Stereoscopic Video API (AGAIN)

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gstreamer

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Who Am I?

Last Year

- Intro to 3D video
- Design Proposal
- Tentative API
- Prototype Code

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Binocular Vision

Stereoscopic Video

- Frame-packed
- Frame-by-Frame
- Separate streams
- Multiview

Stereo API

- video/x-raw,format=.....multiview-mode=(string)side-by-side, multiview-flags=(GstVideoMultiviewFlagsSet)0:ffffffff:/right-view-first/left-flipped/left-flopped/right-flipped/right-flopped/half-aspect/mixed-mono, pixel-aspect-ratio=....

- Multiview-mode (string)

  - Mono, left, right, side-by-side, side-by-side-quincunx, column-interleaved, row-interleaved, top-bottom, checkerboard, frame-by-frame, multiview-frame-by-frame, separated

- multiview-flags (GstFlagSet)

  - Right-view-first, left/right flipped/flopped, half-aspect, mixed-mono

  - GstFlagSet

GstFlagSet

- New type for caps

- Negotiate bitfields of flags efficiently

- Supports "don't care" operations
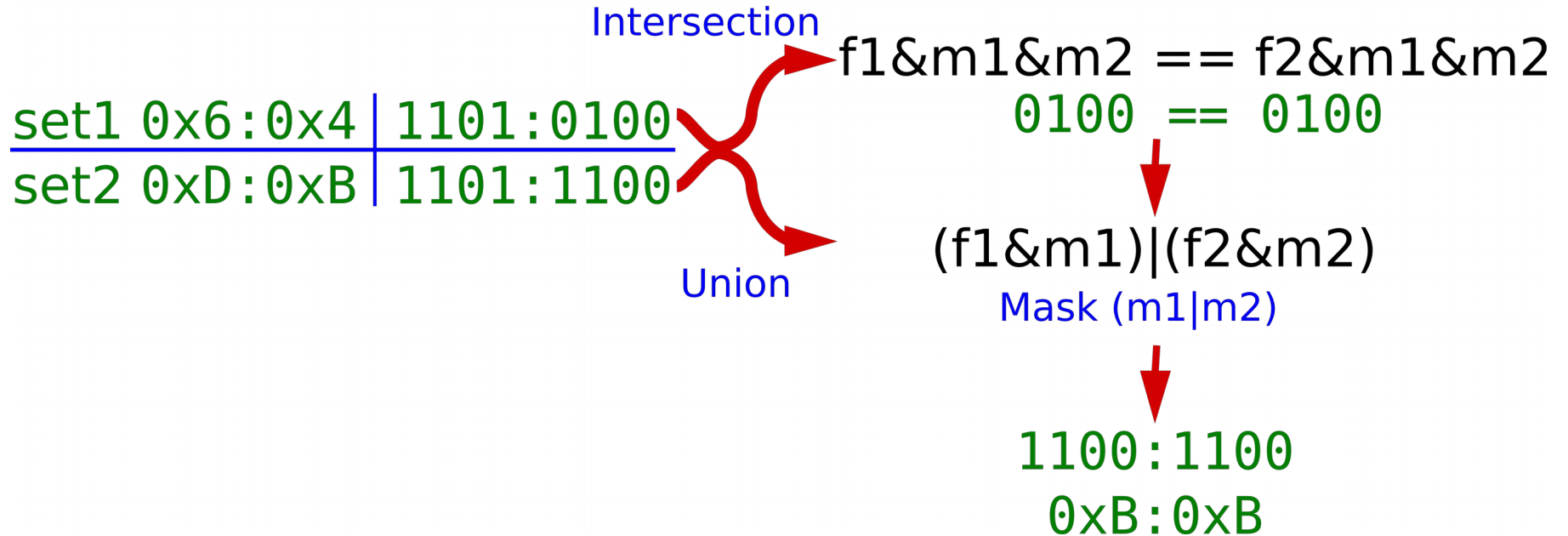
- Serialisation helper for readability

Stereo API

- Buffer flag
  - First-in-bundle, multiple-view
- VideoInfo
  - Mode & Flags enums and fields
  - Frame Packing modes

GstFlagSet

xflip/xflop/yflip/yflop

set1 0x6:0x4 | 1101:0100

set2 0xD:0xB | 1101:1100

Intersection

$f1\&m1\&m2 == f2\&m1\&m2$

$0100 == 0100$

Union

$(f1\&m1)|(f2\&m2)$

Mask (m1|m2)

1100:1100

0xB:0xB

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Stereo API

- Buffer flag
  - First-in-bundle, multiple-view

- VideoInfo
  - Mode & Flags enums and fields
  - Frame Packing modes

Stereo API

- Library functions
  - video-multiview.h in libgstvideo
    - Conversion between frame packings
    - Caps helpers
- gst_gl_view_convert helper object

Implementation

- Available in GStreamer 1.6

- GstGL supports multiple "separated" views

- New elements:
    - glviewconvert
    - glstereosplit
    - glstereomix

- Added to glimagesink
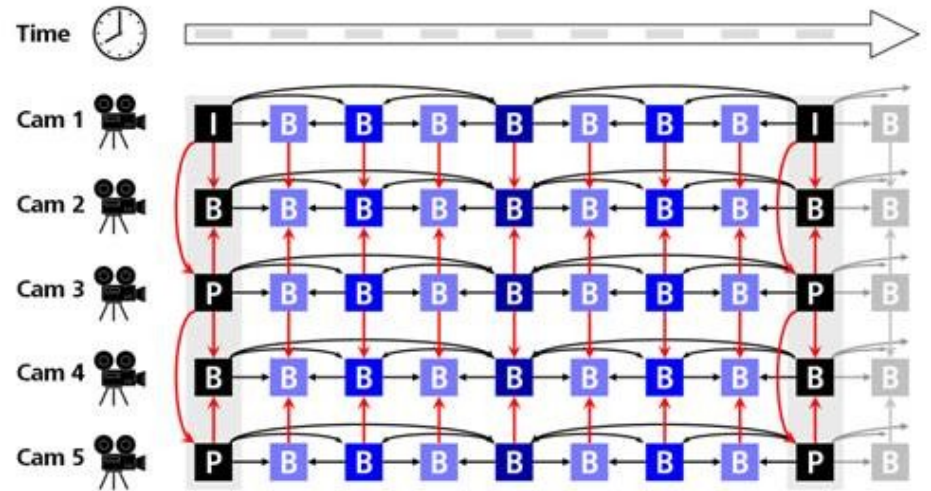   - Downmixing, layout conversion, App handoff

Implementation

- Demuxers
  - Matroska, qtdemux (MPEG-A)
- Parsers
  - h264parse SEI, passthrough
- Decoders
  - Passthrough in all, VAAPI
- Encoders
  - x264enc, passthrough in all
- Muxers
  - Matroska

Multiview

- H.264 MVC
- GStreamer-vaapi
- Works for stereo profile
- SSIF would be nice
- HEVC later

Future Work

- Multiview
    - Labelling views
    - Multiview frame-by-frame output
- Playing back split streams
    - Aux input streams, SCHC
- Spatial Media somewhat related
    - Panoramic video
- Fallback paths in non-GL video sinks
- Wayland support

Demo Time

Questions?