

#WWDC19

# Introducing iPad Apps for Mac

Ali Ozer, Cocoa

Jake Petroules, Developer Tools

Jason Beaver, Cocoa

# Agenda

What it is

Getting started

Things you get for free

API differences

Rebuild and run iPad Apps  
natively on the Mac



macOS App

AppKit

Web

WebKit

Games

Metal

macOS App

AppKit

iOS App

UIKit

Web

WebKit

Games

Metal

Leverage our shared technology stack

Leverage our shared technology stack

Integrate iOS frameworks



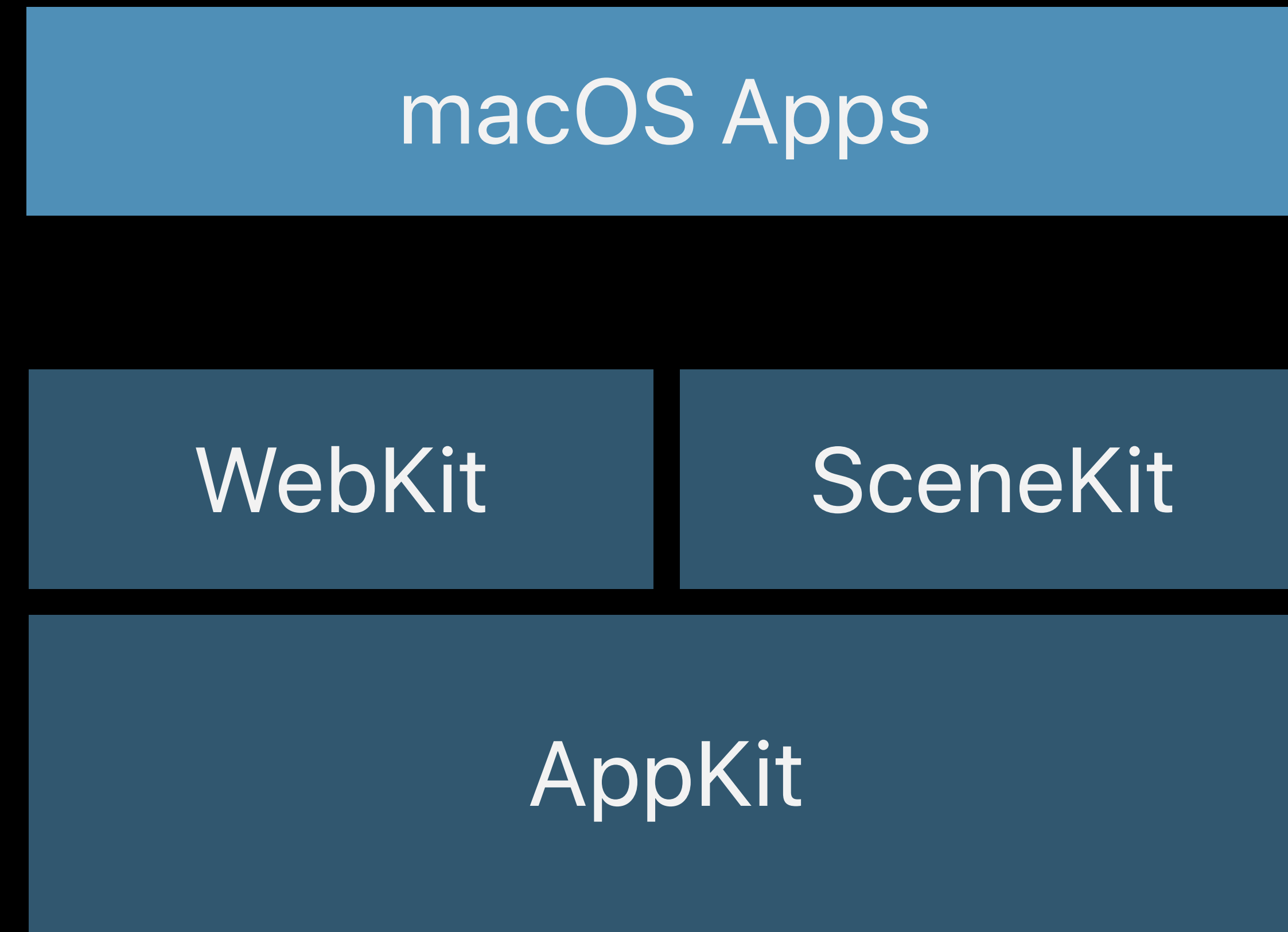
Leverage our shared technology stack

Integrate iOS frameworks

Enable Xcode to build iPad projects for Mac

macOS Apps

UI frameworks



macOS Apps

WebKit

SceneKit

UI frameworks

AppKit

CoreGraphics

Low level frameworks

Foundation

libSystem

macOS Apps

WebKit

SceneKit

UI frameworks

AppKit

CoreGraphics

Low level frameworks

Foundation

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Databases

Photos, Contacts, Prefs, ...

macOS Apps

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Photos, Contacts, Prefs, ...

Services

Clipboard, File coordination, ...

macOS Apps

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Databases

Photos, Contacts, Prefs, ...

Services

Clipboard, File coordination, ...

Kernel

Darwin

macOS Apps

iOS Apps

UI frameworks

WebKit

SceneKit

AppKit

Low level frameworks

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Photos, Contacts, Prefs, ...

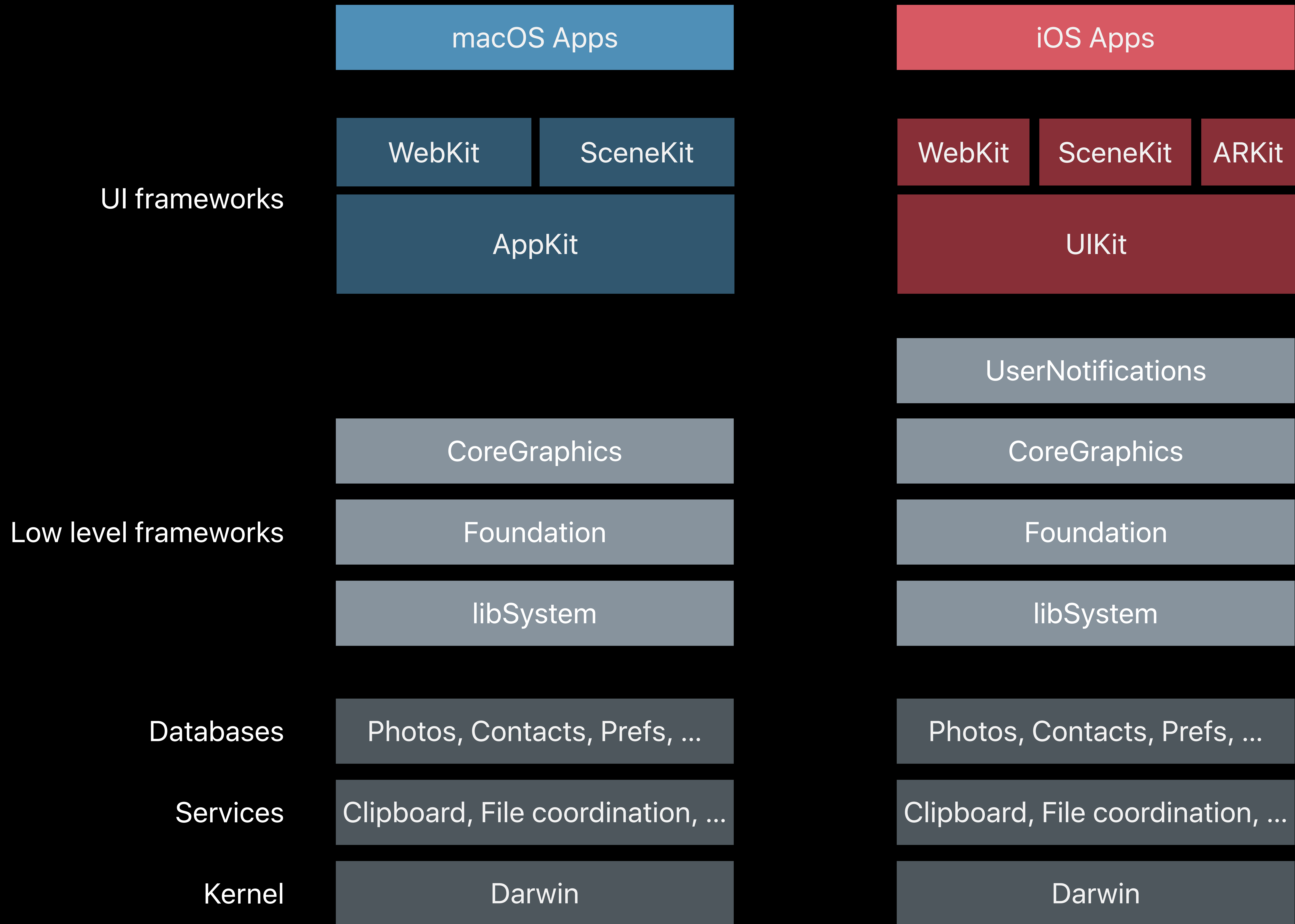
Services

Clipboard, File coordination, ...

Kernel

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macOS Apps

WebKit

SceneKit

AppKit

CoreGraphics

Foundation

libSystem

Photos, Contacts, Prefs, ...

Clipboard, File coordination, ...

Darwin

iOS Apps

WebKit

SceneKit

ARKit

UIKit

UserNotifications

CoreGraphics

Foundation

libSystem

Photos, Contacts, Prefs, ...

Clipboard, File coordination, ...

macOS Apps

WebKit

SceneKit

AppKit

CoreGraphics

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Photos, Contacts, Prefs, ...

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Darwin

iOS Apps

WebKit

SceneKit

ARKit

UIKit

UserNotifications

CoreGraphics

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libSystem

Photos, Contacts, Prefs, ...

Clipboard, File coordination, ...

iOS Simulator

macOS Apps

WebKit

SceneKit

AppKit

CoreGraphics

Foundation

libSystem

Photos, Contacts, Prefs, ...

Clipboard, File coordination, ...

Darwin

iOS Apps

WebKit

SceneKit

ARKit

UIKit

UserNotifications

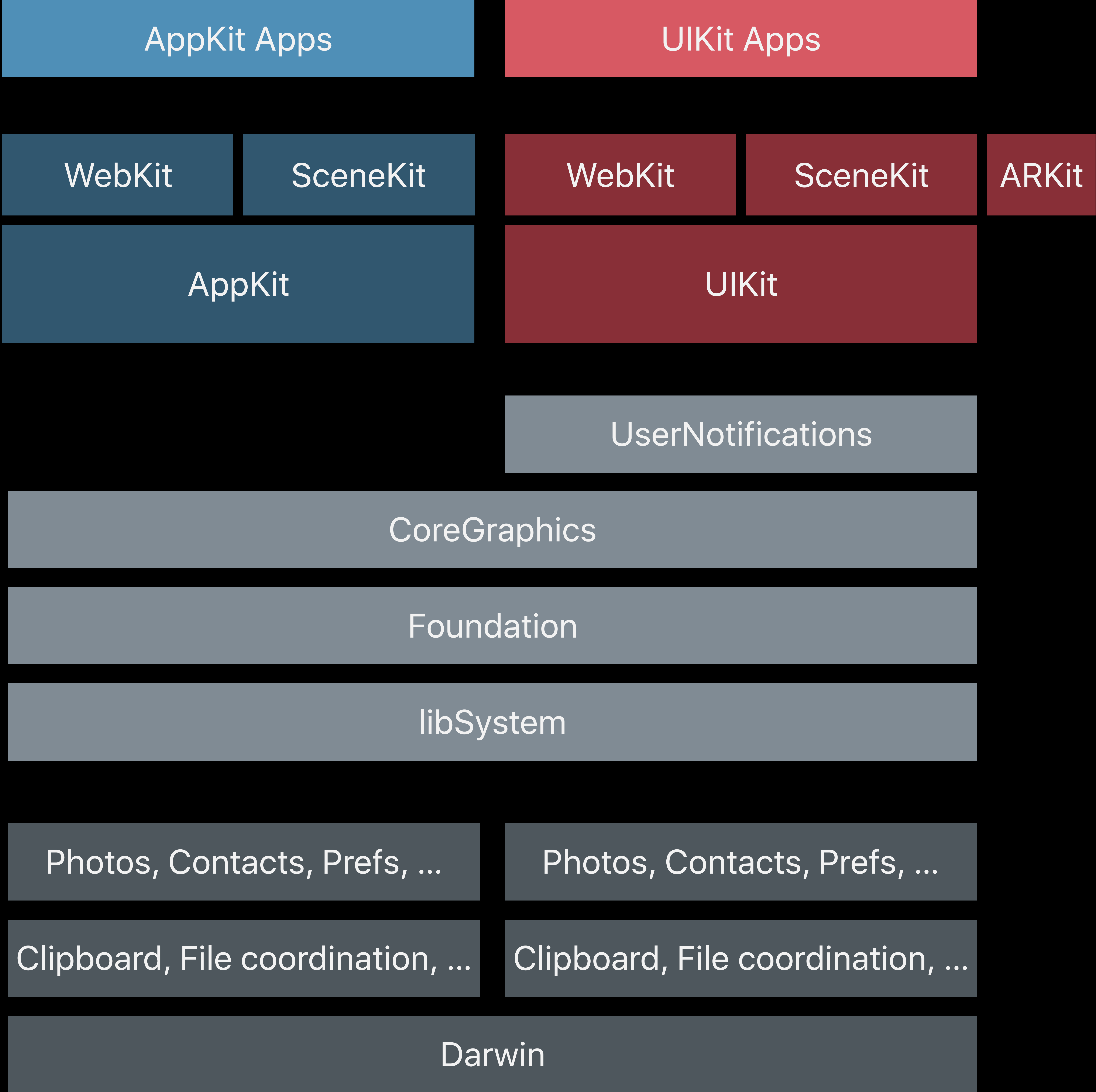
CoreGraphics

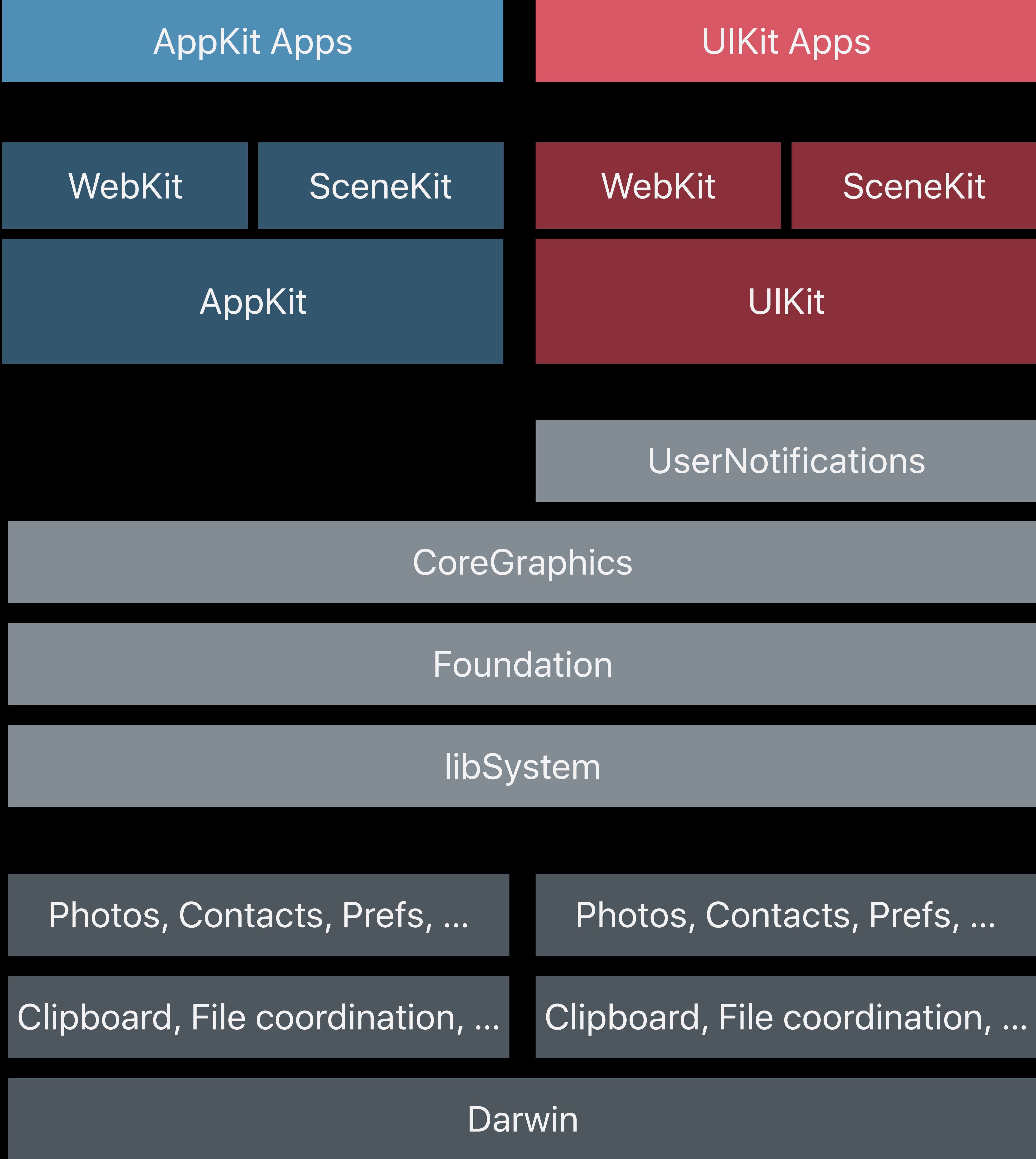
Foundation

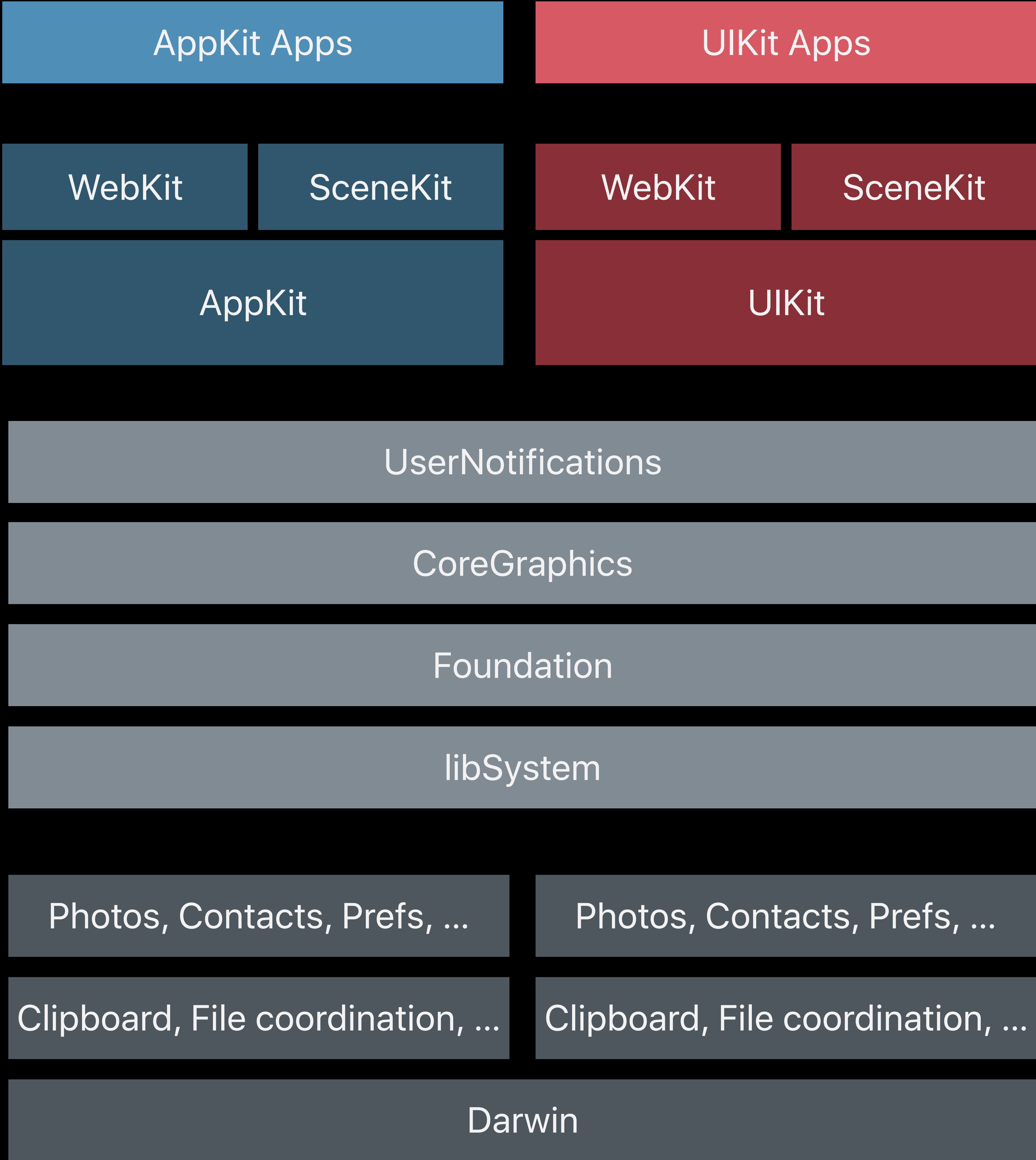
libSystem

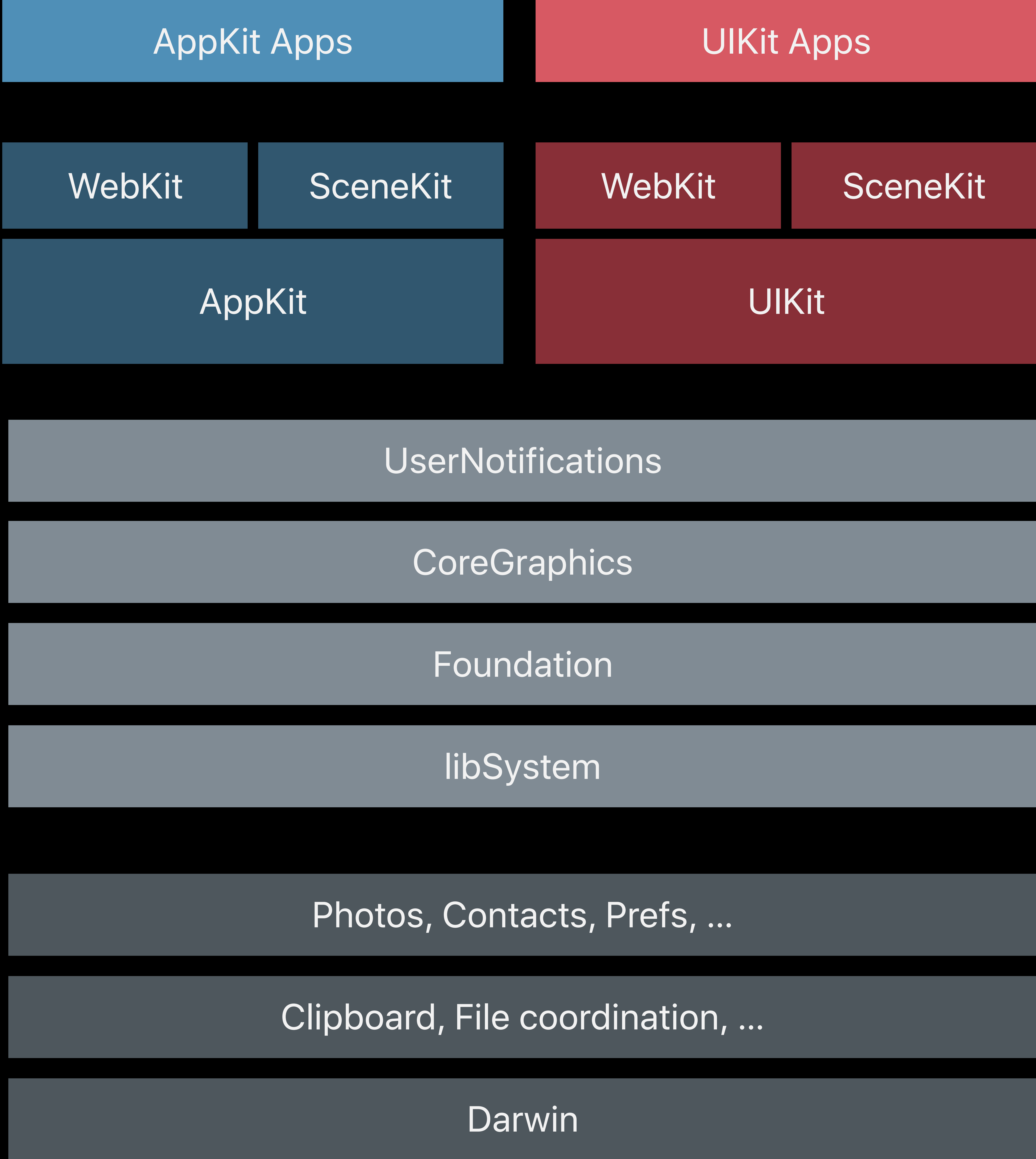
Photos, Contacts, Prefs, ...

Clipboard, File coordination, ...

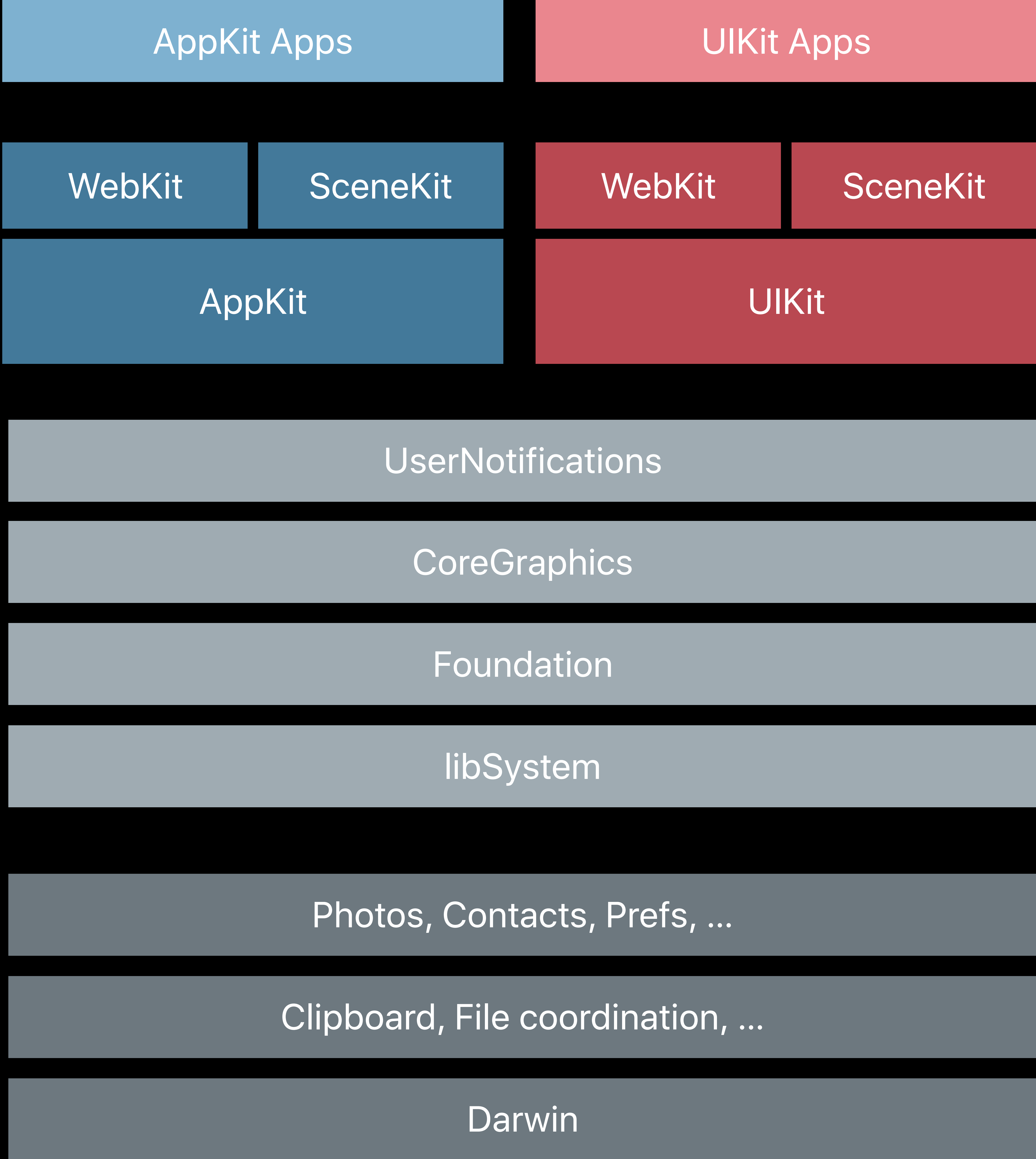


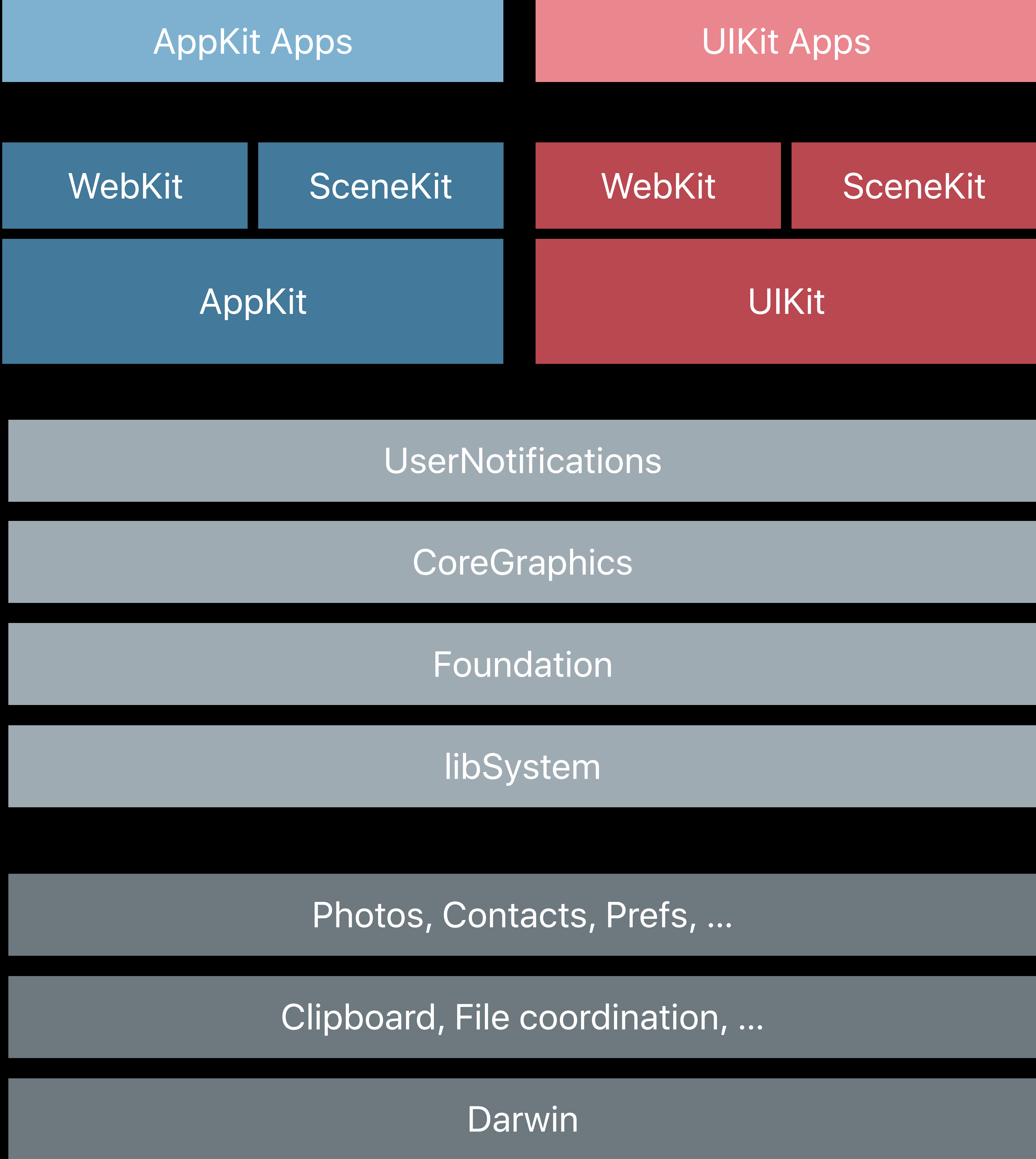




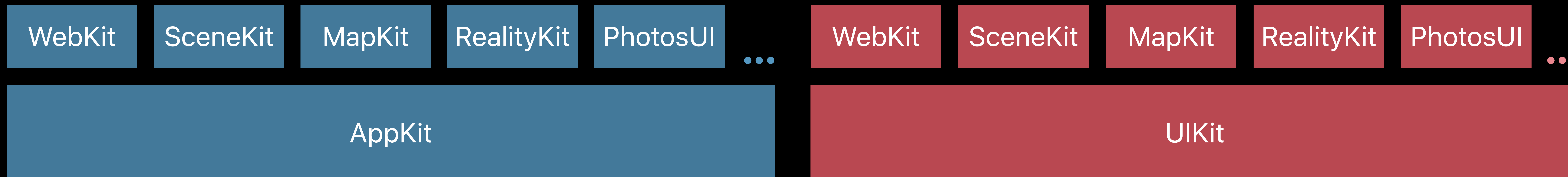




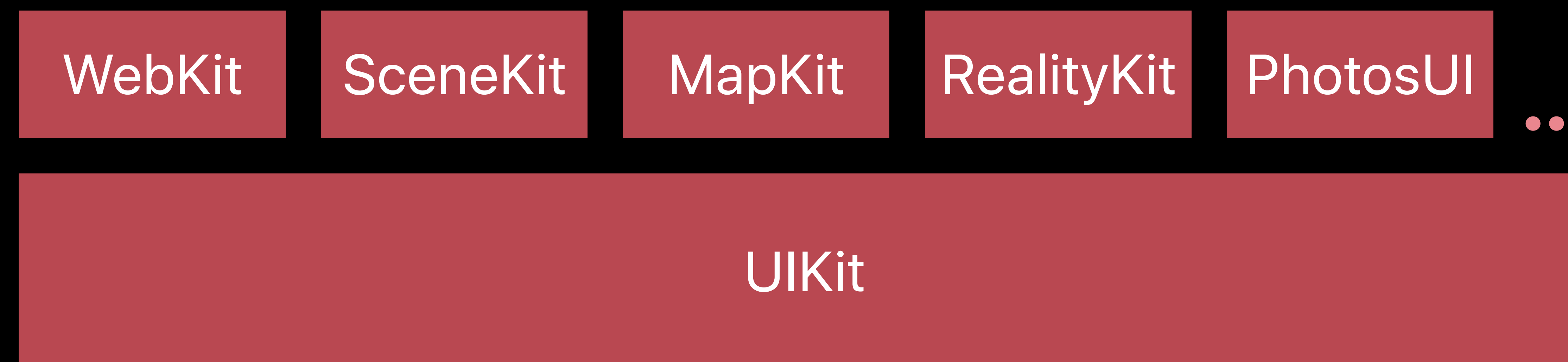
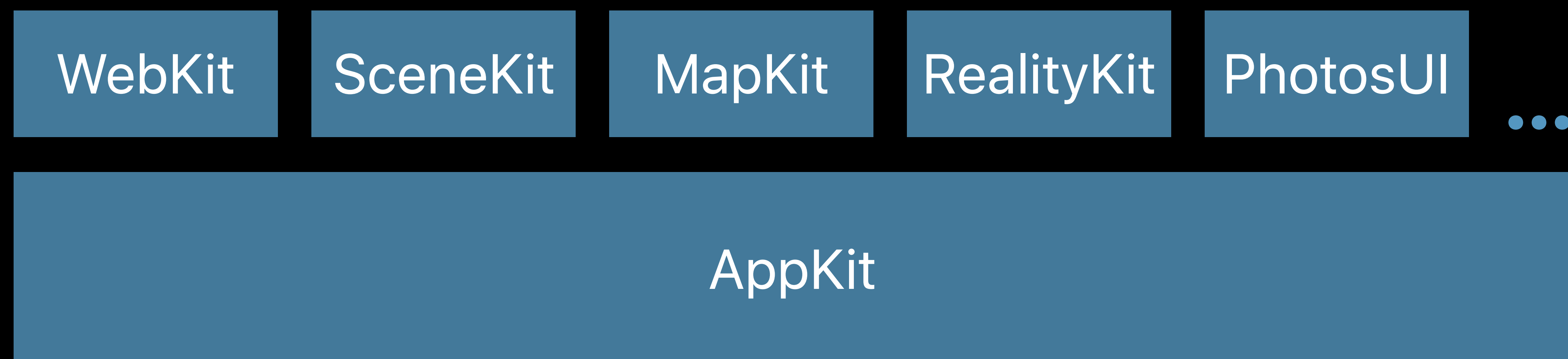




# "Twin" Frameworks



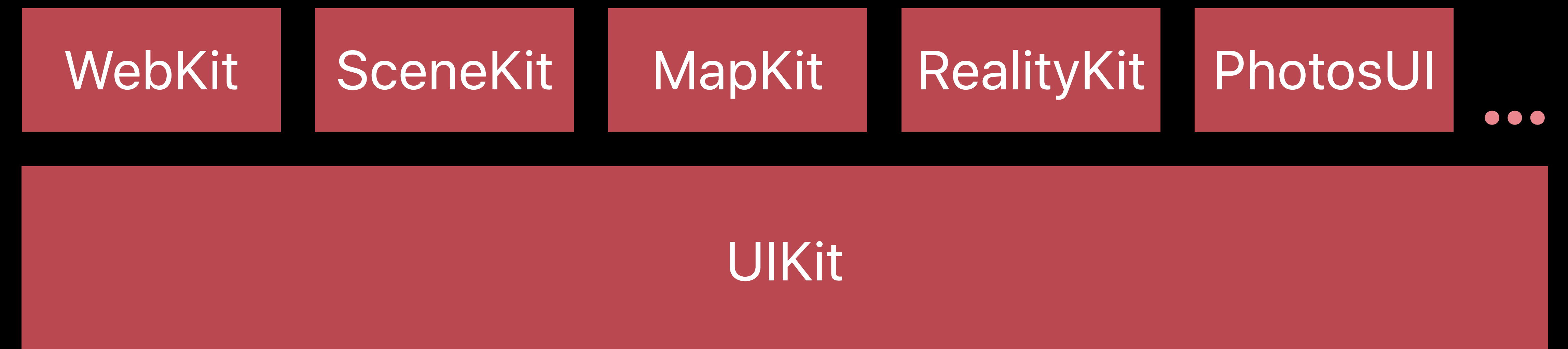
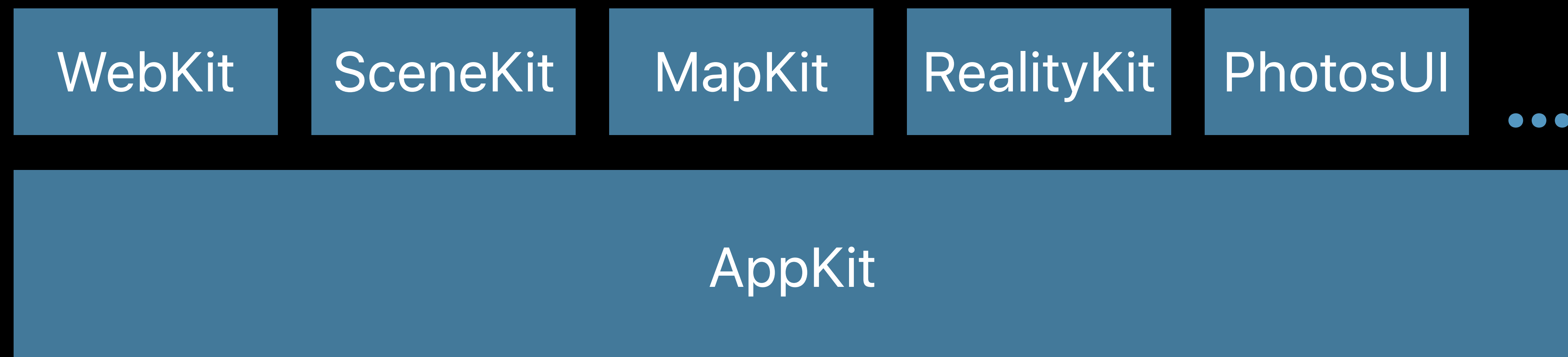
# "Twin" Frameworks



```
import Cocoa

open class MKMapView : NSView, NSCoding {
    ...
}
```

# "Twin" Frameworks



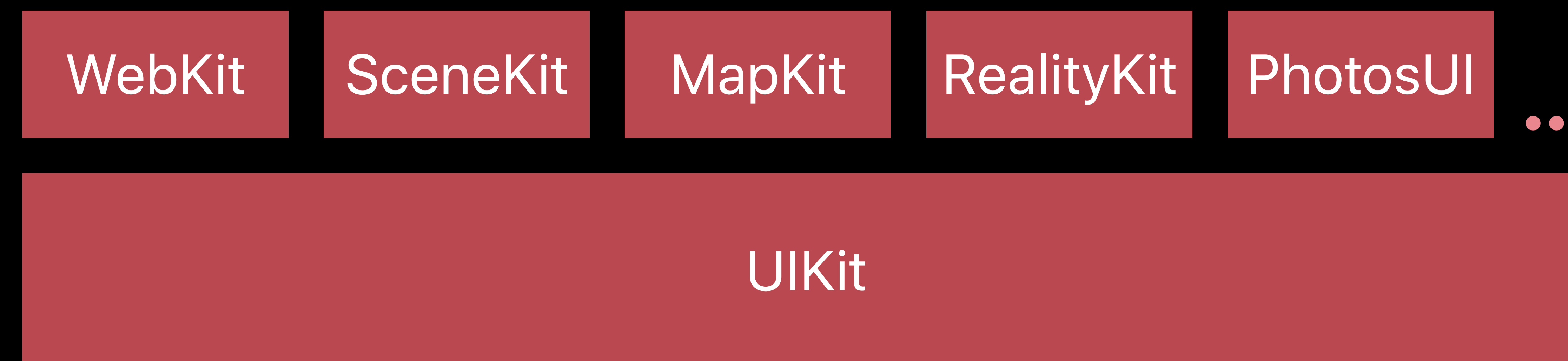
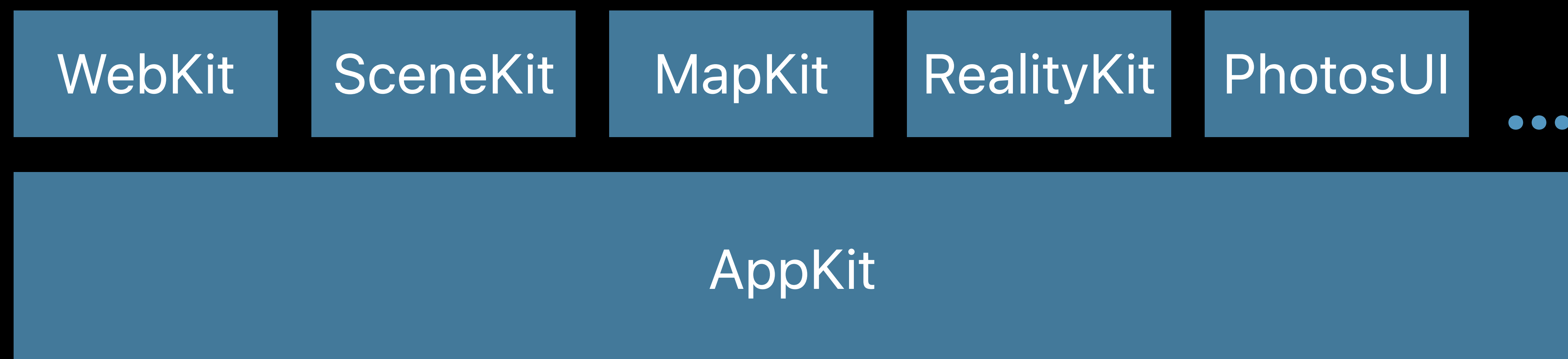
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# "Twin" Frameworks



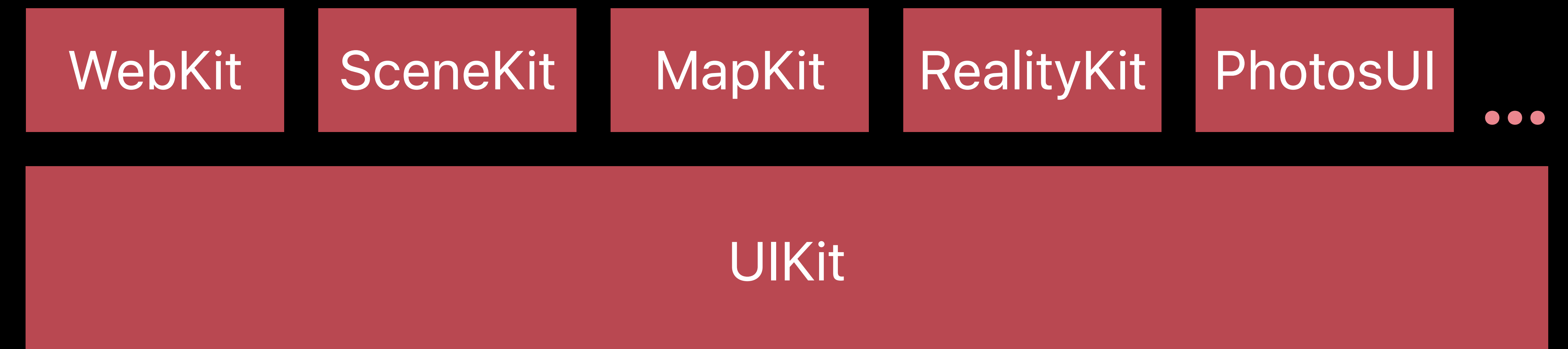
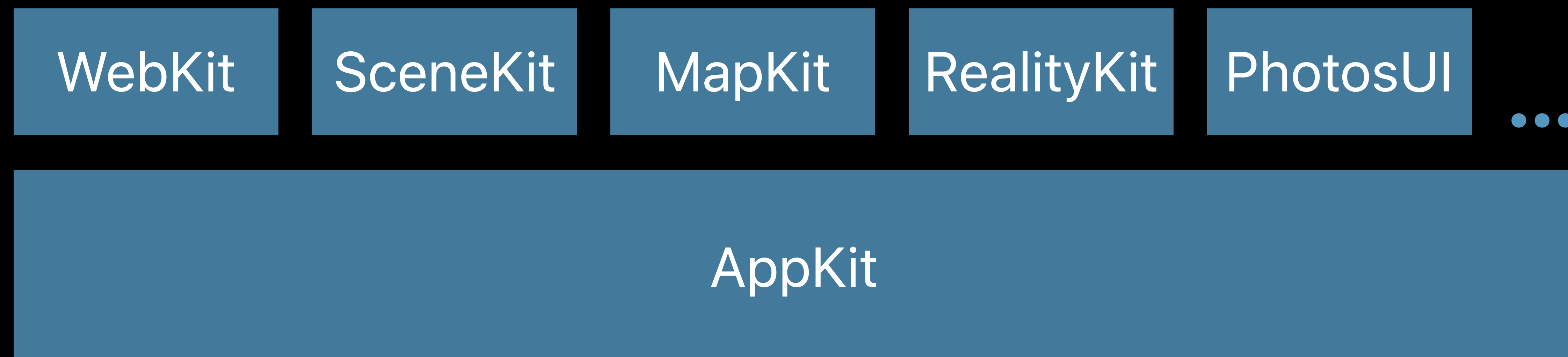
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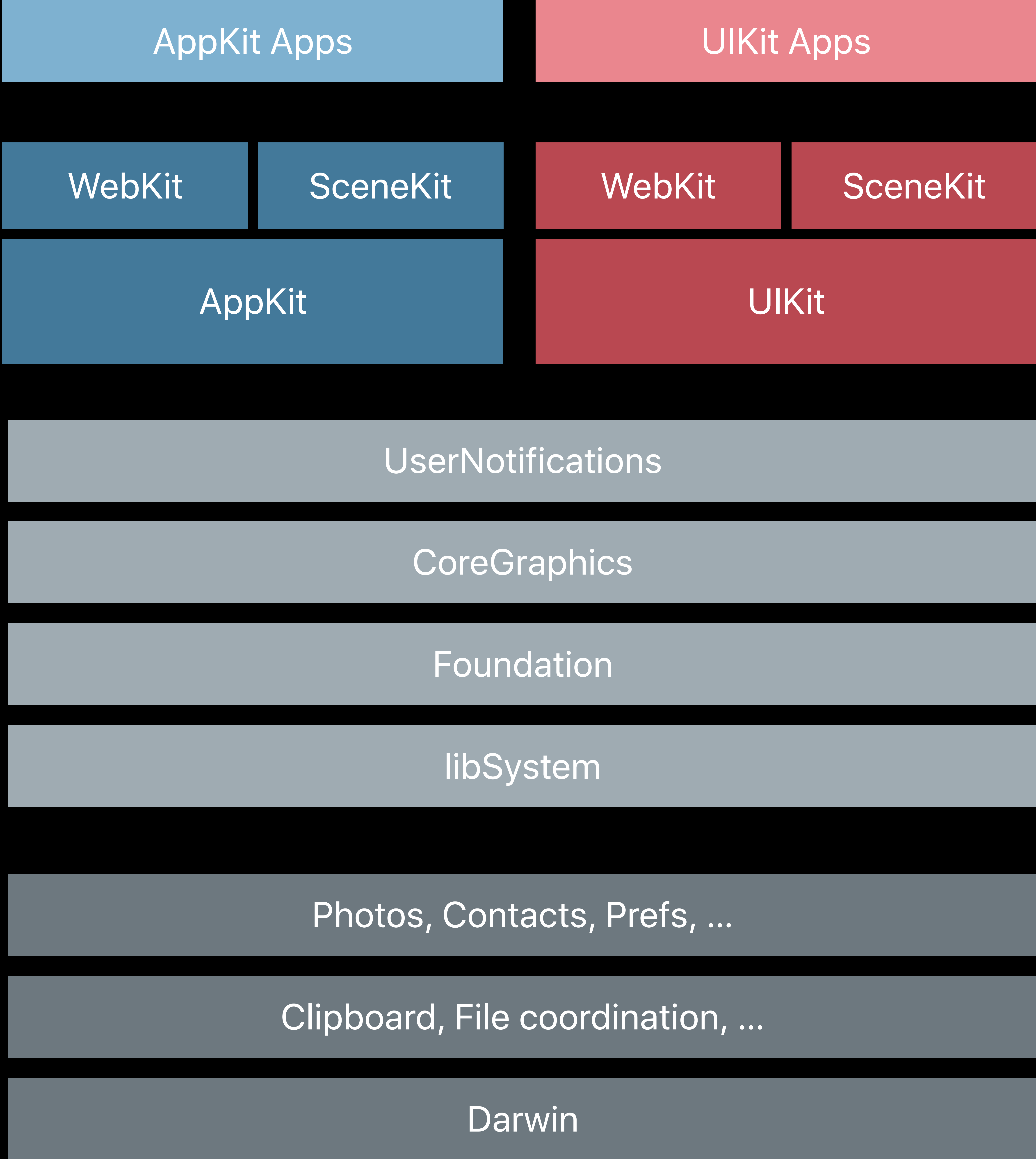


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# When to Consider iPad Apps for Mac

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Make iPad app available on the Mac

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Bring older Mac app to feature parity with iPad app

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Bring older Mac app to feature parity with iPad app

Replace Mac app built on non-native technology

# When to Consider iPad Apps for Mac

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Bring older Mac app to feature parity with iPad app

Replace Mac app built on non-native technology

# Not All Apps Are Candidates

iPhone-only apps

# Not All Apps Are Candidates

iPhone-only apps

Apps that are built around mobile features



# Goals

Easy to get started

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Easy to get started

One project, one source base, one target

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Easy to get started

One project, one source base, one target

iPad app on the inside

# Goals

Easy to get started

One project, one source base, one target

iPad app on the inside

Mac app on the outside

# Getting Started

Jake Petroules

# Things You Get For Free

Ali Ozer

# Default Menu Bar



**ChocolateChip**

File

Edit

Format

View

Window

Help





**ChocolateChip**

File

Edit

Format

View











Window

Help

# Window Management

ChocolateChip

Recipes

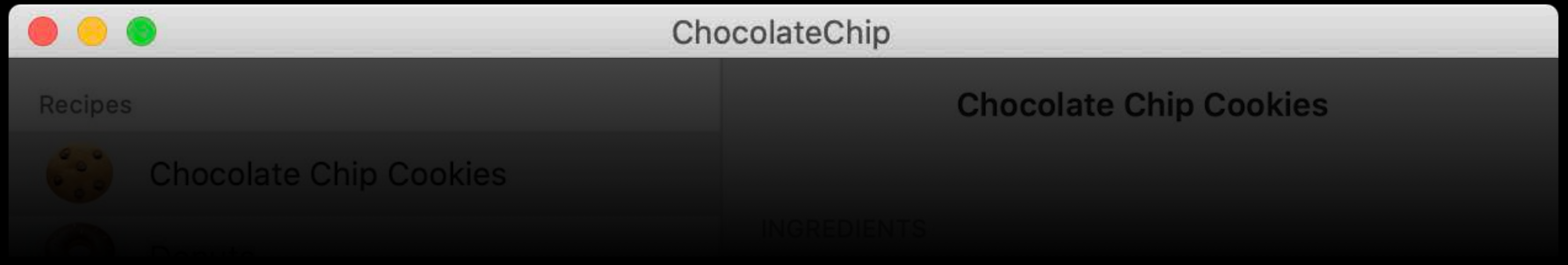
-  Chocolate Chip Cookies
-  Donuts
-  Humble Pie
-  Marzipan 
-  Pancakes
-  Pizza
-  Spaghetti
-  Tacos
-  Whipped Cream

**Chocolate Chip Cookies**

INGREDIENTS

- Baking Soda**  
0.5 teaspoons
- Brown Sugar**  
5.25 ounces
- Egg**  
1.0
- Egg Yolk**  
1.0
- Flour**  
8.75 ounces
- Salt**  
1.0 teaspoon

# Window Management





ChocolateChip

File

Edit

Format

View

Window

Help

Minimize

⌘M

Zoom

Tile Window to Left of Screen

Tile Window to Right of Screen

Move to Ali's iPad

Bring All to Front

✓ ChocolateChip



ChocolateChip

File

Edit

Format

View

Window

Help

Minimize

⌘M

Zoom

Tile Window to Left of Screen

Tile Window to Right of Screen

Move to Ali's iPad











Bring All to Front

✓ ChocolateChip

# Dark Mode

ChocolateChip

Recipes

-  Chocolate Chip Cookies
-  Donuts
-  Humble Pie
-  Marzipan 
-  Pancakes
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## Chocolate Chip Cookies











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ChocolateChip

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# Scroll Bars

ChocolateChip

Recipes

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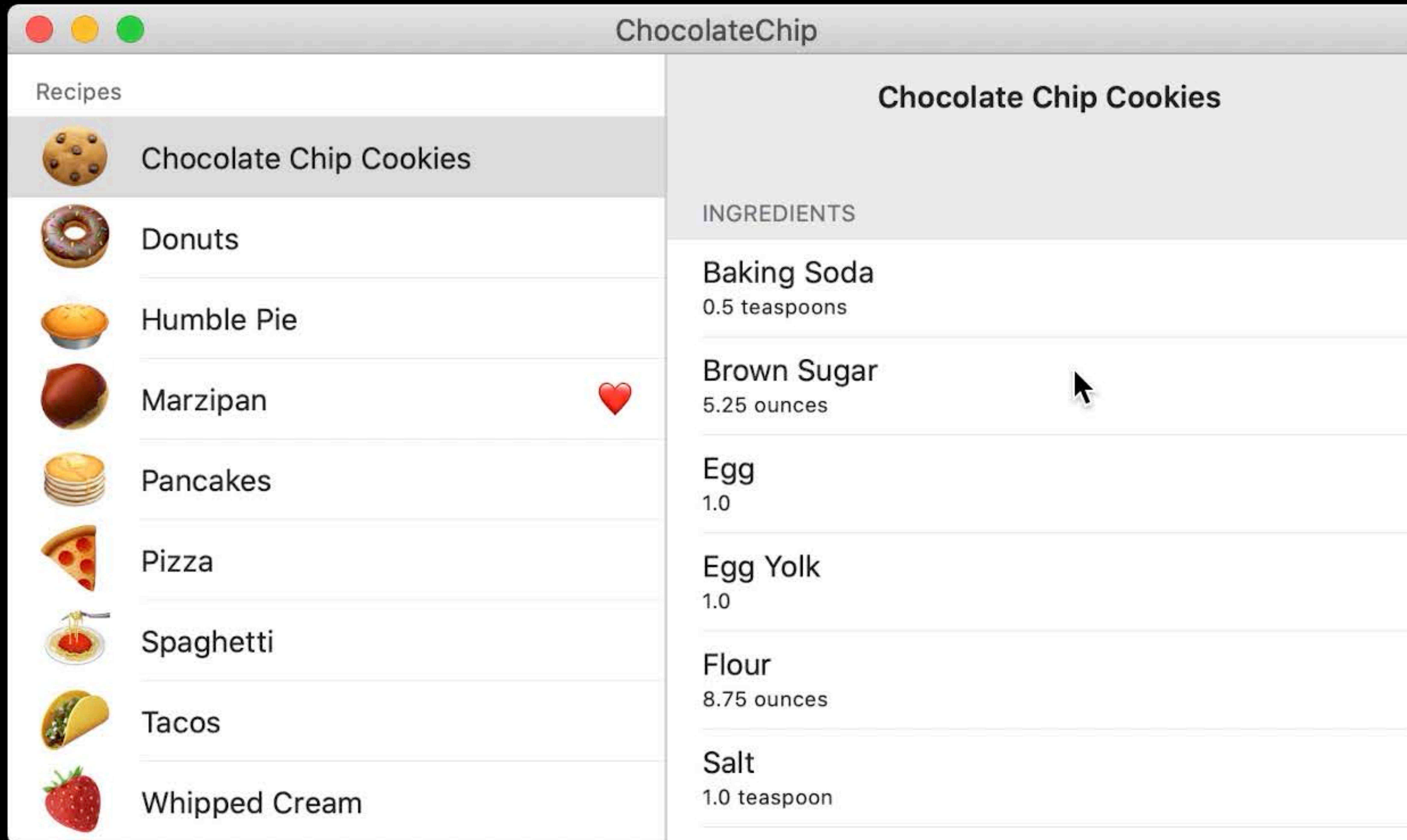
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# Scroll Bars



# Scroll Bars

ChocolateChip

Recipes

-  Chocolate Chip Cookies
-  Donuts
-  Humble Pie
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ChocolateChip

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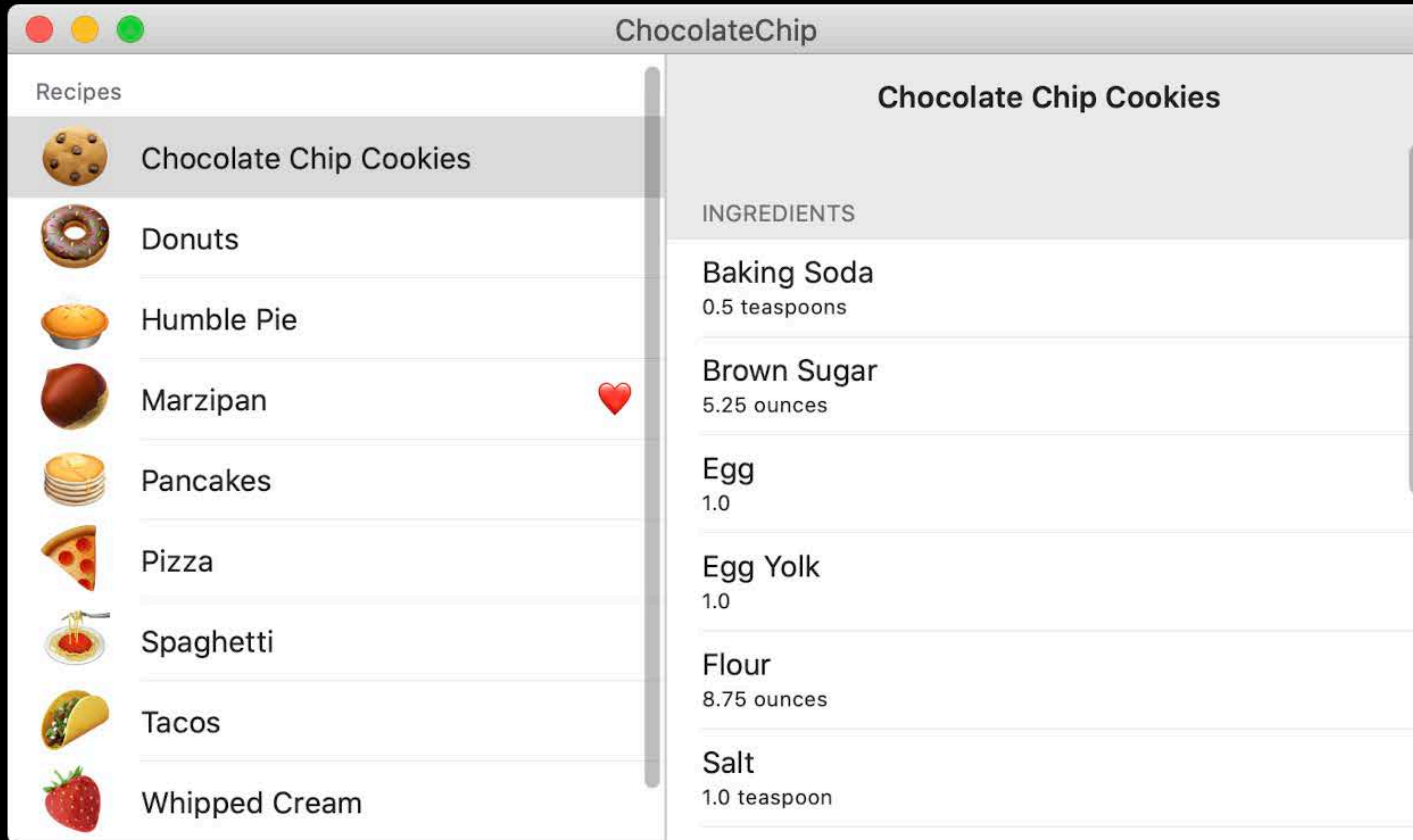
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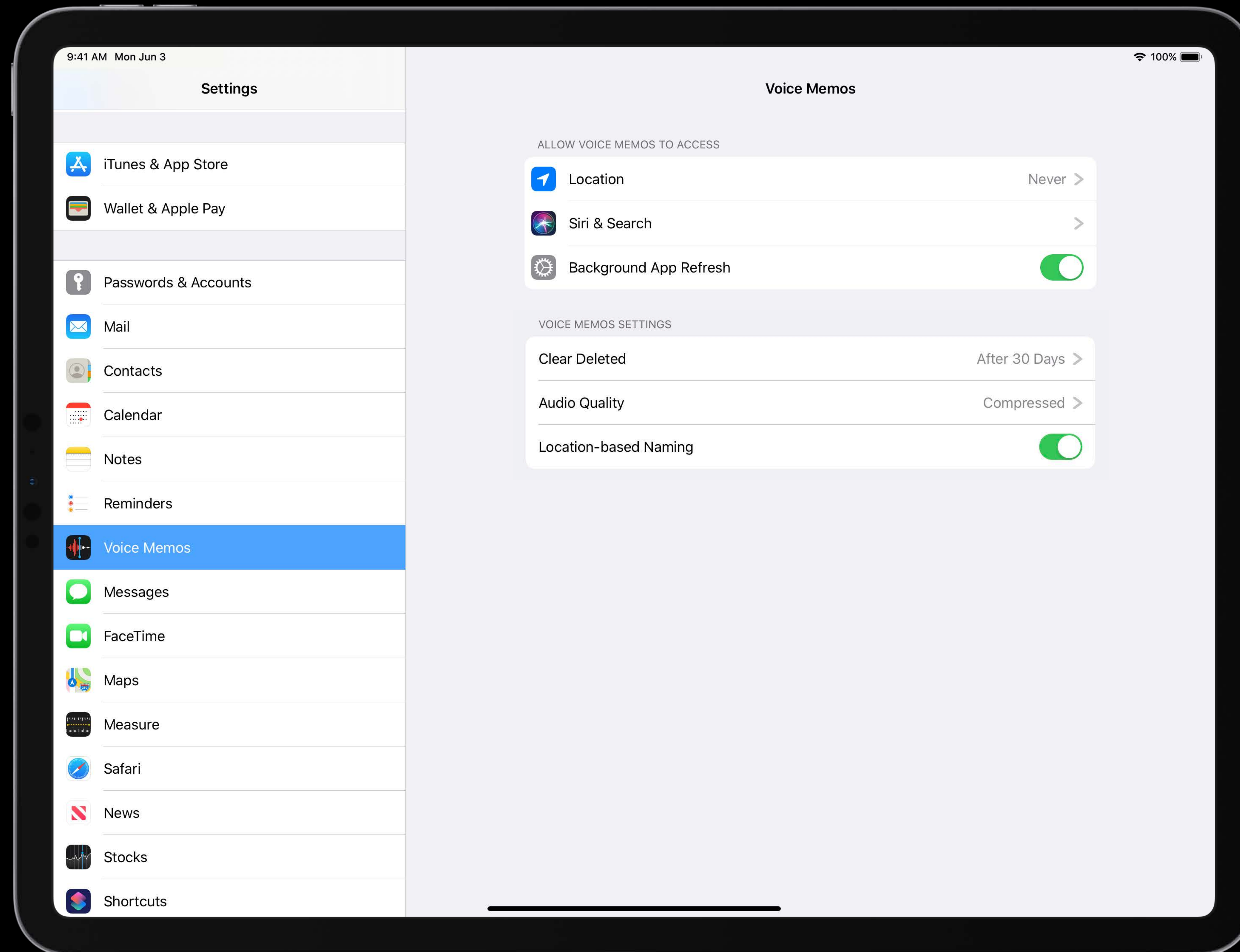
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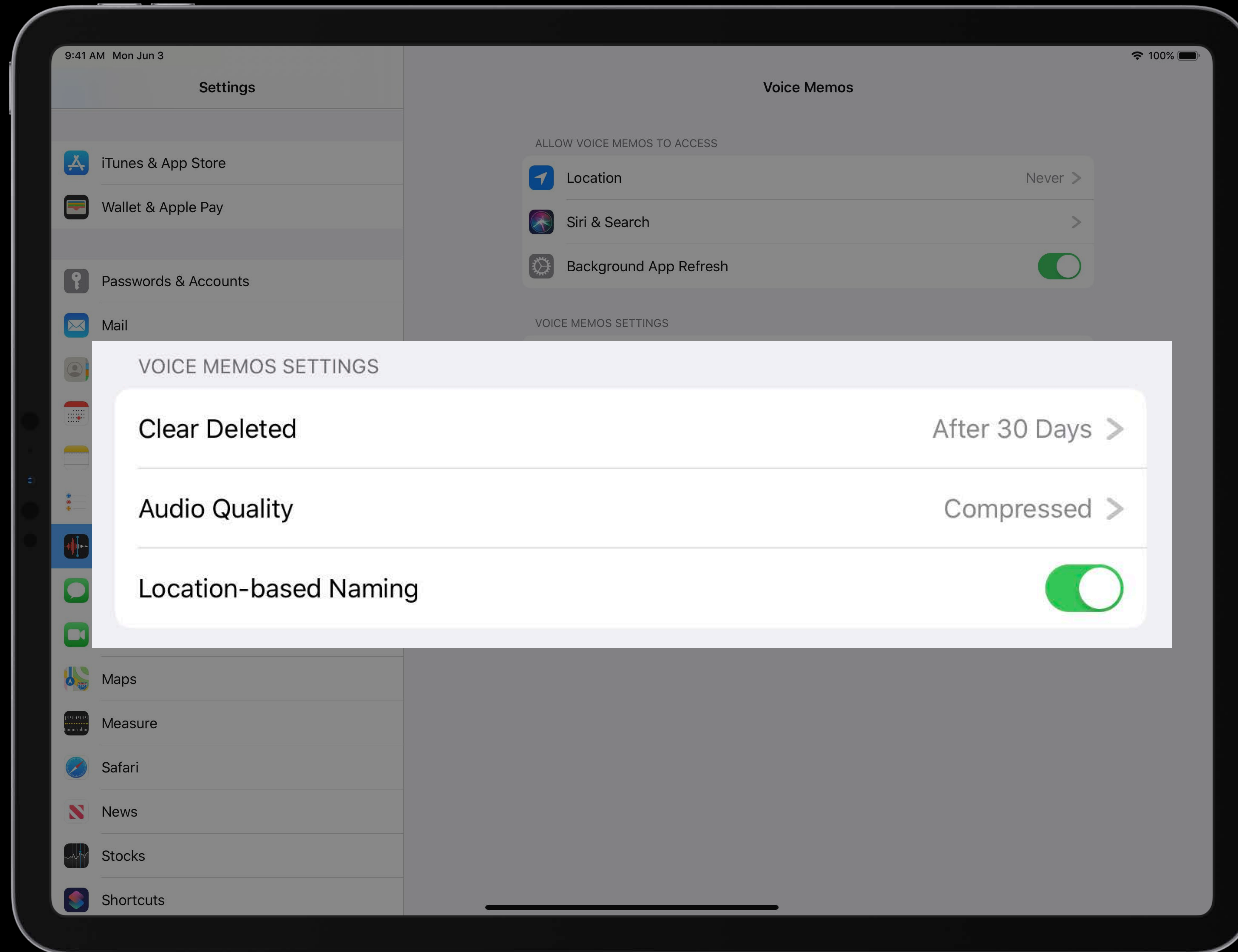


# Settings

# Settings



# Settings



# Settings

Apple **Voice Memos** File Edit View Window Help

- About Voice Memos
- Preferences...** ⌘,
- Services ▶
- Hide Voice Memos ⌘H
- Hide Others ⌘⇧H
- Show All
- Quit Voice Memos ⌘Q



# Settings

The screenshot shows a macOS-style application window titled "Demo Steps". The window has a title bar with three colored window control buttons (red, yellow, green) on the left and "Edit" and "Share" buttons on the right. Below the title bar is a search bar with a magnifying glass icon and the text "Search".

The main content area is split into two sections. The top section shows a zoomed-in waveform of an audio clip, with a blue vertical line indicating the current playback position at 00:00. The bottom section shows a full waveform of the audio clip, with a blue vertical line at the start (00:00) and a timestamp of 00:37 at the end. Below the waveforms is a large digital display showing "00:00.00".

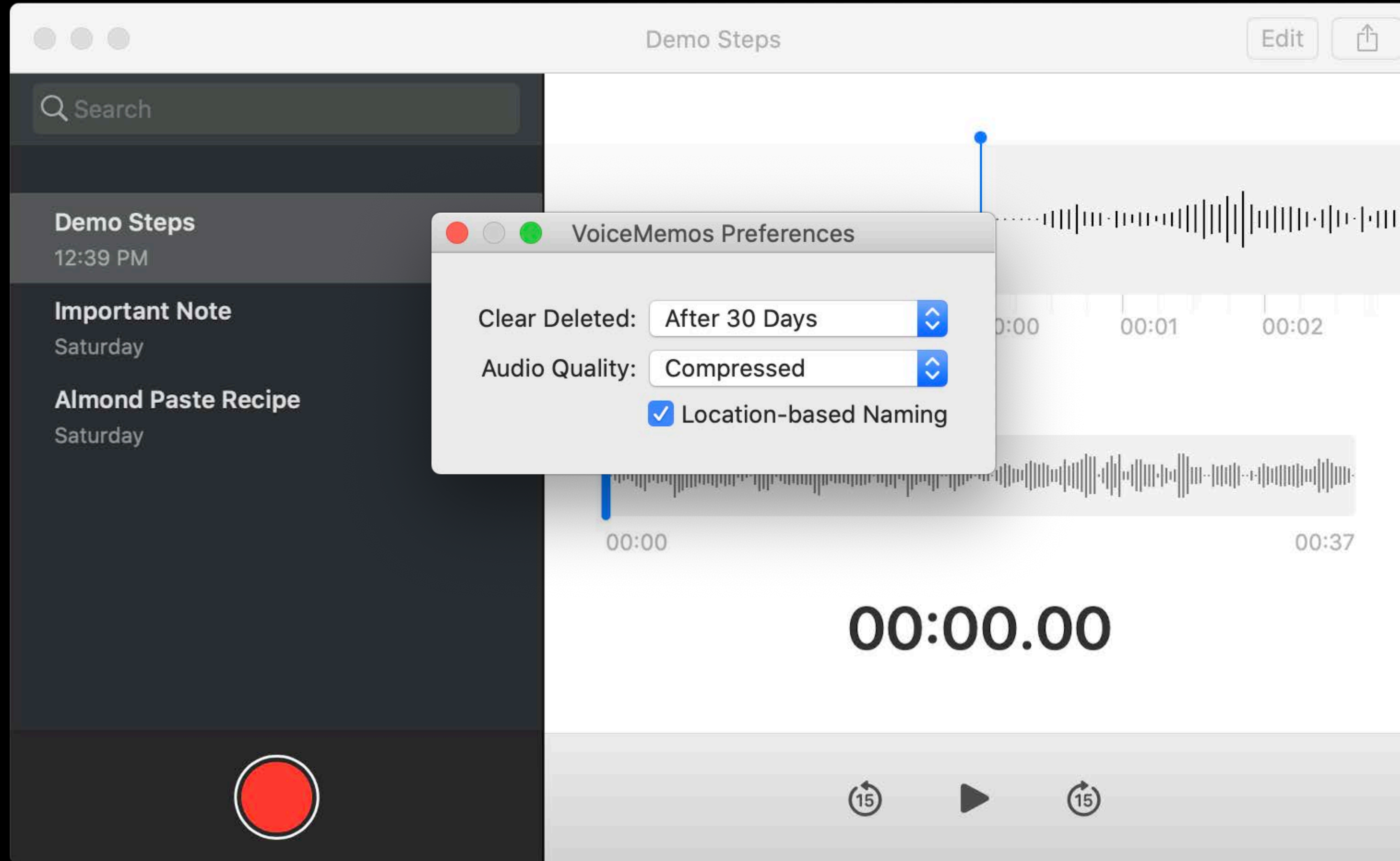
At the bottom of the window is a playback control bar with three icons: a circular icon with "15" (likely a 15-second skip back), a play button, and another circular icon with "15" (likely a 15-second skip forward).

On the left side of the window, there is a dark sidebar with a search bar and a list of items:

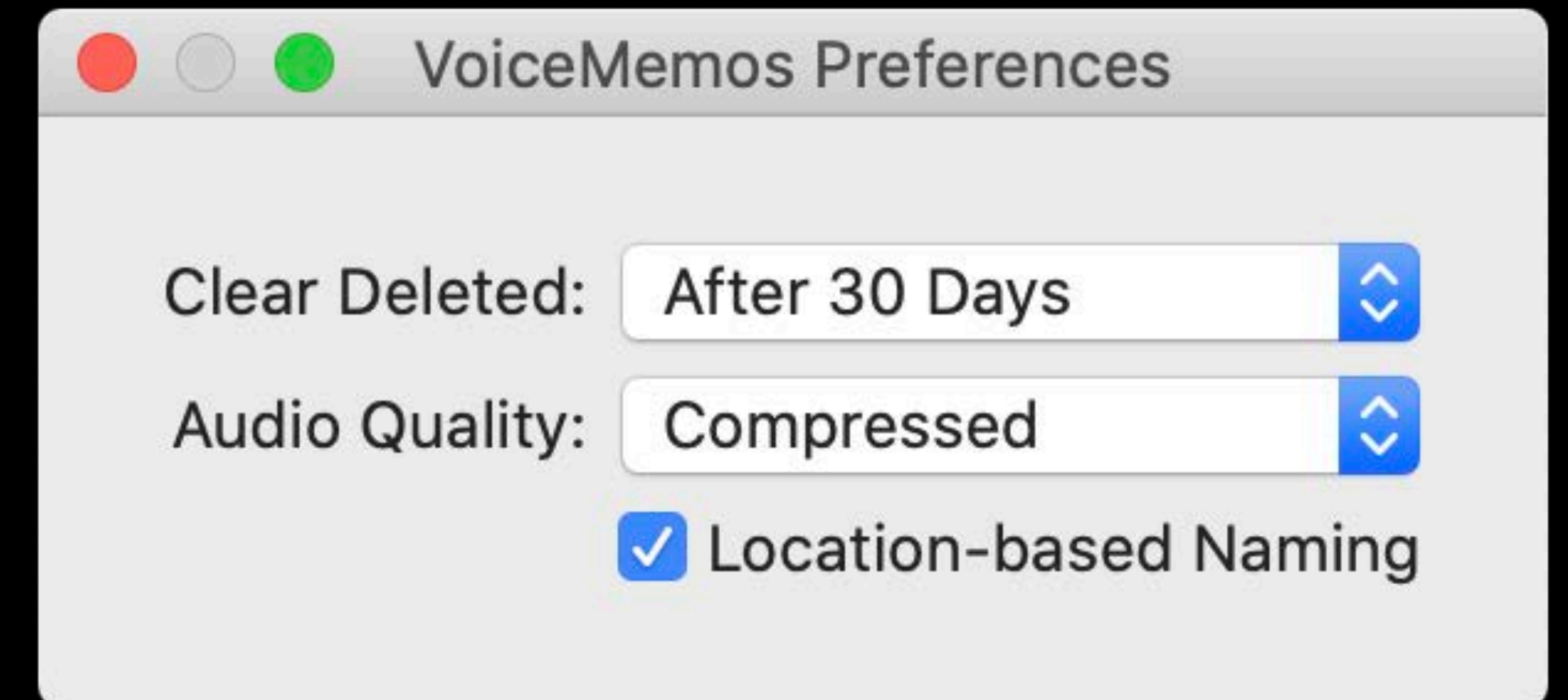
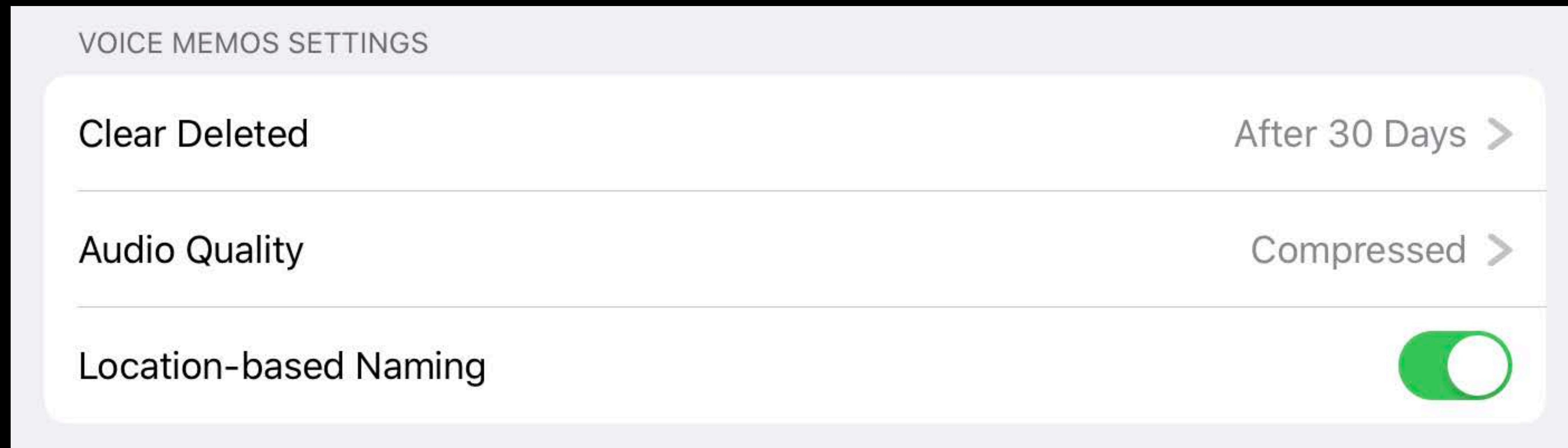
- Demo Steps**  
12:39 PM 00:37
- Important Note**  
Saturday 00:04
- Almond Paste Recipe**  
Saturday 00:42

At the bottom of the sidebar is a large red circular button with a white outline, which is a standard macOS-style "Record" button.

# Settings



# Settings



# Touch Bar



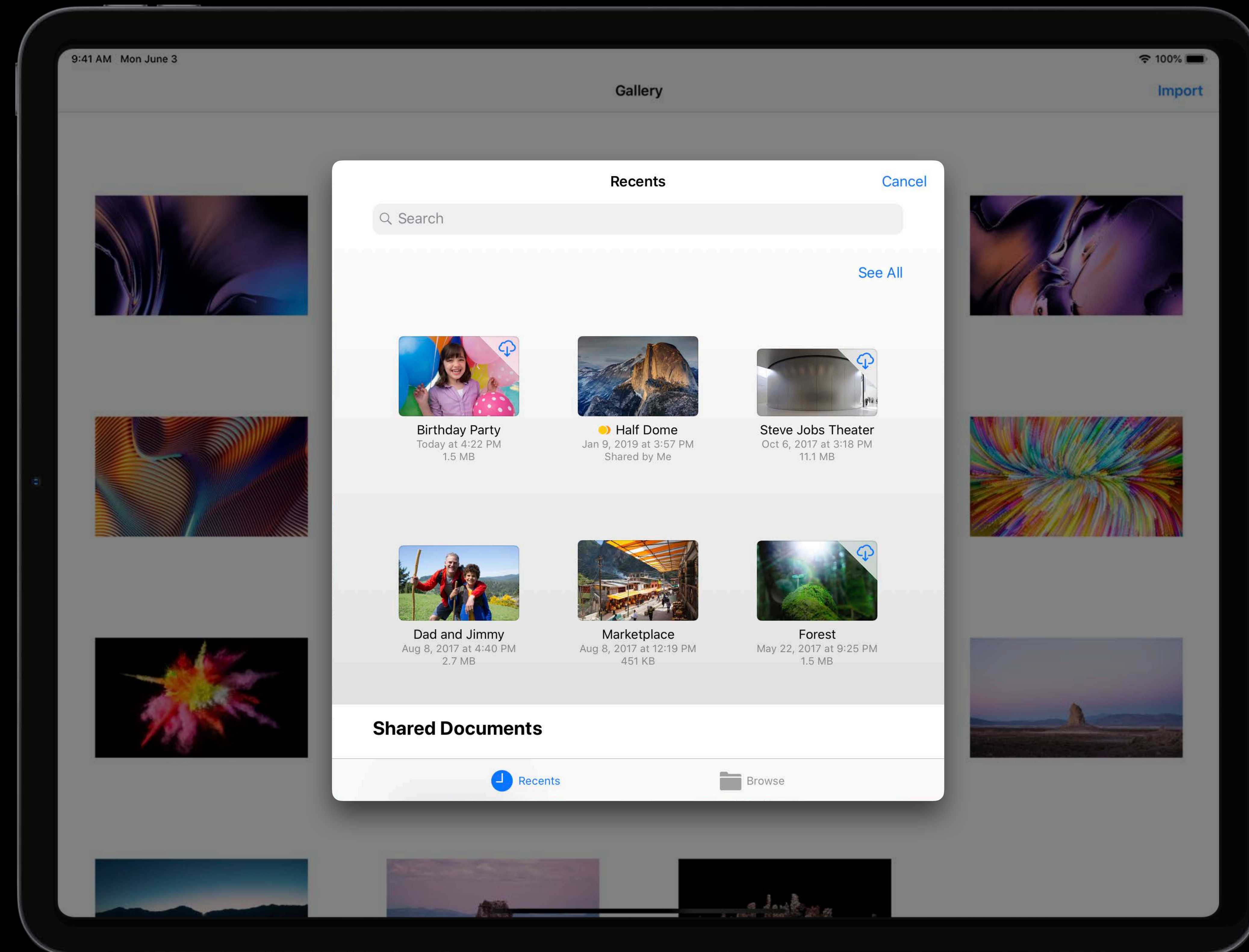
# Touch Bar



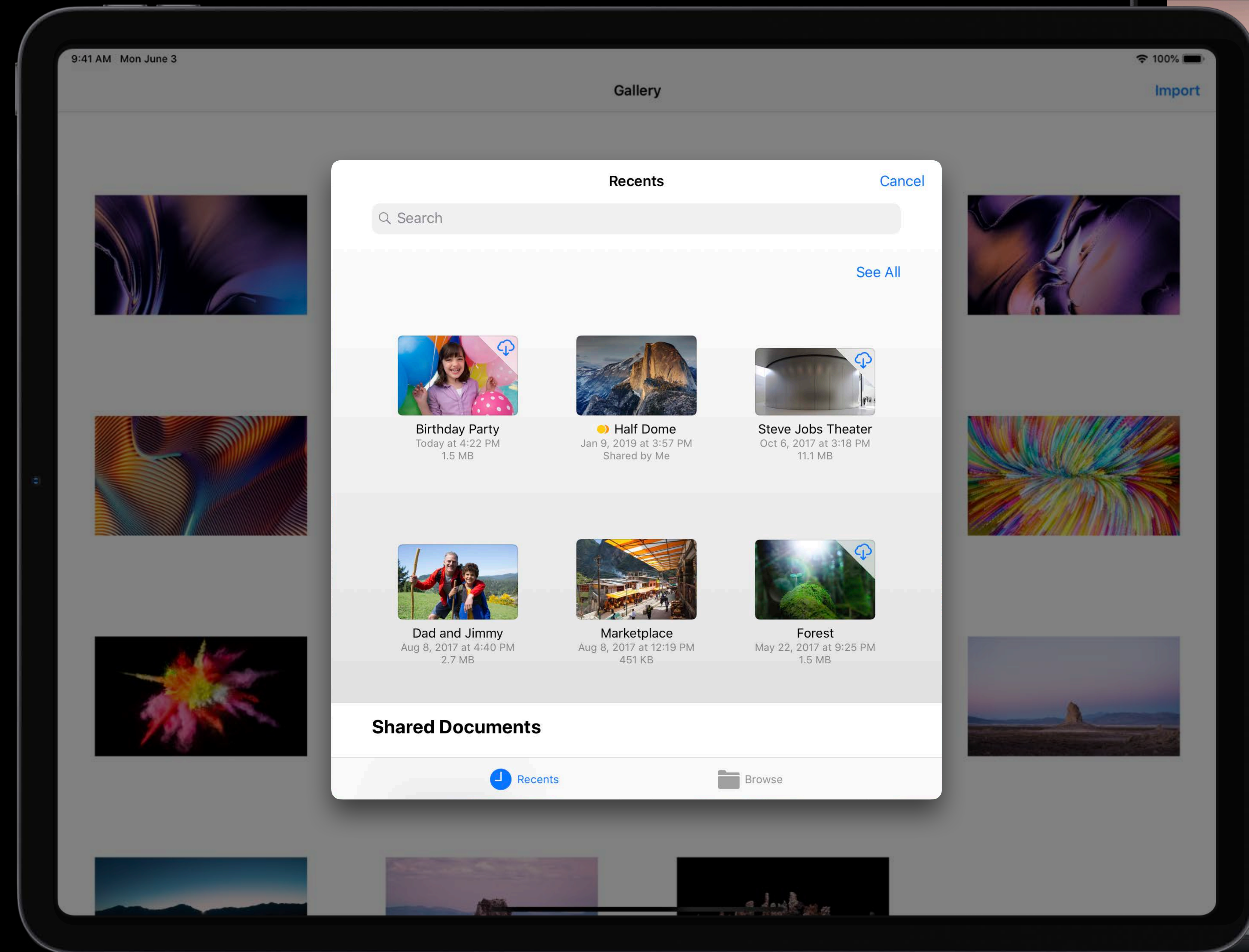
# Touch Bar



# Open and Save Panels

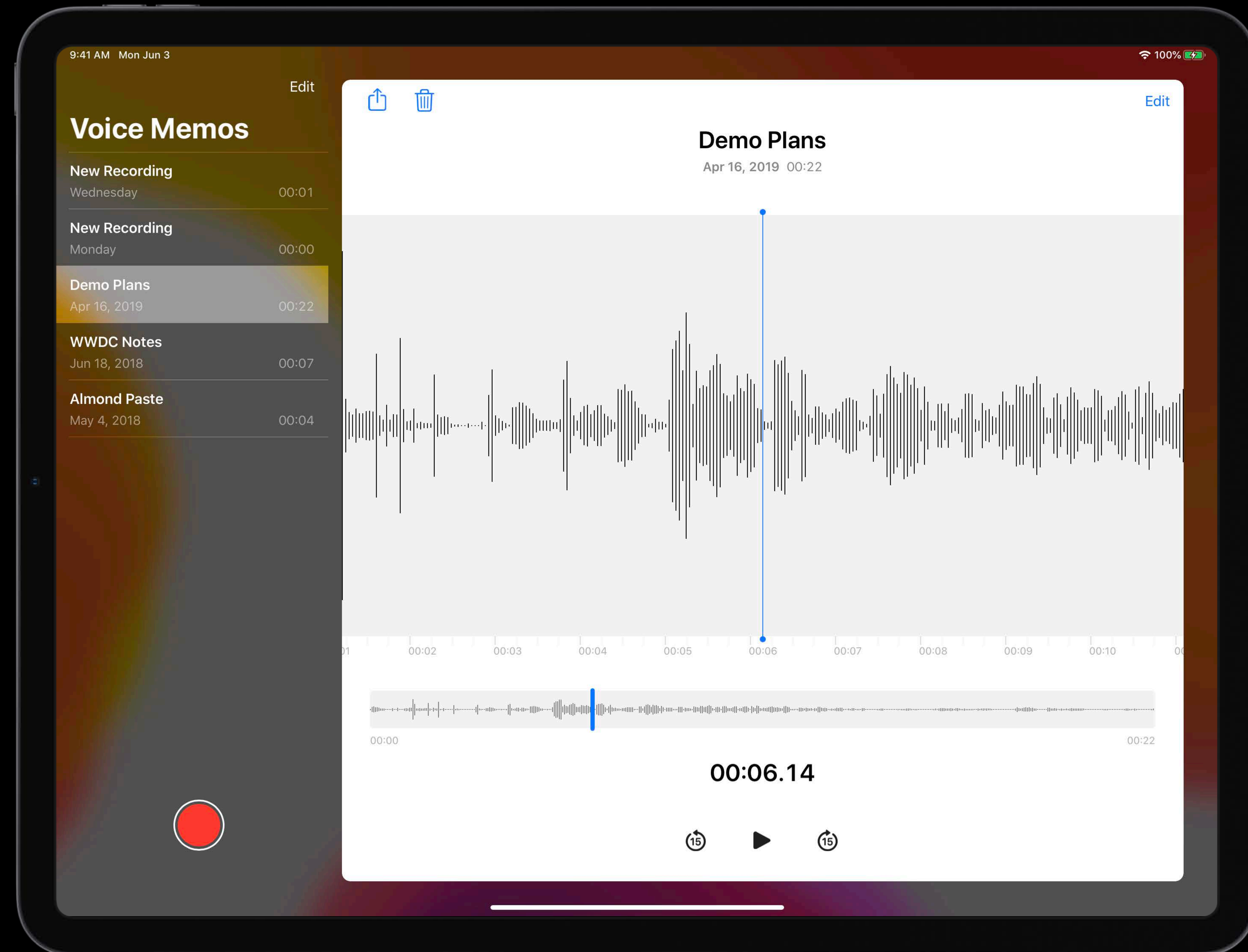


# Open and Save Panels

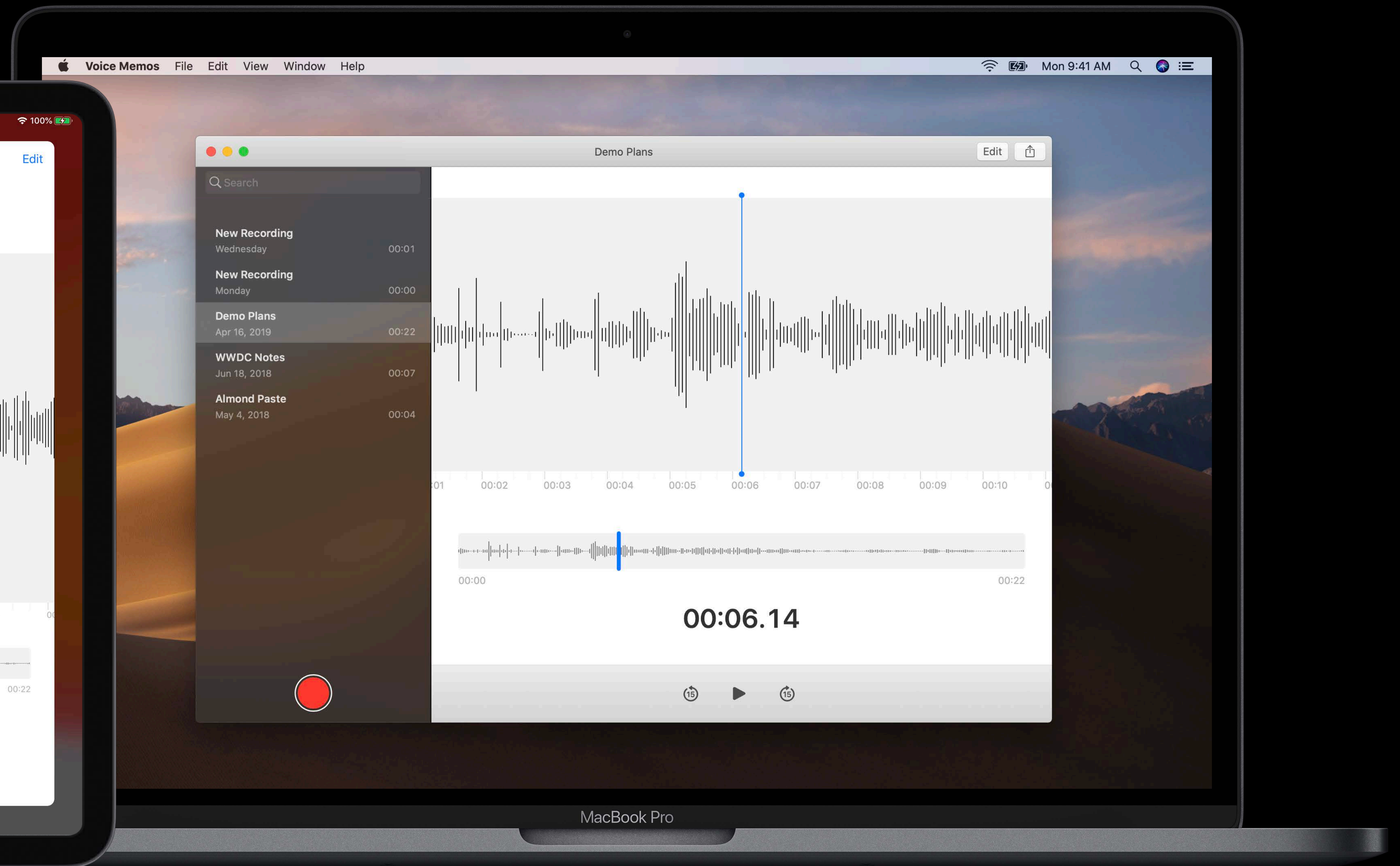
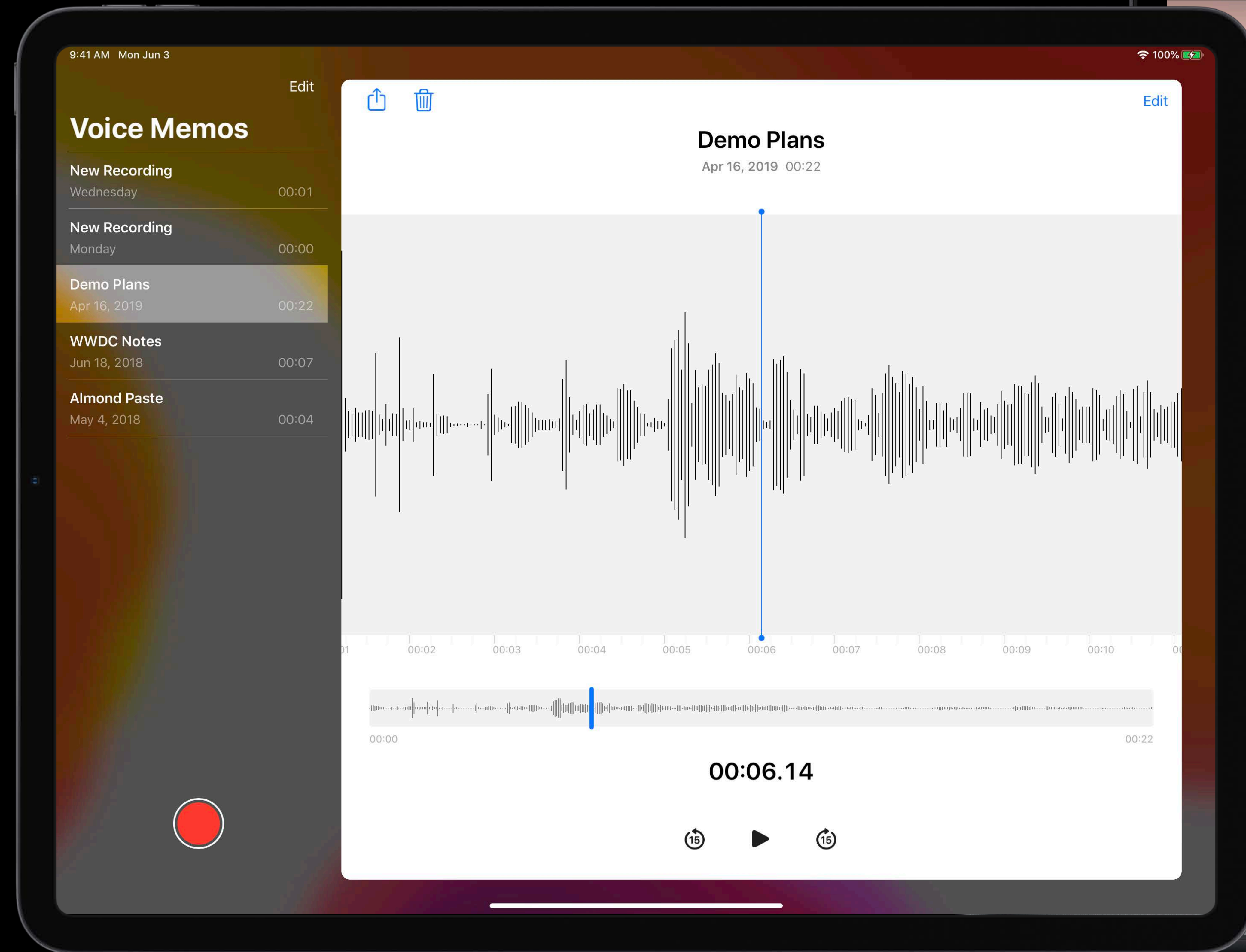




# Custom Views



# Custom Views



# Controls

Edit

Channels, Topics, and Stories

- Sports
- Apple
- Consumer Electronics
- iPhone
- Science
- Health
- Travel
- Business
- Food
- Politics
- Fashion

PERSONALIZE YOUR NEWS

Follow your favorite channels and topics to improve your reading experience.

Discover Channels & Topics

Manage Notifications

APPLE NEWS SPOTLIGHT

Main Conversation Starters Good News

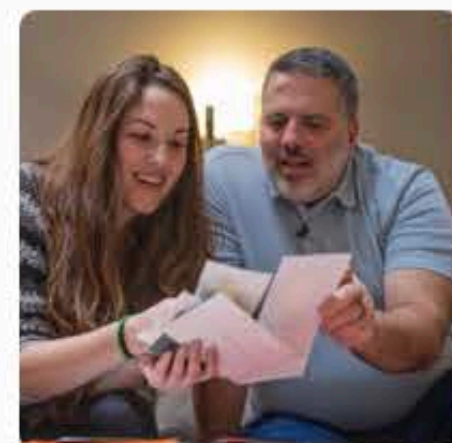


APPLE NEWS SPOTLIGHT At 78, this ballerina is still going strong

Plus: Bored teenagers build a space-ready rocket, a shoe store clerk helps a girl with autism, and more of the week's good news.

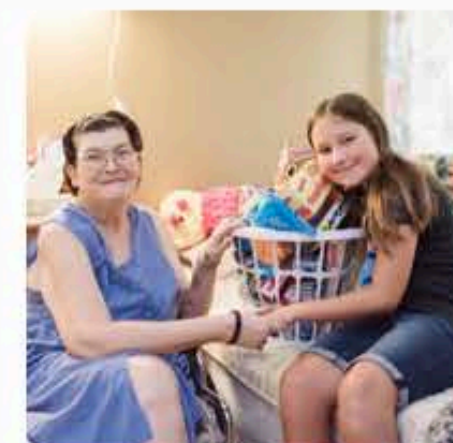
24m ago

APPLE NEWS SPOTLIGHT Man takes DNA test to find his birth father, but discover...



15w ago

APPLE NEWS SPOTLIGHT 5th grader's boredom while visiting her mom's job leads to...



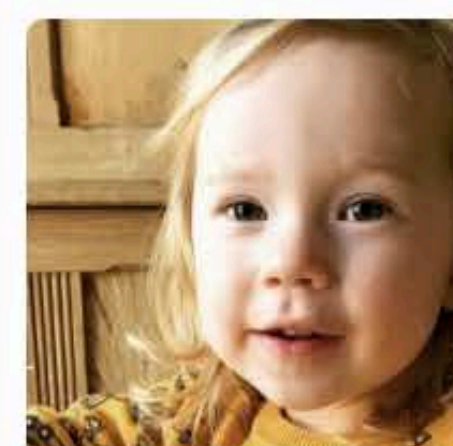
17w ago

APPLE NEWS SPOTLIGHT MLB prospect uses signing bonus to give parents the best gif...



21w ago

APPLE NEWS SPOTLIGHT Elderly man leaves behind 14 years of Christmas gifts for t...



25w ago



APPLE NEWS SPOTLIGHT At 20, she's raising her 5 siblings. So the sheriff bought...

7w ago



APPLE NEWS SPOTLIGHT Boys ranked female classmates on looks. The girl...

9w ago



APPLE NEWS SPOTLIGHT 8-year-old homeless refugee becomes ches...

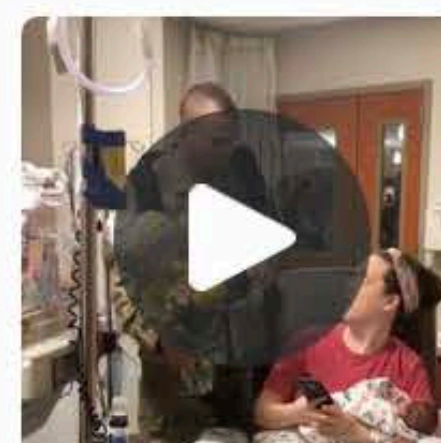
9w ago



APPLE NEWS SPOTLIGHT Virginia woman wins lottery 30 times in one day — and more of...

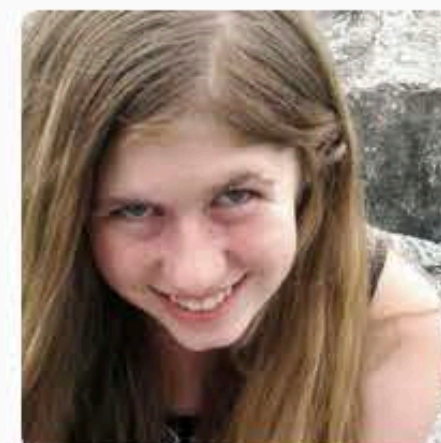
11w ago

APPLE NEWS SPOTLIGHT Deployed dad surprises wife at hospital after birth...



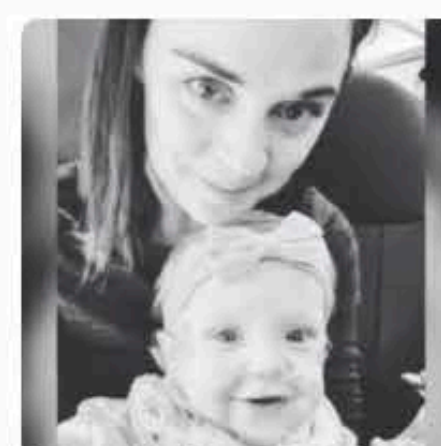
14w ago

APPLE NEWS SPOTLIGHT Missing teen saves herself from alleged captor and gets the...



18w ago

APPLE NEWS SPOTLIGHT Stranger gives up first-class seat to mom and sick baby...



24w ago

- Sports
- Apple
- Consumer Electronics
- iPhone
- Science
- Health
- Travel
- Business
- Food
- Politics
- Fashion

PERSONALIZE YOUR NEWS

Follow your favorite channels and topics to improve your reading experience.

Discover Channels & Topics

Manage Notifications

Notifications

Done

Choose which channels send you notifications.

CHANNELS YOU FOLLOW

- Apple News Spotlight
- News Top Stories

MORE CHANNELS

- BBC News
- Bleacher Report
- Bloomberg
- BuzzFeed News
- BuzzFeed
- CBS News
- CNBC



APPLE NEWS SPOTLIGHT

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7w ago



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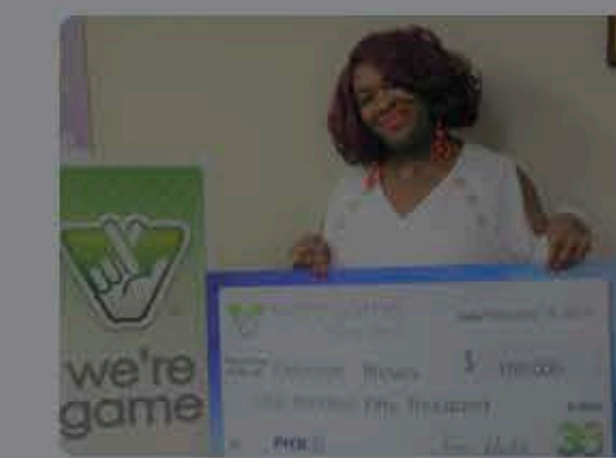
9w ago



APPLE NEWS SPOTLIGHT

8-year-old homeless refugee becomes ches...

9w ago

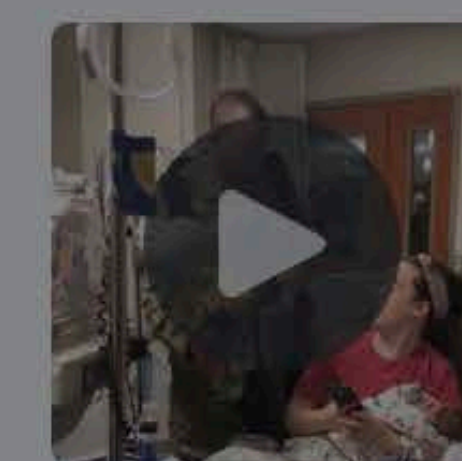


APPLE NEWS SPOTLIGHT

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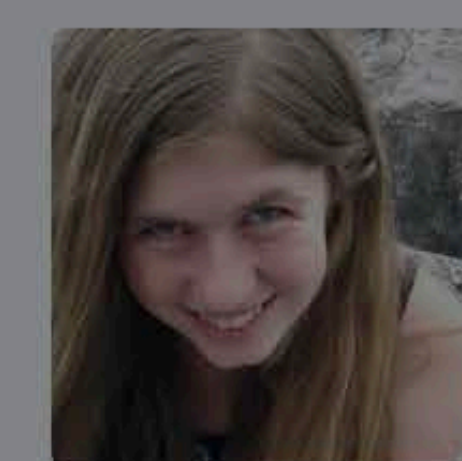
11w ago

APPLE NEWS SPOTLIGHT  
Deployed dad surprises wife at hospital after birth...



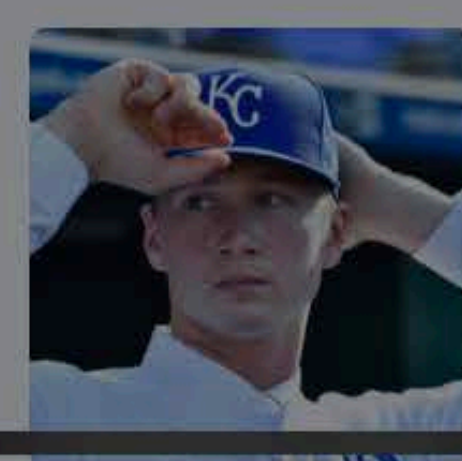
14w ago

APPLE NEWS SPOTLIGHT  
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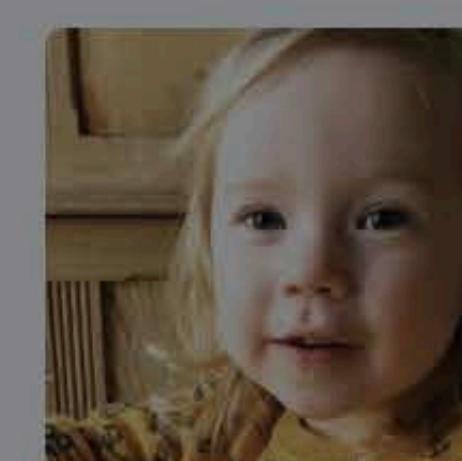
18w ago

APPLE NEWS SPOTLIGHT  
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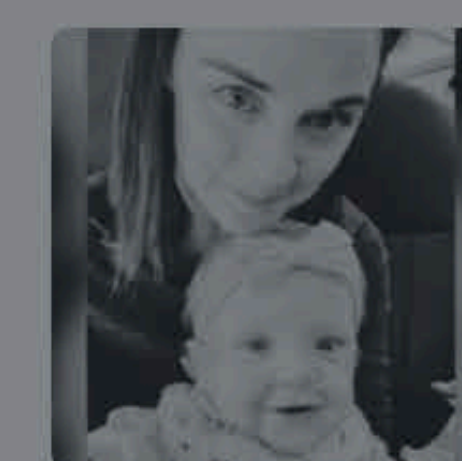
21w ago

APPLE NEWS SPOTLIGHT  
Elderly man leaves behind 14 years of Christmas gifts for t...



25w ago

APPLE NEWS SPOTLIGHT  
Stranger gives up first-class seat to mom and sick baby...



24w ago

News

Settings, Share, Search

Apple News

- Today
- News+
- Saved Stories
- History

Following

- News Top Stories
- Apple News Spotlight

Suggested

- Health
- Science
- Travel
- Technology
- Business
- Sports
- Politics
- Entertainment
- Fashion
- Food

**APPLE NEWS SPOTLIGHT**

Main Conversation Starters Good News

**Notifications** Done

Choose which channels send you notifications.

**CHANNELS YOU FOLLOW**

- Apple News Spotlight
- News Top Stories

**MORE CHANNELS**


- BBC News
- Bleacher Report
- Bloomberg
- BuzzFeed News
- BuzzFeed
- CBS News
- CNBC

**APPLE NEWS SPOTLIGHT**

At 78, this ballerina is still going strong

Plus: Bored teenagers build a space-ready roc...

1h ago

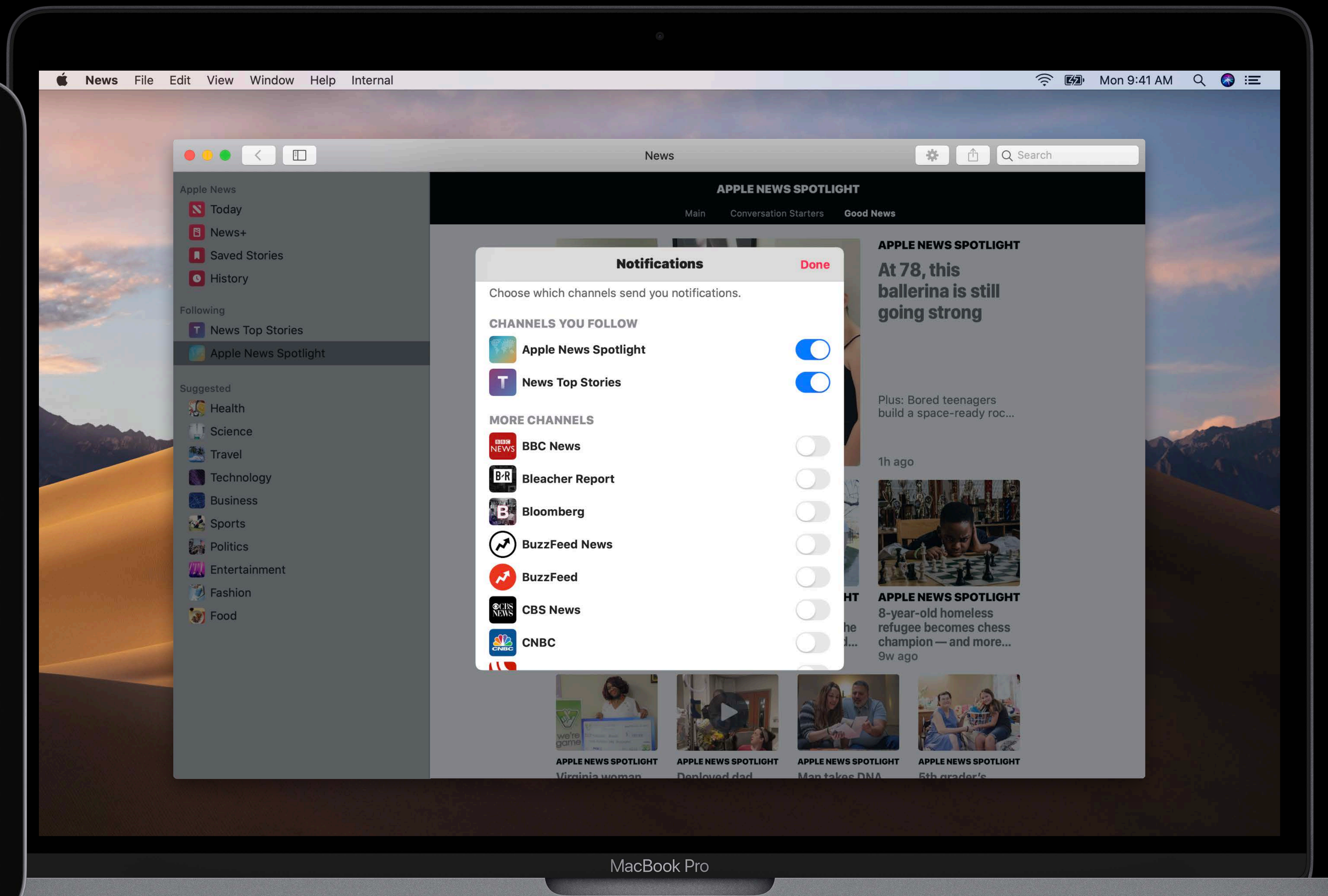
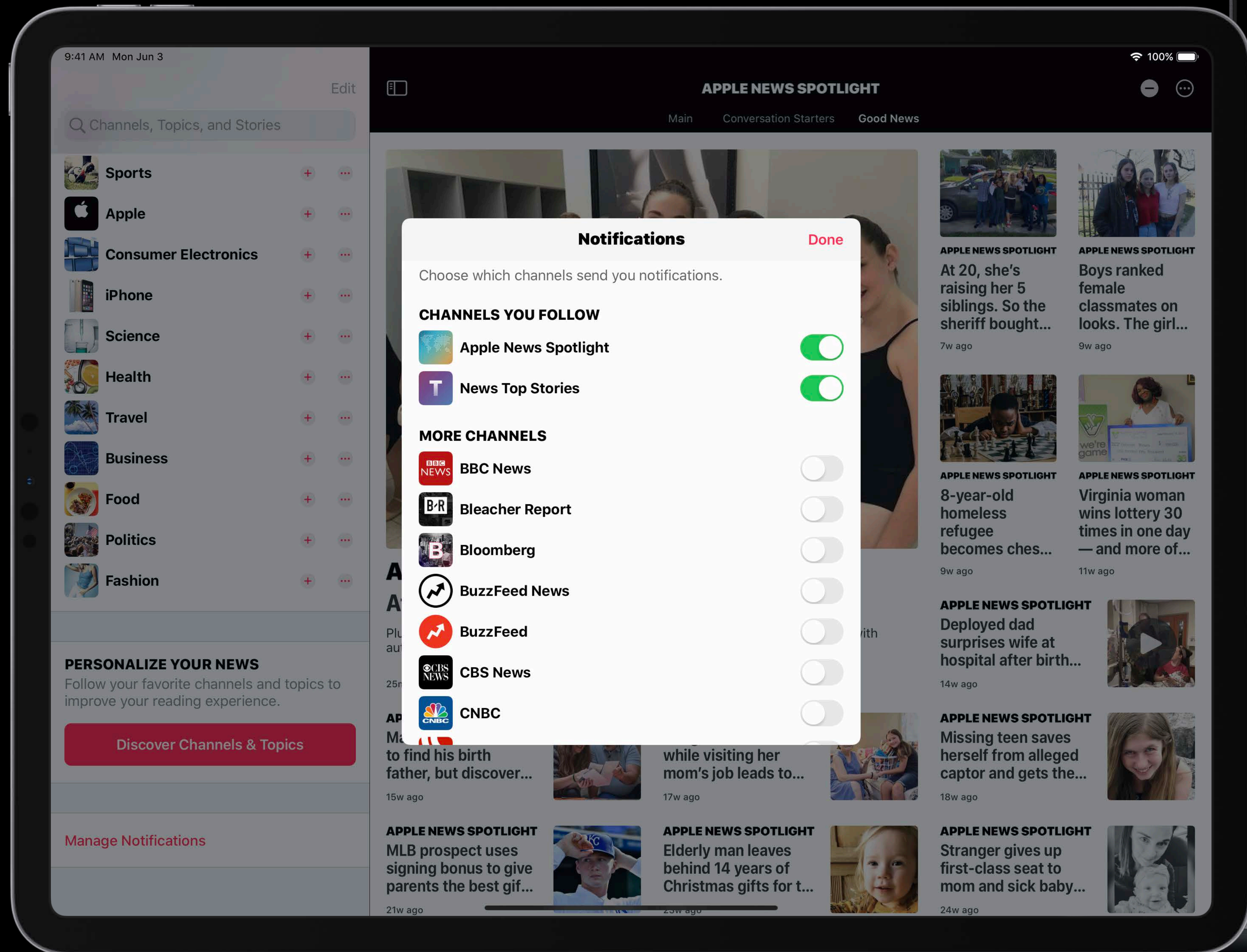


**APPLE NEWS SPOTLIGHT**

8-year-old homeless refugee becomes chess champion — and more...

9w ago

Virginia woman...  
Deployed dad...  
Man takes DNA...  
5th grader's...



# Text Sizes



# Text Sizes

iOS = 17 pt

# Text Sizes

iOS = 17 pt

macOS = 13 pt

# Text Sizes

17 pt

13 pt

# Text Sizes

17 pt

Scaled

13 pt

# More Things You Get For Free

Copy and paste

Drag and drop

Printing

Multiple windows

Application lifecycle

# Features to Adopt

Mac icon

Custom menus

Toolbars

Touch Bar

Hover events

Help

And more!

# API Differences

Jason Beaver

# Overview of API Differences



# Overview of API Differences

APIs that have identical behavior

# Overview of API Differences

APIs that have identical behavior

APIs that are mapped to macOS functionality

# Overview of API Differences

APIs that have identical behavior

APIs that are mapped to macOS functionality

APIs that are unavailable

# Mouse and Touch Events

# Mouse and Touch Events

# Mouse and Touch Events

Hover

# Mouse and Touch Events

Hover

Single-finger touch tracking

# Mouse and Touch Events

Hover

Single-finger touch tracking





# Mouse and Touch Events

Hover

Single-finger touch tracking

Standard gestures

# Mouse and Touch Events

Hover

Single-finger touch tracking

Standard gestures



# Mouse and Touch Events

Hover

Single-finger touch tracking

Standard gestures

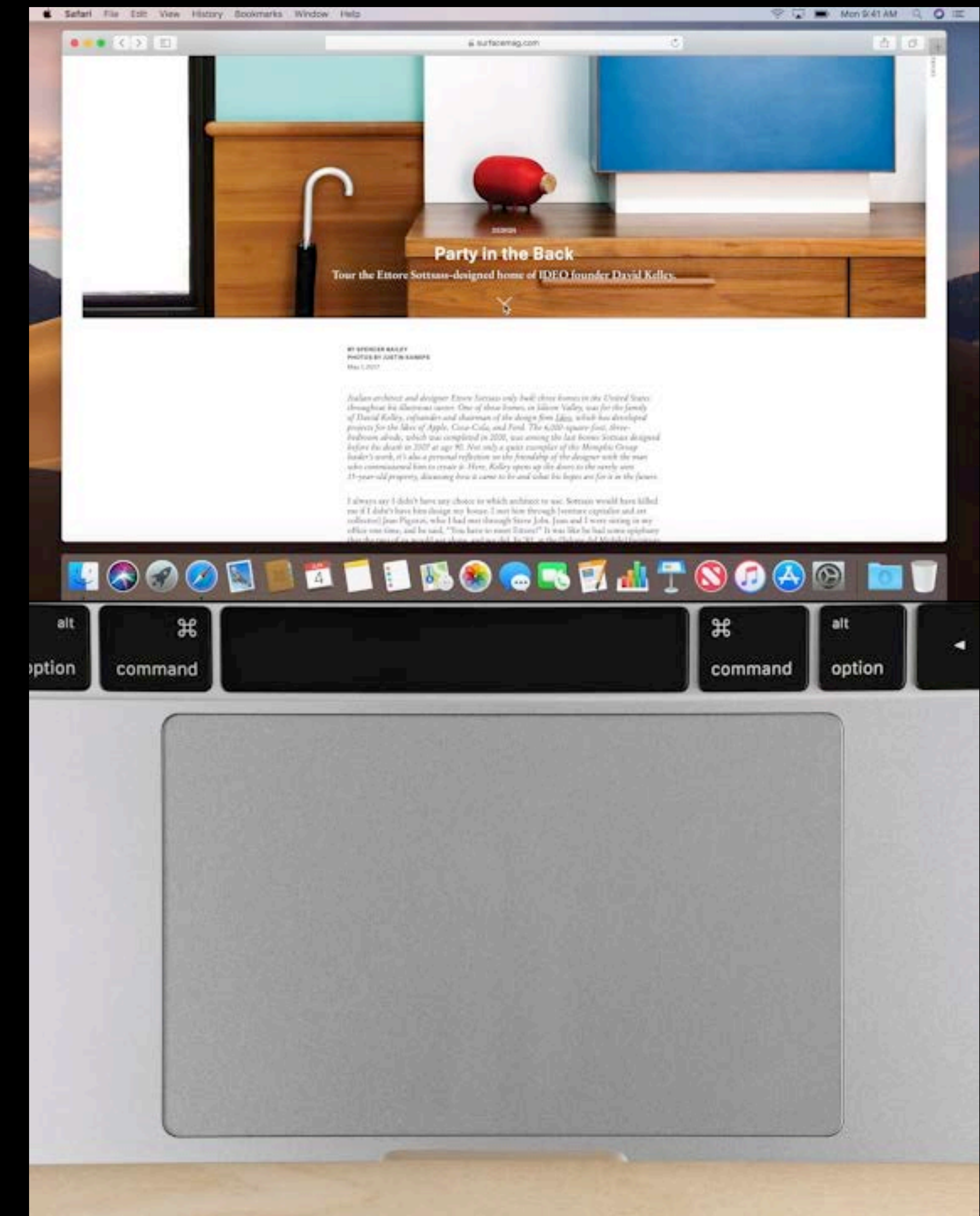


# Mouse and Touch Events

Hover

Single-finger touch tracking

Standard gestures



# Mouse and Touch Events

Hover

Single-finger touch tracking

Standard gestures

Custom multi-touch code

# Unavailable APIs

# Unavailable APIs

Deprecated frameworks

# Unavailable APIs

Deprecated frameworks

iOS-specific frameworks



# Unavailable APIs

Deprecated frameworks

iOS-specific frameworks

Hardware-specific frameworks

# Unavailable APIs

Deprecated frameworks

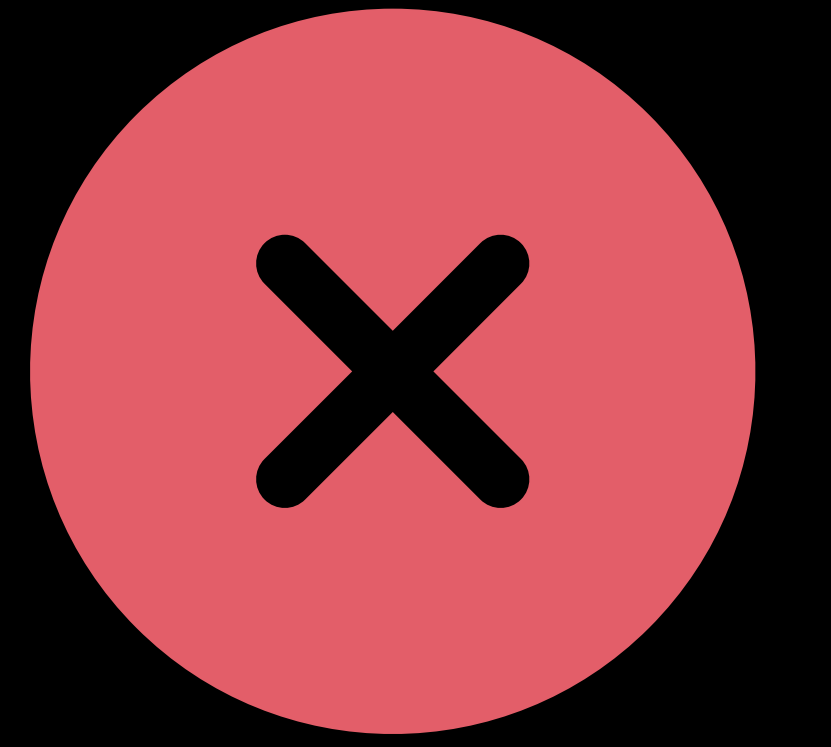
iOS-specific frameworks

Hardware-specific frameworks

Framework differences

# Deprecated Frameworks

# Deprecated Frameworks



## Deprecated Framework

## Replacement Framework

AddressBook

Contacts

AddressBookUI

ContactsUI

AssetsLibrary

Photos

OpenGL ES

Metal

GLKit

MetalKit

# iOS Specific Frameworks

# iOS Specific Frameworks

ClassKit

HealthKit

HomeKit

# Hardware Specific Frameworks

# Hardware Specific Frameworks

ARKit

CarPlay

VisionKit



# Framework Differences

# Framework Differences

Core Location

Core Motion

Core Telephony

Core NFC

Core Bluetooth

# Framework Differences

# Framework Differences

Media Player

AVFoundation

AudioToolbox

# Framework Differences

# Framework Differences

Metal

ReplayKit

UIKit

StoreKit

SafariServices

SystemConfiguration

QuickLook

PassKit

# API Availability

# API Availability

```
// Swift
```

```
@available(macOS 10.10, iOS 8.0, watchOS 2.0, tvOS 9.0)
```

```
// Objective-C
```

```
API_AVAILABLE(macos(10.10), ios(8.0), watchos(2.0), tvos(9.0))
```



# API Availability

```
// Swift
@available(macOS 10.10, iOS 8.0, watchOS 2.0, tvOS 9.0)

// Objective-C
API_AVAILABLE(macos(10.10), ios(8.0), watchos(2.0), tvos(9.0))
```

# API Availability

```
// Swift
```

```
@available(macOS 10.10, UIKitForMac 13.0) @unavailable(iOS, watchOS, tvOS)
```

```
// Objective-C
```

```
API_AVAILABLE(macos(10.10), uikitformac(13.0)) API_UNAVAILABLE(ios, watchos, tvos)
```

# API Availability

```
// Swift
@available(macOS 10.10, UIKitForMac 13.0) @unavailable(iOS, watchOS, tvOS)

// Objective-C
API_AVAILABLE(macos(10.10), uikitformac(13.0)) API_UNAVAILABLE(ios, watchos, tvos)
```

# API Availability

```
// Swift
```

```
@available(macOS 10.10, iOS 8.0, watchOS 2.0, tvOS 9.0) @unavailable(UikitForMac)
```

```
// Objective-C
```

```
API_AVAILABLE(macos(10.10), ios(8.0), watchos(2.0), tvos(9.0)) API_UNAVAILABLE(uikitformac)
```

# API Availability

```
// Swift
@available(macOS 10.10, iOS 8.0, watchOS 2.0, tvOS 9.0) @unavailable(UikitForMac)

// Objective-C
API_AVAILABLE(macos(10.10), ios(8.0), watchos(2.0), tvos(9.0)) API_UNAVAILABLE(uikitformac)
```

# Conditionalizing Code

# Conditionalizing Code

```
// iOS-specific code
let recognizer = MyGestureRecognizer(target: self,
                                     action: #selector(myAction(recognizer:)))
recognizer.delegate = self
view.addGestureRecognizer(recognizer)
```

# Conditionalizing Code

```
#if !targetEnvironment(UikitForMac)
// iOS-specific code
let recognizer = MyGestureRecognizer(target: self,
                                     action: #selector(myAction(recognizer:)))

recognizer.delegate = self
view.addGestureRecognizer(recognizer)
#endif
```



# Conditionalizing Code

```
#if !targetEnvironment(UikitForMac)
// iOS-specific code
let recognizer = MyGestureRecognizer(target: self,
                                     action: #selector(myAction(recognizer:)))

recognizer.delegate = self
view.addGestureRecognizer(recognizer)
#endif
```

```
#if !TARGET_OS_UIKITFORMAC
// iOS-specific code
id recognizer = [[MyGestureRecognizer alloc] initWithTarget:self
                                                         action:@selector(myAction:)];

recognizer.delegate = self;
[view addGestureRecognizer:recognizer];
#endif
```

# Data Protection

# Data Protection

```
NSData.WritingOptions.noFileProtection  
    .completeFileProtection  
    .completeFileProtectionUnlessOpen  
    .completeFileProtectionUntilFirstUserAuthentication
```

# Data Protection

# Data Protection

```
try data.write(to: fileURL, options: .completeFileProtection)
```

# Data Protection

```
try data.write(to: fileURL, options: .completeFileProtection)
```

```
let key = SymmetricKey(size: .bits256)  
let sealed = try AES.GCM.seal(data, using: key)
```

# Bundle Format

# Bundle Format



# Bundle Format



ChocolateChip.app



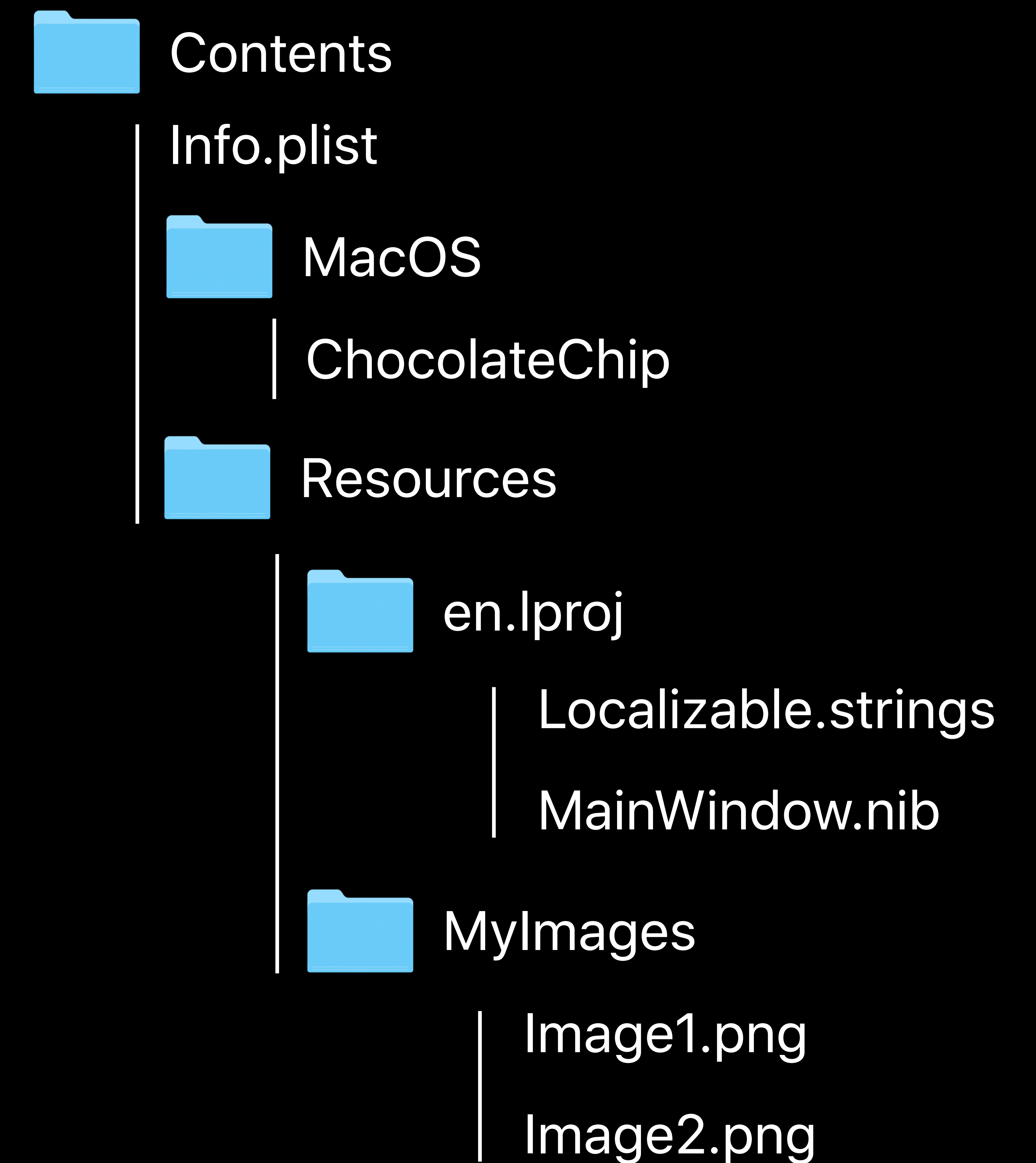
# Bundle Format



ChocolateChip.app



ChocolateChip.app



**Extensions**

# Available Extensions

# Available Extensions

Action

Audio Unit

Broadcast UI

Broadcast Upload

Notification Service

Share

Spotlight Index

Network

# Available Extensions

Action

Audio Unit

Broadcast UI


Broadcast Upload

Notification Service

Share


Spotlight Index


Network


 Add to Reading List

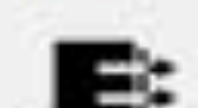
 Mail


 Messages

 AirDrop

 Notes

 Simulator

 Custom Share Activity

 Custom Share UI Activity


 More...

---

Actions

 Like Story

 Dislike Story

 Custom Action UI Activity

# Unavailable Extensions

# Unavailable Extensions

Content Blocker

Unwanted Communication

Message Filter

File Provider

AutoFill Credential Provider

Notification Content

File Provider UI

Call Directory

Photo Editing

Intents

Custom Keyboard

Sticker Pack

Intents UI

iMessage

Today

QuickLook Preview

Thumbnail



***Demo***

# More Information

[developer.apple.com/wwdc19/205](https://developer.apple.com/wwdc19/205)

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Taking iPad Apps for Mac to the Next Level

Thursday, 5:00

---

What's New in iOS and macOS Design

Tuesday, 5:00

---

Font Management and Text Scaling

Thursday, 9:00

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 WWDC19