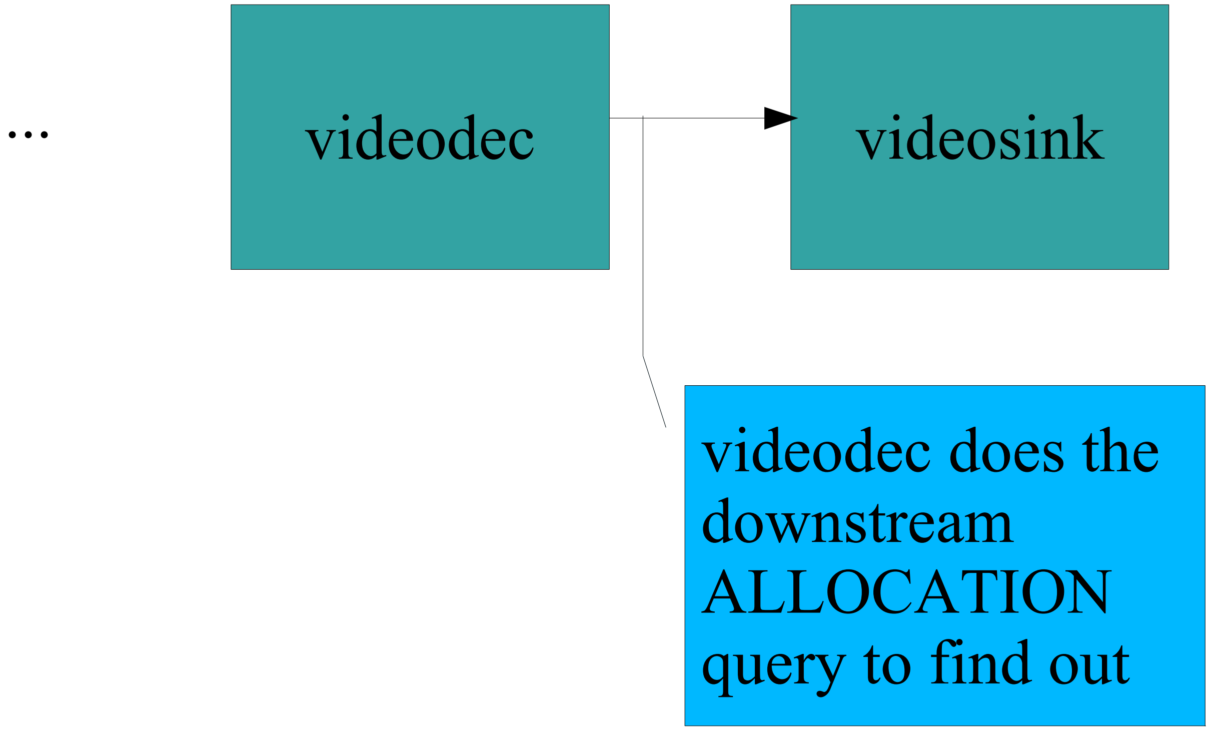
- But how can we know what metadata is supported in the pipeline
  - Does downstream understand cropping metadata or do we have to do the cropping ourselves ?

- Consider decoder ! videosink



Does the videosink
Understand cropping
Metadata ??

- ALLOCATION query



videodec does the downstream ALLOCATION query to find out

- The ALLOCATION query :
  - How to allocate memory blocks (the supported allocators)
  - Alignment/prefix
  - Min/max amount of buffers
  - Supported metadata
  - But also : an optional GstBufferPool object

GstBufferPool ?

- Preallocate buffers
  - min/max amount of buffers
  - Prefix alignment
  - Reuse buffers
  - That's how some hardware wants it
  - That's how some API's want/prefer it (v4l2, OpenMax, ..)
- ...

- Most awesome feature of GstBufferPool is to do extensive configuration of the allocated buffers
  - Enabled/queried with extensible bufferpool options

... An example ?

- Ask bufferpool to attach metadata to buffers
  - Because you can deal with it (GstMetaVideo, for example)

- Ffmpeg without EMU_EDGE flag
  - Sink bufferpool supports extra config option for padding and stride_alignment
  - Ffmpegdec configures and sink allocates bigger area

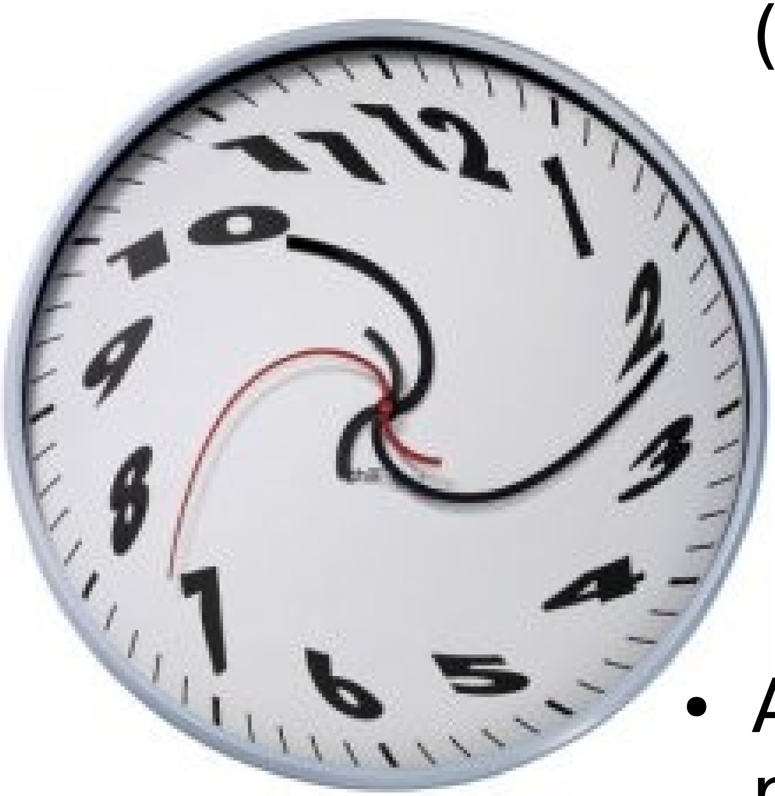
NEGOTIATION
It's not always an option now, is it?
VERY DEMOTIVATIONAL.com

- Renegotiation now with a RECONFIGURE event
  - No more piggyback on buffer_alloc

  Allows us to remove all the complicated code from basetransform

Improved support for dynamic pipelines

- Sticky events
  - Define context of stream (caps, tags, timing info...)
  - Stored on pads
  - Passed to newly linked pads automatically



- Tweaked GstSegment to include the accumulated time (base)
  - No more segment accumulation
  - Segment accumulation was only useful for looping
- Add API to change offset on pads
  - Can adjust running-time on a per pad basis

- Improved pad probes
  - Merged probes and pad block
  - Can get notify about datapassing
  - Notify when no data is flowing on the pad (pad_block on steroids)

- New video GstCaps :
  - video/x-raw-rgb, bpp=16, depth=15, endianness=1234,red_mask=31744, green_mask=992,blue_mask=31
  - ***=> video/x-raw, format=RGB15***

Current state

- Core/Base/gst-ffmpeg working, some plugins from Good and Ugly too.
- First 0.11.0 release is out !
- Port plugins and applications !!
- API not 100% stable yet but getting close
  - There is a porting document

What's not quite working

- Bufferpool renegotiation is not yet well understood/implemented
- Dynamic pipeline features not so much tested
  - Probes API still misses interesting bits.
- We need to port more plugins to make it useful
- We need to make more plugins use the new features

- Some more Goals
  - Remove GstPropertyProbe
  - More base classes
  - Split parsers from decoders

What's next

- We'll be porting more apps and plugins
- We'll be doing more 0.11.x releases

On track for a 1.0 release later this year

Questions ?