

# Introduction to streaming

# What you will learn

- Video fundamentals
- HTTP Live Streaming
- Streaming video in iOS



# Video Fundamentals

# Inspecting a Video File

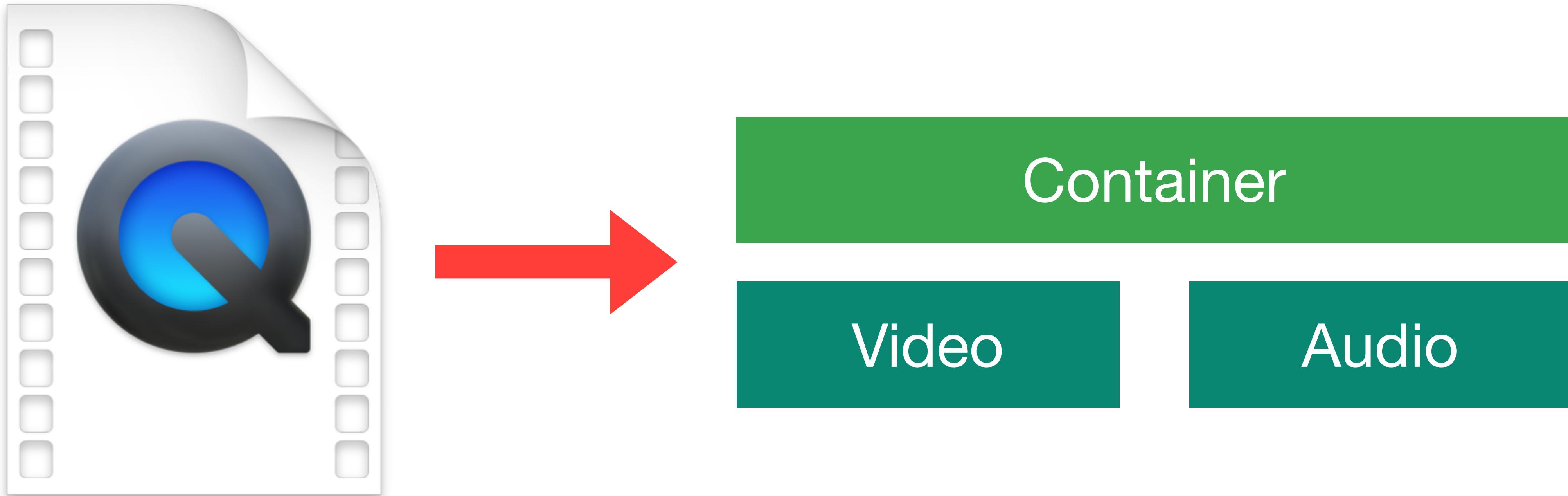




# Inspecting a Video File



# Inspecting a video file



# Inspecting a Video File

Collects media into one file

Video, audio, subtitle, image

AVI, MKV, MP4, TS

Container

Video

Audio

# Inspecting a Video File

Encoded using a codec

Audio - MP3, AAC

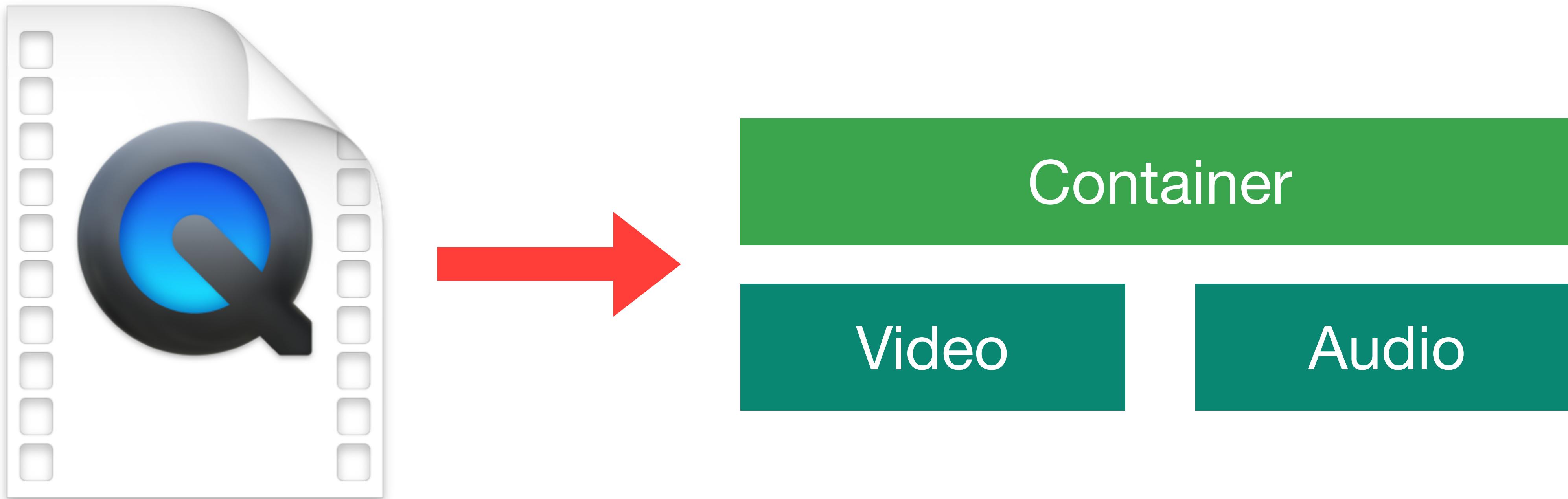
Video - H264, DivX, XviD



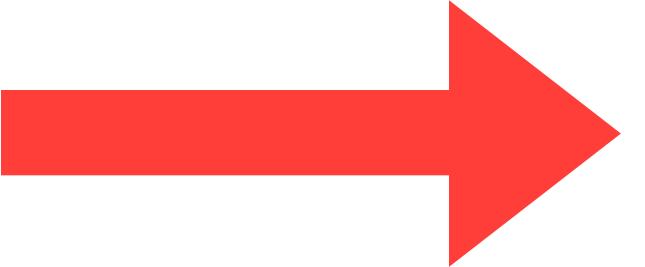
Video

Audio

# Inspecting a Video File



# Inspecting a Video File



MOV

H264

PCM\_S16LE

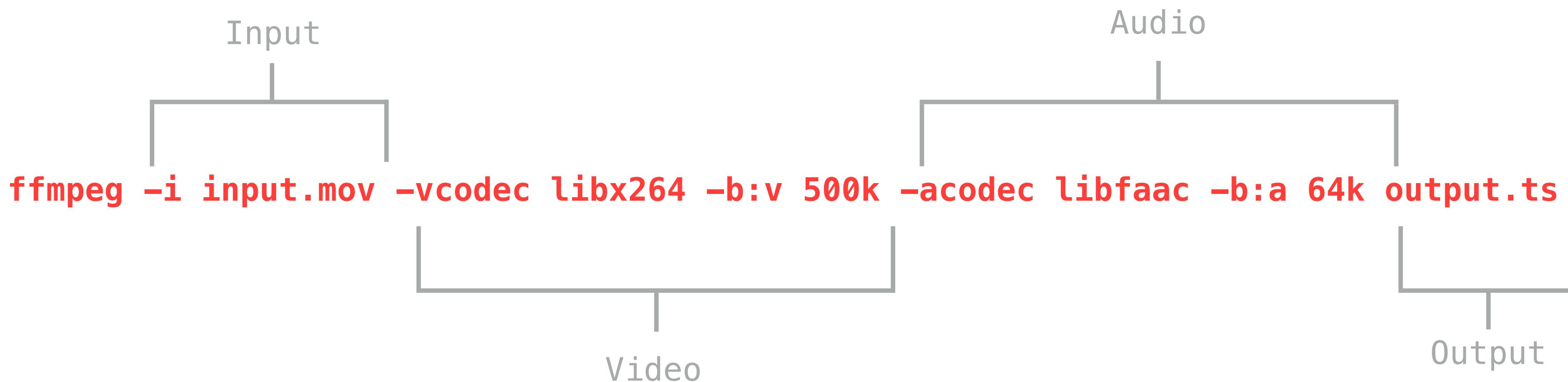
# Transcoding Video

Use ffmpeg to transcode

TS container

H264 encoded video

AAC encoded video





# HTTP Live Streaming



HLS

# Overview

Created by Apple

Splits video into small files

HTTP file downloads

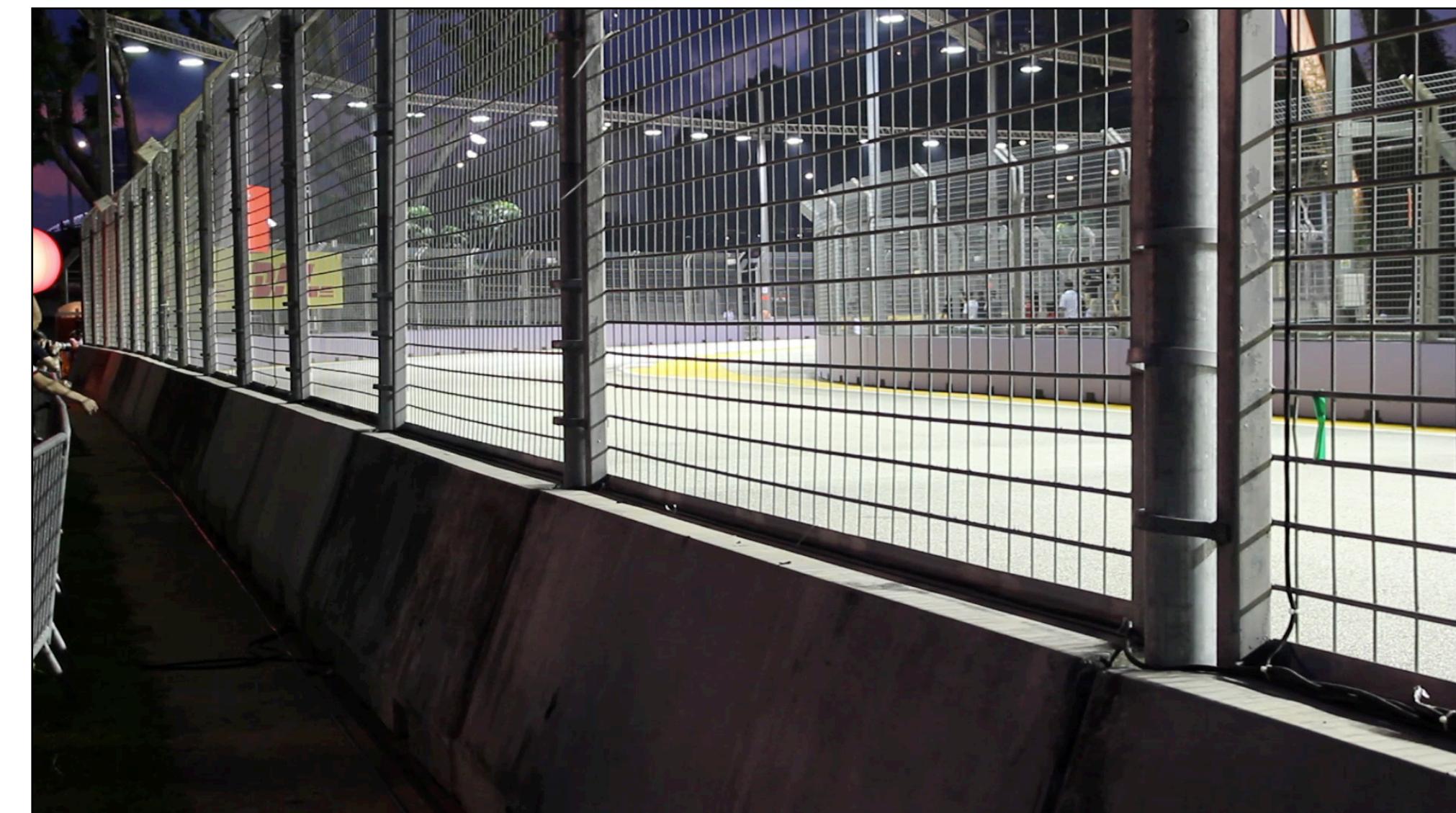
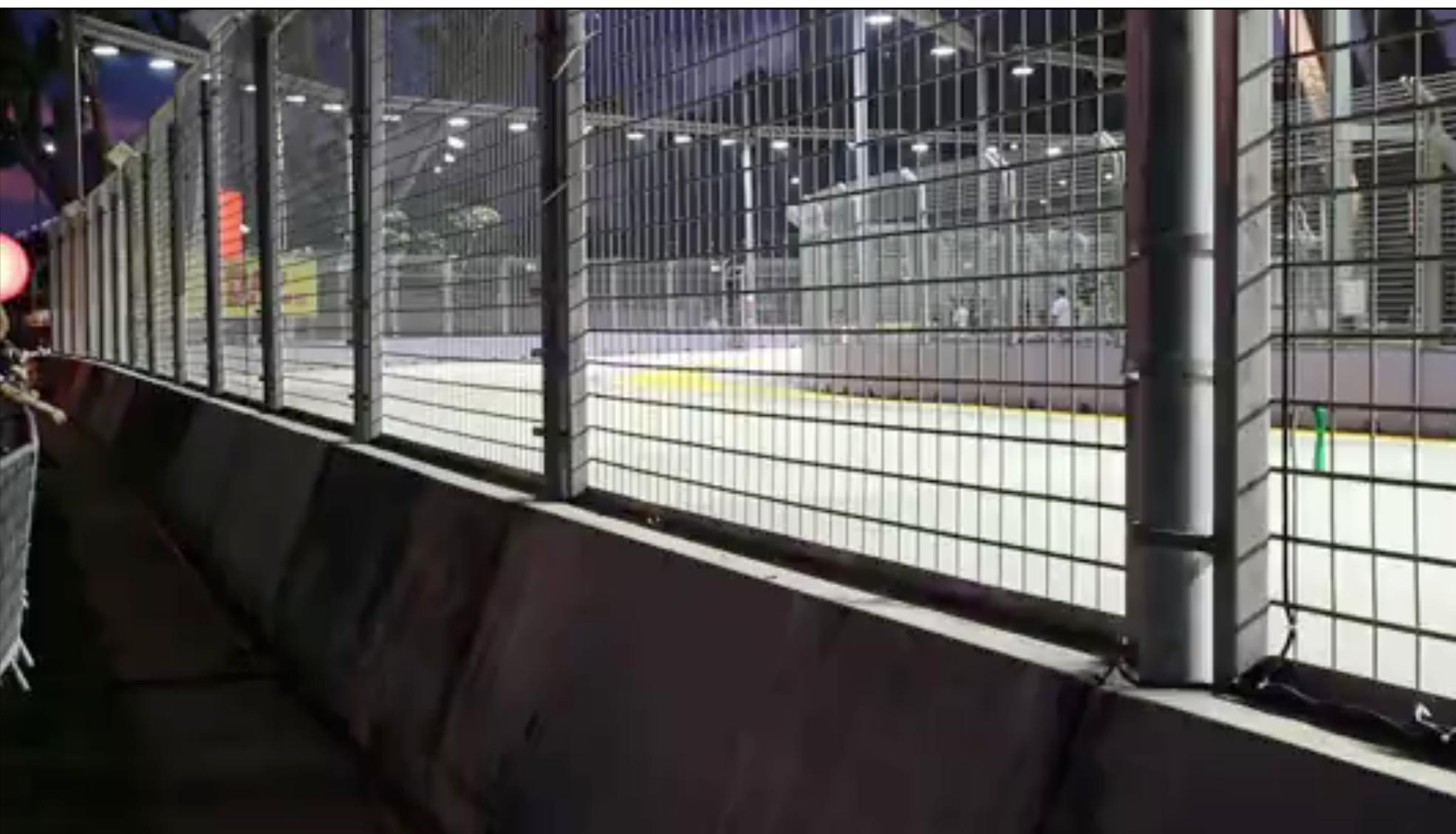
Multiple different qualities

Playlist files

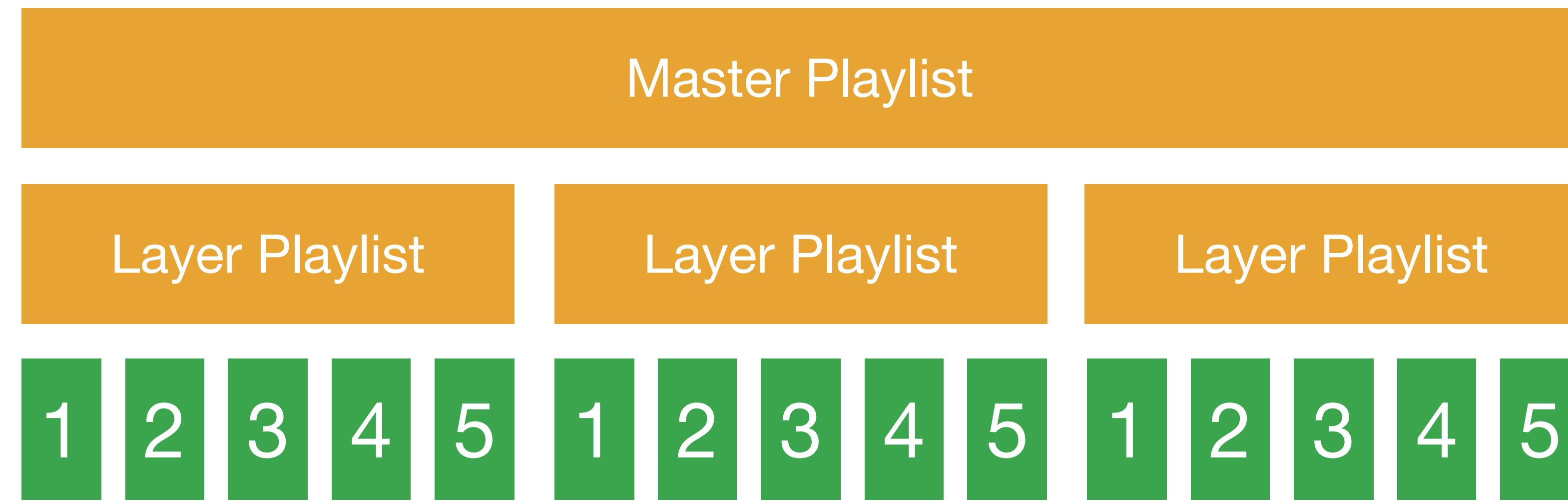


But, why?

# Quality Comparison



# Format



# Master Playlist

#EXTM3U

#EXT-X-STREAM-INF:PROGRAM-ID=1, BANDWIDTH=200000  
[http://example.com/hls/layer\\_200.m3u8](http://example.com/hls/layer_200.m3u8)

#EXT-X-STREAM-INF:PROGRAM-ID=1, BANDWIDTH=500000  
[http://example.com/hls/layer\\_500.m3u8](http://example.com/hls/layer_500.m3u8)

#EXT-X-STREAM-INF:PROGRAM-ID=1, BANDWIDTH=1000000  
[http://example.com/hls/layer\\_1000.m3u8](http://example.com/hls/layer_1000.m3u8)

#EXT-X-STREAM-INF:PROGRAM-ID=1, BANDWIDTH=1500000  
[http://example.com/hls/layer\\_1500.m3u8](http://example.com/hls/layer_1500.m3u8)

# Layer Playlist

#EXTM3U

#EXT-X-TARGETDURATION:10

#EXT-X-MEDIA-SEQUENCE:0

#EXTINF:10,

http://example.com/hls/layer\_500\_segment0.ts

#EXTINF:10,

http://example.com/hls/layer\_500\_segment1.ts

#EXTINF:10,

http://example.com/hls/layer\_500\_segment2.ts

# Packaging a Stream

1. Transcode video into multiple qualities
2. Split each layer using *mediafilesegmenter*
3. Create master using *variantplaylistcreator*



# Streaming video in iOS

# Overview

Media Player

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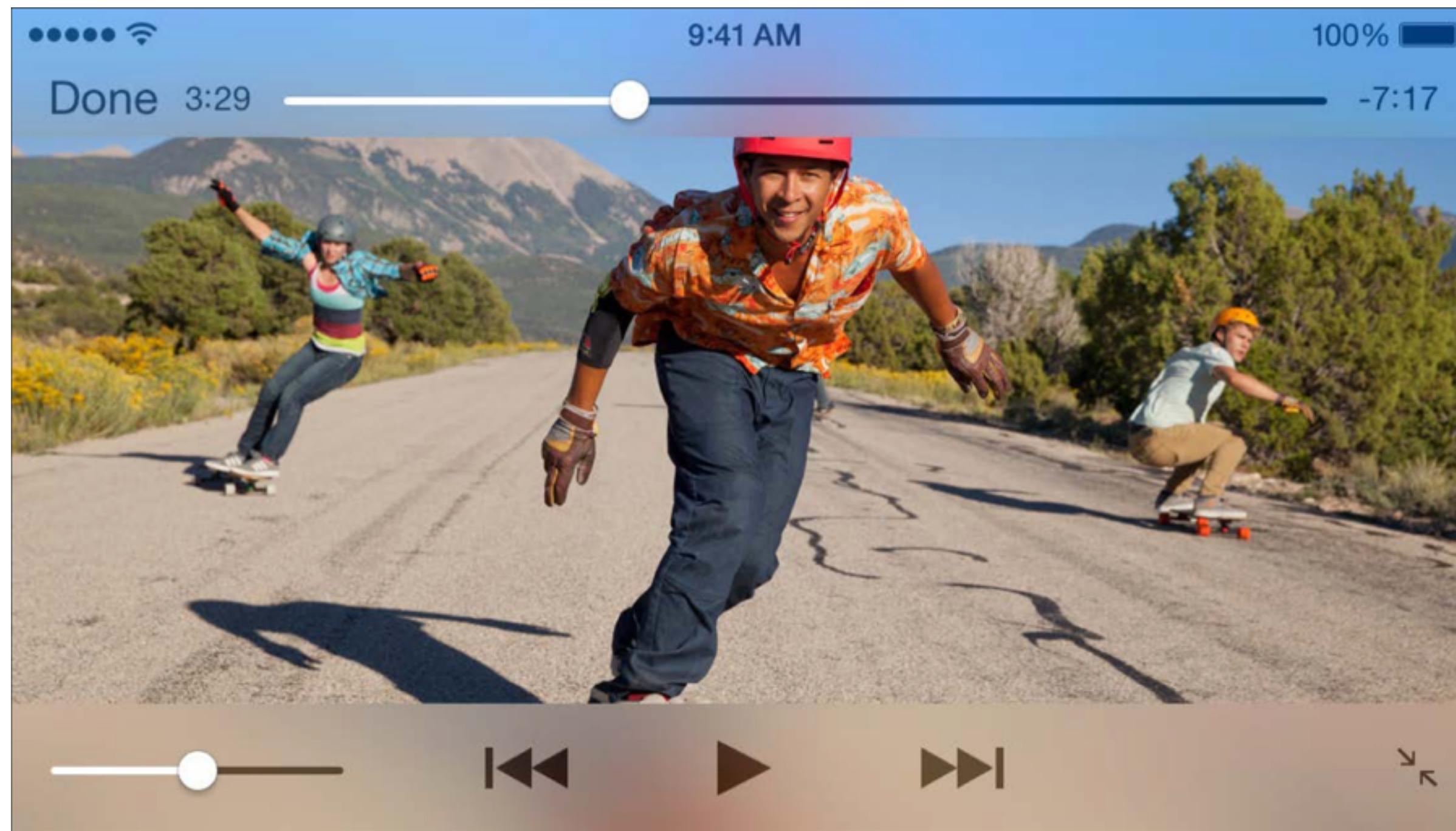
AVFoundation

Core Media

# Framework Comparison

	Standard UI	Access to Media Stack
Media Player		
AVFoundation		

# Standard UI



# Access to Media Stack

Programmatically switch audio/video/subtitle

Play multiple videos

Buffer before playback

Handle interruptions

# Framework Comparison

	Standard UI	Access to Media Stack
Media Player		
AVFoundation		

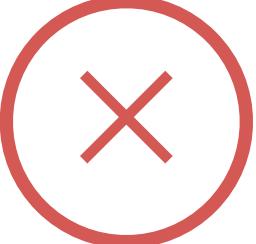
# Media Player

```
MPMoviePlayerViewController *viewController =  
[ [MPMoviePlayerViewController alloc] initWithContentURL:self.videoURL];  
  
[self presentMoviePlayerViewControllerAnimated:viewController];
```

# AVFoundation

```
AVAsset *asset = [AVAsset assetWithURL:self.videoURL];  
  
AVPlayerItem *playerItem = [AVPlayerItem playerItemWithAsset:asset];  
  
AVPlayer *player = [AVPlayer playerWithPlayerItem:playerItem];  
  
AVPlayerLayer *playerLayer = [AVPlayerLayer playerLayerWithPlayer:player];  
  
// Present layer in your own UI
```

# Framework Comparison

	Standard UI	Access to Media Stack
Media Player		
AVFoundation		

# Framework Comparison

	Standard UI	Access to Media Stack
Media Player		
AVFoundation		
AVKit + AVFoundation		

# More information

<https://developer.apple.com/videos/>

<https://developer.apple.com/streaming/>

<https://developer.apple.com/av-foundation/>