CHAIR
MEDIA INFORMATICS

A Scalable Open Source Framework for Live Media Production and Distribution

Based upon the open source multimedia framework Videolan Client (VLC) we developed a scalable solution for video live production. It allows recording, composing images, encoding and distributing to digital TV, web or smartphones.

With the help of few simple and low budget components such as a laptop, (H)DV camera and VGA grabber both video and audio as well as the current picture of a beamer can be captured and arranged at high quality. Graphical elements such as logos, lower thirds and program infocards can be superimposed and managed dynamically.

A broadcast- and broadband-capable playout can be done using a laptop or powerful servers. For a later on demand usage automatically generated recordings are provided in real-time. Particularly interesting for the live operation is the linkage to video conference systems.

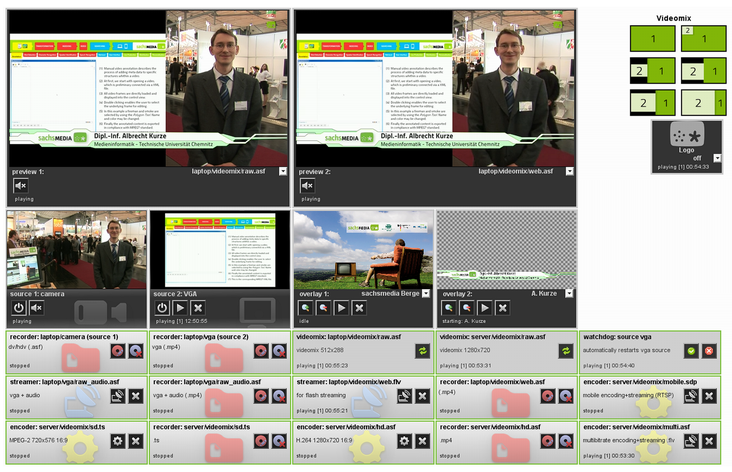
With our system we successfully managed the transmission of lectures and large-scale events.

Proving the system in practice

With our system we successfully realized the transmission of several lectures and large-scale events such as the *Chemnitzer Linux-Tage* 2010 to 2012.

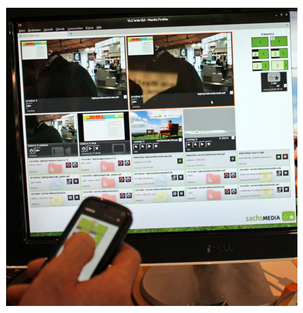
The talks of up to 5 parallel tracks were captured, mixed and transmitted live via DVB-T and Internet streaming.

For that purpose, we used a distributed setup realizing source aggregation and video mixing using laptops on-site on the one hand and transcoding to the target for-mats using powerful remote servers on the other hand.

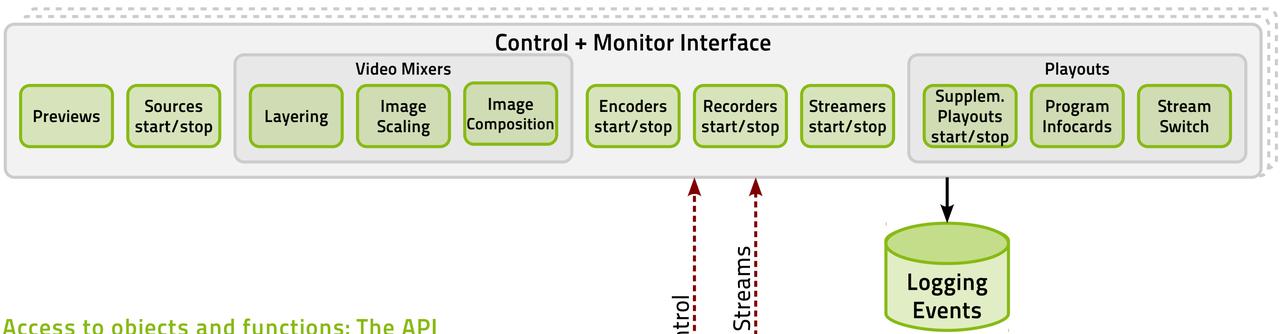


Control + Monitor interface with the web browser

- configurable previews:
  sources – video mix – resulting streams
- preset buttons for a quick toggle of shot compositions
- surveillance and control:
  encoders – recorders – outgoing streams
- scalability: one front-end controls several back-ends
- location-independance to control operations from almost anywhere
- GUI elements are quickly configurable
- quick GUI adaption for different purposes, e.g.
  local video mixing with limited stream administration or centralized playout control without video mixing



Web front-end and mobile front-end for video mixing control.



The Framework

VLC as base framework offers a flexible A/V processing chain for:

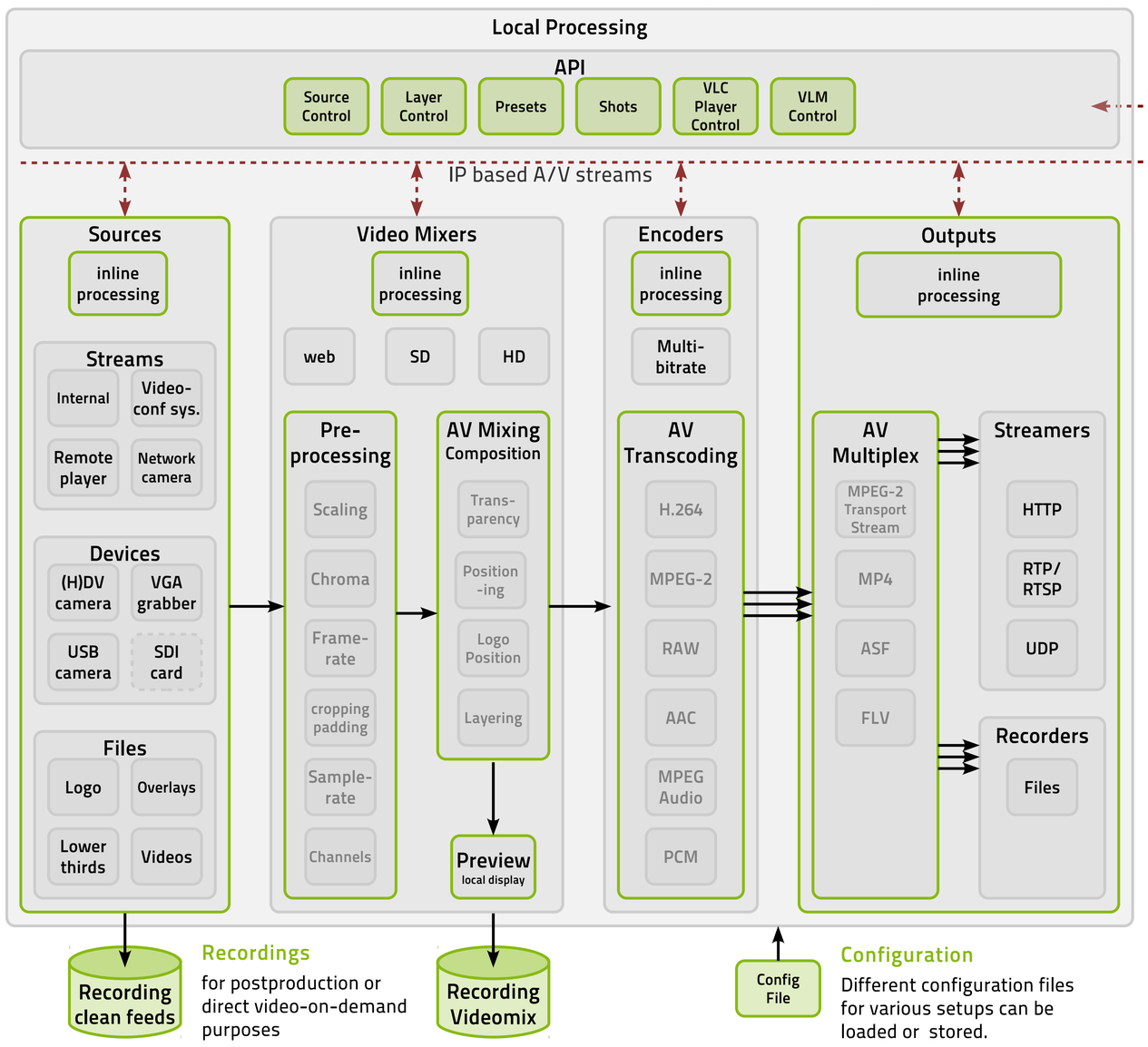
- Source aggregation
- AV processing
- Composition
- Encoding
- Multiplexing
- Output provision

Those consecutive components can be connected via IP. An API enables their independent control.

The resulting IP streams might carry compressed or even raw A/V content. In summary, multiple parallel sources, encoders, and outputs are possible.

Access to objects and functions: The API

- built-in HTTP interface enables network control
- internal Lua scripting engine provides a server pages approach for the easy adding of functionality
- resources can be managed and monitored via HTTP requests and JSON responses in a service-like way



Recordings

for postproduction or direct video-on-demand purposes

Configuration

Different configuration files for various setups can be loaded or stored.

Communication

transport via efficient IP networks (internal/switched)

Scaling and cascading

Connect additional PCs/servers via IP for

- generating supplementary video mixes and A/V formats remotely
- insert clean feed streams of additional attached devices
- separating “Preview” and “Program” views of the video mixes
- other scenarios as mobile or HD viewing

Final Playout

- switching between file based input, (live) stream input, and infocard streams to provide a final decision on the eventual content to be published
- remuxing and streaming
- connecting 3rd-party components such as a MPTS multiplexer for DVB-T or a MPE-encapsulator for DVB-H
- utilizing either the built-in internal streaming capabilities or dedicated stream software (e.g. Wowza or Erlyvideo for Flash video) for Internet or mobile streaming

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