

Preparing and Presenting Media for Accessibility

Session 608

Kevin Calhoun

Media Systems Software Engineer

These are confidential sessions—please refrain from streaming, blogging, or taking pictures

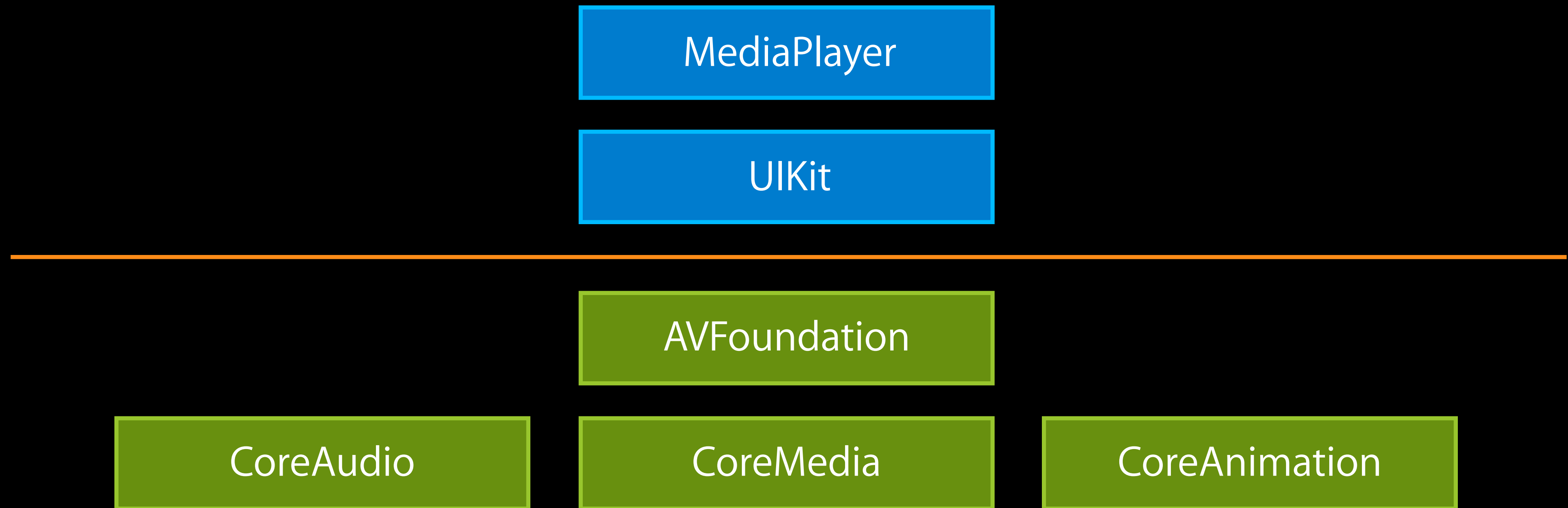
Introduction

- Accessibility options for timed media
 - Captions and Subtitles
 - Audio
- Regulations may apply
 - Twenty-First Century Communications and Video Accessibility Act

What You Will Learn

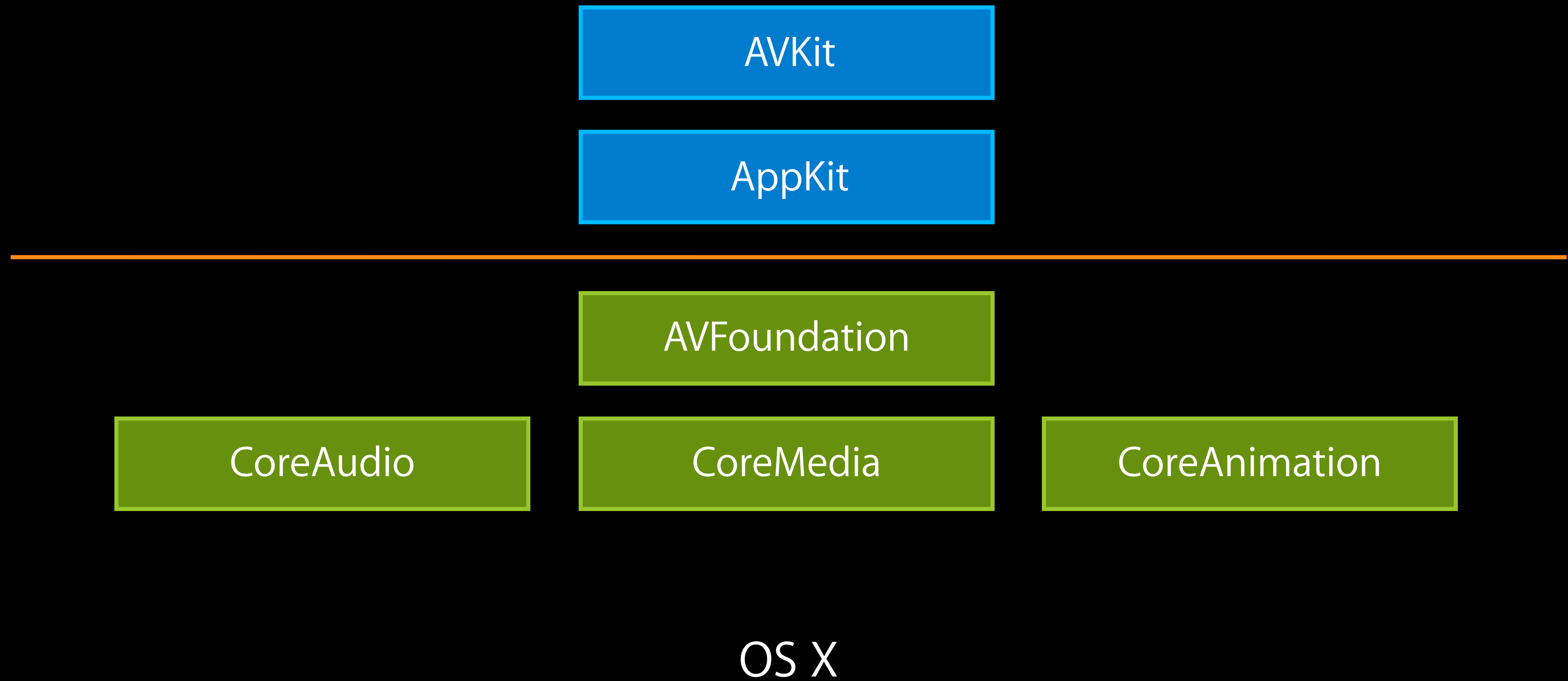
- How OS X and iOS support accessibility options for timed media
- Selecting accessibility options during playback
- Adding accessibility options to your media resources
 - With HTML5
 - With HTTP live streaming
 - In QuickTime movie and MPEG-4 files
 - Writing subtitles to movie files
- Accessing subtitle text during playback

Technology Framework



iOS

Technology Framework



Timed Media: The Big Picture



Video



Audio



Captions or Subtitles

Timed Media: Legible Options



Video



Audio



Captions or Subtitles

Timed Media: Legible Options



Video



Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

Timed Media: Legible Options



Video



Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

Timed Media: The Big Picture



Video



Audio



Captions or Subtitles

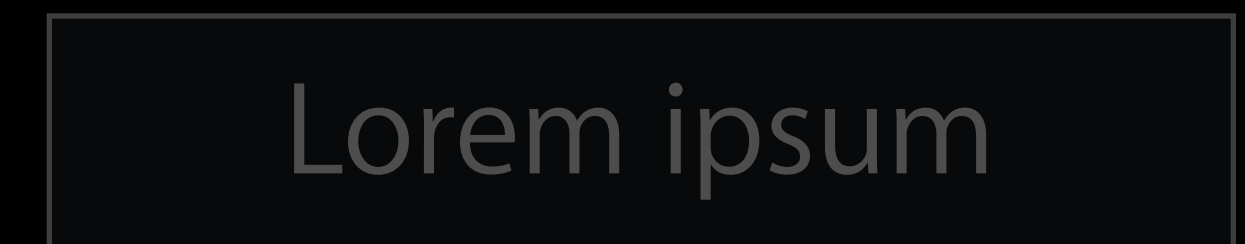
Timed Media: Audible Options



Video



Audio



Captions or Subtitles

Timed Media: Audible Options



Video



Dubbed Audio



Descriptive Audio

Audio

Lorem ipsum

Captions or Subtitles

Timed Media: Audible Options



Video

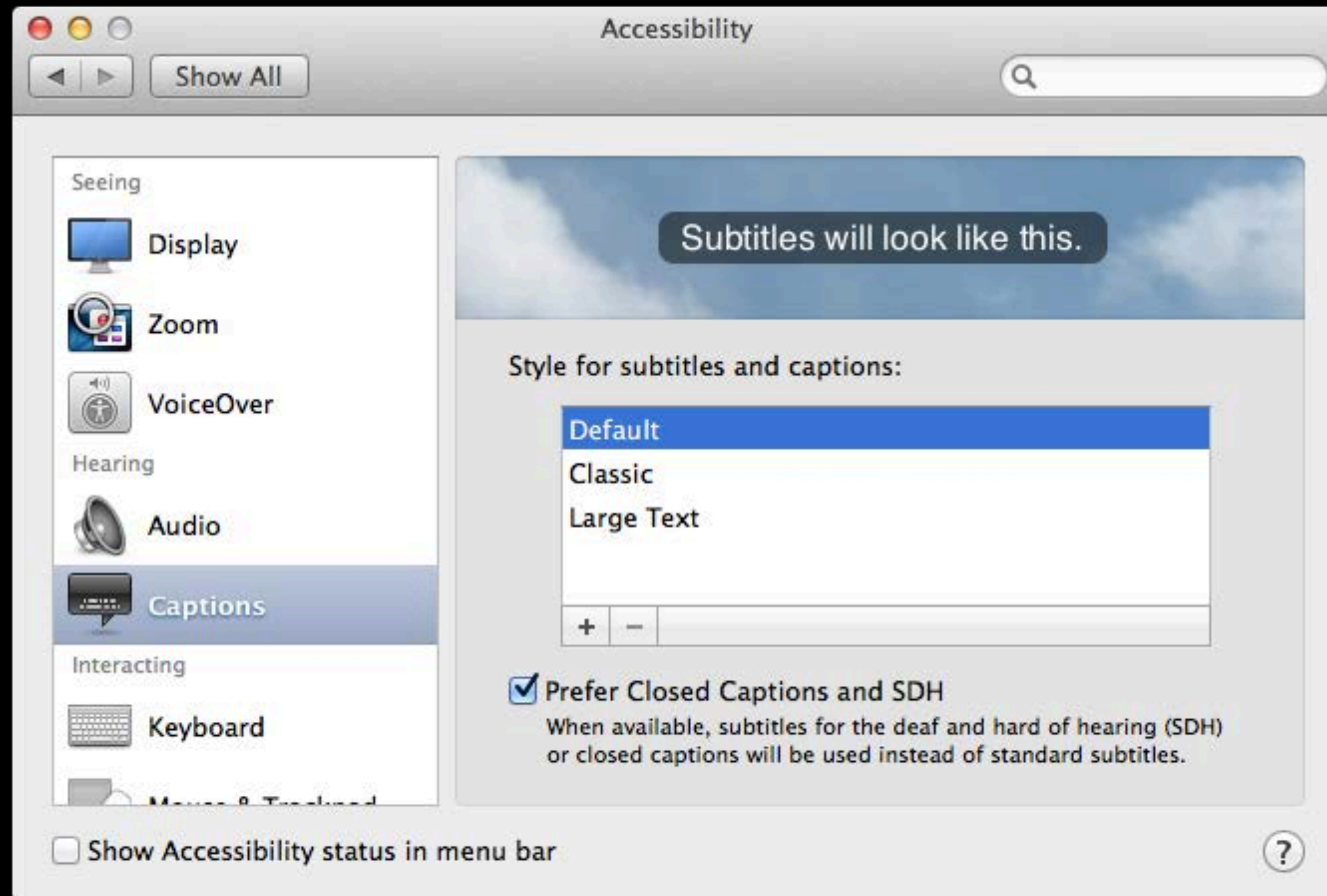


Audio

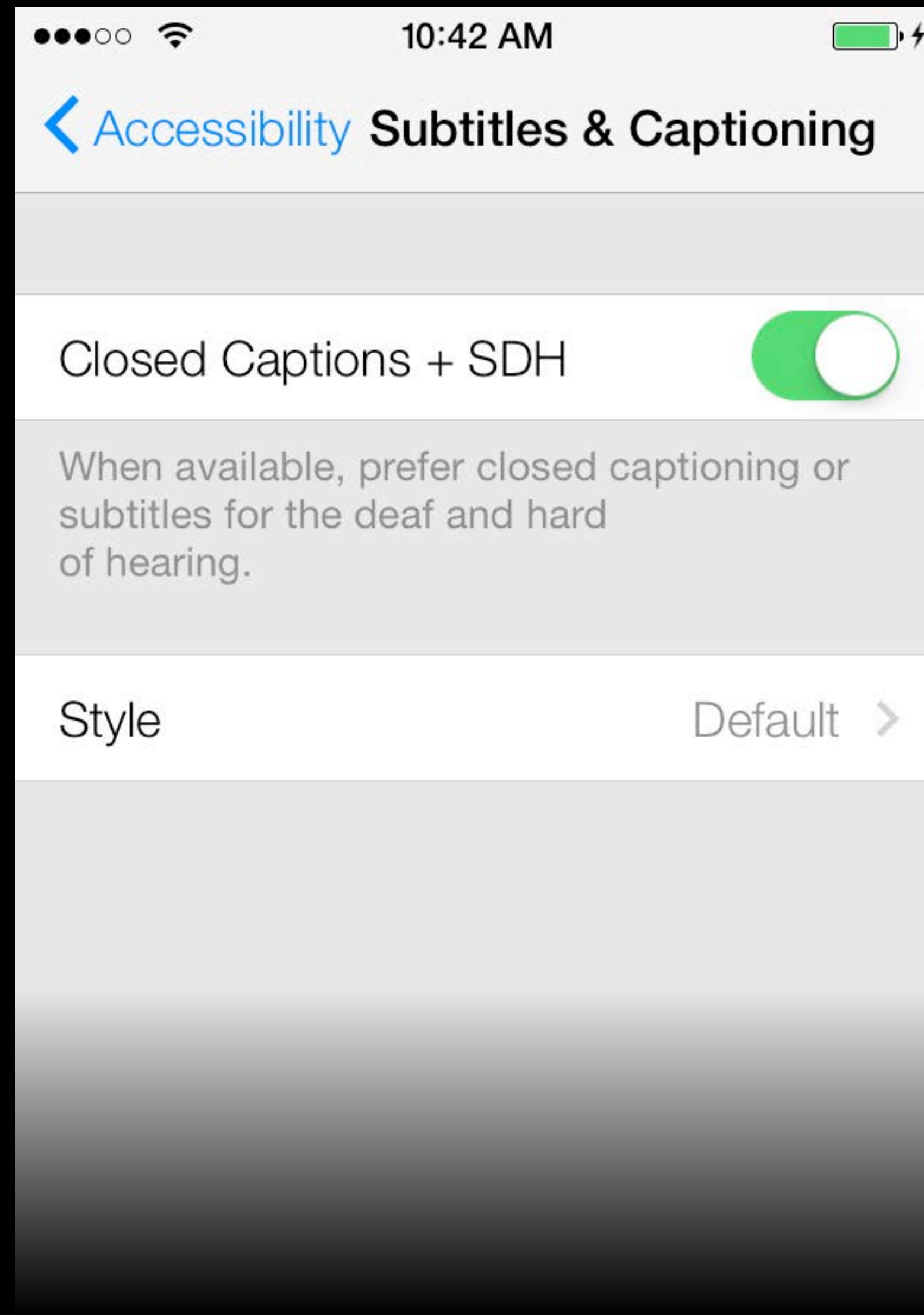
Lorem ipsum

Captions or Subtitles

System Preferences for Media Accessibility



System Preferences for Media Accessibility



Respecting Text Styling Preferences

- Apps do not need to do anything
- User preferences trump all other sources of styling

Respecting Media Selection Preferences

- Many apps do not need to do anything
 - iOS: `MPMoviePlayerController`
 - OS X: `AVPlayerView`
- AV Foundation-based apps
 - For seed: Opt into automatic media selection
 - May need or want to provide media selection UI

Respecting Media Selection Preferences

- Opting into automatic selection
`[player setAppliesMediaSelectionCriteriaAutomatically:YES];`
- Opt-in will be automatic when you link against the new SDKs
 - Not in the current seed; in future seeds and in shipping versions
 - Clients that don't want automatic media selection must opt out

Selecting Media Options



Video



Dubbed Audio



Descriptive Audio

Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

AV Foundation Terminology



AVMediaSelectionOption 0

AVMediaSelectionOption 0

AVMediaSelectionOption 1

AVMediaSelectionOption 1

AVMediaSelectionOption 2

AVMediaSelectionOption 2

AVMediaSelectionGroup
for Audible characteristic

AVMediaSelectionGroup
for Legible characteristic

Implementing a Media Selection UI

AVAsset

Implementing a Media Selection UI

AVAsset

availableMediaCharacteristicsWithMediaSelectionOptions

Implementing a Media Selection UI

AVAsset

AVMediaCharacteristic

AVMediaCharacteristic

AVMediaCharacteristic

Implementing a Media Selection UI

AVAsset

AVMediaCharacteristic

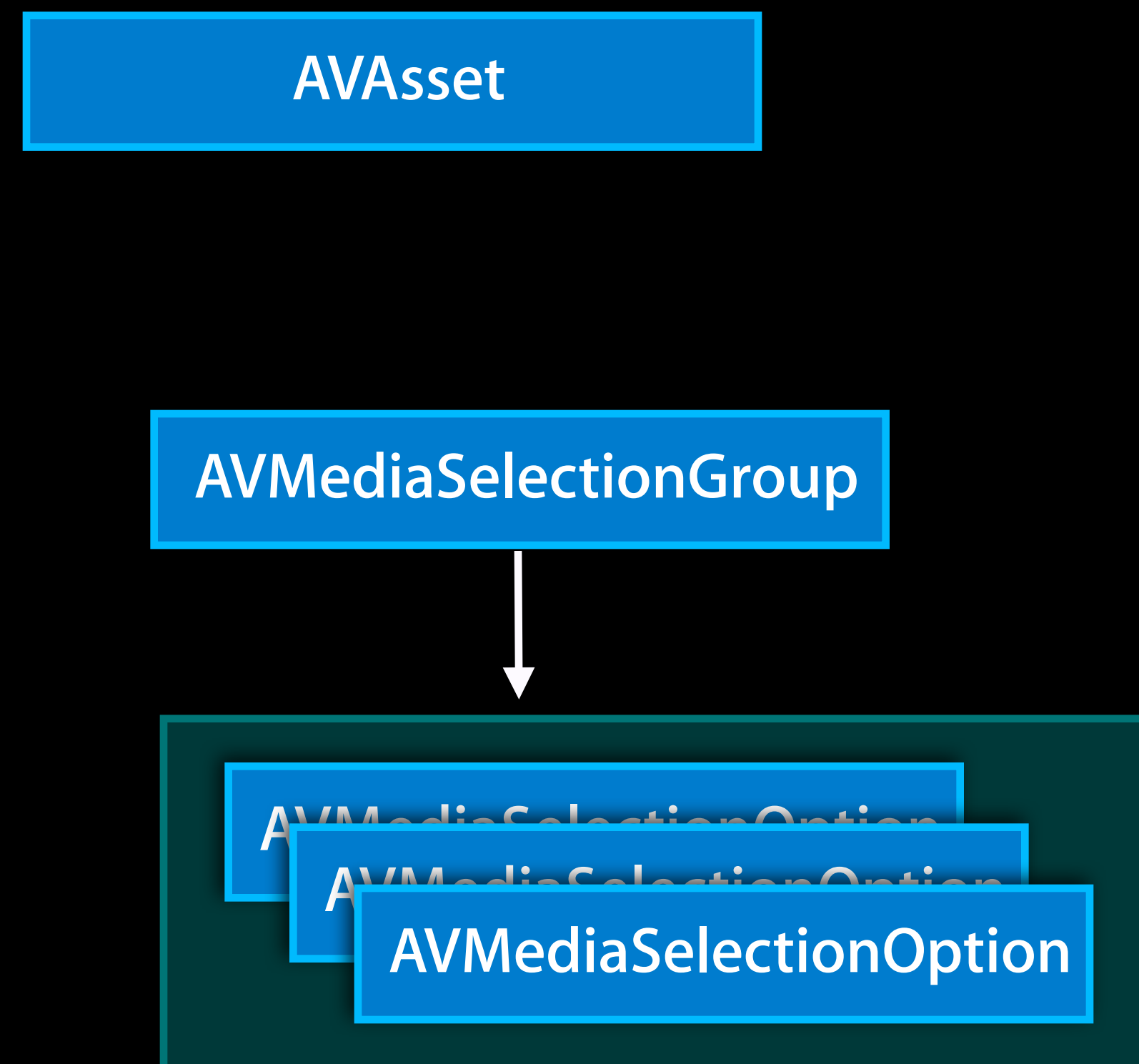
Implementing a Media Selection UI

AVAsset

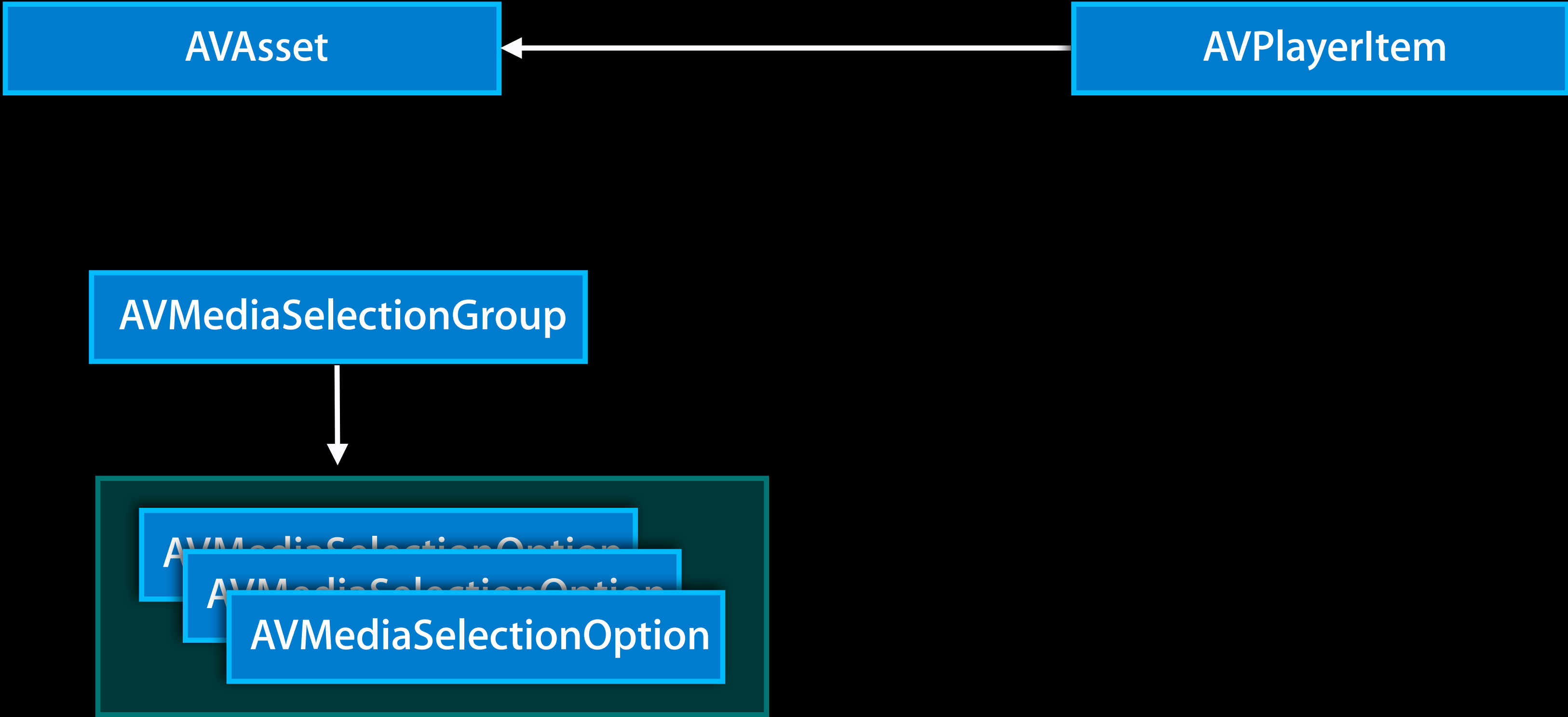
mediaSelectionGroupForMediaCharacteristic:

AVMediaCharacteristic

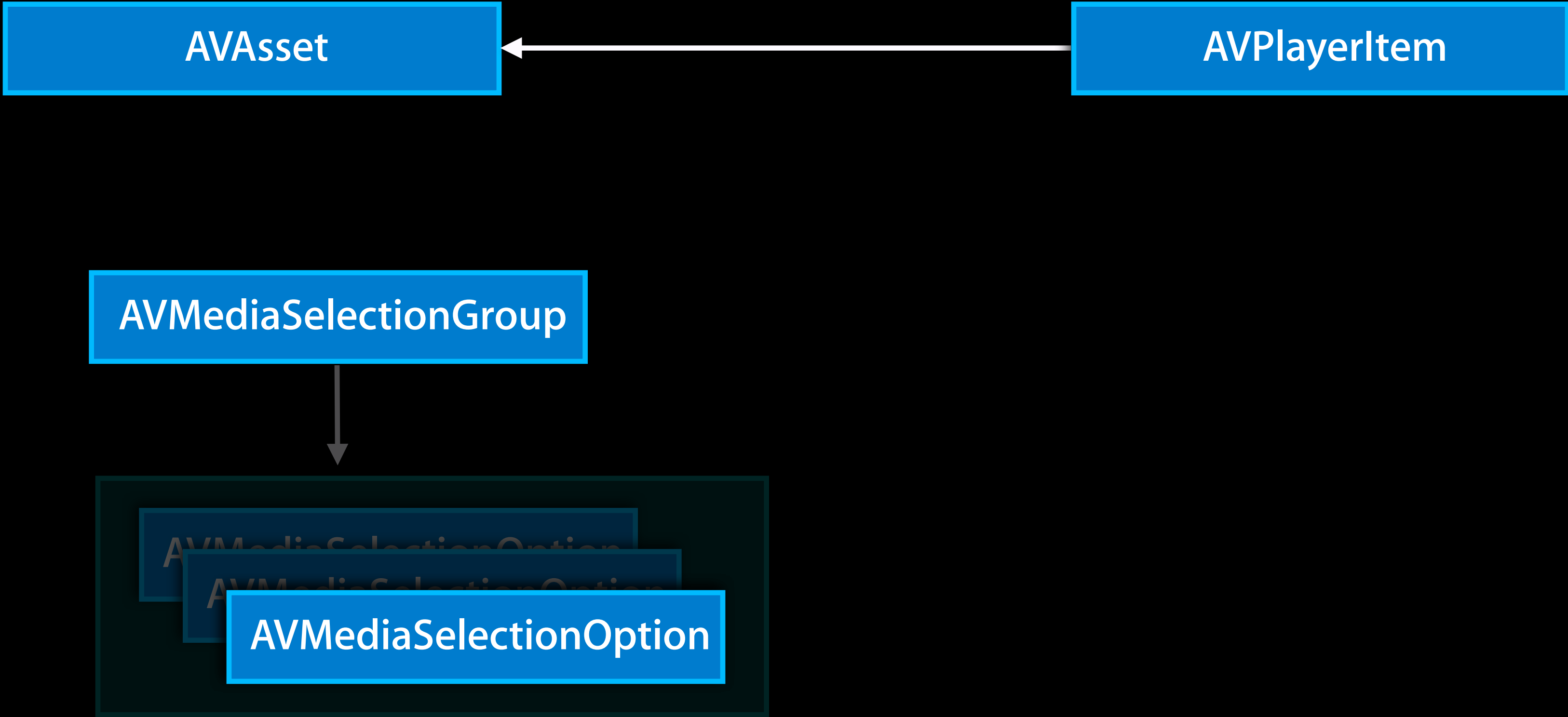
Implementing a Media Selection UI



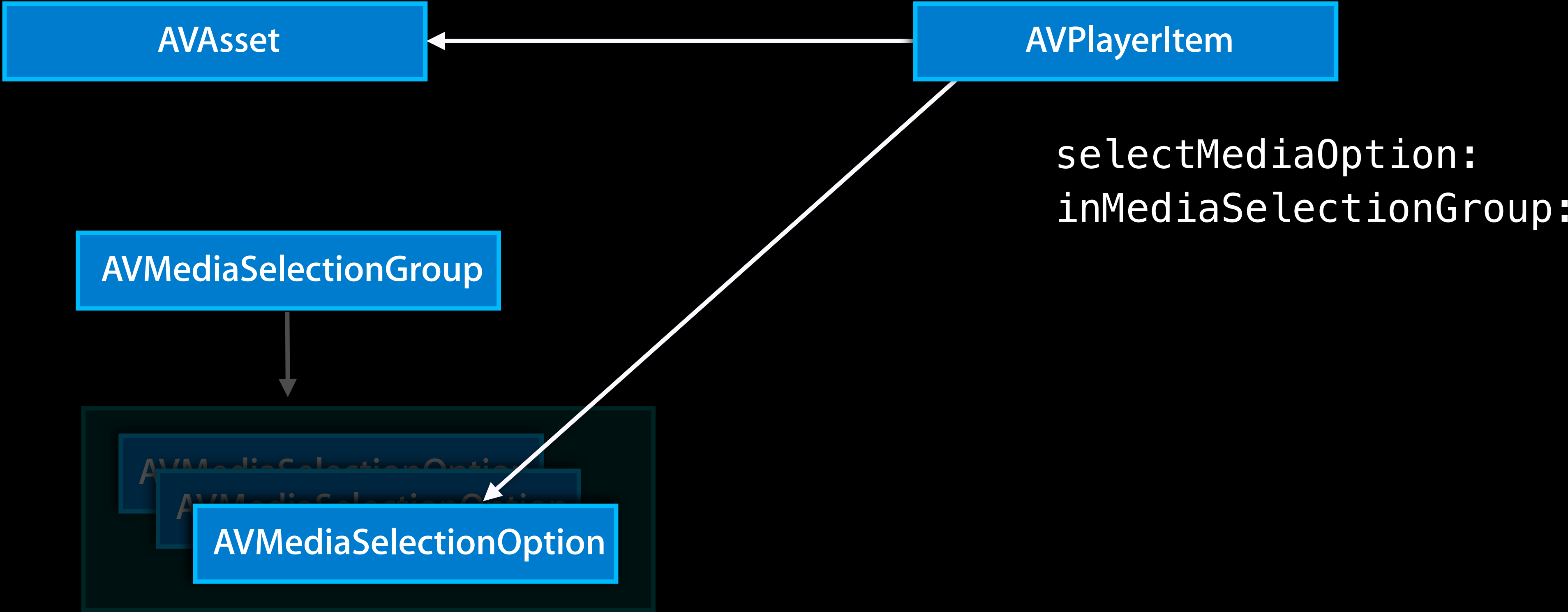
Implementing a Media Selection UI



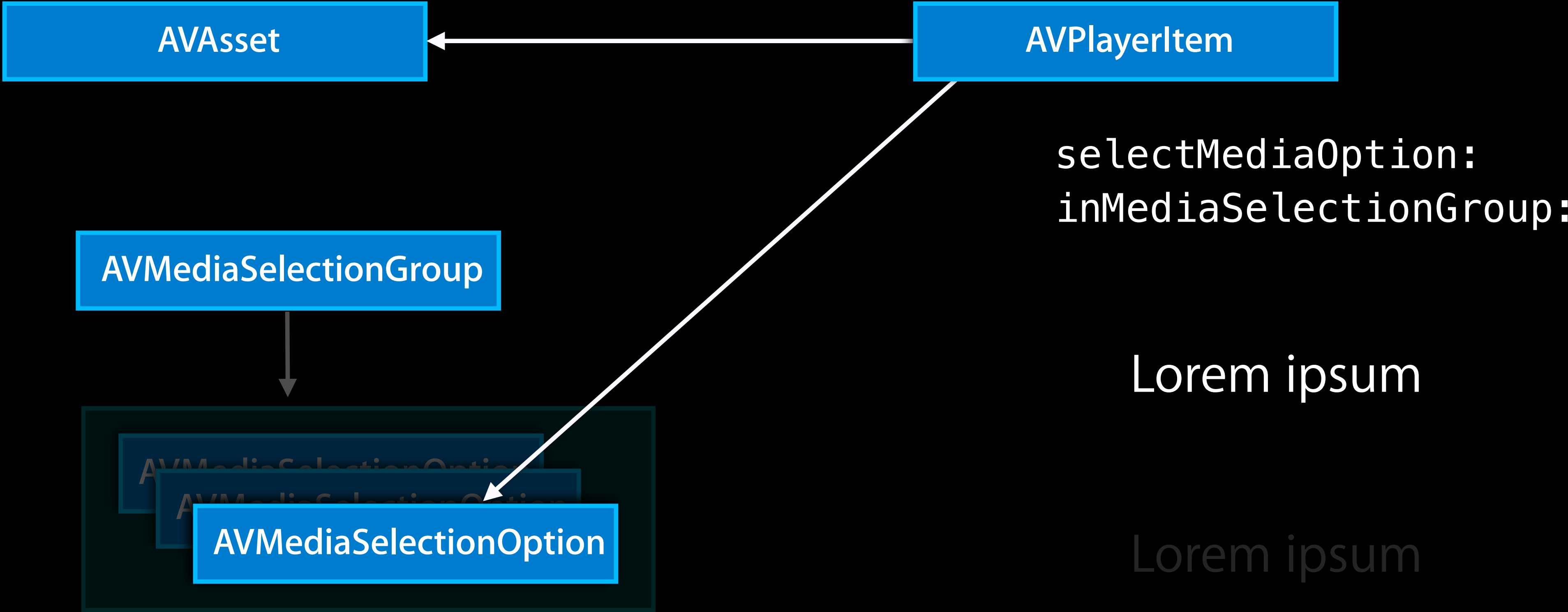
Implementing a Media Selection UI



Implementing a Media Selection UI



Implementing a Media Selection UI



selectMediaOption:
inMediaSelectionGroup:

Lorem ipsum

Lorem ipsum

Lorem ipsum

Demo

AVMediaSelectionDemo

Courtney Kennedy

Engineering Manager, Media Systems

Packaging Media Options



Video



Dubbed Audio



Descriptive Audio

Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

Content Delivery Choices

- HTML5
- HTTP Live Streaming
- QuickTime movie file format (.mov) and MPEG-4 (.m4v and .mp4)

HTML5



Video



Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

HTML5

- “Out of band” text tracks

- kind
- srclang
- default
- label

- Example markup

```
<video src="video_media.m4v" poster="video_poster.png" controls
width="640" height="360" >
  <track src="video_captions.vtt" kind="captions" srclang="en"
label="English Captions" >
</video>
```



HTML5

- “Out of band” text tracks

- `kind`
- `srclang`
- `default`
- `label`

- Example markup

```
<video src="video_media.m4v" poster="video_poster.png" controls
width="640" height="360" >
  <track src="video_captions.vtt" kind="captions" srclang="en"
label="English Captions" >
</video>
```



HTML5

- “Out of band” text tracks

- kind
- `srcLang`
- default
- label

- Example markup

```
<video src="video_media.m4v" poster="video_poster.png" controls
width="640" height="360" >
  <track src="video_captions.vtt" kind="captions" srcLang="en"
label="English Captions" >
</video>
```



HTML5

- “Out of band” text tracks

- kind
- srclang
- default
- label

- Example markup

```
<video src="video_media.m4v" poster="video_poster.png" controls
width="640" height="360" >
  <track src="video_captions.vtt" kind="captions" srclang="en"
    label="English Captions" >
</video>
```



HTML5

- Highlights
 - No need to modify main media resource
 - CSS for styling
 - JavaScript for control
 - Independent placement of text
- Considerations
 - Requires HTML5 user agent



HTTP Live Streaming



Video



Dubbed Audio



Descriptive Audio

Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

HTTP Live Streaming

- Subtitles

- CHARACTERISTICS
- LANGUAGE and ASSOC-LANGUAGE
- DEFAULT and AUTOSELECT
- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=SUBTITLES,  
GROUP-ID="subs", NAME="English SDH", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES, FORCED=NO,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
URI="webvtt/session.m3u8"
```

HTTP Live Streaming

- Subtitles

- CHARACTERISTICS

- LANGUAGE and ASSOC-LANGUAGE

- DEFAULT and AUTOSELECT

- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=SUBTITLES,  
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DEFAULT=NO, AUTOSELECT=YES, FORCED=NO,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
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HTTP Live Streaming

- Subtitles

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- **LANGUAGE** and ASSOC-LANGUAGE
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HTTP Live Streaming

- Subtitles

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GROUP-ID="subs", NAME="English SDH", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES, FORCED=NO,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
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HTTP Live Streaming

- Subtitles

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```
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GROUP-ID="subs", NAME="English SDH", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES, FORCED=NO,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
URI="webvtt/session.m3u8"
```

HTTP Live Streaming

- Closed captions

- CHARACTERISTICS
- LANGUAGE and ASSOC-LANGUAGE
- DEFAULT and AUTOSELECT
- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=CLOSED-CAPTIONS,  
GROUP-ID="ccs", NAME="English Closed Captions", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
INSTREAM-ID="CC1"
```

HTTP Live Streaming

- Closed captions

- **CHARACTERISTICS**

- LANGUAGE and ASSOC-LANGUAGE

- DEFAULT and AUTOSELECT

- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=CLOSED-CAPTIONS,  
GROUP-ID="ccs", NAME="English Closed Captions", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
INSTREAM-ID="CC1"
```

HTTP Live Streaming

- Closed captions

- CHARACTERISTICS
- **LANGUAGE** and ASSOC-LANGUAGE
- DEFAULT and AUTOSELECT
- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=CLOSED-CAPTIONS,  
GROUP-ID="ccs", NAME="English Closed Captions", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
INSTREAM-ID="CC1"
```


HTTP Live Streaming

- Closed captions

- CHARACTERISTICS
- LANGUAGE and ASSOC-LANGUAGE
- **DEFAULT** and **AUTOSELECT**
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CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
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INSTREAM-ID="CC1"
```

HTTP Live Streaming

- Closed captions

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DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.transcribes-spoken-dialog,  
public.accessibility.describes-music-and-sound",  
INSTREAM-ID="CC1"
```

HTTP Live Streaming

- Audio

- CHARACTERISTICS
- LANGUAGE and ASSOC-LANGUAGE
- DEFAULT and AUTOSELECT
- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=AUDIO,  
GROUP-ID="audio", NAME="English Video Description", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.describes-video",  
URI="audiomedia/descriptive.m3u8"
```

HTTP Live Streaming

- Audio

- **CHARACTERISTICS**

- LANGUAGE and ASSOC-LANGUAGE

- DEFAULT and AUTOSELECT

- NAME

- Example declaration

```
#EXT-X-MEDIA:TYPE=AUDIO,  
GROUP-ID="audio", NAME="English Video Description", LANGUAGE="en",  
DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.describes-video",  
URI="audiomedia/descriptive.m3u8"
```

HTTP Live Streaming

- Audio

- CHARACTERISTICS
- **LANGUAGE** and ASSOC-LANGUAGE
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CHARACTERISTICS="public.accessibility.describes-video",  
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```

HTTP Live Streaming

- Audio

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- LANGUAGE and ASSOC-LANGUAGE
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DEFAULT=NO, AUTOSELECT=YES,  
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HTTP Live Streaming

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DEFAULT=NO, AUTOSELECT=YES,  
CHARACTERISTICS="public.accessibility.describes-video",  
URI="audiomedia/descriptive.m3u8"
```

HTTP Live Streaming

- Highlights
 - No need to modify existing media segments
 - `textStyleRules` for styling
 - Alternative renditions for video and audio also supported

QuickTime Movie File/.m4v File



Video



Dubbed Audio



Descriptive Audio

Audio

SDH

Lorem ipsum

Translation

Captions or Subtitles

QuickTime Movie File/.m4v File

- Every track has
 - Language setting
 - Alternate track group setting (default = 0)
 - Accommodation for track references
 - Accommodation for a userdata container



QuickTime Movie File/.m4v File

- Every track has
 - Language setting
 - Alternate track group setting (default = 0)
 - Accommodation for track references
 - Accommodation for a userdata container

	Bytes
Media header atom	
Atom size	4
Type = 'mdhd'	4
Version	1
Flags	3
Creation time	4
Modification time	4
Time scale	4
Duration	4
Language	2
Quality	2

QuickTime Movie File/.m4v File

- Every track has
 - Language setting
 - **Alternate track group setting (default = 0)**
 - Accommodation for track references
 - Accommodation for a userdata container

	Bytes
Track header atom	
Atom size	4
Type = 'tkhd'	4
Version	1
Flags	3
Creation time	4
Modification time	4
Track ID	4
Reserved	4
Duration	4
Reserved	8
Layer	2
Alternate group	2
Volume	2
Reserved	2
Matrix structure	36
Track width	4
Track height	4

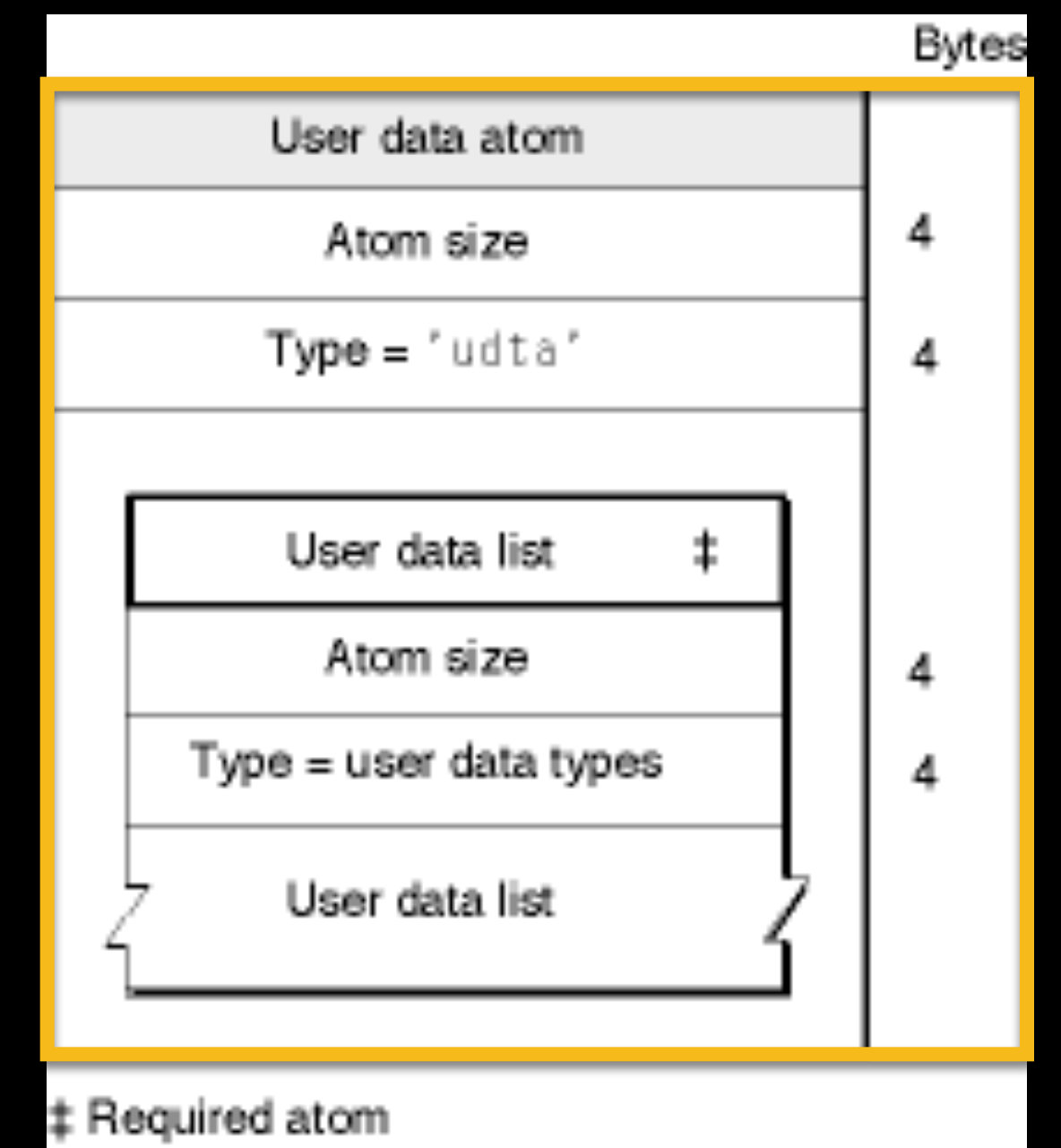
QuickTime Movie File/.m4v File

- Every track has
 - Language setting
 - Alternate track group setting (default = 0)
 - Accommodation for track references
 - Accommodation for a userdata container

Track reference atom		Bytes
Atom size		4
Type = 'tref'		4
Track reference type atom		
Atom size		4
Type = (see table)		4
Track IDs		Variable
⋮		

QuickTime Movie File/.m4v File

- Every track has
 - Language setting
 - Alternate track group setting (default = 0)
 - Accommodation for track references
 - **Accommodation for a userdata container**
 - Stores tagged media characteristics



QuickTime Movie File/.m4v File

- Native structures of the file format
 - Group assignments
 - Languages
 - Associations with other tracks
 - Metadata, including tagged media characteristics
- Considerations
 - All media interleaved in a single media resource



Media Types and Subtypes

- For subtitle tracks

Now:

`AVMediaTypeSubtitle / 'tx3g'`

Following MPEG work:

`AVMediaTypeText / 'wvtt'`



Back to HTML5

- “In band” text tracks
 - Not declared in mark-up
 - Part of the main media resource
 - Work just like “out of band” text tracks
- Subtitles
- Closed captions



Comparison Chart

	Selectable Captions	Selectable Audio	External References	AirPlay Video
HTML 5	✓		✓	
HTTP Live Streaming	✓	✓	✓	✓
.mov & .m4v	✓	✓		✓

Writing Subtitles to Movie Files

Adam Sonnanstine
AV Foundation Engineer

Agenda

- Basics
- Accessibility features
- Scenario: Adding subtitle track



Source Movie



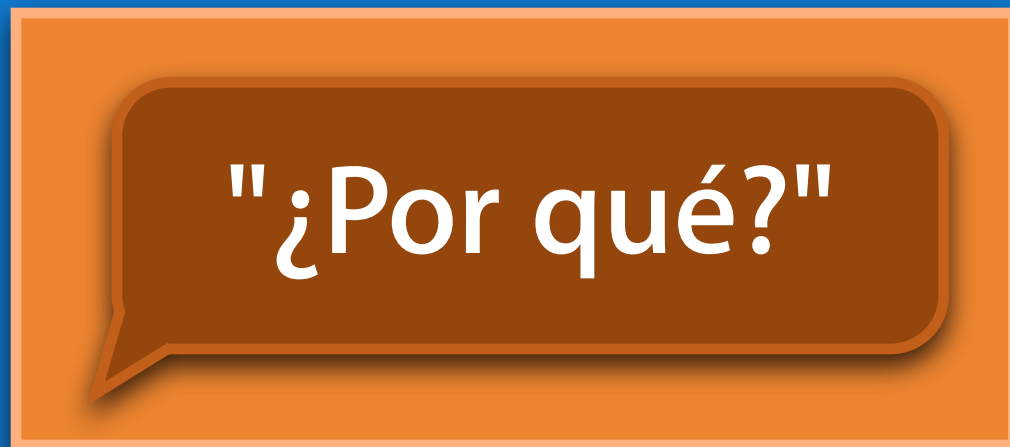
Source Movie



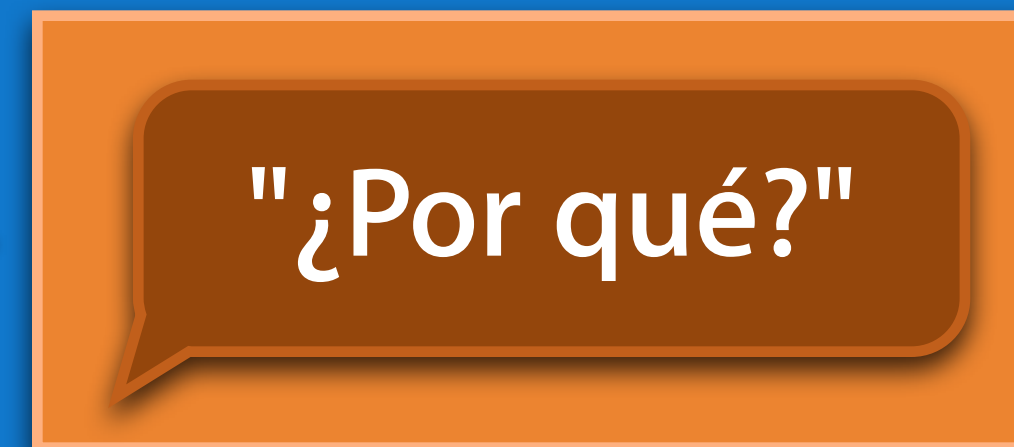
"¿Por qué?"



Source Movie



New Movie





Source Movie



"¿Por qué?"

"Why?"



New Movie



"¿Por qué?"

"Why?"

Demo

Courtney Kennedy
Engineering Manager



Source Movie



"¿Por qué?"

"Why?"



New Movie



"¿Por qué?"

"Why?"



Source Movie



"¿Por qué?"

"Why?"



New Movie



"¿Por qué?"

"Why?"

An orange speech bubble with a white border and a tail pointing towards the bottom-left corner. Inside the bubble, the text "Why?" is written in white.

“Why?”

Packaging the Data

CMSampleBuffer



"Why?"

Packaging the Data

CMSSampleBuffer

CMSSampleBuffer

“Why?”

CMSSampleBuffer

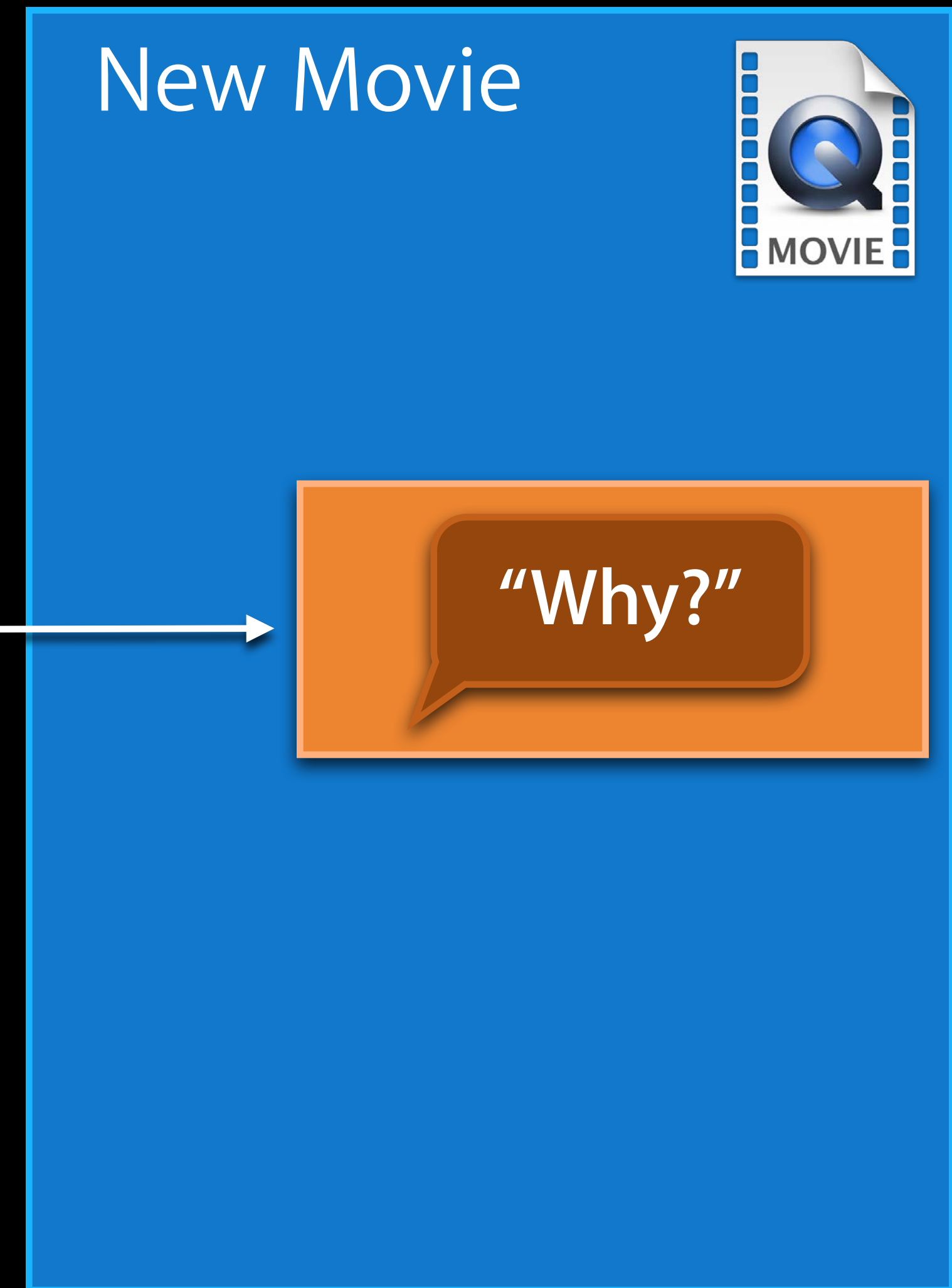
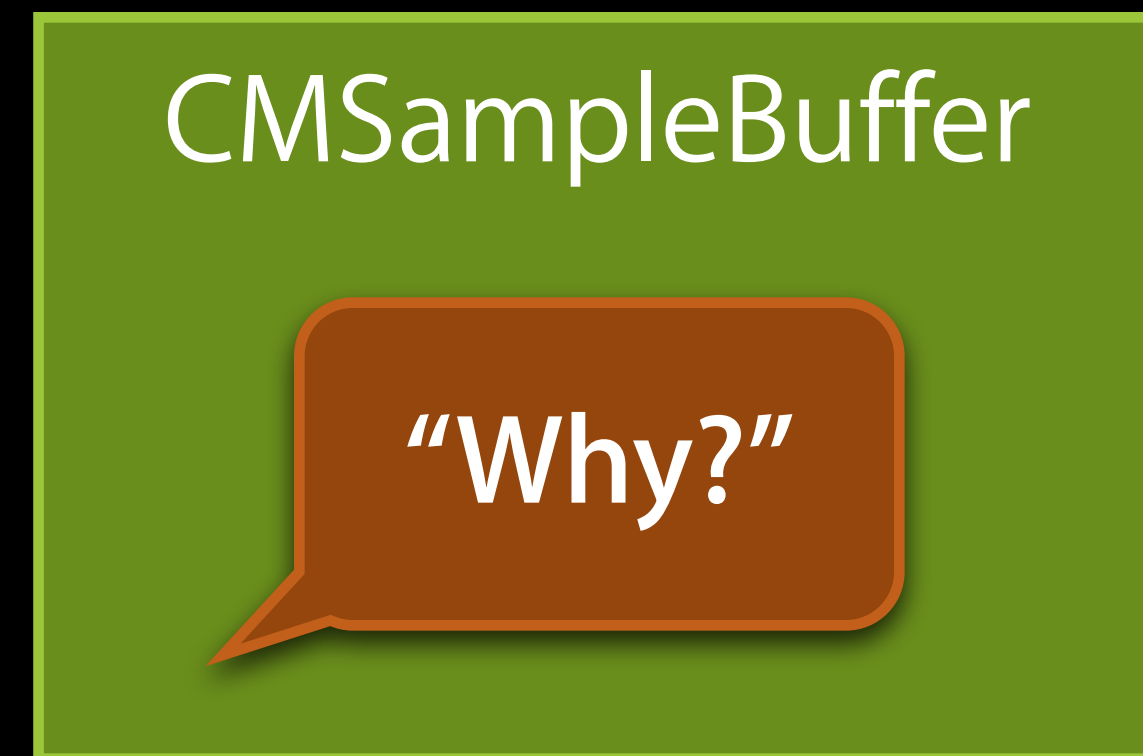
“Why?”

CMSampleBuffer

“Why?”

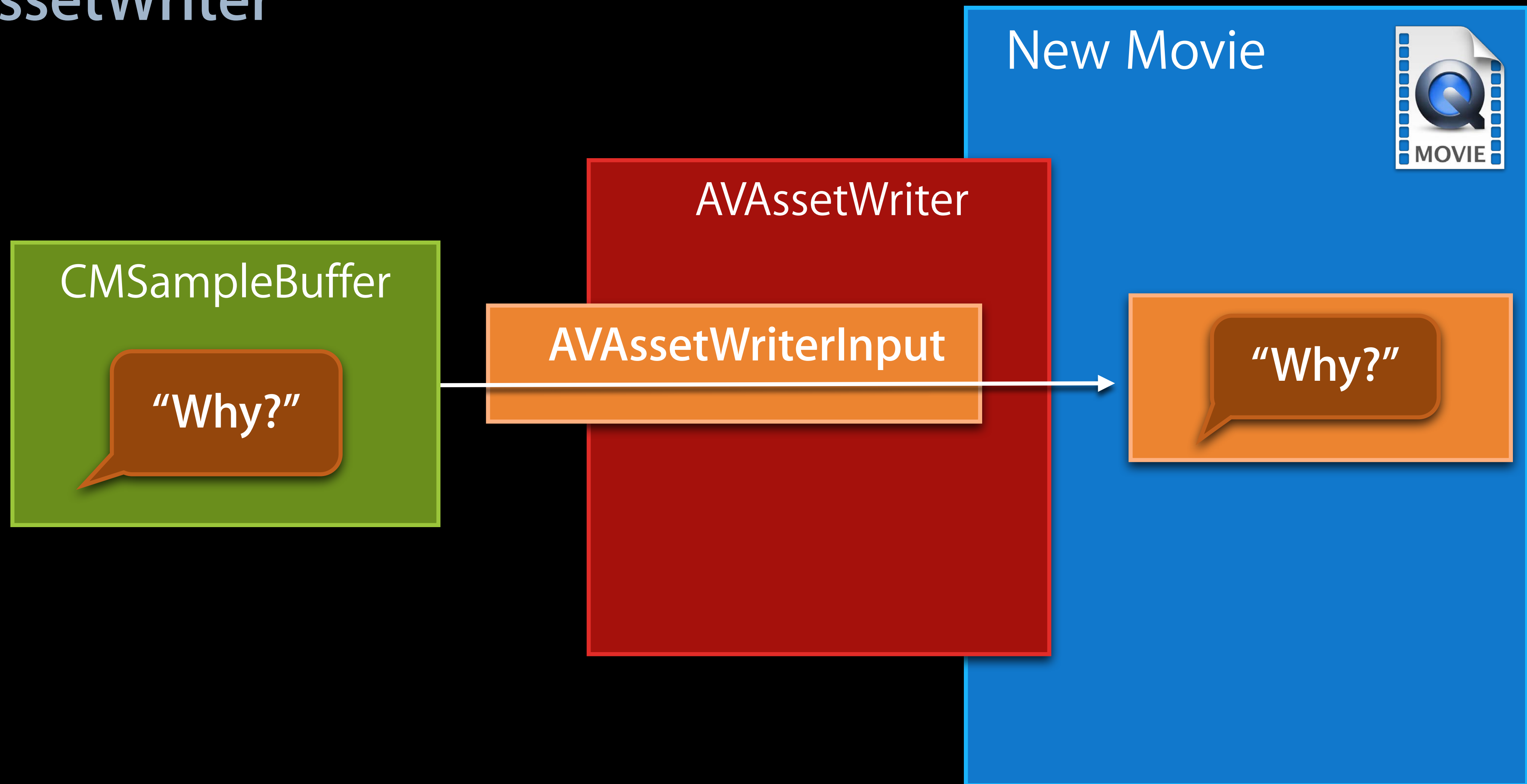
Writing the Data

AVAssetWriter



Writing the Data

AVAssetWriter



More Information

Documentation

- Data format
 - QuickTime File Format Specification
<http://developer.apple.com/library/mac/#documentation/QuickTime/QTFF/>

More Information

Documentation

- Data format
 - QuickTime File Format Specification
<http://developer.apple.com/library/mac/#documentation/QuickTime/QTFF/>
- CMSampleBuffer
 - WWDC 2010, Session 409: “Using the Camera with AV Foundation”

More Information

Documentation

- Data format
 - QuickTime File Format Specification
<http://developer.apple.com/library/mac/#documentation/QuickTime/QTFF/>
- CMSampleBuffer
 - WWDC 2010, Session 409: “Using the Camera with AV Foundation”
- AVAssetWriter
 - WWDC 2011, Session 415: “Working with Media in AV Foundation”

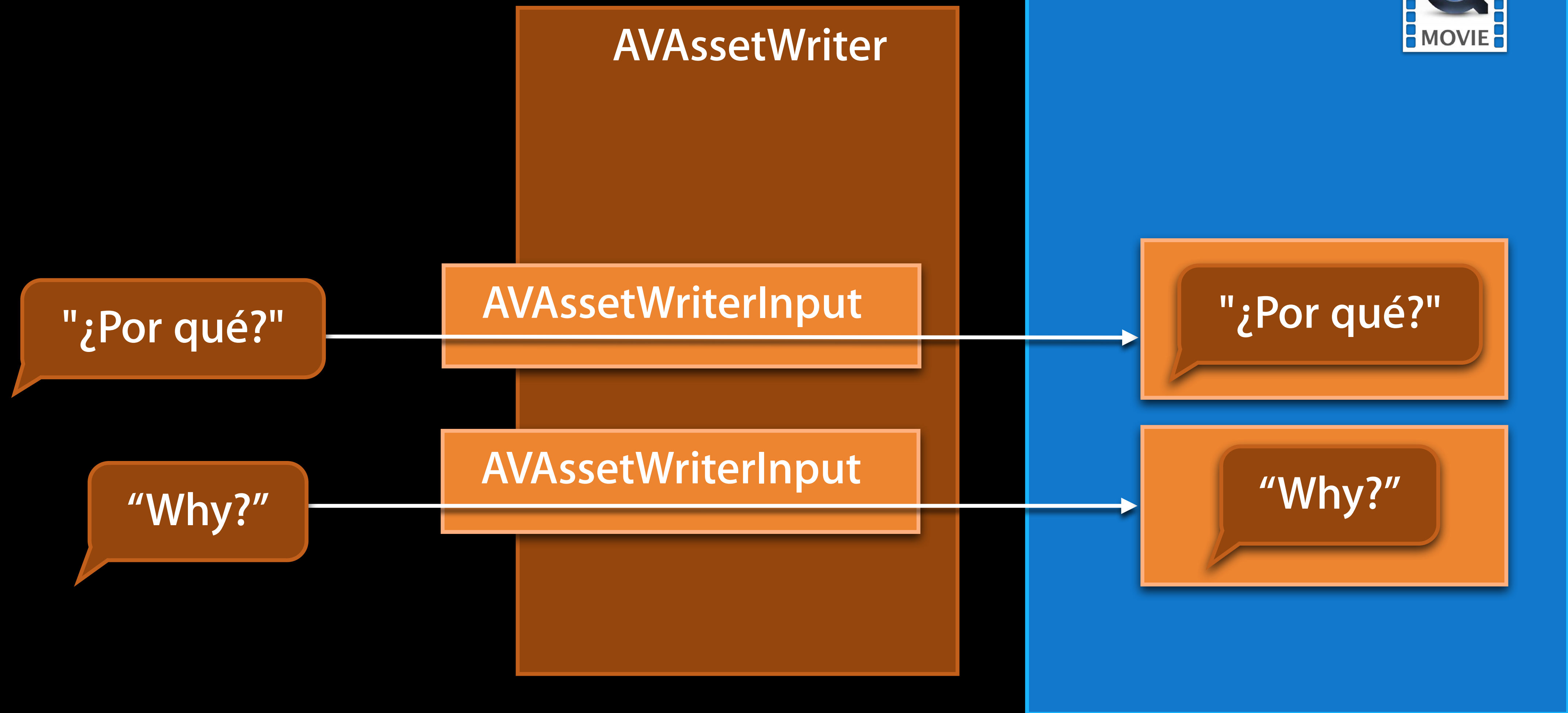
More Information

Sample Code

avsubtitleswriter for OSX

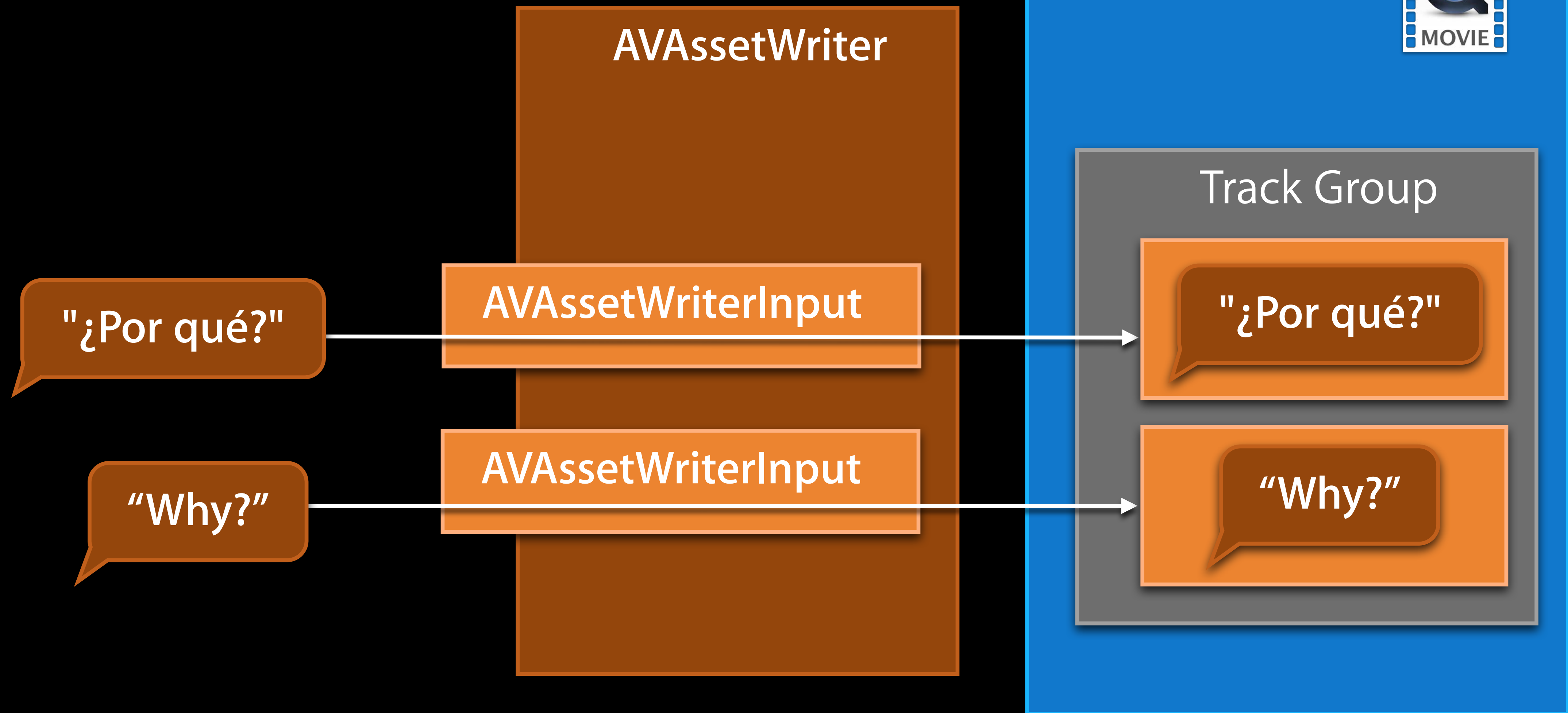
Writing the Data

Track groups



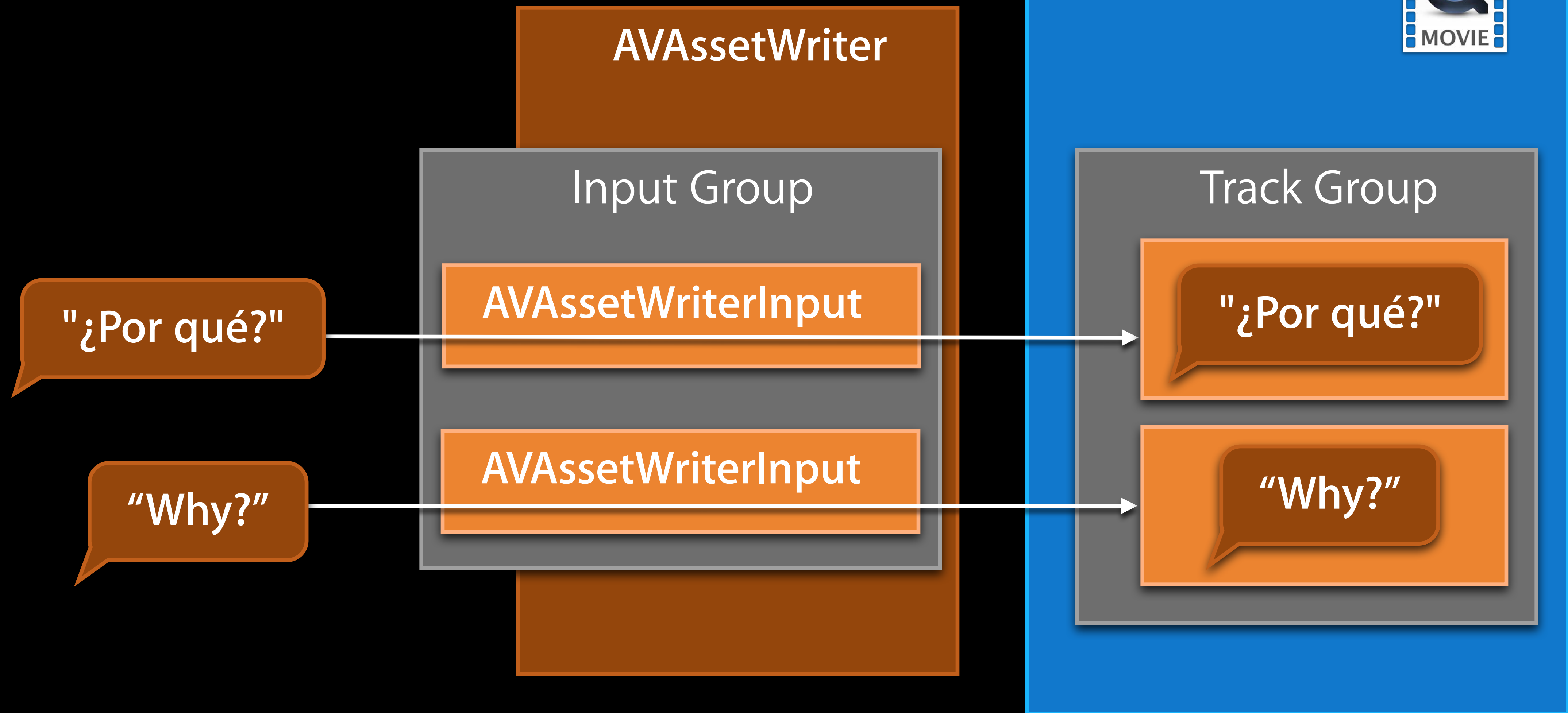
Writing the Data

Track groups



Writing the Data

Track groups



Writing the Data

Track groups

```
AVAssetWriterInput *englishInput = ...;
```

```
AVAssetWriterInput *spanishInput = ...;
```

```
NSArray *subtitleInputs = @[ englishInput, spanishInput ];
```


Writing the Data

Track groups

```
AVAssetWriterInput *englishInput = ...;
```

```
AVAssetWriterInput *spanishInput = ...;
```

```
NSArray *subtitleInputs = @[ englishInput, spanishInput ];
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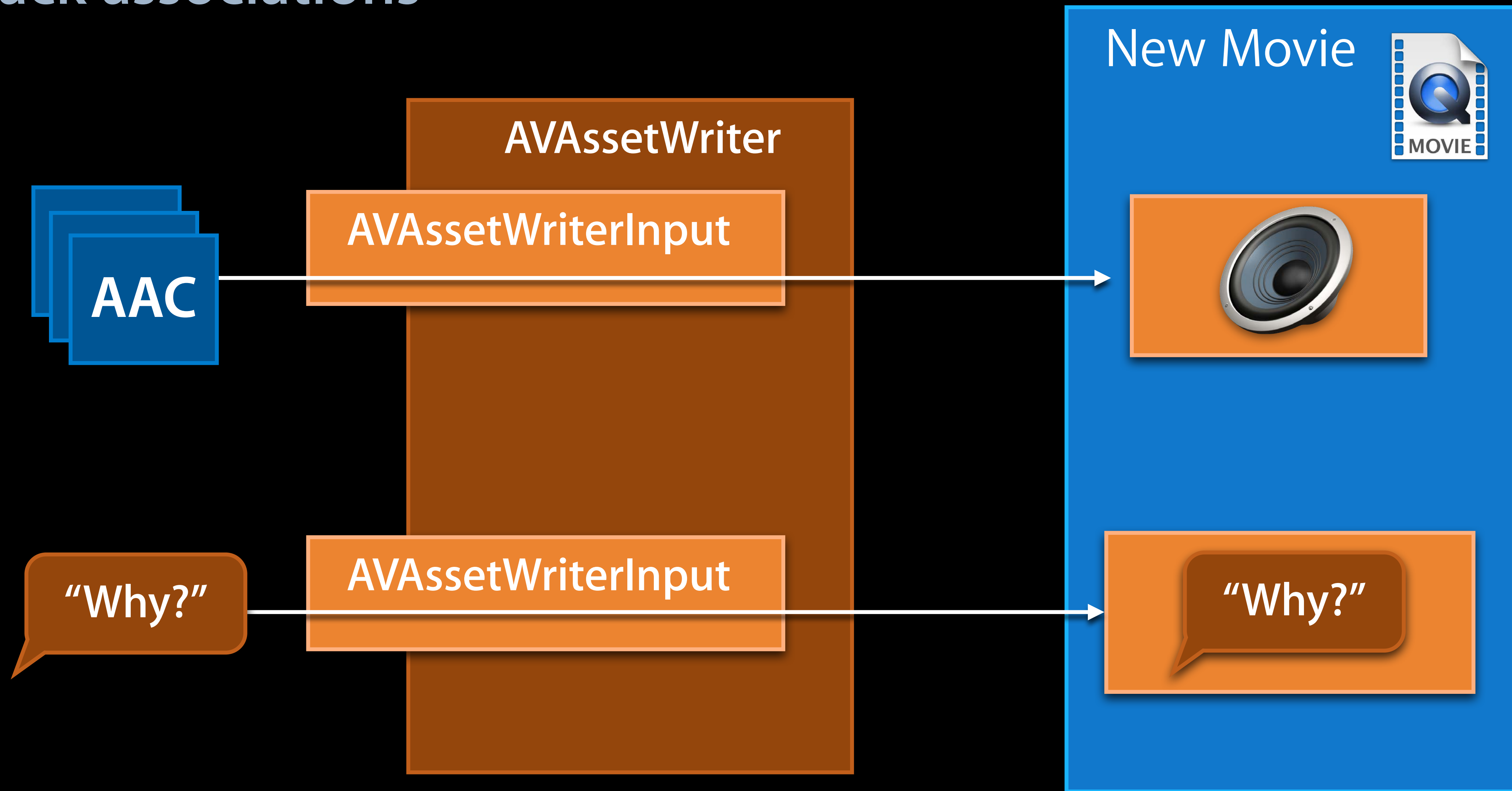
```
inputGroup =
```

```
    [AVAssetWriterInputGroup assetWriterInputGroupWithInputs: subtitleInputs  
                                defaultInput: spanishInput];
```

```
[myAssetWriter addInputGroup: inputGroup];
```

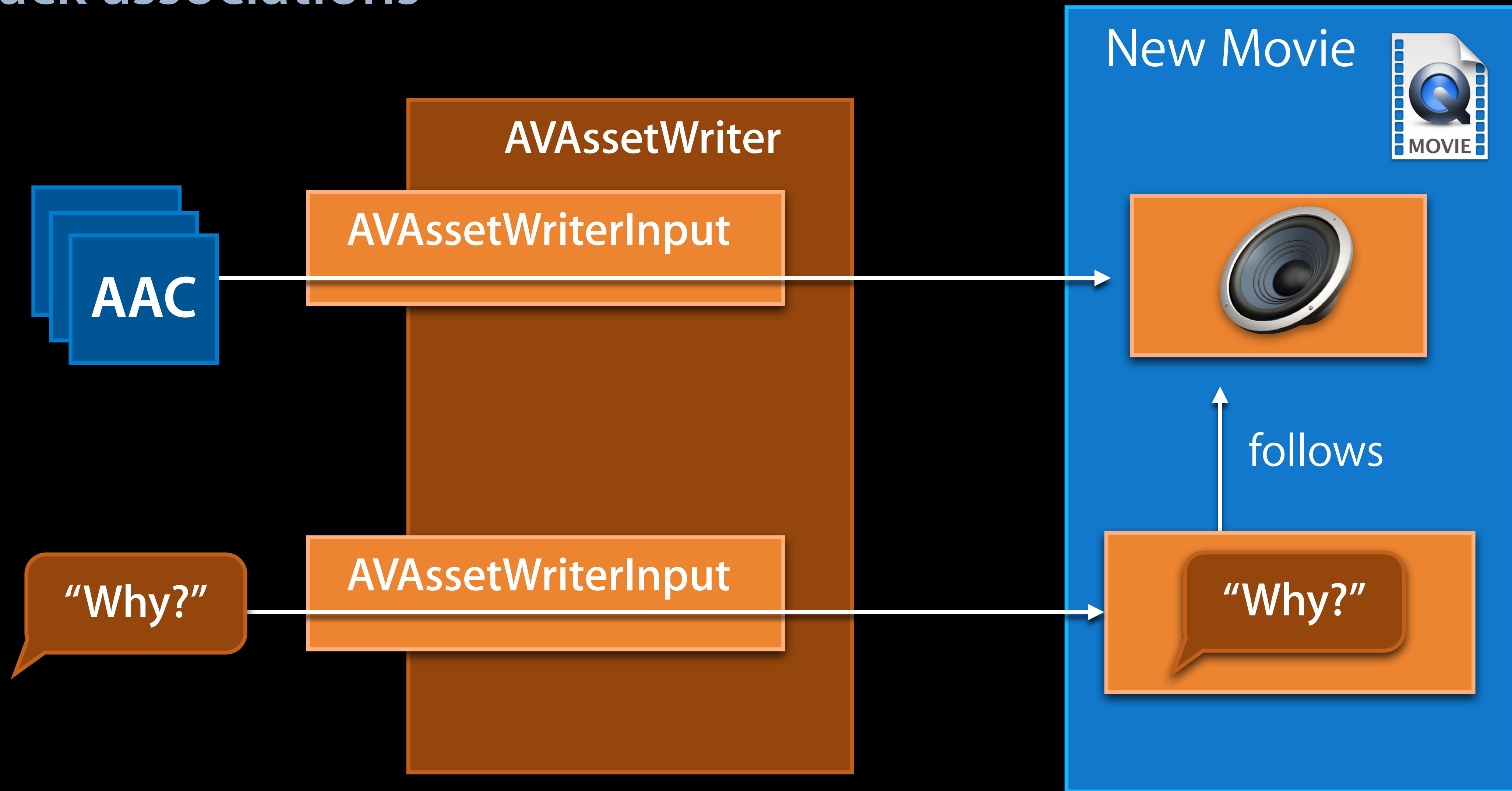
Writing the Data

Track associations



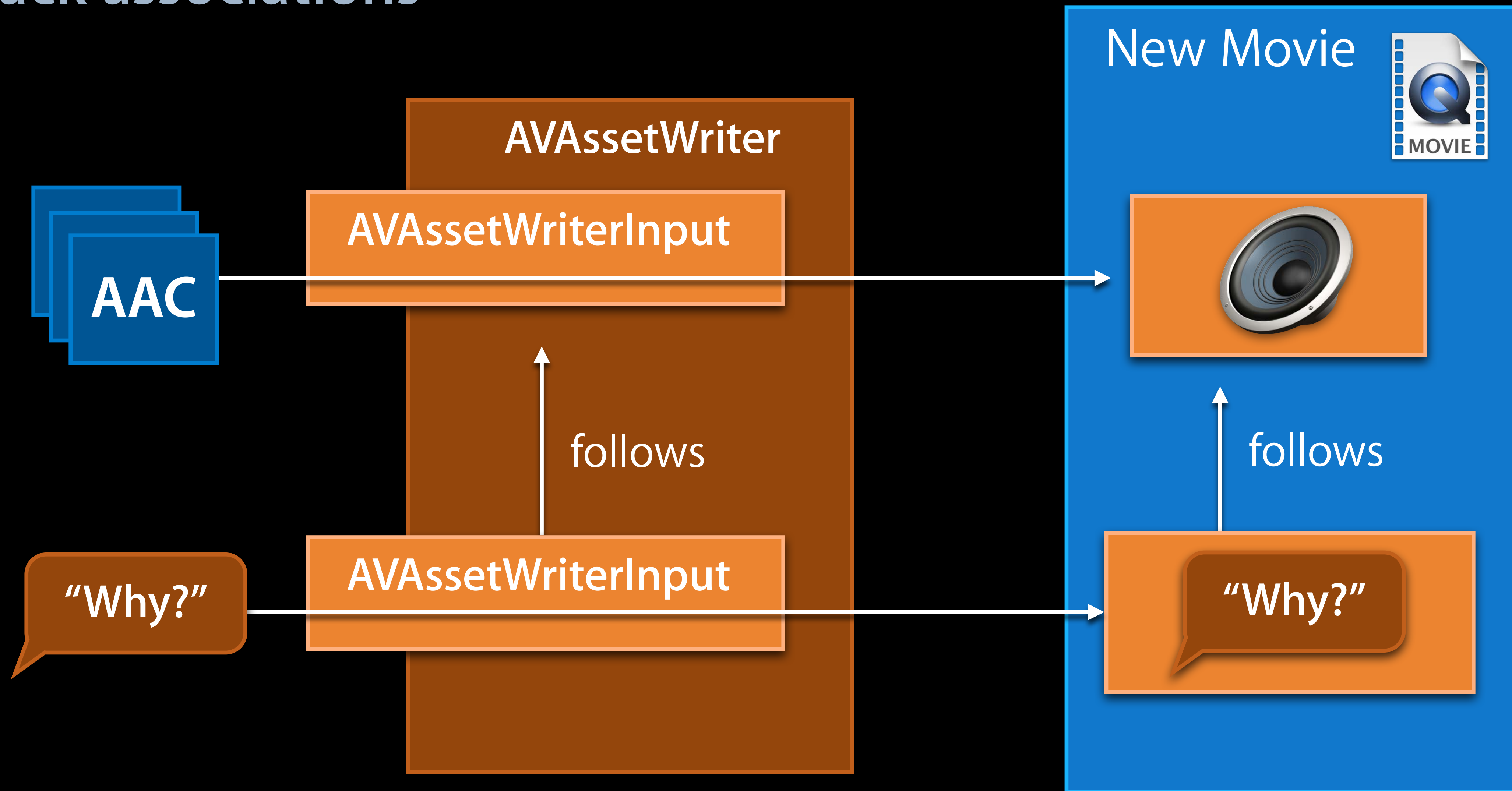
Writing the Data

Track associations



Writing the Data

Track associations



Writing the Data

Track associations

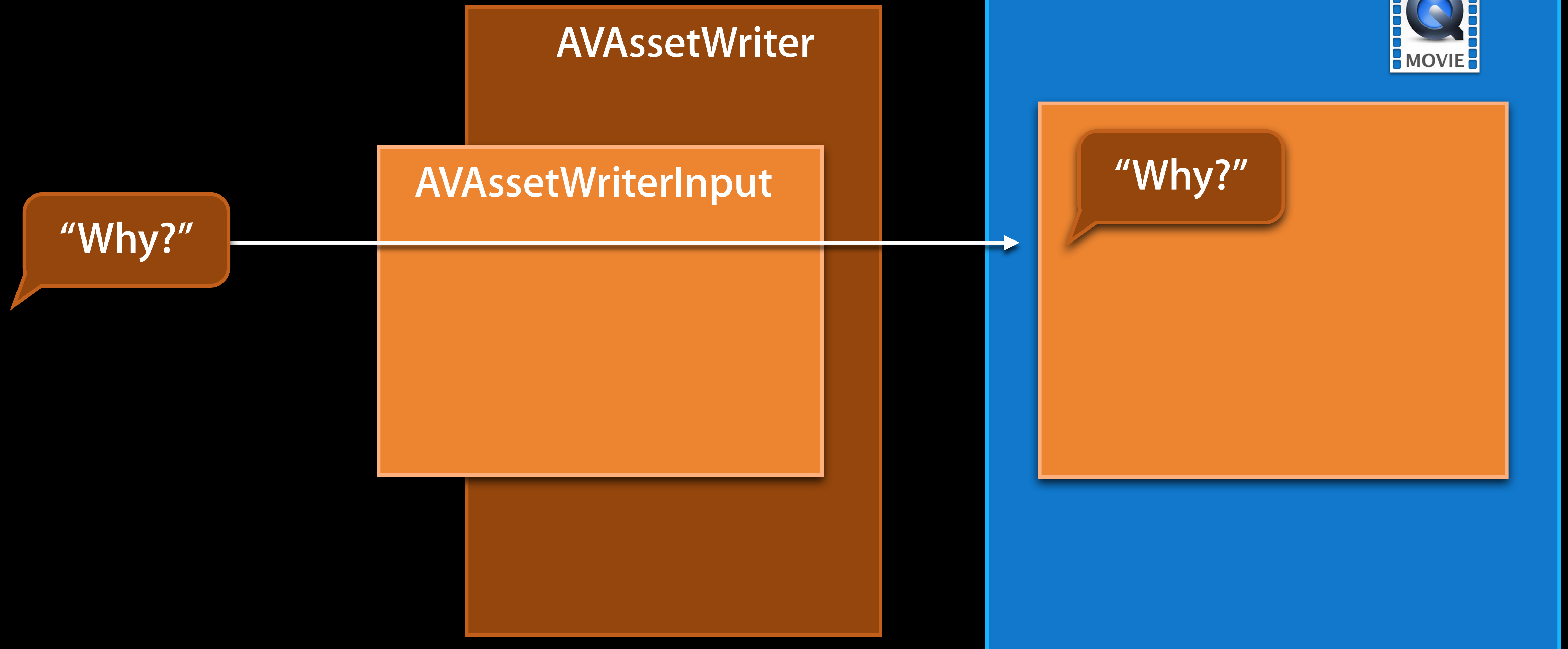
```
AVAssetWriterInput *subtitleInput = ...;
```

```
AVAssetWriterInput *audioInput = ...;
```

```
[audioInput addTrackAssociationWithTrackOfInput: subtitleInput  
                                     type: AVTrackAssociationTypeSelectionFollower];
```

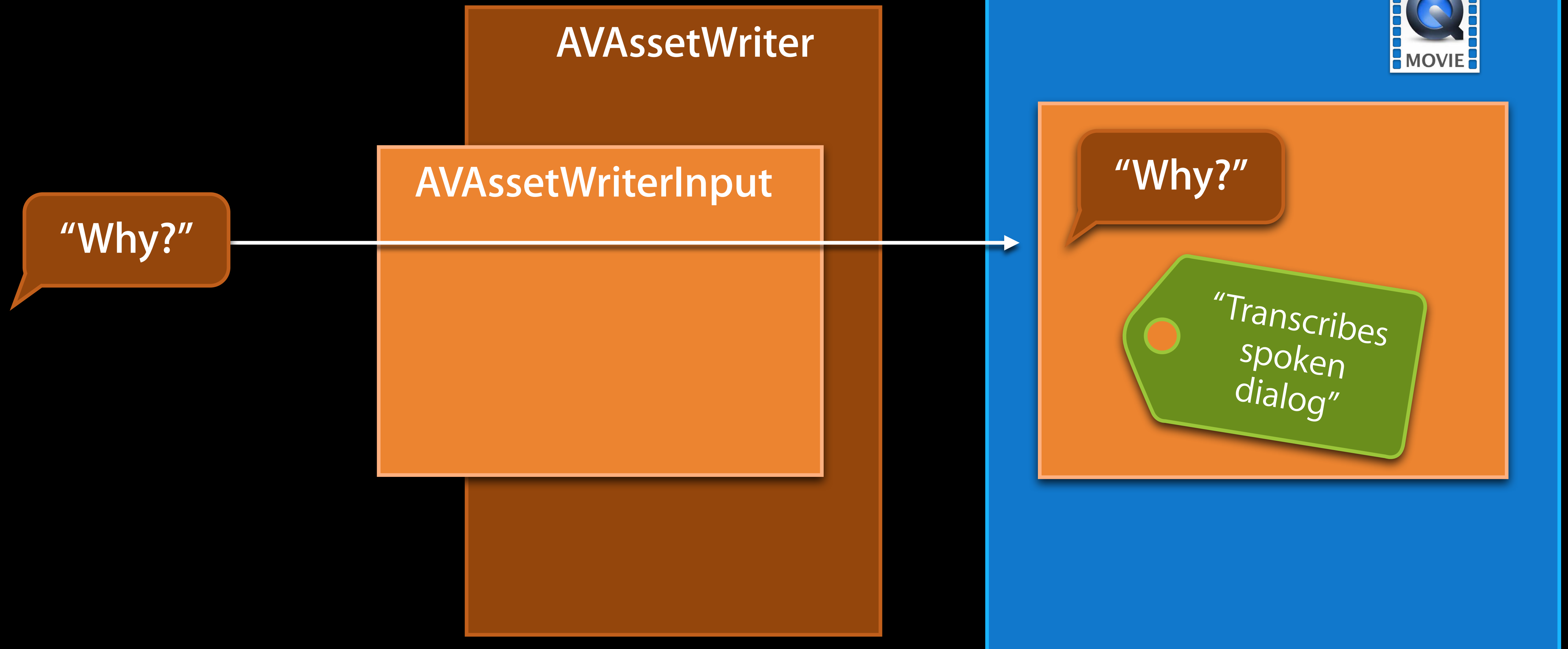

Writing the Data

Tagged characteristics



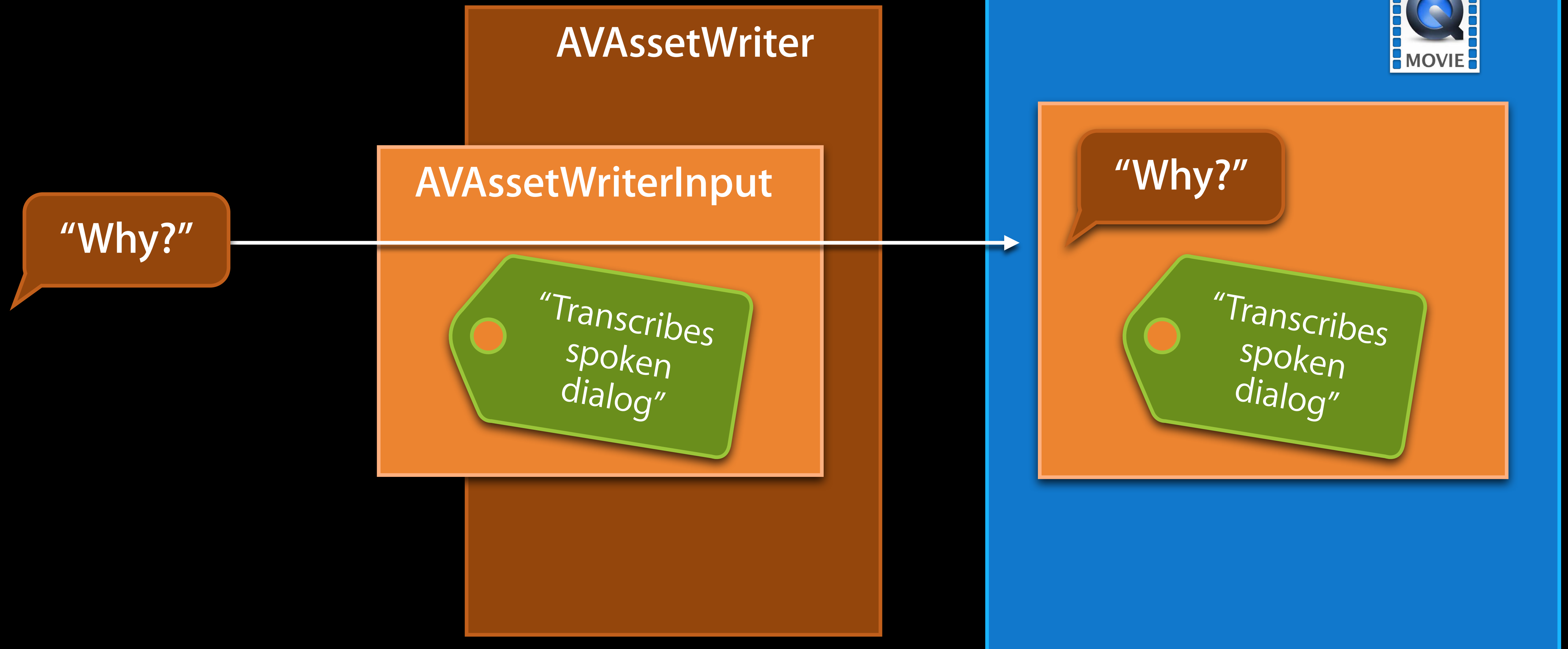
Writing the Data

Tagged characteristics



Writing the Data

Tagged characteristics



Writing the Data

Tagged characteristics

Writing the Data

Tagged characteristics

```
characteristic = [[AVMutableMetadataItem alloc] init];
```

```
[characteristic setKeySpace: AVMetadataKeySpaceQuickTimeUserData];
```

```
[characteristic setKey: AVMetadataQuickTimeUserDataKeyTaggedCharacteristic];
```

Writing the Data

Tagged characteristics

```
characteristic = [[AVMutableMetadataItem alloc] init];

[characteristic setKeySpace: AVMetadataKeySpaceQuickTimeUserData];
[characteristic setKey: AVMetadataQuickTimeUserDataKeyTaggedCharacteristic];

[characteristic setValue:
    AVMediaCharacteristicTranscribesSpokenDialogForAccessibility];
```

Writing the Data

Tagged characteristics

```
characteristic = [[AVMutableMetadataItem alloc] init];

[characteristic setKeySpace: AVMetadataKeySpaceQuickTimeUserData];
[characteristic setKey: AVMetadataQuickTimeUserDataKeyTaggedCharacteristic];

[characteristic setValue:
    AVMediaCharacteristicTranscribesSpokenDialogForAccessibility];

metadataArray = @[ characteristic ];

[subtitleInput setMetadata: metadataArray];
```

Writing the Data

Tagged characteristics

```
characteristic = [[AVMutableMetadataItem alloc] init];

[characteristic setKeySpace: AVMetadataKeySpaceQuickTimeUserData];
[characteristic setKey: AVMetadataQuickTimeUserDataKeyTaggedCharacteristic];

[characteristic setValue:
    AVMediaCharacteristicTranscribesSpokenDialogForAccessibility];

metadataArray = @[ characteristic ];

[subtitleInput setMetadata: metadataArray];
```

- SDH: AVMediaCharacteristicDescribesMusicAndSoundForAccessibility

Closed Captions

QuickTime File Format Specification

<http://developer.apple.com/library/mac/#documentation/QuickTime/QTFF/>

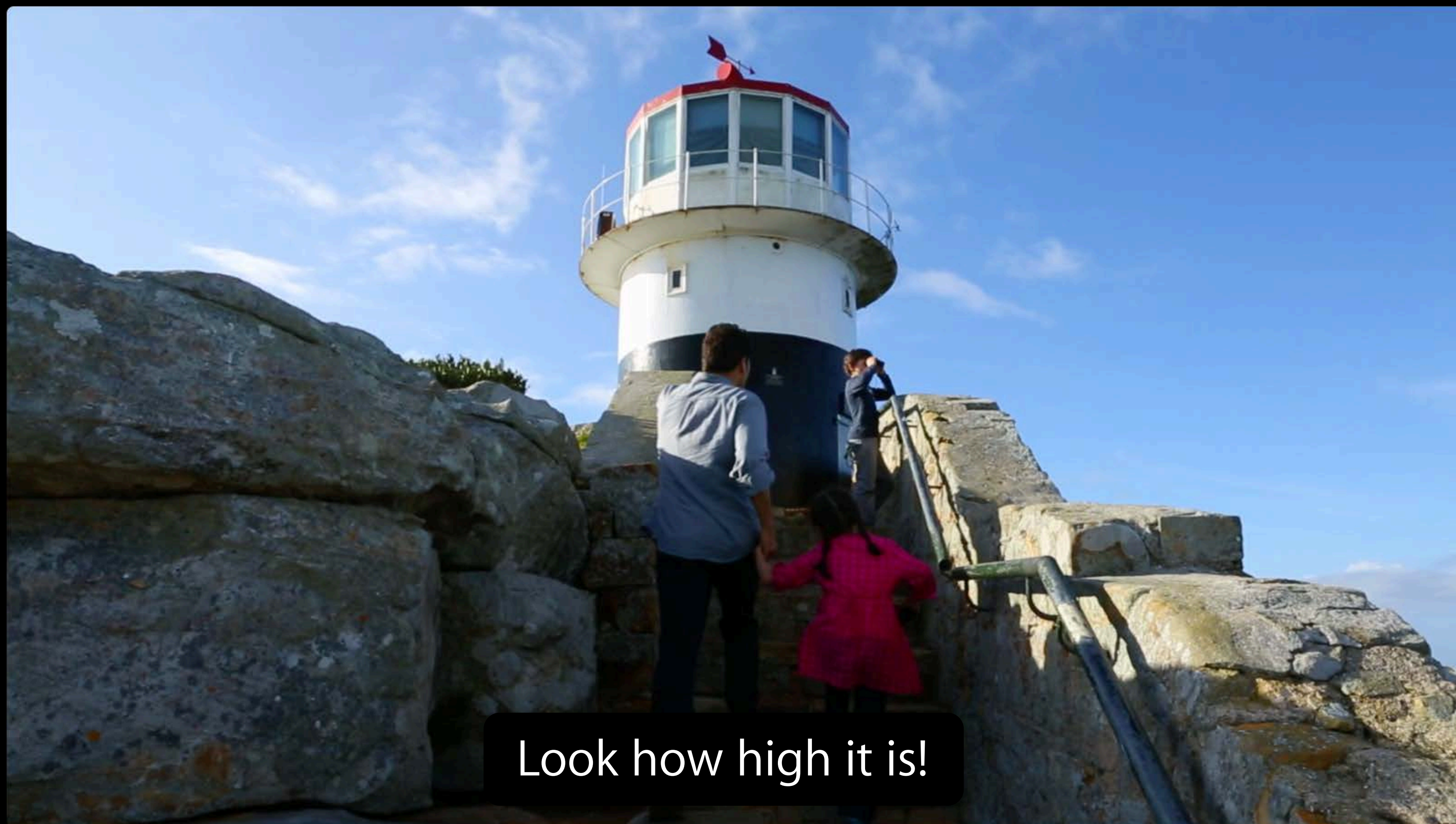
Accessing Subtitle Text

What You Get for Free



Look how high it is!

Place Subtitles Anywhere



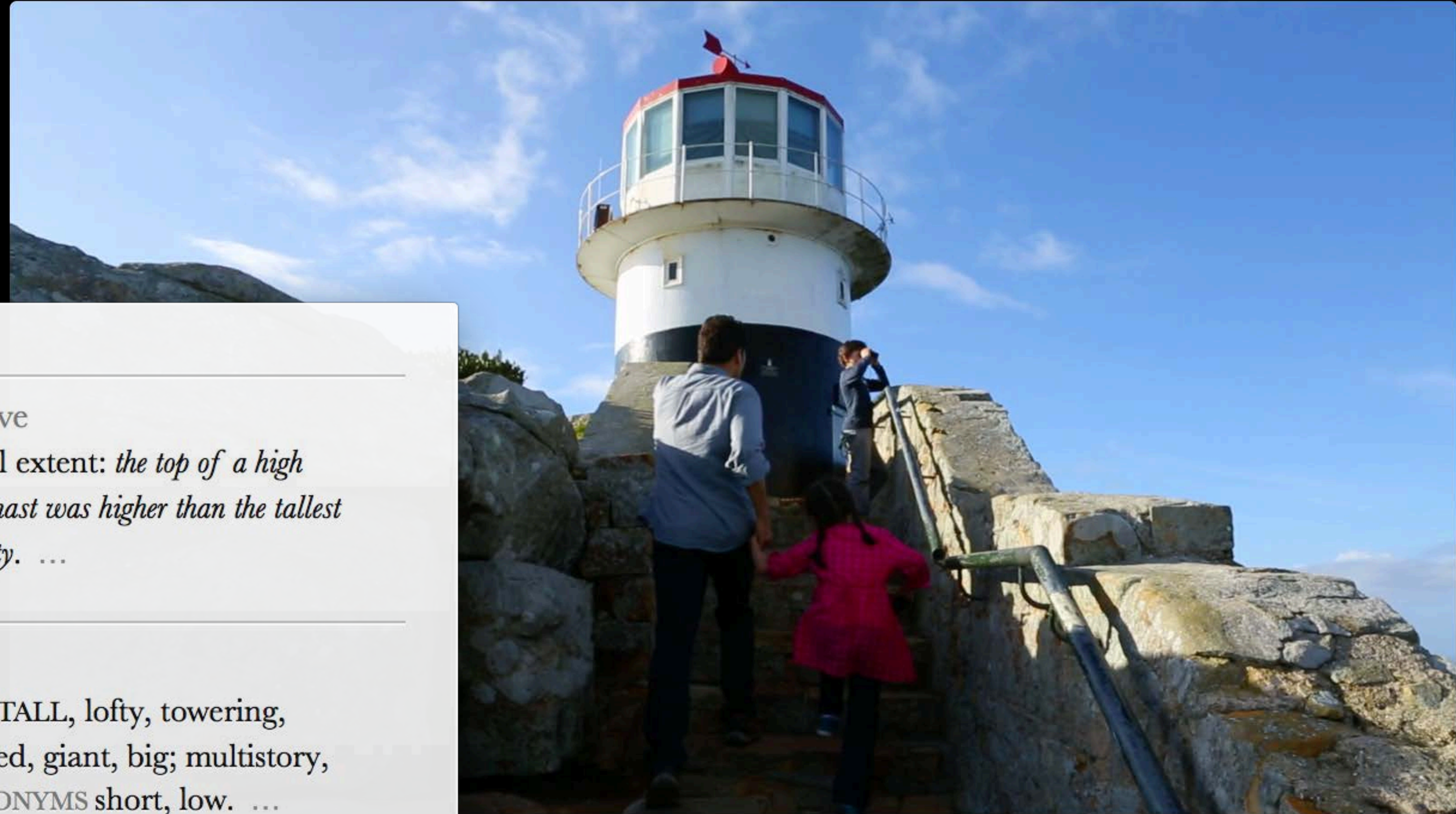
Look how high it is!

Place Subtitles Anywhere



Look how high it is!

Allow User Interaction with Text



Dictionary

high | hī | adjective

1 of great vertical extent: *the top of a high mountain* | *the mast was higher than the tallest building in the city.* ...

Thesaurus

high adjective

1 *a high mountain*: TALL, lofty, towering, soaring, elevated, giant, big; multistory, high-rise. ANTONYMS short, low. ...

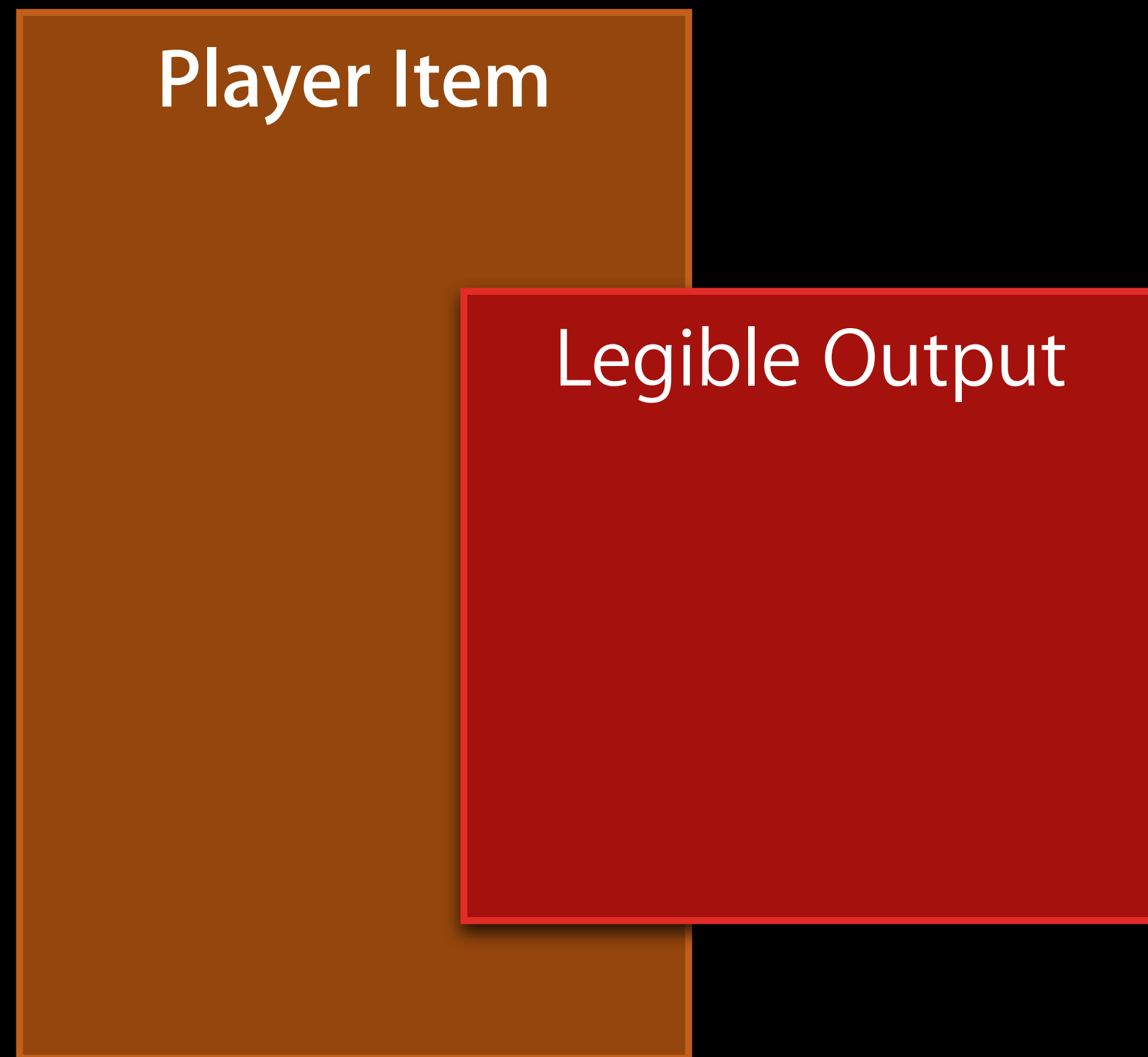
Look how **high** it is!

AVPlayerItemLegibleOutput

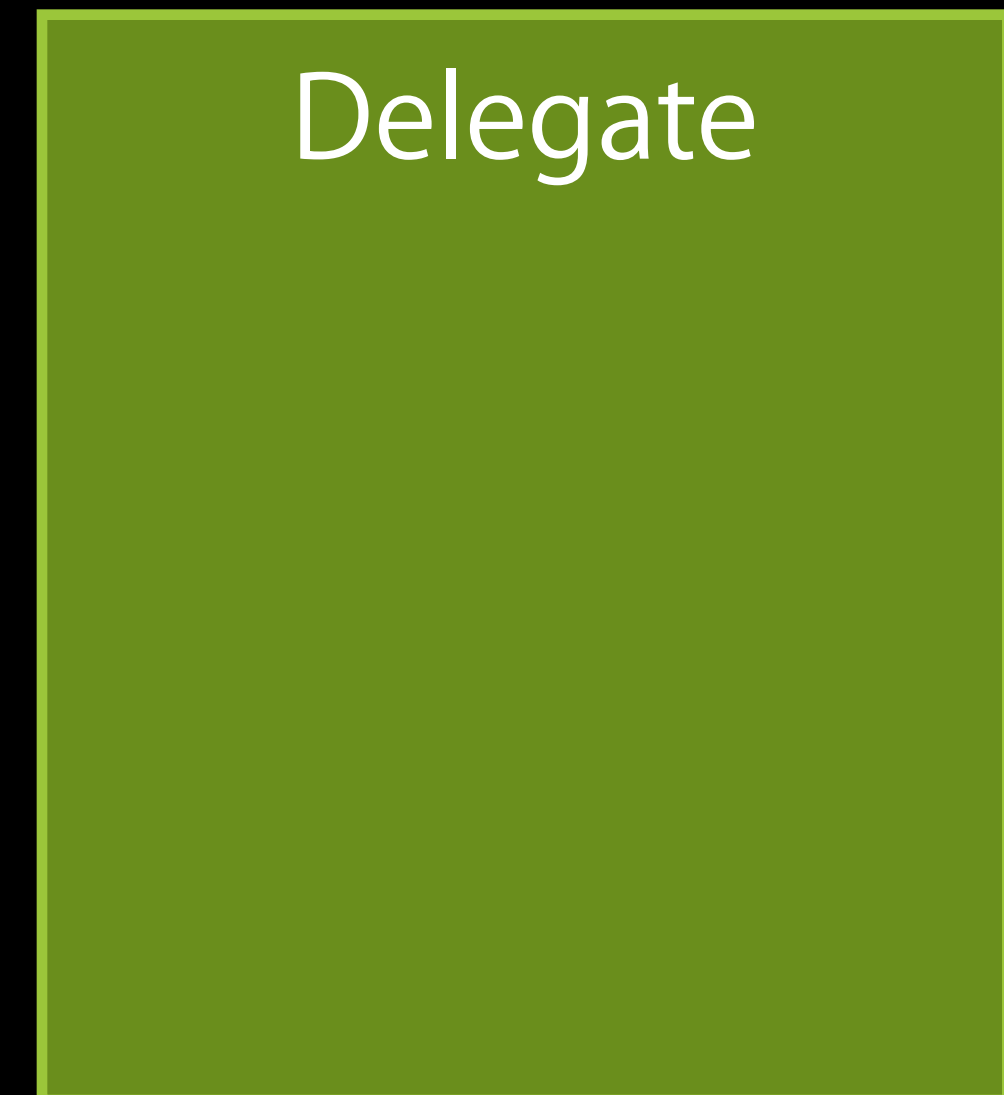
Agenda

- Basic use
- Drawing subtitles
- Alternatives

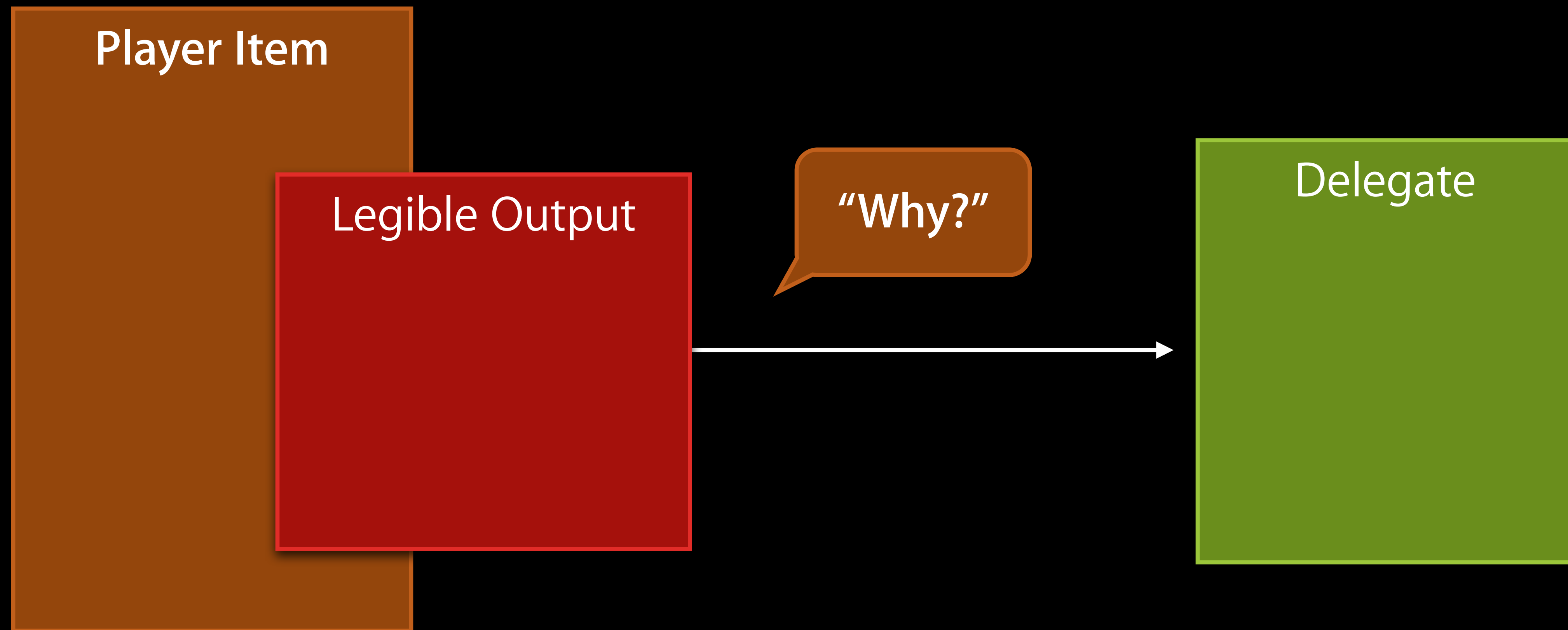
AVPlayerItemLegibleOutput



AVPlayerItemLegibleOutput



AVPlayerItemLegibleOutput



Setup

- Initialize

```
legibleOutput = [[AVPlayerItemLegibleOutput alloc] init];
```

Setup

- Initialize

```
legibleOutput = [[AVPlayerItemLegibleOutput alloc] init];
```

- Attach

```
[playerItem addOutput: legibleOutput];
```

Setup

- Initialize

```
legibleOutput = [[AVPlayerItemLegibleOutput alloc] init];
```

- Attach

```
[playerItem addOutput: legibleOutput];
```

- Set delegate

```
id <AVPlayerItemLegibleOutputPushDelegate> myDelegate = ...;
```

```
[legibleOutput setDelegate: myDelegate queue: dispatch_get_main_queue()];
```

Delegate

AVPlayerItemLegibleOutputPushDelegate protocol

```
- (void) legibleOutput: (AVPlayerItemLegibleOutput *)output  
    didOutputAttributedString: (NSArray *)strings  
        nativeSampleBuffers: (NSArray *)sbufs  
            forItemTime: (CMTime)itemTime;
```


Sample Code

```
AVLegibleMeanings for OSX
```

Drawing Subtitles



Look how high it is!

Drawing Subtitles

String attributes

Drawing Subtitles

String attributes

kCMTextMarkupAttribute_ForegroundColorARGB

kCMTextMarkupAttribute_BackgroundColorARGB

kCMTextMarkupAttribute_BoldStyle

kCMTextMarkupAttribute_ItalicStyle

kCMTextMarkupAttribute_UnderlineStyle

kCMTextMarkupAttribute_FontFamilyName

kCMTextMarkupAttribute_Alignment

kCMTextMarkupAttribute_TextPositionPercentageRelativeToWritingDirection

kCMTextMarkupAttribute_WritingDirectionSizePercentage

kCMTextMarkupAttribute_CharacterBackgroundColorARGB

kCMTextMarkupAttribute_CharacterEdgeStyle

kCMTextMarkupAttribute_VerticalLayout

kCMTextMarkupAttribute_RelativeFontSize

kCMTextMarkupAttribute_GenericFontFamilyName

Drawing Subtitles

String attributes

kCMTextMarkupAttribute_ForegroundColorARGB

kCMTextMarkupAttribute_BackgroundColorARGB

kCMTextMarkupAttribute_BoldStyle

kCMTextMarkupAttribute_ItalicStyle

kCMTextMarkupAttribute_UnderlineStyle

kCMTextMarkupAttribute_FontFamilyName

kCMTextMarkupAttribute_Alignment

kCMTextMarkupAttribute_TextPositionPercentageRelativeToWritingDirection

kCMTextMarkupAttribute_WritingDirectionSizePercentage

kCMTextMarkupAttribute_CharacterBackgroundColorARGB

kCMTextMarkupAttribute_CharacterEdgeStyle

kCMTextMarkupAttribute_VerticalLayout

kCMTextMarkupAttribute_RelativeFontSize

kCMTextMarkupAttribute_GenericFontFamilyName

Drawing Subtitles

String attributes

kCMTextMarkupAttribute_ForegroundColorARGB

kCMTextMarkupAttribute_BackgroundColorARGB

kCMTextMarkupAttribute_BoldStyle

kCMTextMarkupAttribute_ItalicStyle

kCMTextMarkupAttribute_UnderlineStyle

kCMTextMarkupAttribute_FontFamilyName

kCMTextMarkupAttribute_Justification

kCMTextMarkupAttribute_TextPositionPercentageRelativeToWritingDirection

kCMTextMarkupAttribute_WritingDirectionSizePercentage

kCMTextMarkupAttribute_CharacterBackgroundColorARGB

kCMTextMarkupAttribute_CharacterEdgeStyle

kCMTextMarkupAttribute_VerticalLayout

kCMTextMarkupAttribute_RelativeFontSize

kCMTextMarkupAttribute_GenericFontFamilyName

<CoreMedia/CMTextMarkup.h>

Drawing Subtitles

Respecting user preferences

MediaAccessibility framework

When Not to Use Legible Output



- Indexing-like operations
 - Use `AVAssetReader`
- Custom styling of WebVTT
 - Consider using `AVPlayerItem.textStyleRules`
- To override user preferences

Summary

- Support accessibility during playback
- Content delivery choices
- Add subtitles to movie files
- Access subtitle text during playback

More Information

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geleynse@apple.com

Documentation

AV Foundation Programming Guide

<http://developer.apple.com/library/ios/#documentation/AudioVideo/Conceptual/AVFoundationPG/>

Apple Developer Forums

<http://devforums.apple.com>

Related Sessions

What's new in Camera Capture

Nob Hill
Wednesday 11:30AM

Advanced Editing with AV Foundation

Marina
Thursday 9:00AM

Labs

HTTP Live Streaming Lab	Media Lab B Thursday 11:30AM	
AV Foundation Lab	Media Lab B Thursday 2:00PM	
AV Foundation Lab	Media Lab B Friday 9:00AM	

 WWDC2013