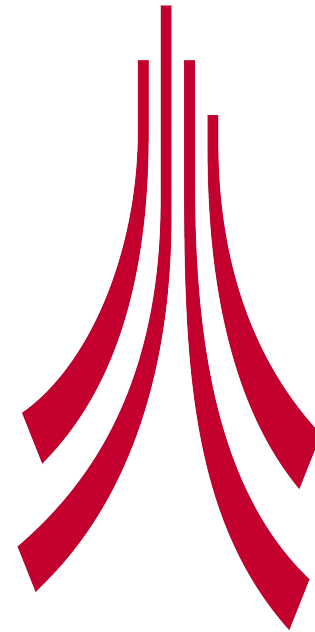# Movie Composition with Recursive EDLs and MP4

Steven Simpson

Mu Mu

James Brown

David Hutchison

Lancaster University

School of Computing and Communications

Aims

- Collaborative Movie Editing
 - Like SourceForge/GitHub
  - Aimed at 'local TV', community production
- Thin (slim?) clients
  - Web front-end
  - Minimal configuration
  - Hand-held devices
  - And desktops/laptops

- Just-in-time rendering
  - Store just rushes
  - ...and Edit-Decision Lists (EDLs)
  - Linked media
- Network/cache-friendly delivery
  - Chunks
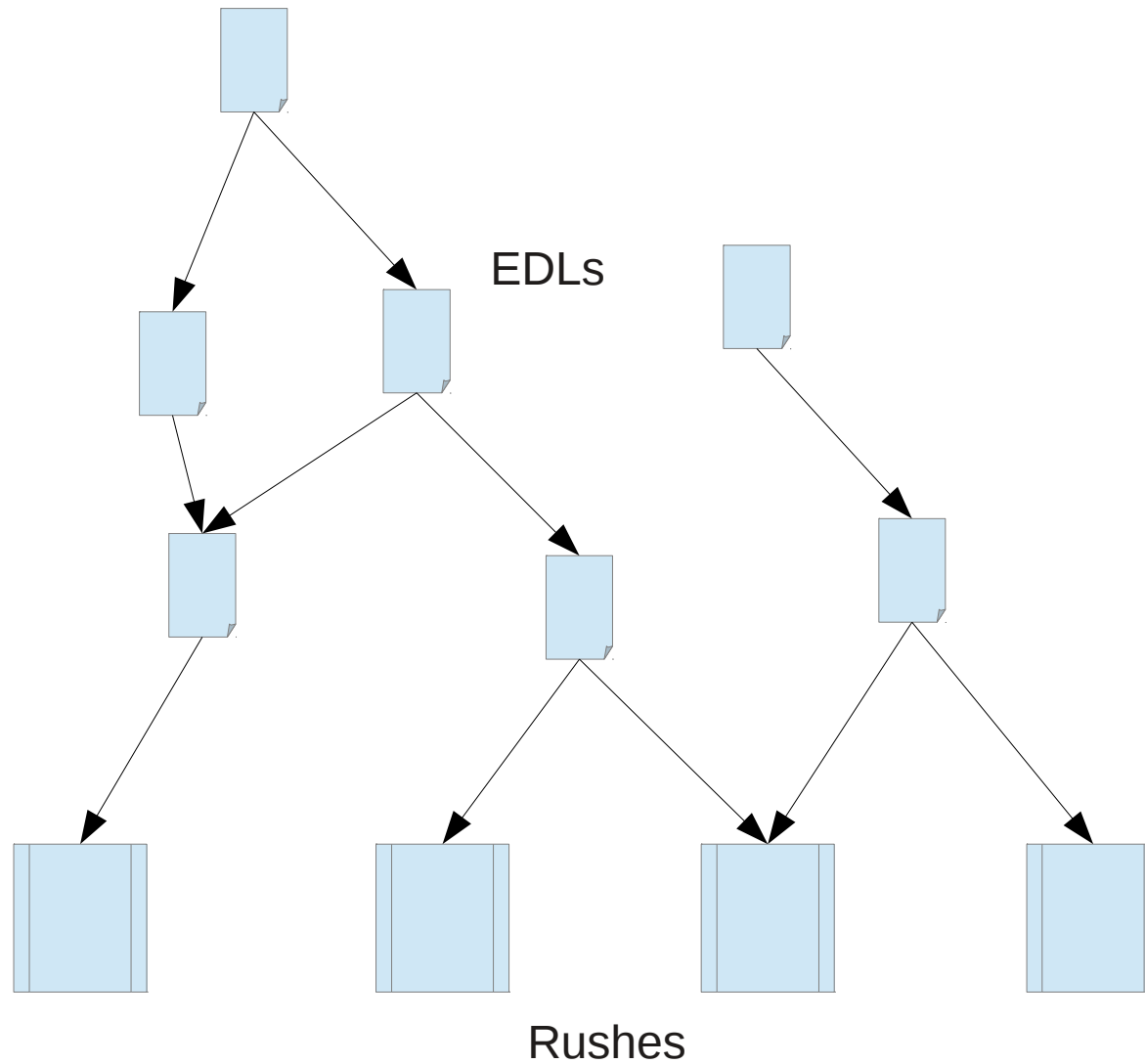 - Shared between videos showing same scenes

Cachable chunks

EDL Composition

new movie

EDL

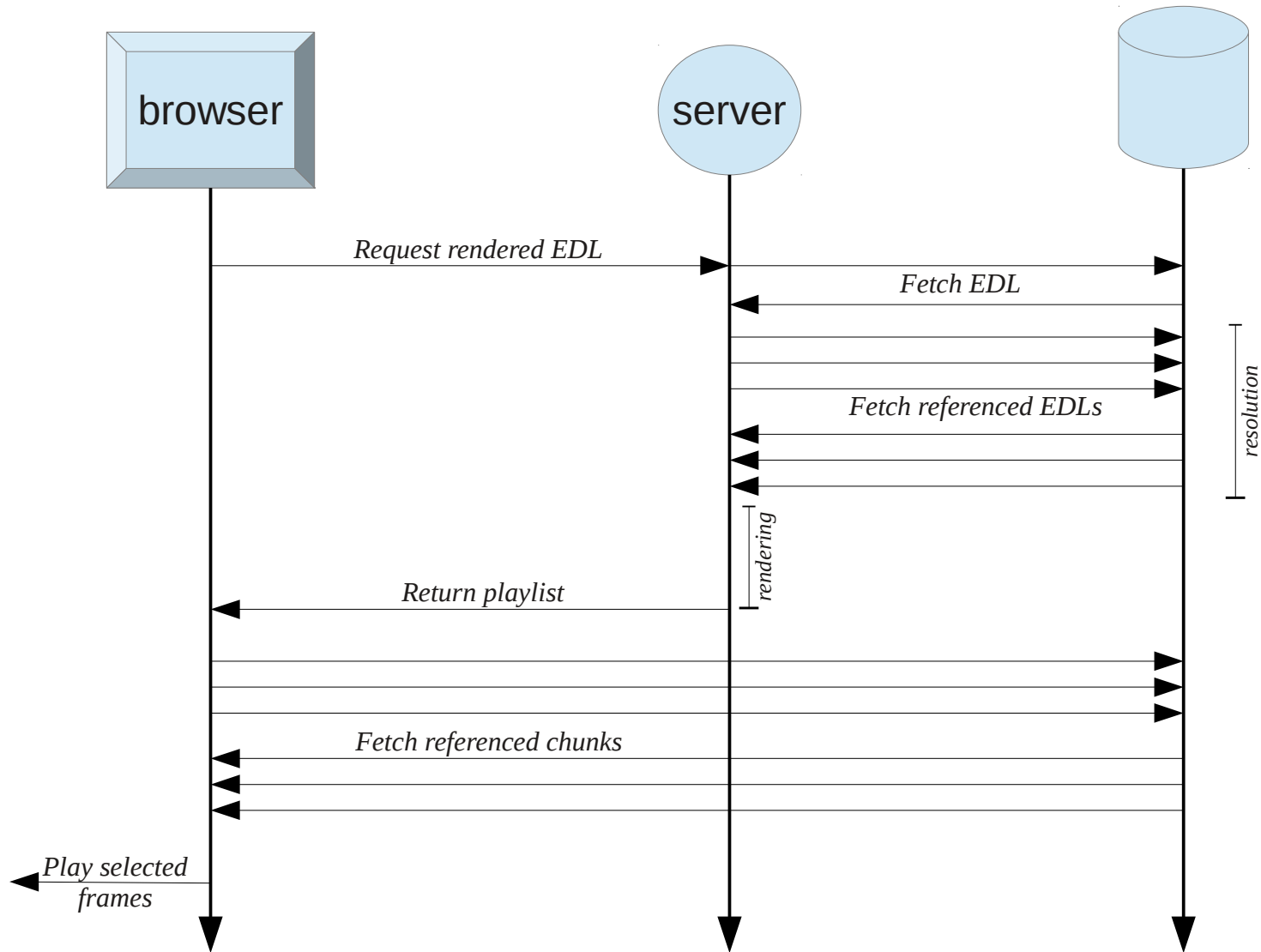segment

segment

segment

source movies
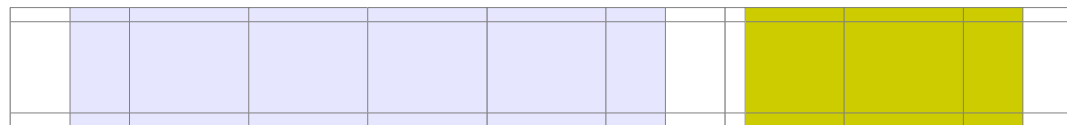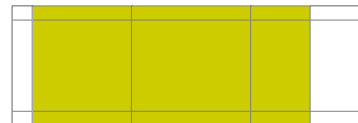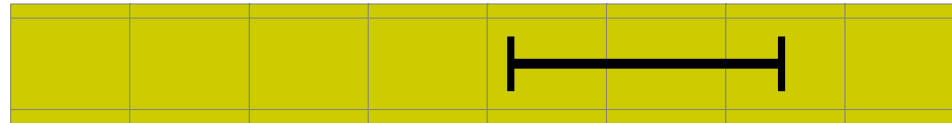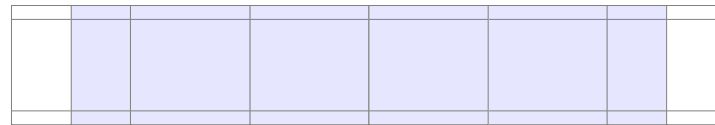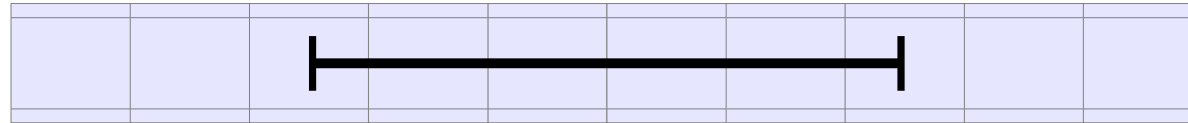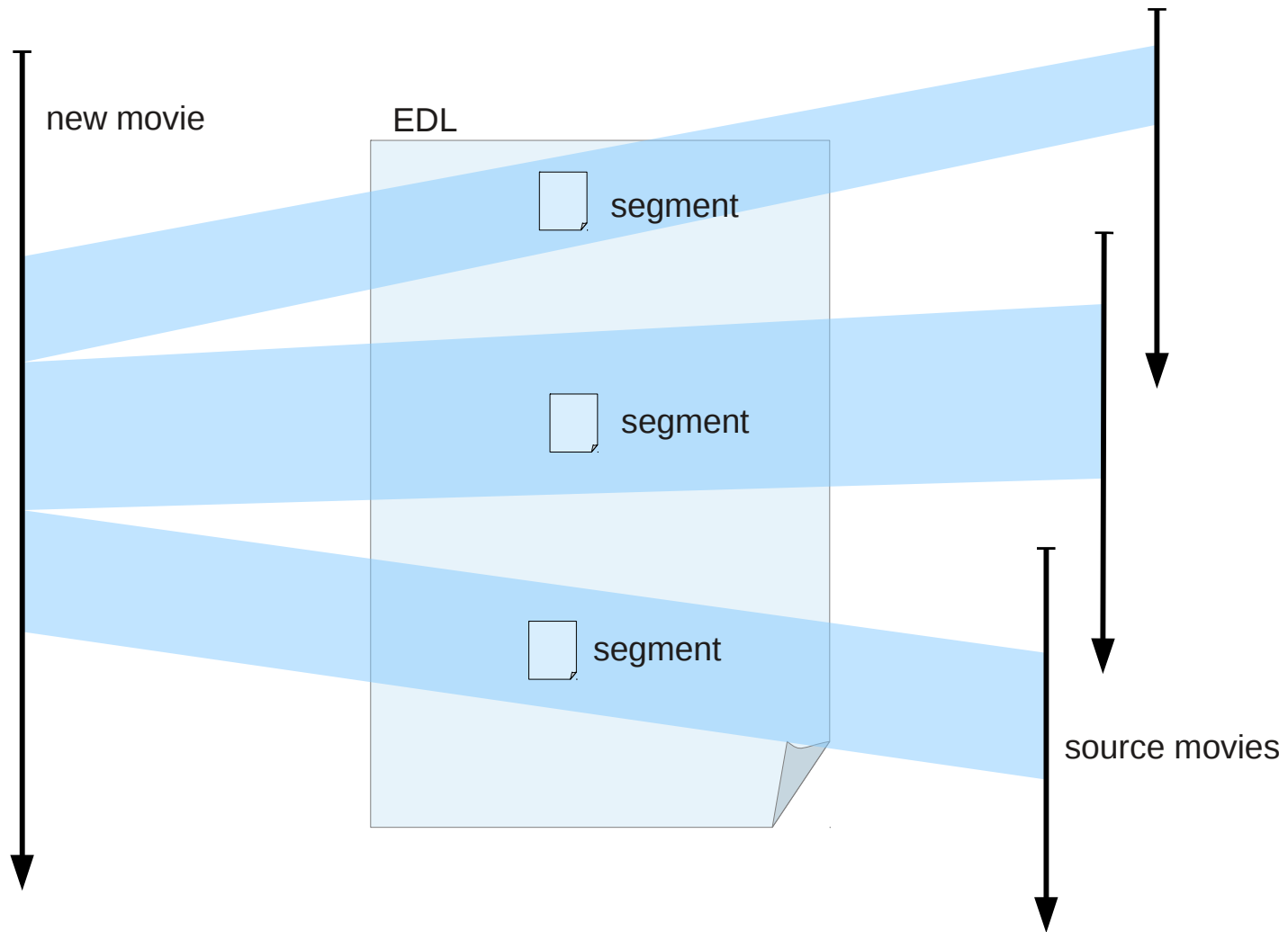
Recursive EDLs

EDLs

Rushes

Playback

Resolution & Rendering

- Resolution
    - Conversion of top-level EDL into base EDL
    - Result directly references only rushes
- Rendering
    - Conversion of base EDL to playlist
    - Playlist identifies chunks to fetch
    - Playlist identifies frames to display
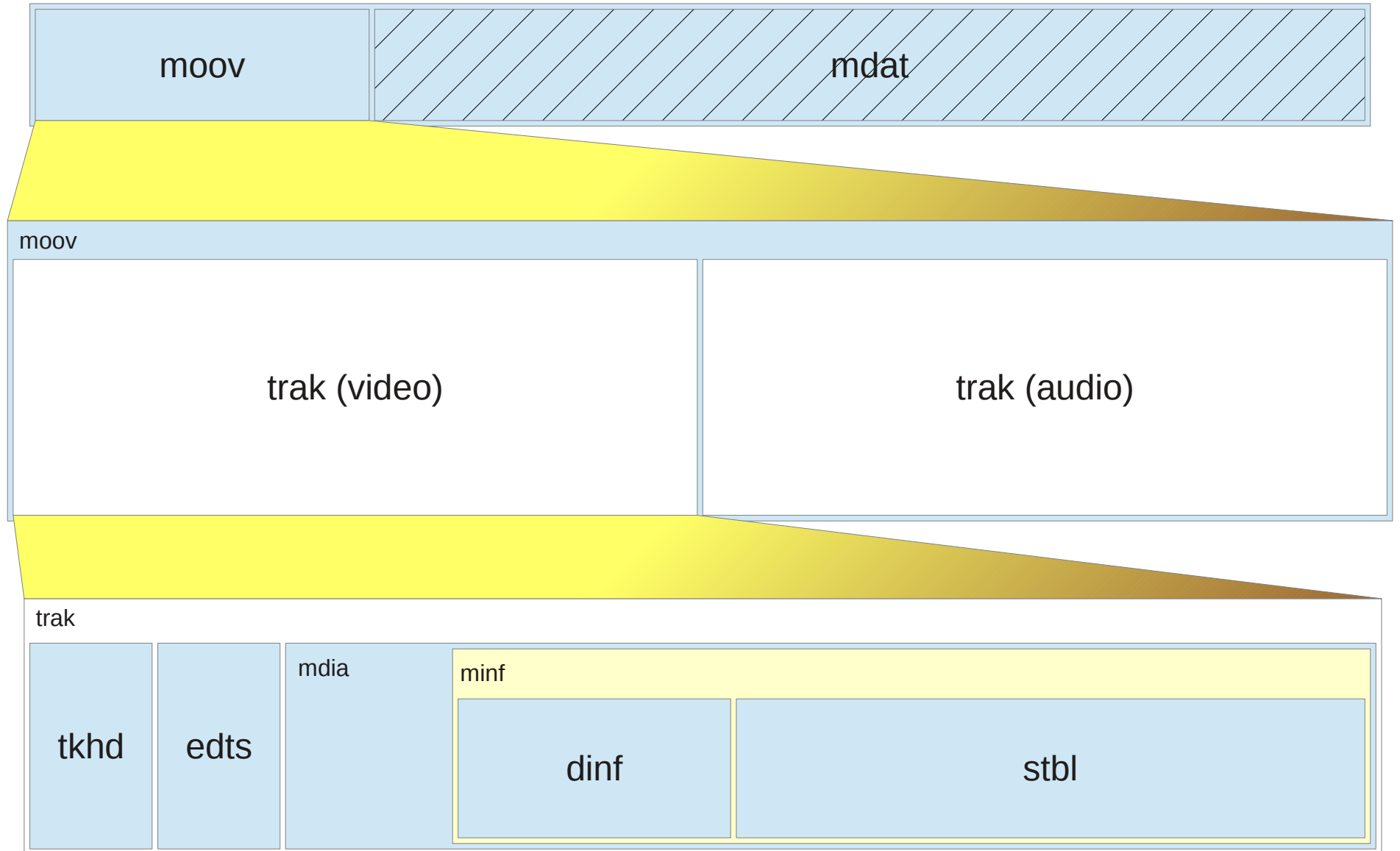
Playlist format?

- Depends on players available
  - JavaScript
    - Could accept proprietary format
    - Seamless?
    - Codec support?
  - Plugins
    - Installation nightmare
  - <video> element (HTML5)
    - Wide support
    - Ready-made solution
    - Only accepts whole files
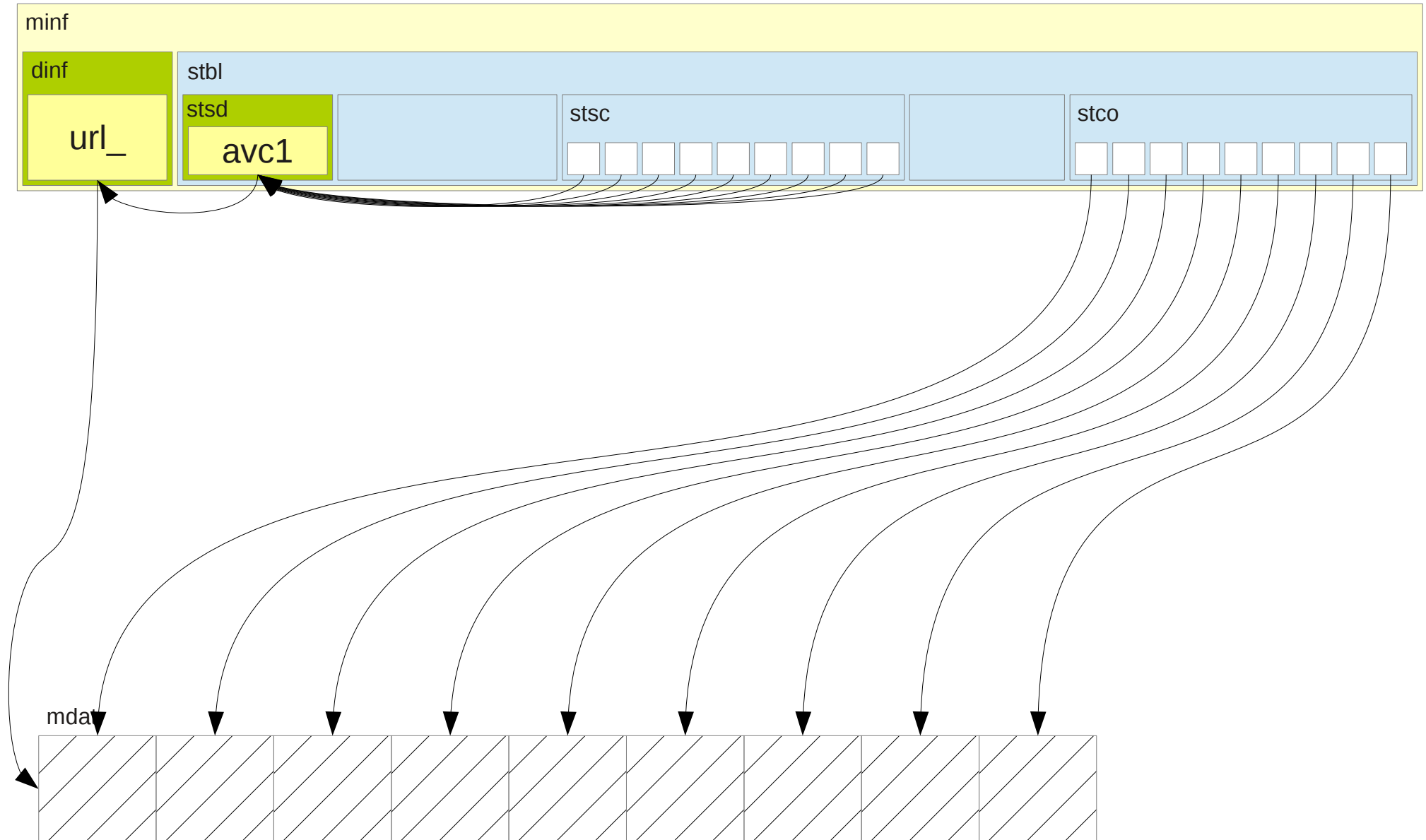
\<video\> + MP4?

- Container format
  - Box hierarchy
  - Supports multiple codecs
  - Holds codec-independent structural data
- Useful features:
  - Edit lists
  - External chunks
- Candidate playlist format

- Problems
  - Few \<video\> implementations support edit lists
  - Fewer support external chunks
  - Even QuickTime has 31-bit duration limits and requires absolute chunk URLs
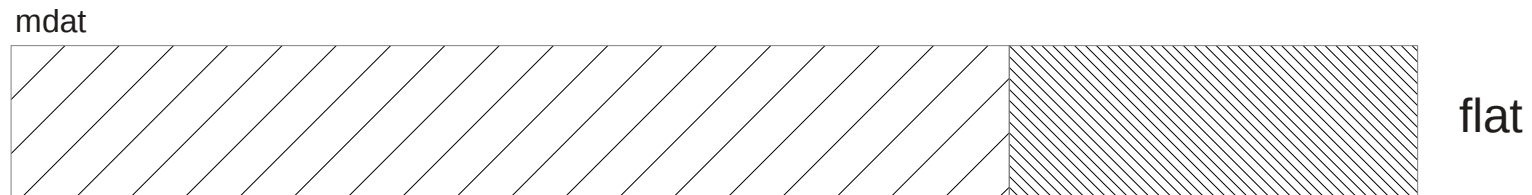
MP4 format

moov	mdat

moov

trak (video)	trak (audio)

trak

tkhd	edts	**mdia**

minf

dinf	stbl

MP4 format

minf
dinf
url_
stbl
stsd
avc1
stsc
stco
mdat

Raw data layout

video   *audio*

mdat — interleaved

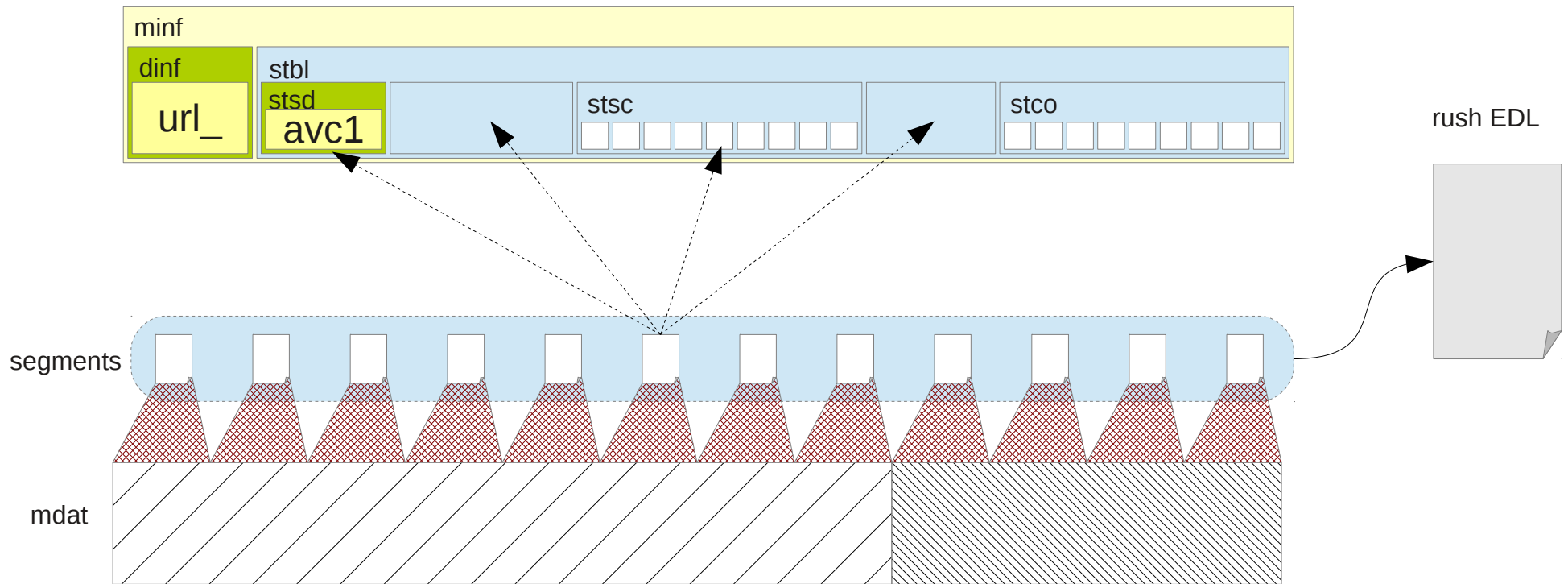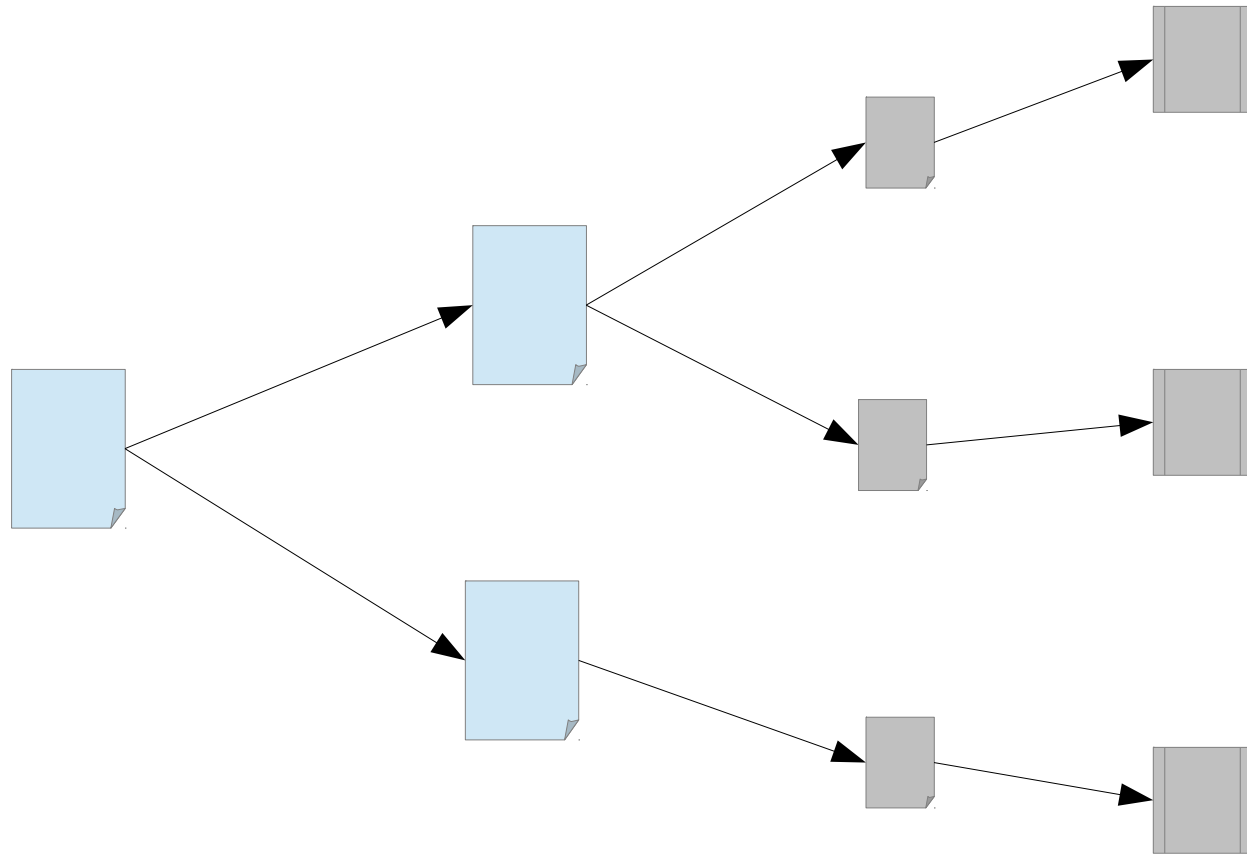mdat — flat

mdat — flat
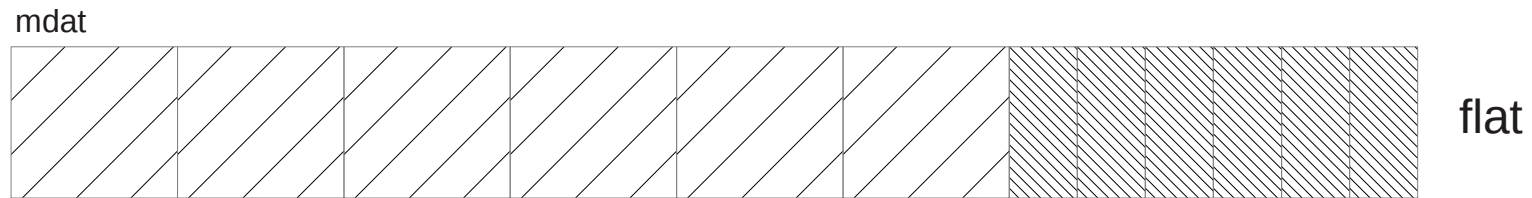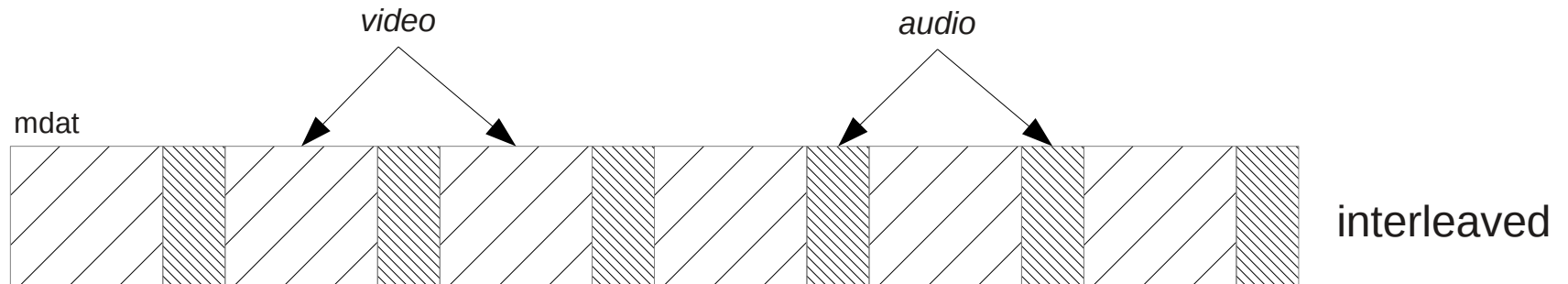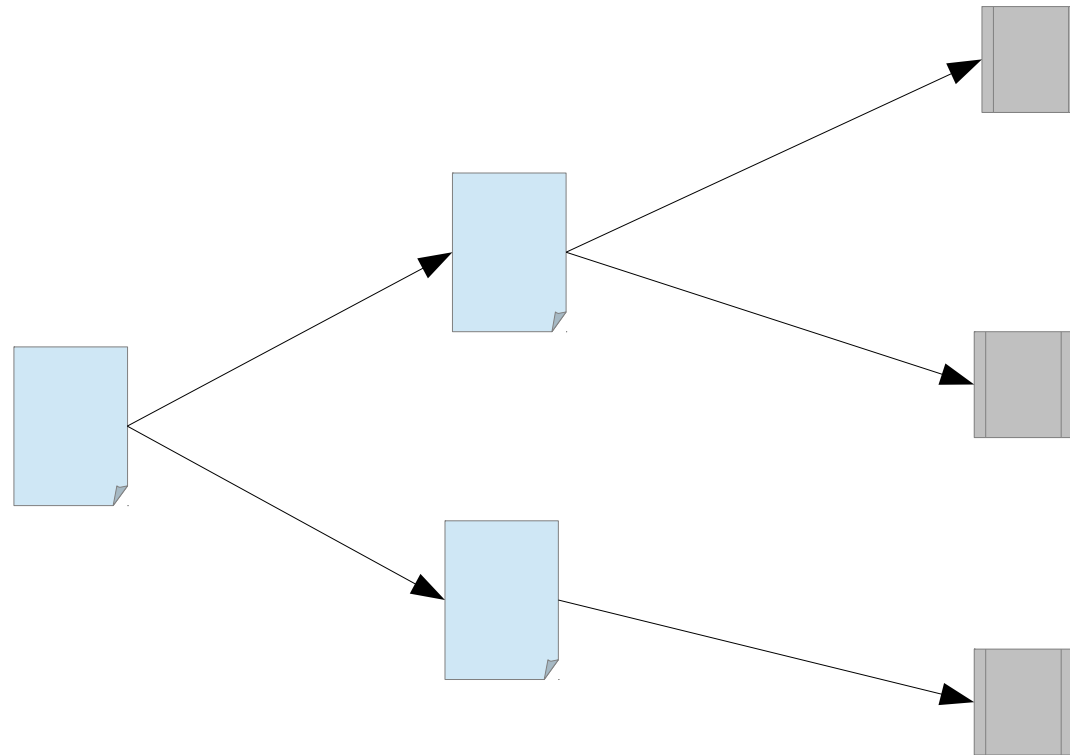
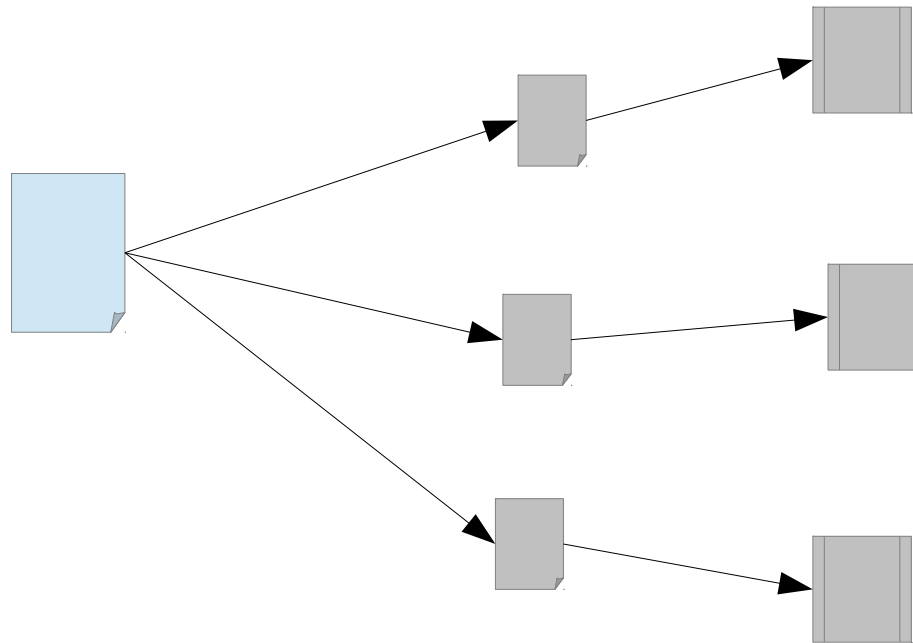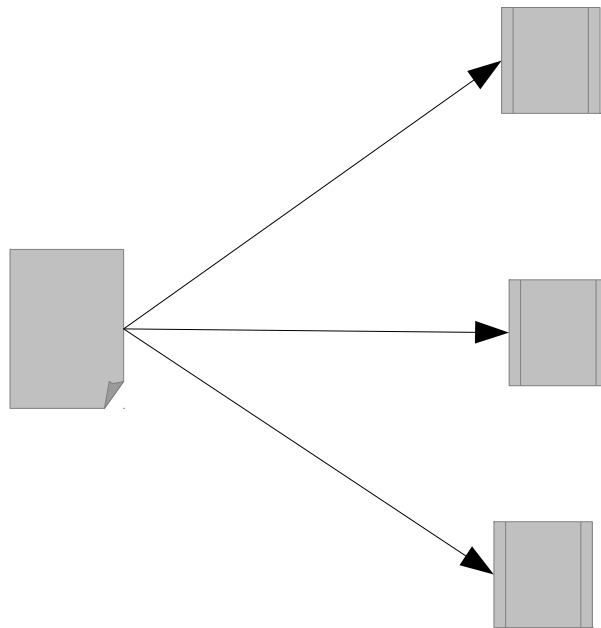# EDL resolution (1)

Creation of rush EDL

EDL resolution (2)

EDL resolution (3)

EDL resolution (4)

MP4 as a playlist
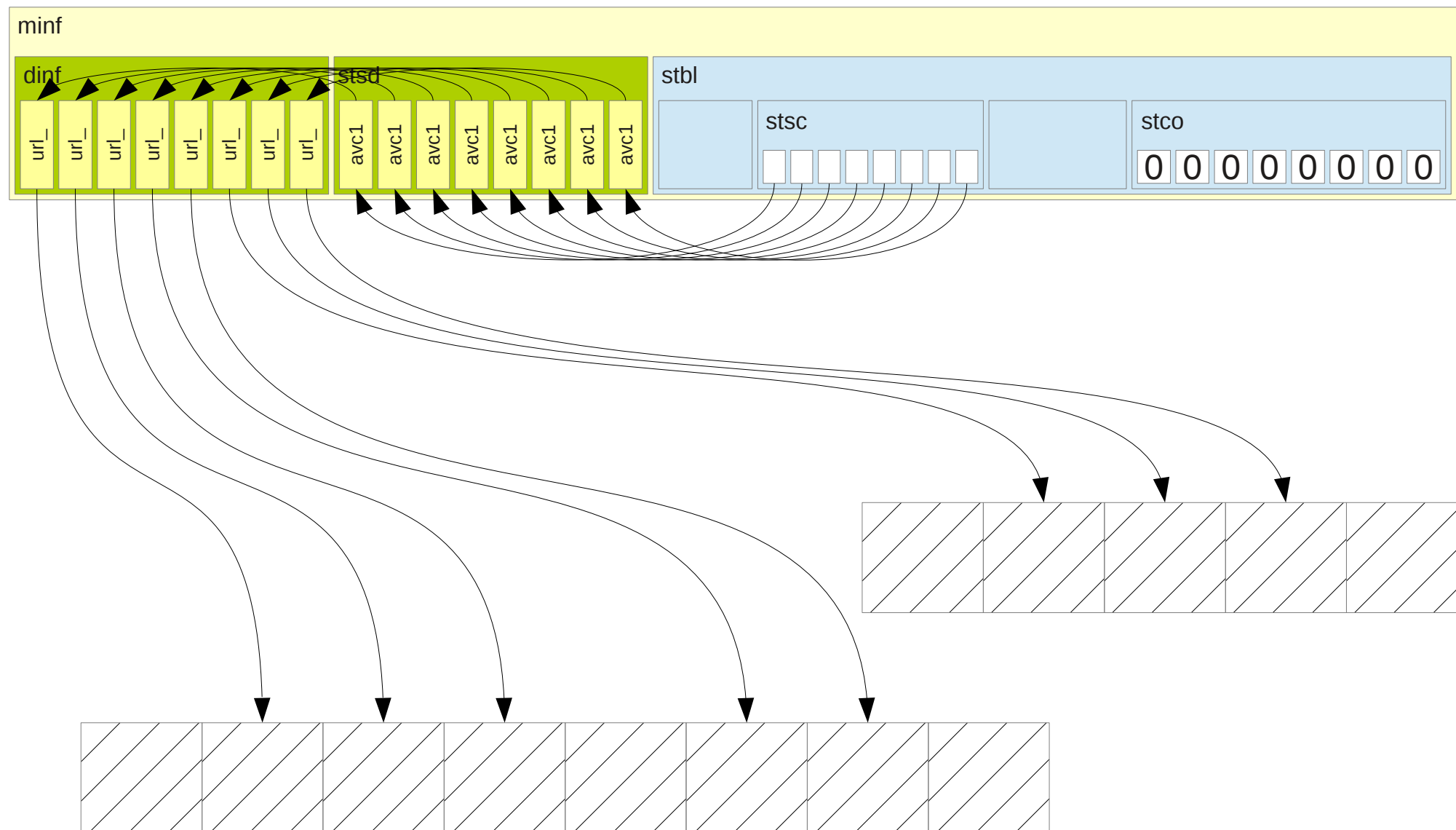
Chunking policy

- Use small GOPs

- Chunk on GOP boundaries

- Ensure GOPs are closed

- Choose audio chunks that interleave easily with video chunks

- Choose chunk sizes in proportion to quality levels

MP4 edit lists not supported?

- Use JavaScript in client

- Disable native timeline and controls

- Mock up intended timeline

- Translate positions on intended timeline to/from native positions

- During playback, detect when to jump

MP4 external chunks not supported?

- Implement kerb-side stitcher

  - A proxy local to the client

  - Fetch MP4 with external chunks

  - Fetch referenced chunks

  - Build new MP4 with integrated chunks

  - Relay to client

- Cache is still close to client

  - Near side of the narrowest link

  - Network still sees delivery of chunks

Storisphere

- Social TV
  - TV for social networking
  - TV content as social focus
- User experience
  - Quality assessment
  - User-computer interaction
  - Inter-user experience

- ONE
  - Collaborative editing
  - Linked media
  - Cache-friendly delivery
- Mediaplex
  - Content analysis
  - Event detection
  - Crowd-assisted production

Links

http://one.lancs.ac.uk/
Front-end of collaborative video editing system
(demo at http://one.lancs.ac.uk/cgi-bin/object-index)

http://www.scc.lancs.ac.uk/research/projects/firm
Documentation of activity

Acknowledgements

FIRM
http://www.firm-innovation.net/