Multitasking Essentials for Media-Based Apps on iPad in iOS 9

Adopting Picture in Picture and Mastering Shared Resources

Session 211

Stefan Hafeneger Picture in Picture Architect
Jonathan Bennett Media Systems Product Lead

Multitasking Sessions

Getting Started with Multitasking on iPad in iOS 9	Presidio	Tuesday 4:30PM
Multitasking Essentials for Media-Based Apps on iPad in iOS 9	Pacific Heights	Wednesday 2:30PM
Optimizing Your App for Multitasking on iPad in iOS 9	Presidio	Wednesday 3:30PM

Multitasking Sessions

Getting Started with Multitasking on iPad in iOS 9	Presidio	Tuesday 4:30PM
Multitasking Essentials for Media-Based Apps on iPad in iOS 9	Pacific Heights	Wednesday 2:30PM
Optimizing Your App for Multitasking on iPad in iOS 9	Presidio	Wednesday 3:30PM

What You Will Learn

Adopt Picture in Picture in video playback applications

Master shared resources in multitasking environment

iPad 9:41 AM 100%

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TRIP MATCHMAKER: FIND YOUR PERFECT HONEYMOON

HIT LIST

Trip Matchmaker: Find Your Perfect Honeymoon

Found your forever travel partner? Congrats! Now we'd like to set you up with an equally perfect honeymoon. Nikki Ridgway plays matchmaker, pairing 10 types of honeymooners with a soul mate of a getaway

1

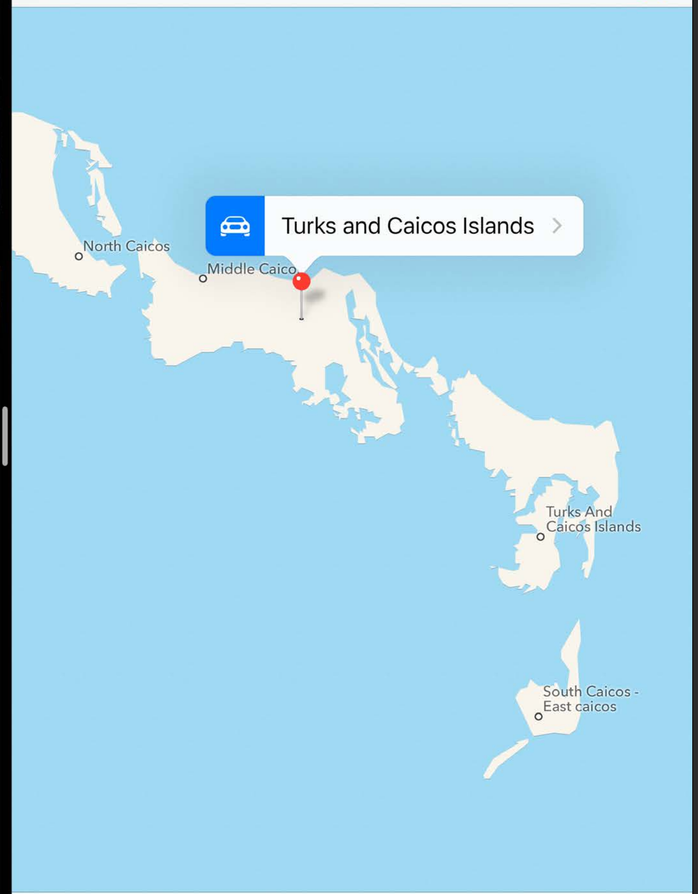
Best for Beach Bliss
Turks & Caicos

Where to Stay

Banyan Tree Mayakoba
Playa del Carmen, Quintana Roo, Mexico

Park Hyatt Maldives Hadahaa
Gaafu Alifu, Maldives

Turks and Caicos Islands



Picture in Picture

Picture in Picture = PiP

Picture in Picture

Supported hardware

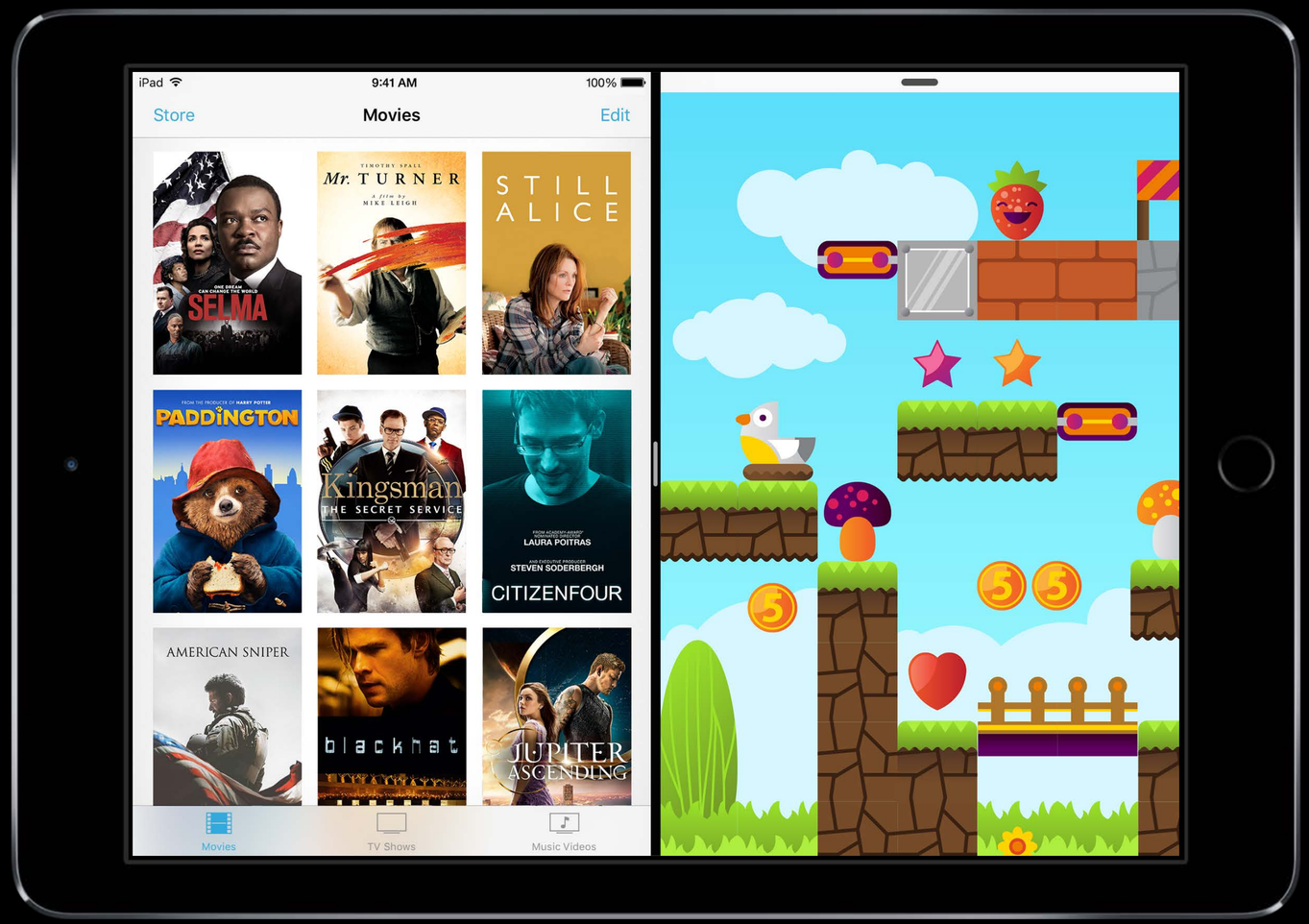
iPad Air 2

iPad Air

iPad mini 3

iPad mini 2

Should my app adopt Picture in Picture?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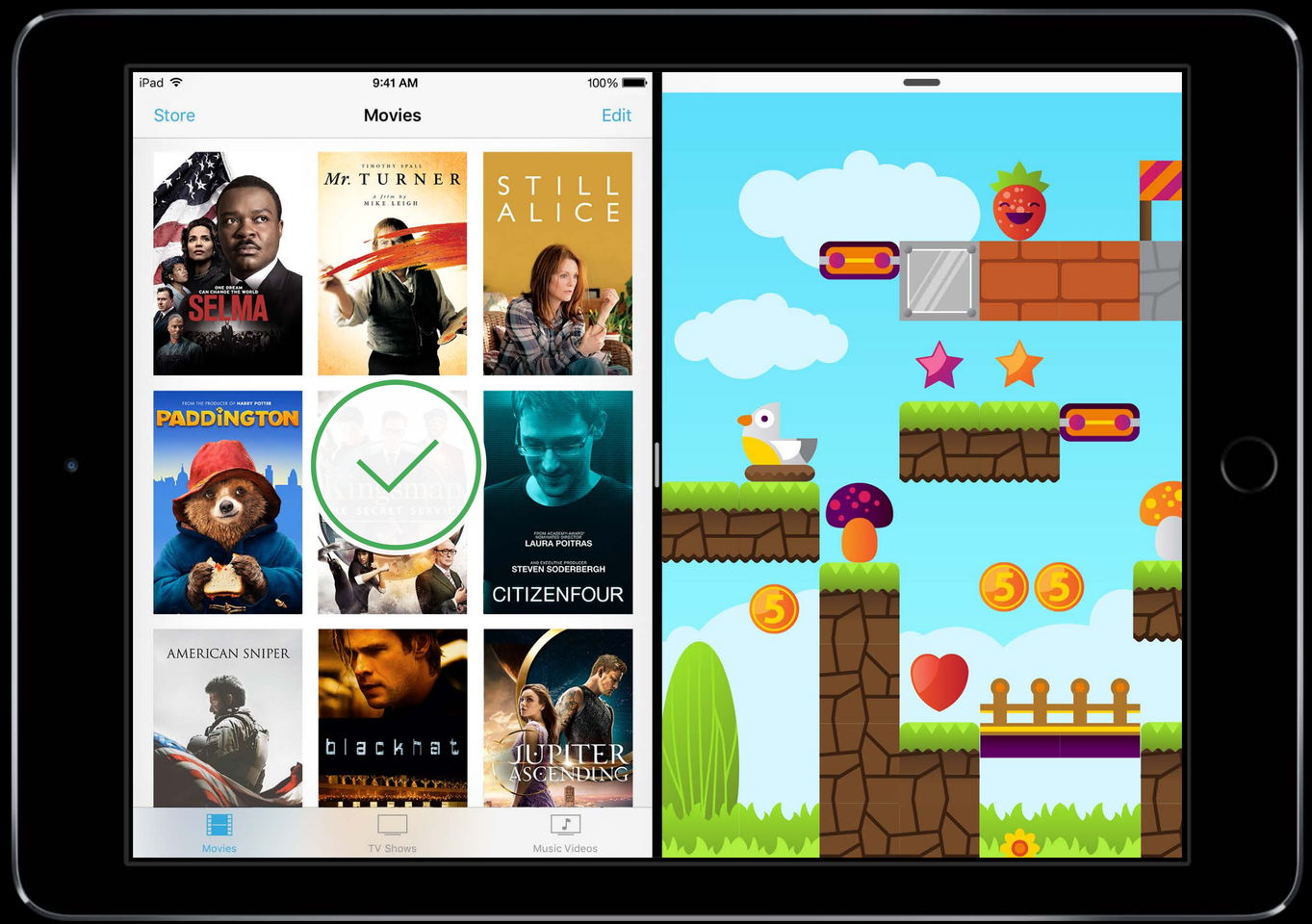
Music Videos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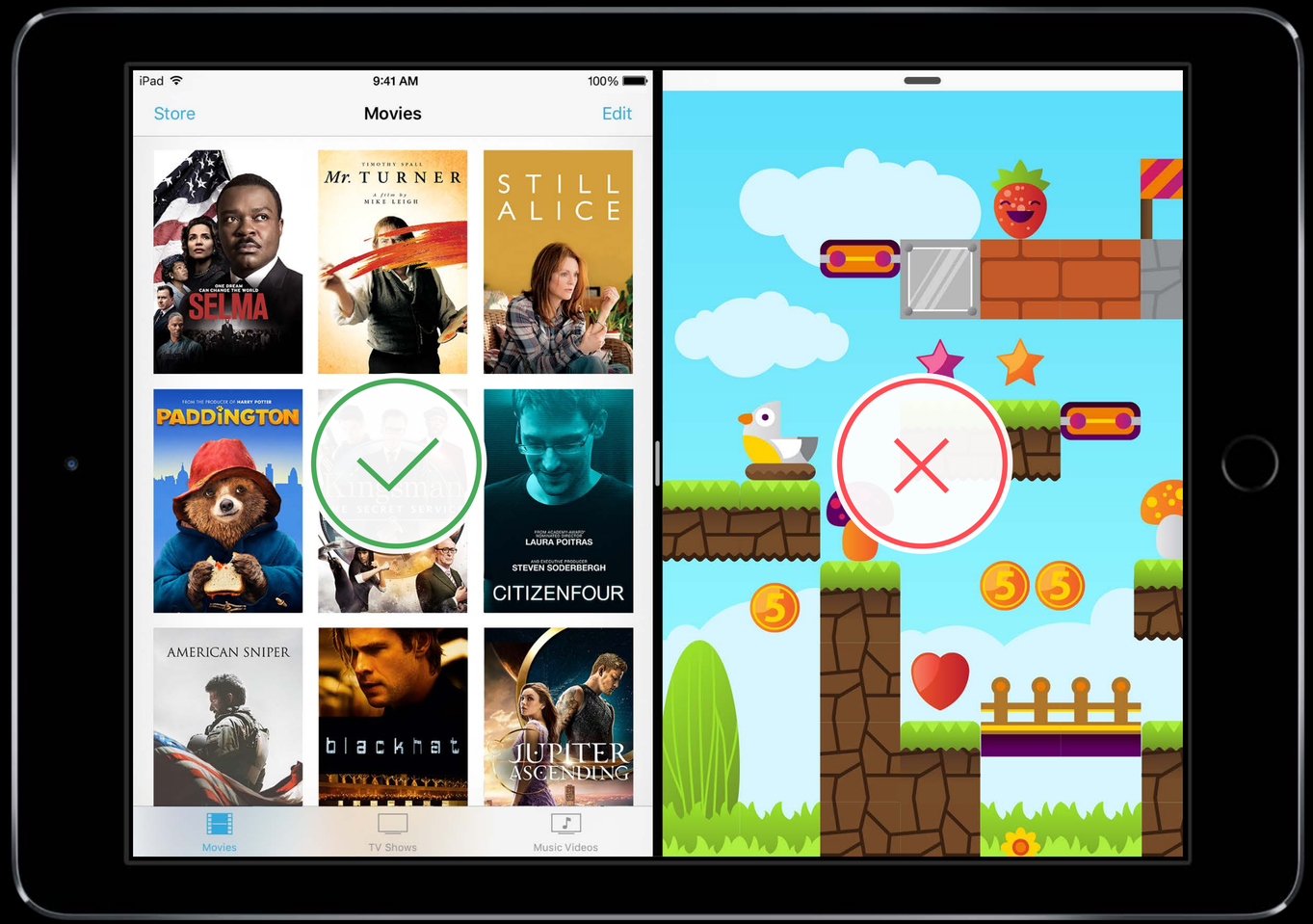
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JUPITER ASCENDING
Movies
TV Shows
Music Videos

Video Playback APIs

iOS 8

MediaPlayer

AVKit

AVFoundation

WebKit

Video Playback APIs

iOS 8

MediaPlayer

Video Playback APIs

Deprecated APIs in iOS 9

`MPMoviePlayerController`

`MPMoviePlayerViewController`

MediaPlayer

Video Playback APIs

Deprecated APIs in iOS 9

`MPMoviePlayerController`

`MPMoviePlayerViewController`

MediaPlayer

Replaced by **`AVPlayerViewController`**

- Introduced in AVKit in iOS 8

Video Playback APIs

Deprecated APIs in iOS 9

`MPMoviePlayerController`

`MPMoviePlayerViewController`

MediaPlayer

Replaced by **`AVPlayerViewController`**

- Introduced in AVKit in iOS 8

Video Playback APIs

iOS 9

AVKit

AVFoundation

WebKit

AVPlayerLayer


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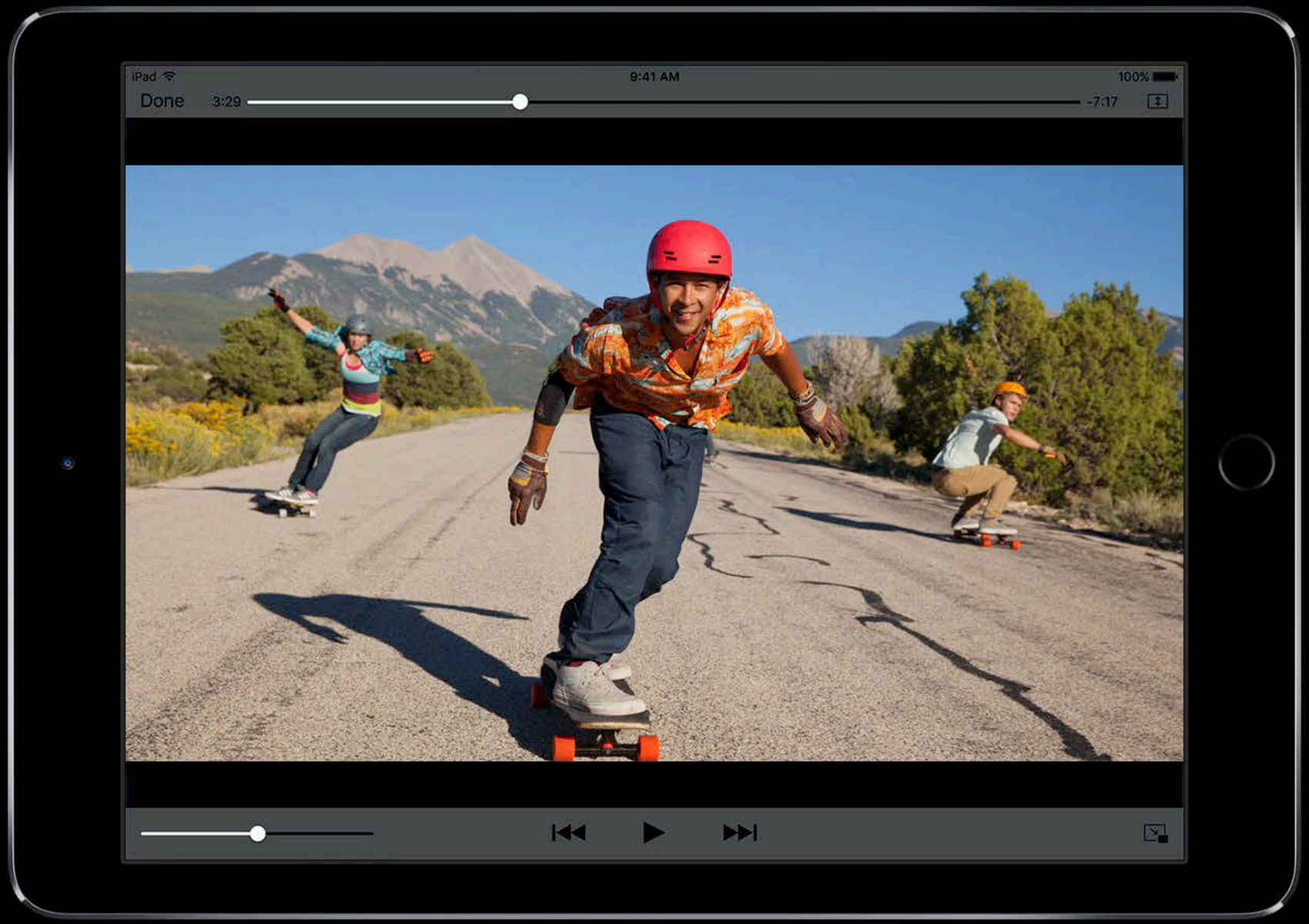
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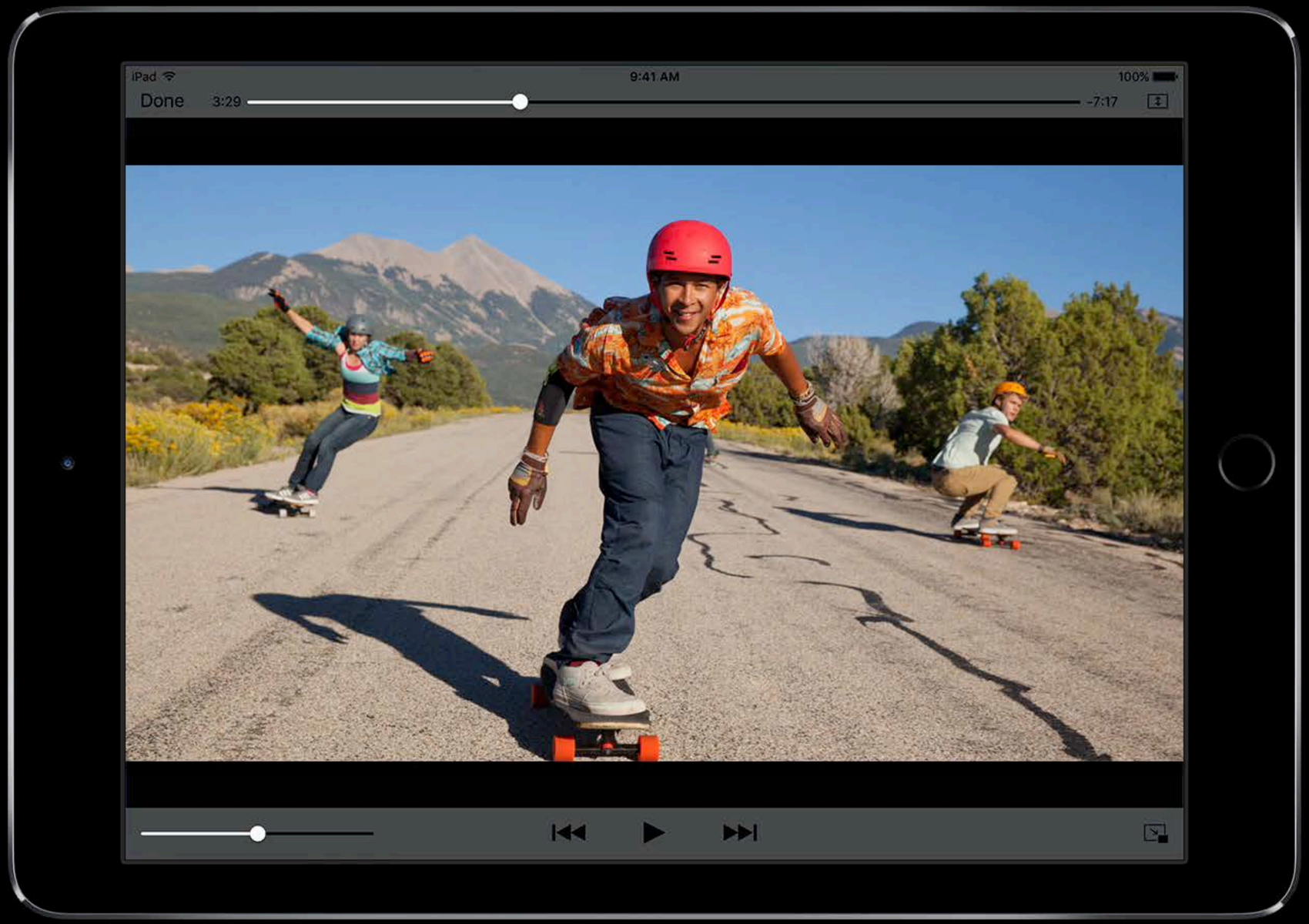
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Contacts
Reminders
iBooks


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This video is playing in Picture in Picture.
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Done 3:29 -7:17

This video is playing in Picture in Picture.


iPad
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FaceTime
Monday
1
Calendar
Photos
Camera
Contacts
Clock
280
Maps
Videos
Notes
Reminders
Photo Booth
Game Center
iTunes Store
App Store
iBooks
Settings
Extras
Messages
Mail
Safari
Music

Picture in Picture

Supported video playback APIs

AVKit

AVFoundation

WebKit

Picture in Picture

Supported video playback APIs

AVKit

AVFoundation

WebKit

AVKit

AVFoundation

WebKit

AVKit

AVFoundation

WebKit

AVKit

AVFoundation

WebKit


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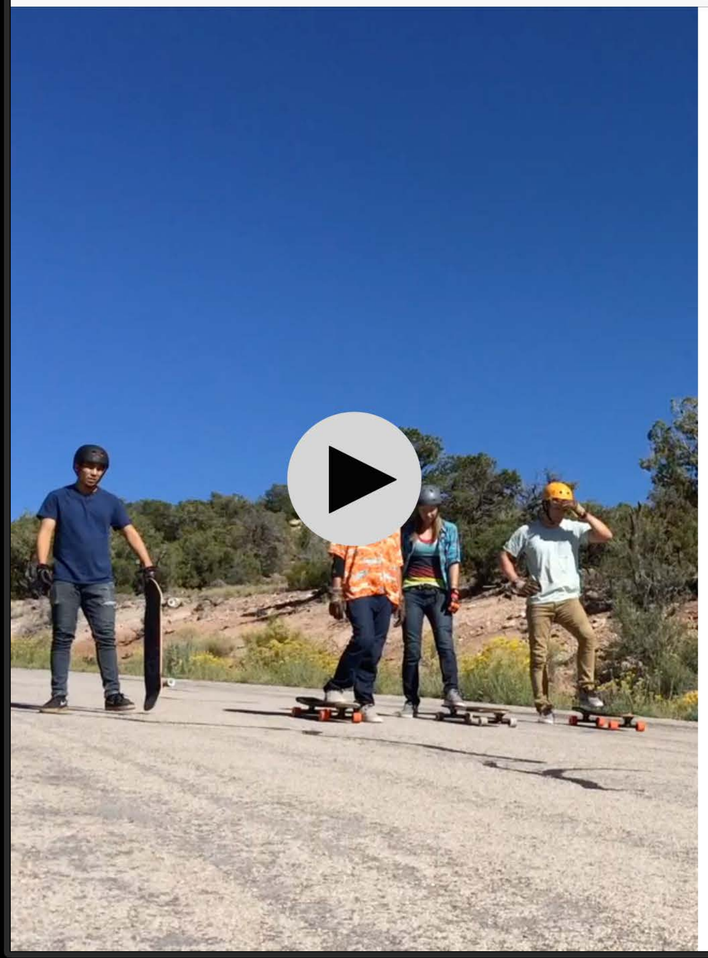
Movie Library



IMG_0353

Creator	John Appleseed
Camera	iPhone 6
Duration	00:01:00
Dimensions	1920 x 1080
Format	H.264, AAC
FPS	30
Data Size	80.8 MB
Data Rate	10.78 Mbit/s
Location	

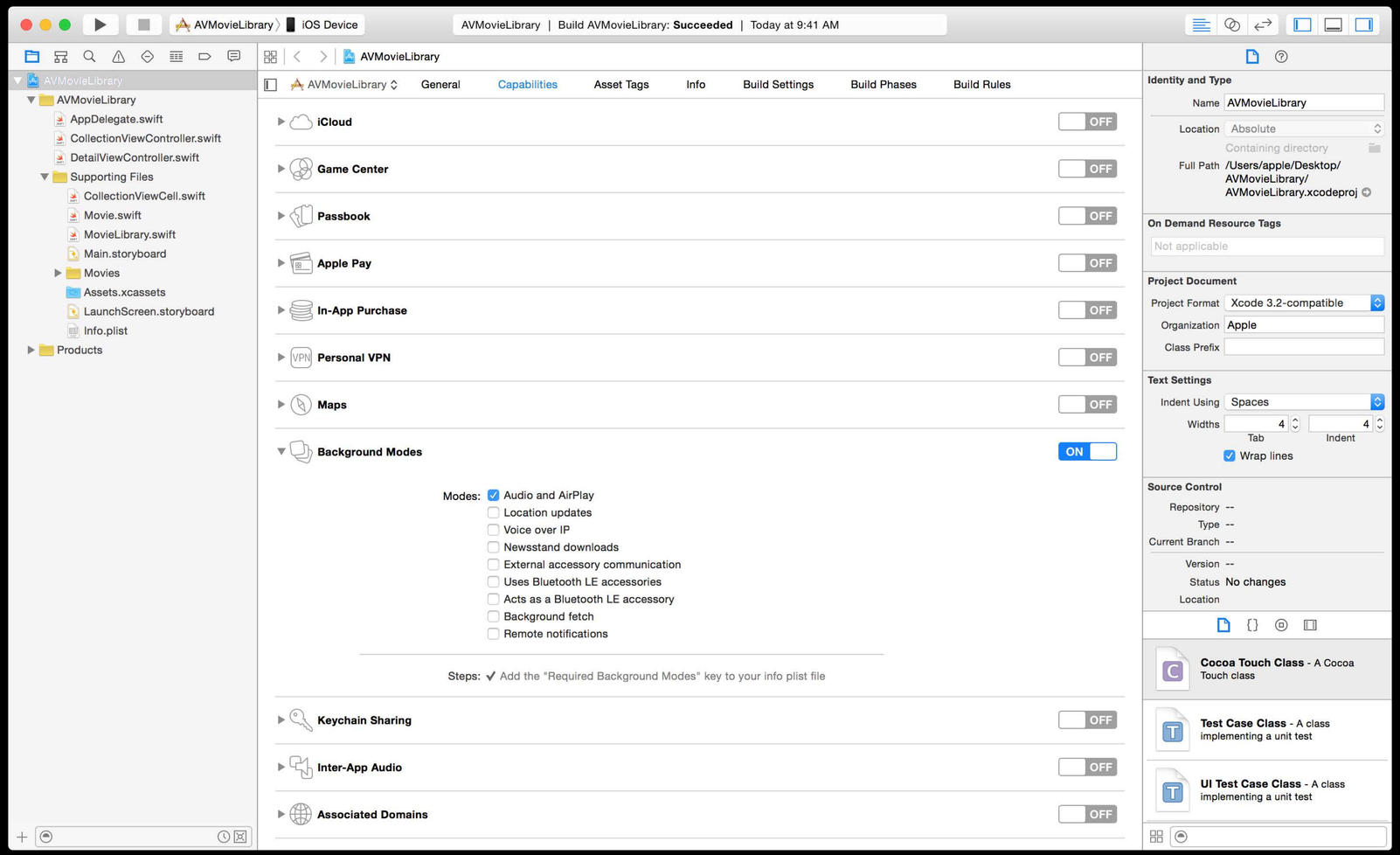
Demo

Adopting Picture in Picture with AVPlayerViewController

Felix Heidrich AVKit Engineer

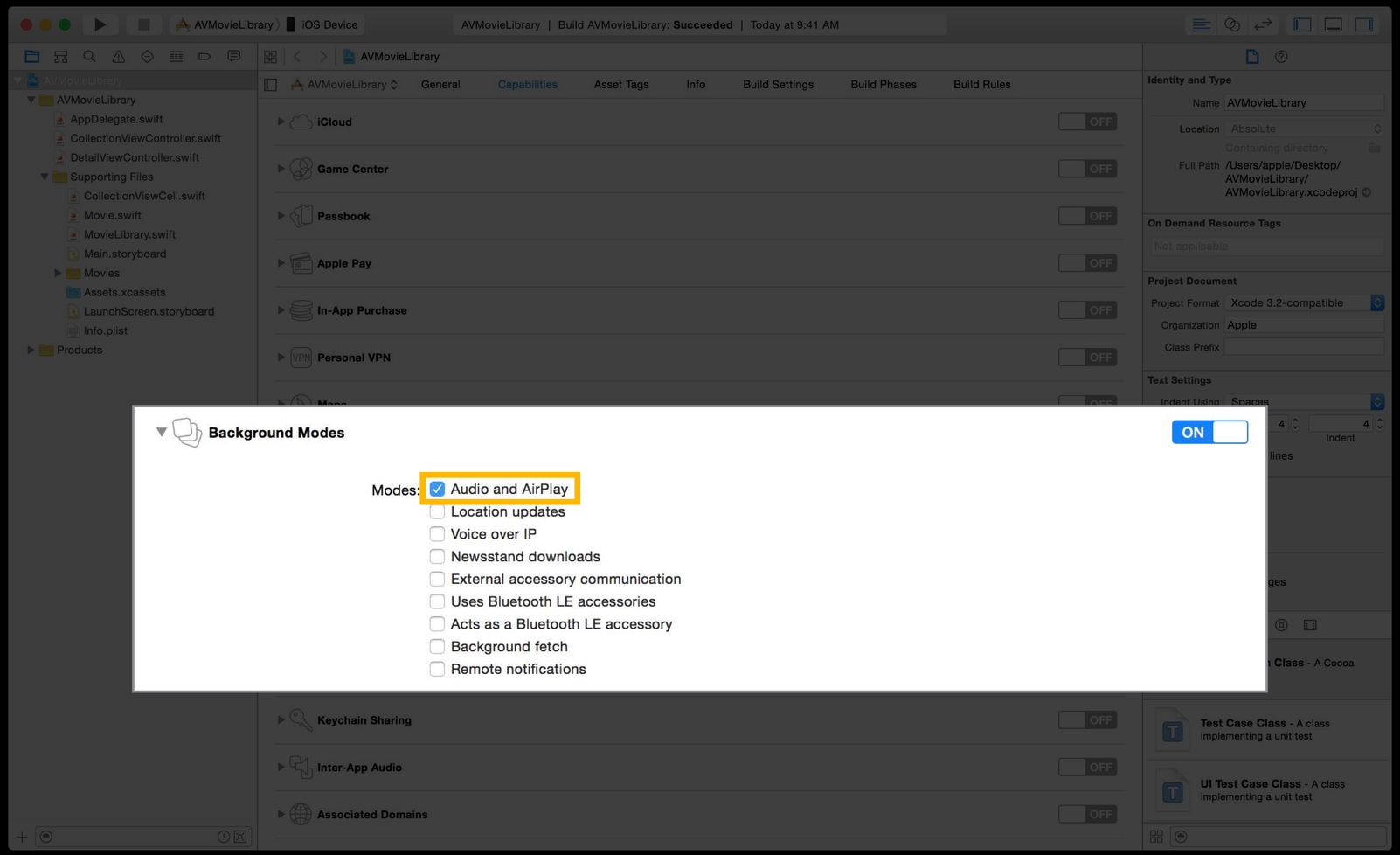
AVPlayerViewController

How to support Picture in Picture



AVPlayerViewController

How to support Picture in Picture



AVPlayerViewController

How to support Picture in Picture

```
func application(application: UIApplication, didFinishLaunchingWithOptions
launchOptions: [NSObject: AnyObject]?) -> Bool {
    // Get shared audio session.
    let audioSession = AVAudioSession.sharedInstance()

    do {
        // Set playback audio session category.
        try audioSession.setCategory(AVAudioSessionCategoryPlayback)
    } catch { … }

    return true
}
```

AVPlayerViewController

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    do {
        // Set playback audio session category.
        try audioSession.setCategory(AVAudioSessionCategoryPlayAndRecord)
    } catch { … }

    return true
}
```

AVPlayerViewController

Disable Picture in Picture playback

```
class AVPlayerViewController : UIViewController {
    // Whether or not to allow Picture in Picture playback. Default is YES.
    var allowsPictureInPicturePlayback: Bool
}
```

AVPlayerViewController

Persistent Video Overlay

Supported in primary application

When application enters background if

- `AVPlayerViewController` is presented full screen
- Video content is playing
- Picture in Picture is possible

AVPlayerViewController

Persistent Video Overlay

User can turn on/off behavior in Settings

- General > Multitasking > Persistent Video Overlay

AVPlayerViewController

Restore user interface before stop

```
func playerViewController(playerViewController: AVPlayerViewController,
restoreUserInterfaceForPictureInPictureStopWithCompletionHandler
completionHandler: (Bool) -> Void) {
    // Present player view controller again.
    navigationController?.presentViewController(playerViewController,
animated: true) {
        // Don’t forget to call completion handler.
        completionHandler(true)
    }
}
```

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AVKit

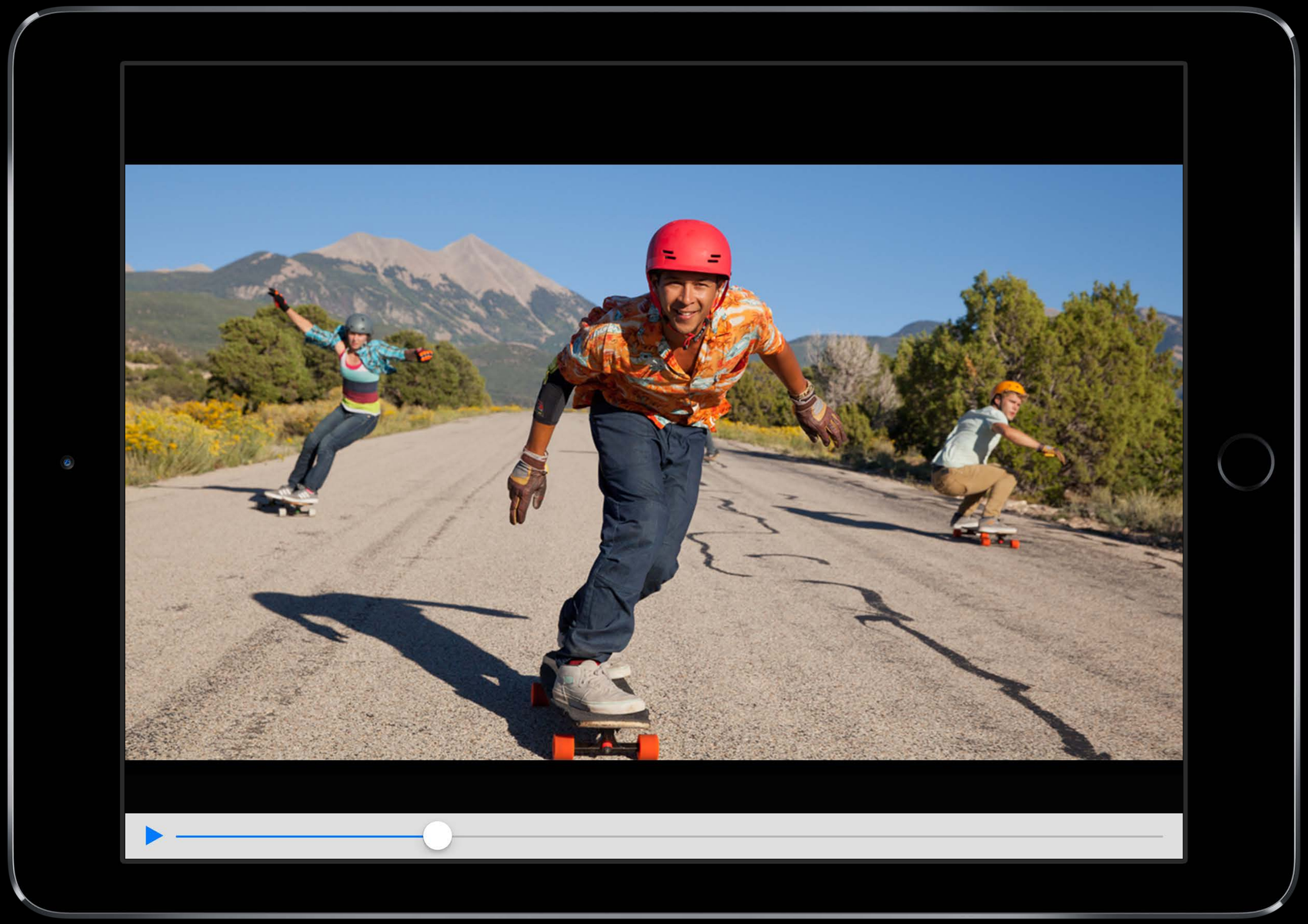
AVFoundation

WebKit

AVKit

AVFoundation

WebKit



This video is playing in Picture in Picture.

AVPictureInPictureController

NEW

New AVKit class in iOS 9

AVKit

AVPictureInPictureController

How to set up

```
// Check whether Picture in Picture is supported on device.
if AVPictureInPictureController.isPictureInPictureSupported() {
    // Create Picture in Picture controller.
    pipController = AVPictureInPictureController(playerLayer: playerLayer)!

    // Set delegate.
    pipController.delegate = self
}
```

AVPictureInPictureController

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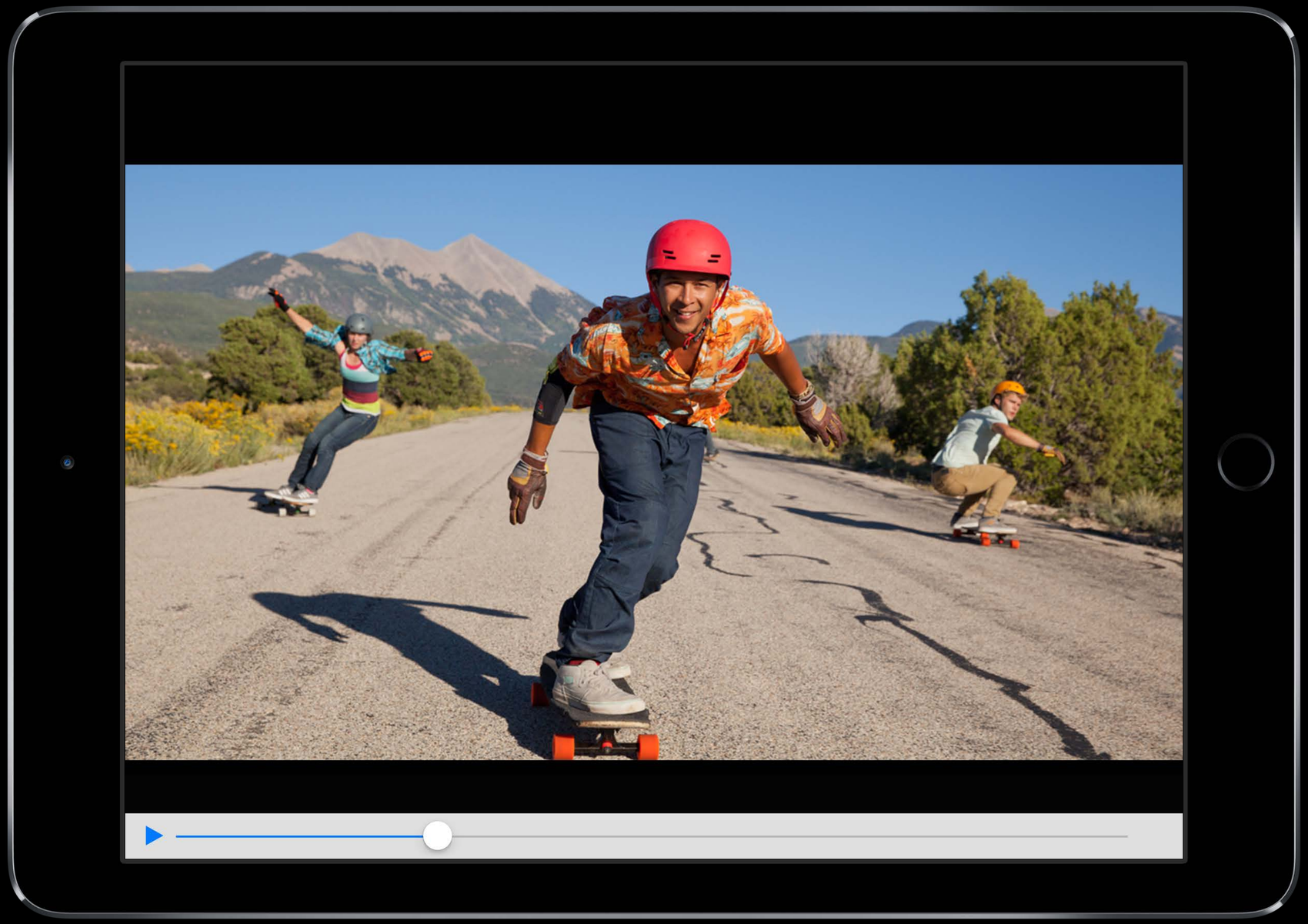

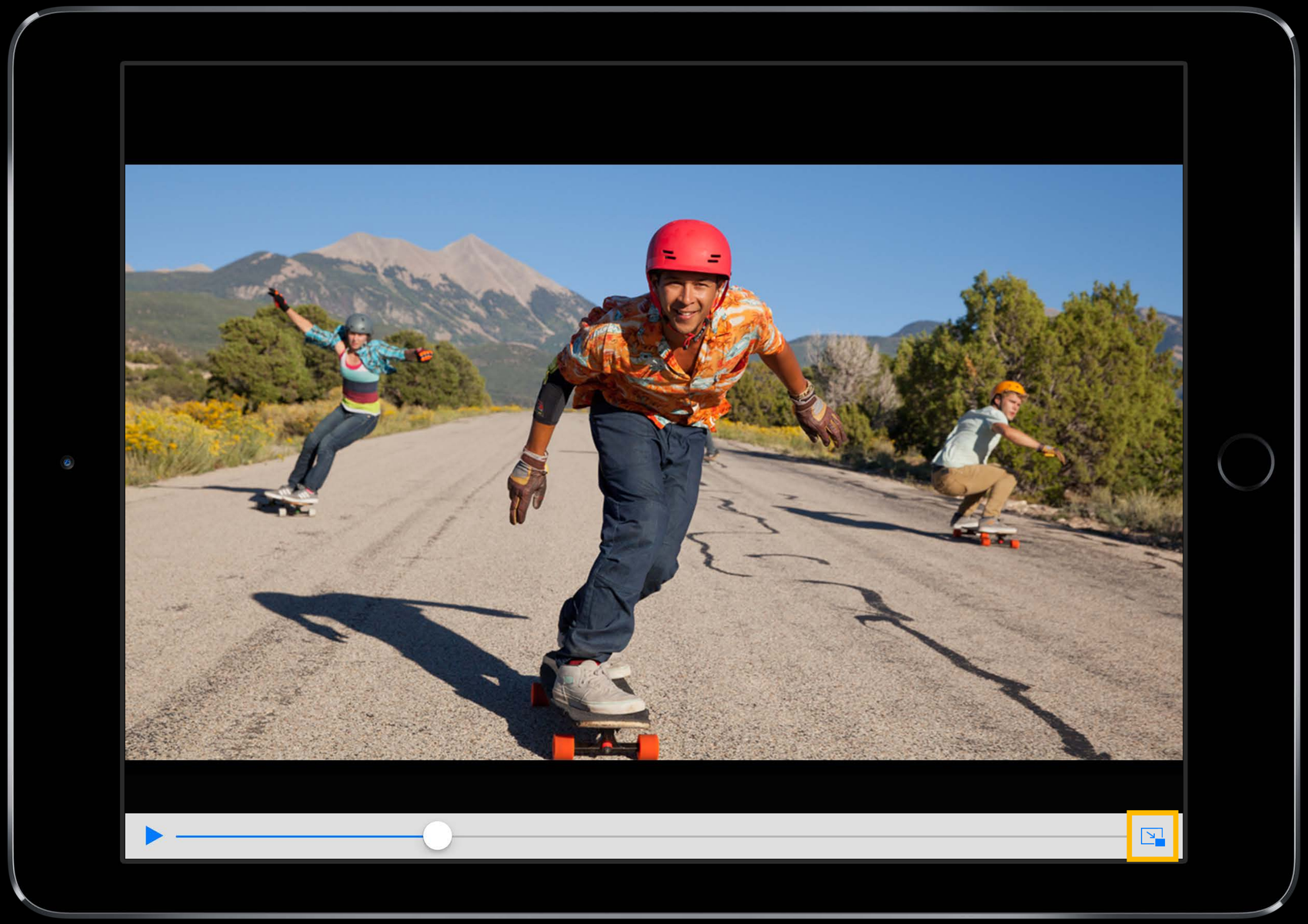

AVPictureInPictureController

Enable/disable Picture in Picture button

```
// Find out whether Picture in Picture is possible.
let pipPossible = pipController.pictureInPicturePossible

// Enable/disable Picture in Picture button.
pipButton.enabled = pipPossible
```

AVPictureInPictureController

Enable/disable Picture in Picture button

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AVPictureInPictureController

Enable/disable Picture in Picture button

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// Enable/disable Picture in Picture button.
pipButton.enabled = pipPossible
```

AVPictureInPictureController

How to start Picture in Picture

```
func pipButtonTapped(sender: AnyObject?) {
    // Make sure Picture in Picture is not already active.
    if !pipController.pictureInPictureActive {
        // Start Picture in Picture on button tap.
        pipController.startPictureInPicture()
    }
}
```

AVPictureInPictureController

How to start Picture in Picture

```
func pipButtonTapped(sender: AnyObject?) {
    // Make sure Picture in Picture is not already active.
    if !pipController.pictureInPictureActive {
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        // Start Picture in Picture on button tap.
        pipController.startPictureInPicture()
    }
}
```

App Store review team will reject your app if used inappropriately

AVPictureInPictureController

Dismiss video playback view controller after start

```
func pictureInPictureControllerDidStartPictureInPicture(pipController:
AVPictureInPictureController) {
    // Dismiss modal video playback view controller.
    dismissViewControllerAnimated(true, completion: nil)
}
```

AVPictureInPictureController

Dismiss video playback view controller after start

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    dismissViewControllerAnimated(true, completion: nil)
}
```

AVPictureInPictureController

While Picture in Picture is active

`pipController`

AVPictureInPictureController

While Picture in Picture is active

AVPictureInPictureController

Restore video playback view controller before stop

```
func pictureInPictureController(pipController: AVPictureInPictureController,
restoreUserInterfaceForPictureInPictureStopWithCompletionHandler
completionHandler: (Bool) -> Void) {
    // Present video playback view controller again.
    navigationController?.presentViewController(self, animated: true) {
        // Don’t forget to call completion handler.
        completionHandler(true)
    }
}
```

AVPictureInPictureController

Restore video playback view controller before stop

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func pictureInPictureController(pipController: AVPictureInPictureController,
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}
```

AVPictureInPictureController

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completionHandler: (Bool) -> Void) {
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AVPictureInPictureController

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completionHandler: (Bool) -> Void) {
    // Present video playback view controller again.
    navigationController?.presentViewController(self, animated: true) {
        // Don’t forget to call completion handler.
        completionHandler(true)
    }
}
```

Need to reuse `AVPlayerLayer` passed to `AVPictureInPictureController`


iPad
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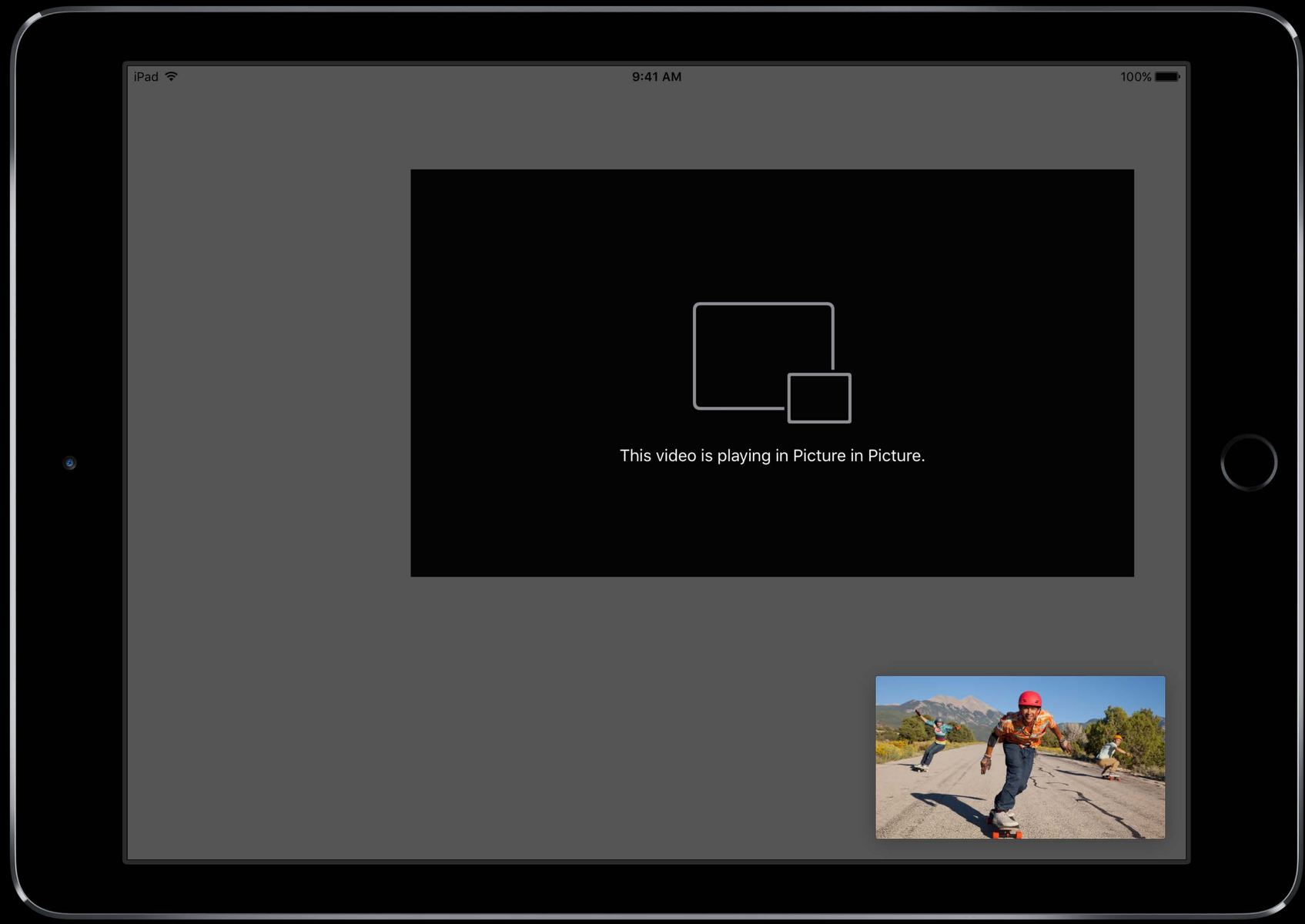
iPad
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100%
This video is playing in Picture in Picture.

AVPictureInPictureController

Hide playback controls and show placeholder artwork

```
func pictureInPictureControllerWillStartPictureInPicture(pipController:
AVPictureInPictureController) {
    // Hide playback controls.
    hidePlaybackControls()

    // Show placeholder artwork.
    showPlaceholderArtwork()
}
```

AVPictureInPictureController

Hide playback controls and show placeholder artwork

```
func pictureInPictureControllerWillStartPictureInPicture(pipController:
AVPictureInPictureController) {
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    hidePlaybackControls()

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AVPictureInPictureController

Hide playback controls and show placeholder artwork

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func pictureInPictureControllerDidStopPictureInPicture(pipController:
AVPictureInPictureController) {
    // Hide placeholder artwork.
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AVPictureInPictureController

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func pictureInPictureControllerDidStopPictureInPicture(pipController:
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AVPictureInPictureController

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AVPictureInPictureController

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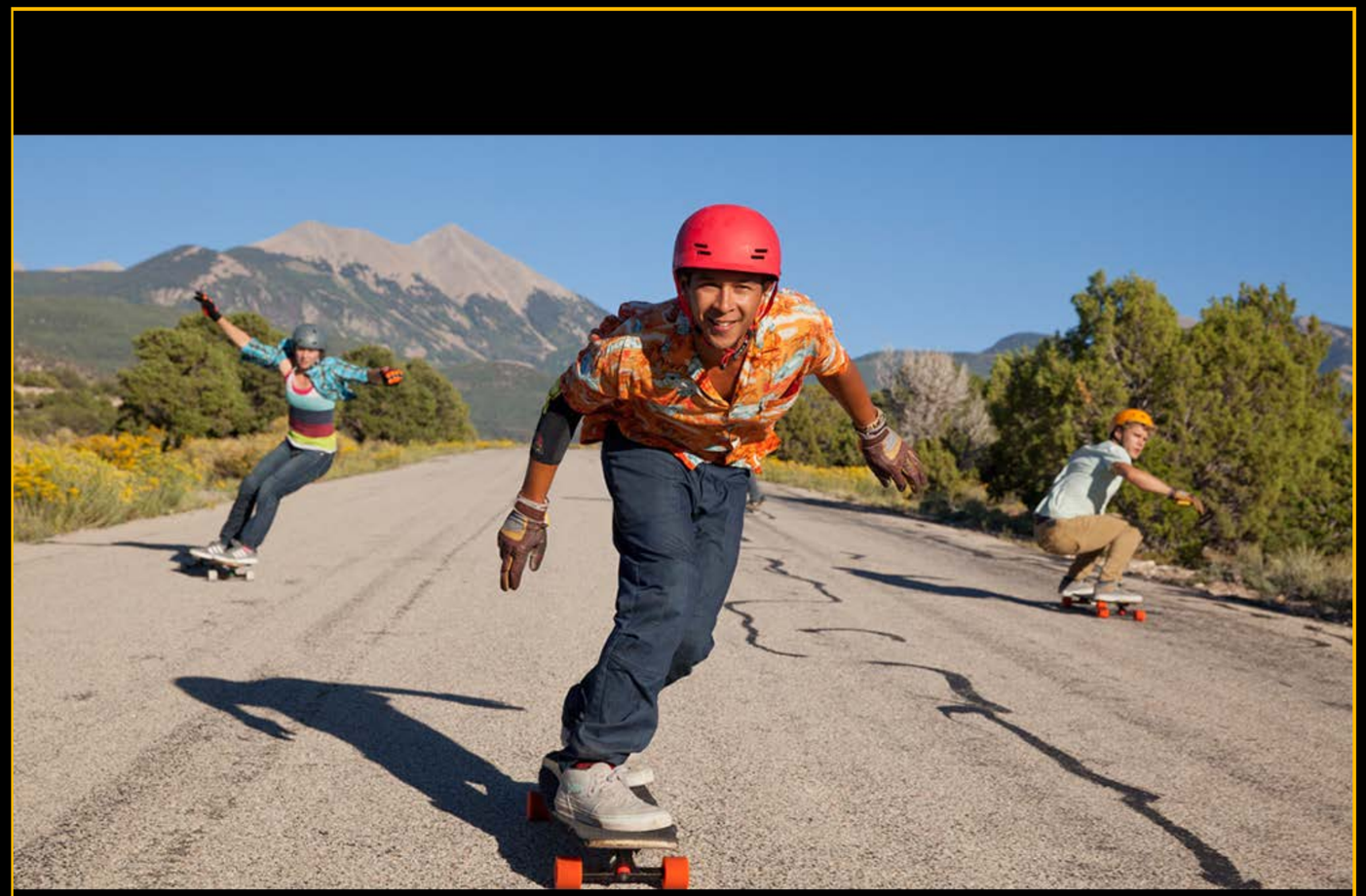
    showPlaybackControls()
}
```

AVPictureInPictureController

Persistent Video Overlay

AVPictureInPictureController

Persistent Video Overlay



UIWindow

AVPictureInPictureController

Sample code

AVFoundationPiPPlayer

AVKit

AVFoundation

WebKit

AVKit

AVFoundation

WebKit

iPad 9:41 AM 100%

apple.com

0:15 -4:29

WKWebView

HTML5 video Picture in Picture support

Application has background audio mode

`AVAudioSession` configured with

- `AVAudioSessionCategoryPlayback`
- `AVAudioSessionCategoryPlayAndRecord`

Web content does not render custom controls

WKWebView

HTML5 video Picture in Picture support

Application has background audio mode

`AVAudioSession` configured with

- `AVAudioSessionCategoryPlayback`
- `AVAudioSessionCategoryPlayAndRecord`

Web content does not render custom controls

What's New in Web Developers in WebKit and Safari Mission Tuesday 9:00AM

WKWebView

Disable HTML5 video Picture in Picture support

```
class WKWebViewConfiguration : NSObject {
    // Whether or not to allow Picture in Picture playback. Default is YES.
    var allowsPictureInPictureMediaPlayback: Bool
}
```

AVKit

AVFoundation

WebKit

AVKit

AVFoundation

WebKit

Picture in Picture

Is a lot like background audio

Same rules as background audio and AirPlay apply

App Store review team will reject app if in violation

Shared Resources

Jonathan Bennett Media Systems Product Lead

Shared Resources

Audio

Video

Camera

Multitasking for iPad

Primary and secondary apps

Fullscreen

Multitasking for iPad

Primary and secondary apps

NEW

Fullscreen

Slide Over

Split View

Picture in Picture

Multitasking for iPad

Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture

Multitasking for iPad

Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture

Multitasking for iPad

Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture

Multitasking for iPad

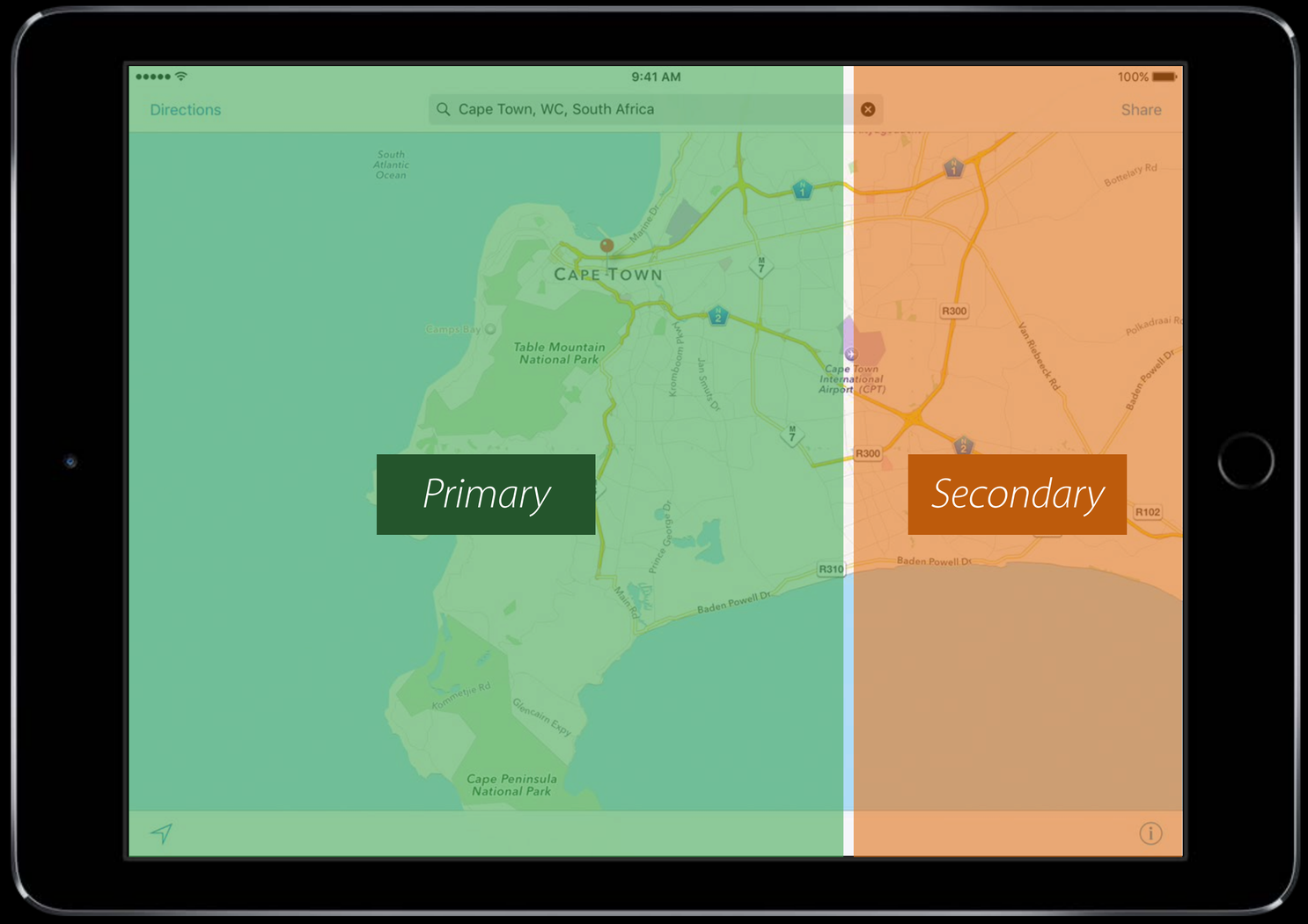
Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture



Multitasking for iPad

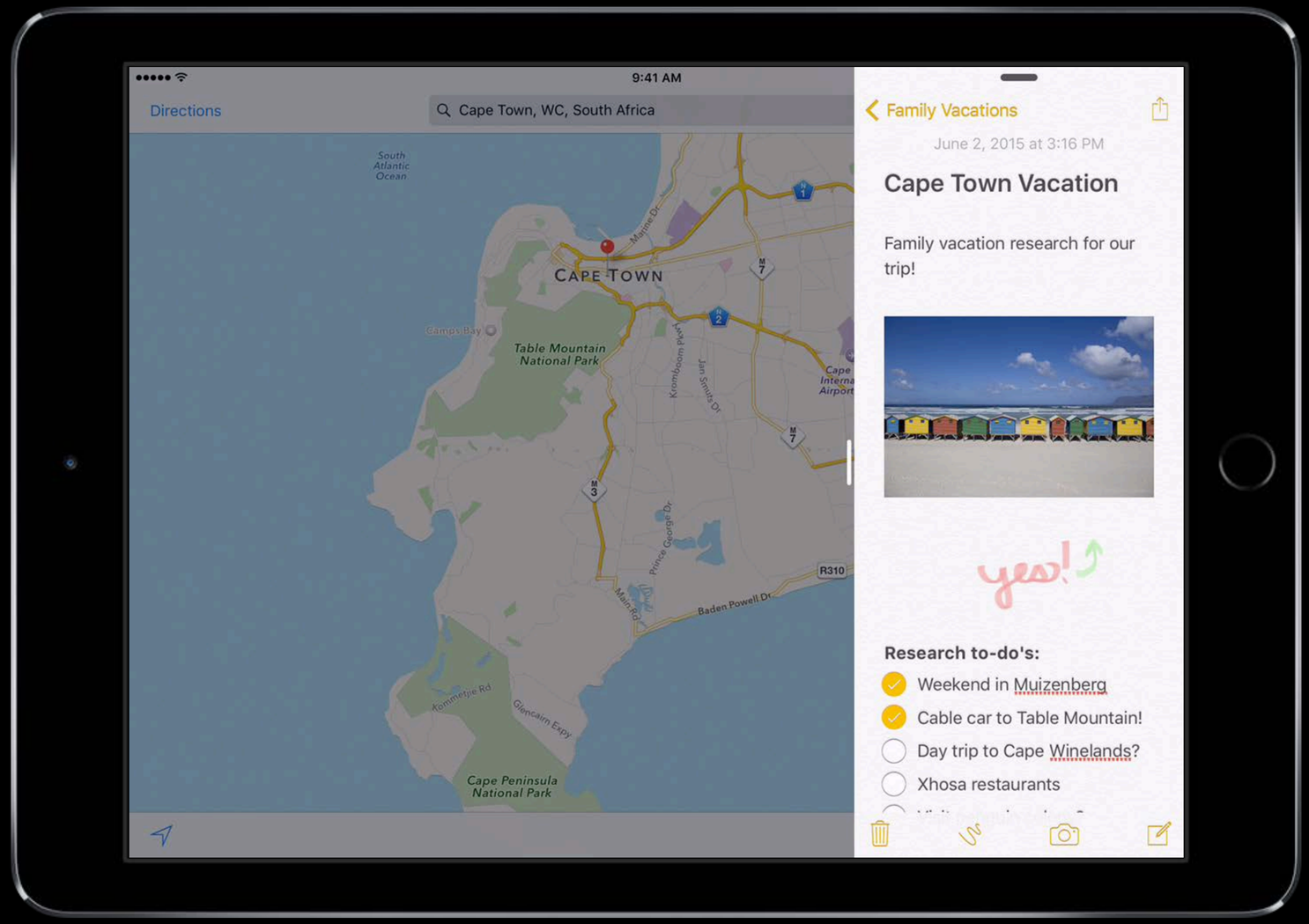
Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture



Multitasking for iPad

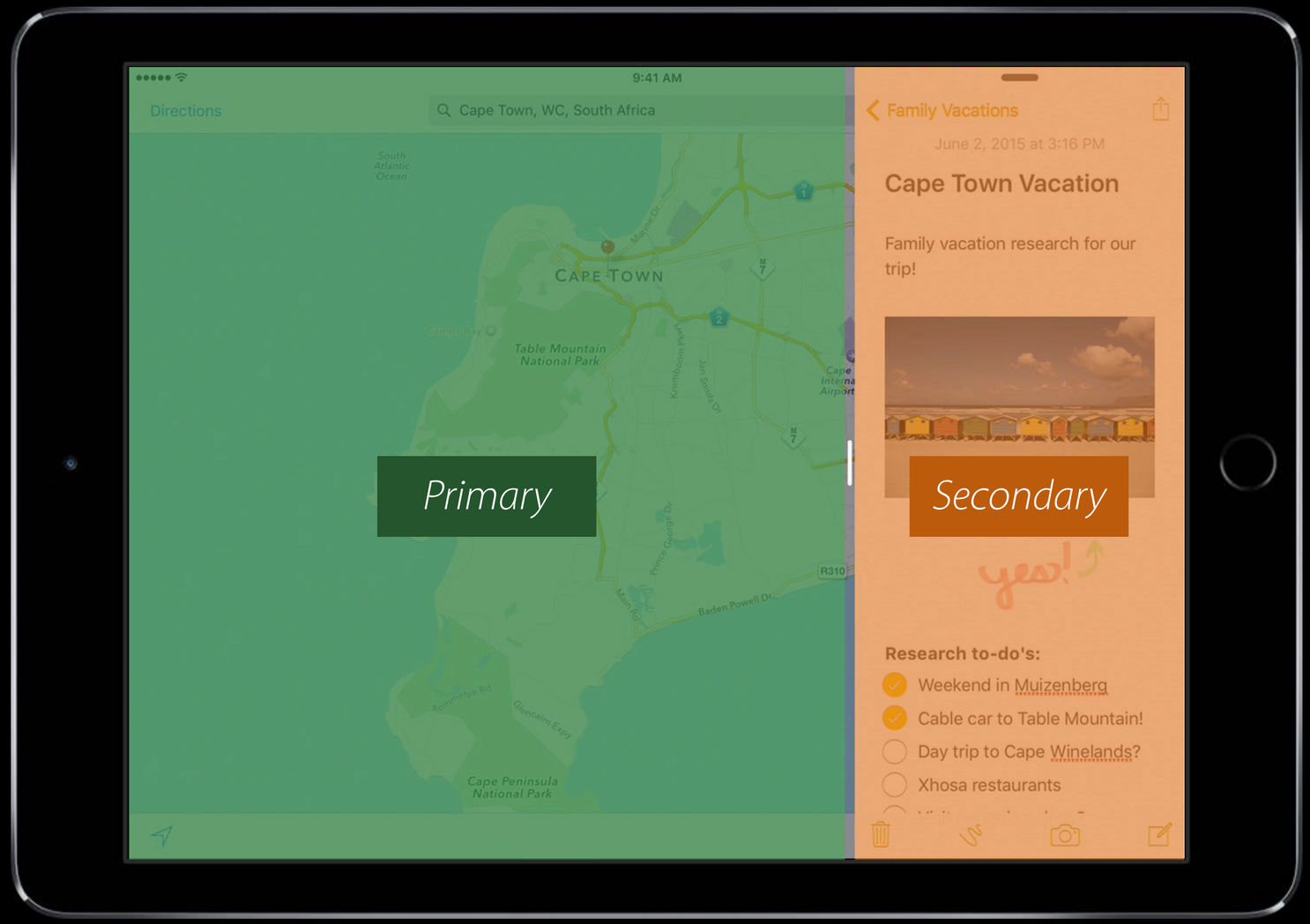
Primary and secondary apps

Fullscreen

Slide Over

Split View

Picture in Picture



Multitasking for iPad

Primary and secondary apps

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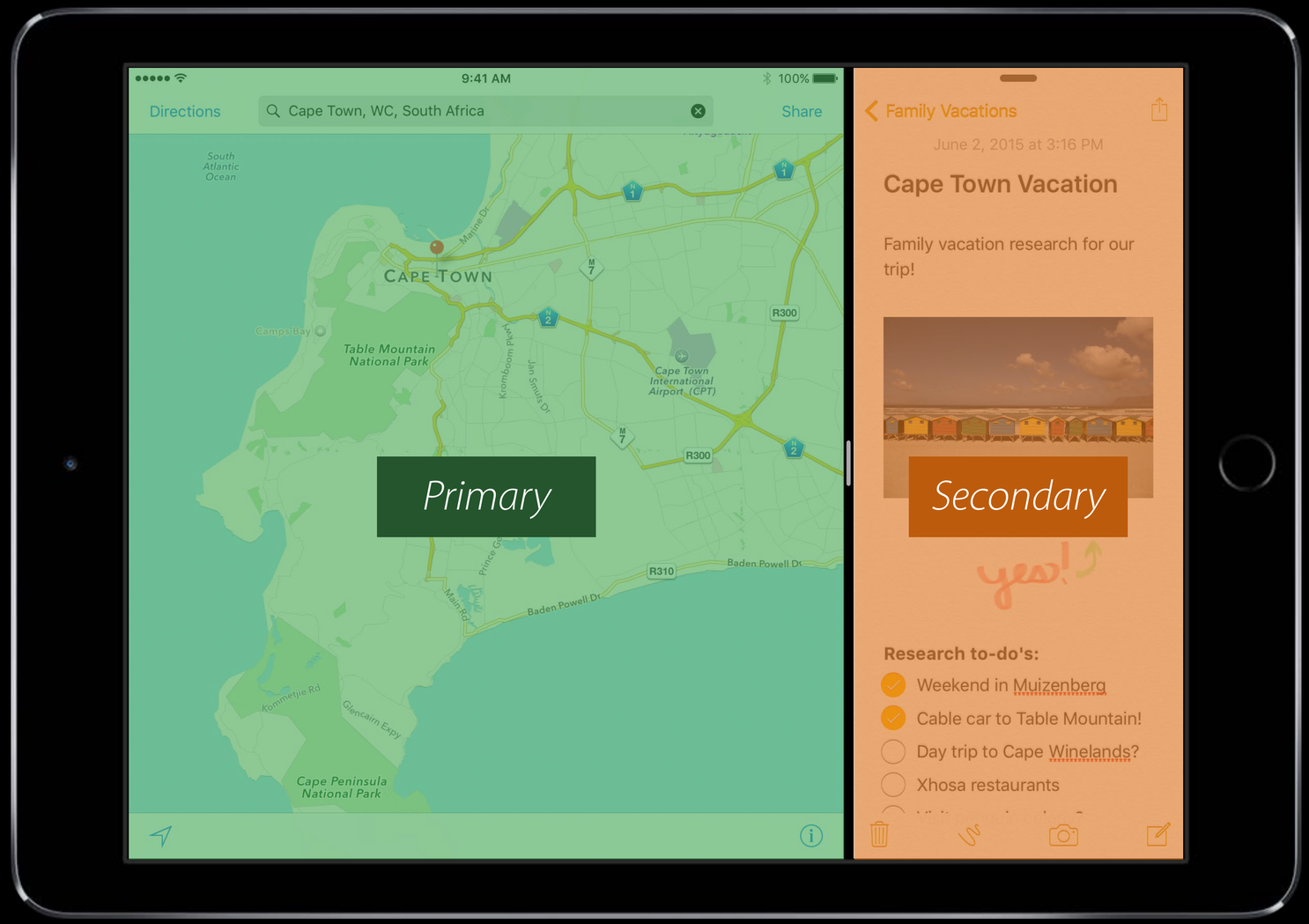

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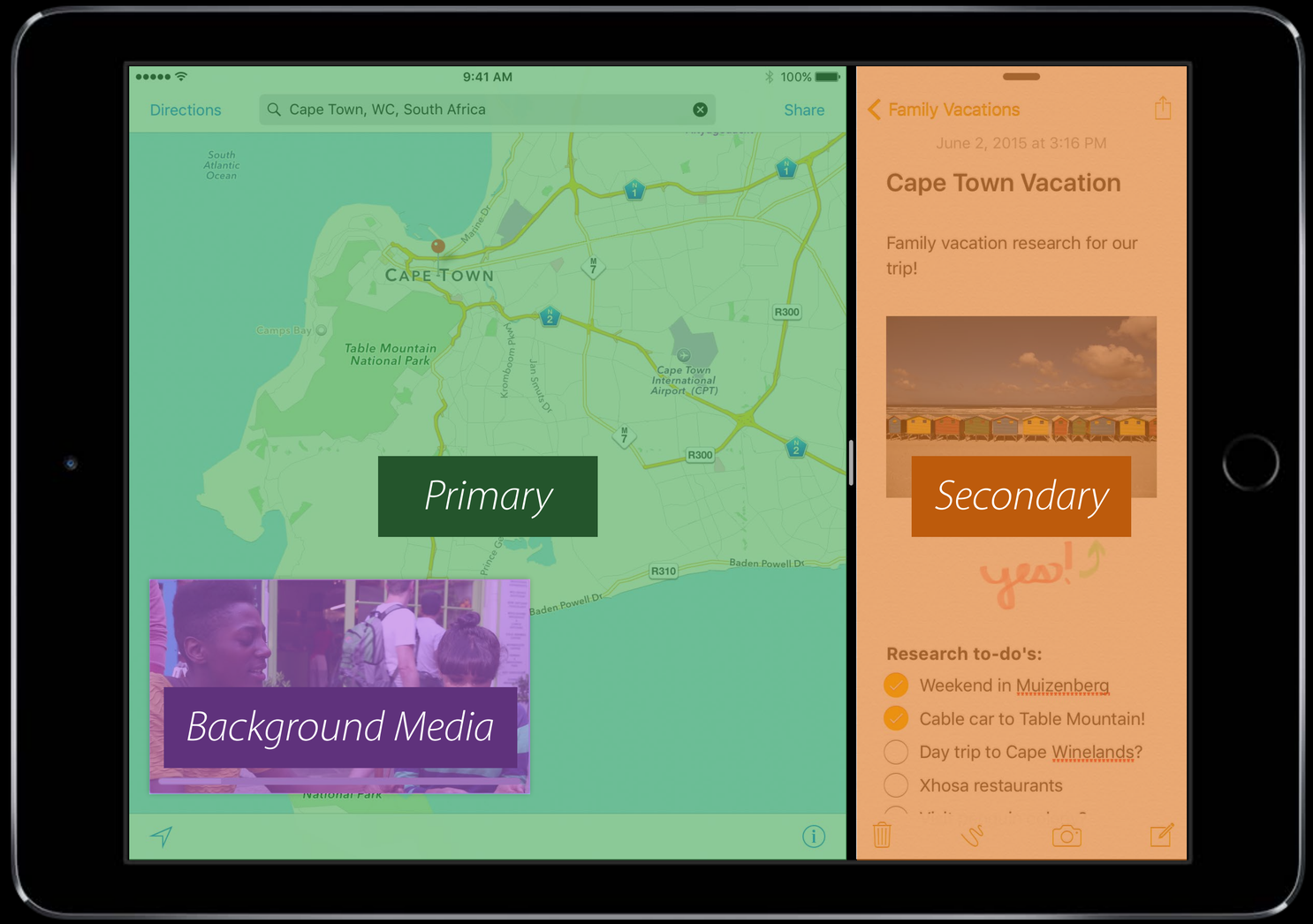

Shared Resources

Audio

Video

Camera

Shared Resources

Audio

Video

Camera

Audio

Best practices

Properly configure `AVAudioSession`

Audio

Best practices

Properly configure `AVAudioSession`

- *One configuration to rule them all…*

Audio

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Only activate session when audio is first needed

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Games or sound effects?

- Use Ambient category

Audio

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Games or sound effects?

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Secondary audio tracks?

- Use `secondaryAudioShouldBeSilencedHint` (iOS 8)

Audio

Best practices

Properly configure `AVAudioSession`

- *One configuration to rule them all…*

Only activate session when audio is first needed

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What's New in Core Audio — WWDC 2014

Audio Session Programming Guide — http://developer.apple.com/iOS

Shared Resources

Audio

Video

Camera

Shared Resources

Audio

Video

Camera

Video

Video has audio?

- Properly configure `AVAudioSession`

Video

Video has audio?

- Properly configure `AVAudioSession`

Background media

- Discard unnecessary data

Video

HTTP Live Streaming

Multiple stream variants

- Include a 1-3 Mbps variant

Annotate variants with RESOLUTION in master playlist

9:41 AM 100%

Family Vacations

Cape Town Vacation

Family vacation research for our trip!

yes!

Research to-do's:

9:41 AM 100%

Family Vacations

Cape Town Vacation

Family vacation research for our trip!

yes!

Research to-do's:

Shared Resources

Audio

Video

Camera

Shared Resources

Audio

Video

Camera

Camera

Only one app can use the camera

Camera

Only one app can use the camera

- Availability can change at any time


Off
HDR
SLO-MO
VIDEO
PHOTO
SQUARE
PANO

Consider `UIRequiresFullscreen = YES`

9:41 AM

Directions

Cape Town, WC, South Africa

South Atlantic Ocean

Maiyne Dr

CAPE TOWN

Camps Bay

Table Mountain National Park

Kromboom Pkwy

Jan Smuts Dr

M7

N1

N2

M3

Prince George Dr

Main Rd

R310

Baden Powell Dr

Kommetjie Rd

Glencairn Expy

Cape Peninsula National Park

Family Vacations

June 2, 2015 at 3:16 PM

Cape Town Vacation

Family vacation research for our trip!

yes!

Research to-do's:

- [x] Weekend in Muizenberg
- [x] Cable car to Table Mountain!
- [ ] Day trip to Cape Winelands?
- [ ] Xhosa restaurants

9:41 AM

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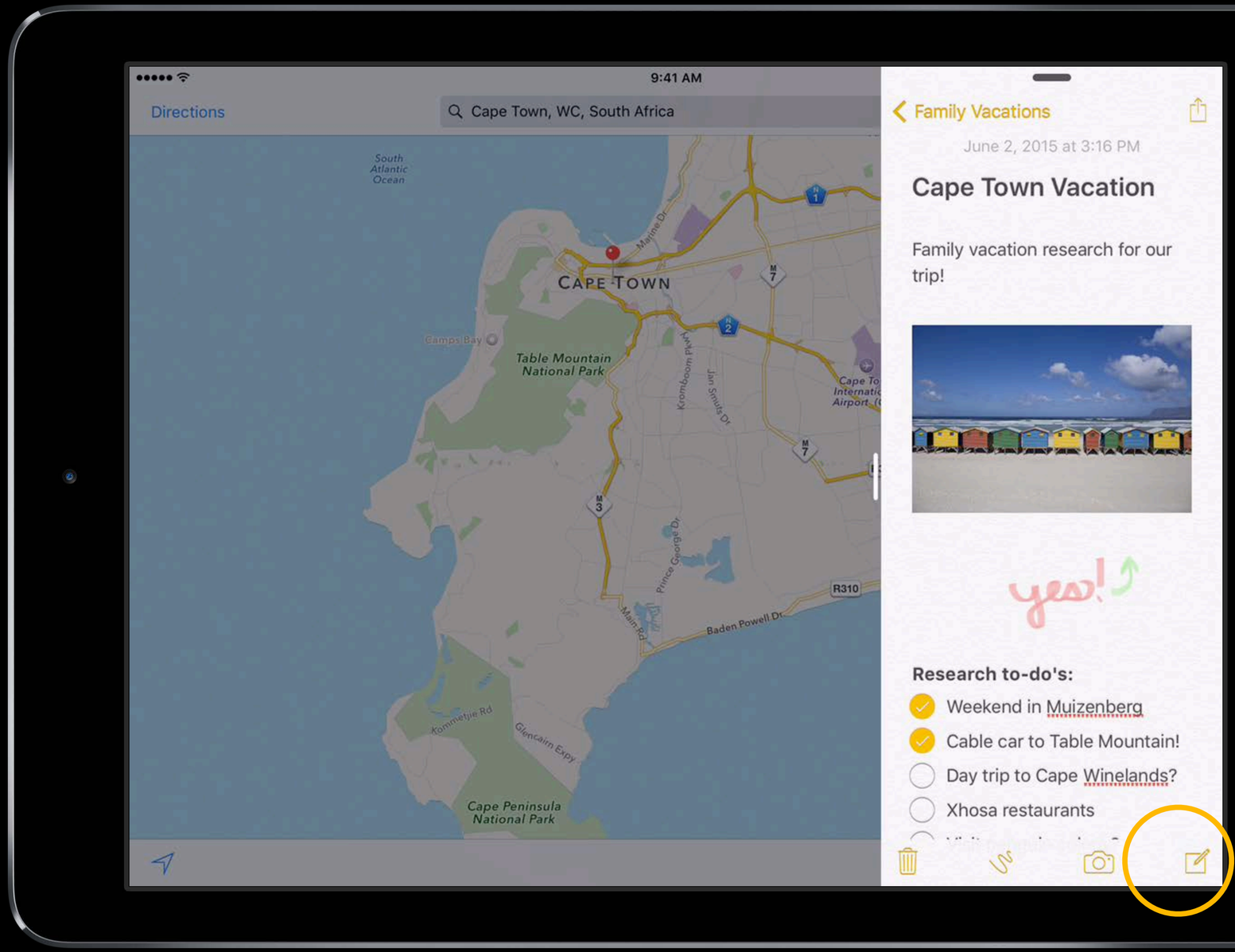
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CAPE TOWN
Table Mountain National Park
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Xhosa restaurants

Camera API

UIImagePickerController

AVCaptureSession

UIImagePickerController

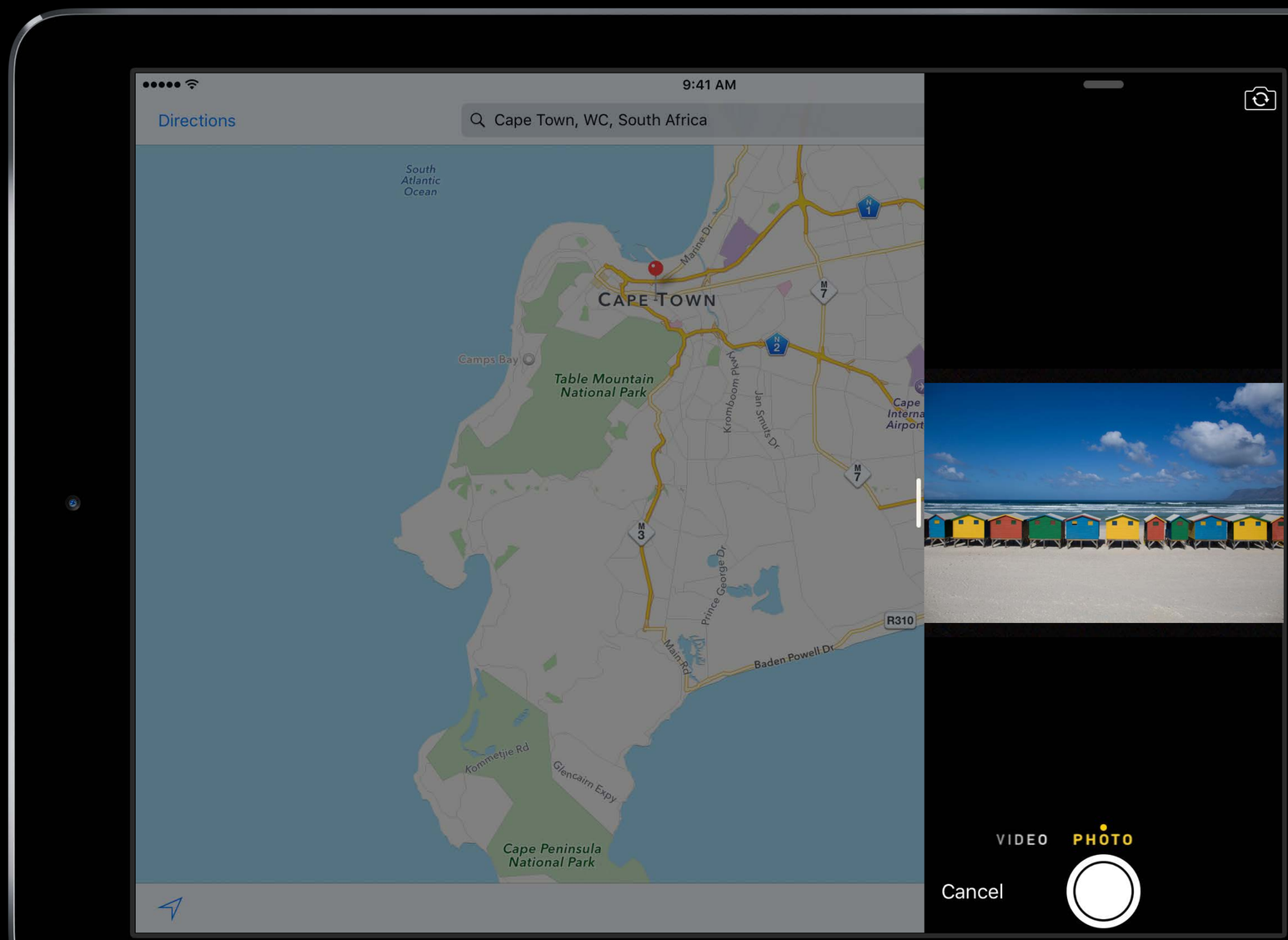
	Single App
Camera Preview	✓
Photo Capture	✓
Video Capture	✓

UIImagePickerController

	Single App	Multiple Apps
Camera Preview	✓	✓
Photo Capture	✓	✓
Video Capture	✓	✗

UIImagePickerController

	Single App	Multiple Apps
Camera Preview	✓	✓
Photo Capture	✓	✓
Video Capture	✓	✗


9:41 AM
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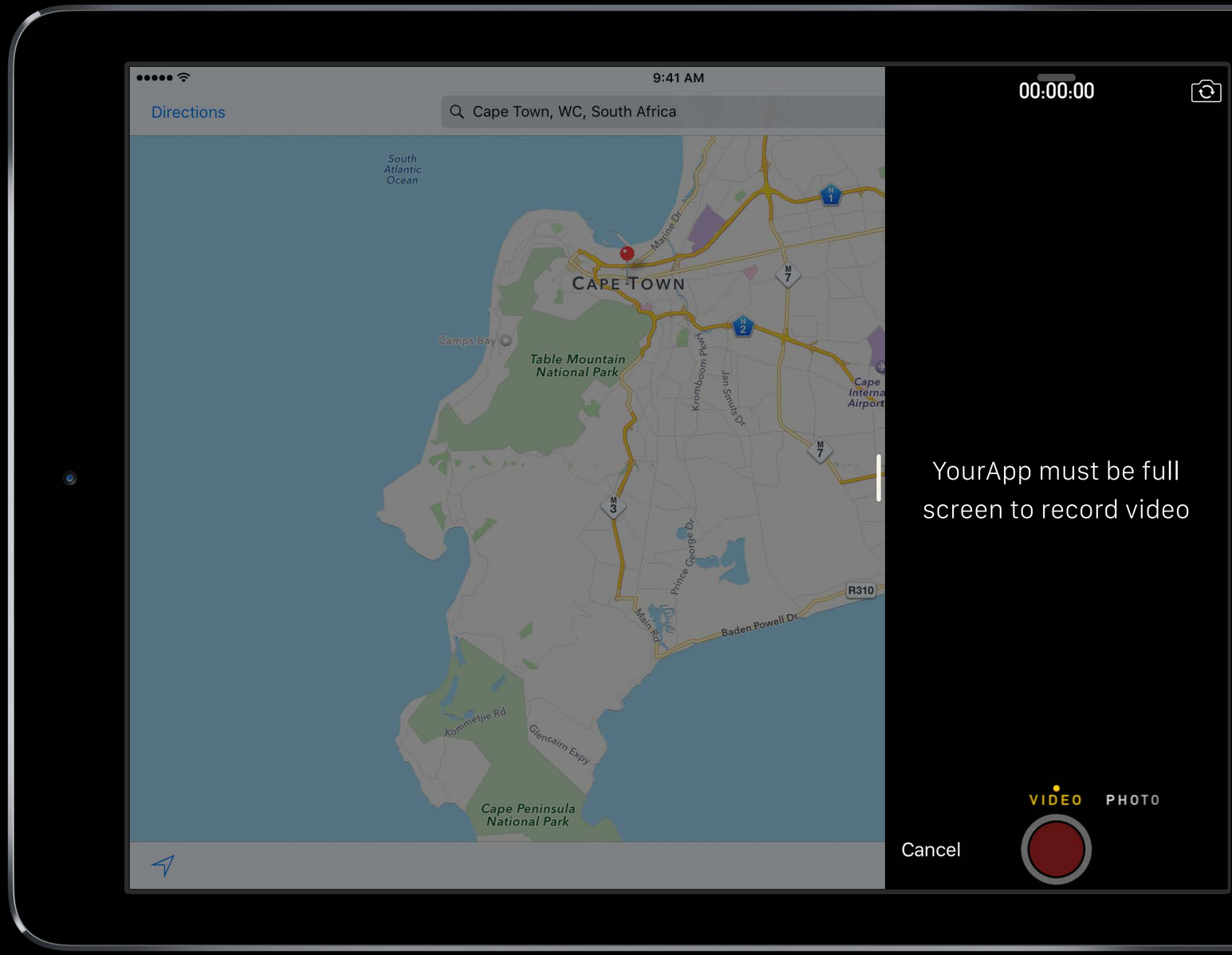
Glencairn Expy
Cape Peninsula National Park
VIDEO
PHOTO
Cancel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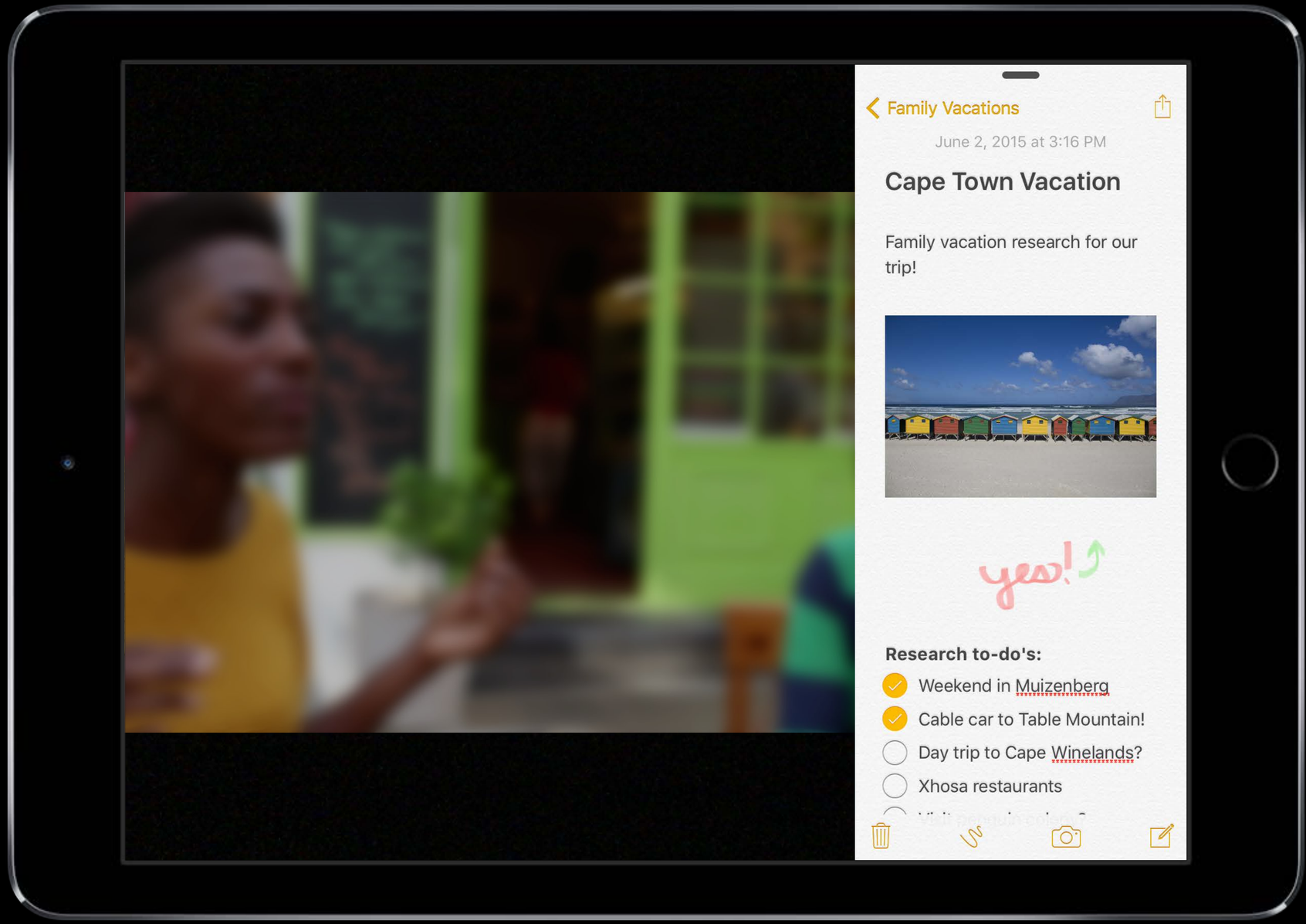
Jan Smuts Dr
Cape Internat Airport
Prince George Dr
Main Rd
R310
Baden Powell Dr
Kommetjie Rd
Glencairn Expy
Cape Peninsula National Park
00:00:00
YourApp must be full screen to record video
VIDEO
PHOTO
Cancel

UIImagePickerController

Active captures may be interrupted


Family Vacations
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UIImagePickerController

Active captures may be interrupted

UIImagePickerController

Active captures may be interrupted

`startVideoCapture()` may return `false`

Camera API

UIImagePickerController

AVCaptureSession

AVCaptureSession

	Single App
Camera Preview	✓
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Video Capture	✓

AVCaptureSession

	Single App	Multiple Apps
Camera Preview	✓	✗
Photo Capture	✓	✗
Video Capture	✓	✗

AVCaptureSession

Interruptions

Observe session interruptions

- `AVCaptureSessionWasInterruptedNotification`

AVCaptureSession

Interruptions

NEW

Observe session interruptions

- `AVCaptureSessionWasInterruptedNotification`

Check the reason

- AVCaptureSessionInterruptionReasonKey
  - .VideoDeviceNotAvailableWithMultipleForegroundApps

AVCaptureSession

Interruptions

NEW

Observe session interruptions

- `AVCaptureSessionWasInterruptedNotification`

Check the reason

- `AVCaptureSessionInterruptionReasonKey`
  - `.VideoDeviceNotAvailableWithMultipleForegroundApps`

Adjust UI

AVCaptureSession

Interruptions

Completed Interruptions

- AVCaptureSession automatically resumes

AVCaptureSession

Interruptions

Completed Interruptions

- AVCaptureSession automatically resumes

Observe

- AVCaptureSession`InterruptionEnded`Notification

AVCaptureSession

Interruptions

Completed Interruptions

- AVCaptureSession automatically resumes

Observe

- `AVCaptureSessionInterruptionEndedNotification`

Restore camera UI

AVCaptureSession

Sample code

AVCam

Summary

Adopt Picture in Picture

- AVKit, AVFoundation, WebKit
- Follow best practices for consistent experience

Master Shared Resources

- Configure audio session
- Provide video streaming variants
- Handle camera interruptions

More Information

Documentation

Adopting Multitasking Enhancements on iPad
What's New in iOS
Start Developing iOS Apps
iOS App Programming Guide

http://developer.apple.com/iOS

Technical Support

Apple Developer Forums
Developer Technical Support

General Inquiries

Curt Rothert, App Frameworks Evangelist
rothert@apple.com

Related Sessions

Getting Started with Multitasking on iPad in iOS 9	Presidio	Tuesday 4:30PM
Optimizing Your App for Multitasking on iPad in iOS 9	Presidio	Wednesday 3:30PM
Performance on iOS and watchOS	Presidio	Friday 11:00AM

Related Labs

AVKit and AVFoundation	Media Lab	Wednesday, Thursday, and Friday
Camera Capture	Media Lab	Wednesday and Thursday
HTTP Live Streaming	Media Lab	Thursday
Audio	Media Lab	Thursday
Cocoa Touch and Multitasking	Frameworks Lab	Wednesday
Cocoa Touch	Frameworks Lab	Friday

WWDC15