System Frameworks

#WWDC15

Privacy and Your App

Session 703

Katie Skinner Product Security and Privacy
Jason Novak Product Security and Privacy

“This is a basic human right.
We all have a right to privacy.”

Tim Cook

Our Users Are Your Users

Architect for Privacy

Updates to iOS, OS X, and watchOS

User Identifiers

Accessing User Data

Protecting User Data

Architect for Privacy

Data retention

Data transfer

Data storage

Identifiers

Transparency and control

Data Retention

Have a retention policy

Delete data when it no longer serves a user need

Collect the minimum data needed

Balance storage of data against risk

Data Minimization Techniques

Anonymize

Aggregate

Sample

De-resolve

Decay

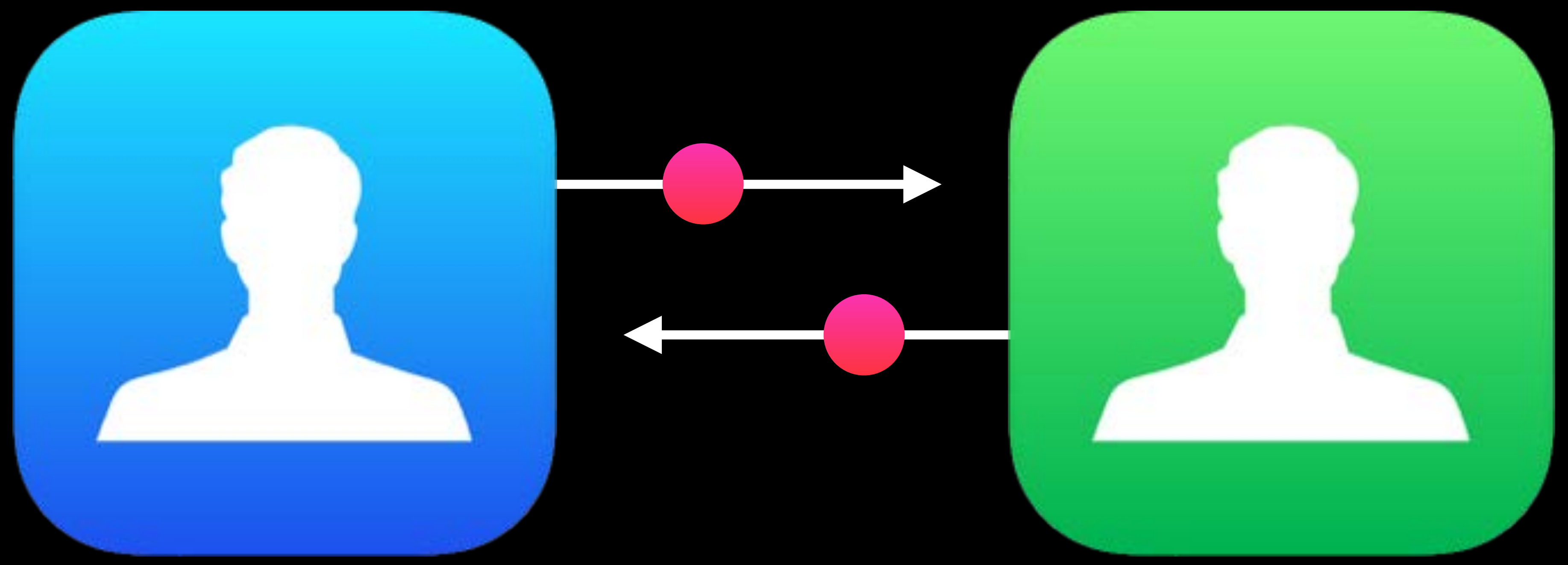
Minimize

Data Transfer

Encrypt data in transit

Keep sensitive data on-device

Process sensitive data on-device



Data Storage

On device

- Data protection
- Keychain

Server-side

- Encrypt at rest
- CloudKit

CloudKit Tips and Tricks

Pacific Heights

Thursday 4:30PM

Identifiers

Use purpose scoped identifiers

- Session, rotating, long lived

Transparency and Control

Be clear about what data is collected

- Ability to inspect data

Explain how it will be used

- Purpose strings
- Privacy Policy

Give users control

- Limit Ad Tracking

Updates

iOS

OS X

watchOS

iOS

MAC Address Randomization

	iOS 8	iOS 9
Unassociated PNO Scans	●	●
Unassociated ePNO Scans	●	●

MAC Address Randomization

NEW

	iOS 8	iOS 9
Unassociated PNO Scans	●	●
Unassociated ePNO Scans	●	●
Location Scans		●
Auto Join Scans		●

App Detection

The apps that a user has installed are their business

App Detection

The apps that a user has installed are their business

If your app is installed isn’t another app’s business

canOpenURL

Purpose is to determine whether an app can open a given URL resource

For instance this can be used to present new user experiences if an app is installed

Use extensions or universal links

LSApplicationQueriesSchemes

```
<key>LSApplicationQueriesSchemes</key>
<array>
     <string>urlscheme</string>
     <string>urlscheme2</string>
     <string>urlscheme3</string>
     <string>urlscheme4</string>
</array>
```

Calling canOpenURL

```
let b = UIApplication.sharedApplication().canOpenURL(url)
```

canOpenURL Responses

URL scheme declared in Info.plist

If a URL scheme is declared in Info.plist, `canOpenURL(urlscheme)` will return:

- YES if an app that supports that URL scheme is installed
- NO if no app supporting that URL is installed
  - syslog will contain

```
canOpenURL: failed for URL: “urlscheme://“ – error: “(null)”
```

canOpenURL Responses

URL scheme not declared in Info.plist

If a URL scheme is not declared in Info.plist, `canOpenURL(urlscheme)` will return:

- NO whether or not an app supporting that scheme is installed
  - syslog will contain

```
canOpenURL: failed for URL: “urlscheme://“ – error: “This app is not allowed
to query for scheme urlscheme”
```

50

Distinct schemes for
apps linked before iOS 9

Universal Links

Web links are seamless

App opens or Safari launches to your website

No need to check if another app is installed

sysctl

`sysctl()` retrieves system information for processes with appropriate privileges

iOS apps are not permitted to see what other apps are running

sysctl

NEW

`sysctl()` retrieves system information for processes with appropriate privileges

iOS apps are not permitted to see what other apps are running

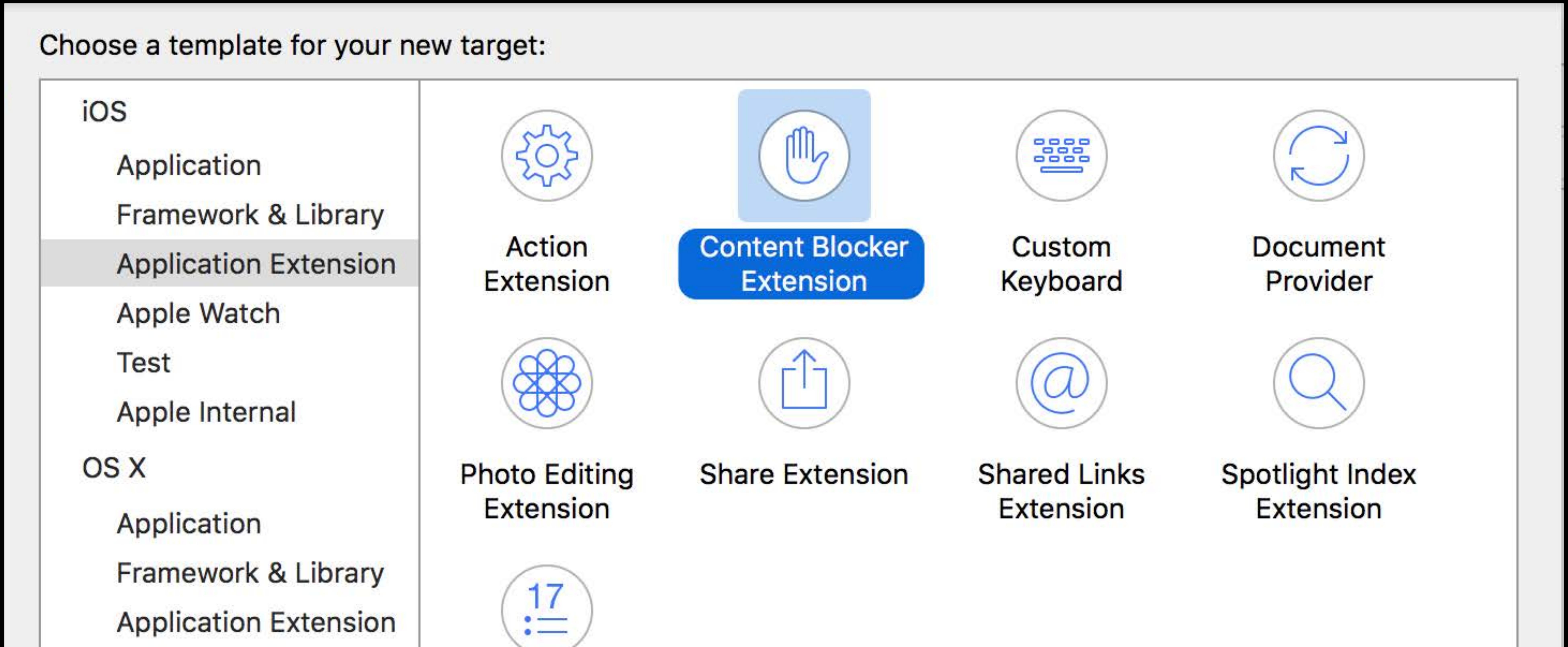
In iOS 9, the sandbox now prevents a process from accessing the `kern.proc`, `kern.procargs`, and `kern.procargs2` values for other processes

Safari Content Blocker

NEW

Block lists will apply to Safari or any apps that use SafariViewController

Does not apply to apps using UIWebView



Choose a template for your new target:

OS X

OS X Cookie Policy

NEW

In OS X Yosemite and before, cookies are shared among all applications and are kept in sync across process boundaries

With OS X El Capitan, cookies are local to a single process and are not shared

watchOS

watchOS

Think about privacy and security from the beginning

watchOS

Think about privacy and security from the beginning

Building off of iOS infrastructure and techniques

watchOS

Think about privacy and security from the beginning

Building off of iOS infrastructure and techniques

User has a single relationship across their Watch and iPhone

Privacy Settings are shared between paired devices

Keychain

NEW

Available on Watch with watchOS 2

Identifiers

Identifiers

Identifiers

Name

Identifiers

Name

Phone number

Identifiers

Name

Phone number

Randomly generated number

Identifiers

Name

Phone number

Randomly generated number

UUID

Identifiers

Name

Phone number

Randomly generated number

UUID

Identifiers

- Name
- Phone number
- Randomly generated number
- UUID

- App activities

Identifiers

Name

Phone number

Randomly generated number

UUID

App activities

Search queries

Identifiers

Name

Phone number

Randomly generated number

UUID

App activities

Search queries

Messages

Identifiers

Name

Phone number

Randomly generated number

UUID

App activities

Search queries

Messages

Location

Identifier Usage

Do you need an identifier or just the data?

7ecf67b6-50f1-493f-9306-b8773f7b8ff7

Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session

7ecf67b6-50f1-493f-9306-b8773f7b8ff7

Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session
- User

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Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session
- User
- Installation on a device

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Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session
- User
- Installation on a device

Scoping identifiers

7ecf67b6-50f1-493f-9306-b8773f7b8ff7

Example

Search identifiers

Identifier	Time	Search Query
123	2015-06-01 12:00	engagement ring
123	2015-06-01 12:05	where to propose
123	2015-06-01 12:10	dinner reservations saturday night
456	2015-06-01 13:34	flights to SFO
456	2015-06-01 13:42	how do I get to moscone center?
456	2015-06-01 13:44	when is wwdc keynote?
789	2015-06-01 14:52	where does john appleseed work?

Example

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Persistent Identifiers

Permit long-term tracking of a user

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Aren’t transparent or in line with user expectations

Persistent Identifiers

Permit long term tracking of a user

Aren’t transparent or in line with user expectations

Users don’t have control

Identifier APIs

	Scope	Control	Backed Up	Restores Across Devices
Vendor ID	Developer	Uninstall all apps from same TeamID	Yes	No
Advertising ID	Device	“Reset Advertising ID”	Yes	No

Identifier API Availability

	iOS	watchOS 1 SDK	watchOS 2 SDK
Vendor ID	BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B	BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B	BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B
Advertising ID	7ED98D72-3CA8-43E9-856D-4160B7D43A59	7ED98D72-3CA8-43E9-856D-4160B7D43A59	7ED98D72-3CA8-43E9-856D-4160B7D43A59

Best Practices

Determine if you need an identifier at all

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If you need an identifier, properly scope it

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Ensure that usage is consistent with guidelines

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Determine if you need an identifier at all

If you need an identifier, properly scope it

Use the OS provided identifiers

Ensure that usage is consistent with guidelines

Always check the value of Limit Ad Tracking and the `advertisingIdentifier` before you use it

```
let identifierForAdvertising =
ASIdentifierManager.sharedManager().advertisingIdentifier.UUIDString
```

Reporting

Privacy in Reporting

Report insights not data

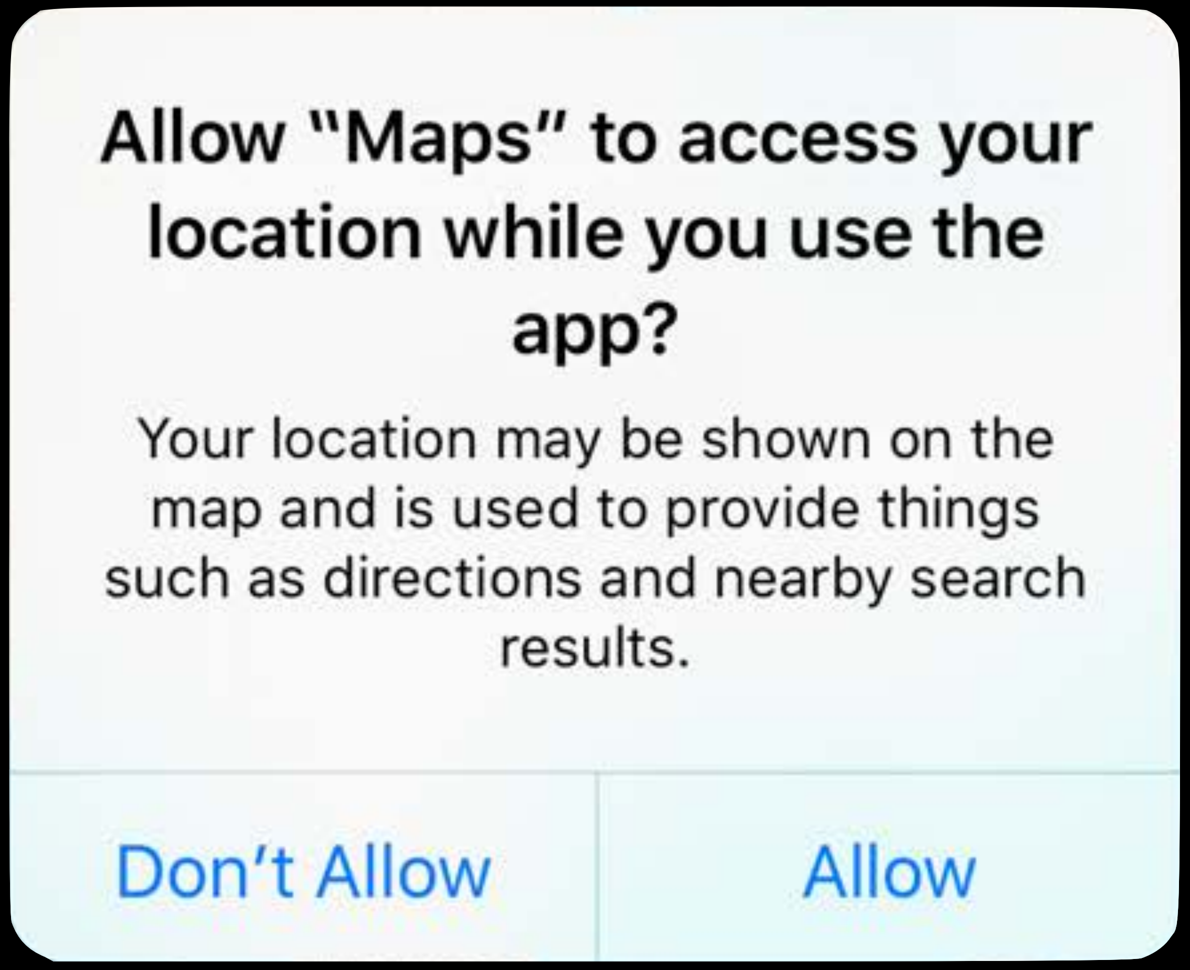
Report aggregates

Require thresholds

Accessing User Data

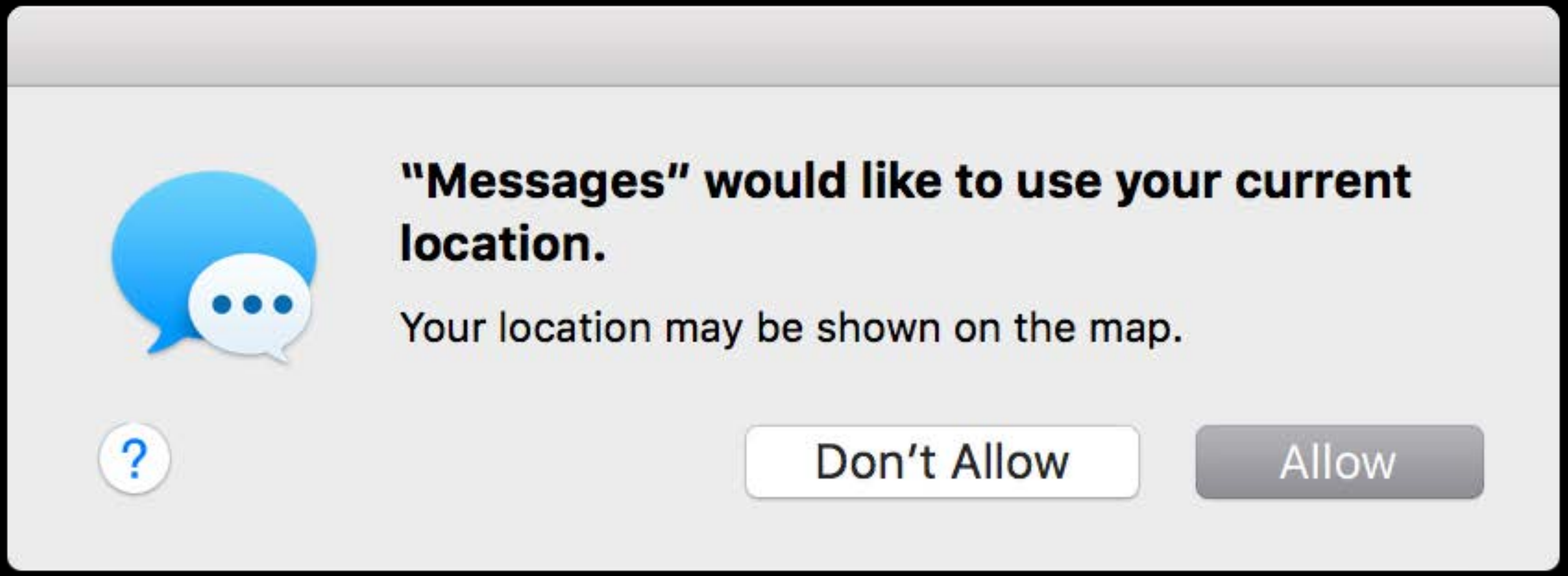
Prompting Well

Consent



Allow "Maps" to access your location while you use the app?

Your location may be shown on the map and is used to provide things such as directions and nearby search results.



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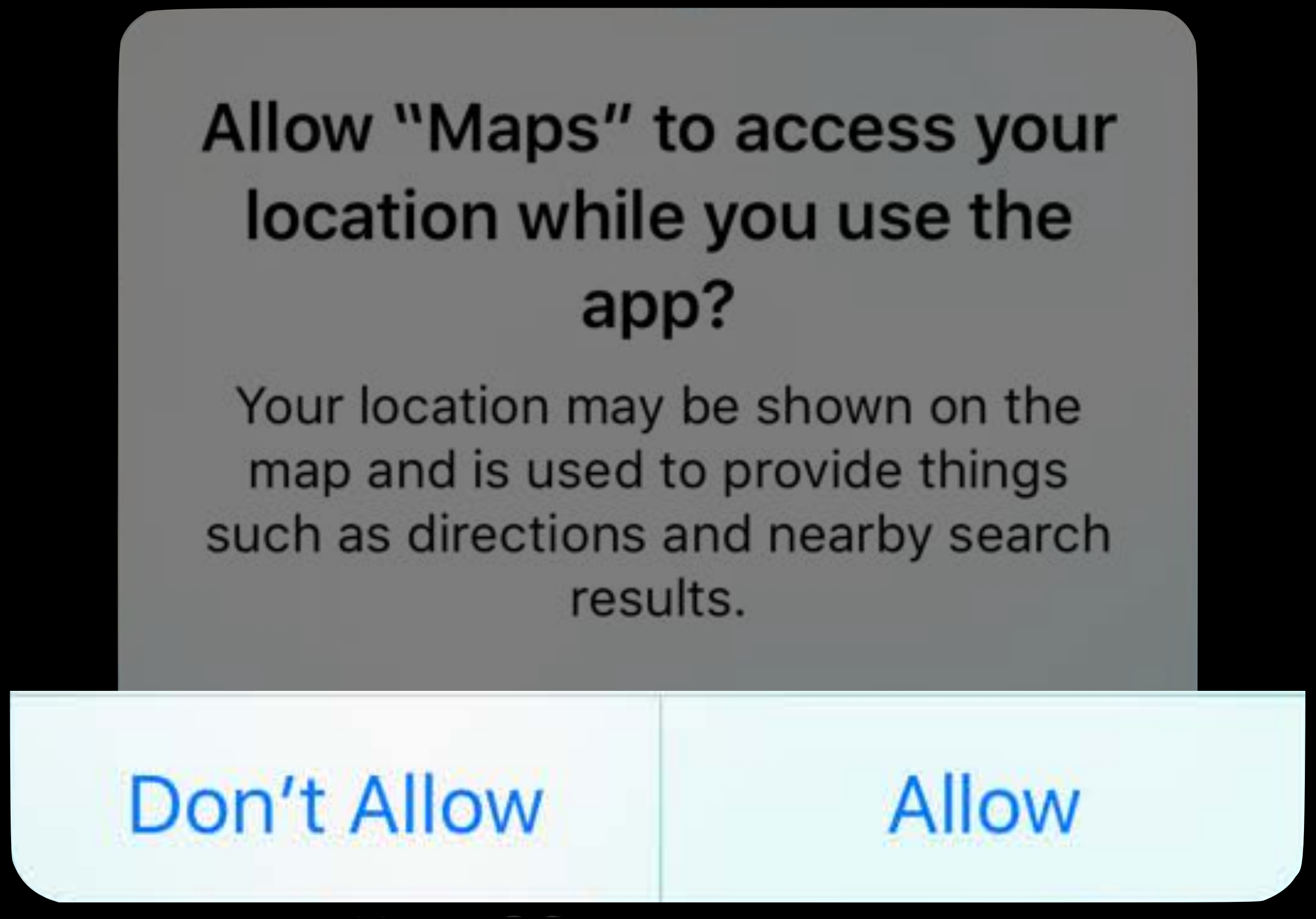
Prompting Well

Consent



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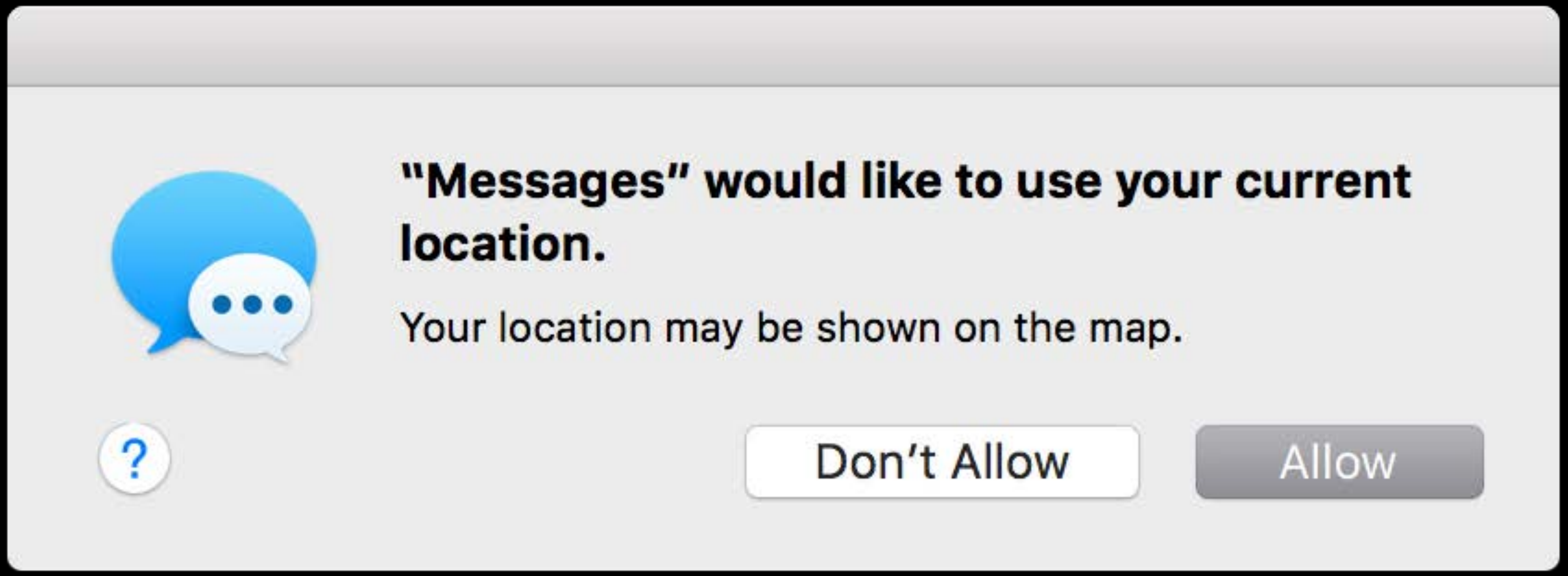

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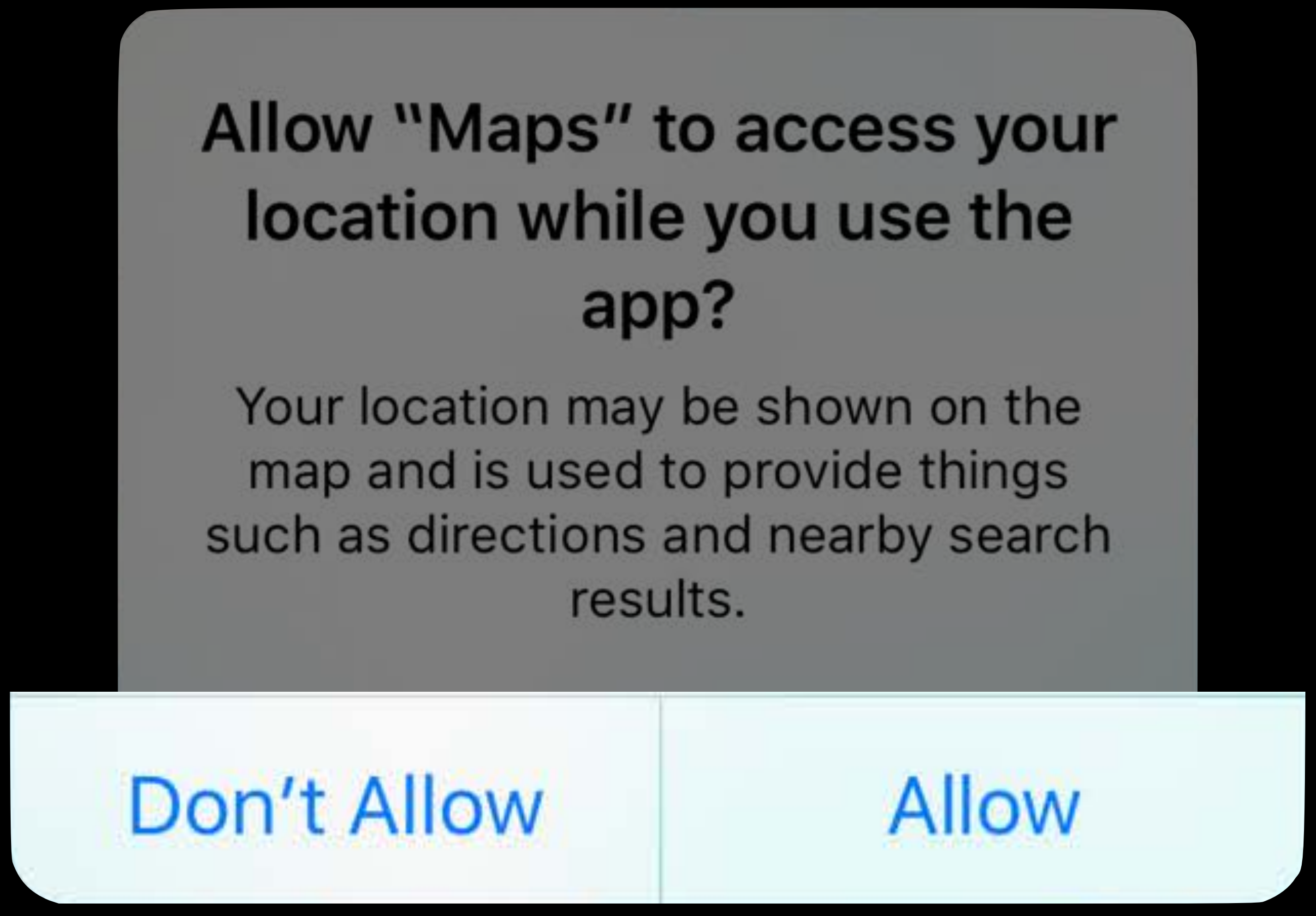

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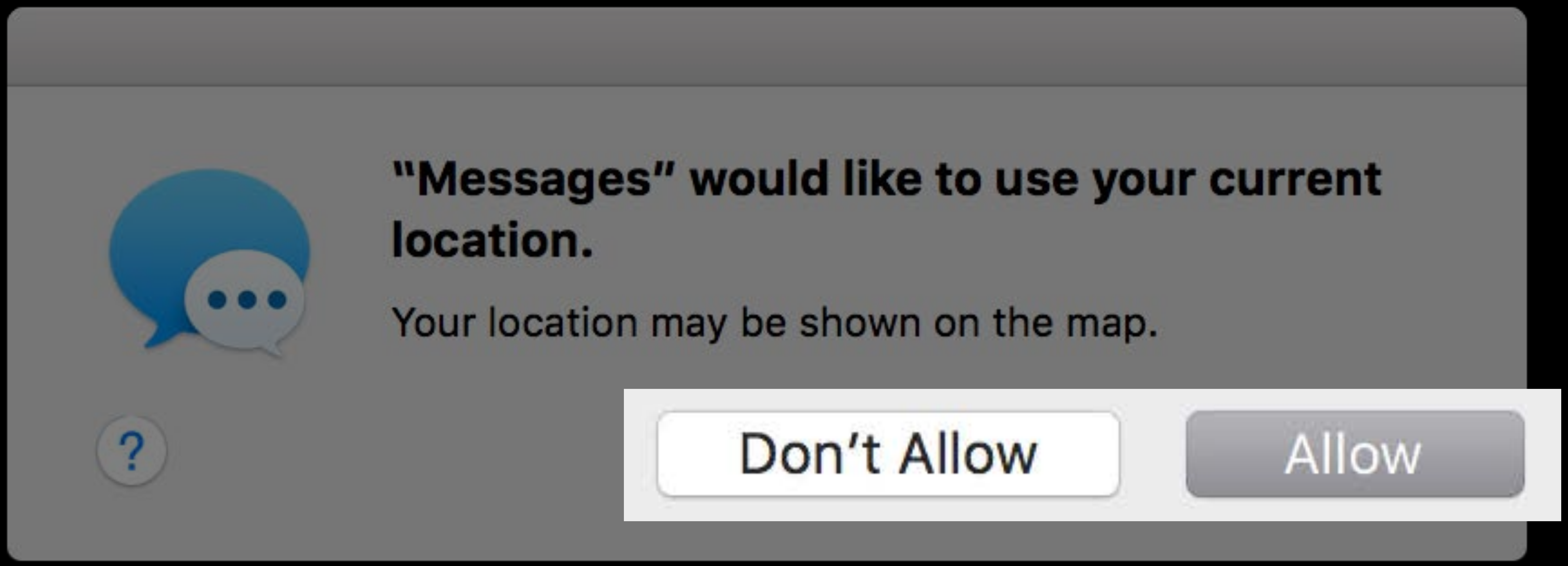

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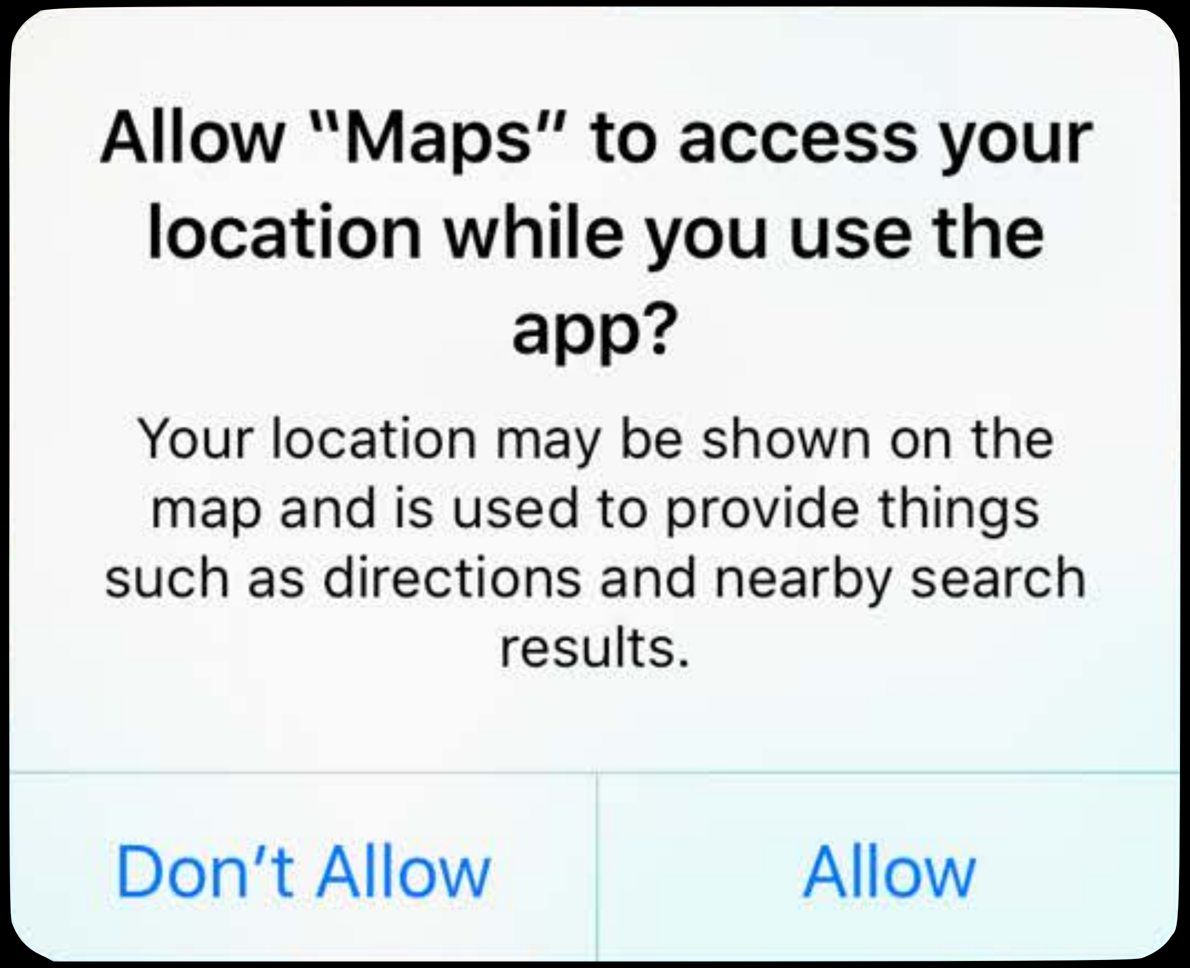
Prompting Well

Transparency



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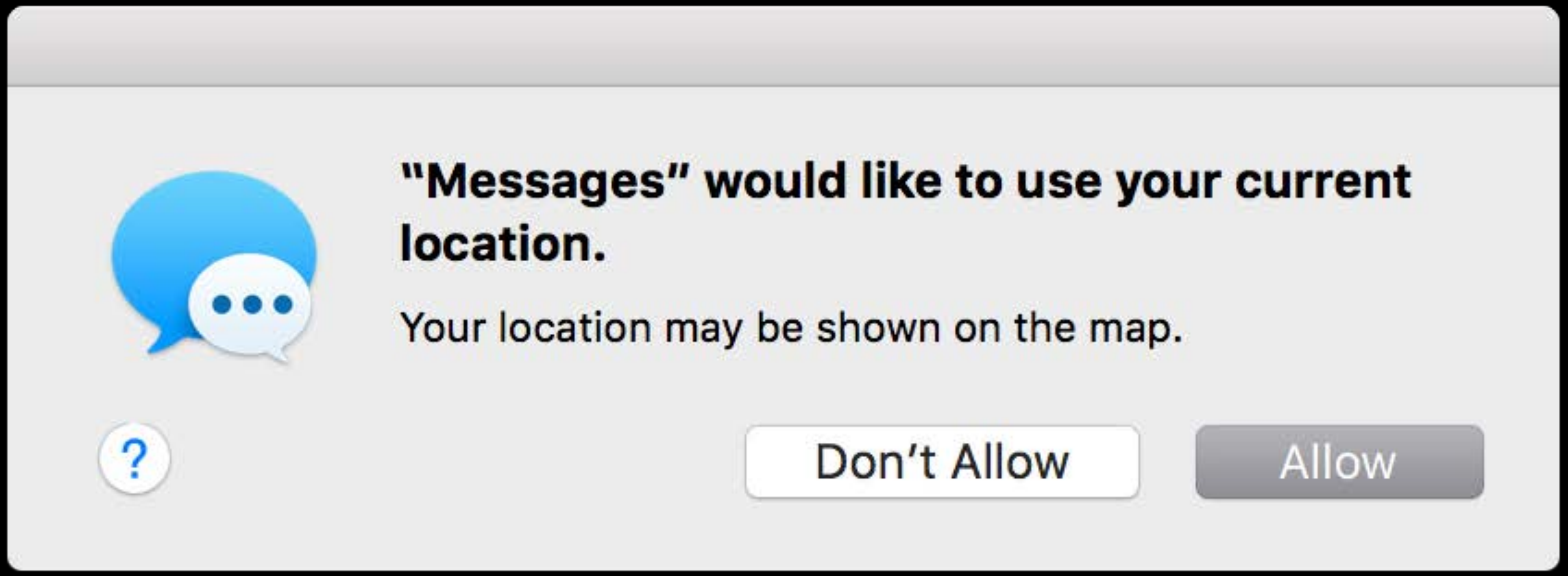

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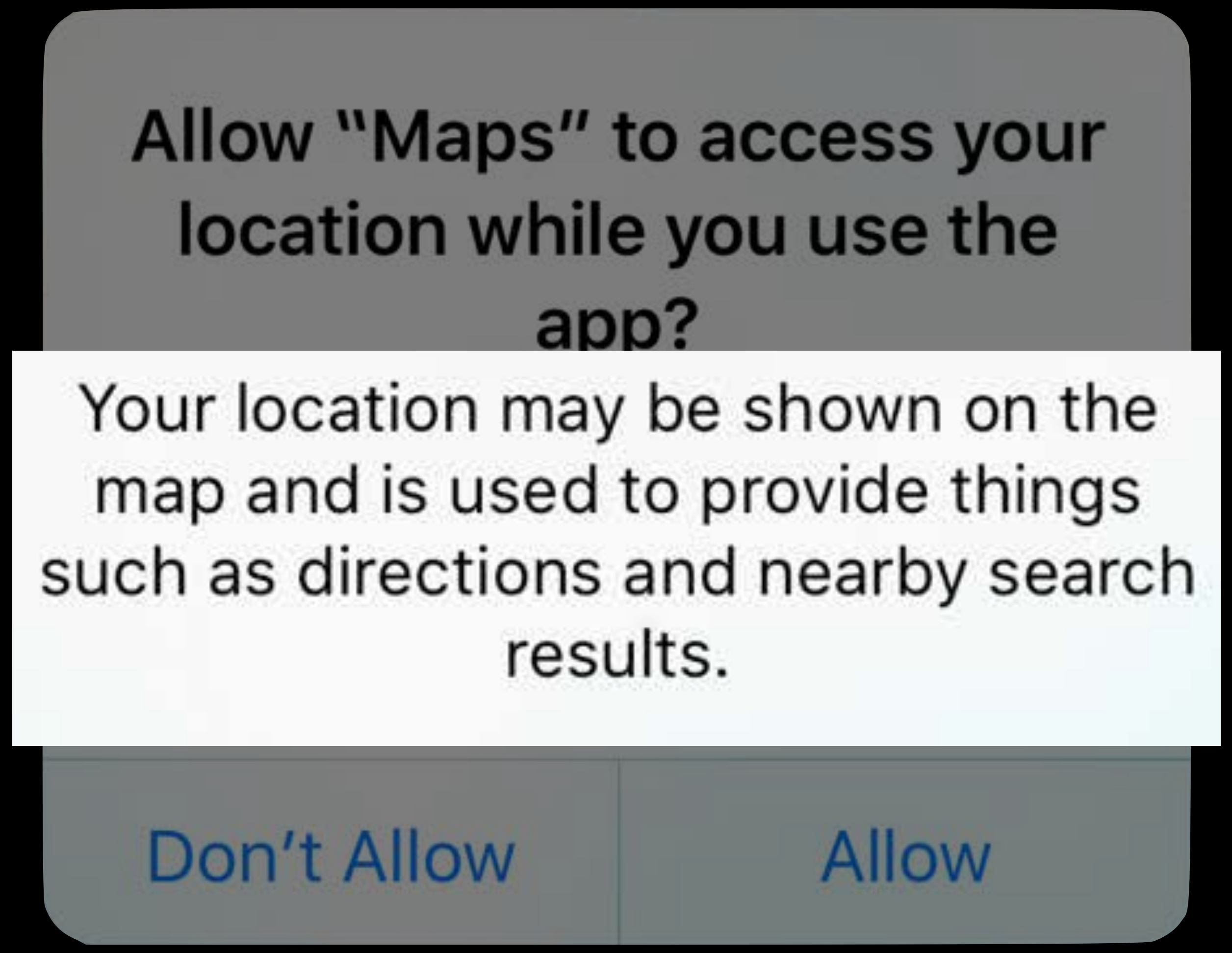

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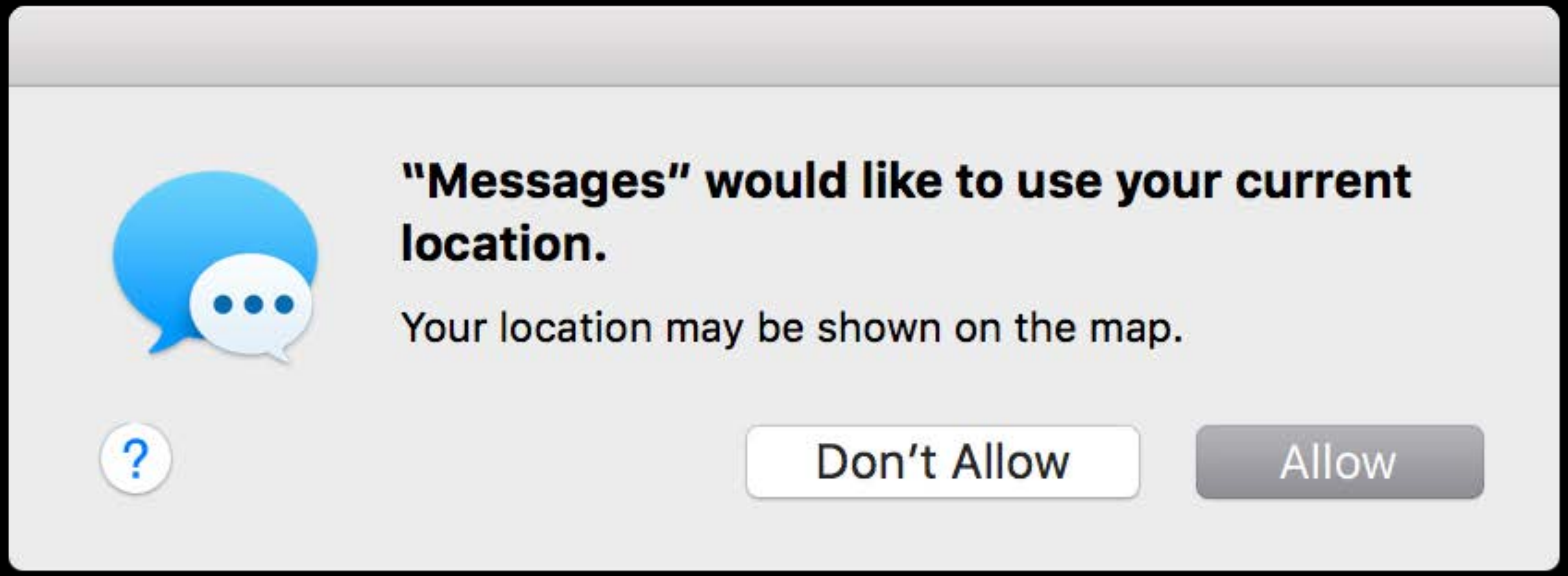

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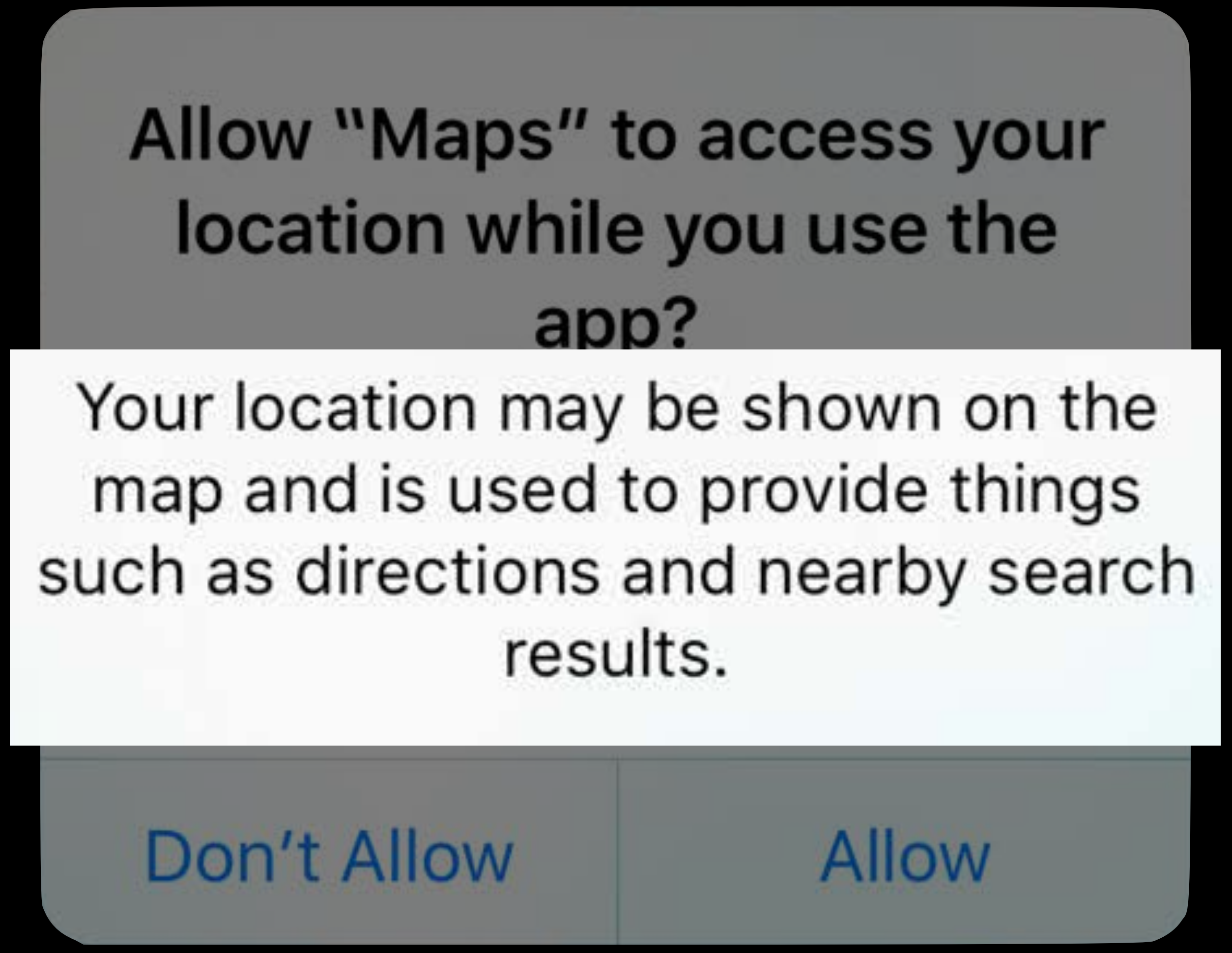

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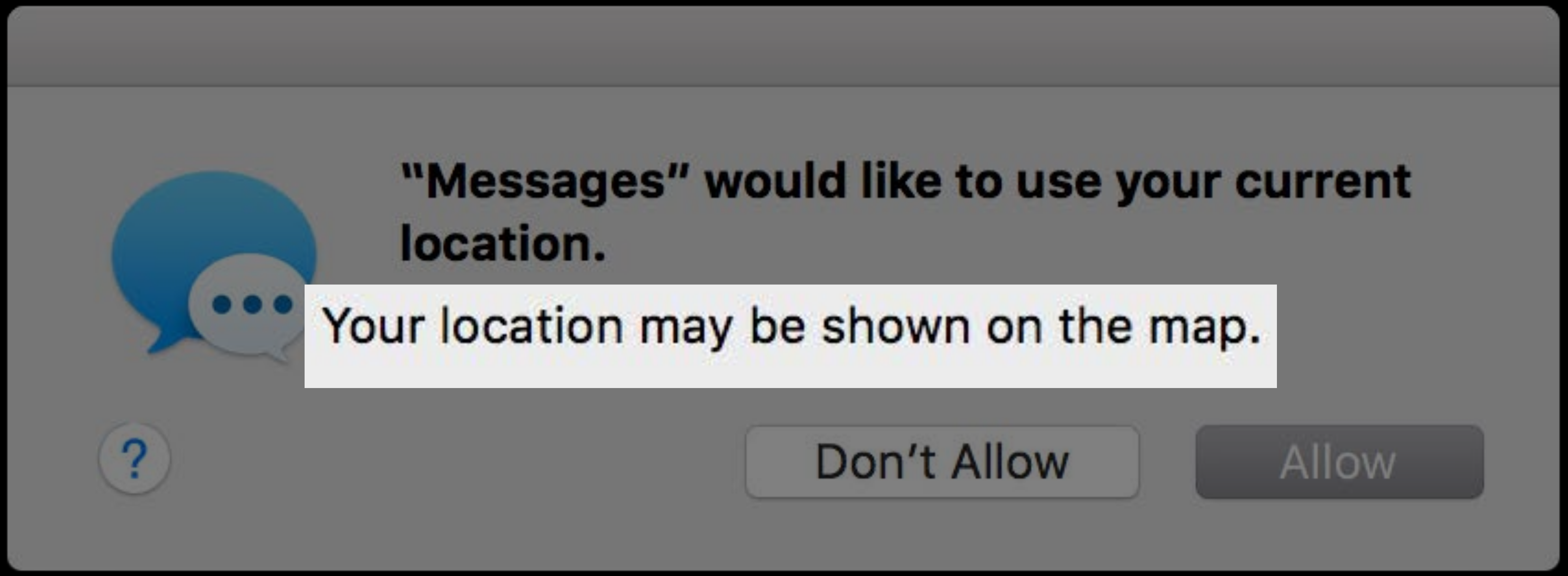

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Prompting on watchOS

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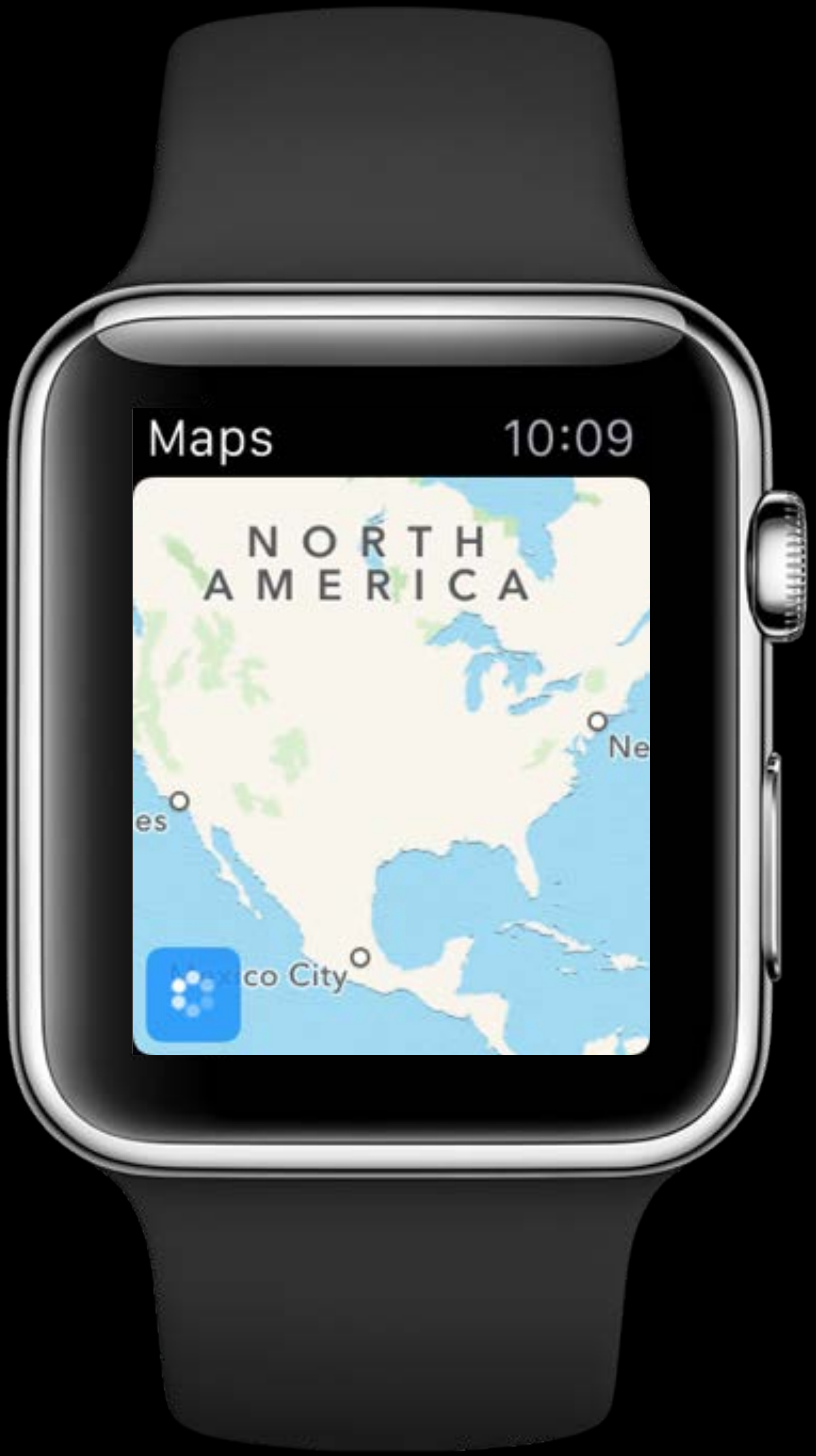

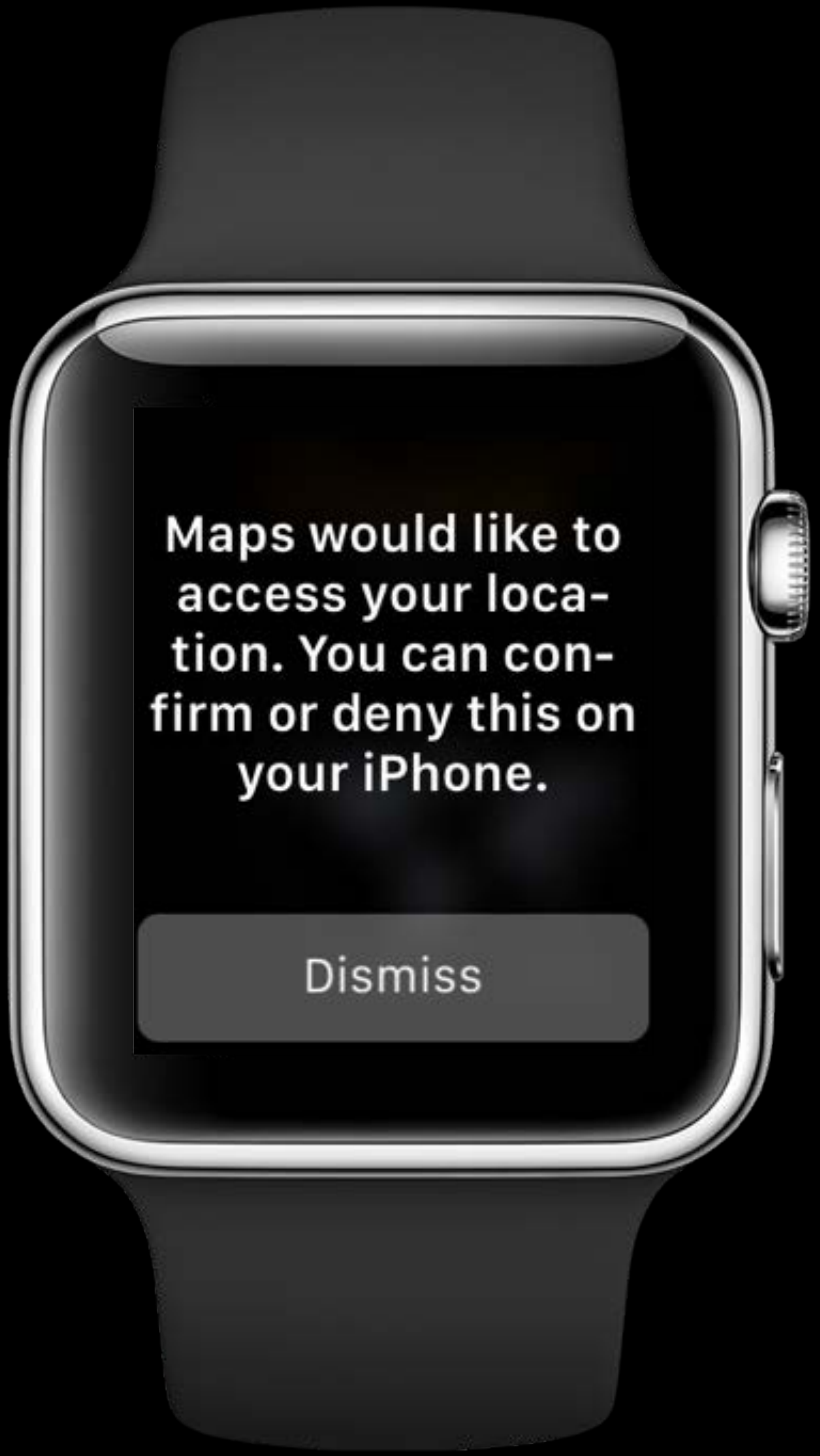
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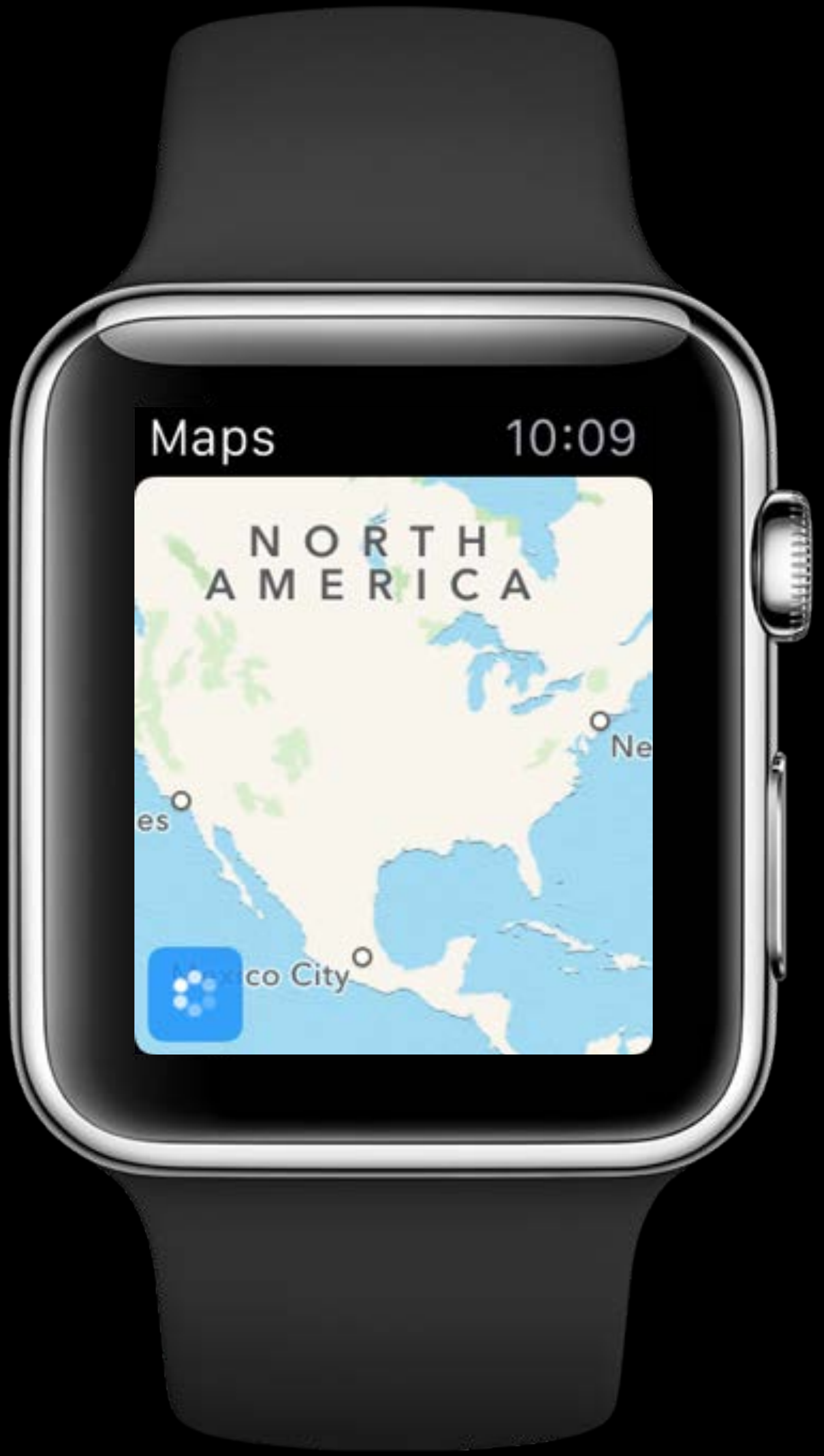
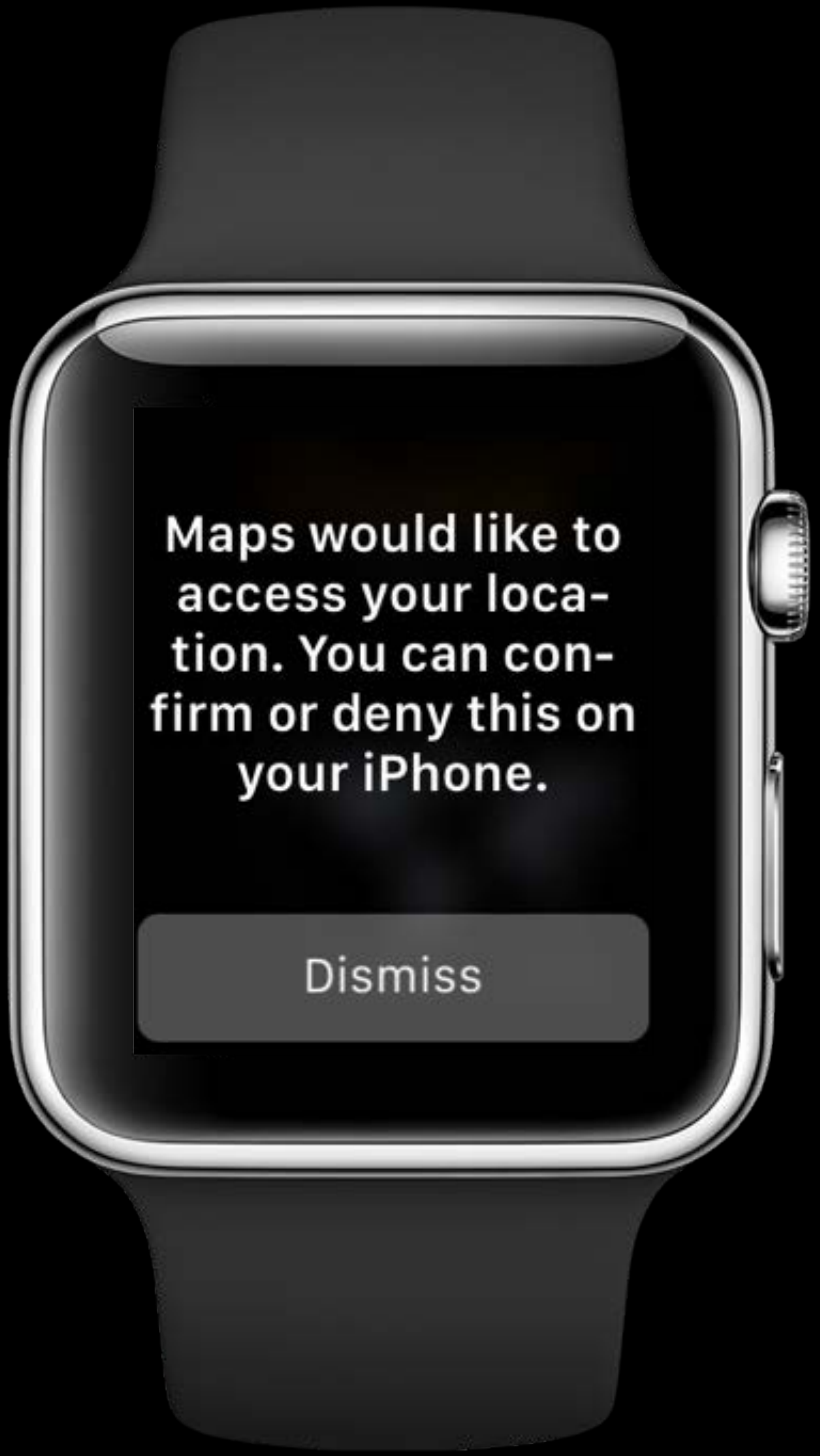
Prompting on watchOS

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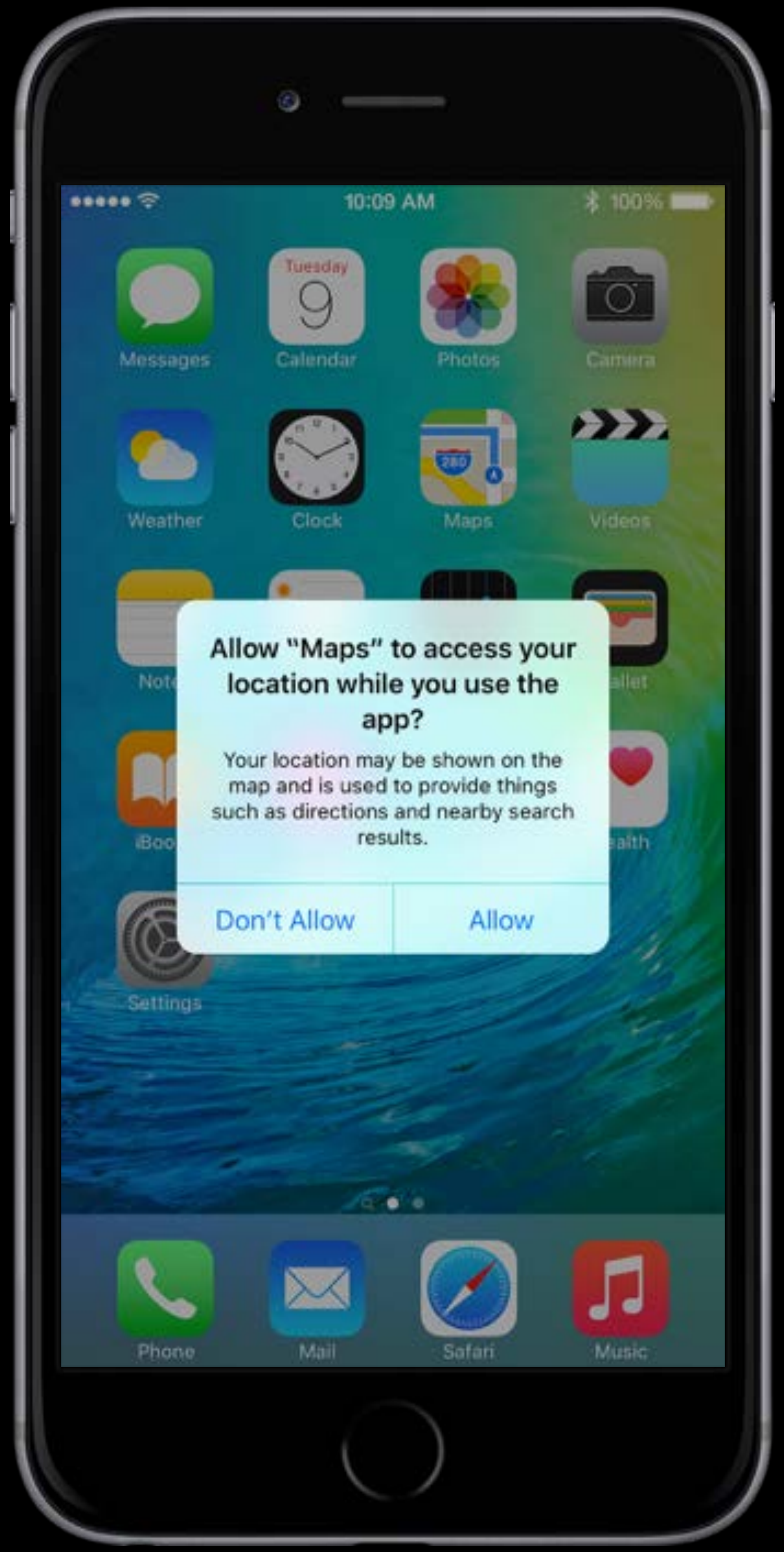
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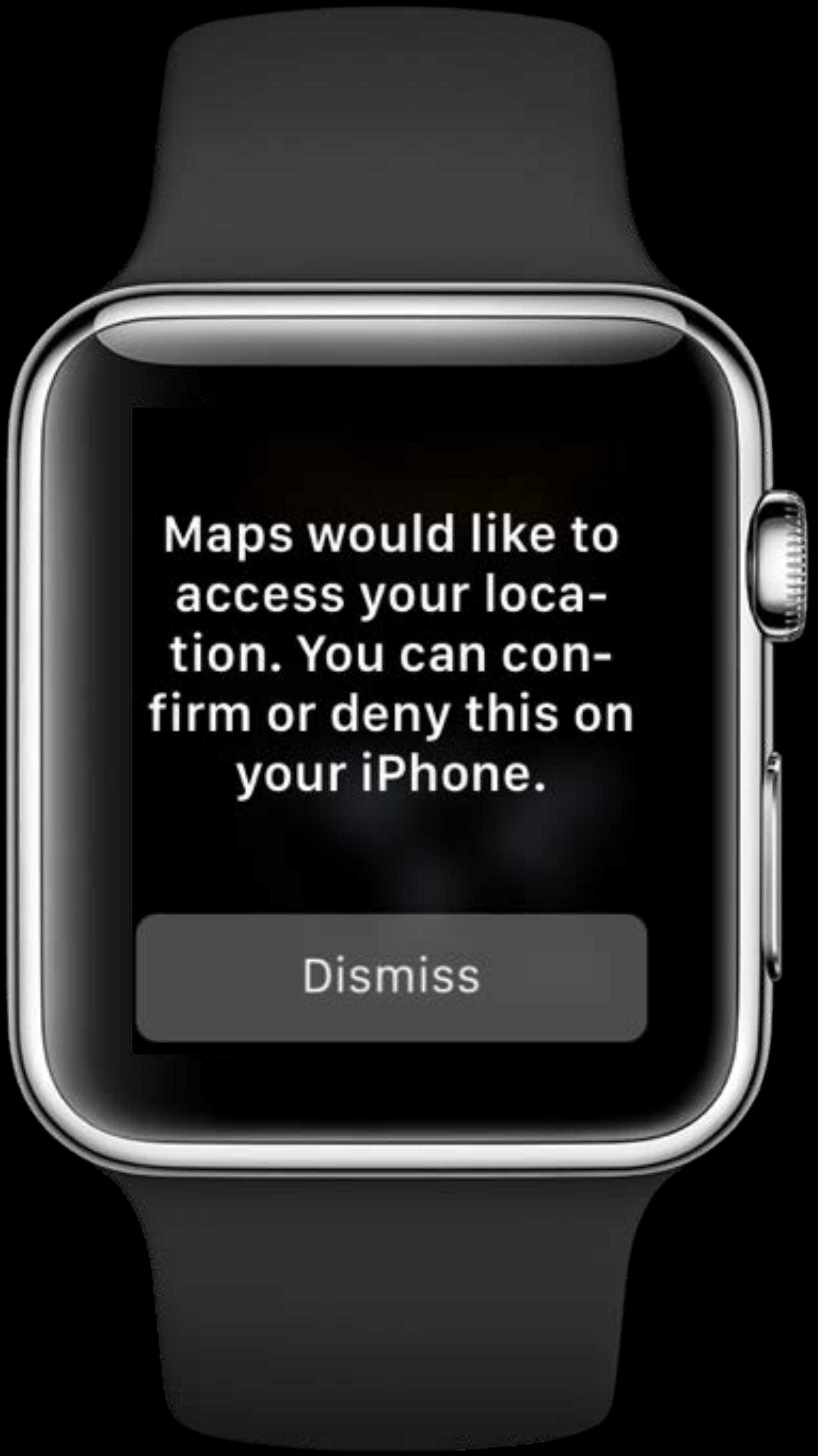

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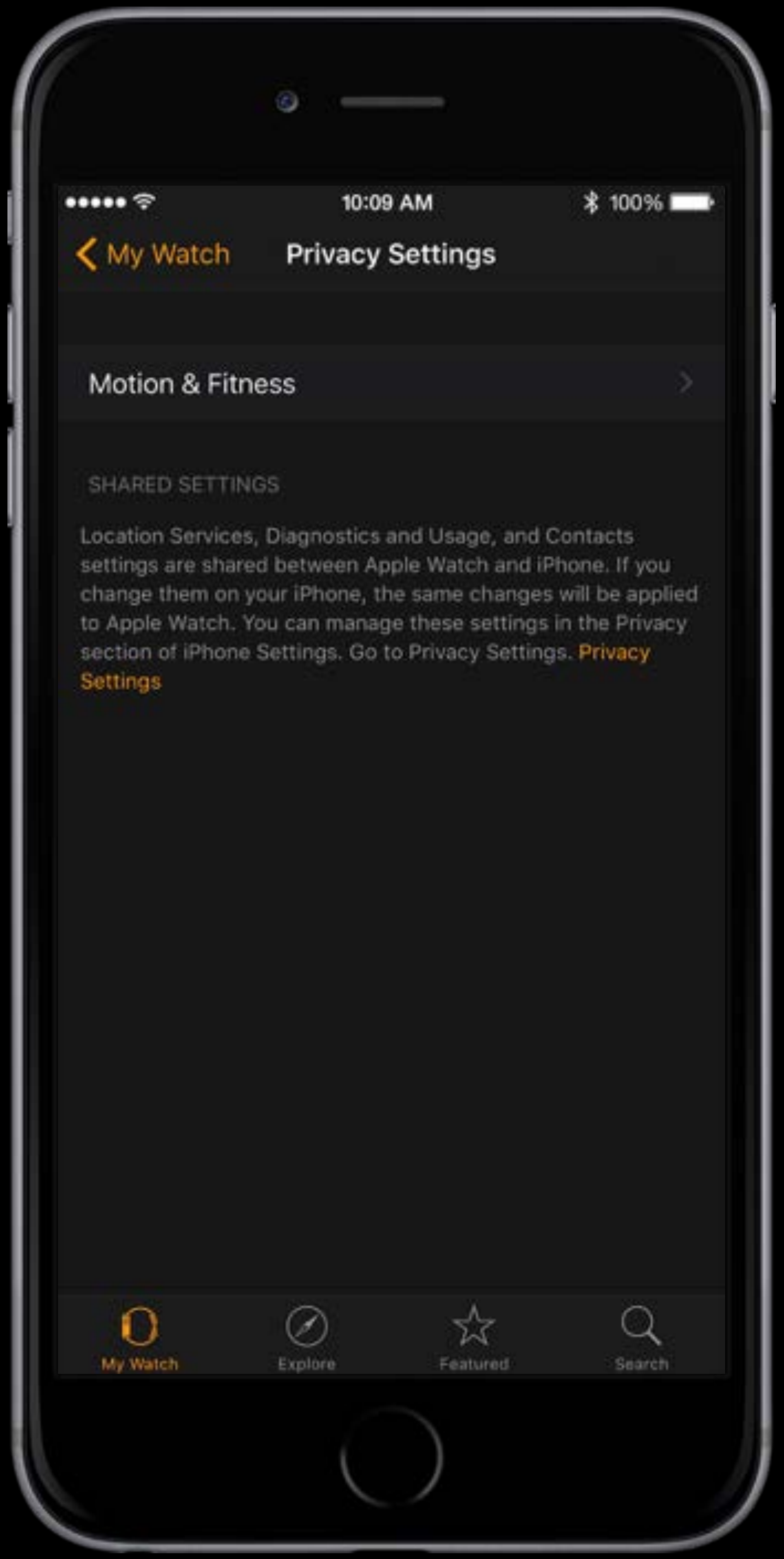
Settings on watchOS and iOS

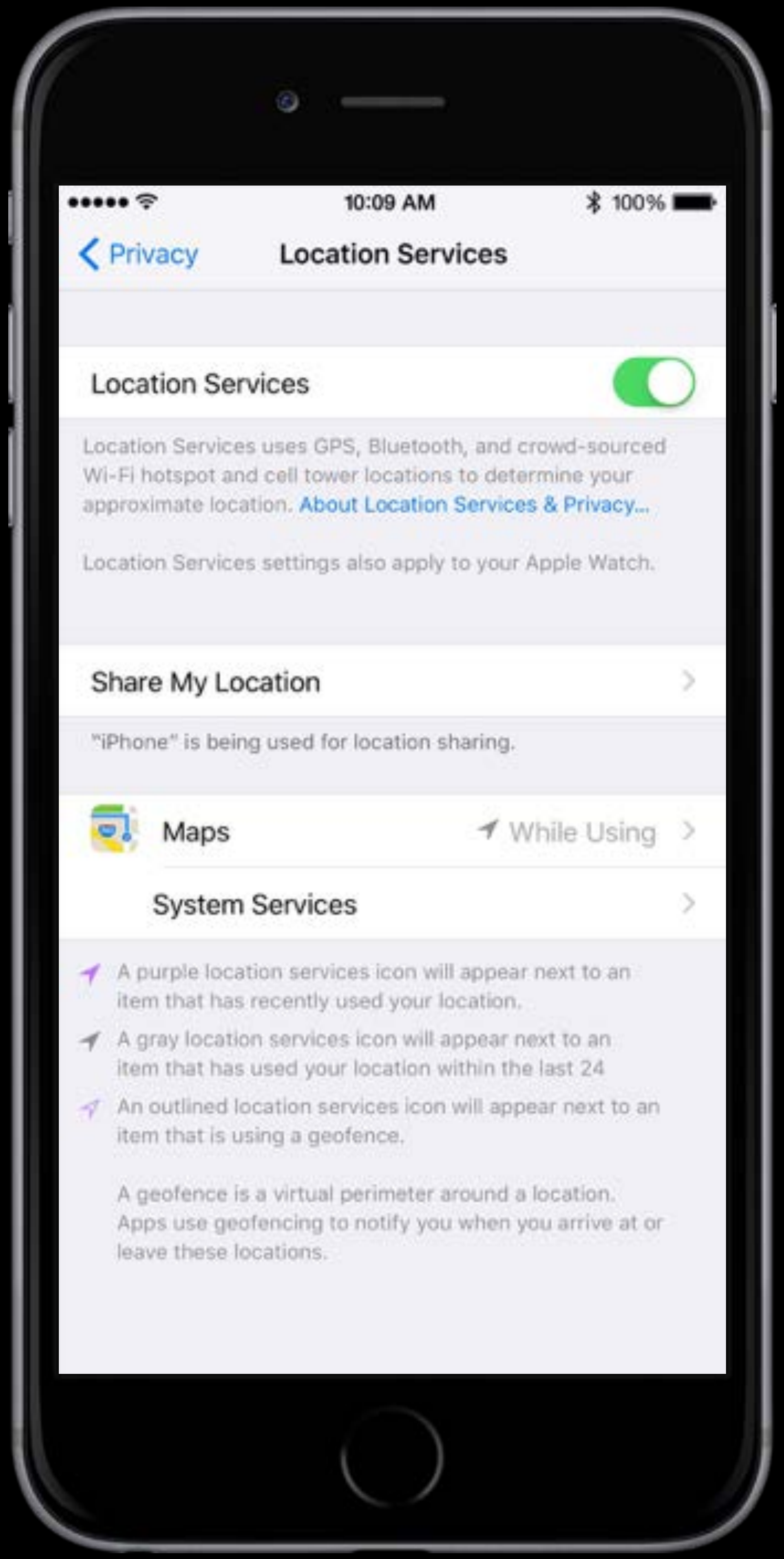


Privacy Settings

Motion & Fitness

SHARED SETTINGS

Location Services, Diagnostics and Usage, and Contacts settings are shared between Apple Watch and iPhone. If you change them on your iPhone, the same changes will be applied to Apple Watch. You can manage these settings in the Privacy section of iPhone Settings. Go to Privacy Settings. Privacy Settings



Location Services

Location Services ●

Location Services uses GPS, Bluetooth, and crowd-sourced Wi-Fi hotspot and cell tower locations to determine your approximate location. About Location Services & Privacy...

Location Services settings also apply to your Apple Watch.

Share My Location

"iPhone" is being used for location sharing.

Maps — While Using

System Services

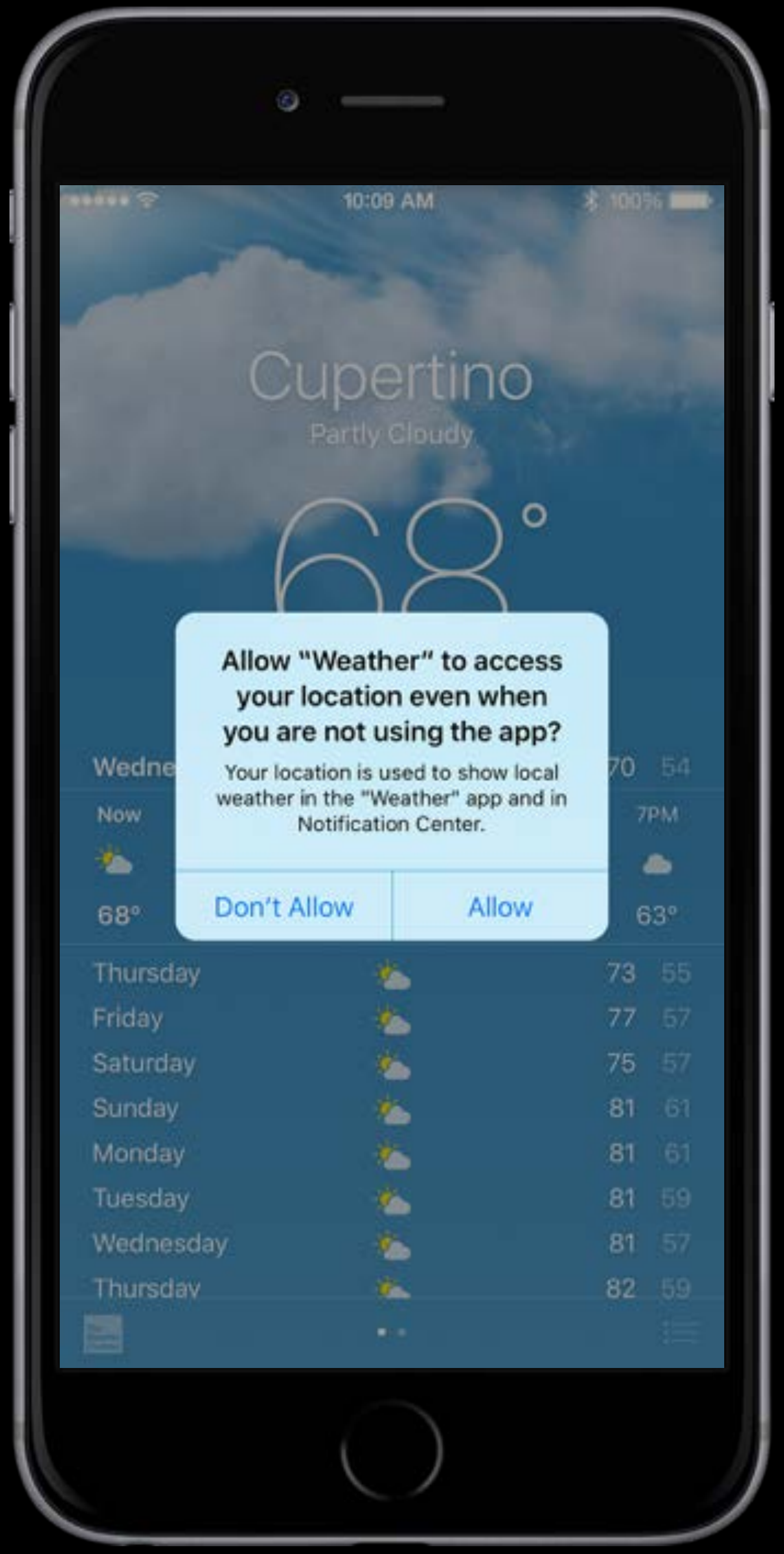
A purple location services icon will appear next to an item that has recently used your location.

A gray location services icon will appear next to an item that has used your location within the last 24

An outlined location services icon will appear next to an item that is using a geofence.

A geofence is a virtual perimeter around a location. Apps use geofencing to notify you when you arrive at or leave these locations.

Settings on watchOS and iOS

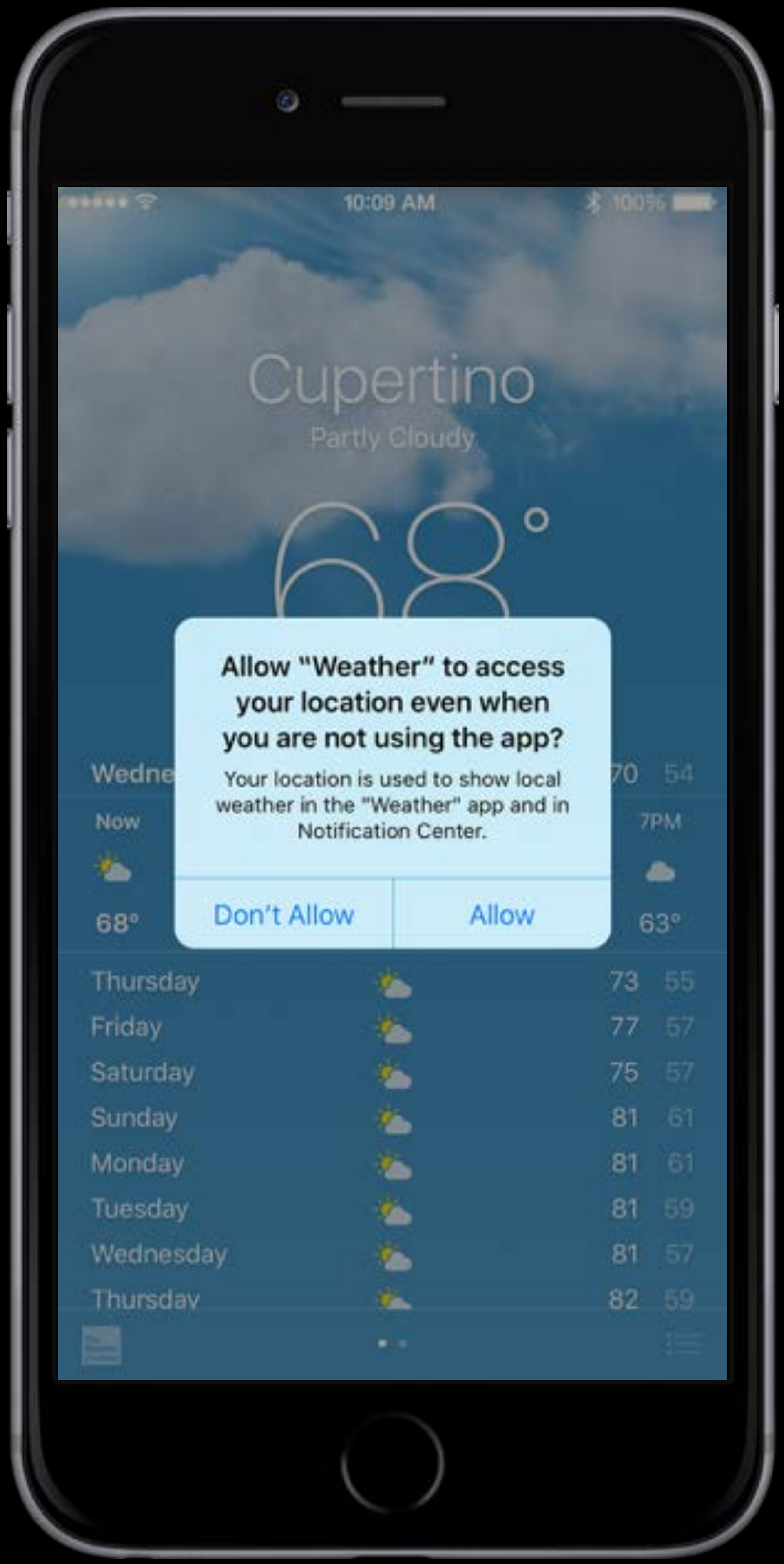


Allow "Weather" to access your location even when you are not using the app?

Your location is used to show local weather in the "Weather" app and in Notification Center.

Thursday	73	55
Friday	77	57
Saturday	75	57
Sunday	81	61
Monday	81	61
Tuesday	81	59
Wednesday	81	57
Thursday	82	59

Settings on watchOS and iOS



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Wedne	70	54
Now		7PM
68°		63°
Thursday	73	55
Friday	77	57
Saturday	75	57
Sunday	81	61
Monday	81	61
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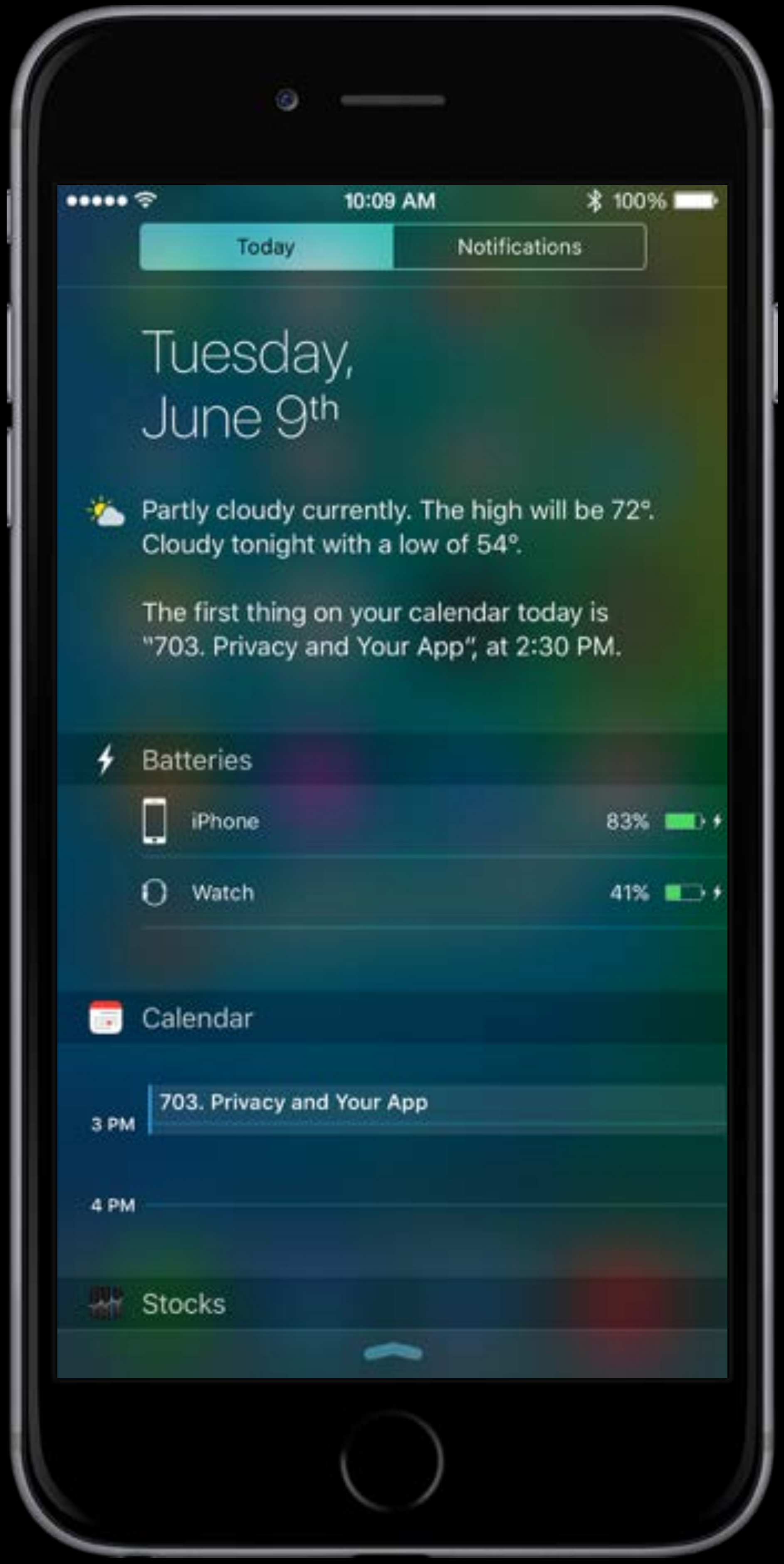


Tuesday, June 9th

Partly cloudy currently. The high will be 72°. Cloudy tonight with a low of 54°.

The first thing on your calendar today is "703. Privacy and Your App", at 2:30 PM.

Batteries

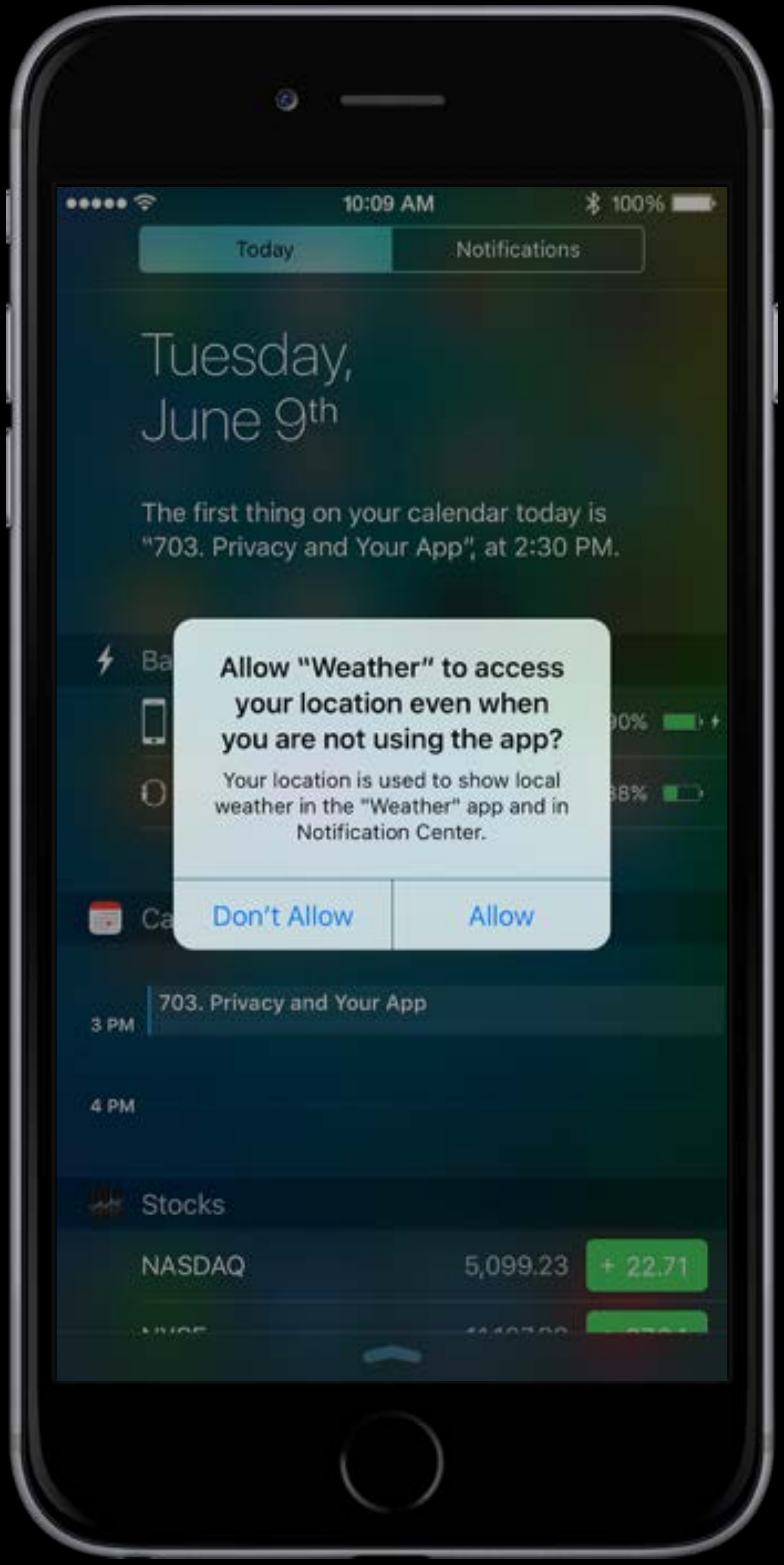
iPhone	83%
Watch	41%

Calendar

3 PM — 703. Privacy and Your App

4 PM

Settings on watchOS and iOS



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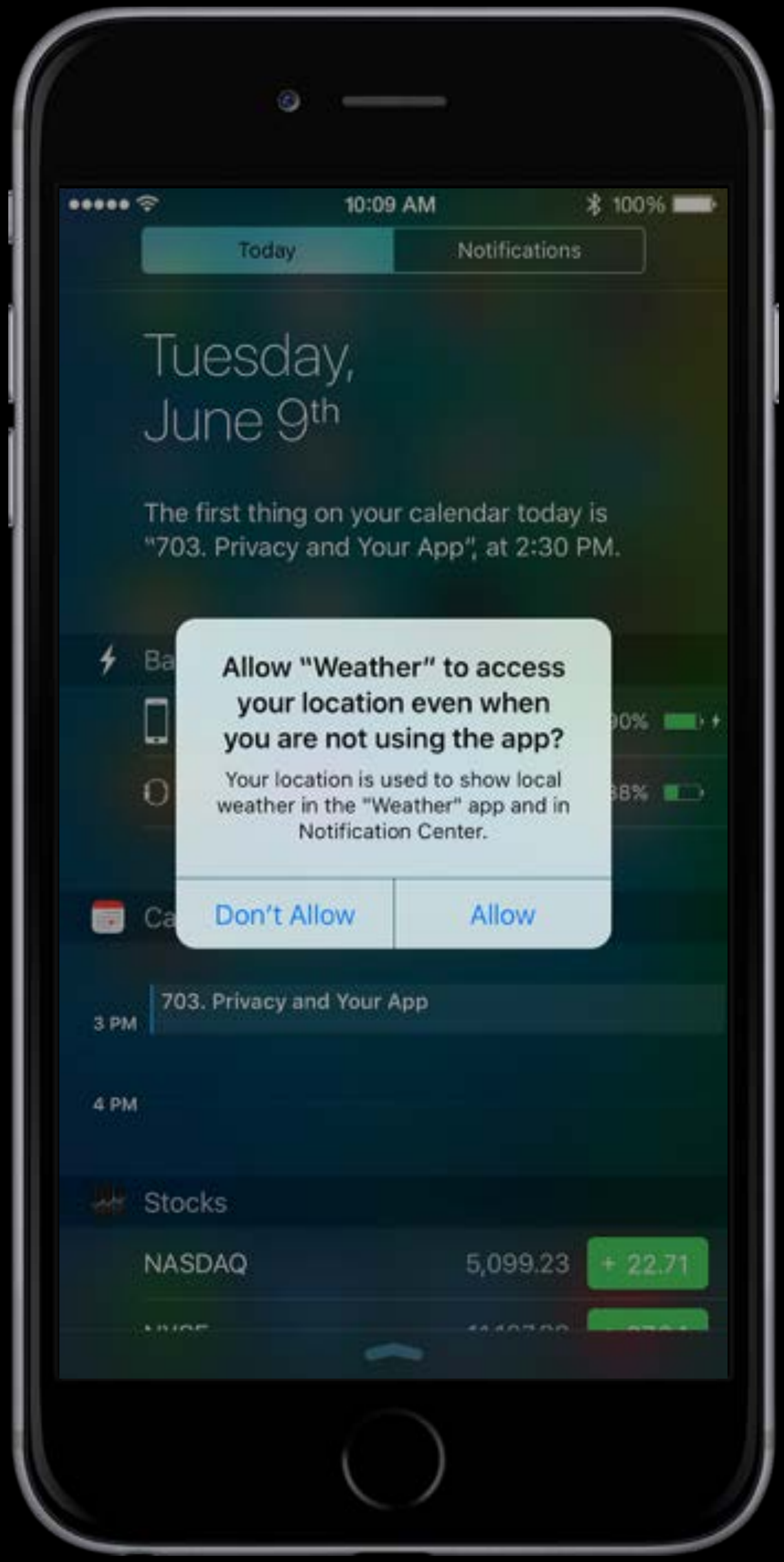

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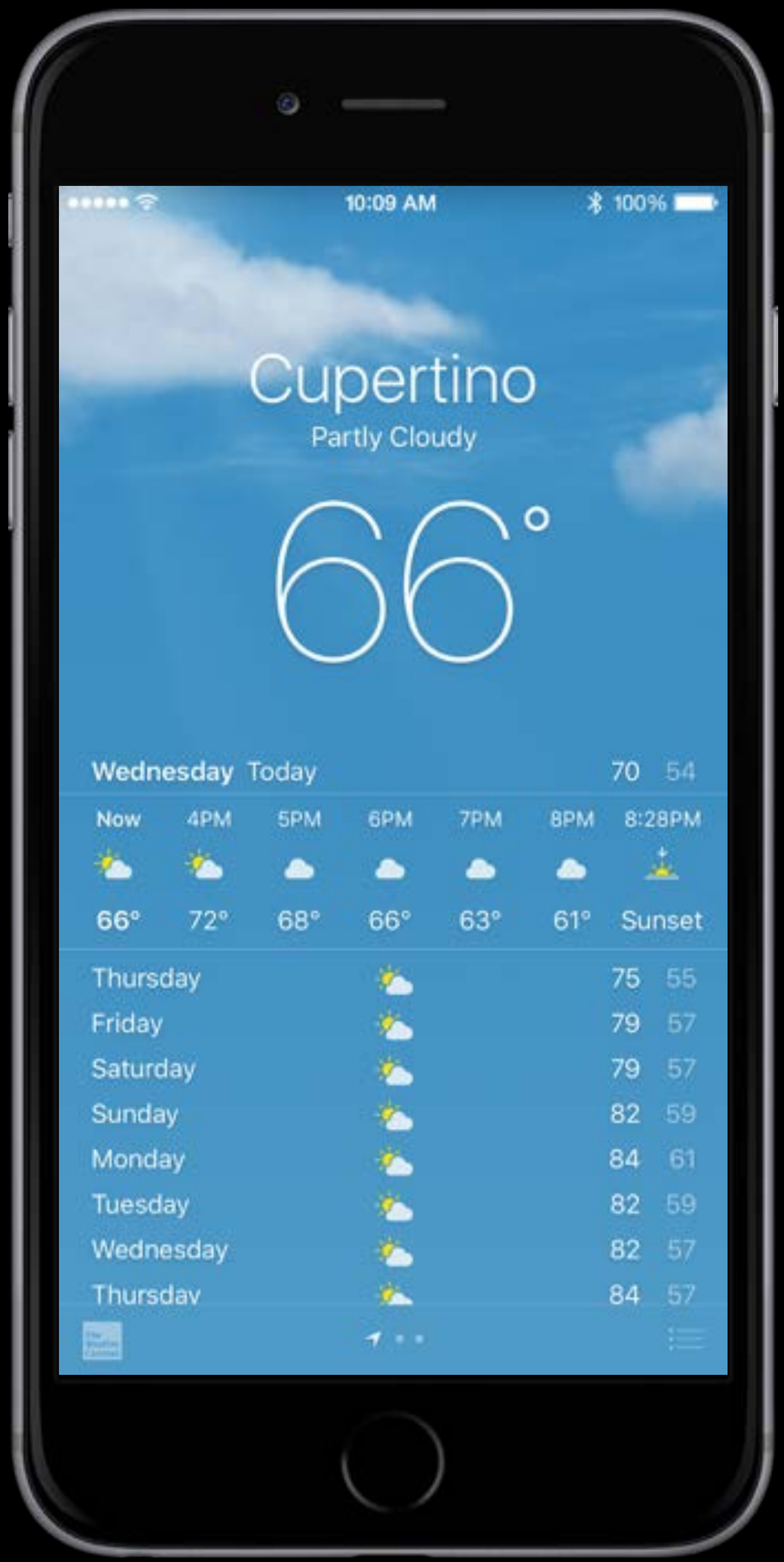
703. Privacy and Your App

Stocks

NASDAQ	5,099.23	+ 22.71



Cupertino

Partly Cloudy

66°

Wednesday Today 70 54

Now	4PM	5PM	6PM	7PM	8PM	8:28PM
66°	72°	68°	66°	63°	61°	Sunset

Thursday	75	55
Friday	79	57
Saturday	79	57
Sunday	82	59
Monday	84	61
Tuesday	82	59
Wednesday	82	57
Thursday	84	57

Settings on watchOS and iOS

Settings on watchOS and iOS

Settings on watchOS and iOS

Protecting User Data

New Technologies

App Transport Security

Secure—TLSv1.2 with forward secrecy—connections by default

- `NSURLErrorAppTransportSecurityRequiresSecureConnection` error on insecure connections

App Transport Security

Secure—TLSv1.2 with forward secrecy—connections by default

- `NSURLErrorAppTransportSecurityRequiresSecureConnection` error on insecure connections

Specify specific domains to load content over insecurely in your app’s Info.plist

Networking with NSURLSession Pacific Heights Thursday 9:00 AM

App Transport Security

```
<key>NSAppTransportSecurity</key>
<dict>
    <key>NSExceptionDomains</key>
    <dict>
        <key>testdomain.com</key>
        <dict>
            <key>NSIncludesSubdomains</key>
            <false/>
            <key>NSTemporaryExceptionAllowInsecureHTTPLoads</key>
            <false/>
            <key>NSTemporaryExceptionRequiresForwardSecrecy</key>
            <true/>
            <key>NSTemporaryExceptionMinimumTLSVersion</key>
            <string>TLSv1.2</string>
            <key>NSTemporaryThirdPartyExceptionAllowInsecureHTTPLoads</key>
```

App Transport Security

```
            <key>NSTemporaryExceptionRequiresForwardSecrecy</key>
            <true/>
            <key>NSTemporaryExceptionMinimumTLSVersion</key>
            <string>TLSv1.2</string>
            <key>NSTemporaryThirdPartyExceptionAllowInsecureHTTPLoads</key>
            <false/>
            <key>NSTemporaryThirdPartyExceptionRequiresForwardSecrecy</key>
            <true/>
            <key>NSTemporaryThirdPartyExceptionMinimumTLSVersion</key>
            <string>TLSv1.2</string>
            <key>NSRequiresCertificateTransparency</key>
            <false/>
        </dict>
    </dict>
</dict>
```

Rewards Cards

Encrypt personally identifying data

```
  "nfc" : {
    "message" : “4444678966661234",
"encryptionPublicKey" : "MDkwEwYHKoZIzj0CAQYIKoZIzj0DAQcDIgACigjq
+QYC17m3i9uO8uKc8mLpaS1UJOEaCFvMedkXsuA="
  },
```

Rewards Cards

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```
  "nfc" : {
    "message" : “4444678966661234",
"encryptionPublicKey" : "MDkwEwYHKoZIzj0CAQYIKoZIzj0DAQcDIgACigjq
+QYC17m3i9uO8uKc8mLpaS1UJOEaCFvMedkXsuA="
  },
```

Deep App Search

NSUserActivity

- All apps

CoreSpotlight

- Apps that persist user data

Introducing App Search Mission Wednesday 11:00AM

Indexing

NSUserActivity

Extension of iOS 8 Handoff APIs

Views that can be searched for by the user in Search to resume an activity

NSUserActivity API

NEW

Enable Capabilities

```
var eligibleForHandoff: Bool
var eligibleForSearch: Bool
var eligibleForPublicIndexing: Bool
```

Manage Data

```
@NSCopying var expirationDate: NSDate
```

NSUserActivity API

NEW

Enable Capabilities

```
var eligibleForHandoff: Bool
var eligibleForSearch: Bool
var eligibleForPublicIndexing: Bool
```

Manage Data

```
@NSCopying var expirationDate: NSDate
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NSUserActivity API

NEW

Enable Capabilities

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NSUserActivity and Public Indexing

NEW

Privacy

NSUserActivity and Public Indexing

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Activities are private by default

Designate "public" if searchable activity fields are solely public

Provisions to prevent user specific activities from being indexed

NSUserActivity and Public Indexing

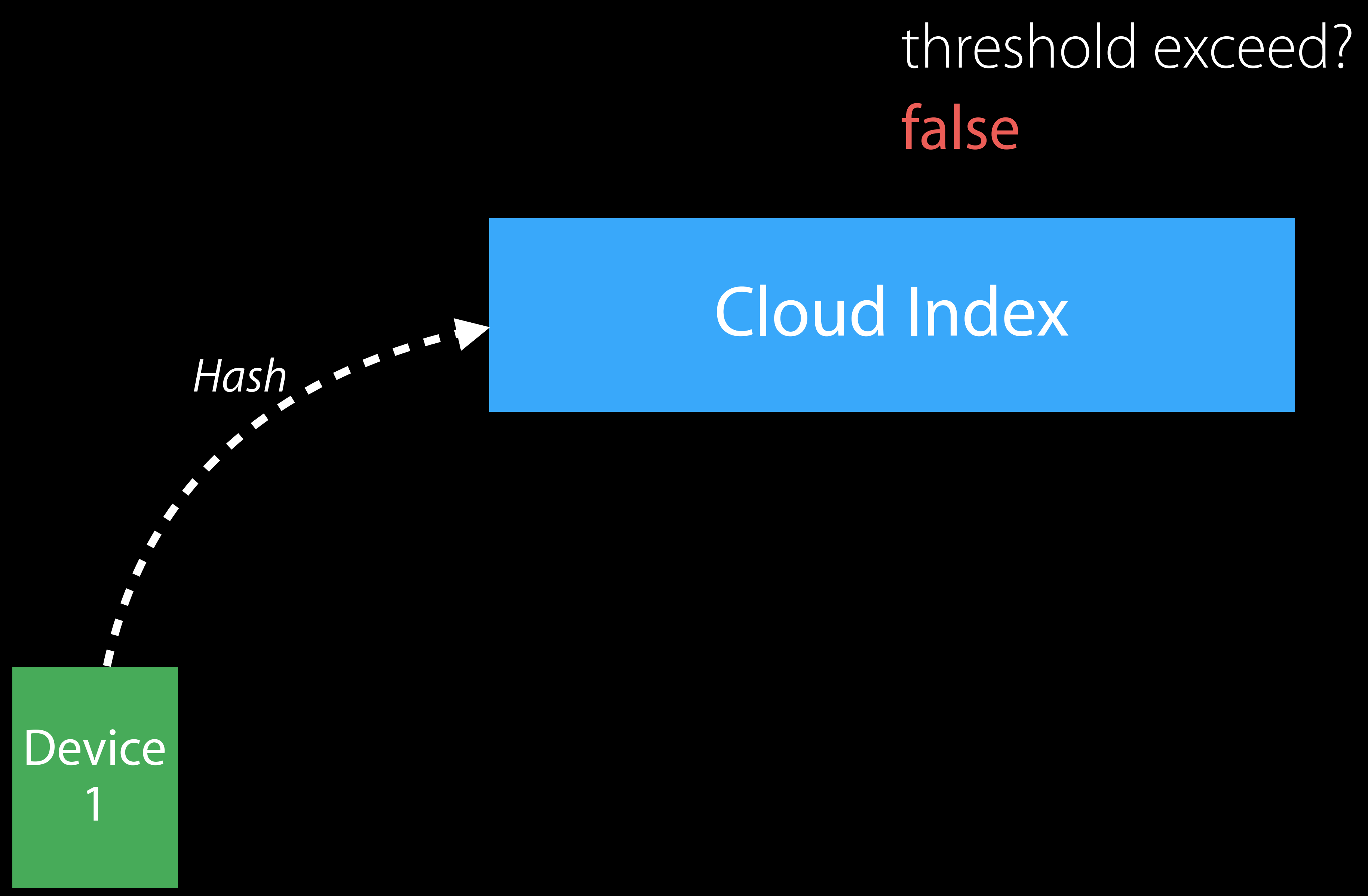
Privacy

NEW

Activities are private by default

Designate "public" if searchable activity fields are solely public

Provisions to prevent user specific activities from being indexed



NSUserActivity and Public Indexing

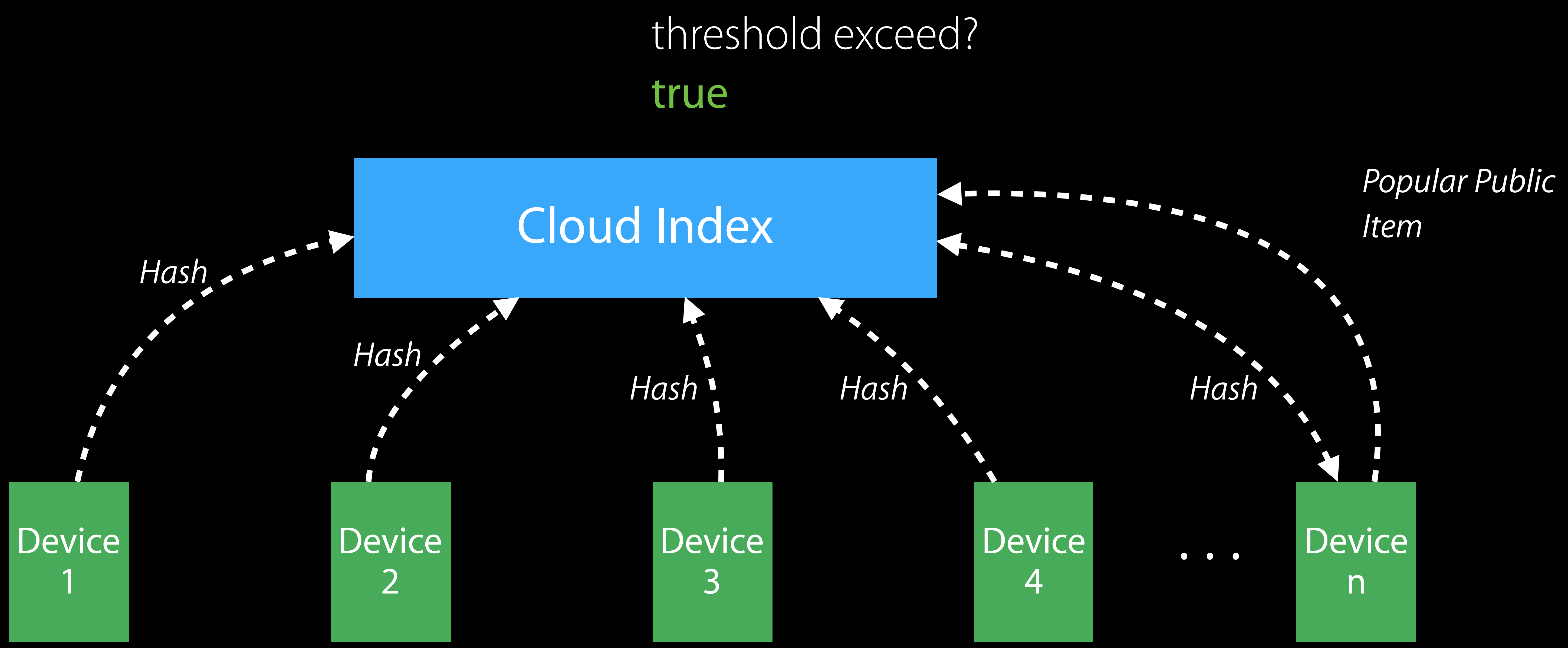
Privacy

NEW

Activities are private by default

Designate "public" if searchable activity fields are solely public

Provisions to prevent user specific activities from being indexed



CoreSpotlight

Encryption

Protect your data in Spotlight:

- Set a default with your entitlements
- Set a specific data class for certain items:

```
- init(name: String, protectionClass: String) { … }
NSFileProtectionNone,
NSFileProtectionComplete,
NSFileProtectionCompleteUnlessOpen, or
NSFileProtectionCompleteUntilFirstUserAuthentication
```

Search

Data management best practices

Store relevant user data

Search

Data management best practices

Store relevant user data

Update data after the user updates the original

- `func indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Search

Data management best practices

Store relevant user data

Update data after the user updates the original

- `func indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

- `func deleteSearchableItemsWithIdentifiers(identifiers: [String], completionHandler: ((NSError?) -> Void)?)`

Search

Data management best practices

Store relevant user data

Update data after the user updates the original

- `func indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

- `func deleteSearchableItemsWithIdentifiers(identifiers: [String], completionHandler: ((NSError?) -> Void)?)`
- `func deleteSearchableItemsWithDomainIdentifiers(domainIdentifiers: [String], completionHandler: ((NSError?) -> Void)?)`

Search

Data management best practices

Store relevant user data

Update data after the user updates the original

- `func indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

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- `func deleteSearchableItemsWithDomainIdentifiers(domainIdentifiers: [String], completionHandler: ((NSError?) -> Void)?)`
- `func deleteAllSearchableItemsWithCompletionHandler(completionHandler: ((NSError?) -> Void)?)`

Existing Technologies

Leverage Existing Technologies

Touch ID

Apple Pay

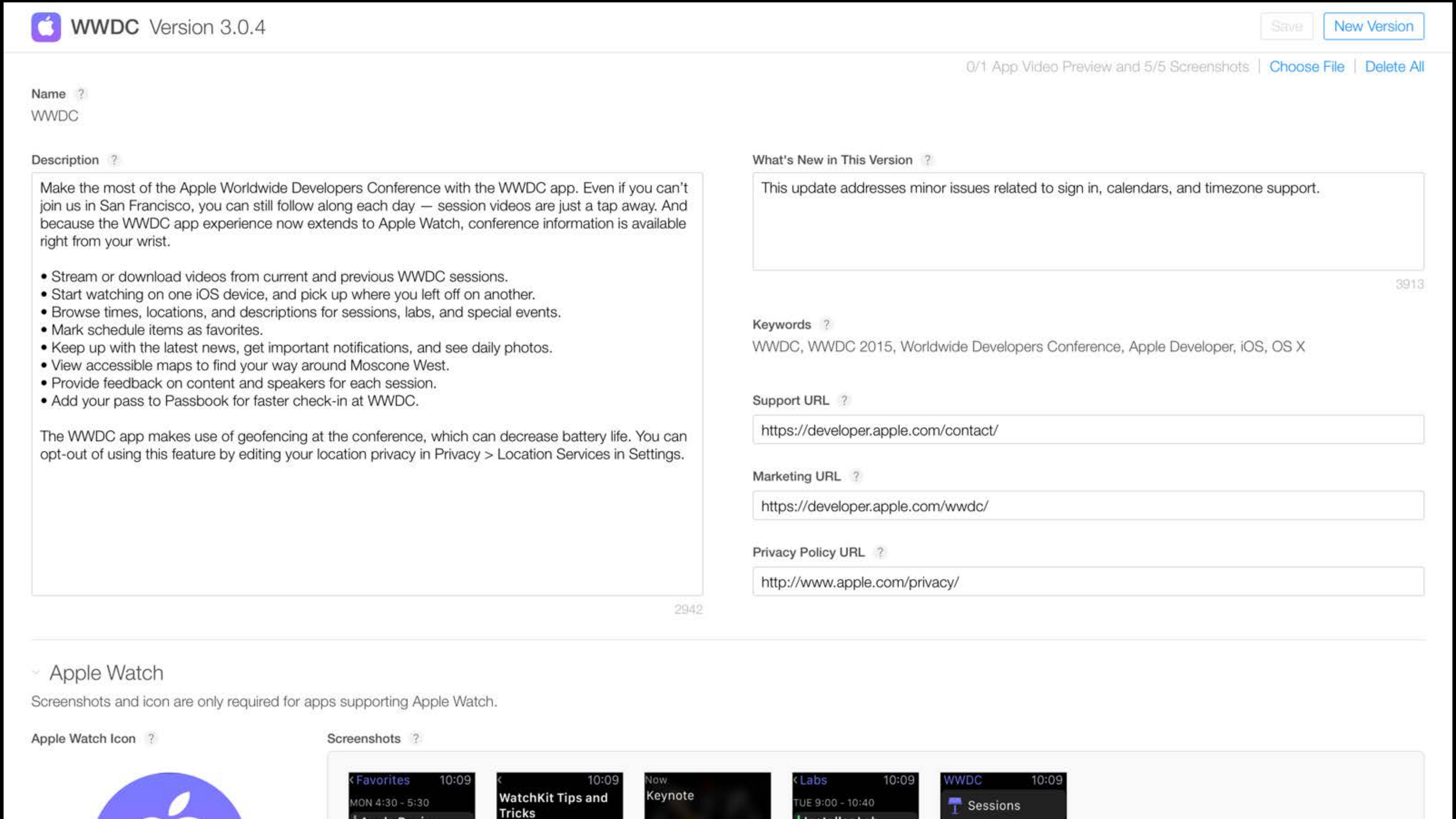
Privacy Policy transparency

Data Protection

Privacy Policy

Privacy Policy

iTunes Connect



WWDC Version 3.0.4

Save | New Version

0/1 App Video Preview and 5/5 Screenshots | Choose File | Delete All

Name ?

WWDC

Description ?

Make the most of the Apple Worldwide Developers Conference with the WWDC app. Even if you can't join us in San Francisco, you can still follow along each day — session videos are just a tap away. And because the WWDC app experience now extends to Apple Watch, conference information is available right from your wrist.

- Stream or download videos from current and previous WWDC sessions.
- Start watching on one iOS device, and pick up where you left off on another.
- Browse times, locations, and descriptions for sessions, labs, and special events.
- Mark schedule items as favorites.
- Keep up with the latest news, get important notifications, and see daily photos.
- View accessible maps to find your way around Moscone West.
- Provide feedback on content and speakers for each session.
- Add your pass to Passbook for faster check-in at WWDC.

The WWDC app makes use of geofencing at the conference, which can decrease battery life. You can opt-out of using this feature by editing your location privacy in Privacy > Location Services in Settings.

2942

What's New in This Version ?

This update addresses minor issues related to sign in, calendars, and timezone support.

3913

Keywords ?

WWDC, WWDC 2015, Worldwide Developers Conference, Apple Developer, iOS, OS X

Support URL ?

https://developer.apple.com/contact/

Marketing URL ?

https://developer.apple.com/wwdc/

Privacy Policy URL ?

http://www.apple.com/privacy/

Apple Watch

Screenshots and icon are only required for apps supporting Apple Watch.

Apple Watch Icon ?

Screenshots ?

Privacy Policy

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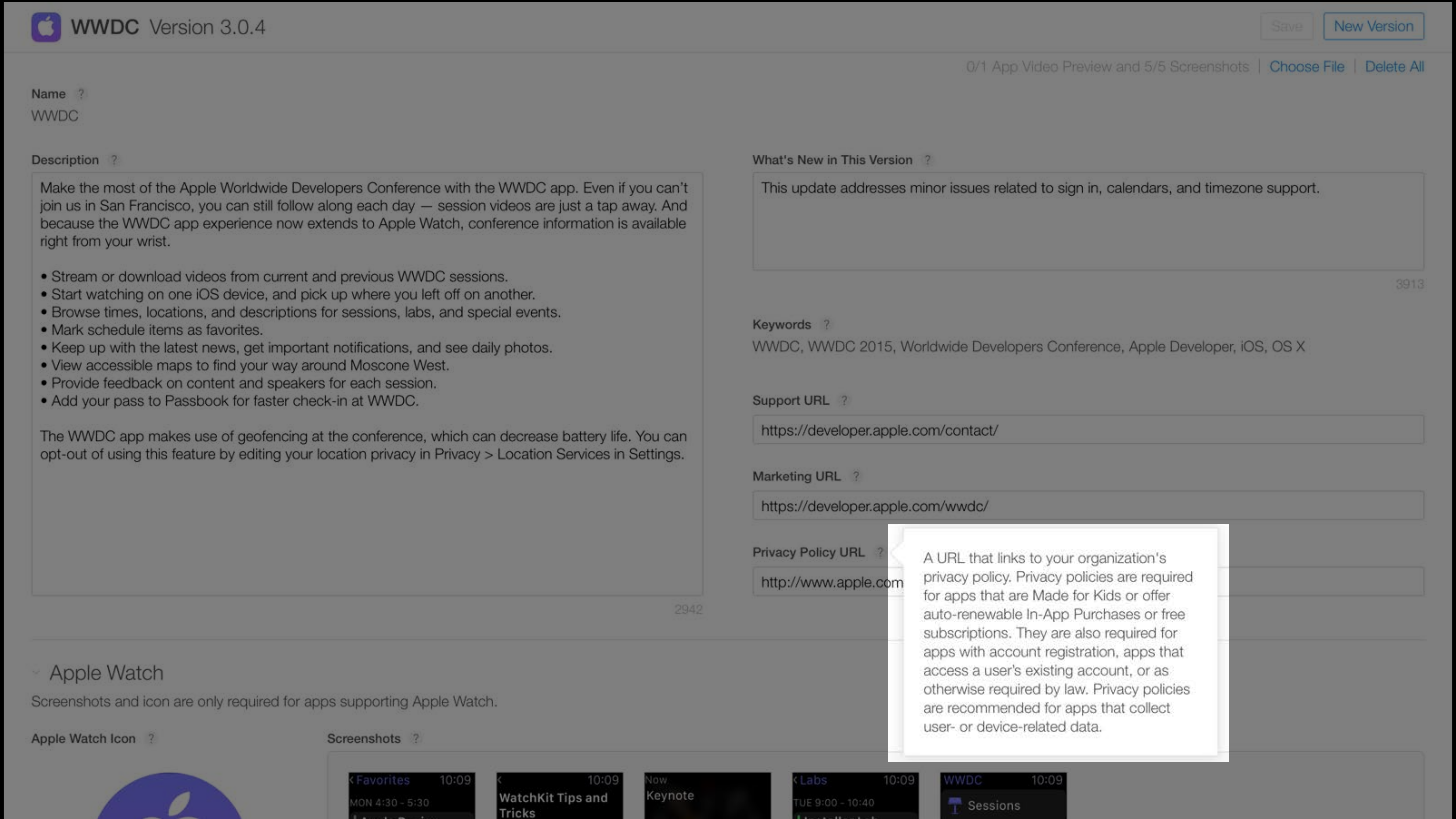

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Privacy Policy URL ?

http://www.apple.com

A URL that links to your organization's privacy policy. Privacy policies are required for apps that are Made for Kids or offer auto-renewable In-App Purchases or free subscriptions. They are also required for apps with account registration, apps that access a user's existing account, or as otherwise required by law. Privacy policies are recommended for apps that collect user- or device-related data.

Apple Watch

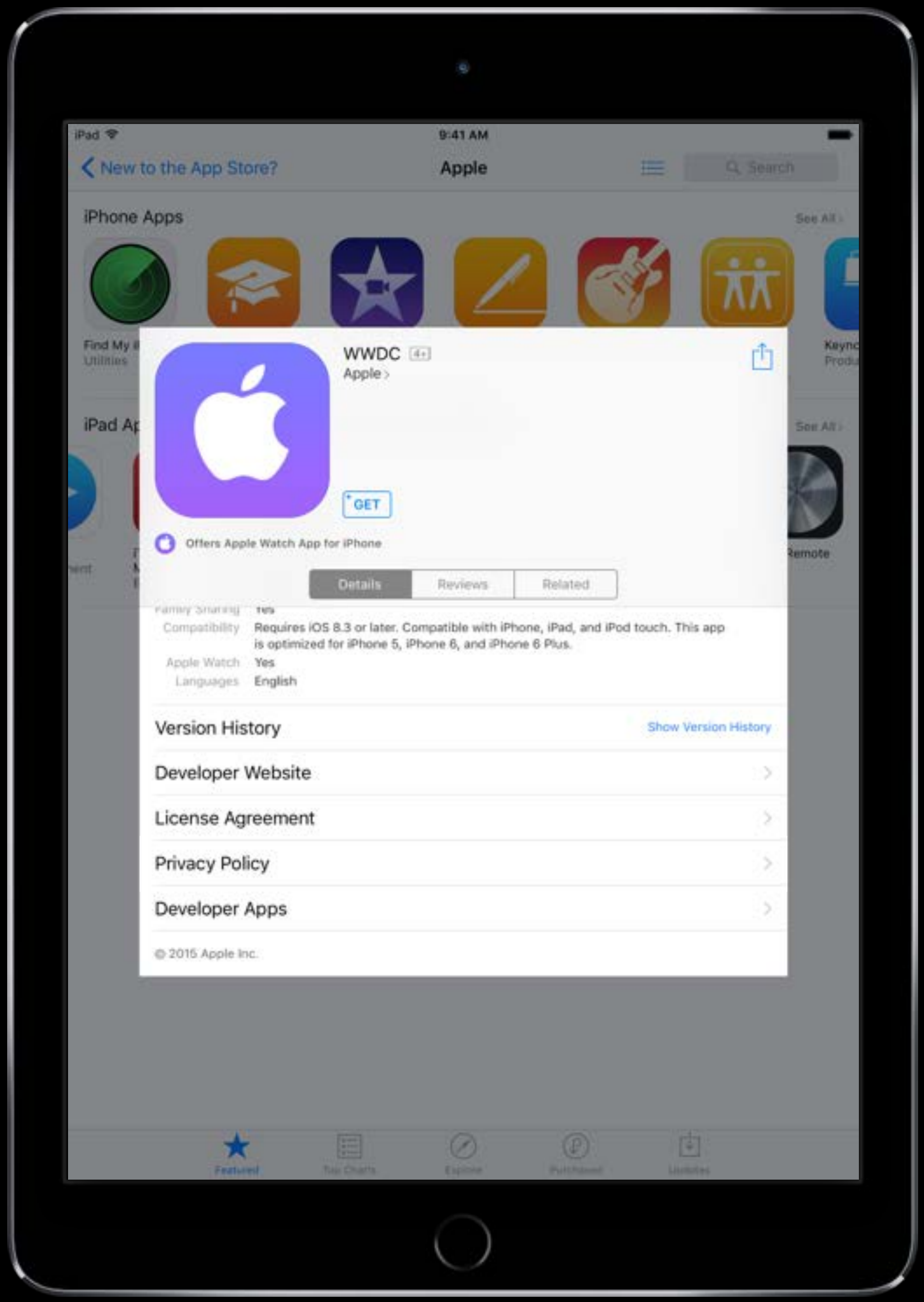
Screenshots and icon are only required for apps supporting Apple Watch.

Apple Watch Icon ?

Screenshots ?

Privacy Policy

App Store



WWDC 4+
Apple

Offers Apple Watch App for iPhone

Family Sharing Yes
Compatibility Requires iOS 8.3 or later. Compatible with iPhone, iPad, and iPod touch. This app is optimized for iPhone 5, iPhone 6, and iPhone 6 Plus.
Apple Watch Yes
Languages English

Version History — Show Version History

Developer Website

License Agreement

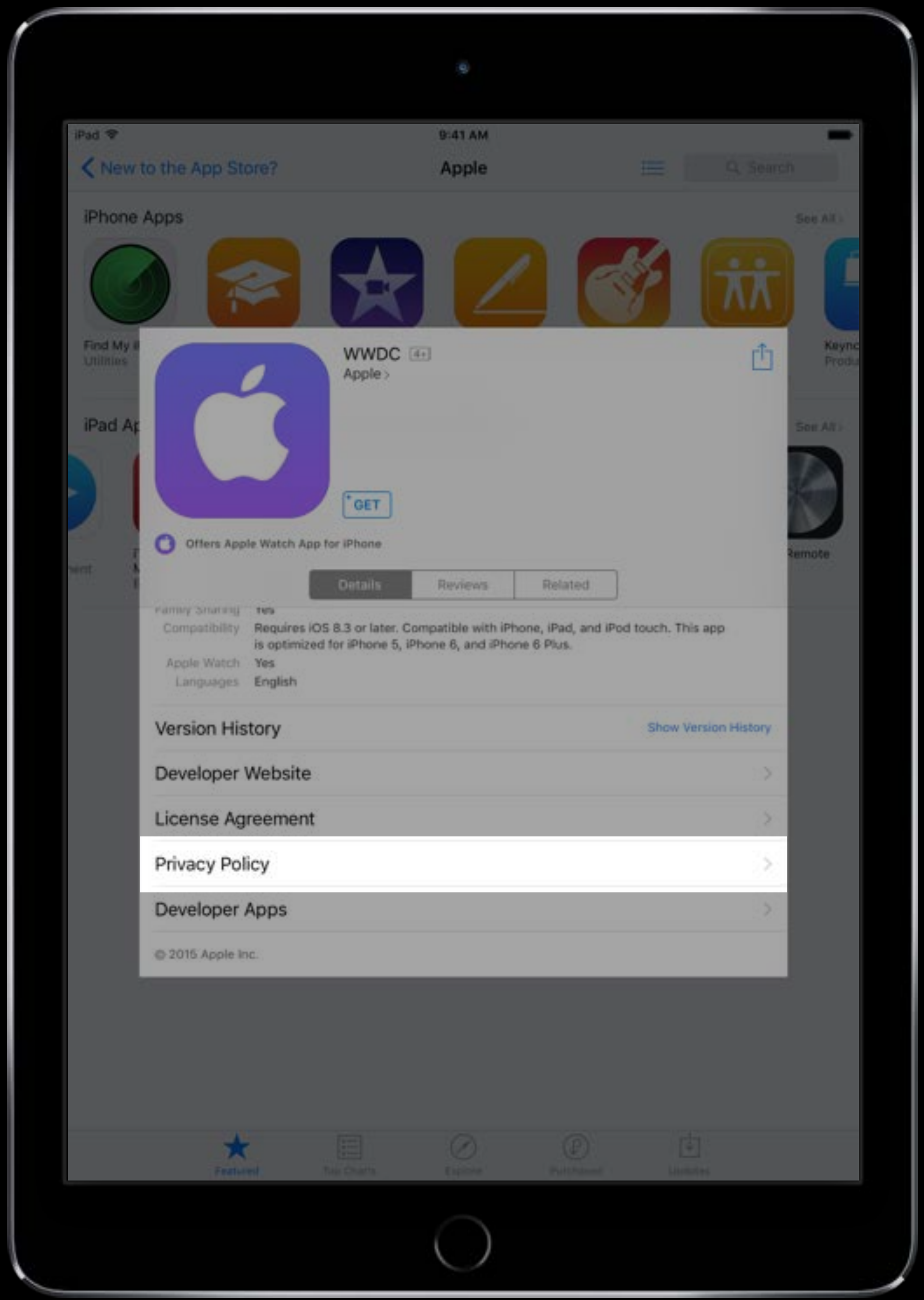
Privacy Policy

Developer Apps

© 2015 Apple Inc.

Privacy Policy

App Store



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Apple Watch Yes
Languages English

Data Protection

Data Protection

Uses encryption hardware to protect user data on iOS and watchOS

Per-file encryption

Multiple levels of protection

Data Protection

Data Protection Class	Key Availability
`NSFileProtectionComplete`	Read/Write Keys Available Only While Device Is Unlocked
`NSFileProtectionCompleteUnlessOpen`	Read When Device is Unlocked Write When Device is Locked
`NSFileProtectionCompleteUntilFirstUserAuthentication`	Read and Write After First Unlock of Device
`NSFileProtectionNone`	Read and Write After Booting Device

Data Protection

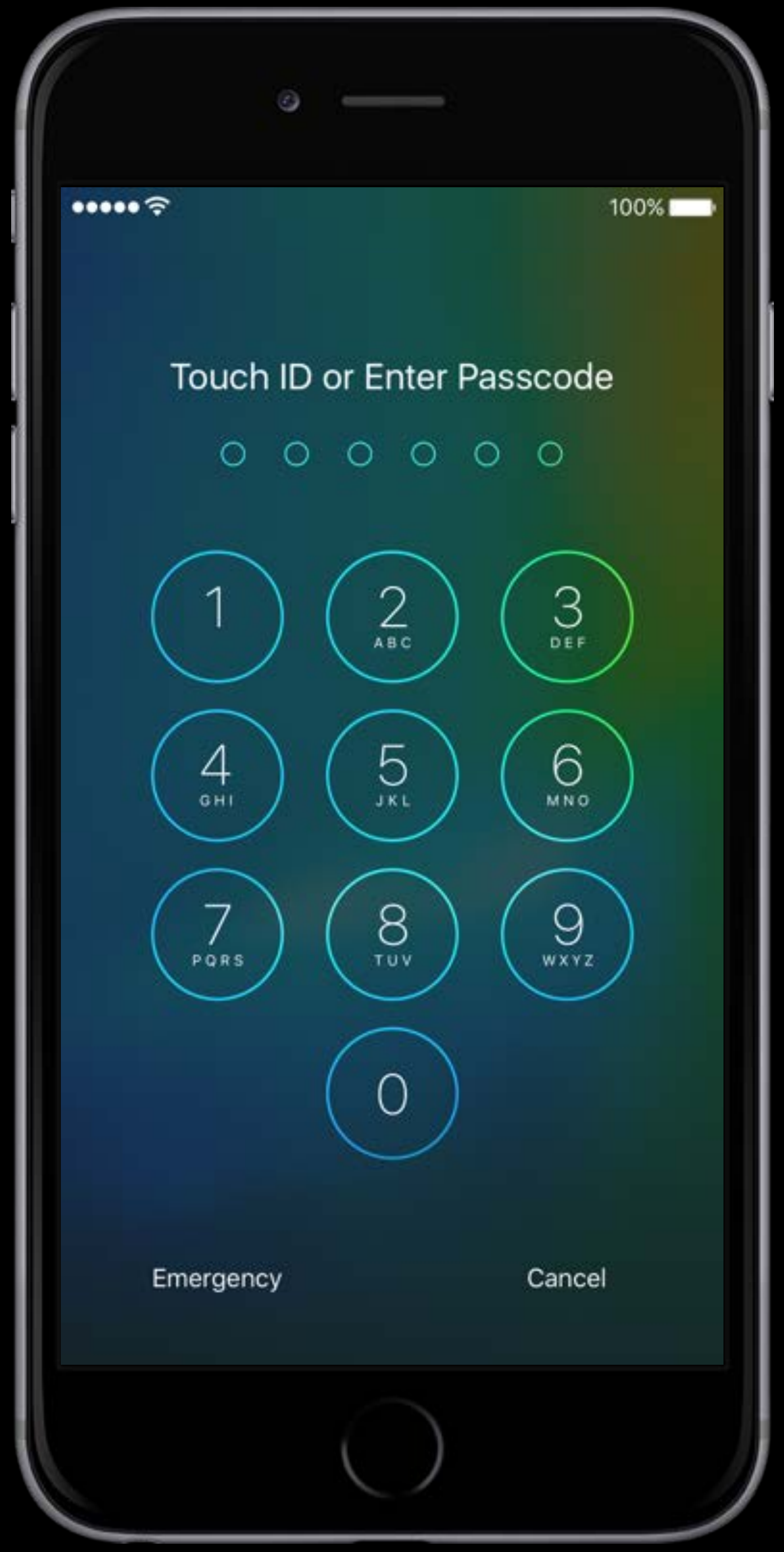
Data Protection Class	Key Availability
`NSFileProtectionCompleteUntilFirstUserAuthentication`	Read and Write After First Unlock of Device

`NSFileProtectionNone`

No Protection

No Protection

No Protection



No Protection

No Protection

`NSFileProtectionCompleteUntilFirstUserAuthentication`

Protected Until First User Authentication

Protected Until First User Authentication

Protected Until First User Authentication

Protected Until First User Authentication

Protected Until First User Authentication

`NSFileProtectionCompleteUnlessOpen`

Protected Unless Open

Protected Unless Open

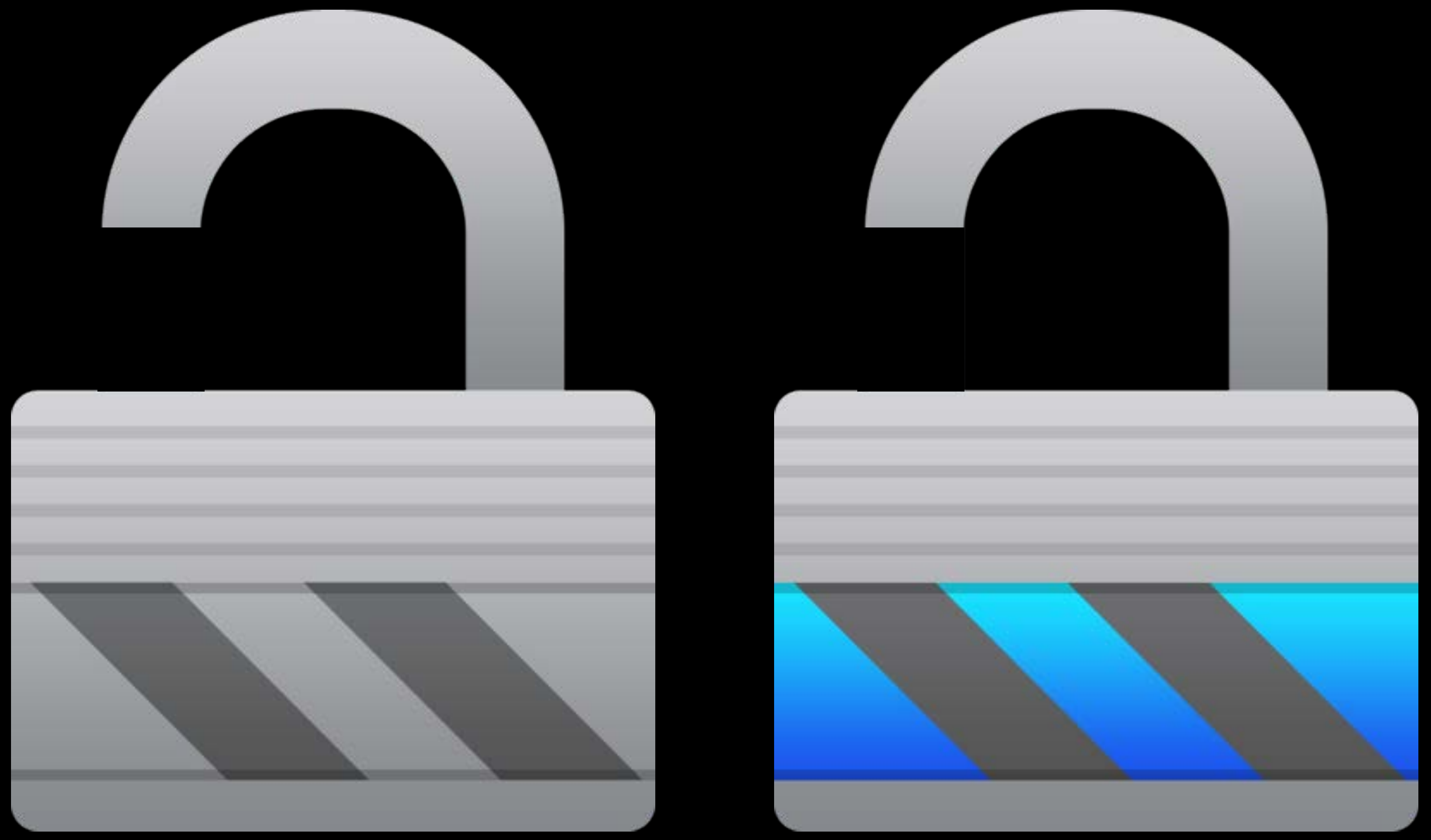
100%
9:41
Tuesday, June 9
Reading
Writing

Protected Unless Open

Reading

Writing

Protected Unless Open



Reading

Writing

Protected Unless Open

Reading

Writing

```
NSFileProtectionComplete
```

Complete Protection

Complete Protection

Complete Protection

Complete Protection

Complete Protection

Data Protection

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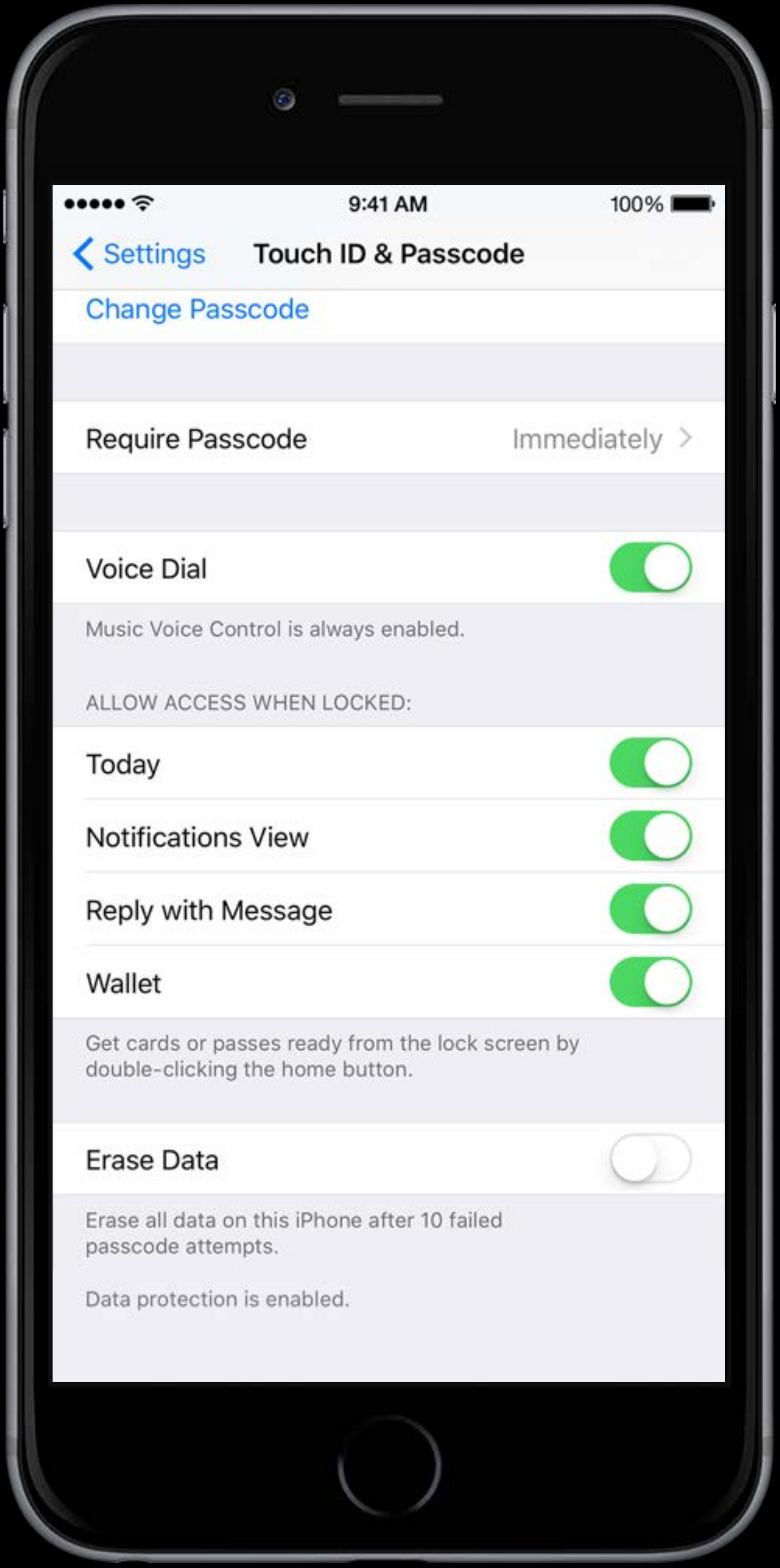


9:41 AM

100%

< Settings

Touch ID & Passcode

Change Passcode

Require Passcode — Immediately >

Voice Dial — On

Music Voice Control is always enabled.

ALLOW ACCESS WHEN LOCKED:

Today — On

Notifications View — On

Reply with Message — On

Wallet — On

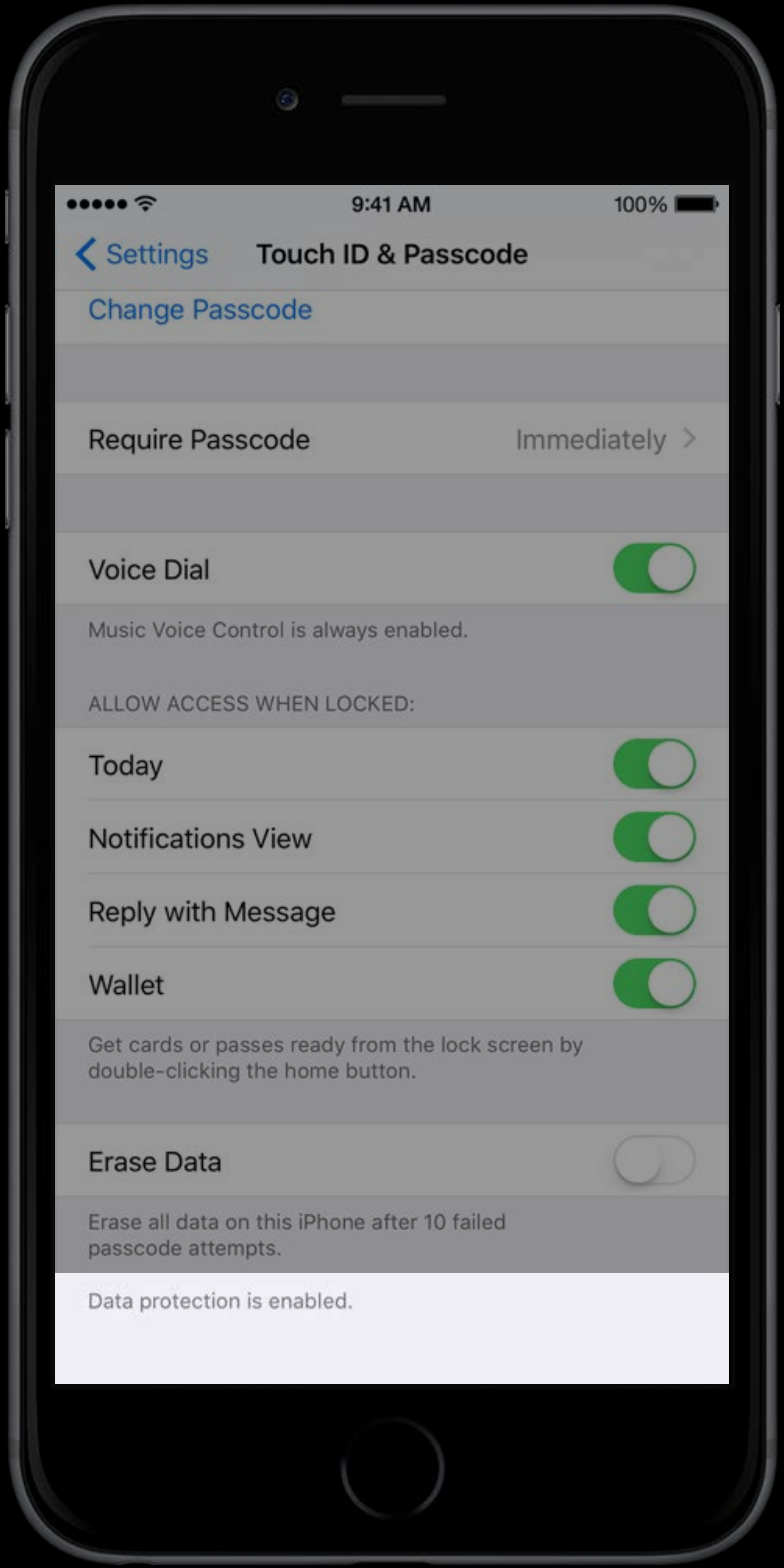
Get cards or passes ready from the lock screen by double-clicking the home button.

Erase Data — Off

Erase all data on this iPhone after 10 failed passcode attempts.

Data protection is enabled.

Data Protection



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Summary

Test to understand impact

Prompt with purpose

Minimize data and keep it up to date

Leverage the platform’s infrastructure

User privacy is our shared responsibility

More Information

Sample Code

PrivacyPrompts

http://developer.apple.com/library/prerelease/ios/samplecode/PrivacyPrompts/index.html

Technical Support

Apple Developer Forums

http://developer.apple.com/forums

Developer Technical Support

http://developer.apple.com/support/technical

General Inquiries

Paul Danbold, Core OS Evangelist

danbold@apple.com

Related Sessions

Wallet—The Home for Apple Pay and More	Mission	Tuesday 10:00AM
Security and Your Apps	Mission	Tuesday 4:30PM
WatchKit In-Depth, Part 1	Pacific Heights	Wednesday 9:00AM
Introducing App Search	Mission	Wednesday 11:00AM
Networking with NSURLSession	Pacific Heights	Thursday 9:00AM
Seamless Linking to Your App	Nob Hill	Thursday 3:30PM
App Extension Best Practices	Presidio	Thursday 4:30PM
CloudKit Tips and Tricks	Pacific Heights	Thursday 4:30PM

Related Labs

Security and Privacy Lab	Frameworks Lab C	Wednesday 9:00AM
Security and Privacy Lab	Frameworks Lab B	Thursday 9:00AM

WWDC15