

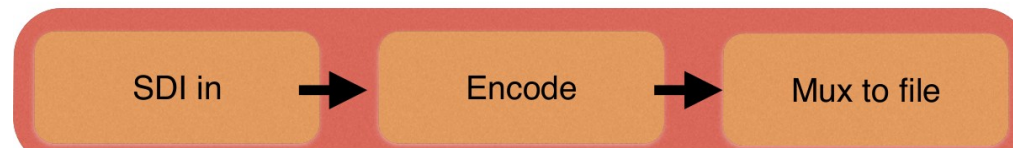
Aligning audio and video streams' start and end

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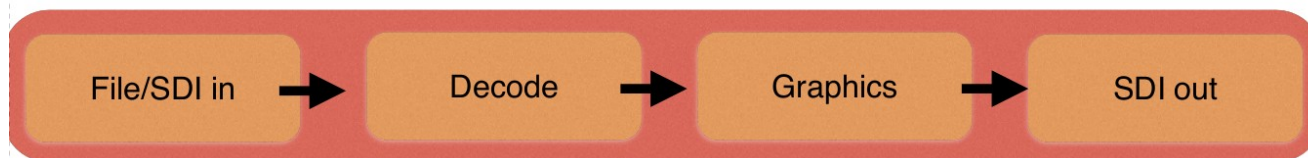
ToolsOnAir

- Based in Vienna, Austria
- Existing products (OSX-only)

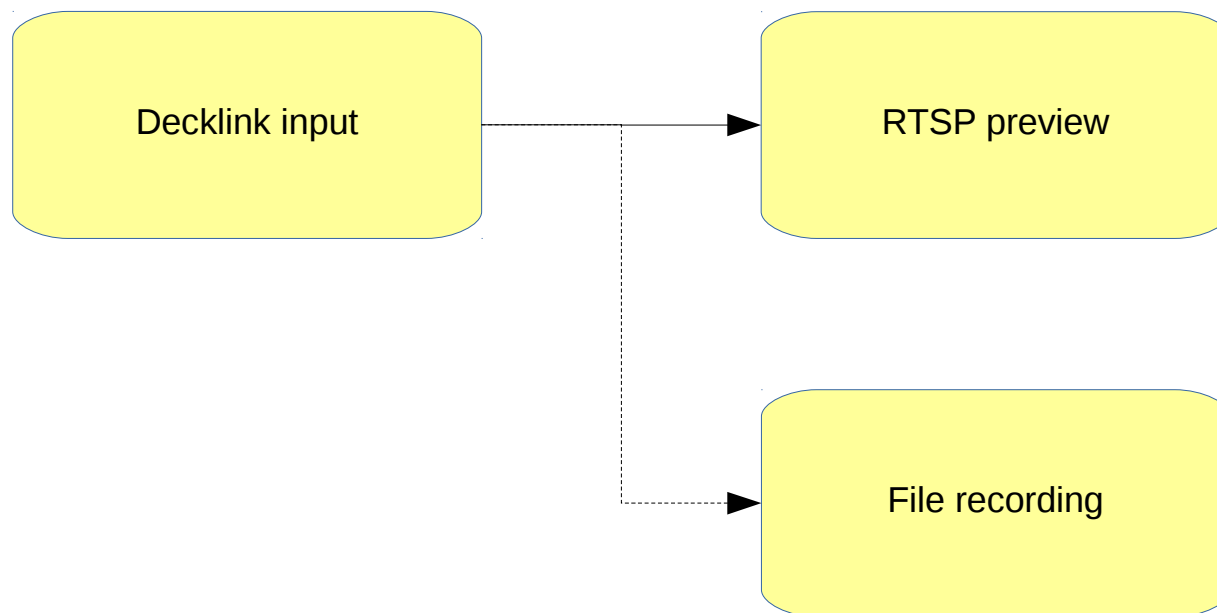
just:in



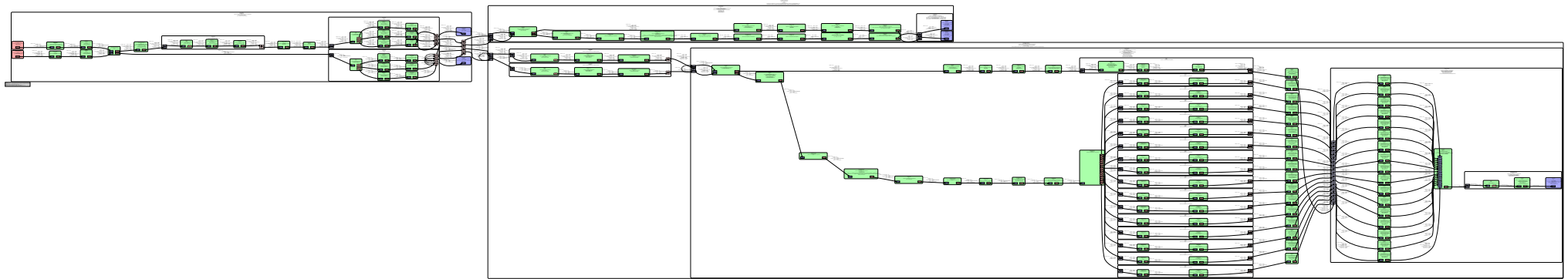
just:out



just:in



Sample pipeline



A/V alignment requirements

- Audio and video **MUST** start together
 - Less than 1 audio sample apart
- Audio and video **MUST** end together
 - Again – less than 1 audio sample apart
- For *every* splitmuxsink fragment!

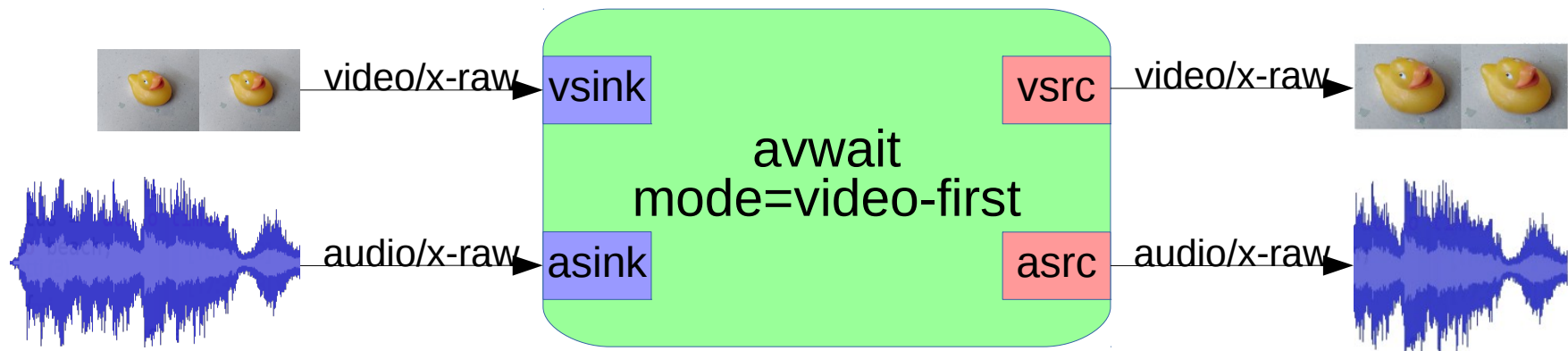


The problem

- Different streaming threads for audio and video
- Different buffer durations
- Queues
- Gaps

Making sure streams start together

- `await mode=video-first`
 - It will conveniently split audio buffers



- But it allows audio to start long after the video!

Overwriting chain functions

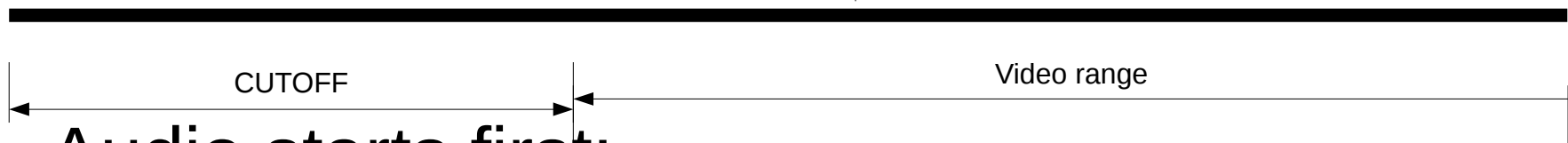
- Wait for both audio and video pads to enter the function
 - A pad probe here would deadlock!
 - Chain function is also more efficient
- Compare the first audio and the first video timestamp
- Remember the largest of the two
- Drop buffers until the largest has been reached
 - With some tolerance

Tolerance

- Video starts first:

AUDIO START

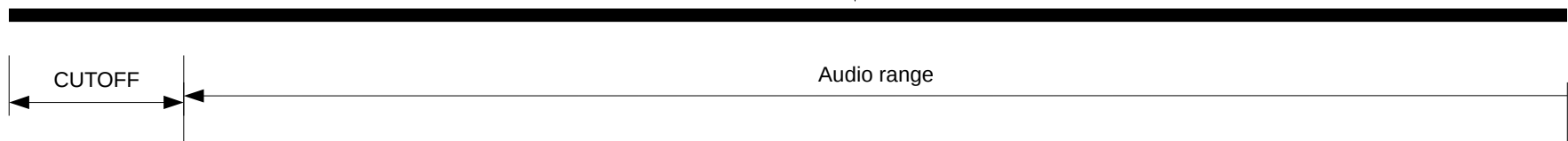
1 sample



- Audio starts first:

VIDEO START

1 frame

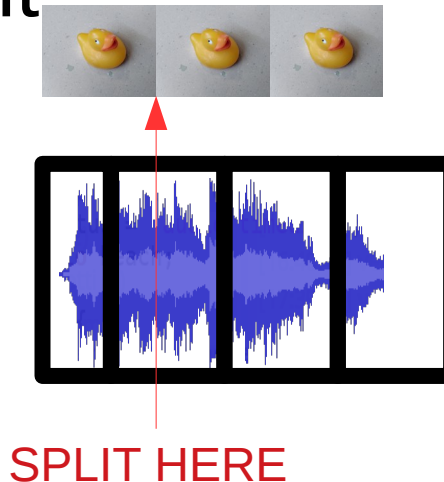


Making sure streams end together

- Still inside the chain function, but the other way around
- Compare the first audio and the first video timestamp – after the “stop” command
- *Add the buffer duration!*
- Remember the largest of the two
- *Pass buffers until the largest has been reached*
 - With the same tolerance

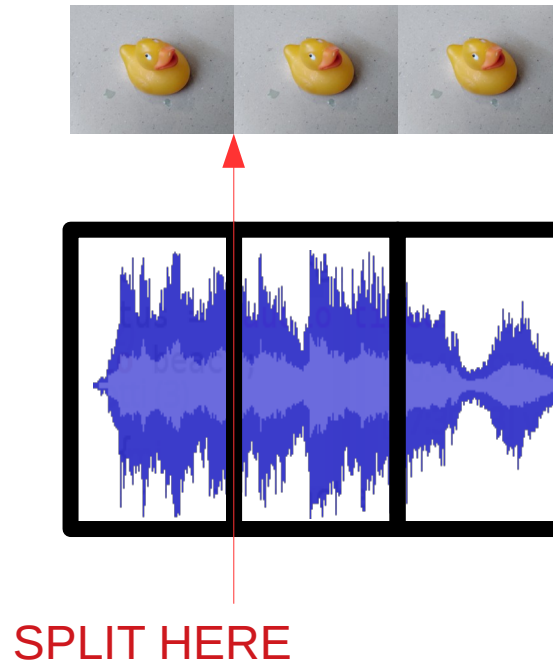
What about splitmuxsink?

- For now, assume smooth streams (no discontinuity)
- splitmuxsink may arbitrarily decide to start a new file at any point



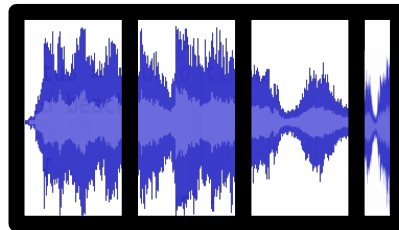
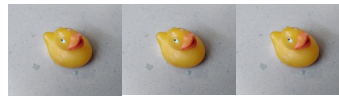
- Use `audiobuffersplit!`!

Audiobuffersplit



Last fragment

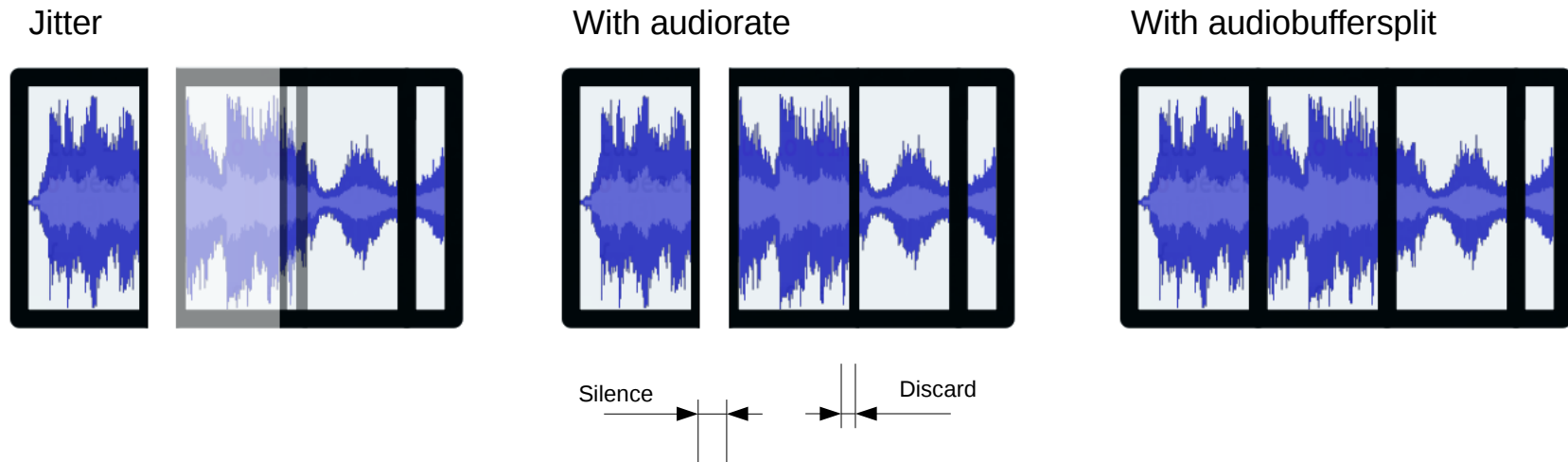
- Different audio buffer sizes?



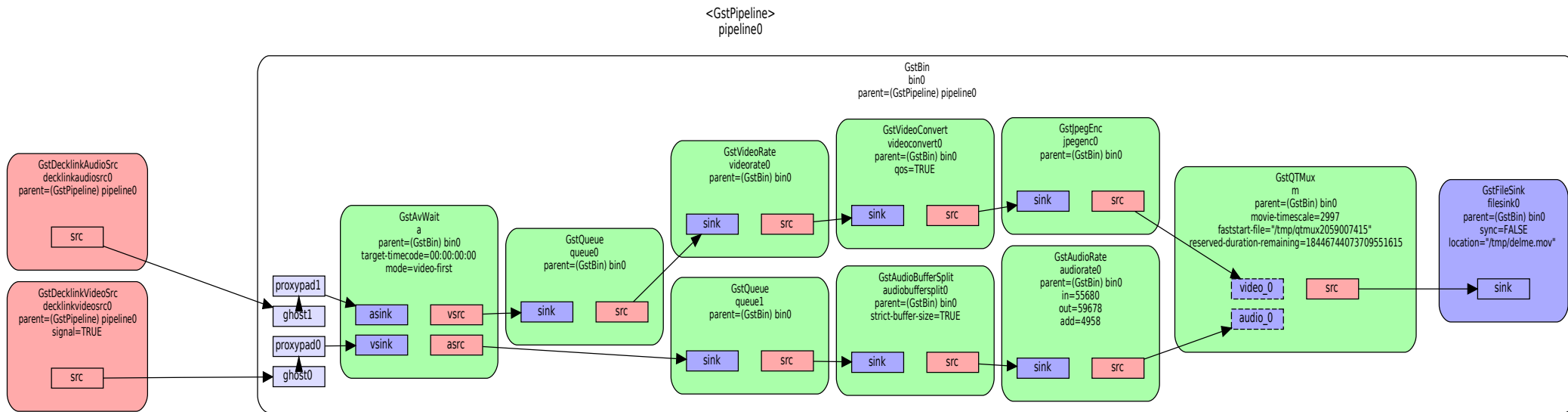
- `audiobuffersplit strict-buffer-size=true`

Ironing out gaps

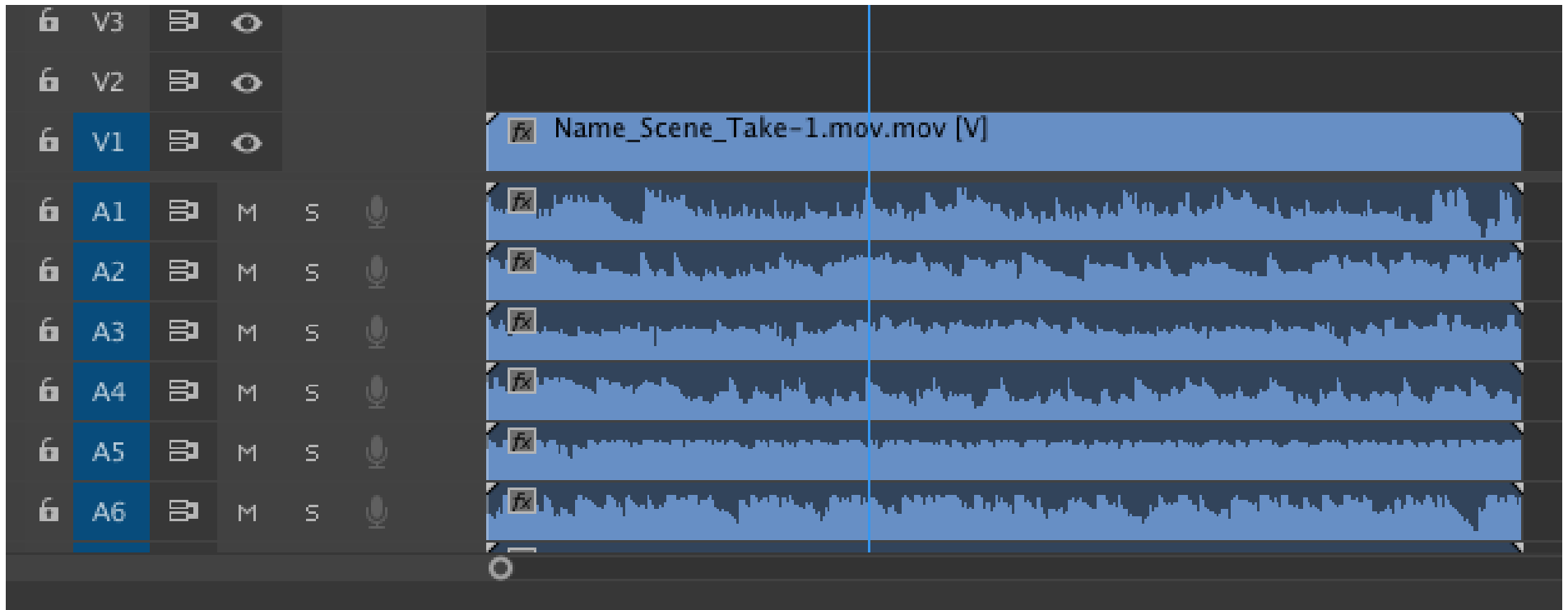
- Video gaps: Use videorate
- Audio gaps: Use audiorate *after* audiobuffersplit



The big picture



Results





Thank you!



PS: We're hiring 😊

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