App Frameworks

#WWDC16

App Development Using TVMLKit

Part 1

Session 212

Nurinder Manj tvOS Engineer

Agenda

What is TVMLKit?

Agenda

What is TVMLKit?

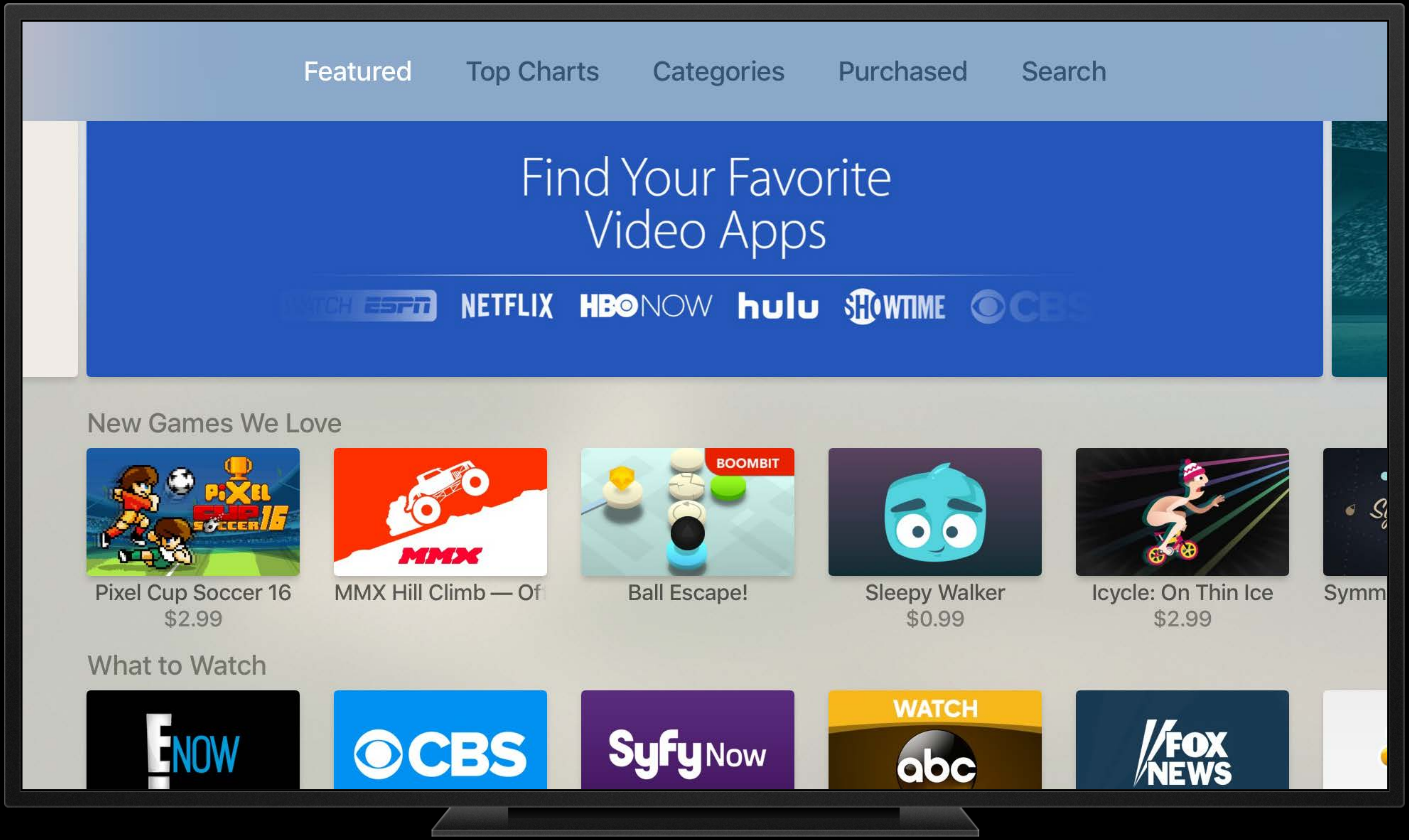
Building an app with TVMLKit

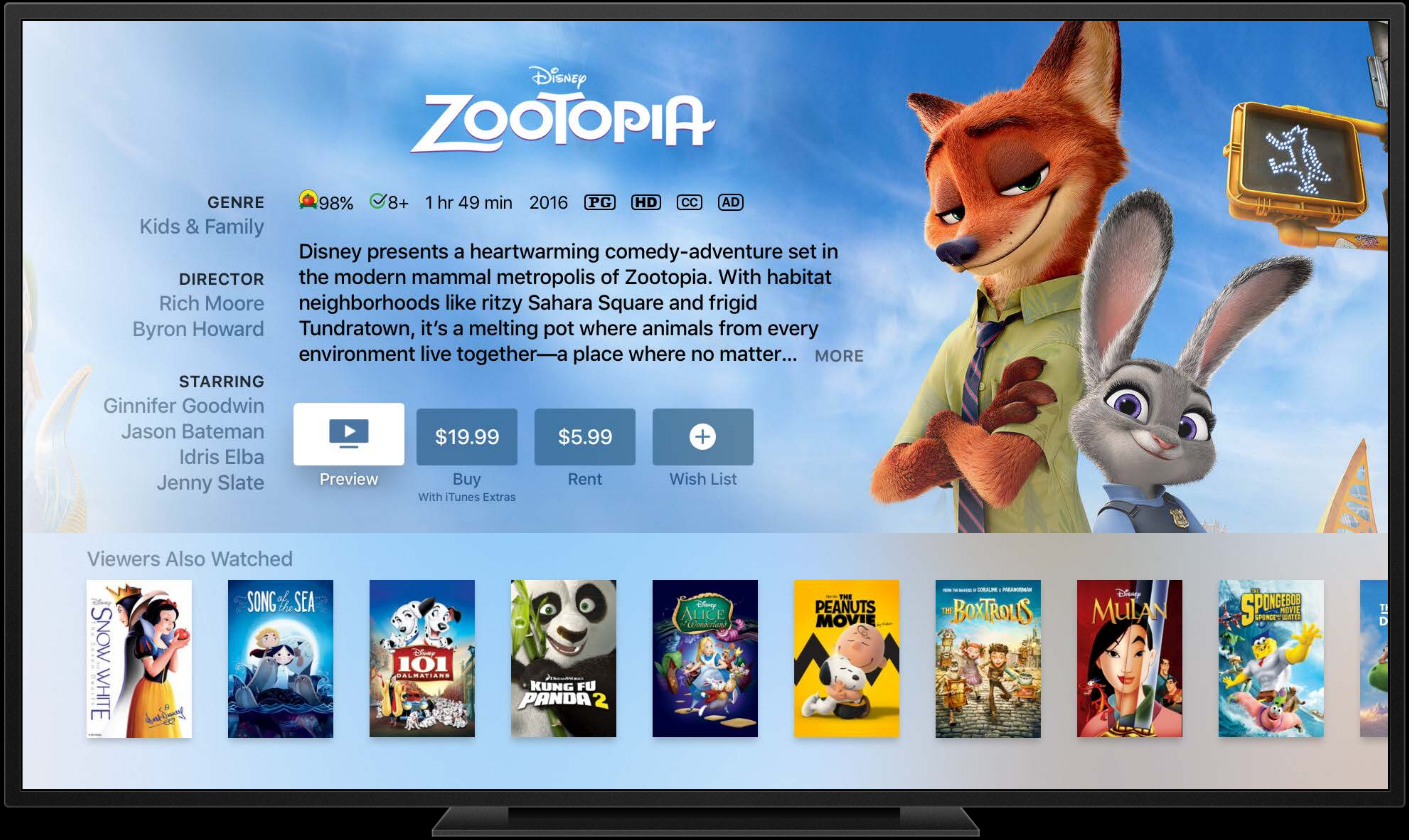
Agenda

What is TVMLKit?

Building an app with TVMLKit

New features


Featured
Top Charts
Categories
Purchased
Search
Find Your Favorite Video Apps
NETFLIX
HBO NOW
hulu
SHOWTIME
New Games We Love
Pixel Cup Soccer 16
$2.99
MMX Hill Climb — Of
Ball Escape!
BOOMBIT
Sleepy Walker
$0.99
Icycle: On Thin Ice
$2.99
Symm
What to Watch
E! NOW
CBS
Syfy Now
WATCH abc
FOX NEWS



Disney ZOOTOPIA

GENRE
Kids & Family

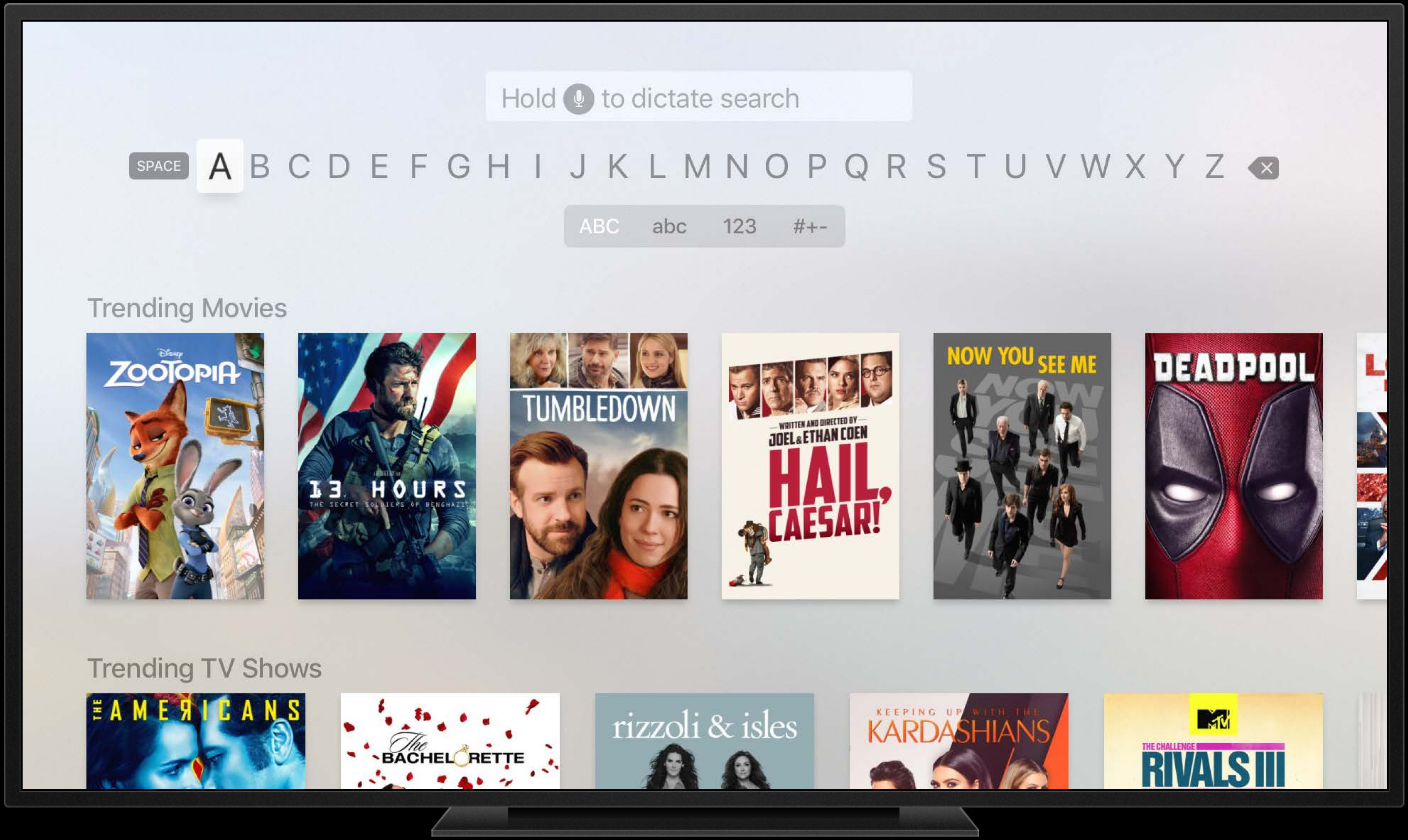
DIRECTOR
Rich Moore
Byron Howard

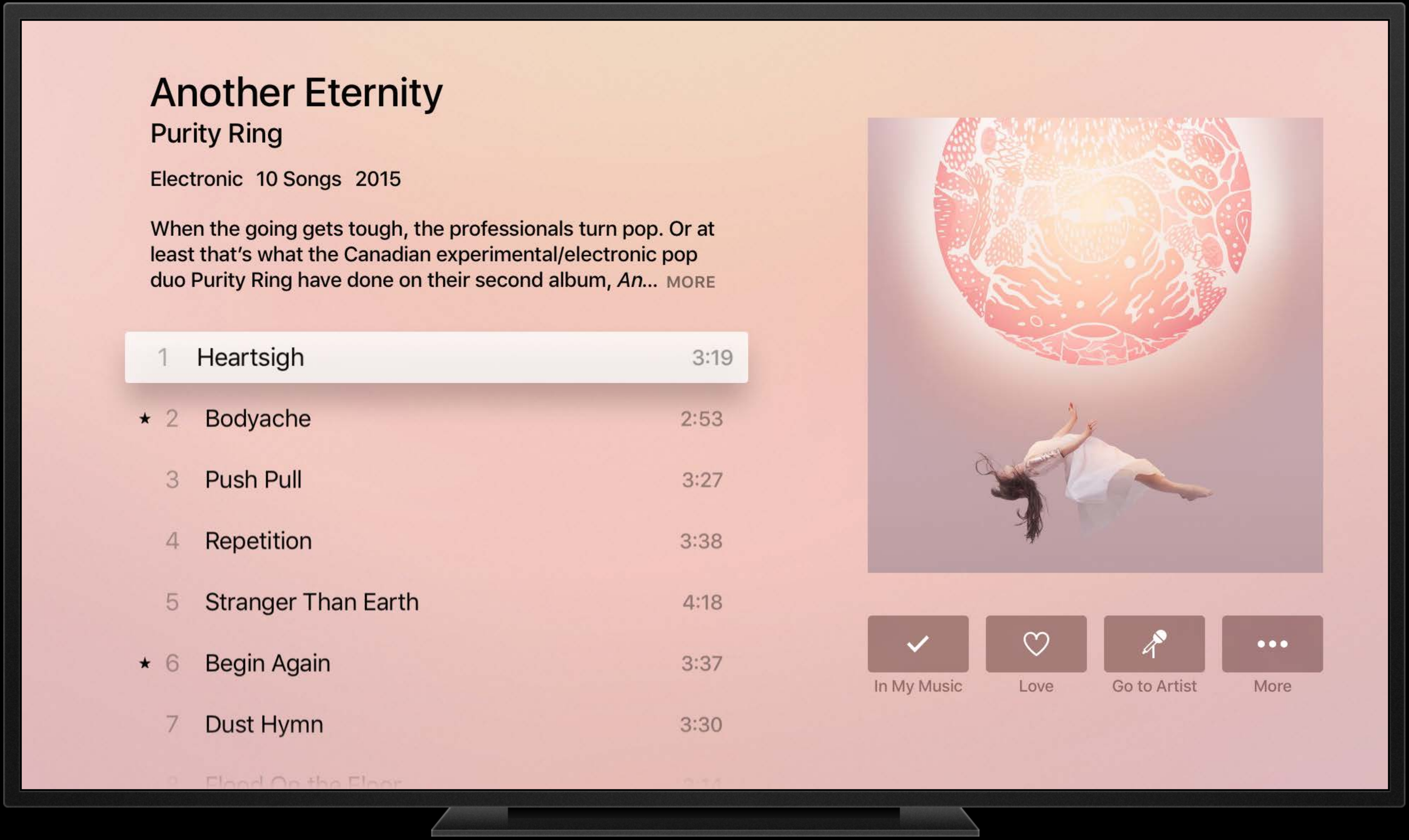
STARRING
Ginnifer Goodwin
Jason Bateman
Idris Elba
Jenny Slate

98% ✓8+ 1 hr 49 min 2016 PG HD CC AD

Disney presents a heartwarming comedy-adventure set in the modern mammal metropolis of Zootopia. With habitat neighborhoods like ritzy Sahara Square and frigid Tundratown, it's a melting pot where animals from every environment live together—a place where no matter... MORE

Viewers Also Watched


Hold to dictate search
SPACE
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
ABC
abc
123
#+-
Trending Movies
ZOOTOPIA
13 HOURS
THE SECRET SOLDIERS OF BENGHAZI
TUMBLEDOWN
WRITTEN AND DIRECTED BY JOEL & ETHAN COEN
HAIL, CAESAR!
NOW YOU SEE ME
DEADPOOL
Trending TV Shows
THE AMERICANS
The BACHELORETTE
rizzoli & isles
KEEPING UP WITH THE KARDASHIANS
MTV
THE CHALLENGE
RIVALS III



Another Eternity

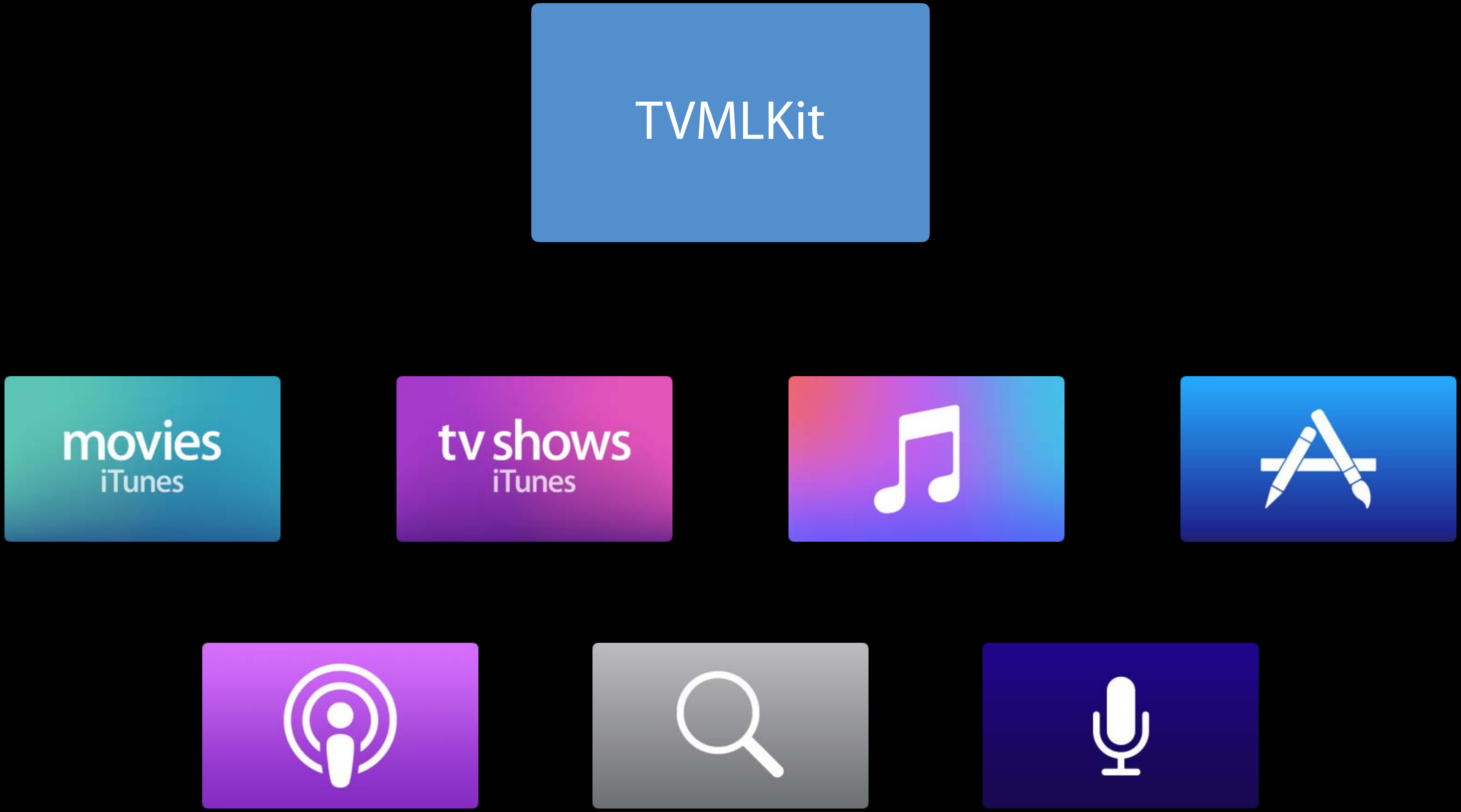
Purity Ring

Electronic 10 Songs 2015

When the going gets tough, the professionals turn pop. Or at least that's what the Canadian experimental/electronic pop duo Purity Ring have done on their second album, *An*... MORE

	1	Heartsigh	3:19
★	2	Bodyache	2:53
	3	Push Pull	3:27
	4	Repetition	3:38
	5	Stranger Than Earth	4:18
★	6	Begin Again	3:37
	7	Dust Hymn	3:30
	8	Flood On the Floor	3:14

TVMLKit



TVMLKit

What is TVMLKit?

Native experience

What is TVMLKit?

Native experience

XML and JavaScript

What is TVMLKit?

Native experience

XML and JavaScript

Configurable

What is TVMLKit?

Native experience

XML and JavaScript

Configurable

Extensible

What is TVMLKit?

Native experience

XML and JavaScript

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Not a web browser

Building an App With TVMLKit

Building an App With TVMLKit

Xcode

Building an App With TVMLKit

Xcode

TVML and Styles

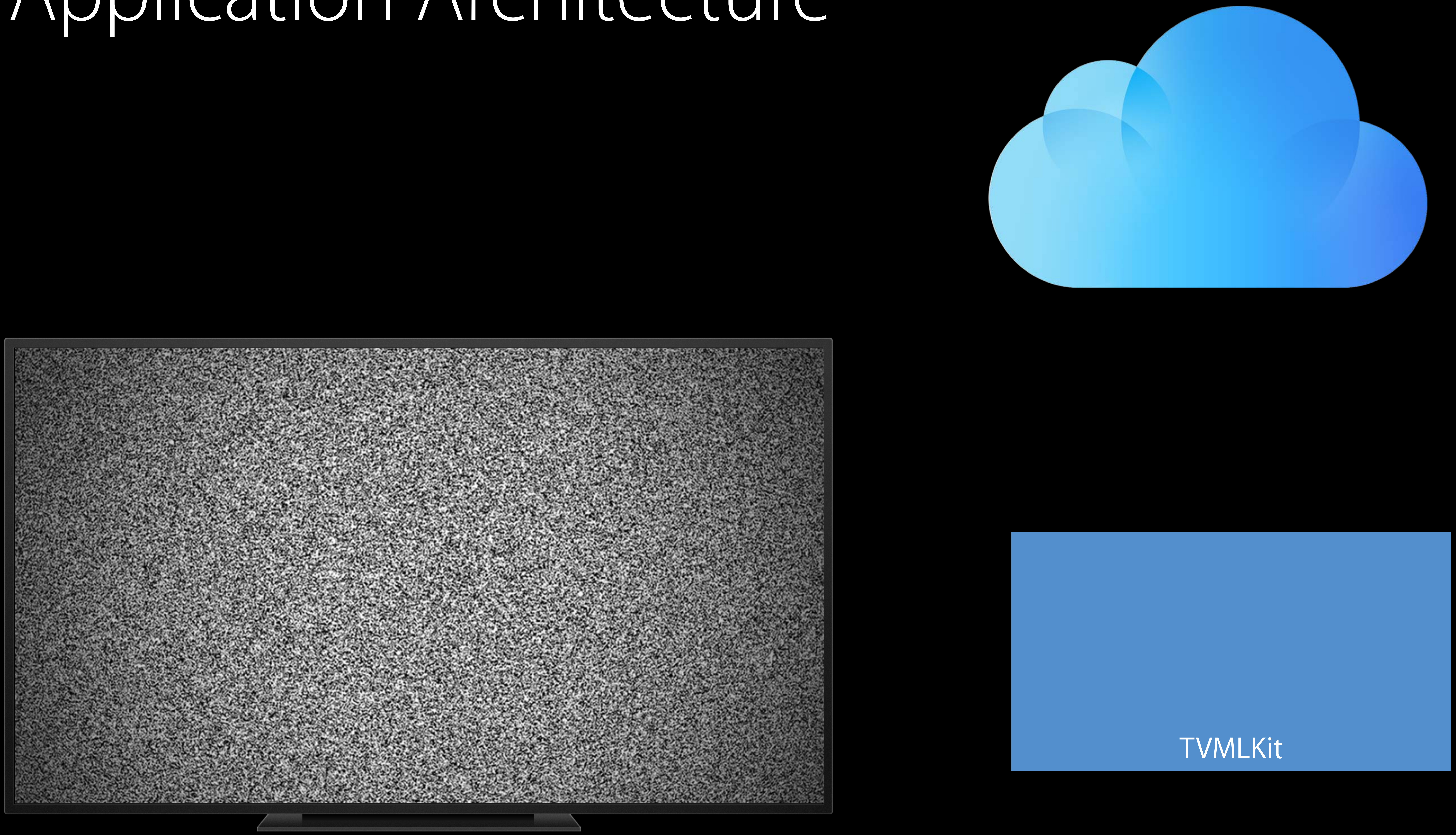
Building an App With TVMLKit

Xcode

TVML and Styles

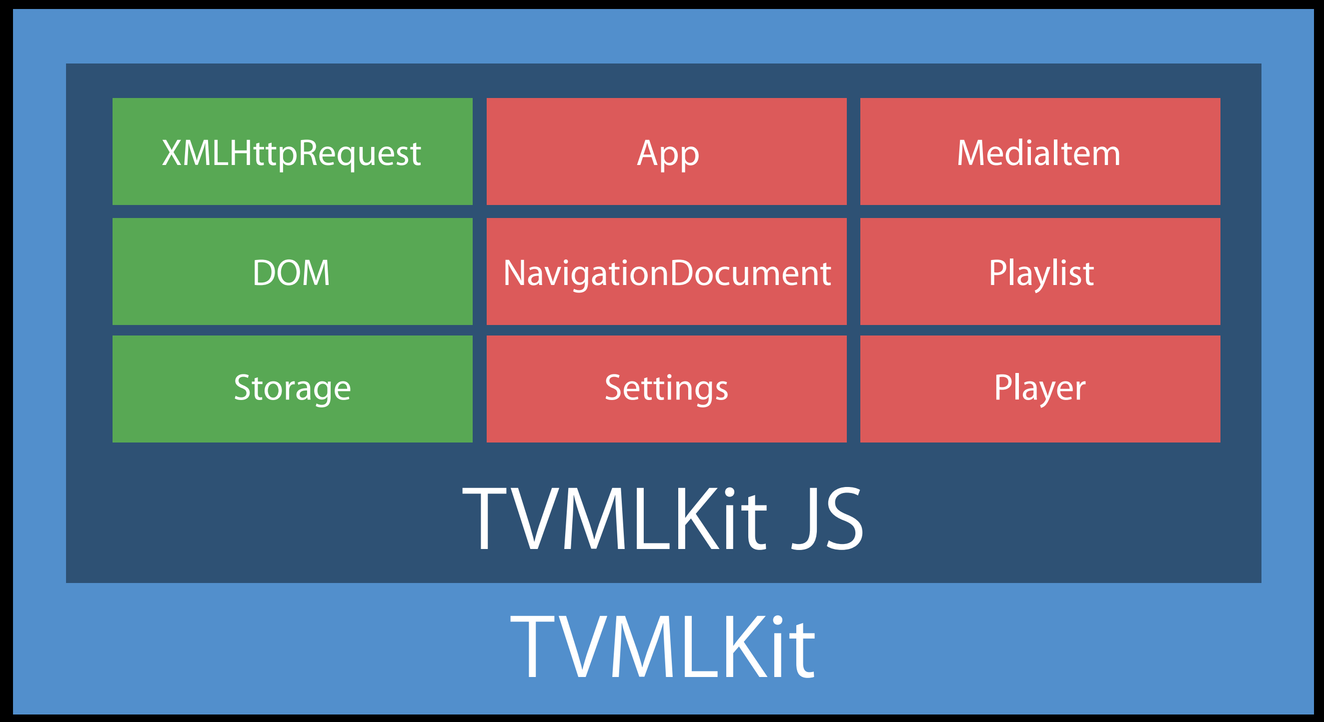
TVMLKit JS

Application Architecture



TVMLKit

Application Architecture

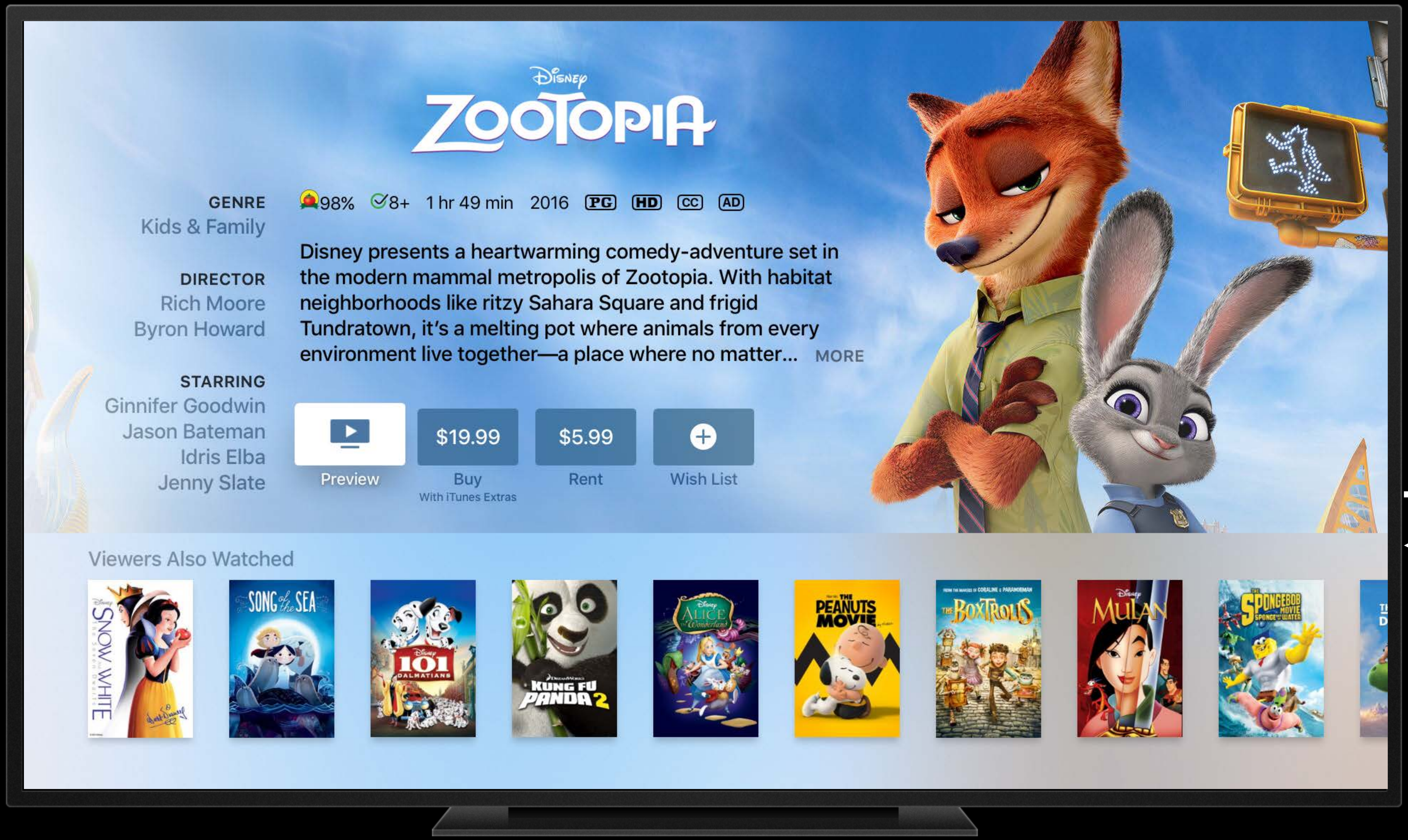


XMLHttpRequest	App	MediaItem
DOM	NavigationDocument	Playlist
Storage	Settings	Player

TVMLKit JS

TVMLKit

Application Architecture



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98% 8+ 1 hr 49 min 2016 PG HD CC AD

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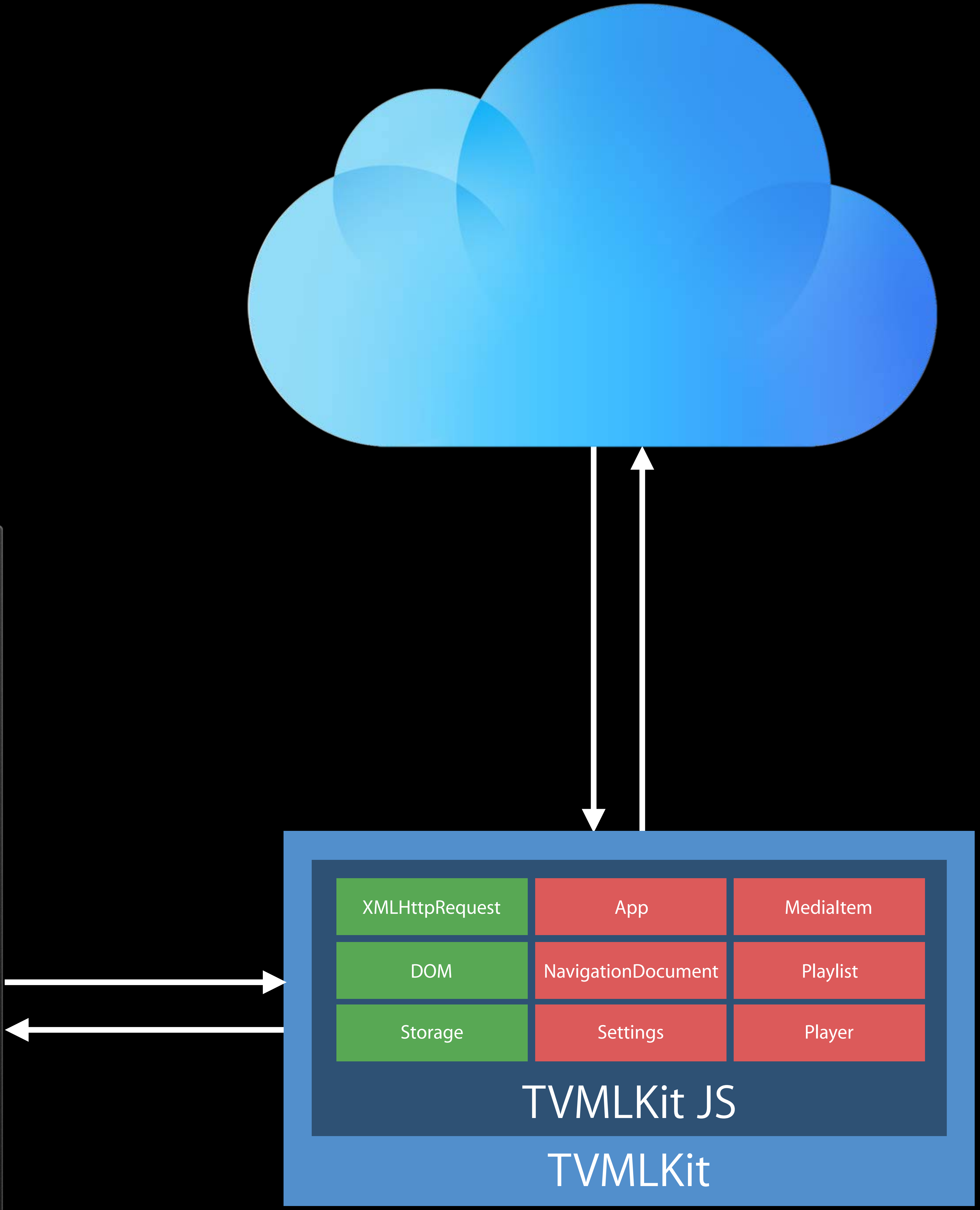
Preview
$19.99 Buy With iTunes Extras
$5.99 Rent
Wish List

Viewers Also Watched



XMLHttpRequest	App	MediaItem
DOM	NavigationDocument	Playlist
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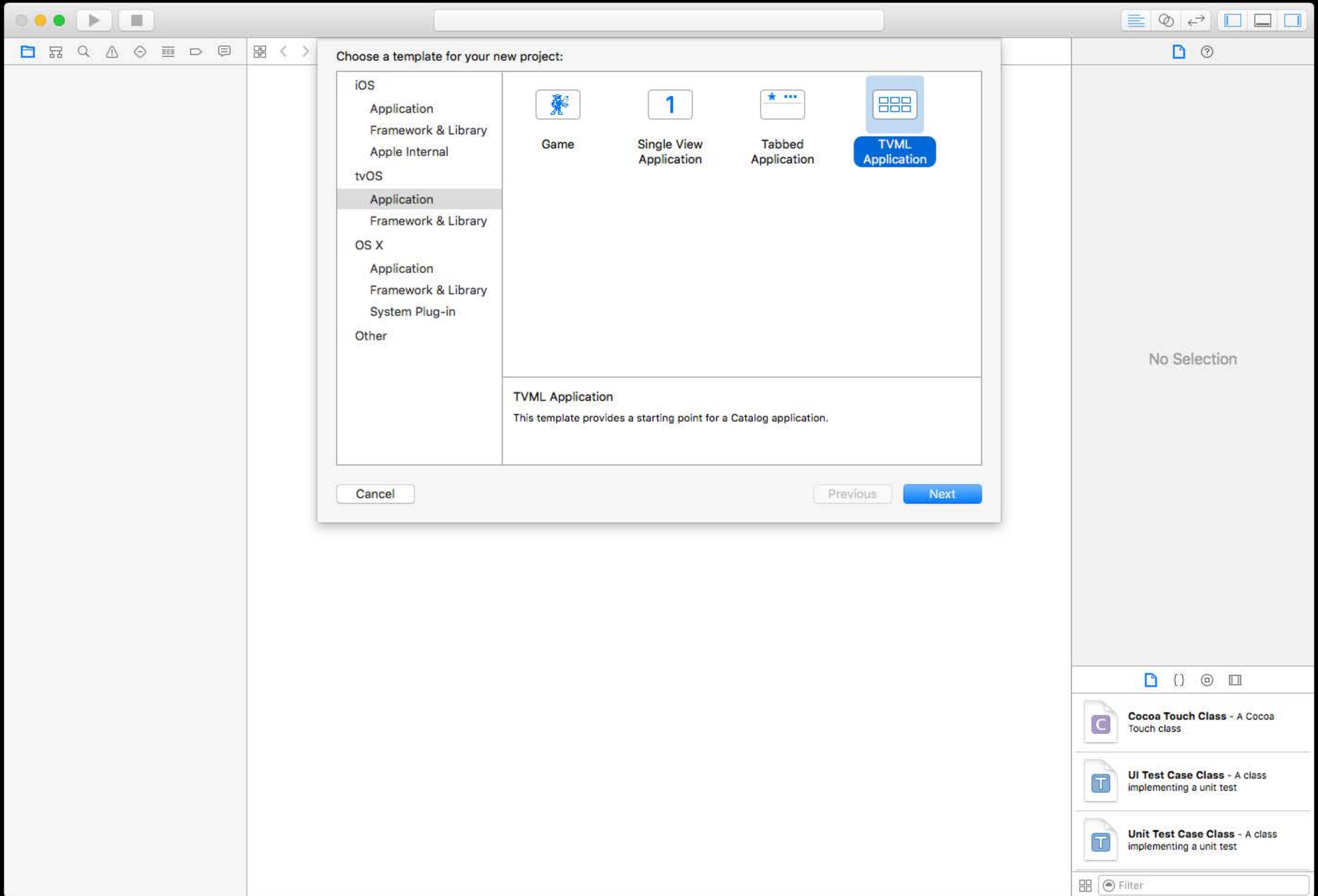
TVMLKit JS

TVMLKit

TVML Application Template

Xcode window



Choose a template for your new project:

TVML Application

This template provides a starting point for a Catalog application.

```swift
// Bootstrapping TVMLKit App

class AppDelegate: ..., TVApplicationControllerDelegate {
   ...
   static let tvBaseURL = "http://localhost:9001/"
   static let tvBootURL = "\(AppDelegate.tvBaseURL)/application.js"
   func application(..., didFinishLaunchingWithOptions launchOptions: ...) -> Bool {
      ...
      let appControllerContext = TVApplicationControllerContext()
      if let javaScriptURL = NSURL(string: AppDelegate.tvBootURL) {
         appControllerContext.javaScriptApplicationURL = javaScriptURL
      }
      ...
      appController = TVApplicationController(context: appControllerContext, window: window,
         delegate: self)
      ...
      return true
   }
}
```

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        return true
    }
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```

TVML and Styles

TVML and Styles

Markup to define template

TVML and Styles

Markup to define template

Templates have default style

TVML and Styles

Markup to define template

Templates have default style

Customize appearance with styles

```
// Document XML Structure

<?xml version="1.0" encoding="UTF-8" ?>
<document>
   <head>
      <style>
         <!-- custom styles -->
      </style>
   </head>
   <templateName>
      <!-- template content -->
   </templateName>
</document>
```

```
// Document XML Structure

<?xml version="1.0" encoding="UTF-8" ?>
<document>
   <head>
      <style>
         <!-- custom styles -->
      </style>
   </head>
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      <!-- template content -->
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</document>
```

```
// Document XML Structure

<?xml version="1.0" encoding="UTF-8" ?>
<document>
   <head>
      <style>
         <!-- custom styles -->
      </style>
   </head>
   <templateName>
      <!-- template content -->
   </templateName>
</document>
```

iTunes Extras
THE 5TH WAVE
$9.99 in HD—Limited Time
Top Movies
LONDON HAS FALLEN
10 CLOVERFIELD LANE
BRADLEY COOPER
BURNT
DEADPOOL
JOHNSON WILSON BRIE MANN
HOW TO BE SINGLE
13 HOURS
THE SECRET SOLDIERS OF BENGHAZI
New & Noteworthy
PRESENTING PRINCESS
SALLY FIELD
EDDIE THE EAGLE
DREAMWORKS KUNG FU PANDA
AWAYDAYS

```
<stackTemplate>
   <collectionList>
      <carousel>...</carousel>
      <shelf>...</shelf>
      ...
   </collectionList>
</stackTemplate>
```

iTunes Extras

$9.99 in HD—Limited Time

Top Movies

New & Noteworthy

THE 5TH WAVE
LONDON HAS FALLEN
10 CLOVERFIELD LANE
BRADLEY COOPER
BURNT
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PRESENTING PRINCESS
SALLY FIELD
EDDIE THE EAGLE
DREAMWORKS KUNG FU PANDA
AWAYDAYS
iTu

```
<carousel>
   <section>
      <lockup><img ... /></lockup>
      ...
   </section>
</carousel>
```

Top Movies
LONDON HAS FALLEN
10 CLOVERFIELD LANE
BRADLEY COOPER BURNT
DEADPOOL
JOHNSON WILSON BRIE MANN HOW TO BE SINGLE
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DREAMWORKS KUNG FU PANDA
AWAYDAYS

iTunes Extras
THE 5TH WAVE
$9.99 in HD—Limited Time
iTu

```
<shelf>
   <header>...</header>
   <section>
      <lockup>...</lockup>
      ...
   </section>
</shelf>
```

New & Noteworthy
PRESENTING PRINCESS
SALLY FIELD
EDDIE THE EAGLE
DREAMWORKS KUNG FU PANDA
AWAYDAYS

```
<lockup>
    <img ... />
</lockup>
```

Top Movies

```
<lockup>
   <img ... />
   <title>
      ...
   </title>
</lockup>
```

New & Noteworthy

iTu
LONDON HAS FALLEN
10 CLOVERFIELD LANE
BRADLEY COOPER
BURNT
JOHNSON WILSON BRIE MANN
HOW TO BE SINGLE
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Deadpool
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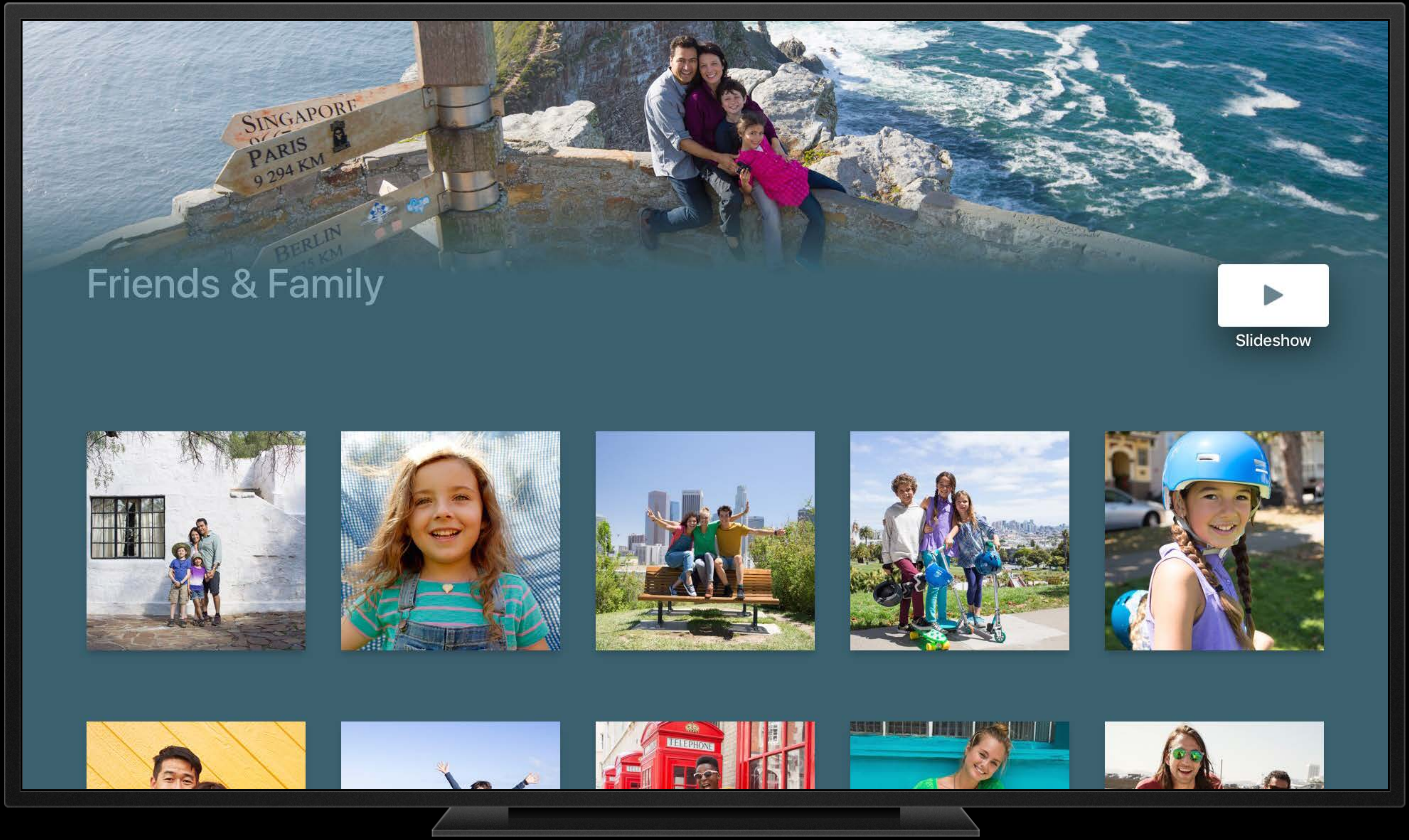
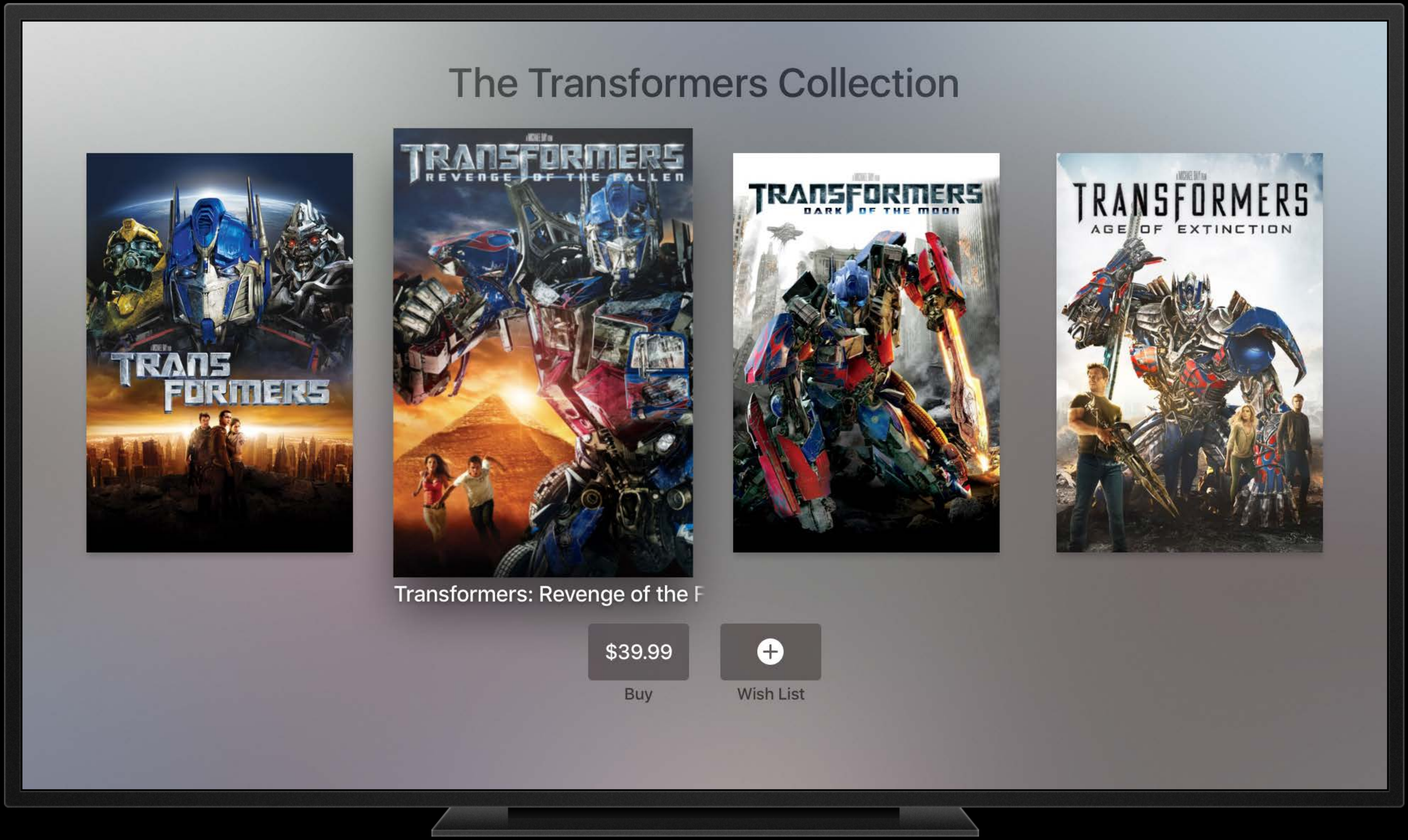
HOW TO BE SINGLE
13 HOURS
THE SECRET SOLDIERS OF BENGHAZI
New & Noteworthy
PRESENTING
PRINCESS SHAW
SALLY FIELD
HELLO, MY NAME IS
DORIS
EDDIE THE EAGLE
WRITTEN AND DIRECTED BY
JOEL & ETHAN COEN
HAIL
DREAMWORKS
KUNG FU PANDA 3
AWAY DAYS

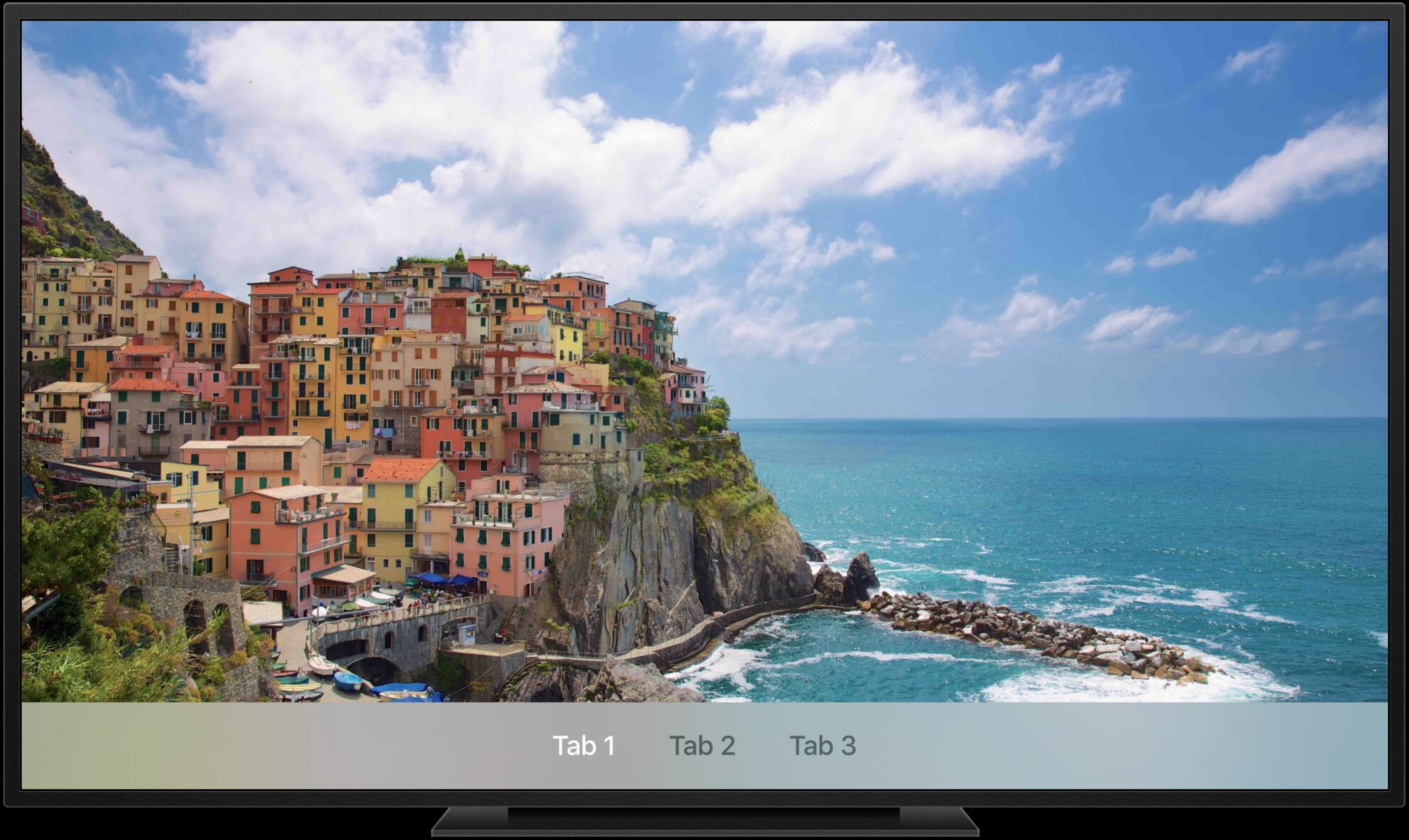
```
// Configure text elements
<document>
   <head>
      <style>
         .lockupTitle {
            tv-text-highlight-style: marquee-and-show-on-highlight;
         }
      </style>
   </head>
   <stackTemplate>
      ...
      <lockup>
         <img src="..." width="..." height="..." />
         <title class="lockupTitle">...</title>
         ...
      </lockup>
      ...
   </stackTemplate>
</document>
```

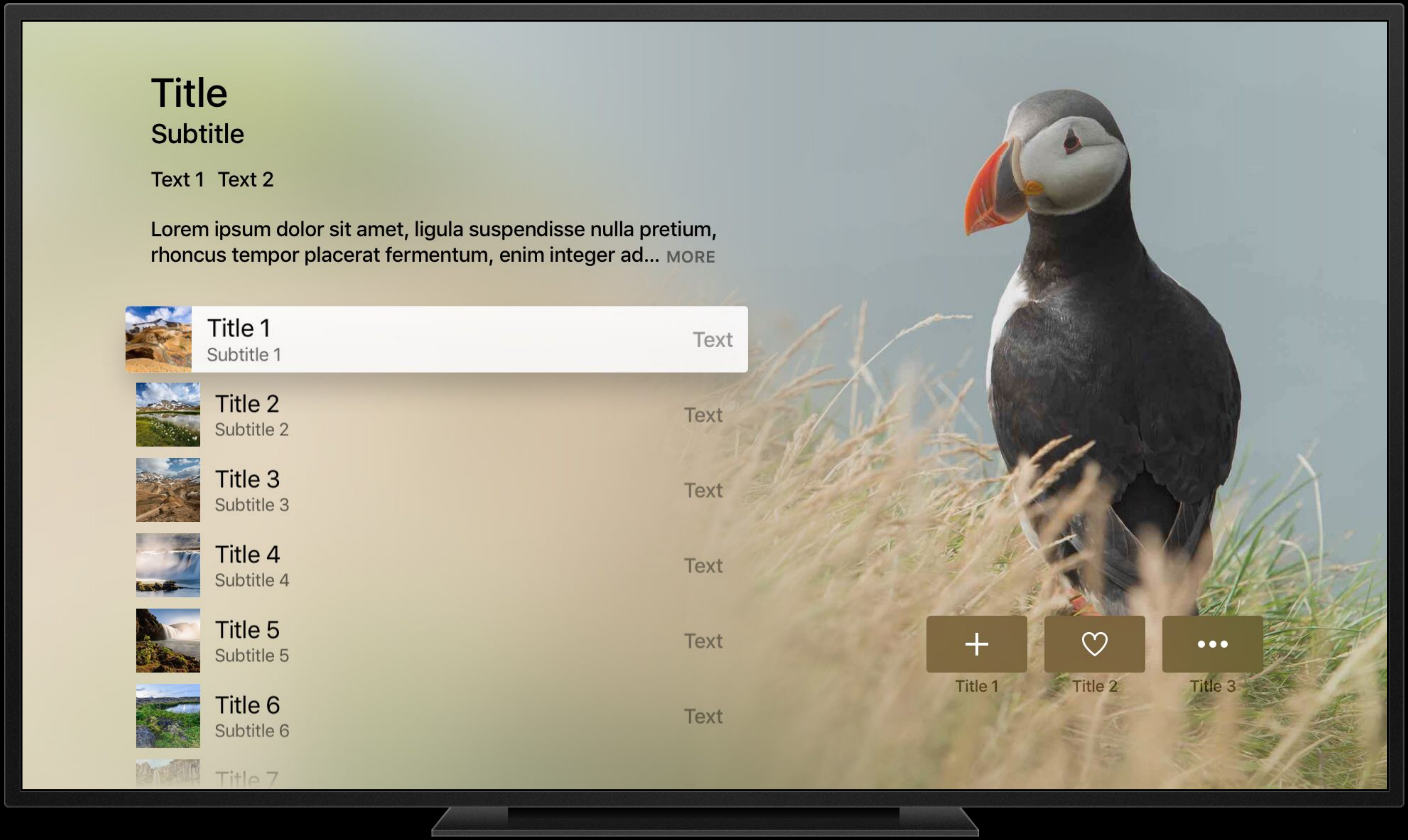

Friends & Family
Slideshow



The Transformers Collection

Transformers: Revenge of the F


Tab 1
Tab 2
Tab 3



Title

Subtitle

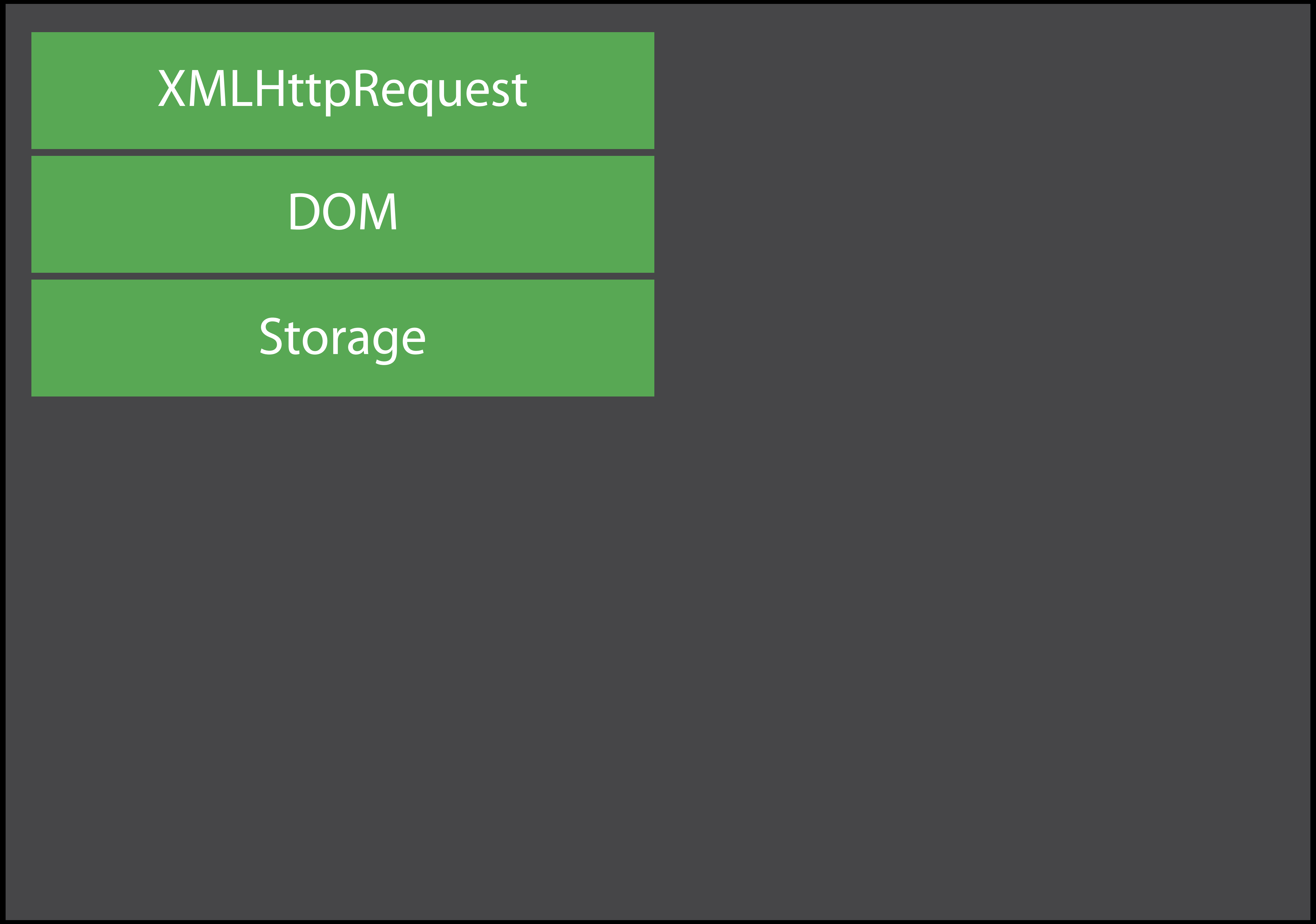
Text 1 Text 2

Lorem ipsum dolor sit amet, ligula suspendisse nulla pretium, rhoncus tempor placerat fermentum, enim integer ad... MORE

Title 1	Subtitle 1	Text
Title 2	Subtitle 2	Text
Title 3	Subtitle 3	Text
Title 4	Subtitle 4	Text
Title 5	Subtitle 5	Text
Title 6	Subtitle 6	Text
Title 7		

TVMLKit JS

TVMLKit JS

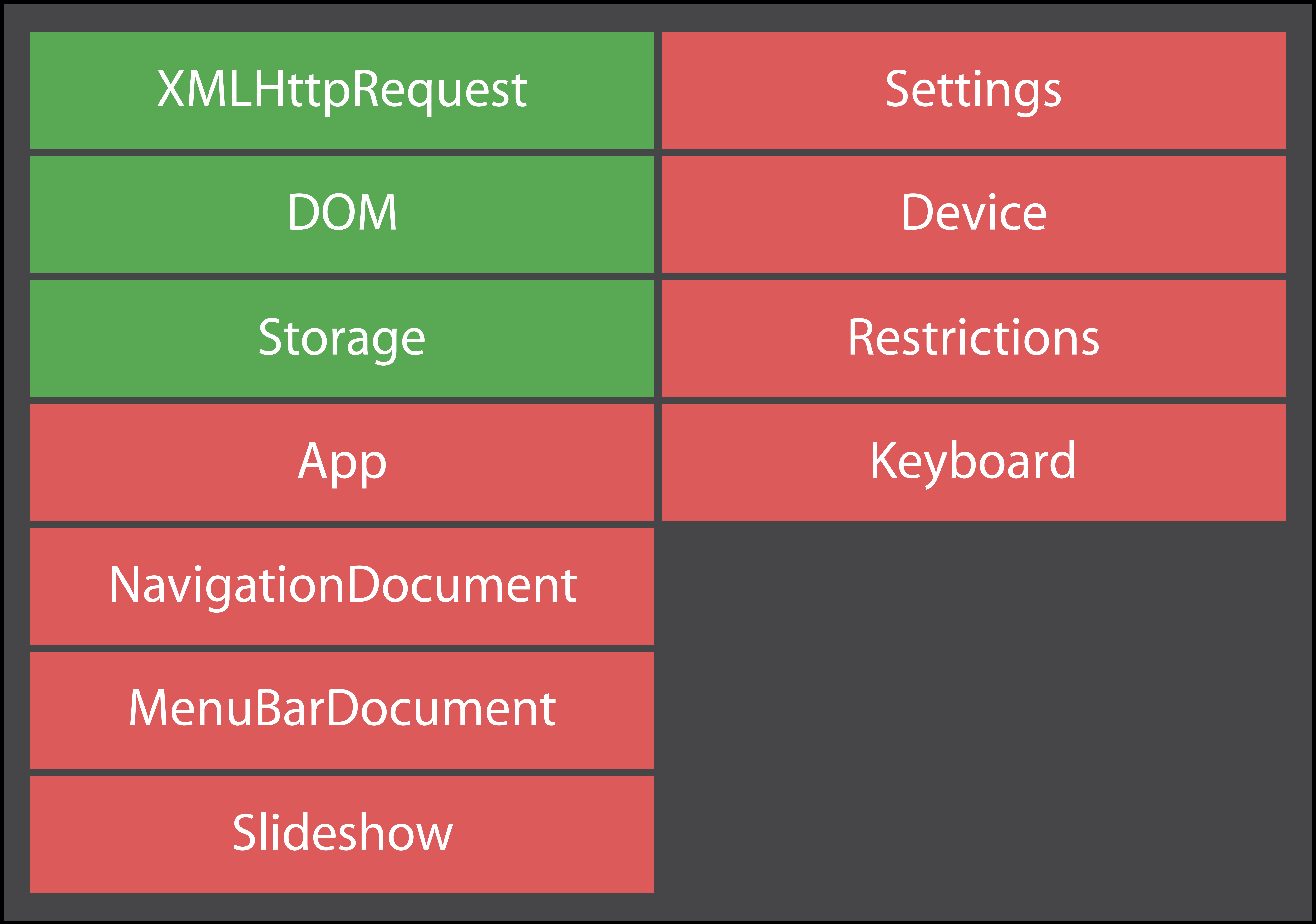


XMLHttpRequest

DOM

Storage

TVMLKit JS



🟩 XMLHttpRequest

🟩 DOM

🟩 Storage

🟥 App

🟥 NavigationDocument

🟥 MenuBarDocument

🟥 Slideshow

🟥 Settings

🟥 Device

🟥 Restrictions

🟥 Keyboard

TVMLKit JS

🟩 XMLHttpRequest	🟥 Settings
🟩 DOM	🟥 Device
🟩 Storage	🟥 Restrictions
🟥 App	🟥 Keyboard
🟥 NavigationDocument	🟥 MediaItem
🟥 MenuBarDocument	🟥 Playlist
🟥 Slideshow	🟥 Player

TVMLKit JS

App lifecycle

When TVApplicationController is initialized

```
App.onLaunch = function(options) {
   var locationStr = options['location'];
   ...
};
```

TVMLKit JS

App error handler

Capture uncaught exceptions

```
App.onError = function(message, sourceURL, line) {
    console.error("Uncaught Exception!", message, sourceURL, line);
};
```

TVMLKit JS

NavigationDocument

Manage document hierarchy

Global instance

Dismiss handled by framework

TVMLKit JS

NavigationDocument

Manage document hierarchy

Global instance

Dismiss handled by framework

```
navigationDocument.pushDocument(document)
navigationDocument.replaceDocument(document, oldDocument)
navigationDocument.presentModal(document)
```

```
// Presenting documents

let loadingMarkup = `<?xml version="1.0" encoding="UTF-8" ?>
   <document>
      <loadingTemplate>
         <activityIndicator>
            <text>Loading ...</text>
         </activityIndicator>
      </loadingTemplate>
   </document>`;
let loadingDocument = new DOMParser().parseFromString(loadingMarkup, ‘application/xml');

navigationDocument.pushDocument(loadingDocument);

// Later ...
let stackDocument = createStackDocument(...);
navigationDocument.replaceDocument(stackDocument, loadingDocument);
```

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TVMLKit JS

NavigationDocument

Manage document hierarchy

Global instance

Dismiss handled by framework

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```

Media Playback

```
// Setting up a TVMLKit JS Video Player

var video = new MediaItem('video', 'https://example.com/video.m3u8');
video.title = 'My Great Movie';
video.description = 'An extensive description…';
video.resumeTime = 10.0; // seconds

var playlist = new Playlist();
playlist.push(video);

var player = new Player();
player.playlist = playlist;
player.play(); // Present the player
```

```javascript
// Setting up a TVMLKit JS Video Player

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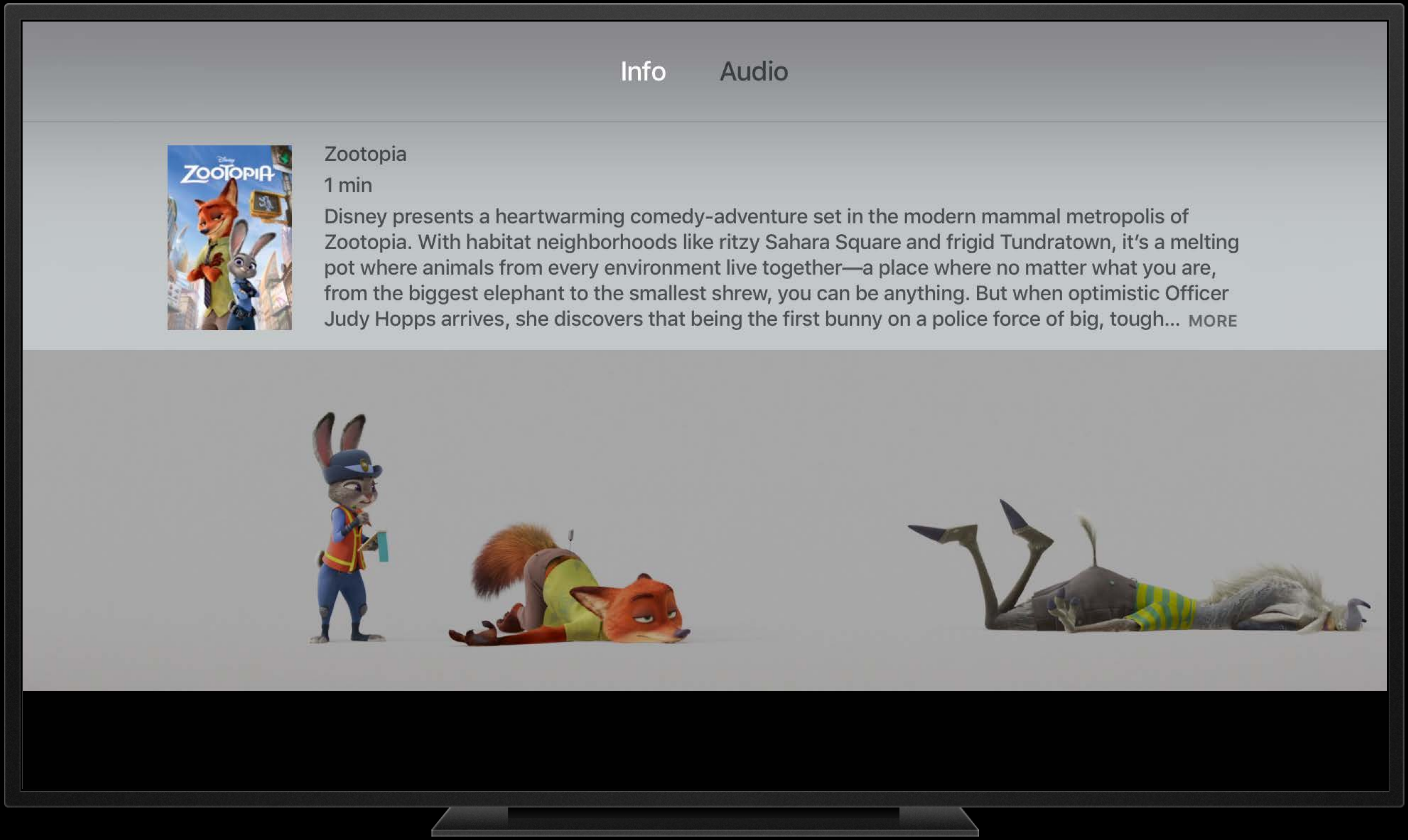


Zootopia

1 min

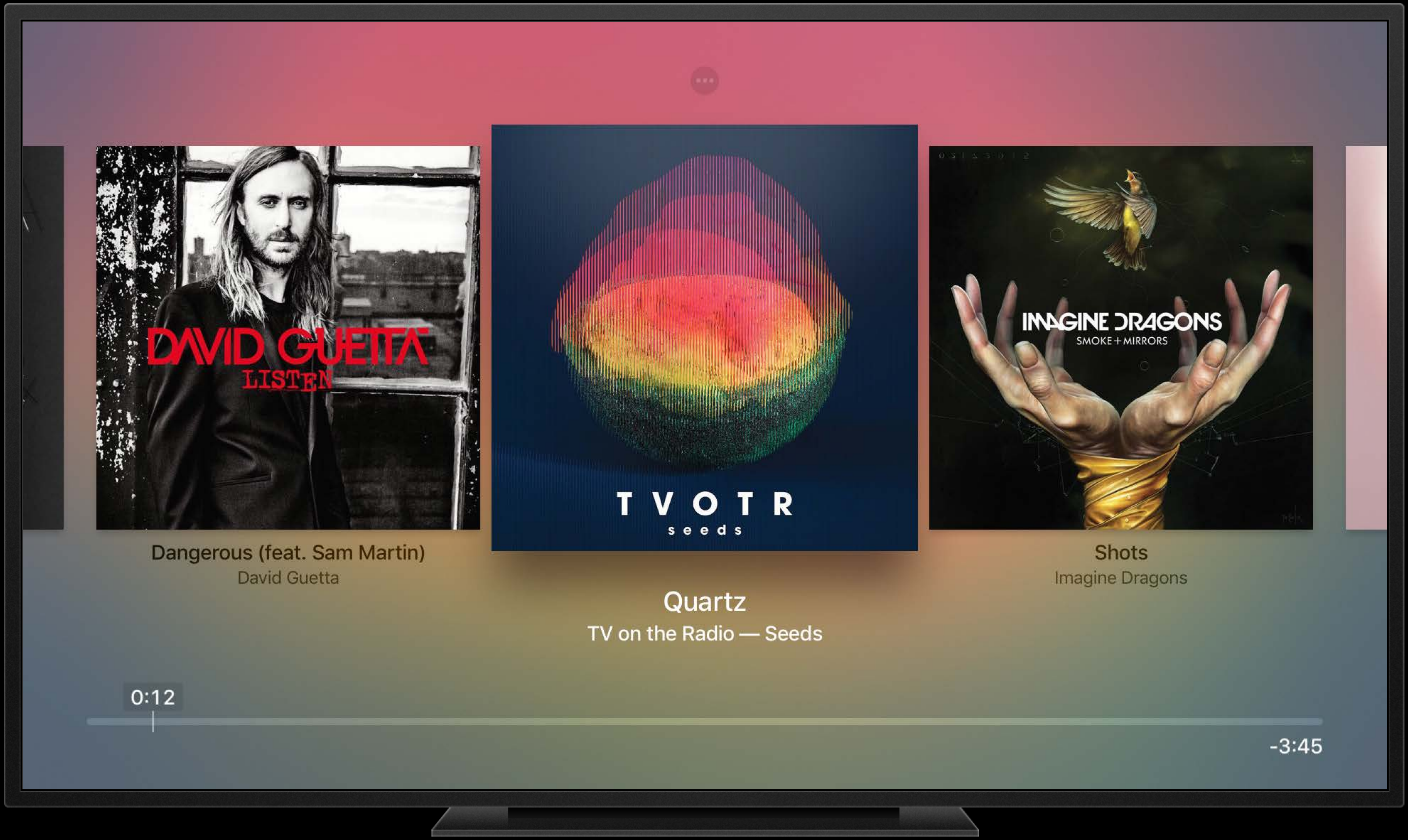
Disney presents a heartwarming comedy-adventure set in the modern mammal metropolis of Zootopia. With habitat neighborhoods like ritzy Sahara Square and frigid Tundratown, it's a melting pot where animals from every environment live together—a place where no matter what you are, from the biggest elephant to the smallest shrew, you can be anything. But when optimistic Officer Judy Hopps arrives, she discovers that being the first bunny on a police force of big, tough... MORE

```
// Setting up a TVML JS Audio Player

var audio = new MediaItem('audio', 'https://example.com/audio.mp3');
audio.title = 'My Great Song';
audio.artworkImageURL = 'https://example.com/audio-artwork.jpg';

var playlist = new Playlist();
playlist.push(audio);

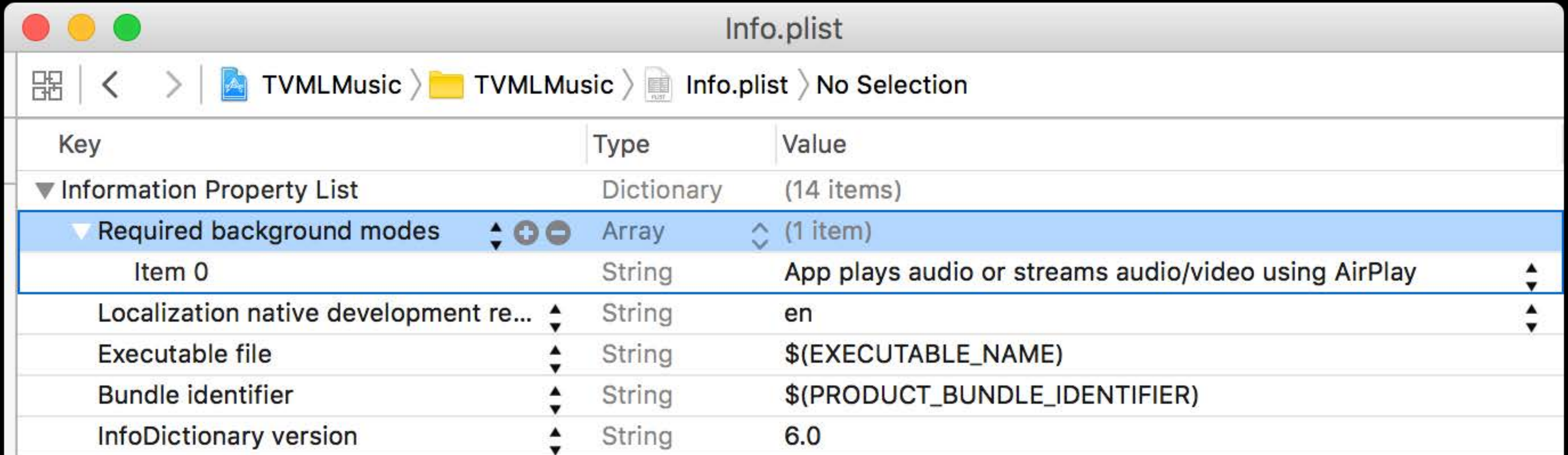
var player = new Player();
player.playlist = playlist;
player.play(); // Present the player
```


DAVID GUETTA
LISTEN
TVOTR
seeds
IMAGINE DRAGONS
SMOKE + MIRRORS
Dangerous (feat. Sam Martin)
David Guetta
Quartz
TV on the Radio — Seeds
Shots
Imagine Dragons
0:12
-3:45

AVFoundation

Background audio app playback

```
func application(application: UIApplication,
   didFinishLaunchingWithOptions launchOptions: [NSObject: AnyObject]?) -> Bool
{
   // ...
   let audioSession = AVAudioSession.sharedInstance()
   let success = try? audioSession.setCategory(AVAudioSessionCategoryPlayback)
   // ...
}
```



Info.plist

TVMLMusic 〉 TVMLMusic 〉 Info.plist 〉 No Selection

Key	Type	Value
▼ Information Property List	Dictionary	(14 items)
▼ Required background modes	Array	(1 item)
Item 0	String	App plays audio or streams audio/video using AirPlay
Localization native development re...	String	en
Executable file	String	$(EXECUTABLE_NAME)
Bundle identifier	String	$(PRODUCT_BUNDLE_IDENTIFIER)
InfoDictionary version	String	6.0

Demo

Building TVMLKit application

Jeff Tan-Ang tvOS Design Engineer

Recap

Setup project using Xcode

Recap

Setup project using Xcode

Construct and manage documents

Recap

Setup project using Xcode

Construct and manage documents

Handle events

Recap

Setup project using Xcode

Construct and manage documents

Handle events

Playback videos

New Features

Parry Panesar tvOS Engineer

TVMLKit

- New Styles and Attributes
- Embedded Video
- New Lockups
- Animatable DOM Updates
- Image Placeholders
- Audio Now Playing
- ECMAScript 6
- Multi-row Shelf
- Light and Dark Appearance
- Slideshow
- Interactive Video Overlays
- Custom Collection Cells
- New Player API’s
- Web Inspector Enhancements

New Styles and Attributes

Embedded Video

New Lockups

Animatable DOM Updates

Image Placeholders

Audio Now Playing

ECMAScript 6

TVMLKit

Multi-row Shelf

Light and Dark Appearance

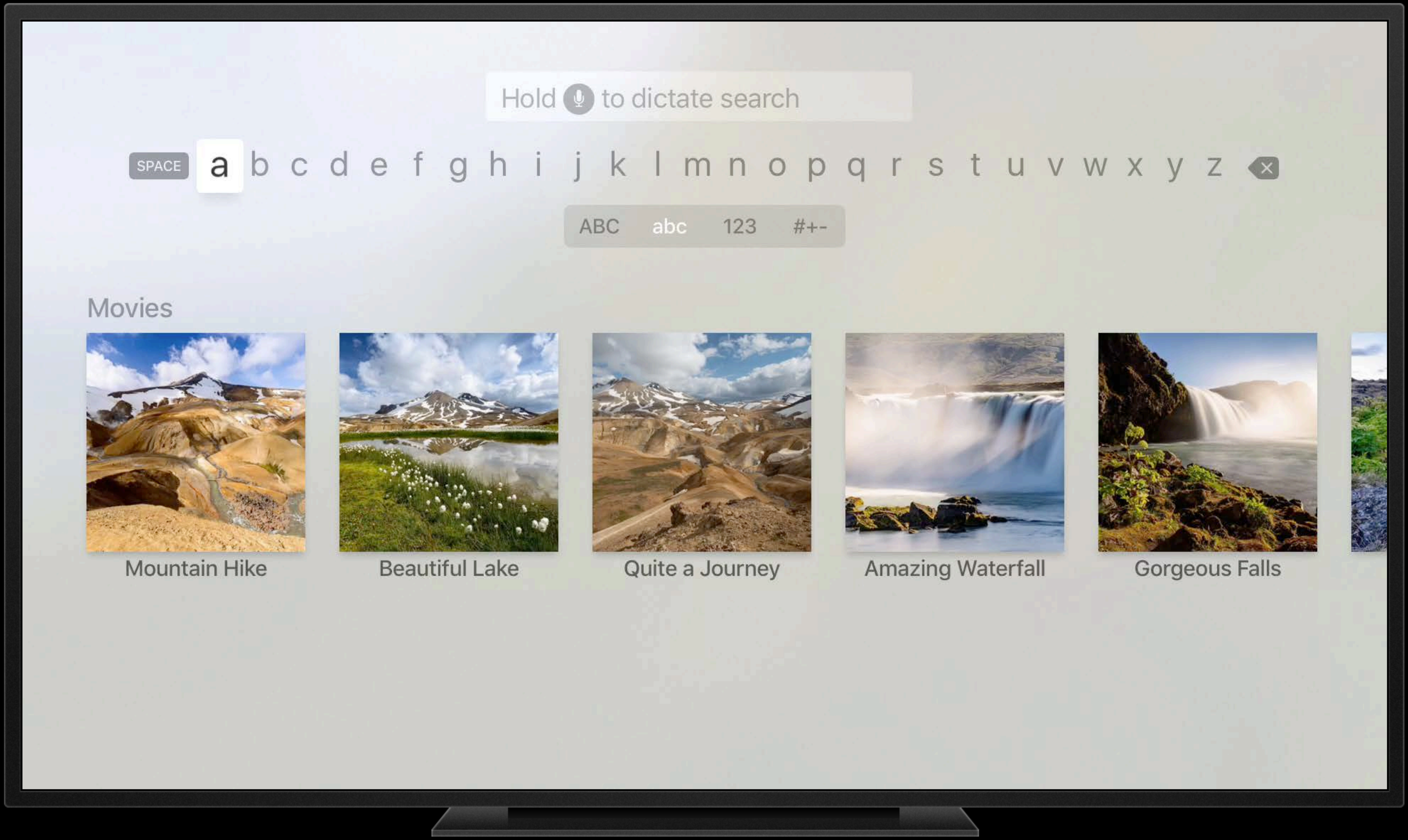
Slideshow

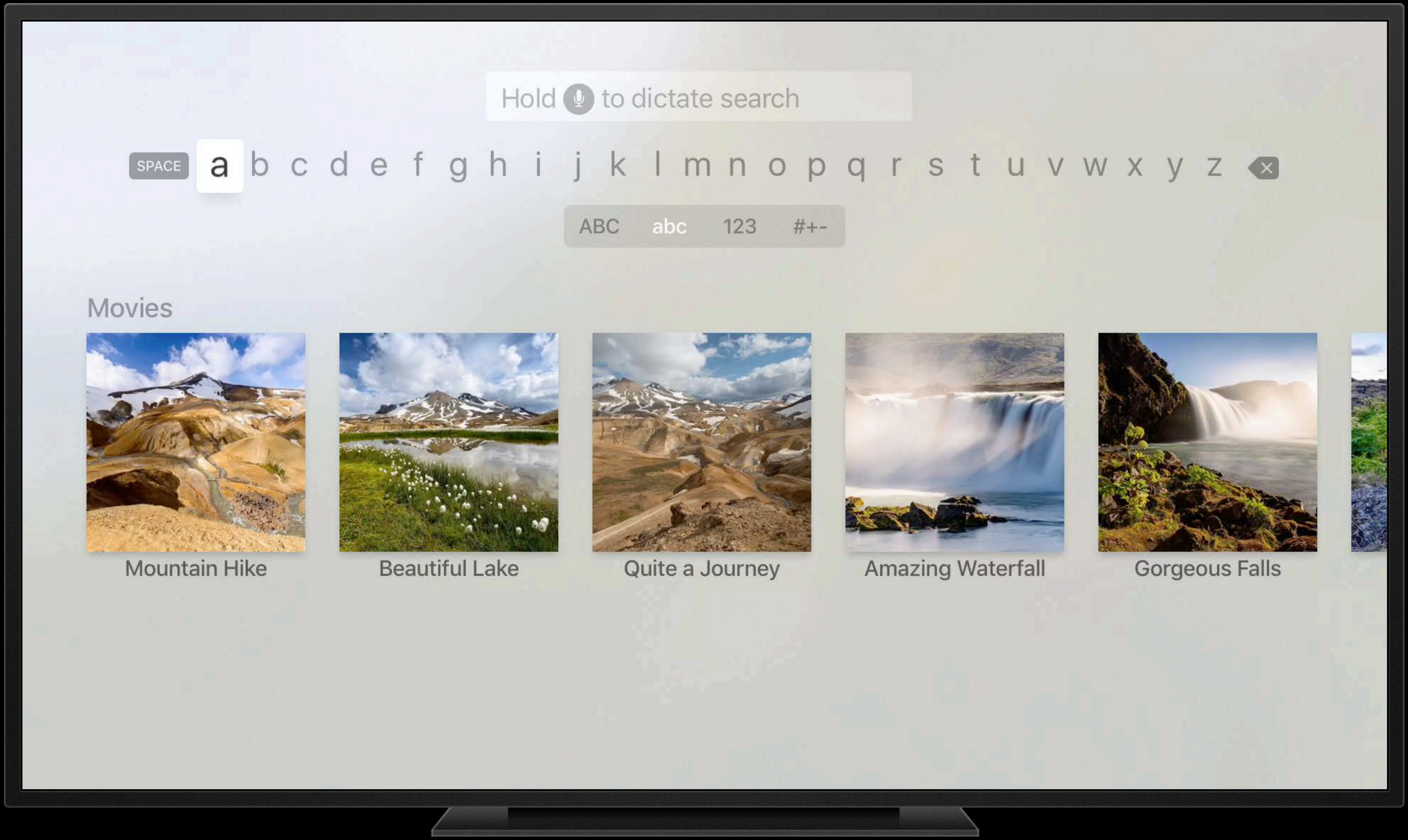
Interactive Video Overlays

Custom Collection Cells

New Player API's

Web Inspector Enhancements


Hold to dictate search
SPACE a b c d e f g h i j k l m n o p q r s t u v w x y z
ABC abc 123 #+-
Movies
Mountain Hike
Beautiful Lake
Quite a Journey
Amazing Waterfall
Gorgeous Falls


Hold to dictate search
SPACE a b c d e f g h i j k l m n o p q r s t u v w x y z
ABC abc 123 #+-
Movies
Mountain Hike
Beautiful Lake
Quite a Journey
Amazing Waterfall
Gorgeous Falls

TVMLKit

New Styles and Attributes

Embedded Video

New Lockups

Animatable DOM Updates

Image Placeholders

Audio Now Playing

ECMAScript 6

Multi-row Shelf

Light and Dark Appearance

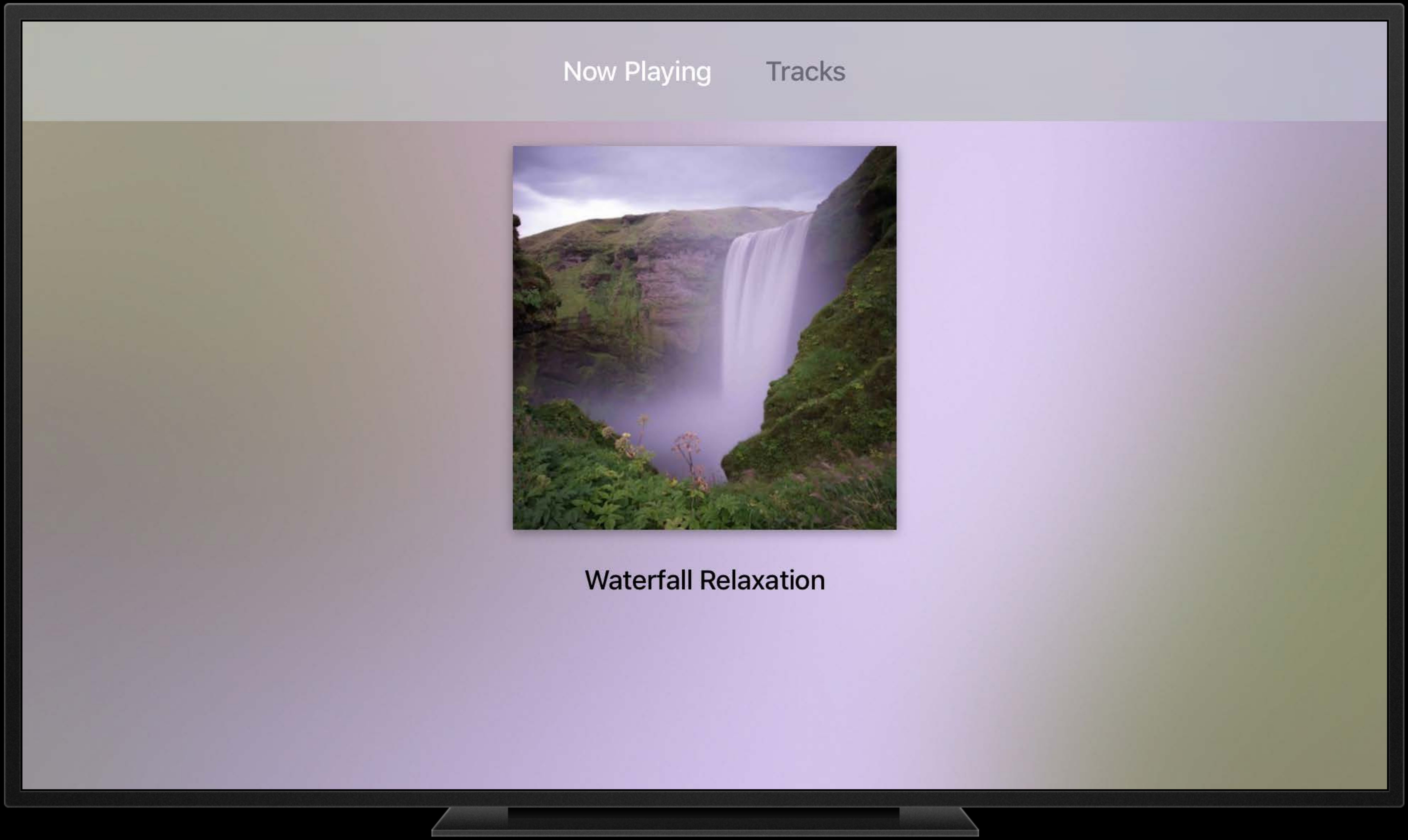
Slideshow

Interactive Video Overlays

Custom Collection Cells

New Player API's

Web Inspector Enhancements


Now Playing
Tracks
Waterfall Relaxation

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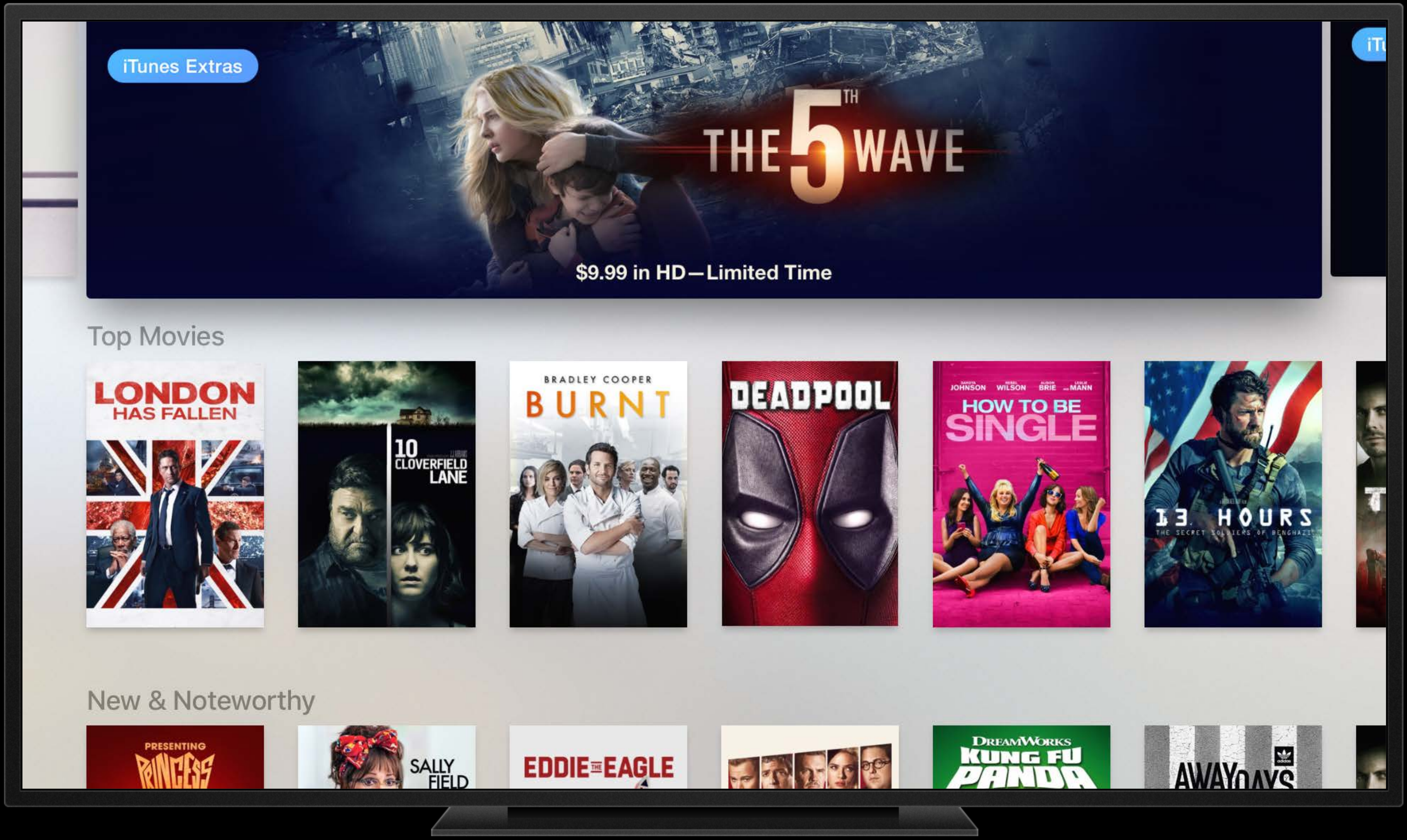
New Player API's

Web Inspector Enhancements

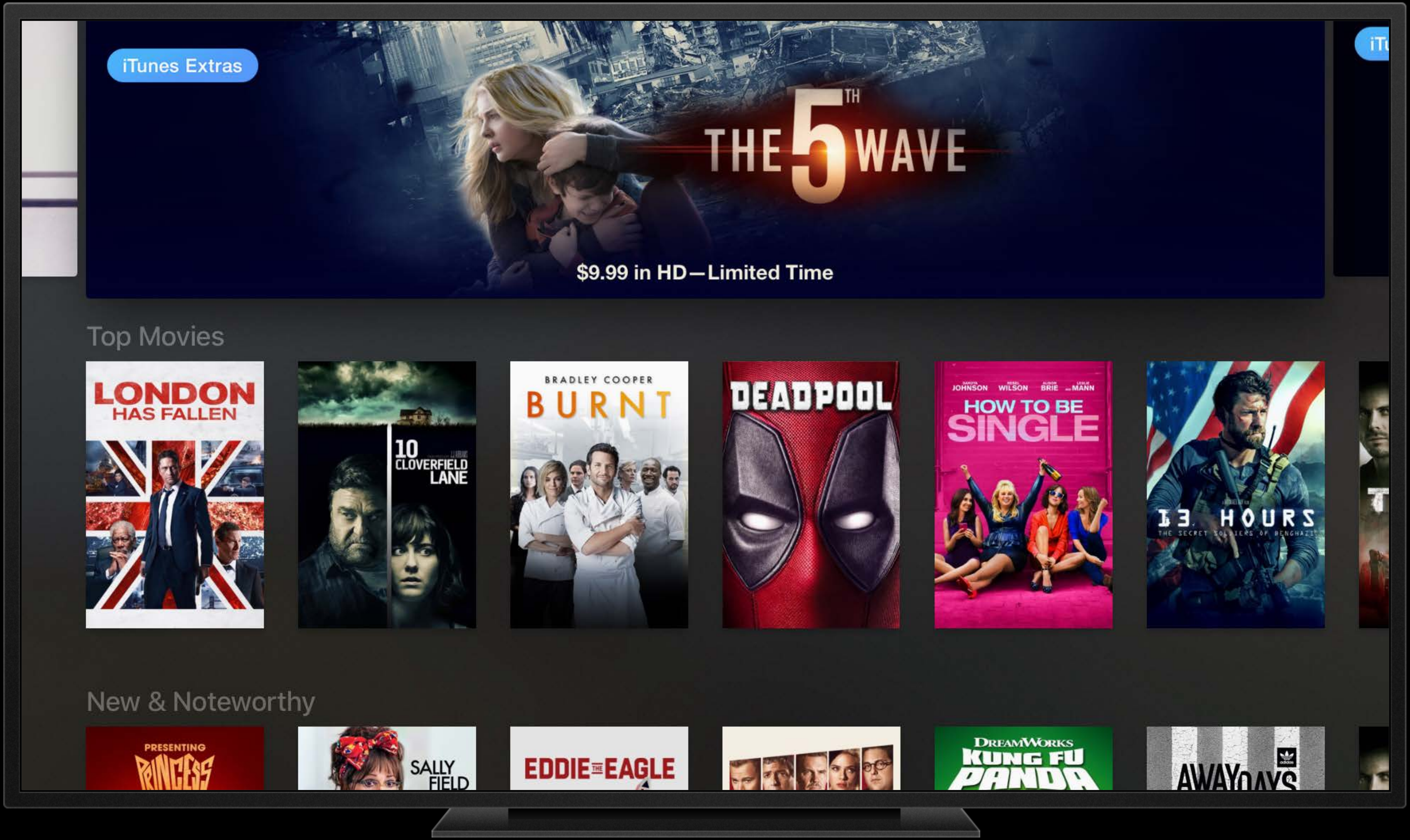
Light / Dark

NEW



Light / Dark

NEW



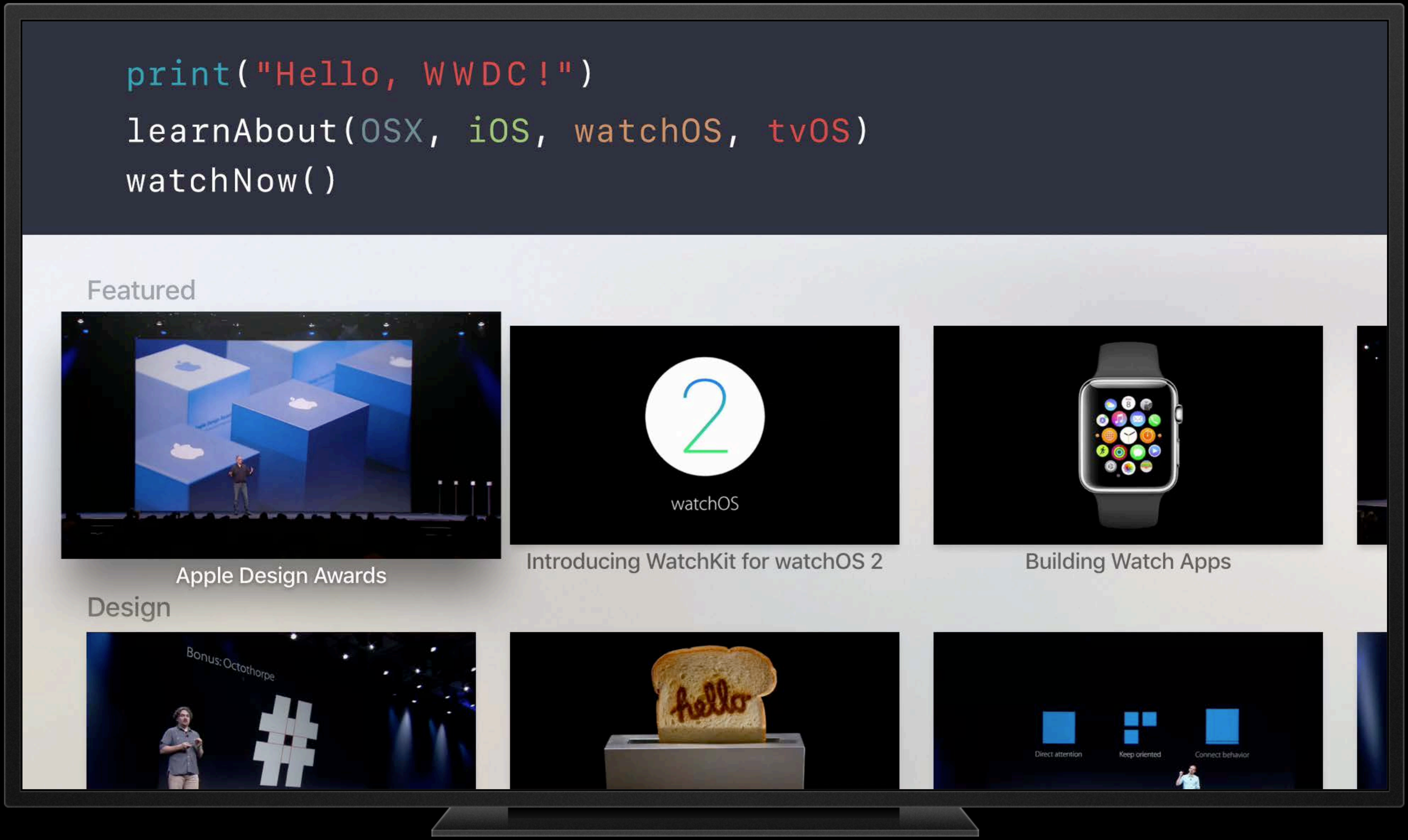
```
// tv-theme media query property

<document>
   <head>
      <style>
         .foo { color: rgb(0, 0, 0); }
      </style>
   </head>
   <templateName>
      ...
      <title class="foo">text</title>
      ...
   </templateName>
</document>
```

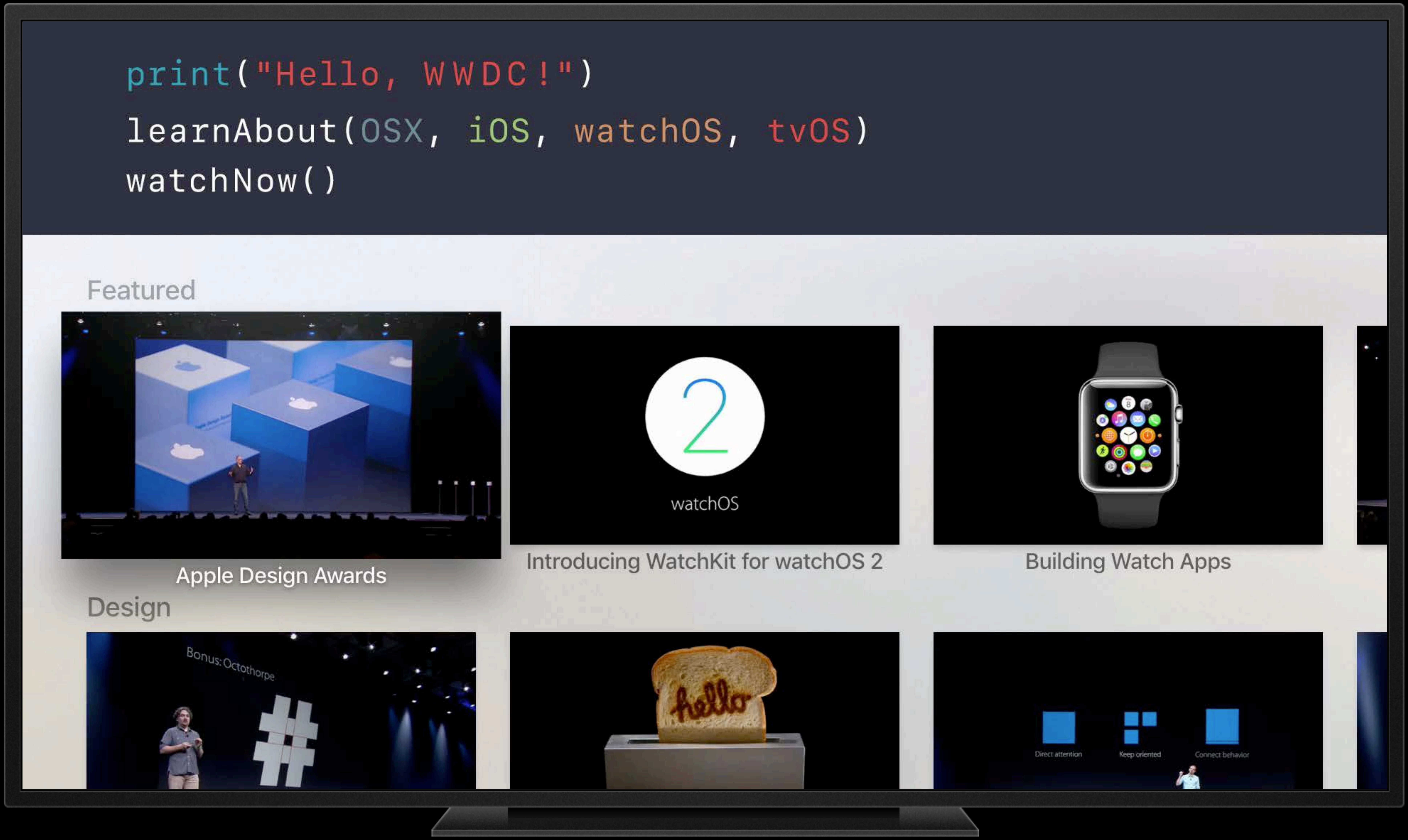
```
// tv-theme media query feature

<document>
   <head>
      <style>
         @media tv-template and (tv-theme:light) {
            .foo { color: rgb(0, 0, 0); }
         }
         @media tv-template and (tv-theme:dark) {
            .foo { color: rgb(255, 255, 255); }
         }
      </style>
   </head>
   <templateName>
      ...
      <title class="foo">text</title>
      ...
   </templateName>
</document>
```

Embedded Video Playback



```
print("Hello, WWDC!")
learnAbout(OSX, iOS, watchOS, tvOS)
watchNow()
```



```
print("Hello, WWDC!")
learnAbout(OSX, iOS, watchOS, tvOS)
watchNow()
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Featured

Apple Design Awards

Introducing WatchKit for watchOS 2

Building Watch Apps

Design

Embedded Video Playback

NEW

Playback context inside templates

Embedded Video Playback

NEW

Playback context inside templates

Plays on focus, or always

Embedded Video Playback

NEW

Playback context inside templates

Plays on focus, or always

Transitions to full screen

Embedded Video Playback

NEW

Playback context inside templates

Plays on focus, or always

Transitions to full screen

Supports all player functionality

Embedded Video Playback

NEW

Steps to configure

Configure template

Embedded Video Playback

NEW

Steps to configure

Configure template

Configure player

Embedded Video Playback

Steps to configure

NEW

Configure template

Configure player

Transition to fullscreen

Embedded Video Playback

NEW

Configure template

Wrap <img> with <mediaContent>

Embedded Video Playback

NEW

Configure template

Wrap <img> with <mediaContent>

Configure playback mode

Embedded Video Playback

NEW

Configure template

Wrap <img> with <mediaContent>

Configure playback mode

```
<lockup>
   <mediaContent playbackMode="onFocus">
      <img src="http://host/image.jpg" width="548" height="308"/>
   </mediaContent>
<lockup>
```

Embedded Video Playback

Configure template

NEW

Wrap <img> with <mediaContent>

Configure playback mode

```
<lockup>
    <mediaContent playbackMode="onFocus">
        <img src="http://host/image.jpg" width="548" height="308"/>
    </mediaContent>
<lockup>
```

Embedded Video Playback

NEW

Configure template

Wrap <img> with <mediaContent>

Configure playback mode

```
<lockup>
    <mediaContent playbackMode="onFocus">
        <img src="http://host/image.jpg" width="548" height="308"/>
    </mediaContent>
<lockup>
```

Embedded Video Playback

Configure player

NEW

Player per <mediaContent>

Access with 'Player' feature

Embedded Video Playback

Configure player

NEW

Player per <mediaContent>

Access with ‘Player’ feature

```
var mediaContentElement = document.getElementsByTagName('mediaContent').item(0);
var player = mediaContentElement.getFeature('Player');
player.playlist = playlist;
```

Embedded Video Playback

Transition to fullscreen

NEW

Does not transition automatically

Embedded Video Playback

Transition to fullscreen

NEW

Does not transition automatically

```
document.addEventListener('select', function(event) {
   var mediaContentElement = event.target.getElementsByTagName('mediaContent').item(0);
   var player = mediaContentElement.getFeature('Player');
   player.present();
});
```

Embedded Video Playback

Transition to fullscreen

NEW

Does not transition automatically

```
document.addEventListener('select', function(event) {
    var mediaContentElement = event.target.getElementsByTagName('mediaContent').item(0);
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});
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Embedded Video Playback

Transition to fullscreen

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Does not transition automatically

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document.addEventListener('select', function(event) {
    var mediaContentElement = event.target.getElementsByTagName('mediaContent').item(0);
    var player = mediaContentElement.getFeature('Player');
    player.present();
});
```
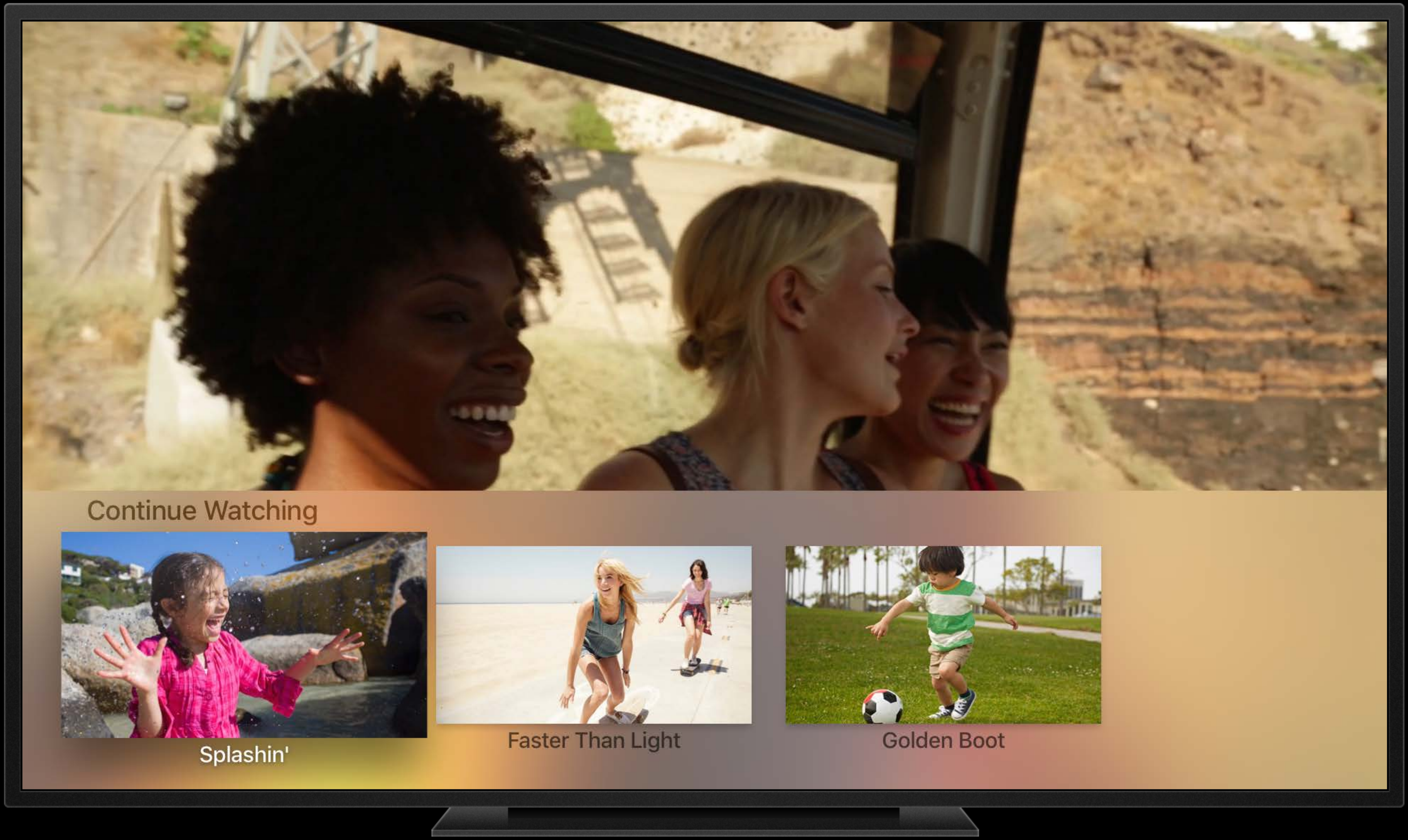
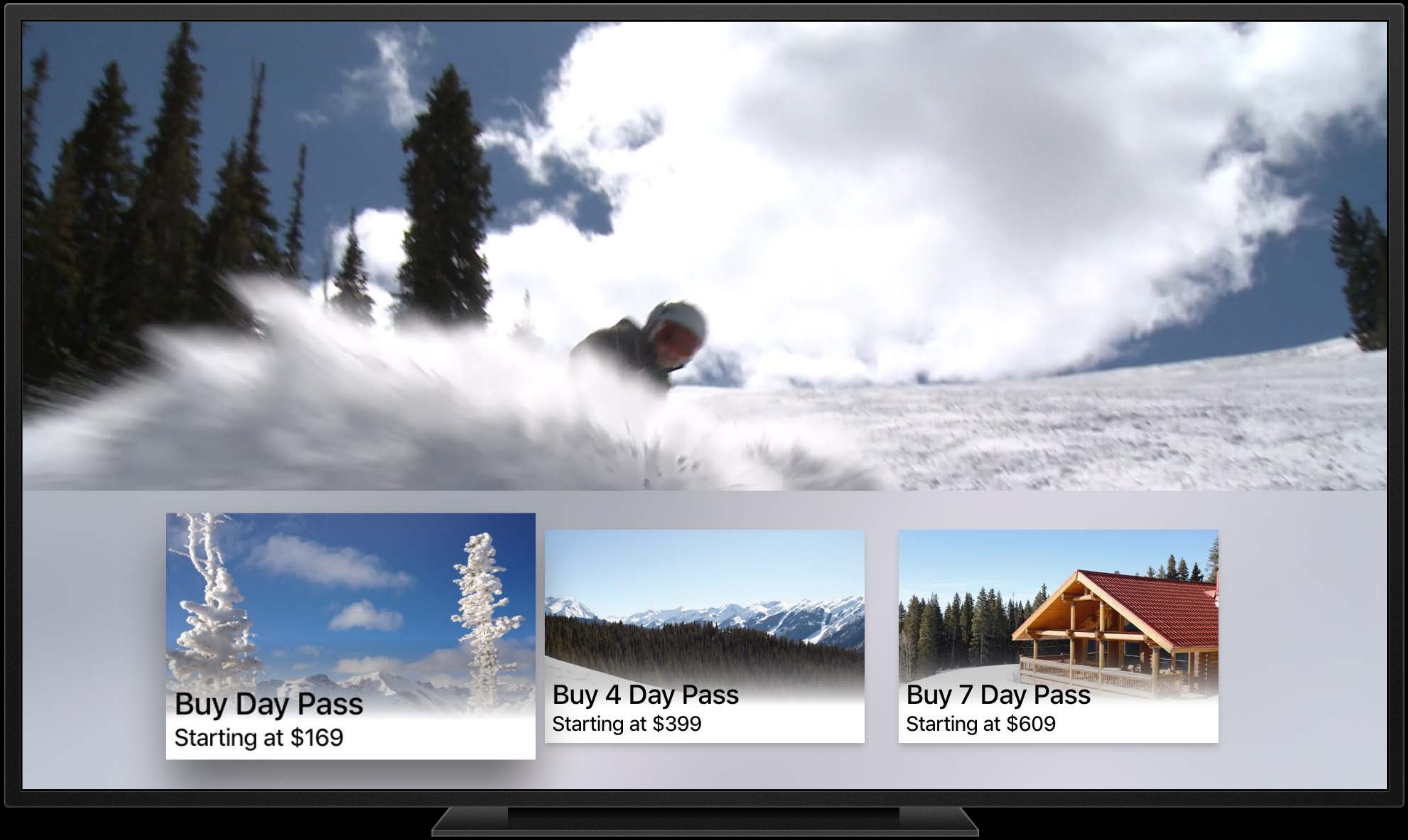
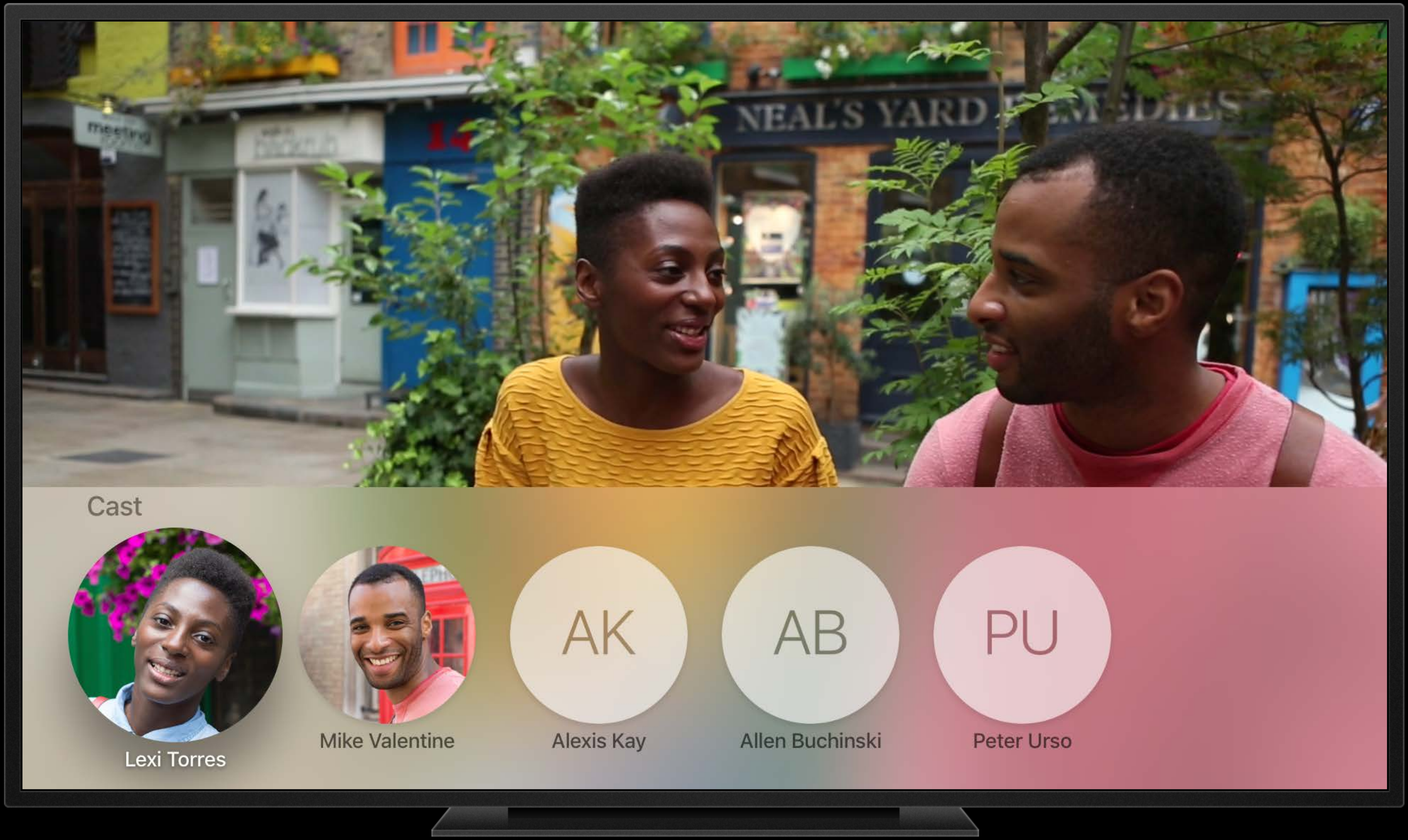

Interactive Video Overlays


Continue Watching
Splashin'
Faster Than Light
Golden Boot


Buy Day Pass
Starting at $169
Buy 4 Day Pass
Starting at $399
Buy 7 Day Pass
Starting at $609


Cast
Lexi Torres
Mike Valentine
AK
Alexis Kay
AB
Allen Buchinski
PU
Peter Urso

Interactive Video Overlays

NEW

One per player

Use any template

Presented on full screen video

Interactive Video Overlays

NEW

One per player

Use any template

Presented on full screen video

```
// Set a document to present over the player.
player.modalOverlayDocument = document;
```

Demo

Appearance, embedded video and interactive video overlay

Jeff Tan-Ang tvOS Design Engineer

Recap

Adopt dark appearance

Recap

Adopt dark appearance

Immersive using embedded videos

Recap

Adopt dark appearance

Immersive using embedded videos

Interactive video overlays

Summary

Native experience

Summary

Native experience

Rapid development

Summary

Native experience

Rapid development

New features

More Information

https://developer.apple.com/wwdc16/212

Related Sessions

Designing for tvOS	Presidio	Tuesday 4:00PM
Mastering UIKit on tvOS	Presidio	Wednesday 10:00AM
Focus Interaction on tvOS	Mission	Wednesday 4:00PM
Developing tvOS Apps Using TVMLKit: Part 2	Mission	Thursday 4:00PM

Labs

tvOS Lab	Frameworks Lab D	Wednesday 2:00PM
TVMLKit Lab	Graphics, Games, and Media Lab B	Wednesday 3:00PM
tvOS Lab	Frameworks Lab D	Thursday 9:00AM
TVMLKit Lab	Graphics, Games, and Media Lab C	Friday 9:00AM

WWDC16