

FFMPEG CLI multithreading

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FFlabs

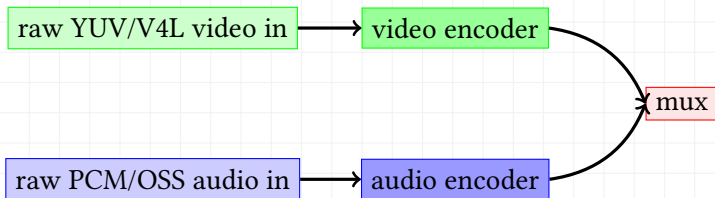
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VDD@Dublin

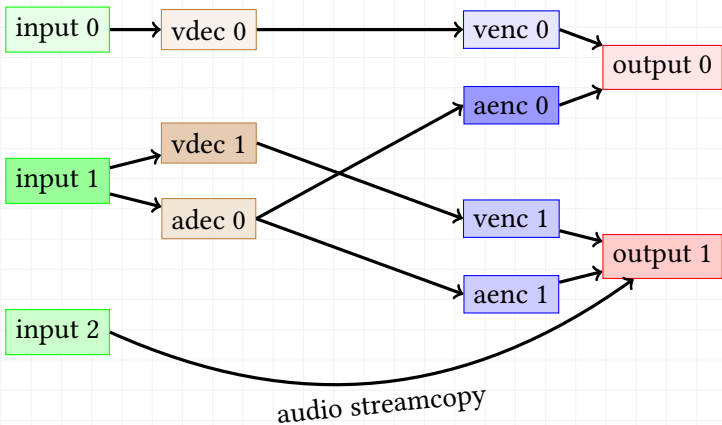


- most widely used multimedia transcoder on at least two planets
- uses LIBAV* libraries to demux, decode, filter, encode, mux
- almost all format-specific logic is in the libraries
- covers more use cases than any other comparable tool
- all scales — from individual users to giant corporations

- ~700 LoC
- raw input only, no decoding
- encoding and muxing



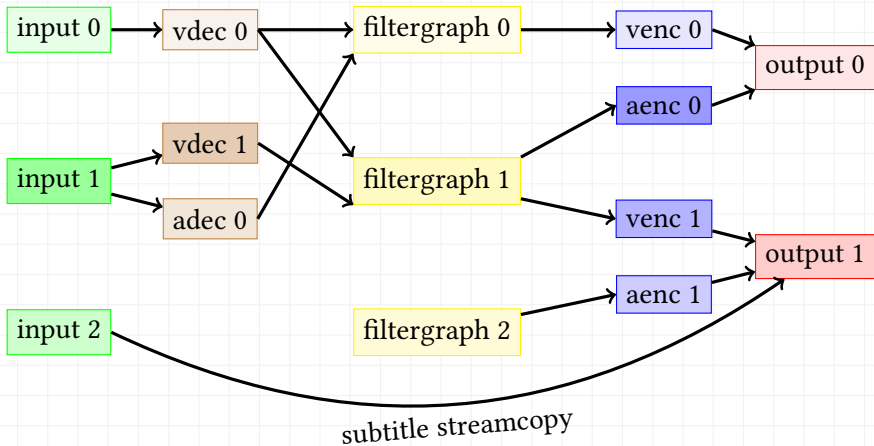
- ~2000 LoC
- demuxing and decoding
- multiple input and output files with multiple streams each



A brief history: up to now

- 2005 — subtitles (~4.5 kLoC)
- 2010 — simple video filtering with `LIBAVFILTER` (~4.5 kLoC)
- 2012 — complex filtergraphs (~5 kLoC)
- 2013 — basic hardware acceleration (~6 kLoC)
- 2016 — full hwaccel pipelines become possible (~8 kLoC)
- as of 2022:
 - ~11 kLoC
 - dynamic stream parameter changes
 - more options than anyone can remember
 - options interact in highly nontrivial ways

General transcoding pipeline



- bring code structure in alignment with actual data flow by
 - making the code more explicitly object-oriented
 - clearly defined interfaces and responsibilities
 - separation of public and private state
 - every major component in its own thread
 - information flows downstream through the pipeline
- makes the code easier to understand/maintain/extend
- improved throughput under the right conditions

- project started in late 2021
- ≥ 700 commits, almost every line of code in `fftools/ffmpeg*` touched
- in master: demuxer&muxer threading, “fake” decoder threading
- extras
 - sync queues
 - frame duration handling
 - timestamps handling improvements
 - opaque passthrough
- in my dev branch
 - fully threaded transcoding
 - some features still broken
 - needs more tuning and testing

- separate encoders from output streams
 - encoders are currently coupled to muxers
 - sending an encoded stream to multiple muxers
 - looping an encoded stream back to a decoder
- separate decoders from input streams
- dynamic pipelines
- scripting (Lua?)