Core OS

What's New in Core Location

Session 706

Stephen Rhee

Engineering Manager

What’s New in Core Location

What’s New in Core Location

Location authorization

What’s New in Core Location

Location authorization

Visit monitoring

What’s New in Core Location

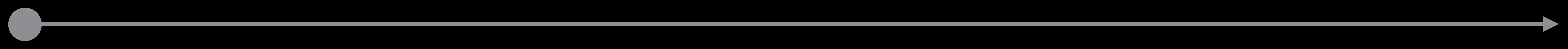
Location authorization

Visit monitoring

Indoor positioning

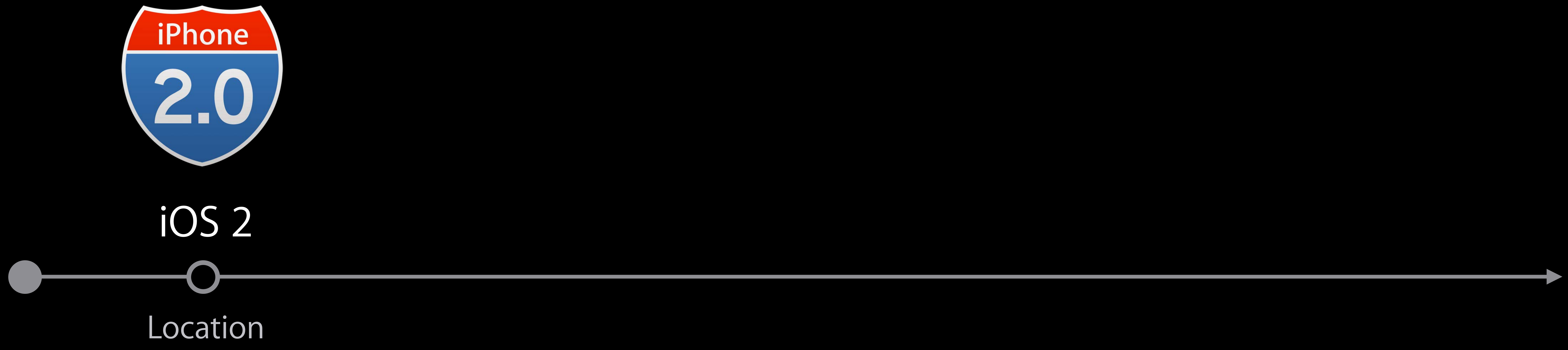
Introduction

A brief history



Introduction

A brief history

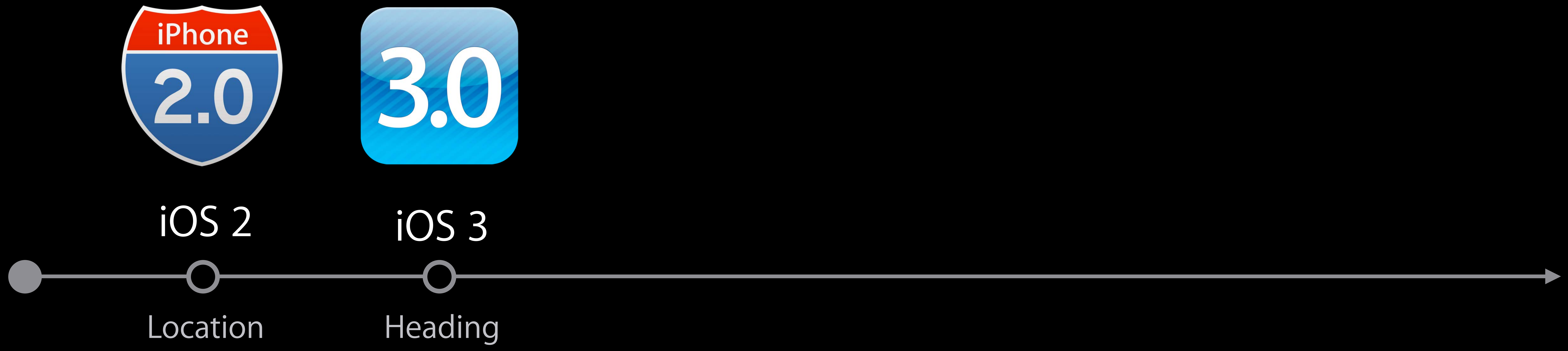


iOS 2

Location

Introduction

A brief history



iOS 2

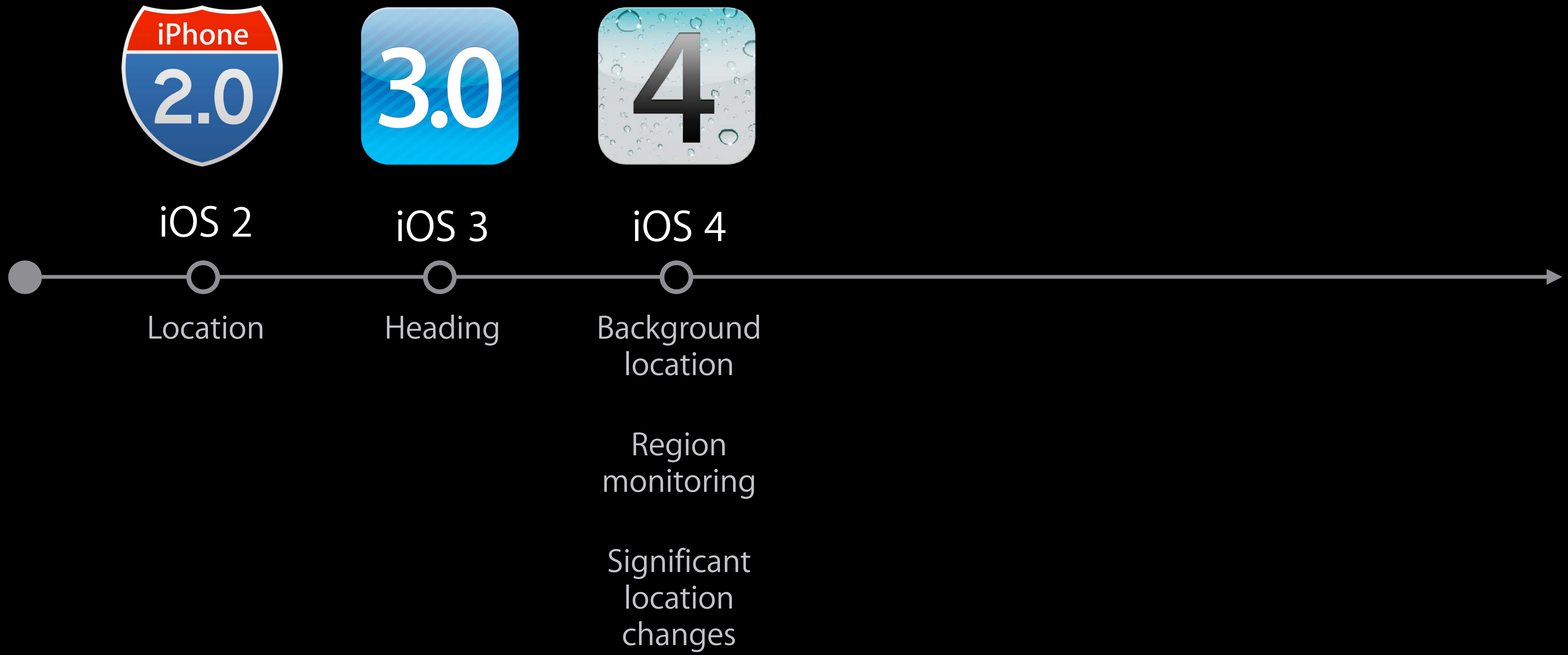
iOS 3

Location

Heading

Introduction

A brief history



iOS 2

Location

iOS 3

Heading

iOS 4

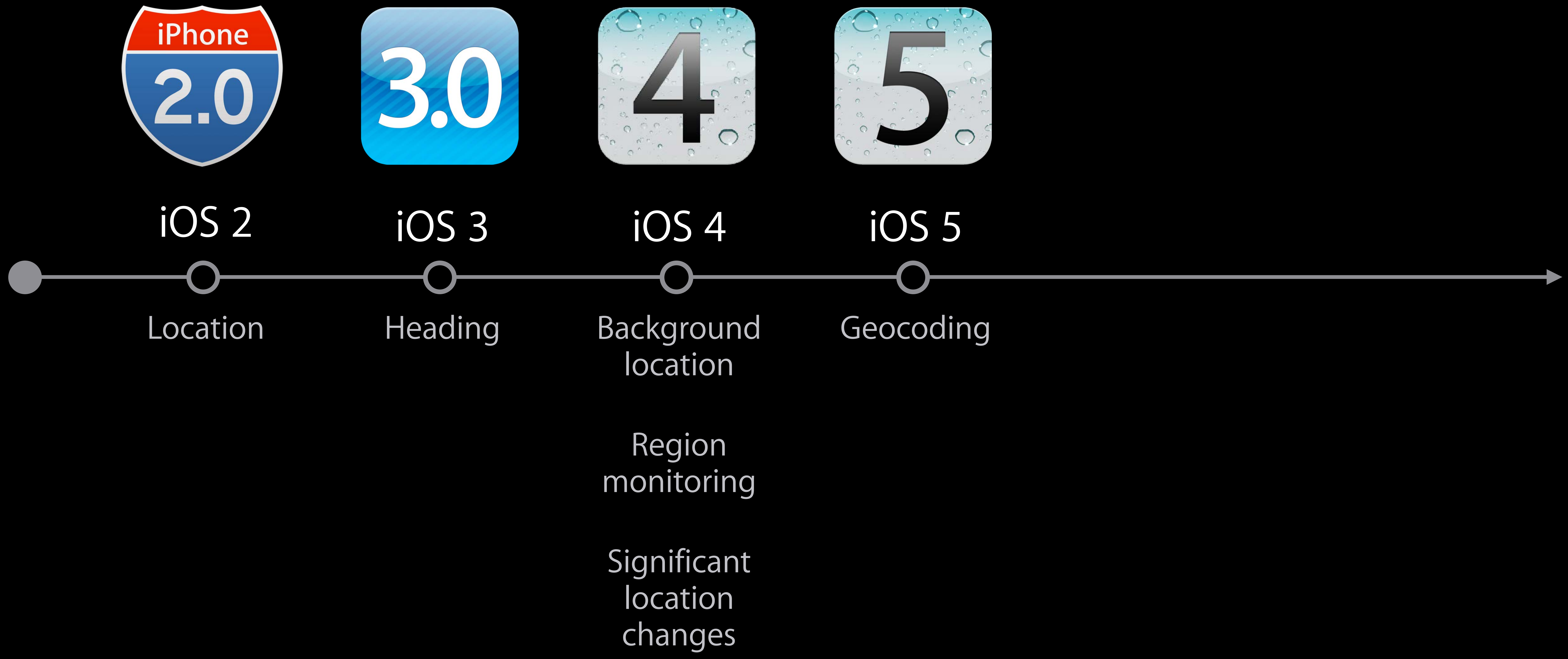
Background location

Region monitoring

Significant location changes

Introduction

A brief history



iOS 2

Location

iOS 3

Heading

iOS 4

Background location

Region monitoring

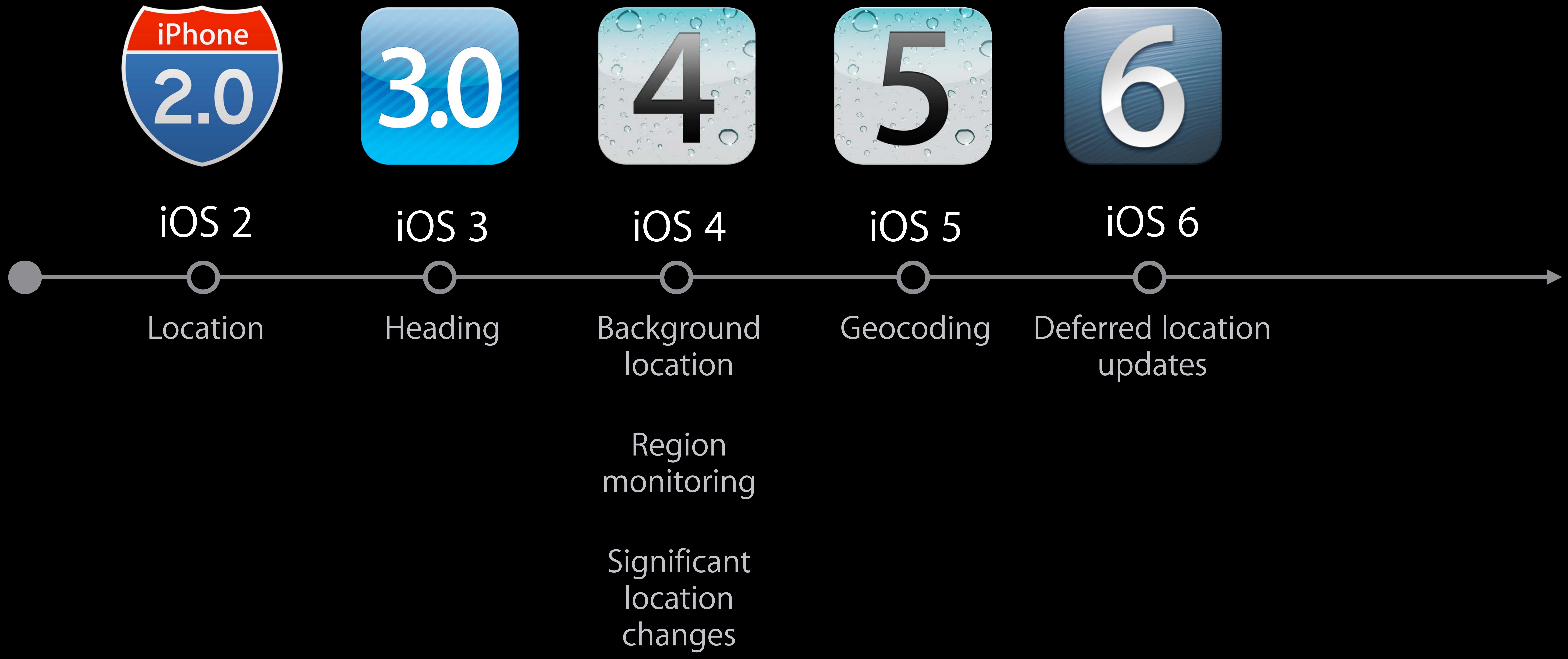
Significant location changes

iOS 5

Geocoding

Introduction

A brief history



iOS 2

Location

iOS 3

Heading

iOS 4

Background location

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Significant location changes

iOS 5

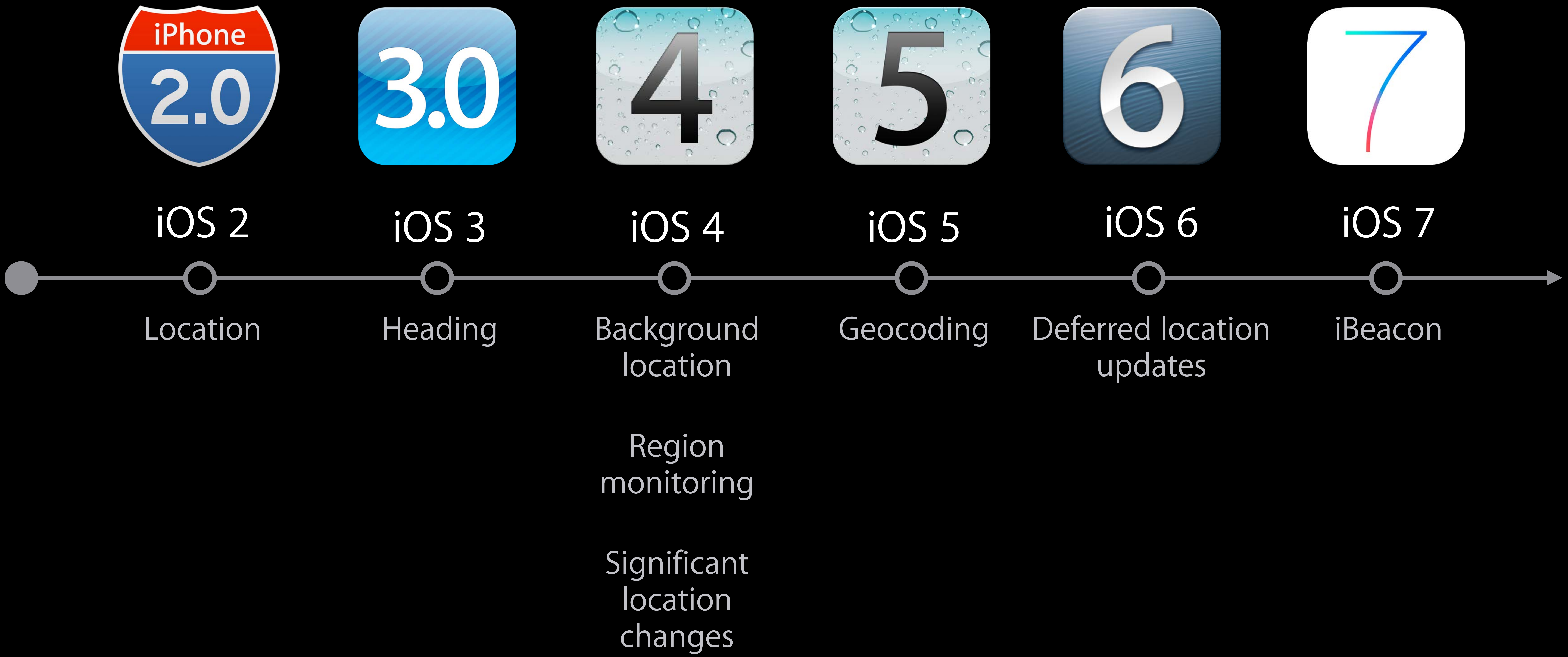
Geocoding

iOS 6

Deferred location updates

Introduction

A brief history



iOS 2	Location
iOS 3	Heading
iOS 4	Background location Region monitoring Significant location changes
iOS 5	Geocoding
iOS 6	Deferred location updates
iOS 7	iBeacon

680,000

Apps using location

Navigation

680,000

Apps using location

Travel

Navigation

680,000

Apps using location

Travel

Navigation

680,000

Apps using location

Fitness

Travel

Navigation

Shopping

680,000

Apps using location

Fitness

Travel

Navigation

Shopping

680,000

Apps using location

Social

Fitness

Travel

Navigation

Shopping

680,000

Apps using location

Social

Gaming

Fitness

Introduction

Location indication

Introduction

Location indication

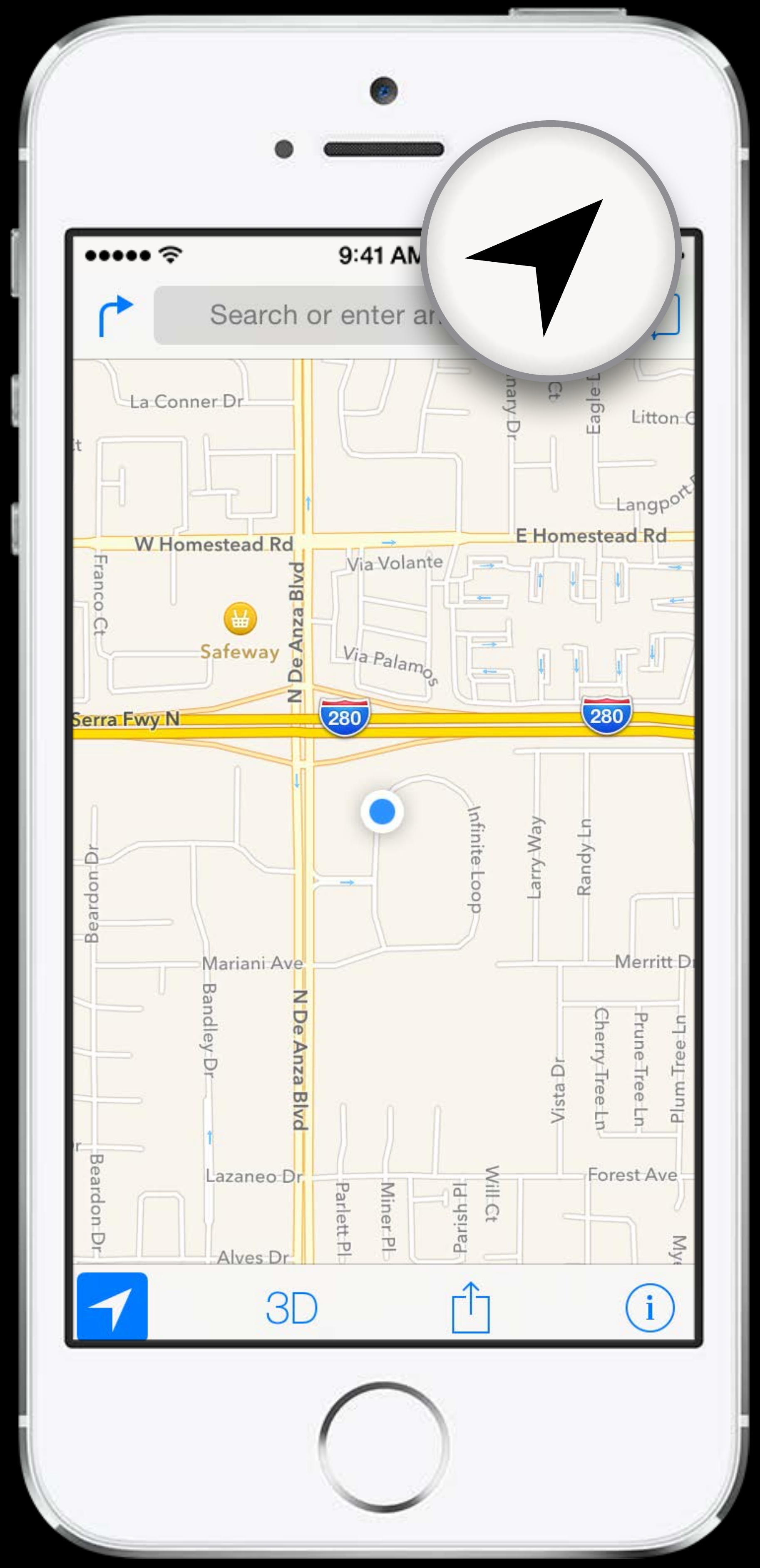
Status bar icon

Introduction

Location indication

Status bar icon

- Solid

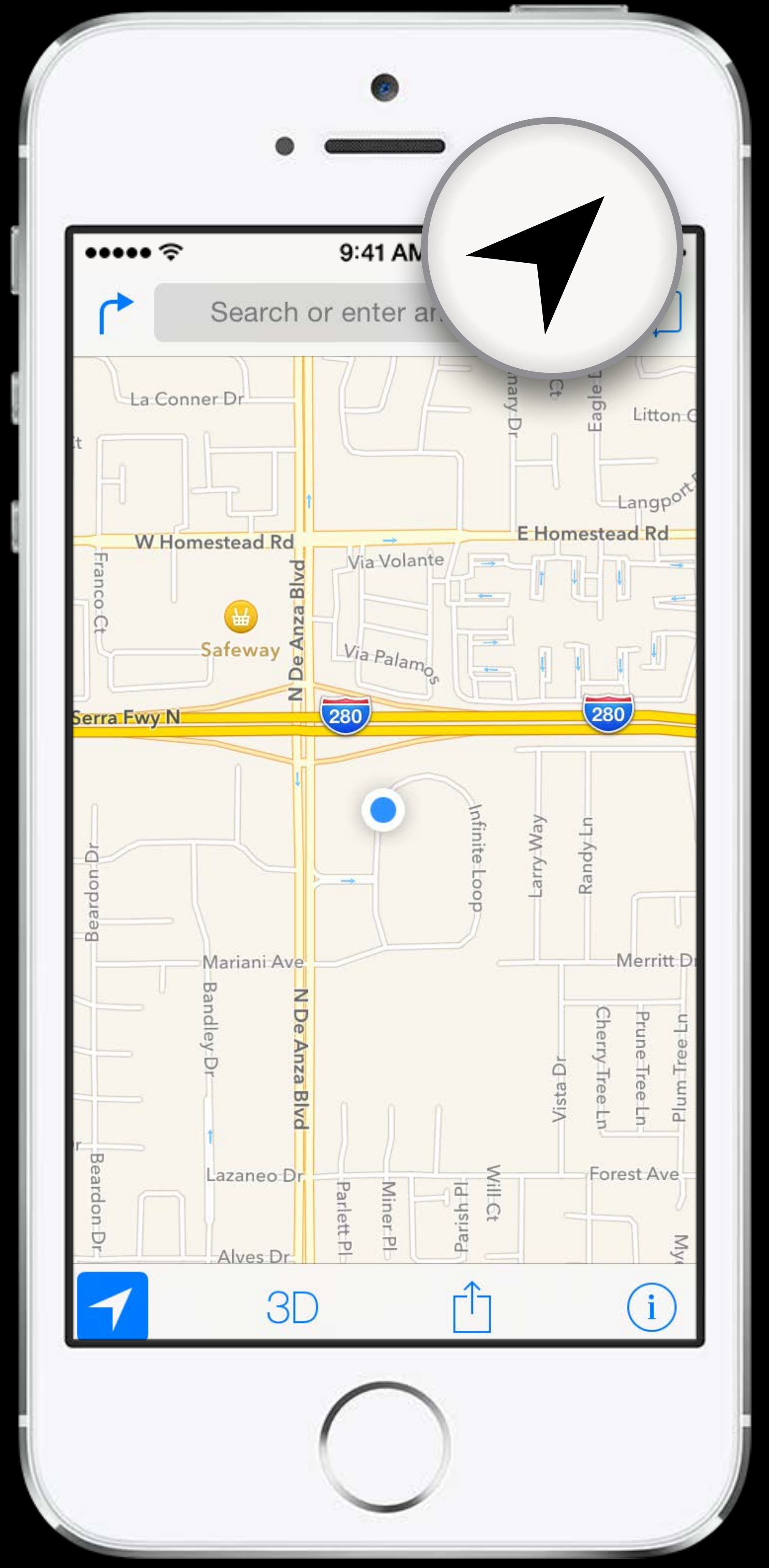


Introduction

Location indication

Status bar icon

- Solid
  - Location
  - Ranging
  - Significant location changes



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Location indication

Status bar icon

- Solid
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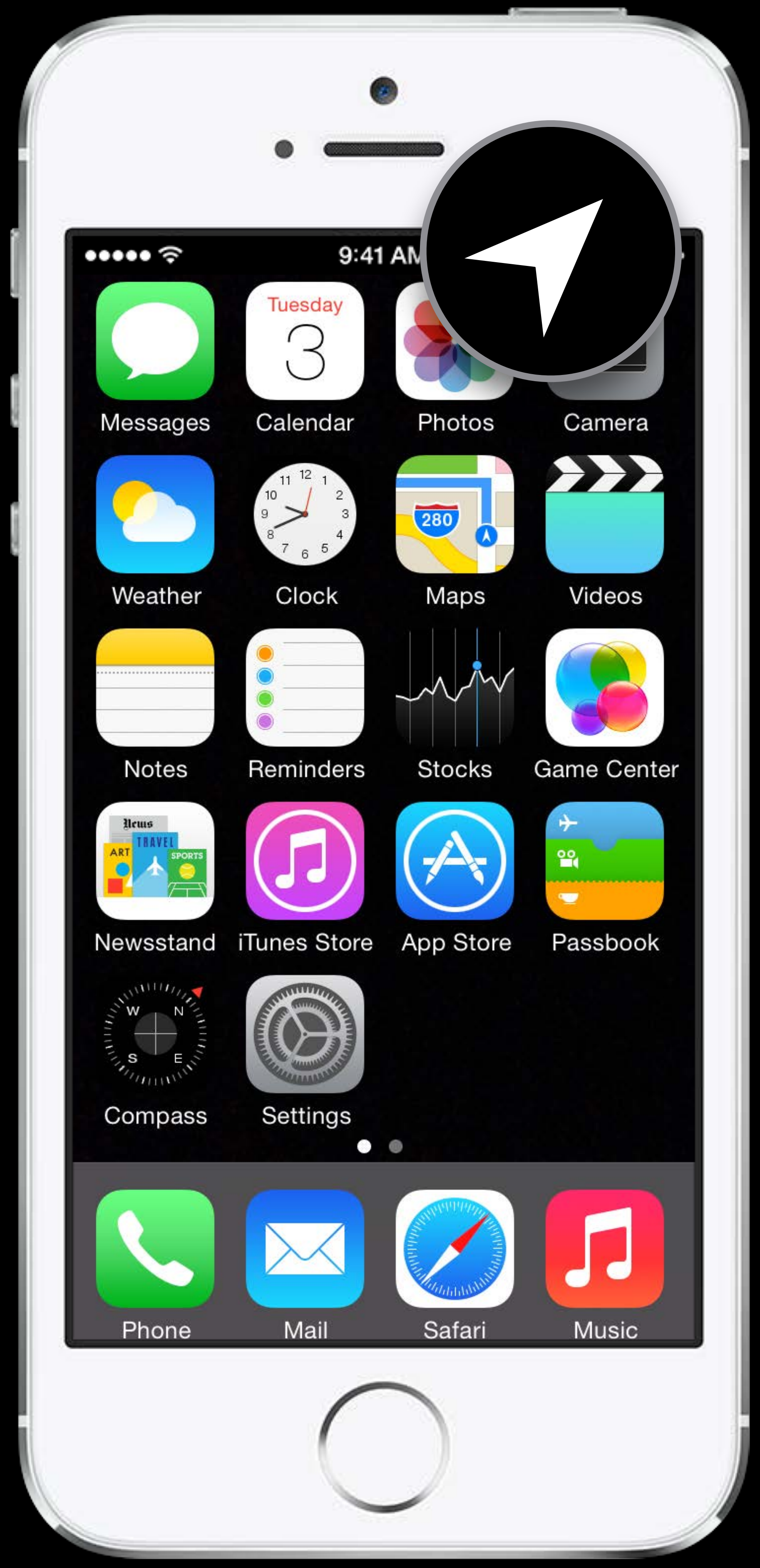
  - Ranging
  - Significant location changes

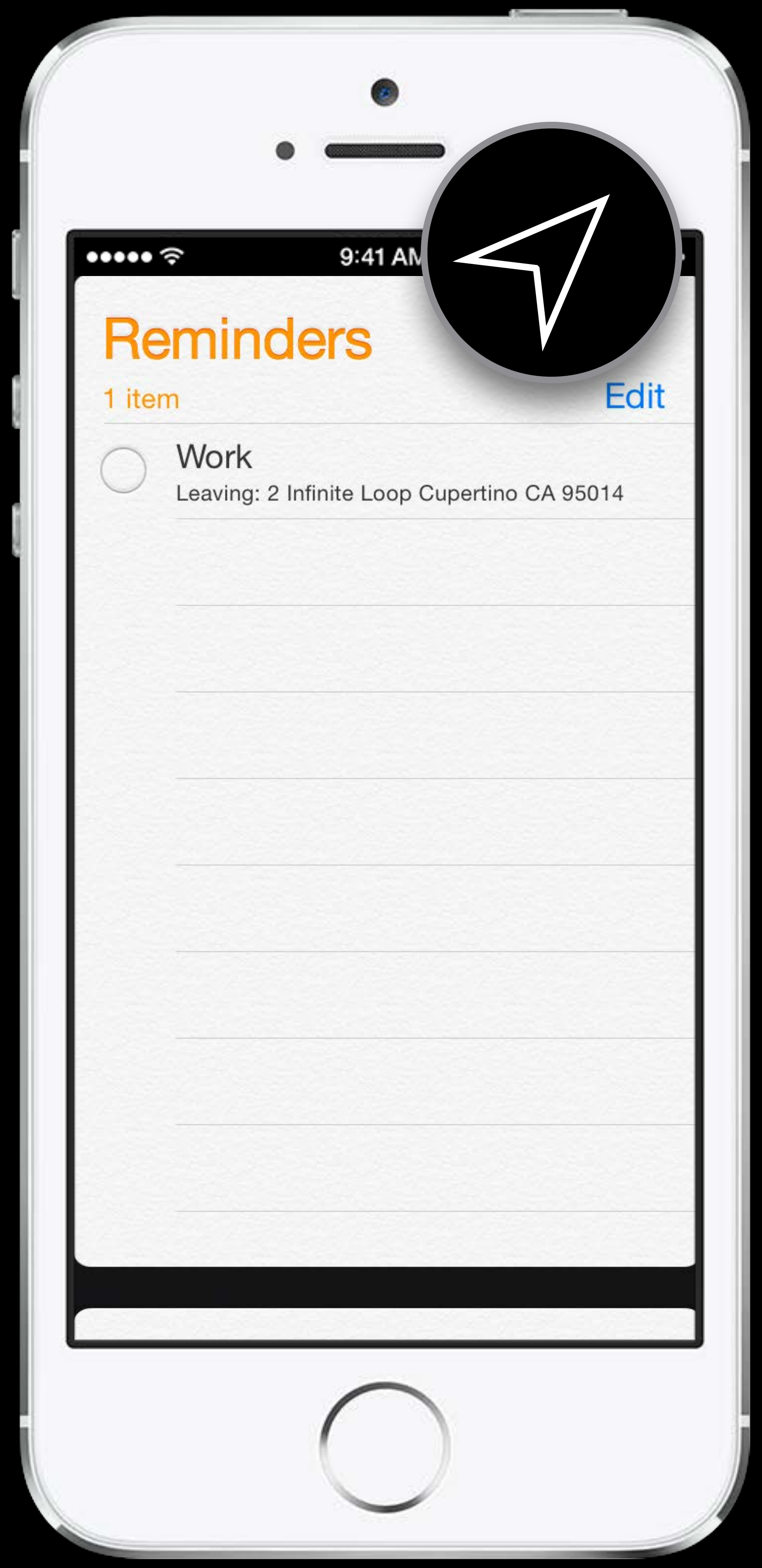


Introduction

Location indication

Status bar icon

- Solid
  - Location
  - Ranging
  - Significant location changes
- Hollow

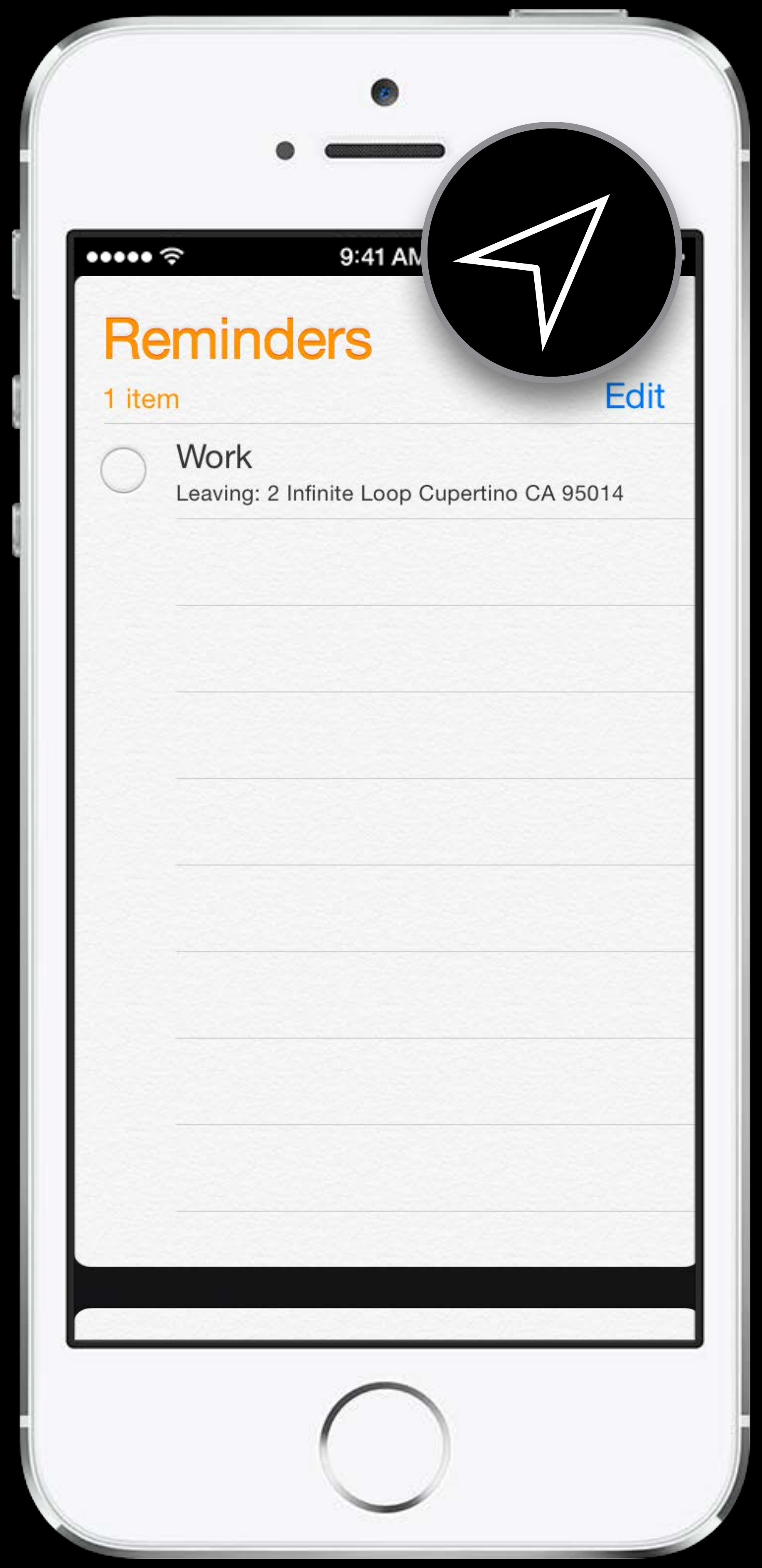


Introduction

Location indication

Status bar icon

- Solid
  - Location
  - Ranging
  - Significant location changes
- Hollow
  - Region monitoring only



Reminders

1 item

Work

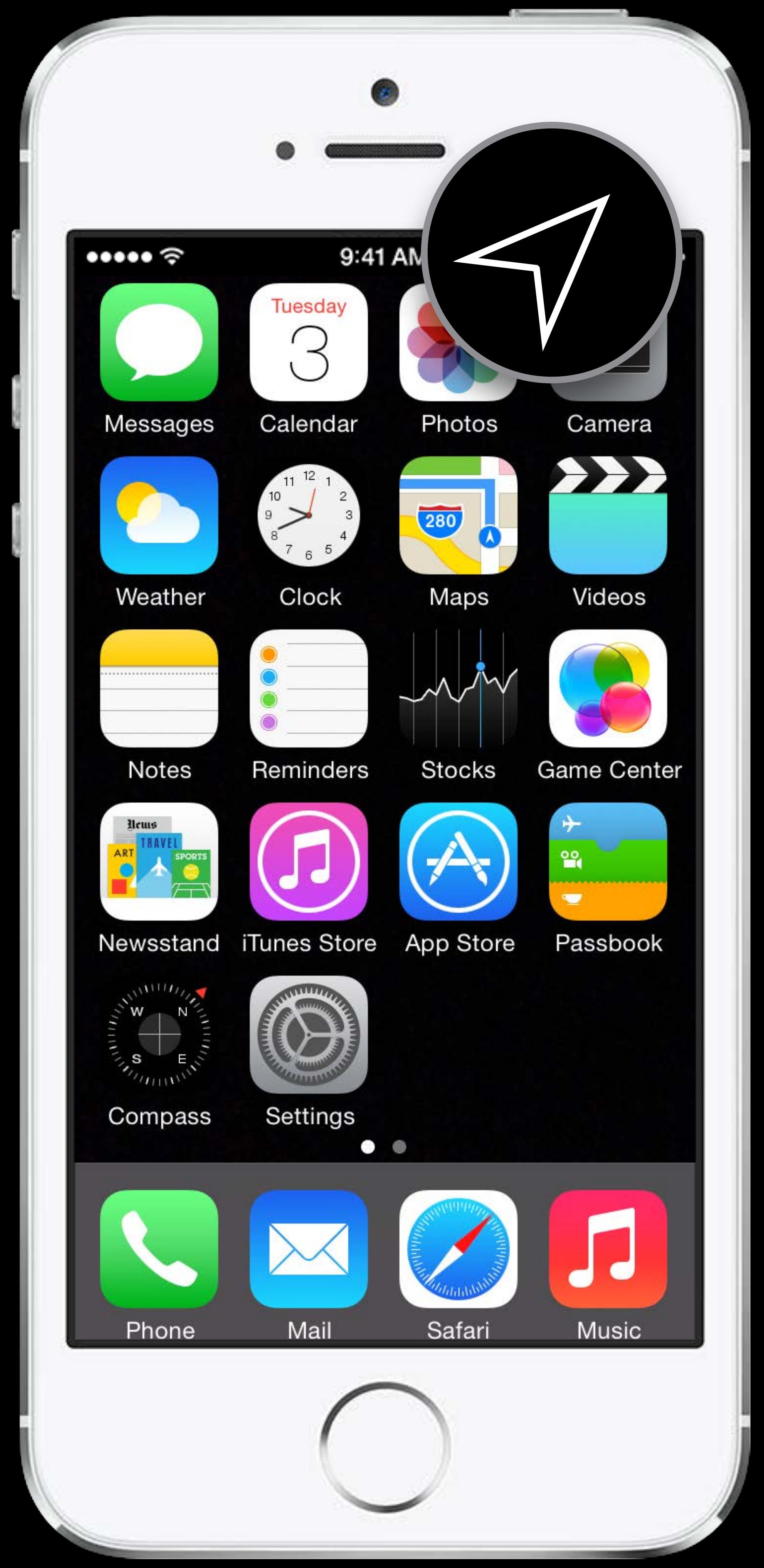
Leaving: 2 Infinite Loop Cupertino CA 95014

Introduction

Location indication

Status bar icon

- Solid
  - Location
  - Ranging
  - Significant location changes
- Hollow
  - Region monitoring only



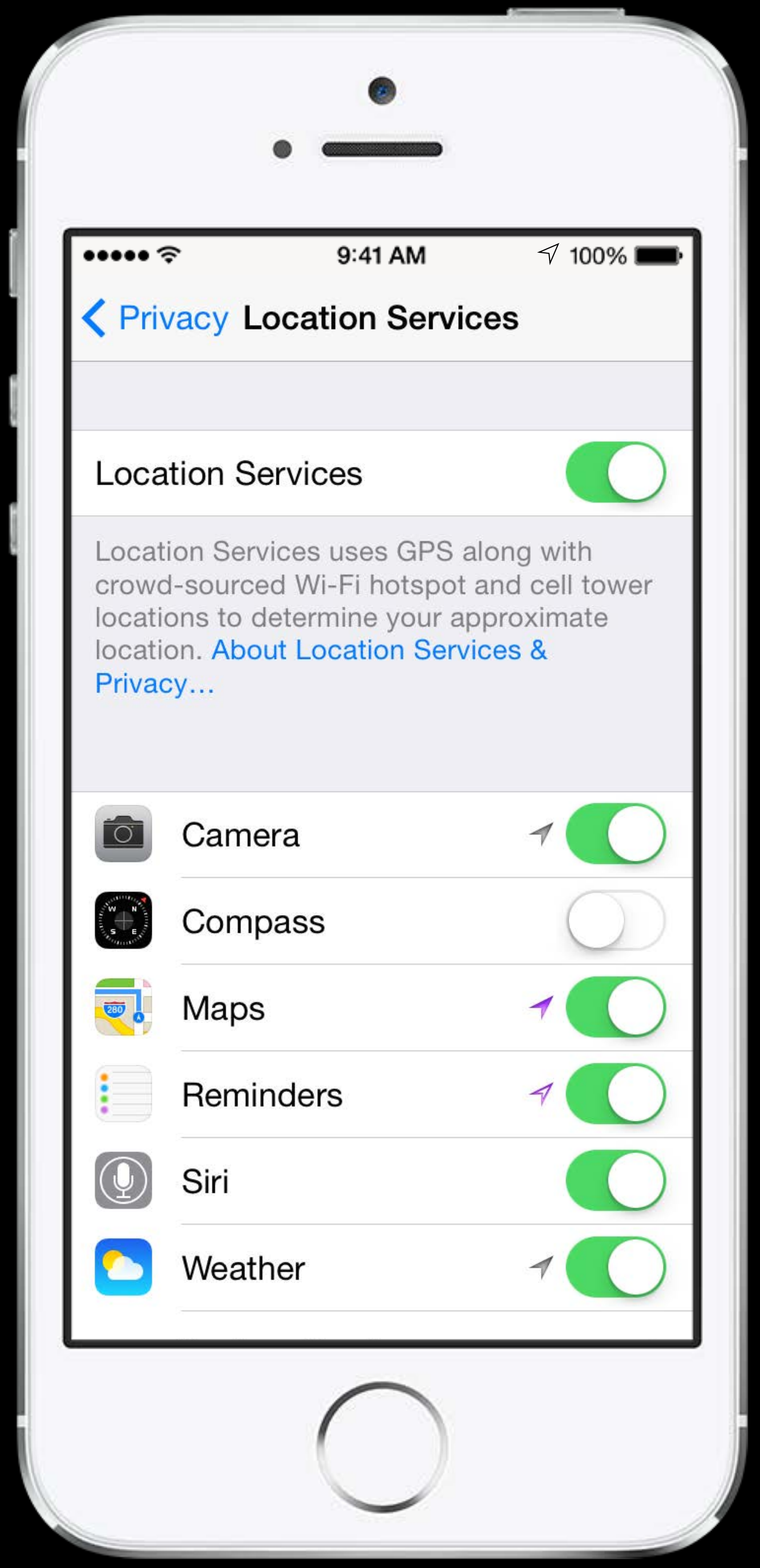
Introduction

Location Services settings

Introduction

Location Services settings

Settings > Privacy > Location Services



●●●●● 9:41 AM 100%

< Privacy Location Services

Location Services ●

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

Camera ●

Compass ○

Maps ●

Reminders ●

Siri ●

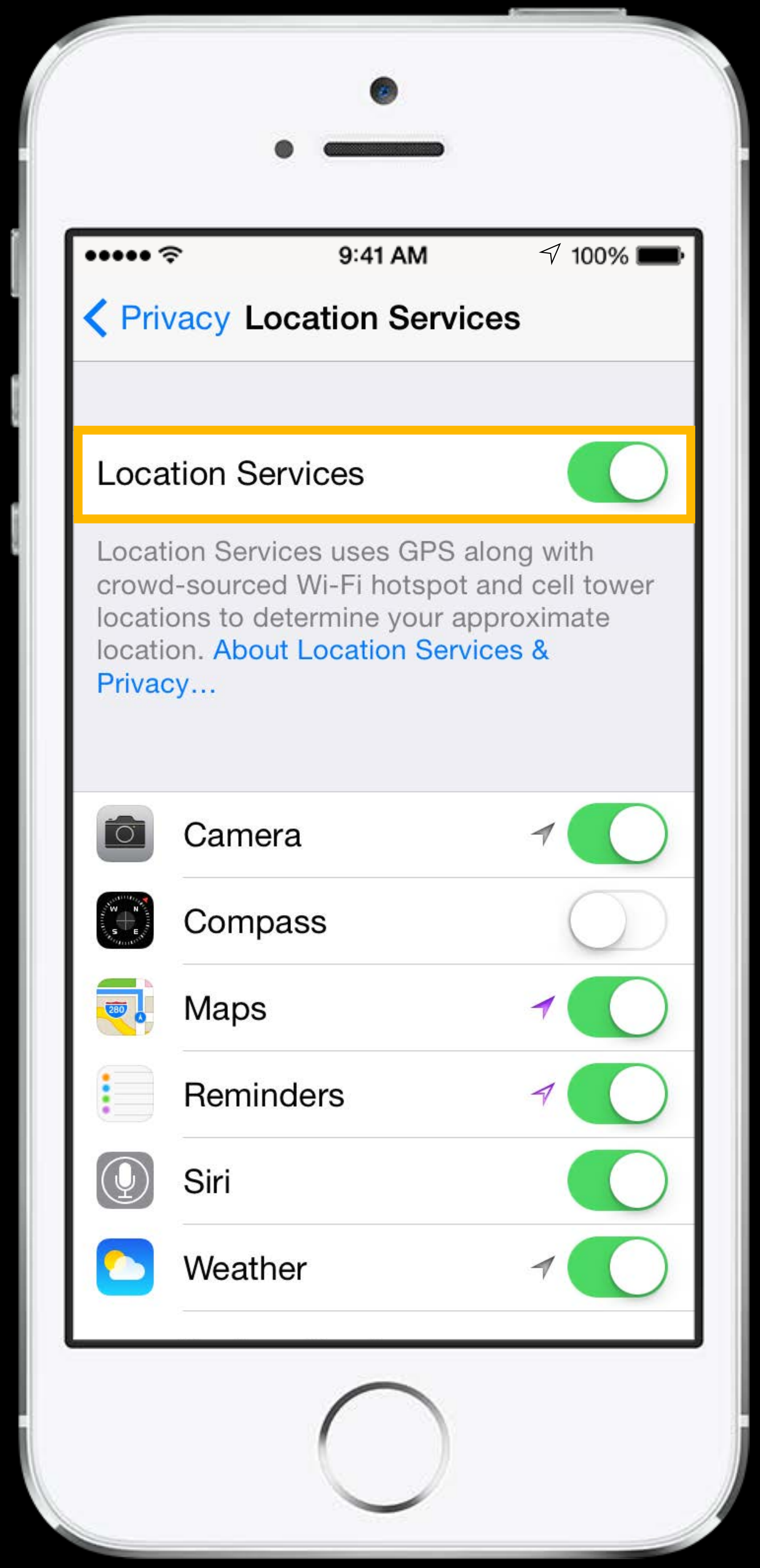
Weather ●

Introduction

Location Services settings

Settings > Privacy > Location Services

- Global control



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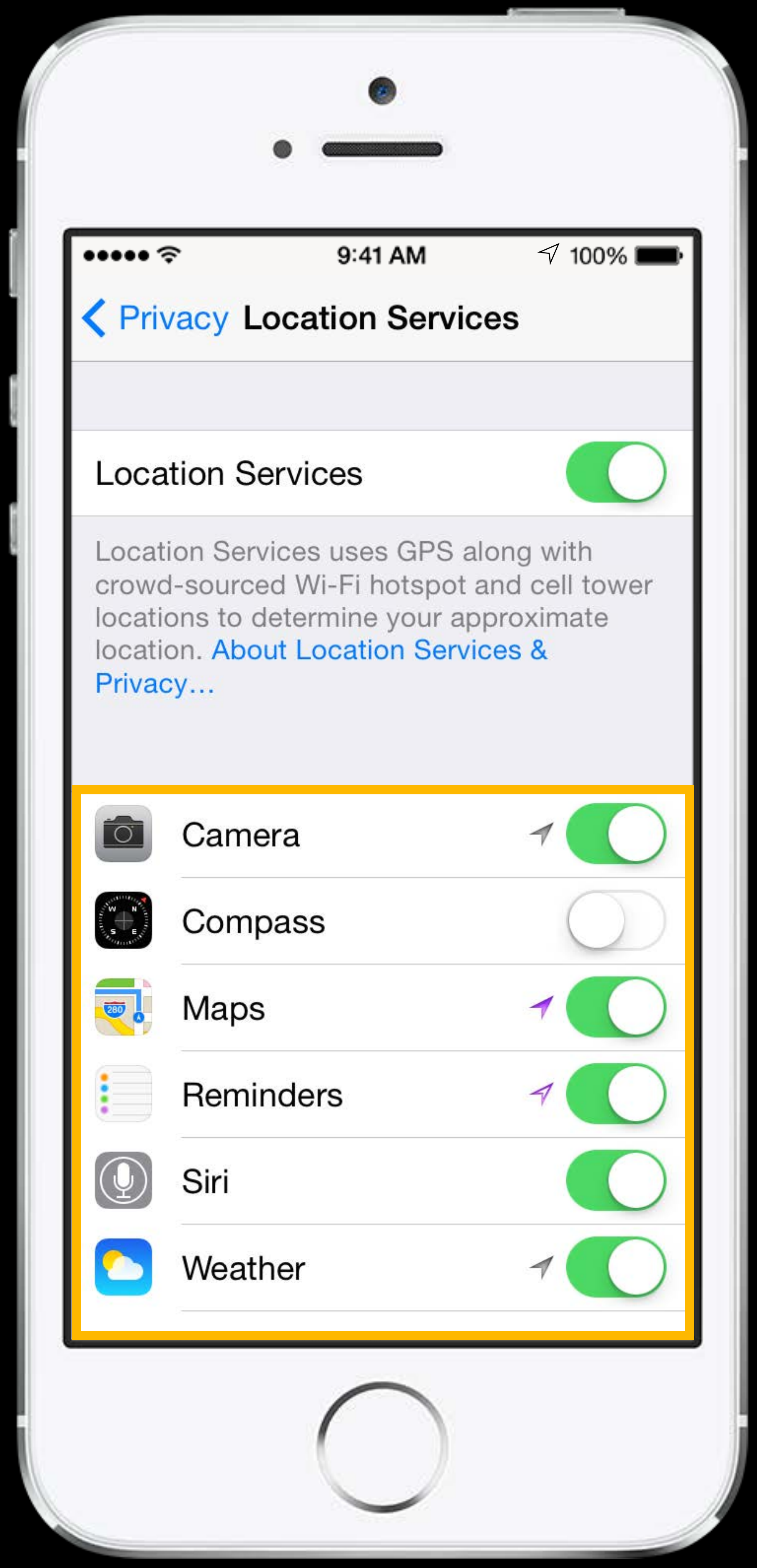
- Camera ●
- Compass ○
- Maps ●
- Reminders ●
- Siri ●
- Weather ●

Introduction

Location Services settings

Settings > Privacy > Location Services

- Global control
- Per app control



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Compass ○

Maps ●

Reminders ●

Siri ●

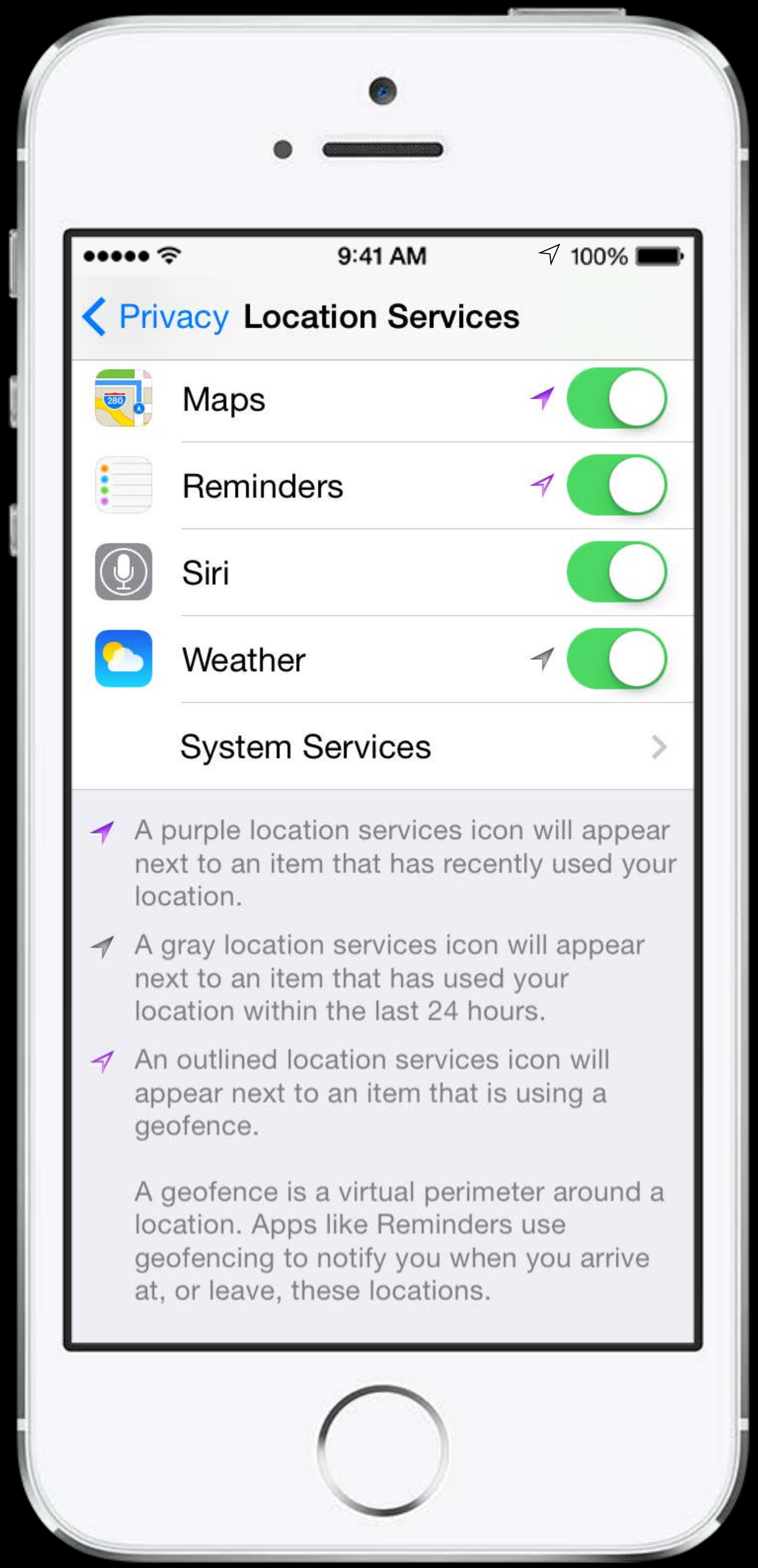
Weather ●

Introduction

Location Services settings

Settings > Privacy > Location Services

- Global control
- Per app control
- Per app usage



9:41 AM 100%

< Privacy **Location Services**

Maps	On
Reminders	On
Siri	On
Weather	On
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 hours.

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

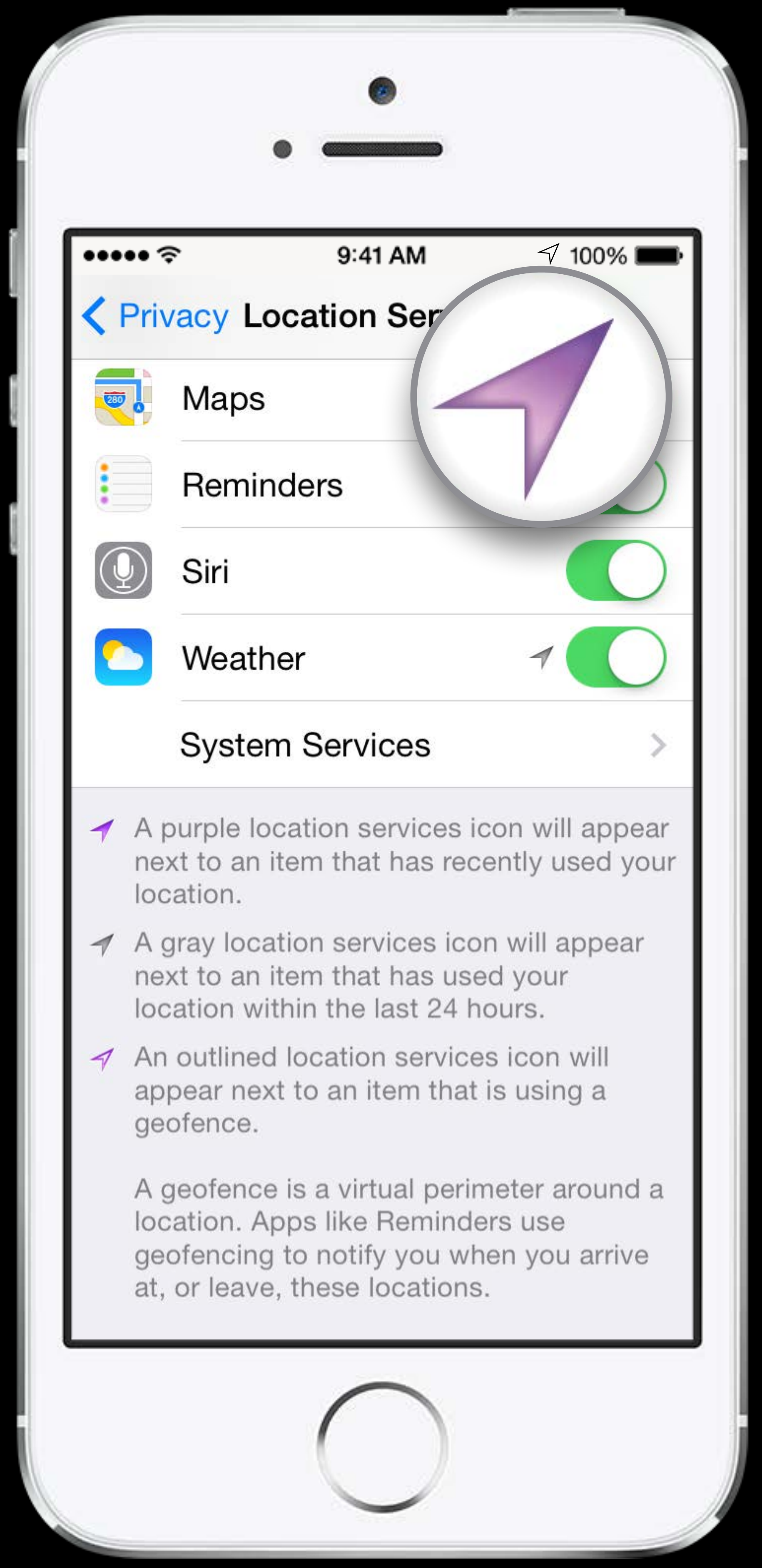
A geofence is a virtual perimeter around a location. Apps like Reminders use geofencing to notify you when you arrive at, or leave, these locations.

Introduction

Location Services settings

Settings > Privacy > Location Services

- Global control
- Per app control
- Per app usage
  - Recent



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Location Services settings

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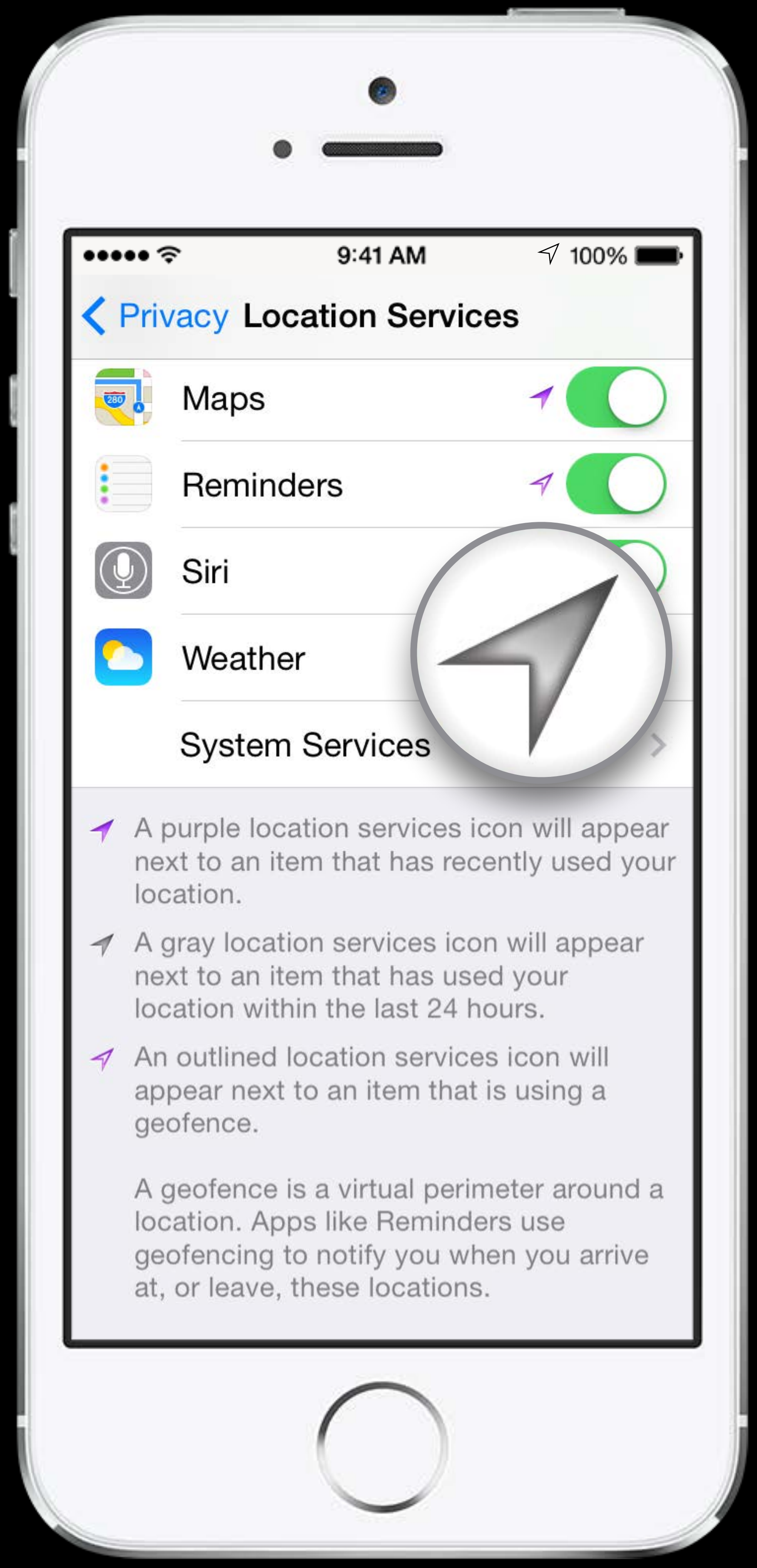
- Global control
- Per app control
- Per app usage
  - Recent
  - Within last 24 hours



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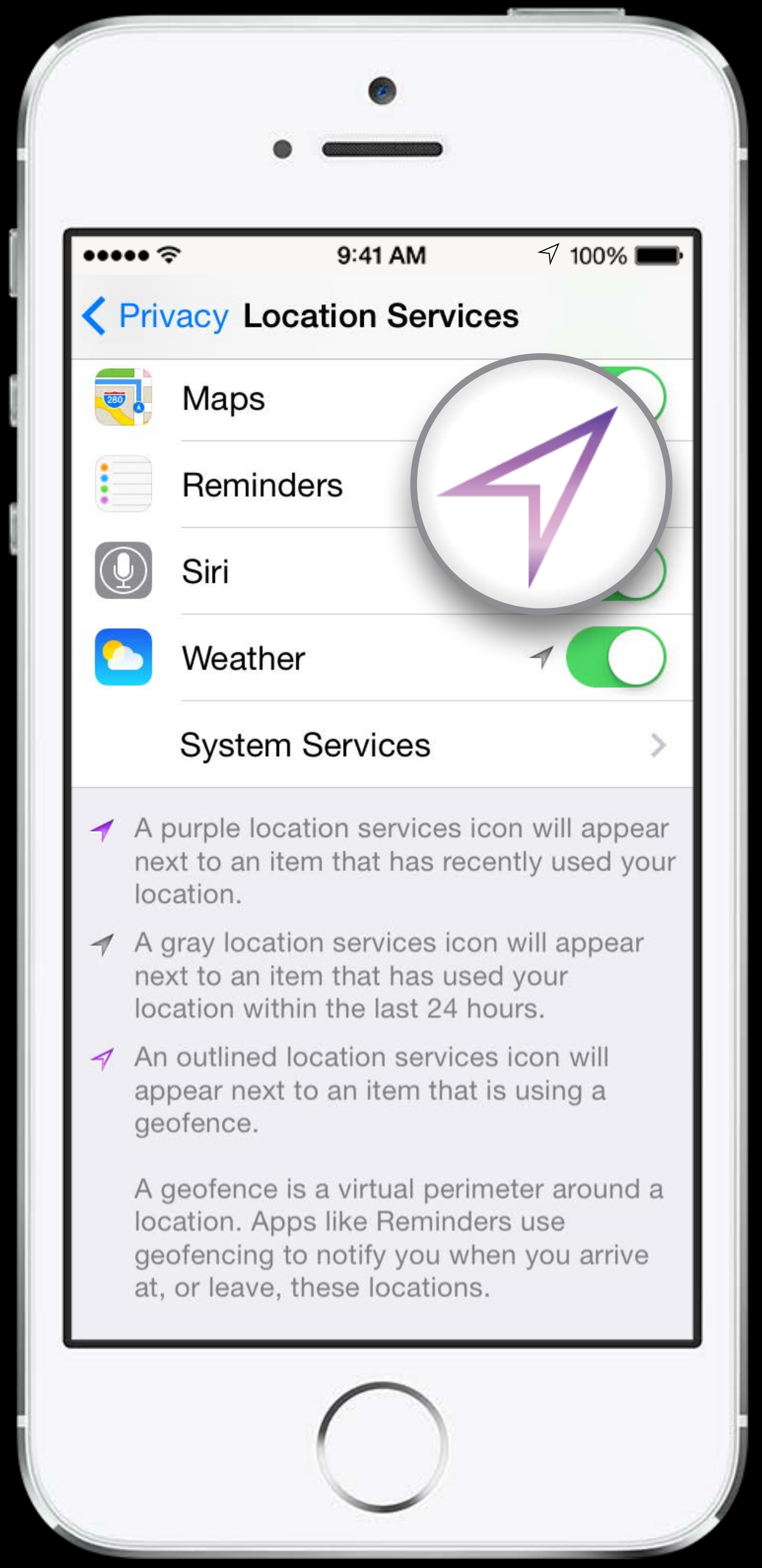
Location Services settings

Settings > Privacy > Location Services

- Global control
- Per app control
- Per app usage
    - Recent
    - Within last 24 hours
    - Region monitoring



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- System Services >

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Introduction

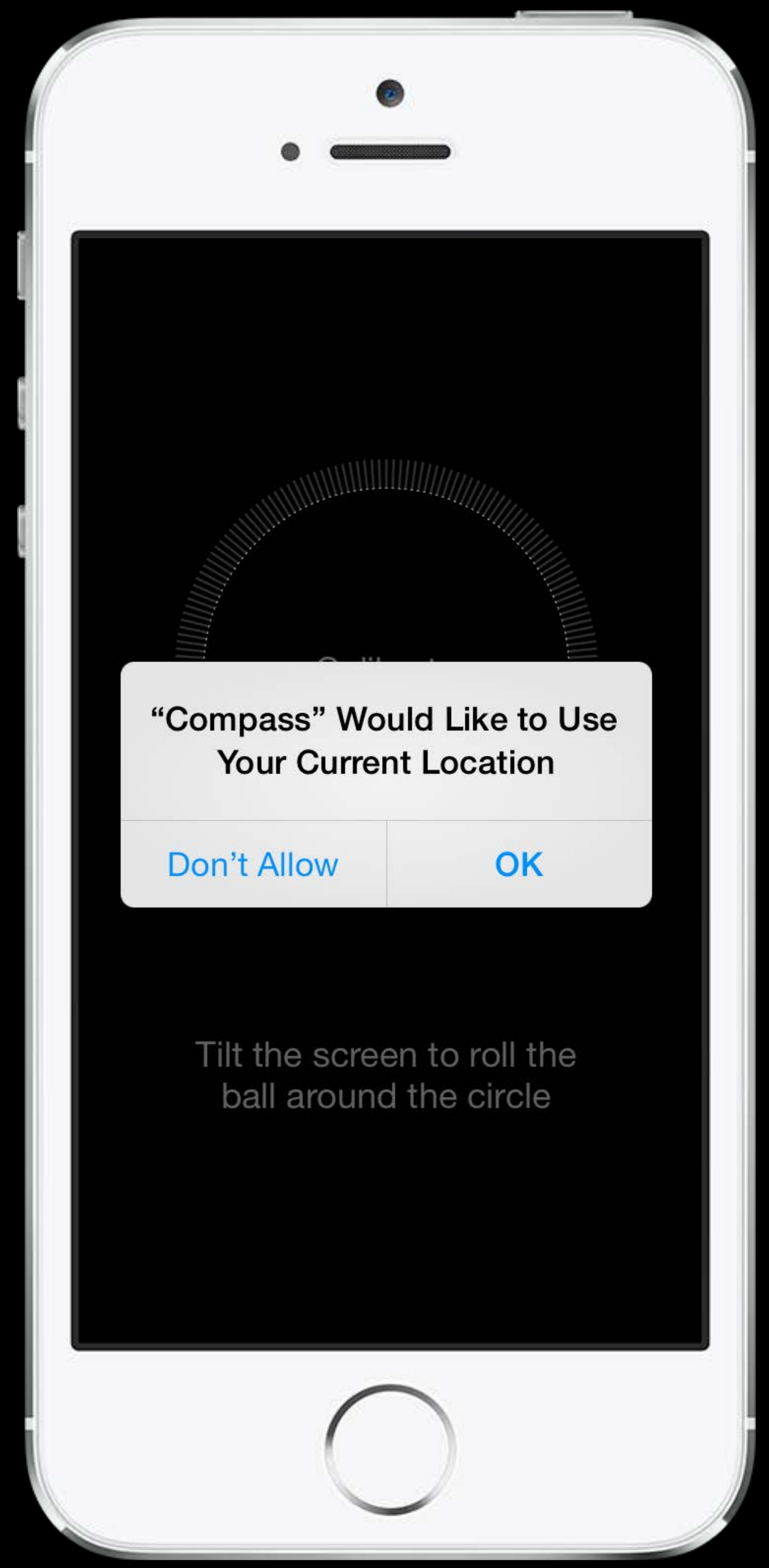
Location authorization

Introduction

Location authorization

Request for authorization

- For all location functionality



“Compass” Would Like to Use Your Current Location

Tilt the screen to roll the ball around the circle

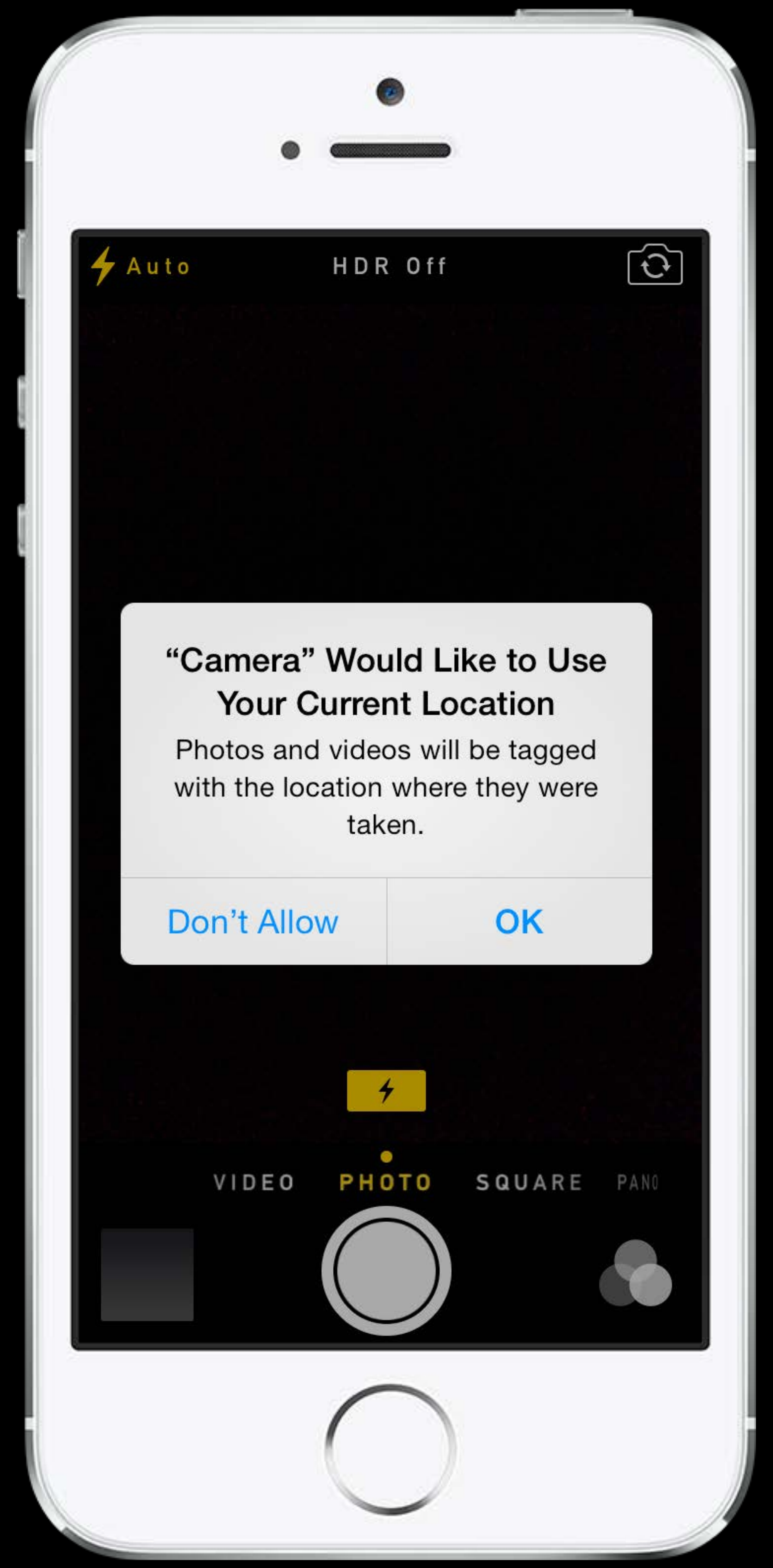
Introduction

Location authorization

Request for authorization

- For all location functionality

Text is customizable by the app



“Camera” Would Like to Use Your Current Location

Photos and videos will be tagged with the location where they were taken.

Location Authorization

Location Authorization

Authorization types

Location Authorization

Authorization types

Continuous Updates

- Location
- Background location
- Ranging

Location Authorization

Authorization types

Continuous Updates

- Location
- Background location
- Ranging

Location Monitoring

- Region monitoring
- Significant location changes

Location Authorization

Authorization types

Continuous Updates	Always
Location	✓
Background location	✓
Ranging	✓

Location Monitoring	
Region monitoring	✓
Significant location changes	✓

Location Authorization

Authorization types

Continuous Updates	Always	WhenInUse
Location	✓	✓
Background location	✓	✓
Ranging	✓	✓

Location Monitoring		
Region monitoring	✓	
Significant location changes	✓	

Location Authorization

Background location

Location Authorization

Background location

Continuous background location

- Specified statically by the app
- Started in the foreground
- Available with WhenInUse authorization

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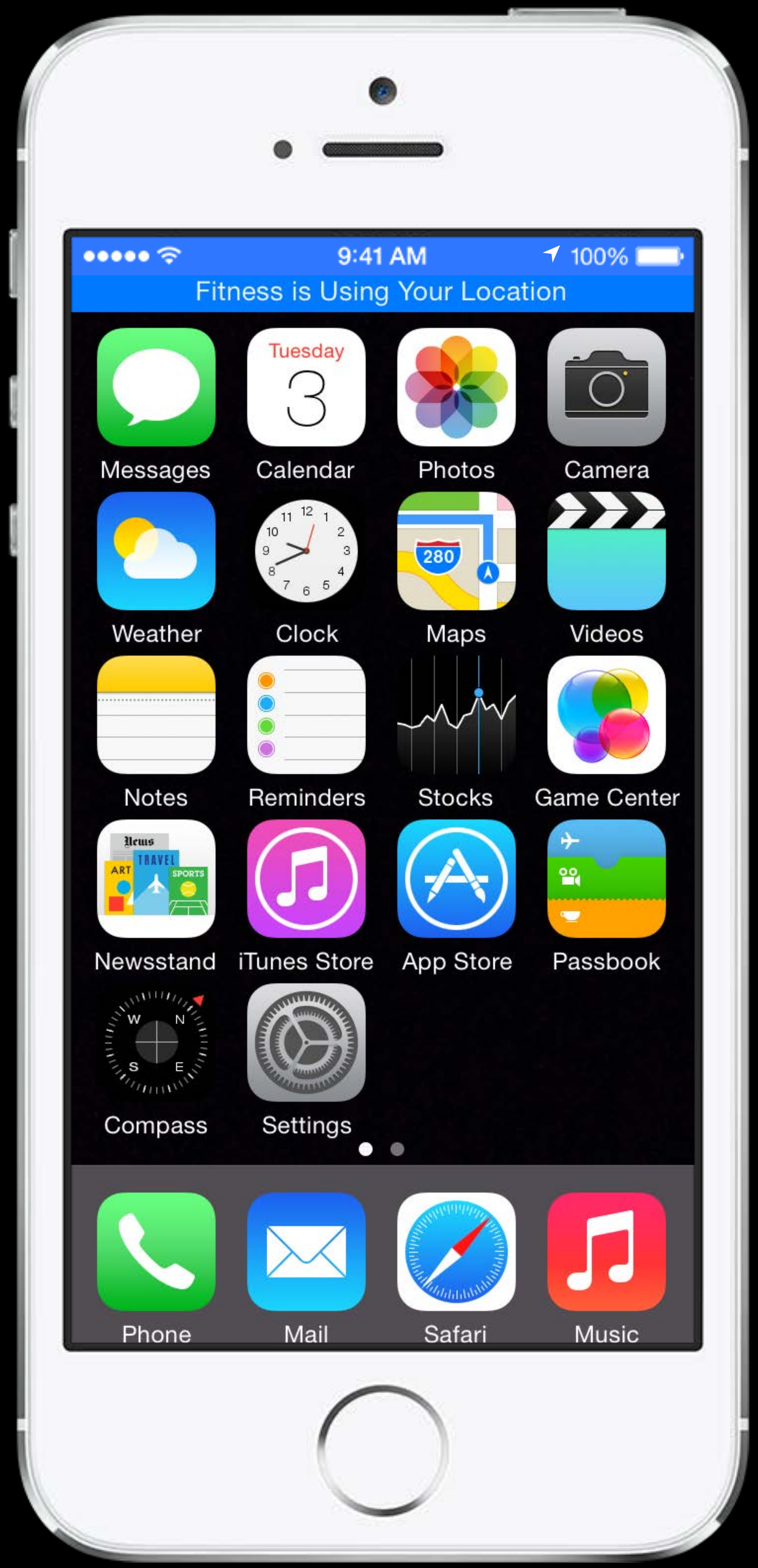


9:41 AM

100%

Fitness is Using Your Location

Location Authorization

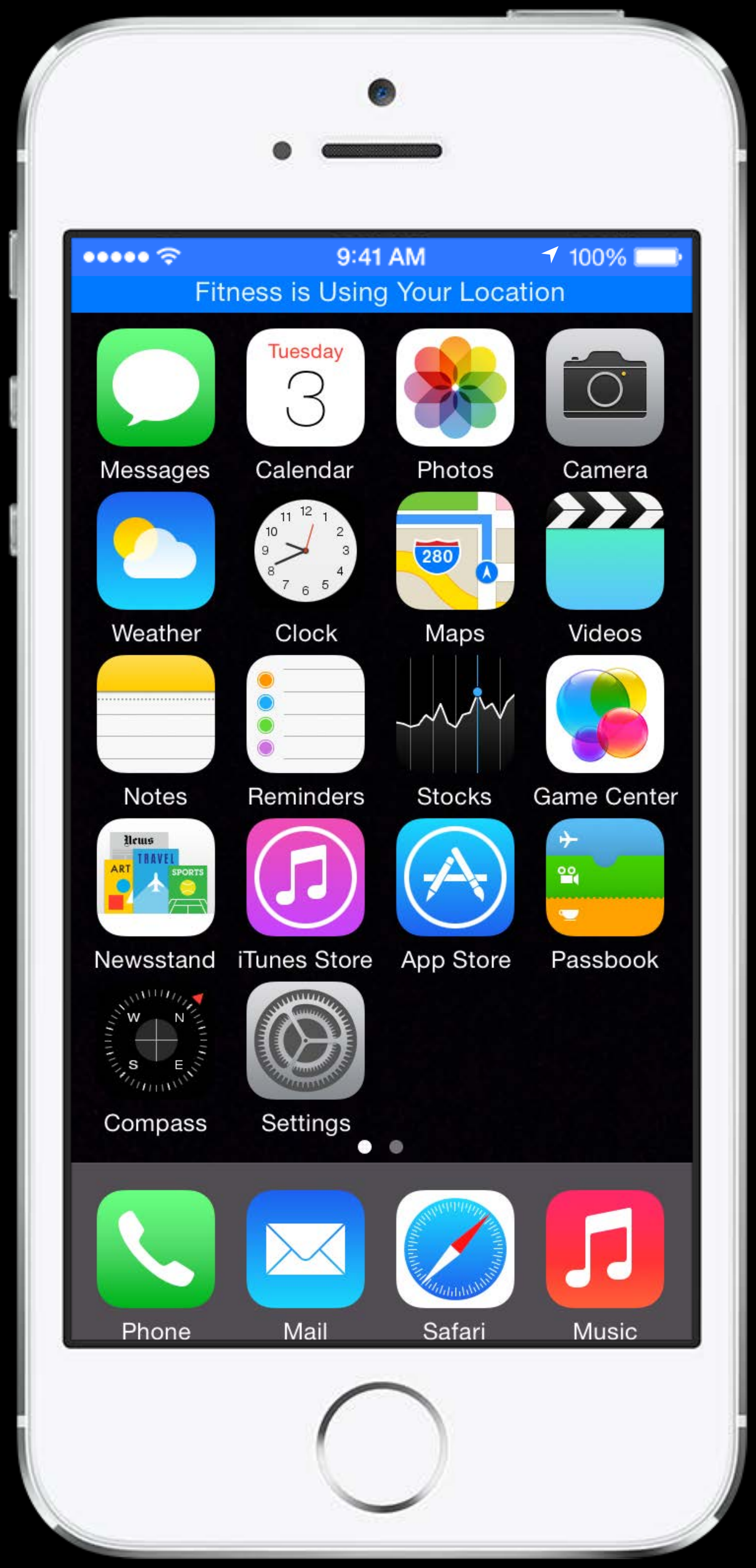
Background location

Continuous background location

- Specified statically by the app
- Started in the foreground
- Available with WhenInUse authorization

Location in the background

- Invoked from the background
  - For example, Background App Refresh
- Requires Always authorization



9:41 AM

100%

Fitness is Using Your Location

Location Authorization

Multitasking

Location Authorization

Multitasking

App switcher quit

- Stops continuous background location
- Does not stop location monitoring

Location Authorization

Multitasking

App switcher quit

- Stops continuous background location
- Does not stop location monitoring

Background App Refresh

- No longer disables location

Location Authorization

What the user sees

Location Authorization

Requesting authorization

Location Authorization

Requesting authorization

Apps explicitly request authorization

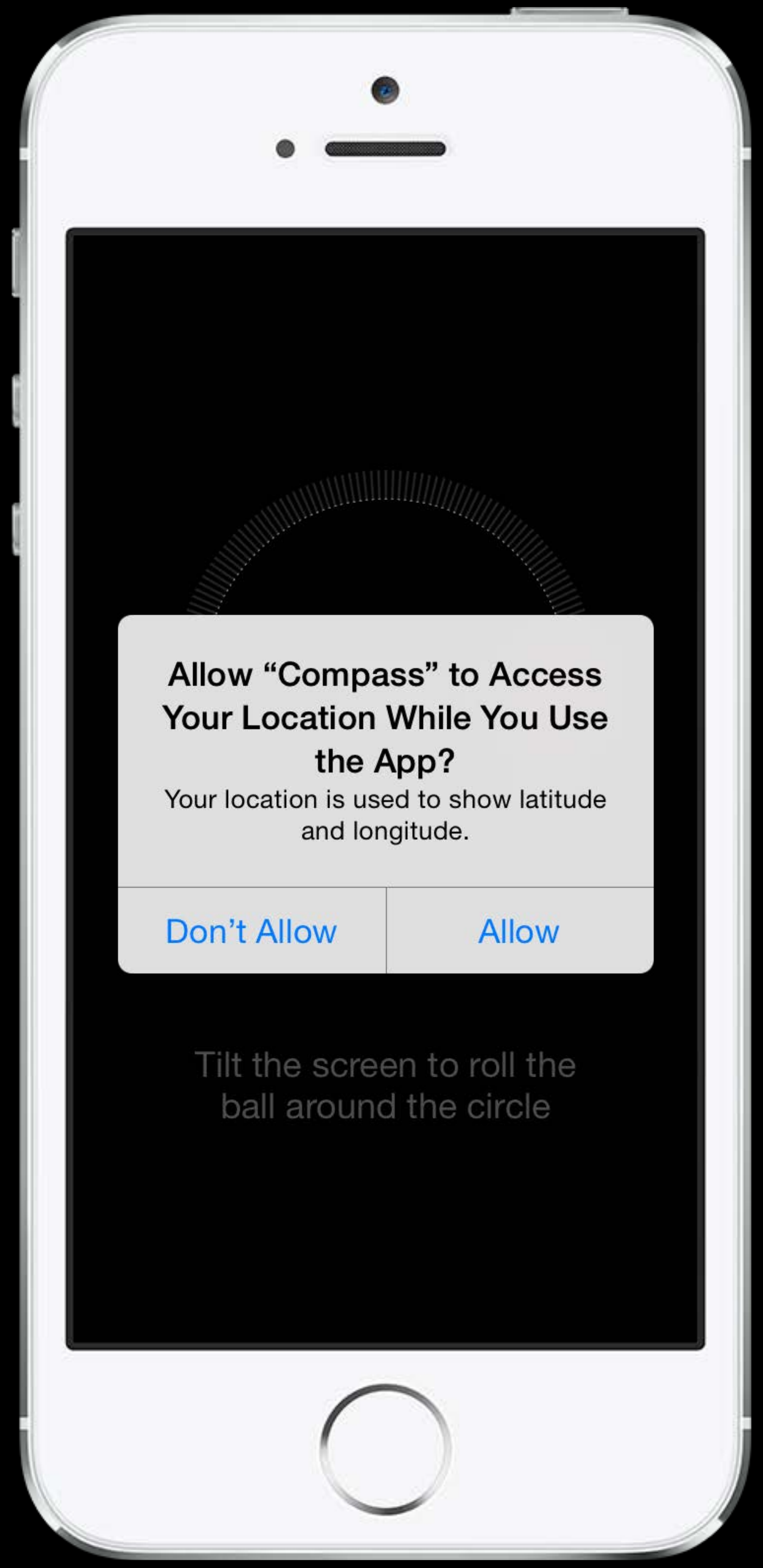
- For either WhenInUse or Always

Location Authorization

Requesting authorization

Apps explicitly request authorization

- For either WhenInUse or Always



Allow "Compass" to Access Your Location While You Use the App?

Your location is used to show latitude and longitude.

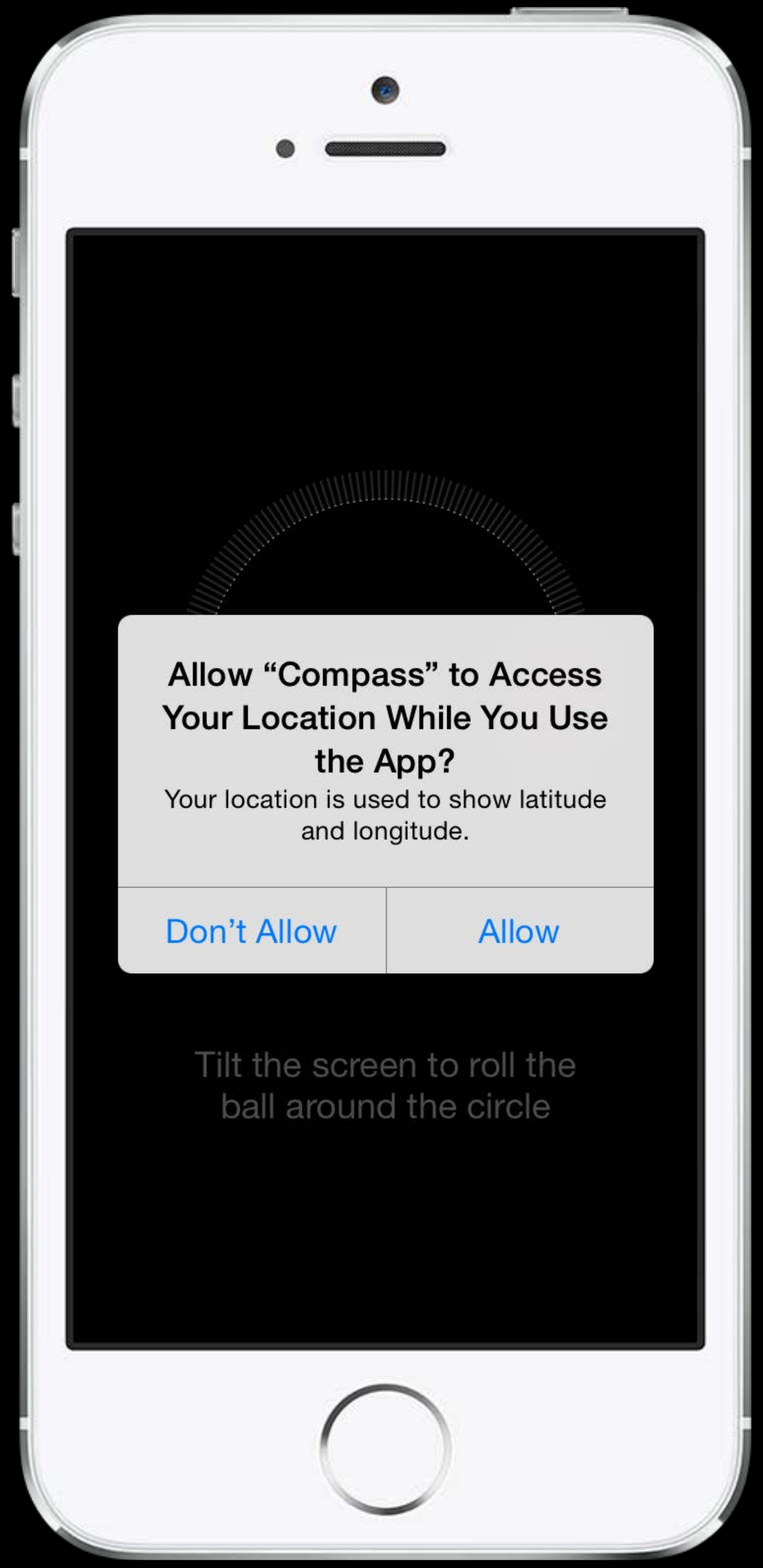
Location Authorization

Requesting authorization

Apps explicitly request authorization

- For either WhenInUse or Always

Dialog will only be presented once



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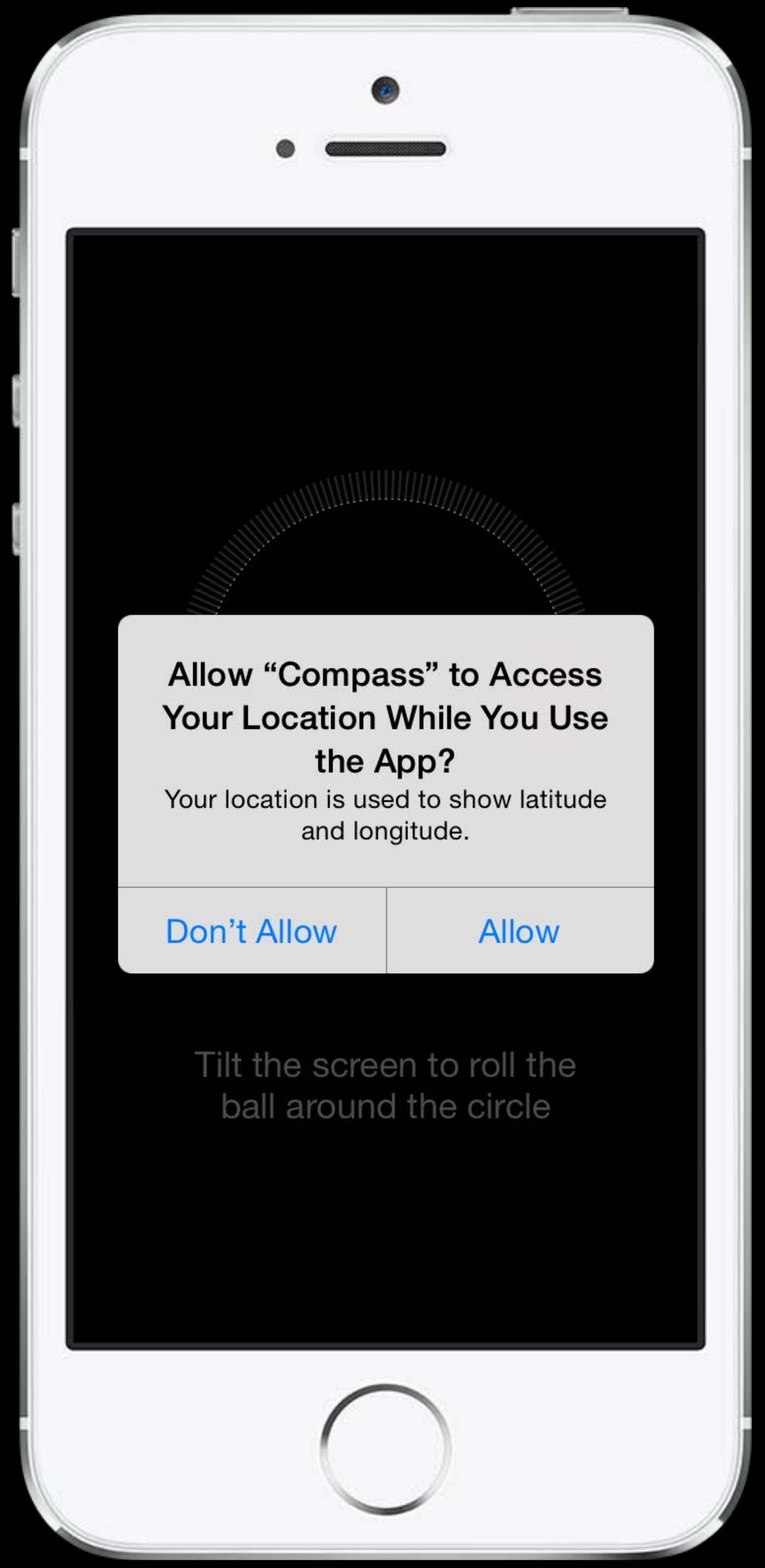

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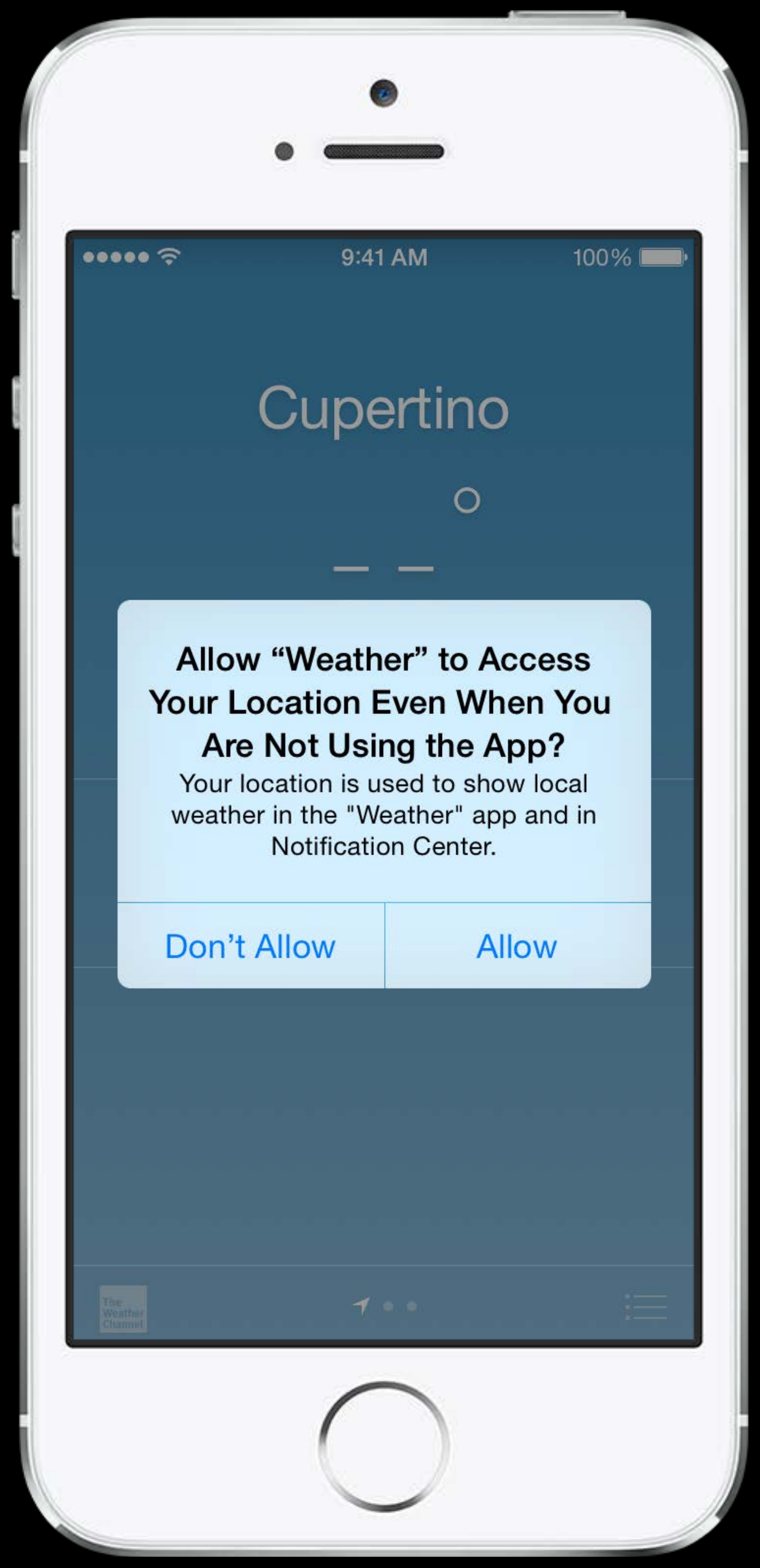


Allow “Weather” to Access Your Location Even When You Are Not Using the App?

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

Location Authorization

Always authorization

Location Authorization

Always authorization

User will be asked again a few days later

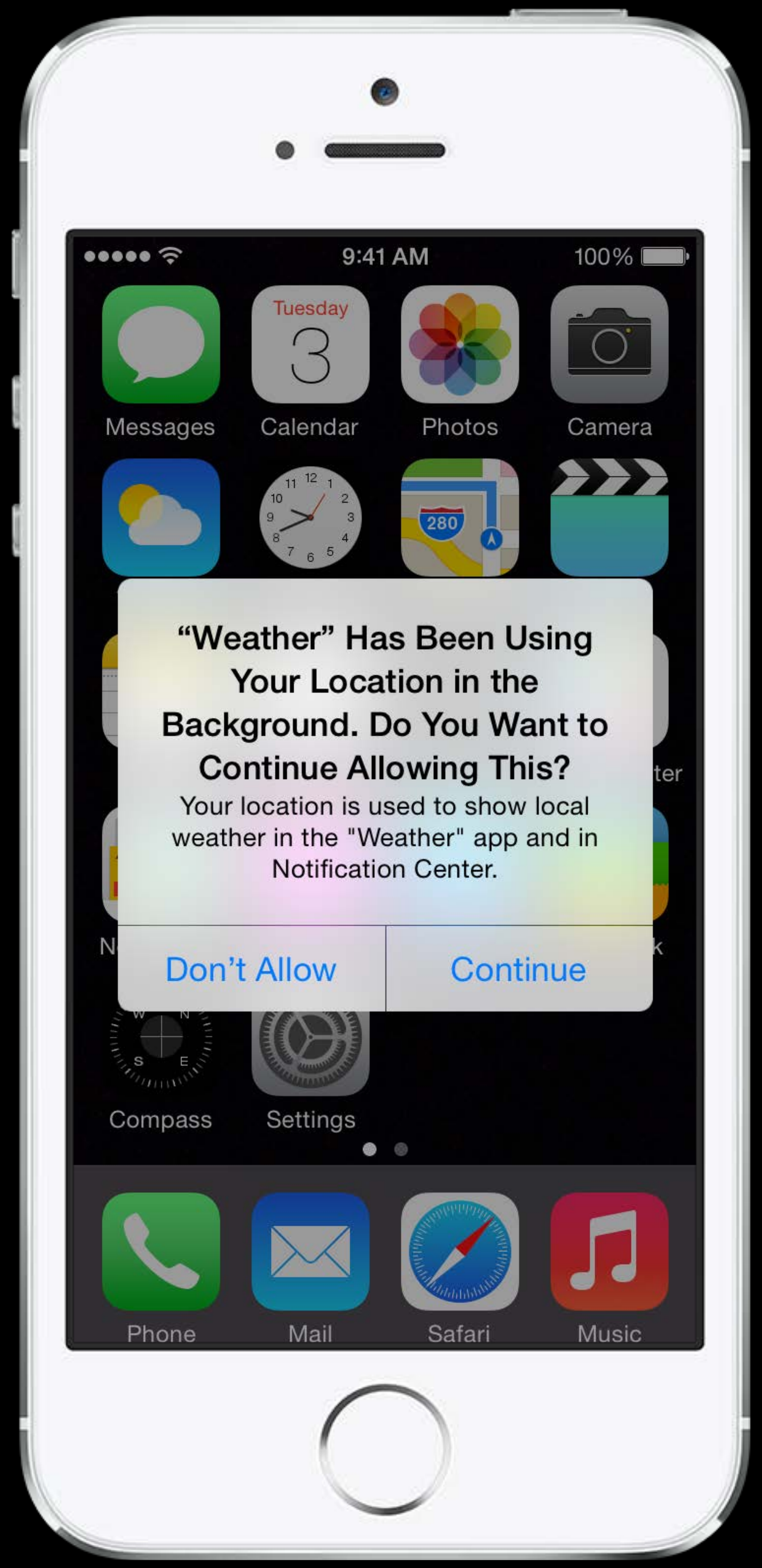
- Only if Always authorization exercised

Location Authorization

Always authorization

User will be asked again a few days later

- Only if Always authorization exercised



“Weather” Has Been Using Your Location in the Background. Do You Want to Continue Allowing This?

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

Location Authorization

Always authorization

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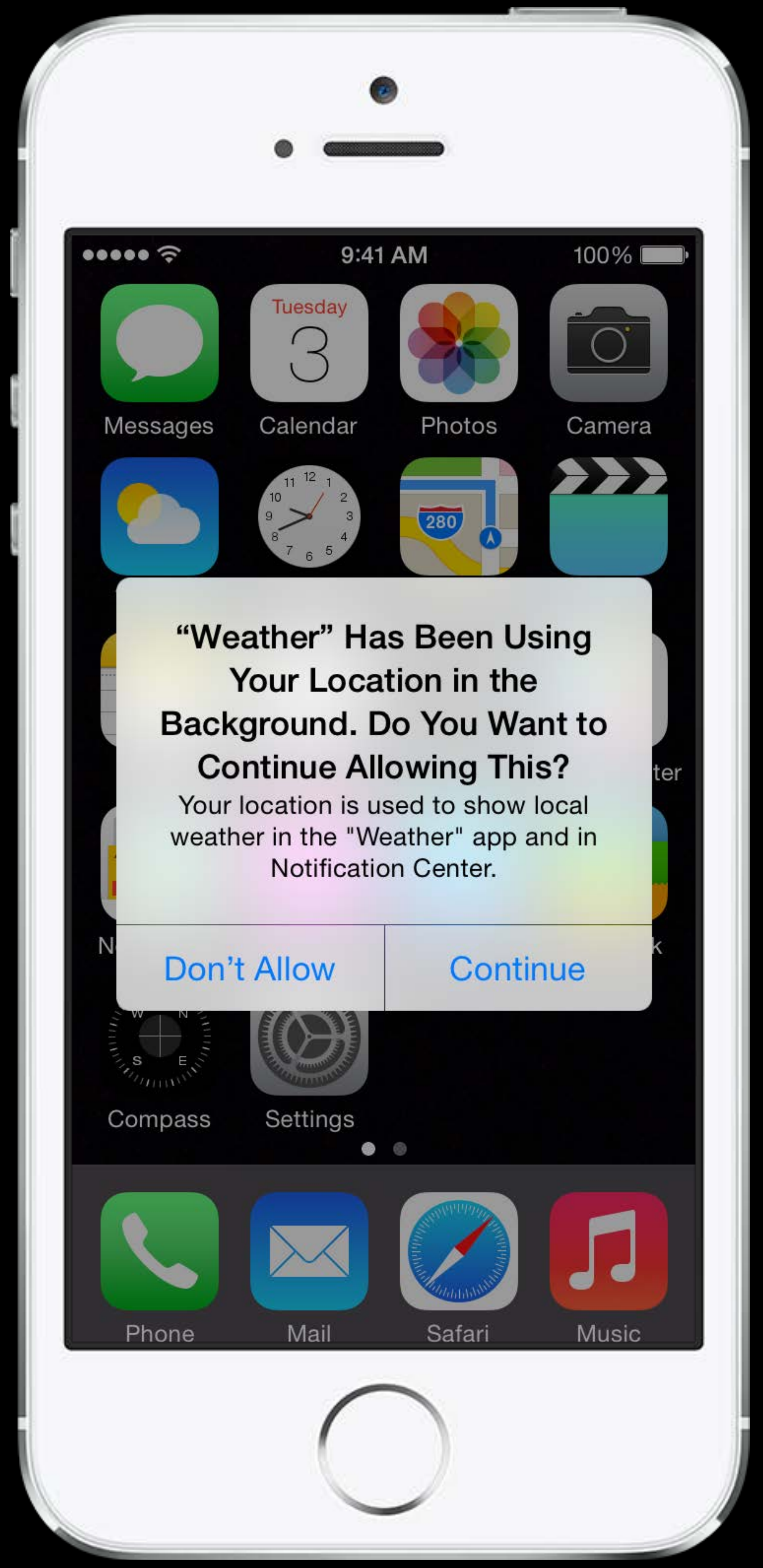

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Location Authorization

Location Services settings

Location Authorization

Location Services settings

Apps support WhenInUse and/or Always

- Specified statically by the app

Location Authorization

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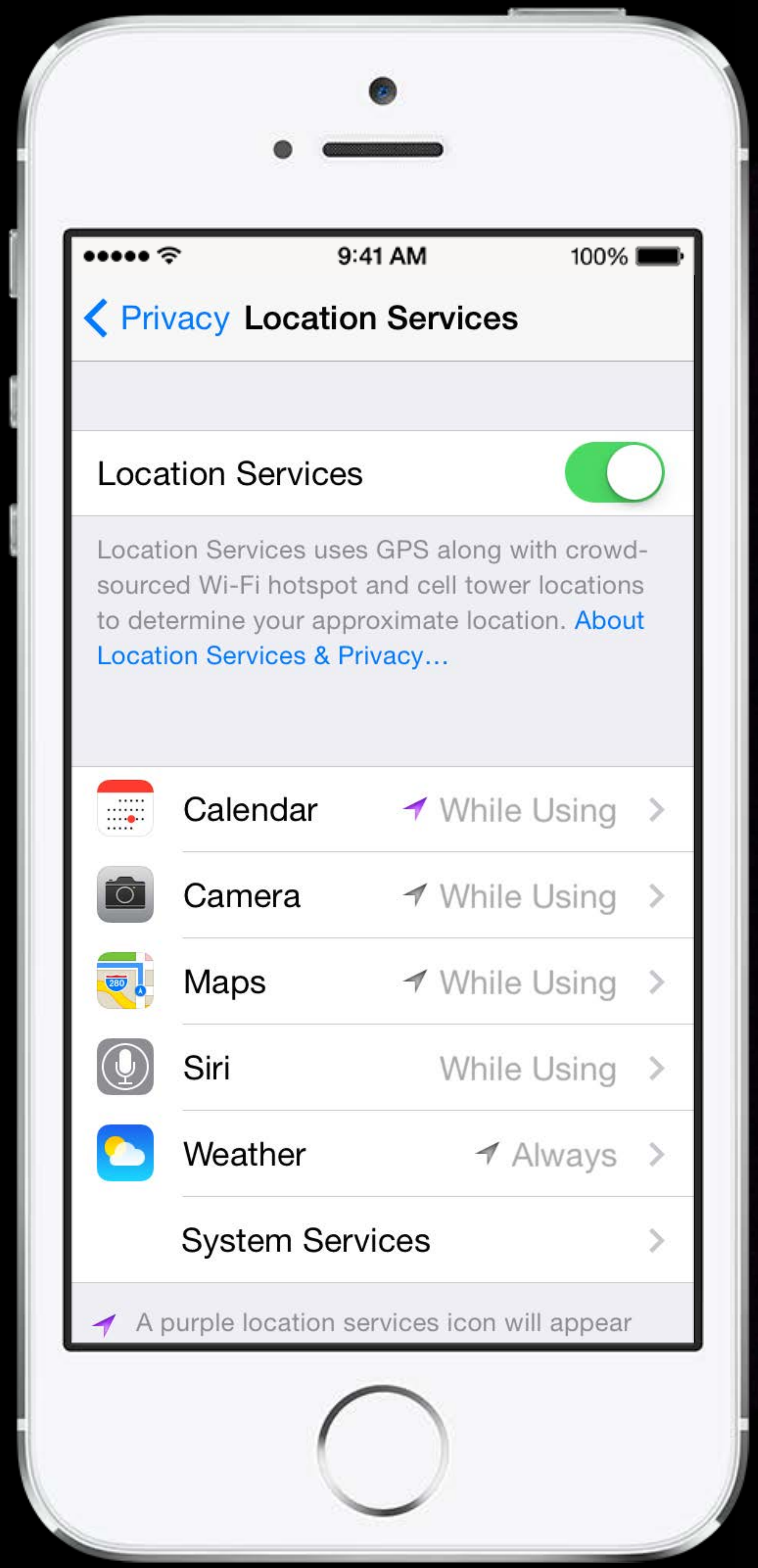

9:41 AM 100%

Privacy Location Services

Location Services

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

Calendar	While Using
Camera	While Using
Maps	While Using
Siri	While Using
Weather	Always
System Services	

A purple location services icon will appear

Location Authorization

Location Services settings

Apps support WhenInUse and/or Always

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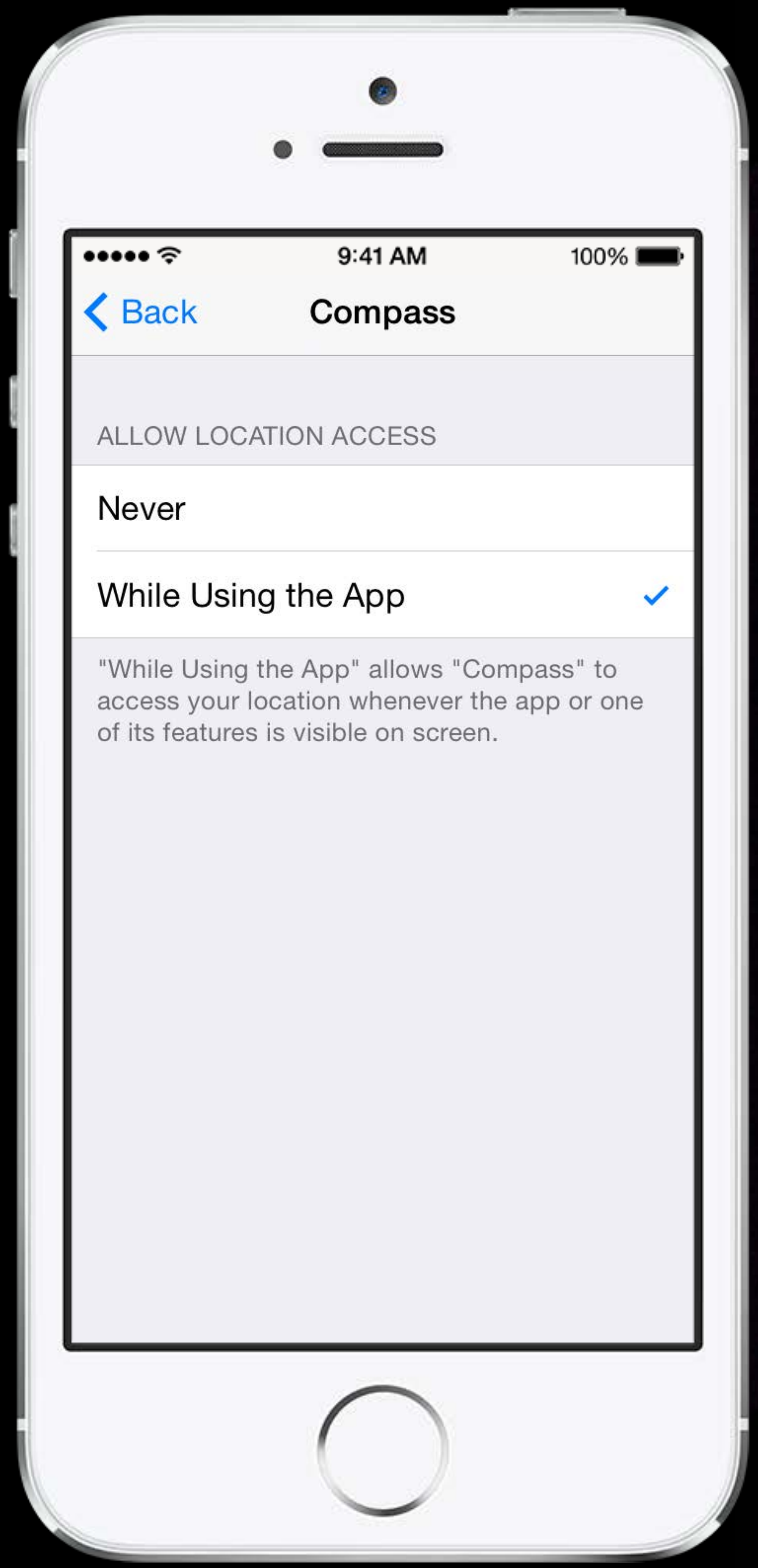


ALLOW LOCATION ACCESS

Never

While Using the App ✓

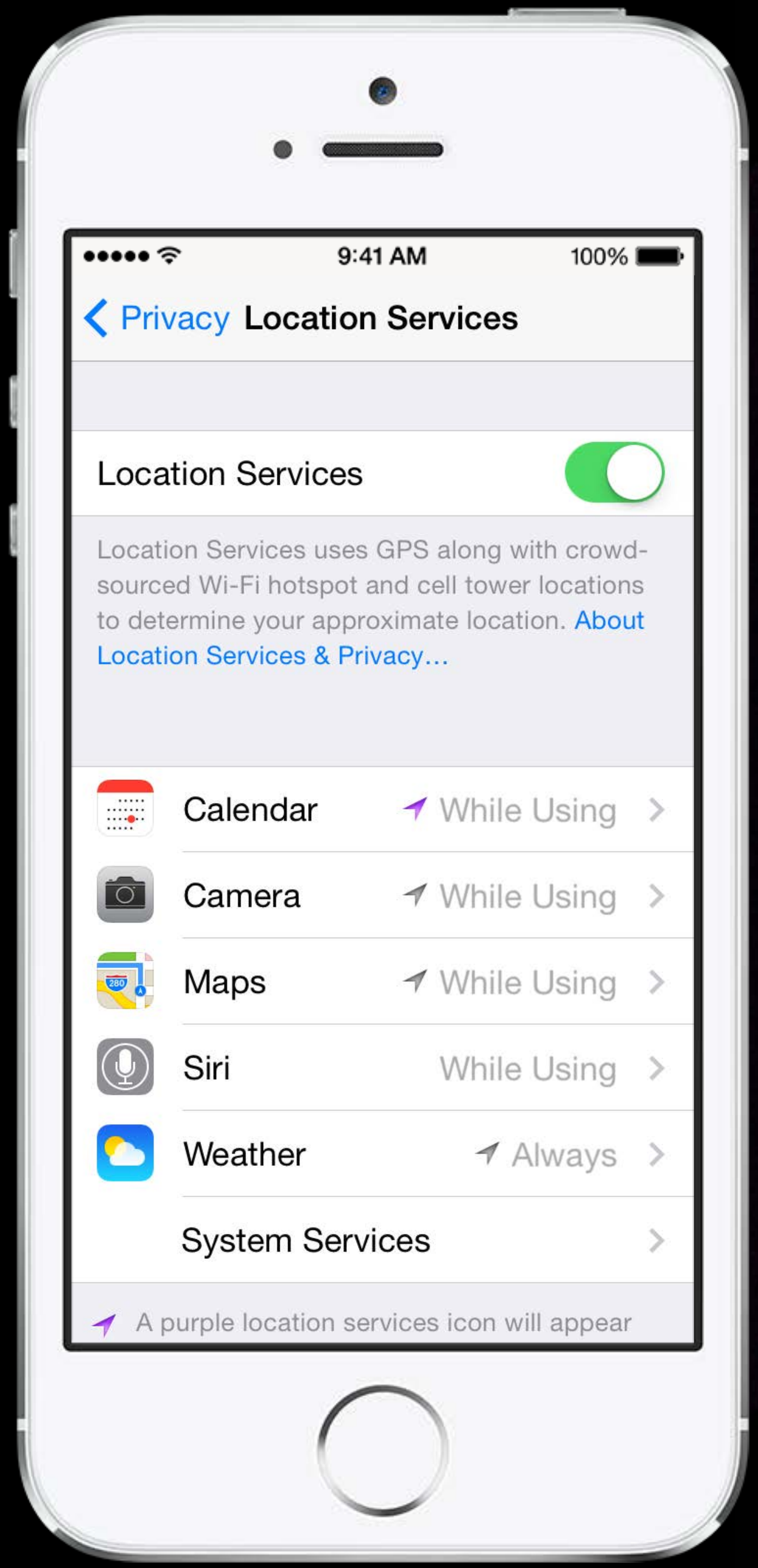
"While Using the App" allows "Compass" to access your location whenever the app or one of its features is visible on screen.

Location Authorization

Location Services settings

Apps support WhenInUse and/or Always

- Specified statically by the app



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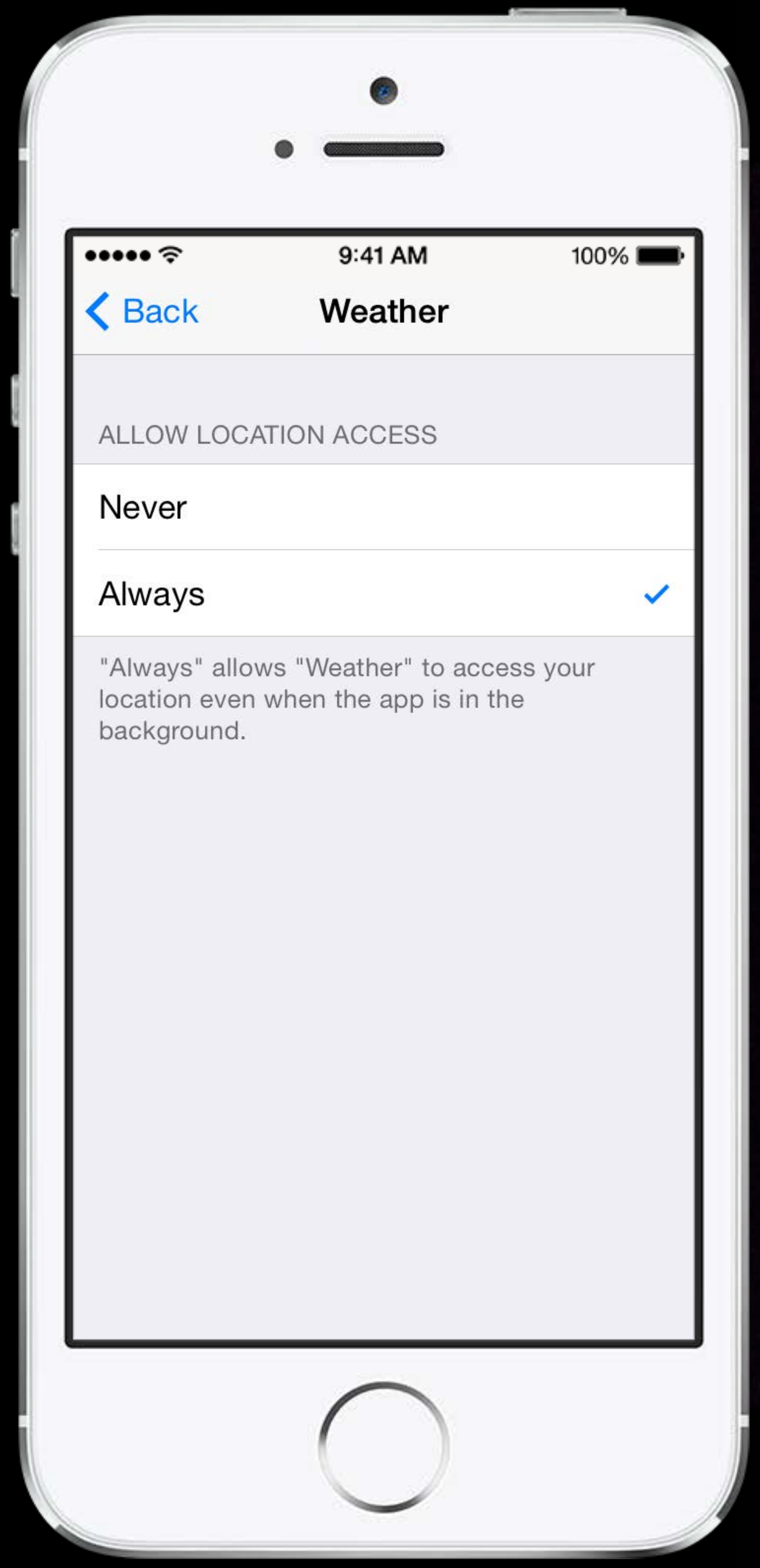

ALLOW LOCATION ACCESS

Never

Always ✓

"Always" allows "Weather" to access your location even when the app is in the background.

Location Authorization

App settings

Location Authorization

App settings

Now has link to Privacy

- Includes Location Services

Location Authorization

App settings

Now has link to Privacy

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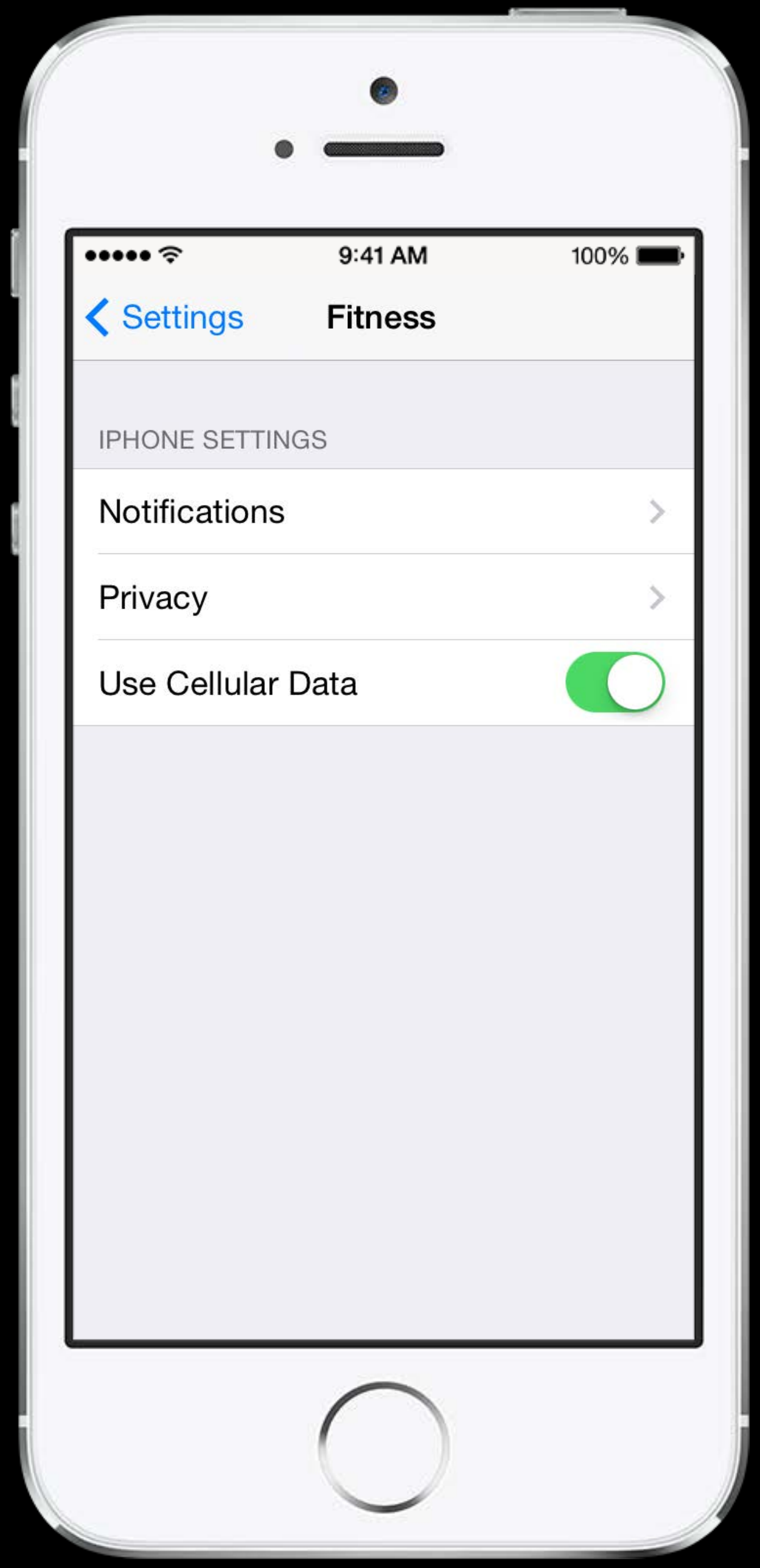


IPHONE SETTINGS

Notifications

Privacy

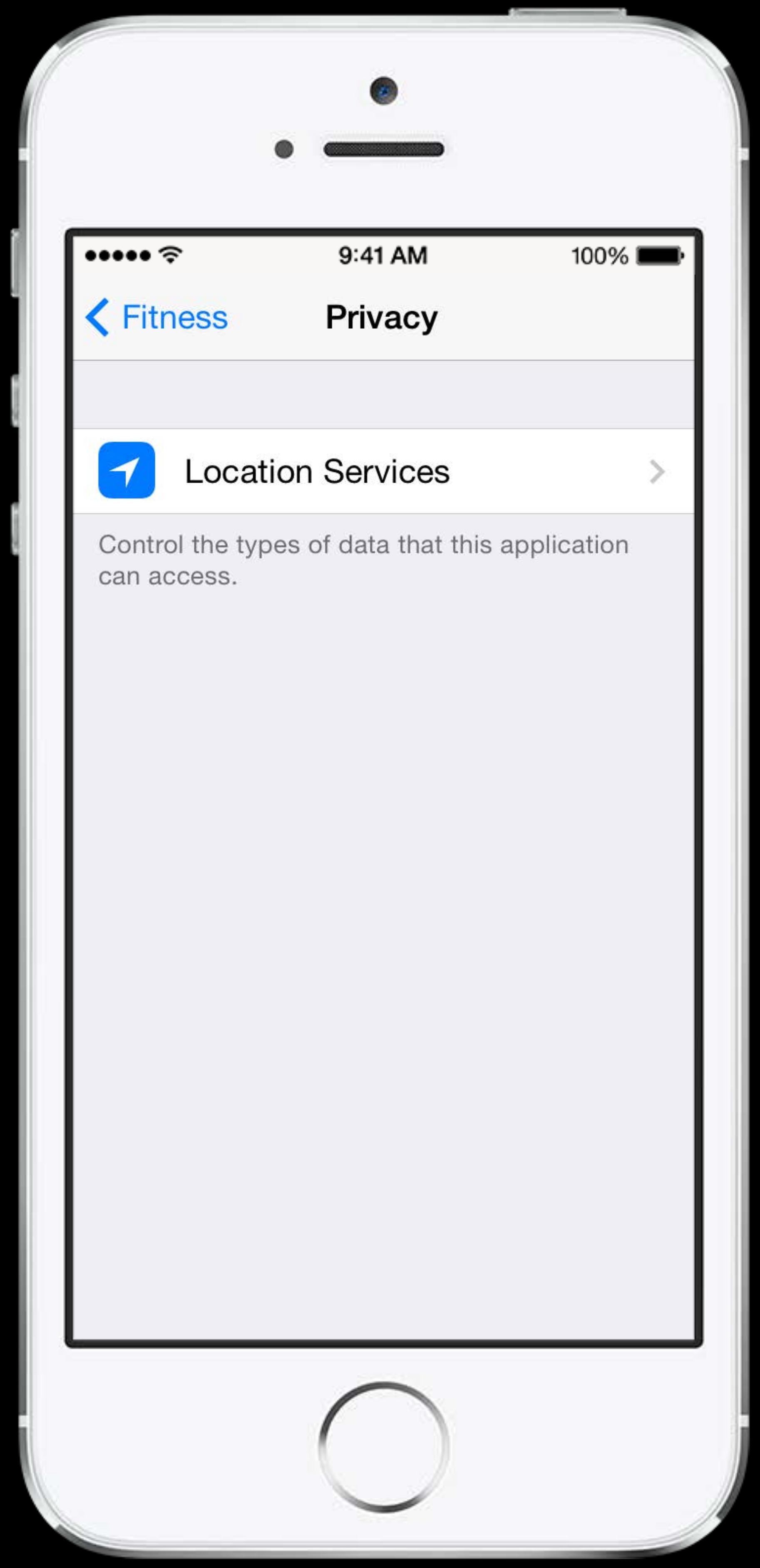
Use Cellular Data ●

Location Authorization

App settings

Now has link to Privacy

- Includes Location Services



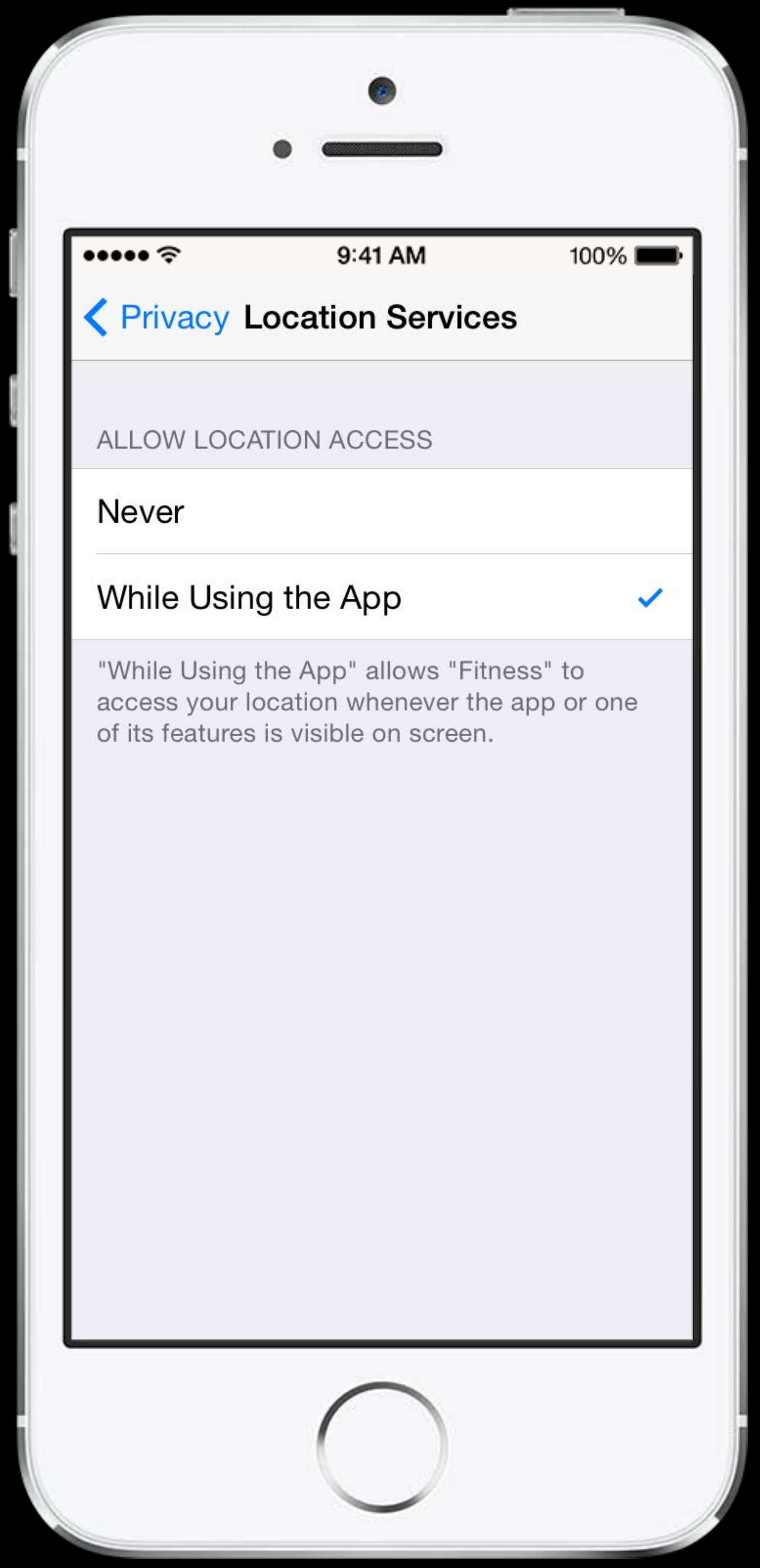
Control the types of data that this application can access.

Location Authorization

App settings

Now has link to Privacy

- Includes Location Services



ALLOW LOCATION ACCESS

Never

While Using the App ✓

"While Using the App" allows "Fitness" to access your location whenever the app or one of its features is visible on screen.

Location Authorization

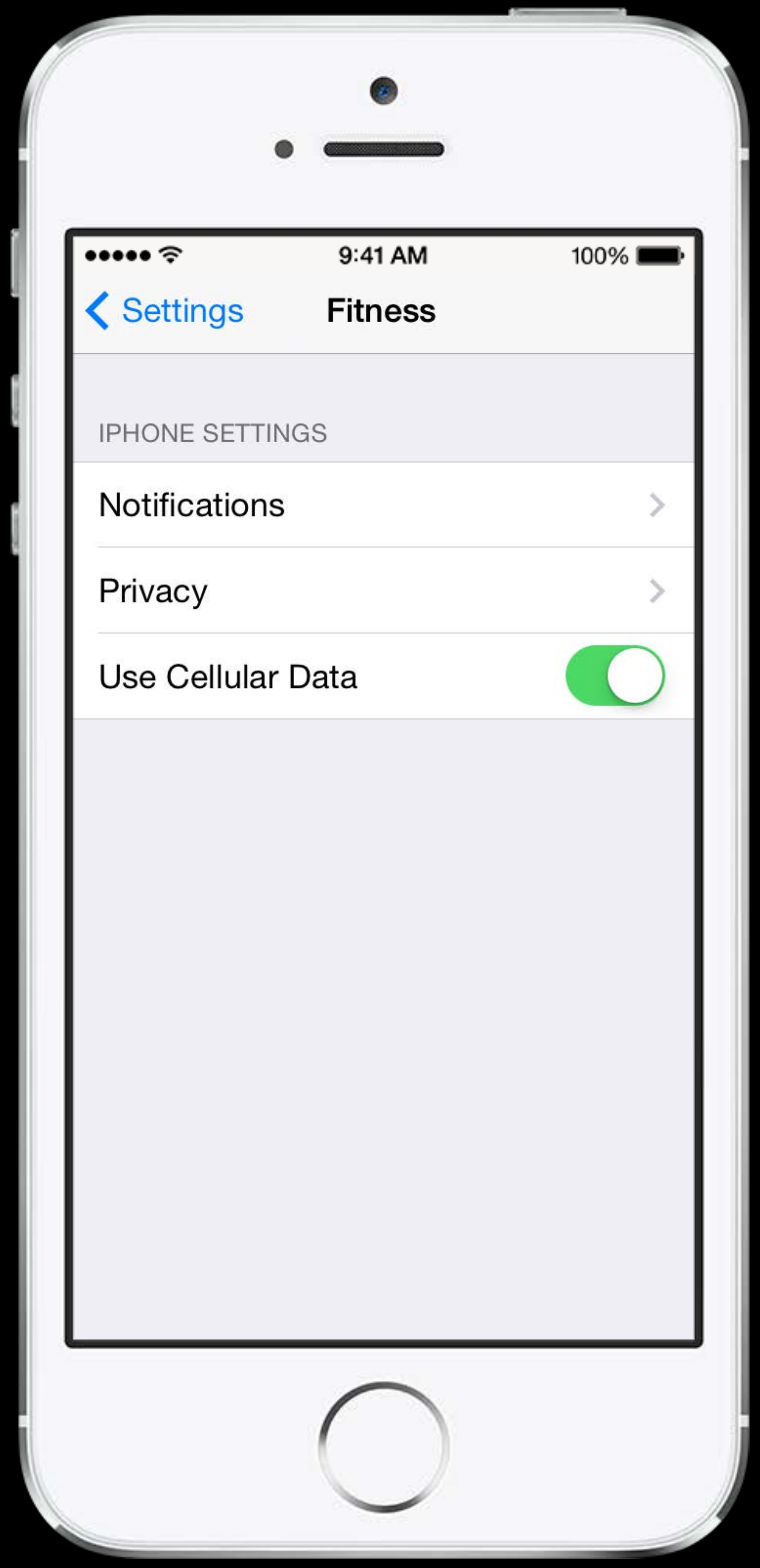
App settings

Now has link to Privacy

- Includes Location Services

Now able to open Settings directly for the app

```
[[UIApplication sharedApplication] openURL:
    [NSURL URLWithString:
    UIApplicationOpenSettingsURLString]];
```



IPHONE SETTINGS

Notifications

Privacy

Use Cellular Data

Location Authorization

Developer adoption

Location Authorization

Adoption

Location Authorization

Adoption

Info.plist keys

Location Authorization

Adoption

Info.plist keys

Authorization status enum values

Location Authorization

Adoption

Info.plist keys

Authorization status enum values

Authorization request APIs

Location Authorization

Adoption—Info.plist keys

Location Authorization

⊗

Adoption—Info.plist keys

`NSLocationUsageDescription`

Location Authorization

Adoption—Info.plist keys

```
NSLocationUsageDescription
NSLocationAlwaysUsageDescription
NSLocationWhenInUseUsageDescription
```

At least one is mandatory

Location Authorization

Adoption—Authorization status enum values

Location Authorization

Adoption—Authorization status enum values

```
CLAuthorizationStatus
    kCLAuthorizationStatusNotDetermined
    kCLAuthorizationStatusRestricted
    kCLAuthorizationStatusDenied
    kCLAuthorizationStatusAuthorized
```

Location Authorization

Adoption—Authorization status enum values

```
CLAuthorizationStatus
    kCLAuthorizationStatusNotDetermined
    kCLAuthorizationStatusRestricted
    kCLAuthorizationStatusDenied
    kCLAuthorizationStatusAuthorized
    kCLAuthorizationStatusAuthorizedAlways
    kCLAuthorizationStatusAuthorizedWhenInUse
```

Location Authorization

Adoption—Authorization request APIs

Location Authorization

Adoption—Authorization request APIs

```
- (void)requestAlwaysAuthorization;
```

Location Authorization

Adoption—Authorization request APIs

```
- (void)requestAlwaysAuthorization;
- (void)requestWhenInUseAuthorization;
```

Location Authorization

Adoption recap

Location Authorization

Adoption recap

Decide which authorization

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?
- Is it mandatory or nice to have?

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?
- Is it mandatory or nice to have?

Add the keys to your Info.plist

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?
- Is it mandatory or nice to have?

Add the keys to your Info.plist

- Explain how your app uses location

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?
- Is it mandatory or nice to have?

Add the keys to your Info.plist

- Explain how your app uses location

Make the right API call

Location Authorization

Adoption recap

Decide which authorization

- What location functionality does your app use?
- Is it mandatory or nice to have?

Add the keys to your Info.plist

- Explain how your app uses location

Make the right API call

- Do it when needed

Location Authorization

Example—Fitness app

Location Authorization

Example—Fitness app

Determine how location is used

Location Authorization

Example—Fitness app

Determine how location is used

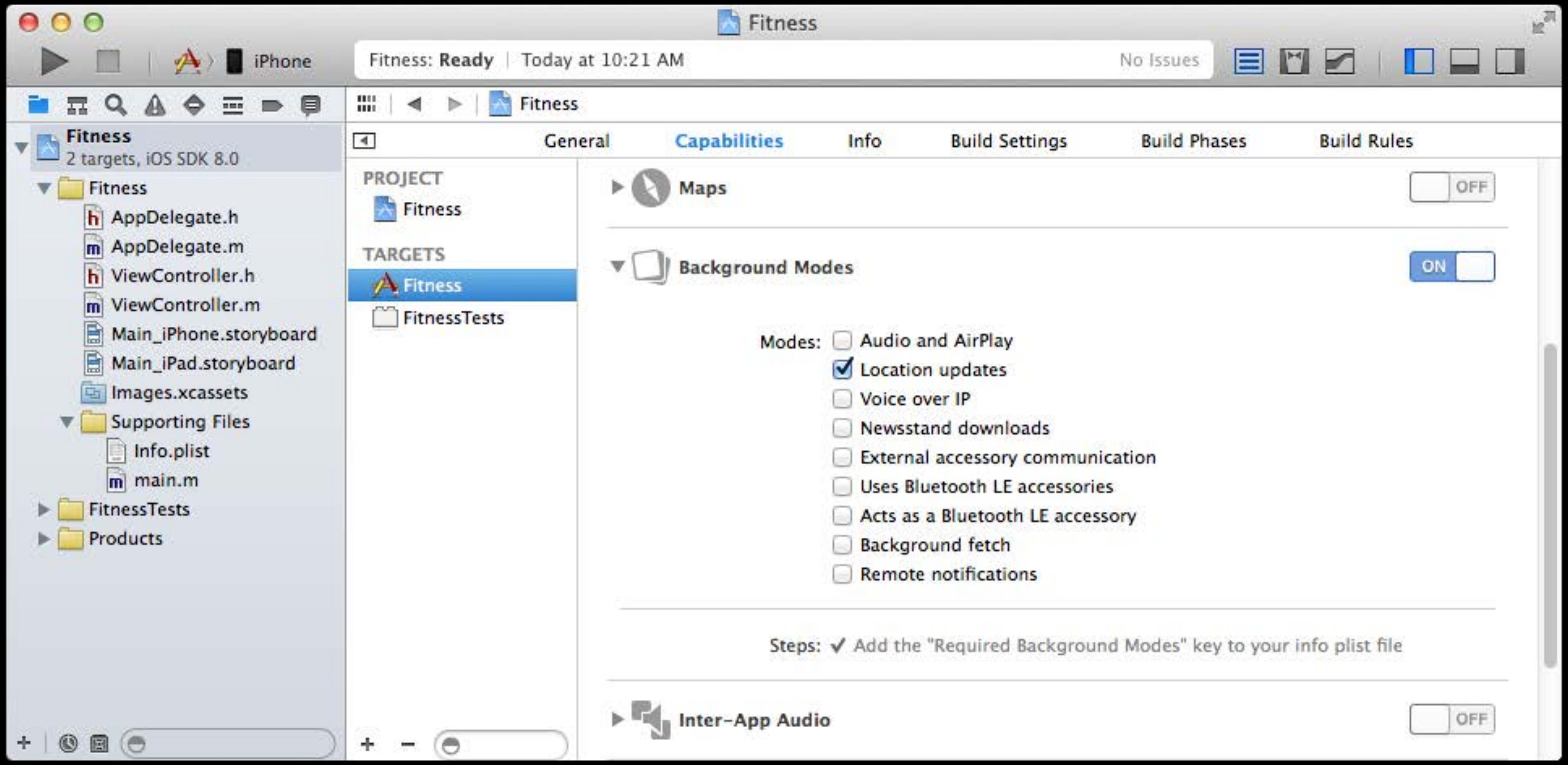
- Location
- Background location

Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location



Maps OFF

Background Modes ON

Modes:
- □ Audio and AirPlay
- ☑ Location updates
- □ Voice over IP
- □ Newsstand downloads
- □ External accessory communication
- □ Uses Bluetooth LE accessories
- □ Acts as a Bluetooth LE accessory
- □ Background fetch
- □ Remote notifications

Steps: ✓ Add the "Required Background Modes" key to your info plist file

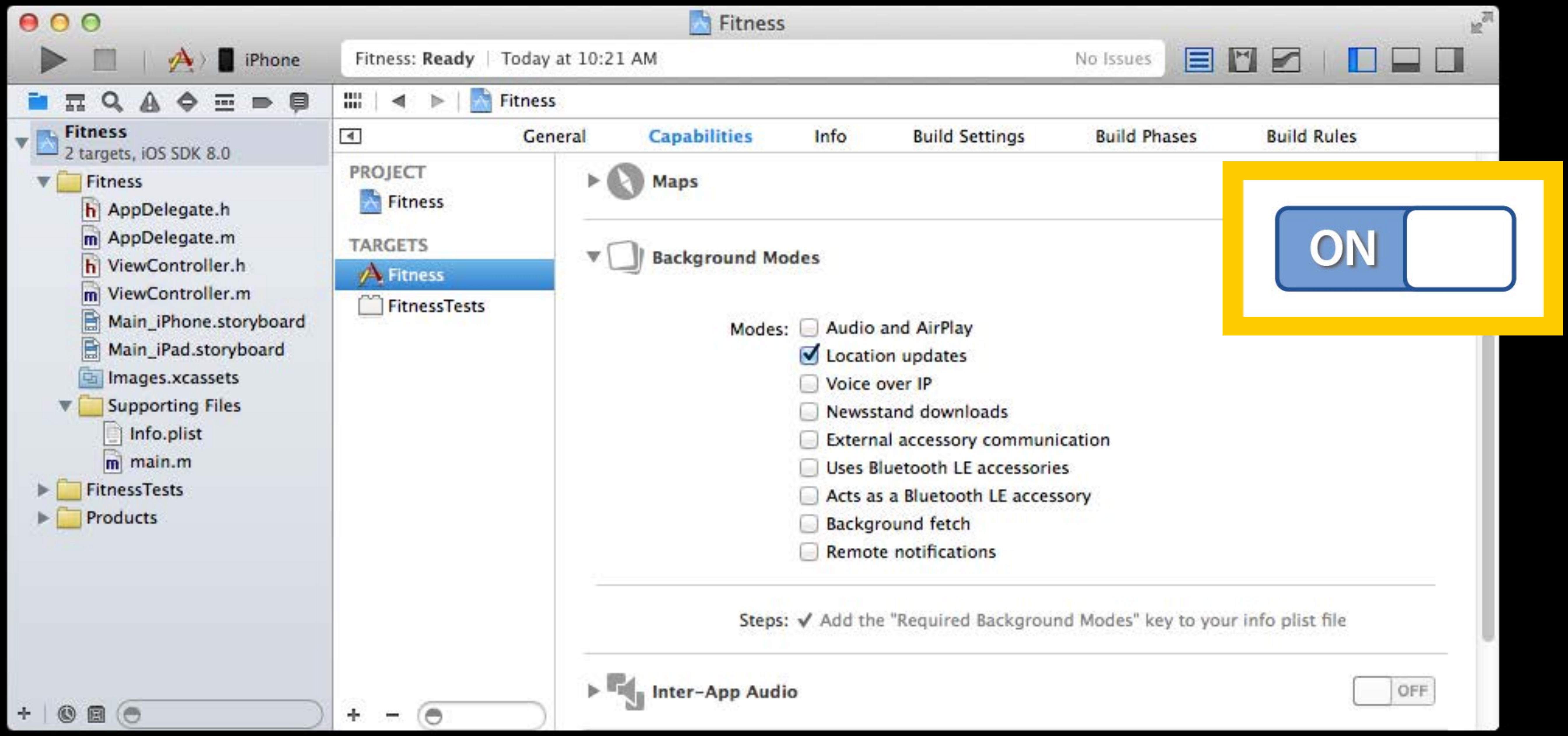
Inter-App Audio OFF

Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location



Background Modes: ON

Modes:
- □ Audio and AirPlay
- ☑ Location updates
- □ Voice over IP
- □ Newsstand downloads
- □ External accessory communication
- □ Uses Bluetooth LE accessories
- □ Acts as a Bluetooth LE accessory
- □ Background fetch
- □ Remote notifications

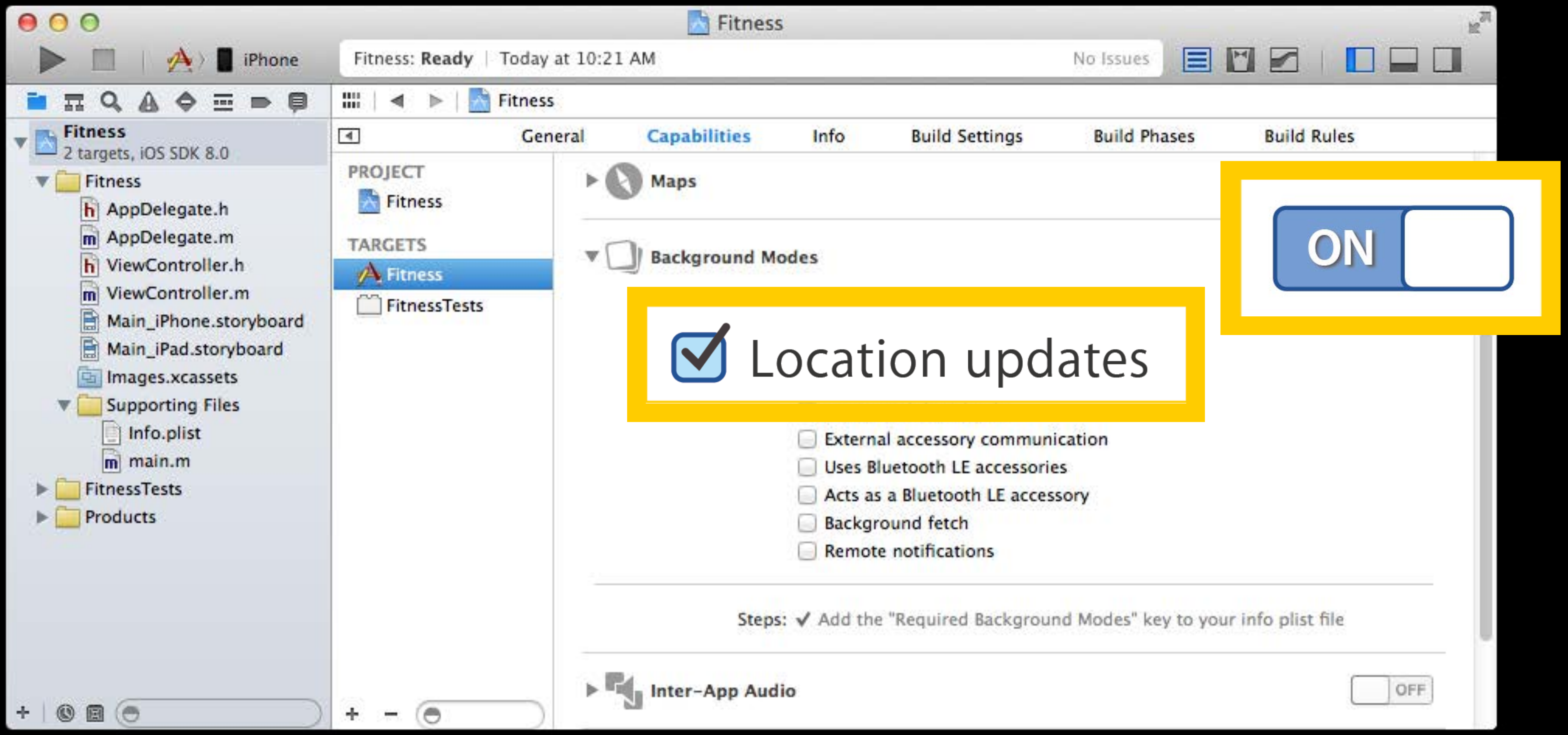
Steps: ✓ Add the "Required Background Modes" key to your info plist file

Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location



Background Modes ON

☑ Location updates

□ External accessory communication

□ Uses Bluetooth LE accessories

□ Acts as a Bluetooth LE accessory

□ Background fetch

□ Remote notifications

Steps: ✓ Add the "Required Background Modes" key to your info plist file

Inter-App Audio OFF

Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location

Add the key to the app's information property list

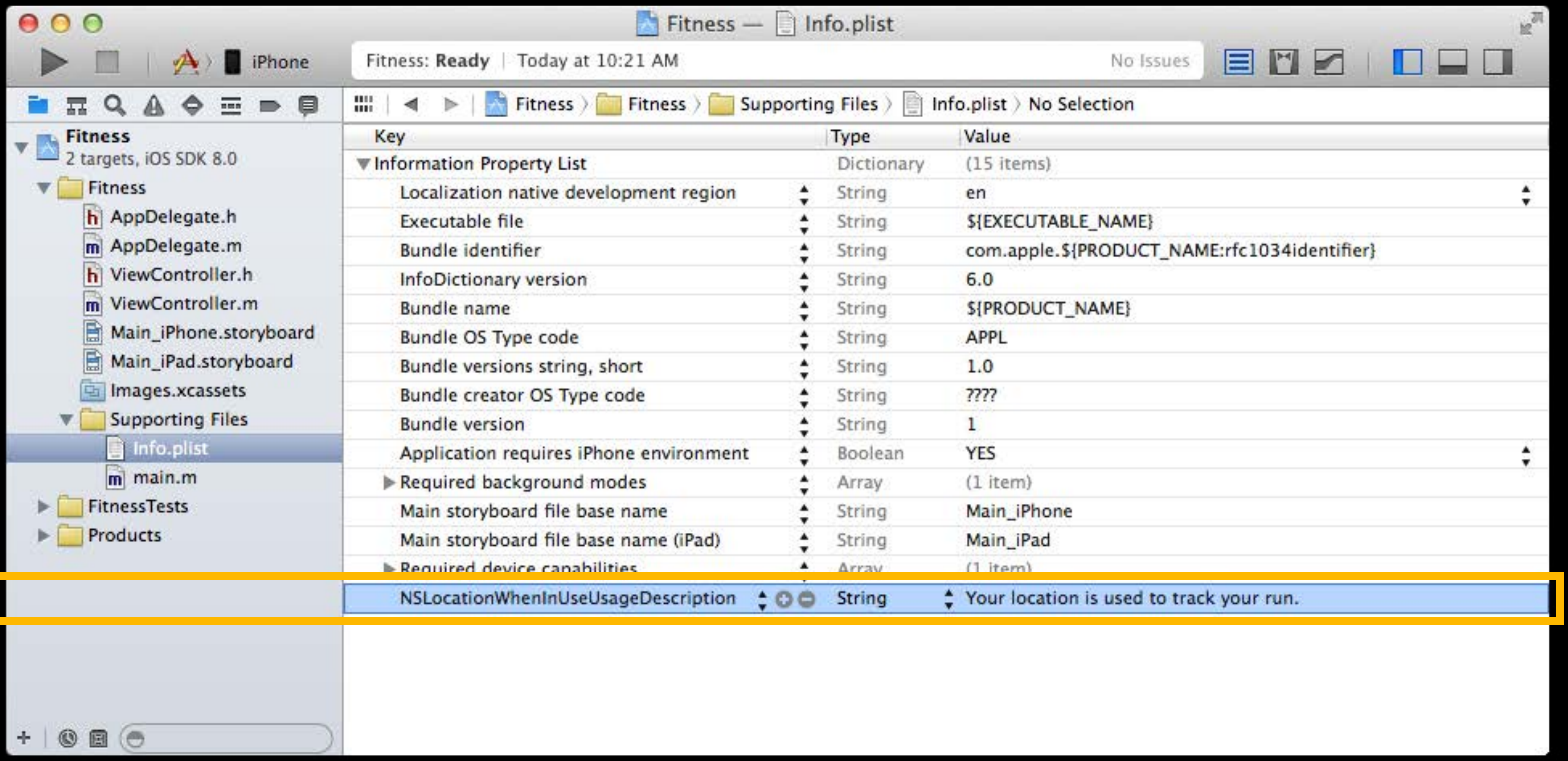
Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location

Add the key to the app’s information property list



Key	Type	Value
▼Information Property List	Dictionary	(15 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
▶Required background modes	Array	(1 item)
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
▶Required device capabilities	Array	(1 item)
NSLocationWhenInUseUsageDescription	String	Your location is used to track your run.

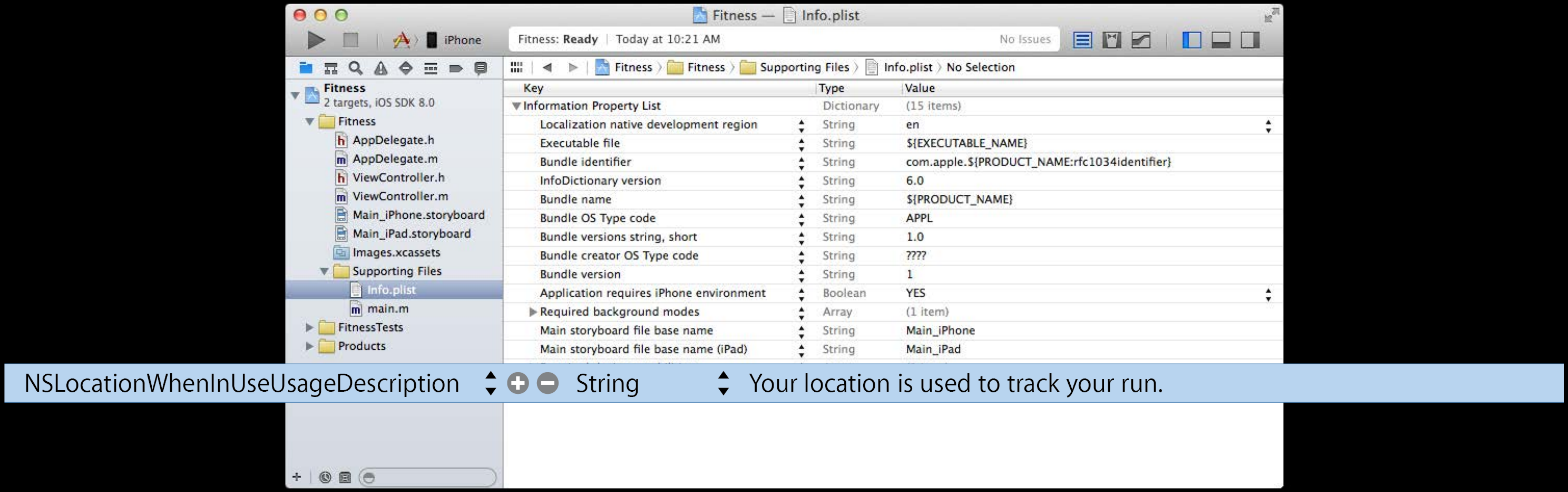
Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location

Add the key to the app's information property list



Key	Type	Value
▼Information Property List	Dictionary	(15 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
▶Required background modes	Array	(1 item)
Main storyboard file base name	String	Main_iPhone
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Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location

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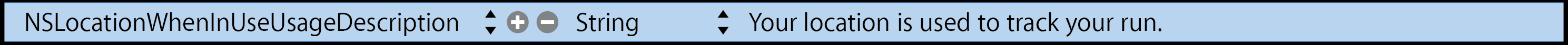


NSLocationWhenInUseUsageDescription ⬍ ⊕ ⊖ String ⬍ Your location is used to track your run.

Make the corresponding authorization request API call

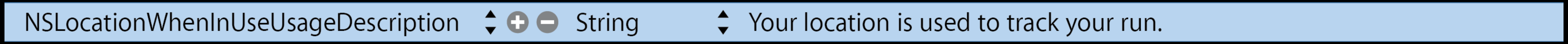
Location Authorization

Example—Fitness app

Determine how location is used

- Location
- Background location

Add the key to the app's information property list



NSLocationWhenInUseUsageDescription | String | Your location is used to track your run.

Make the corresponding authorization request API call

```
CLLocationManager *locationManager = [[CLLocationManager alloc] init];
locationManager.delegate = self;
[locationManager requestWhenInUseAuthorization];
[locationManager startUpdatingLocation];
```

Location Authorization

Example—WelcomeHome app

Location Authorization

Example—WelcomeHome app

Determine how location is used

Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Add the key to the app’s information property list

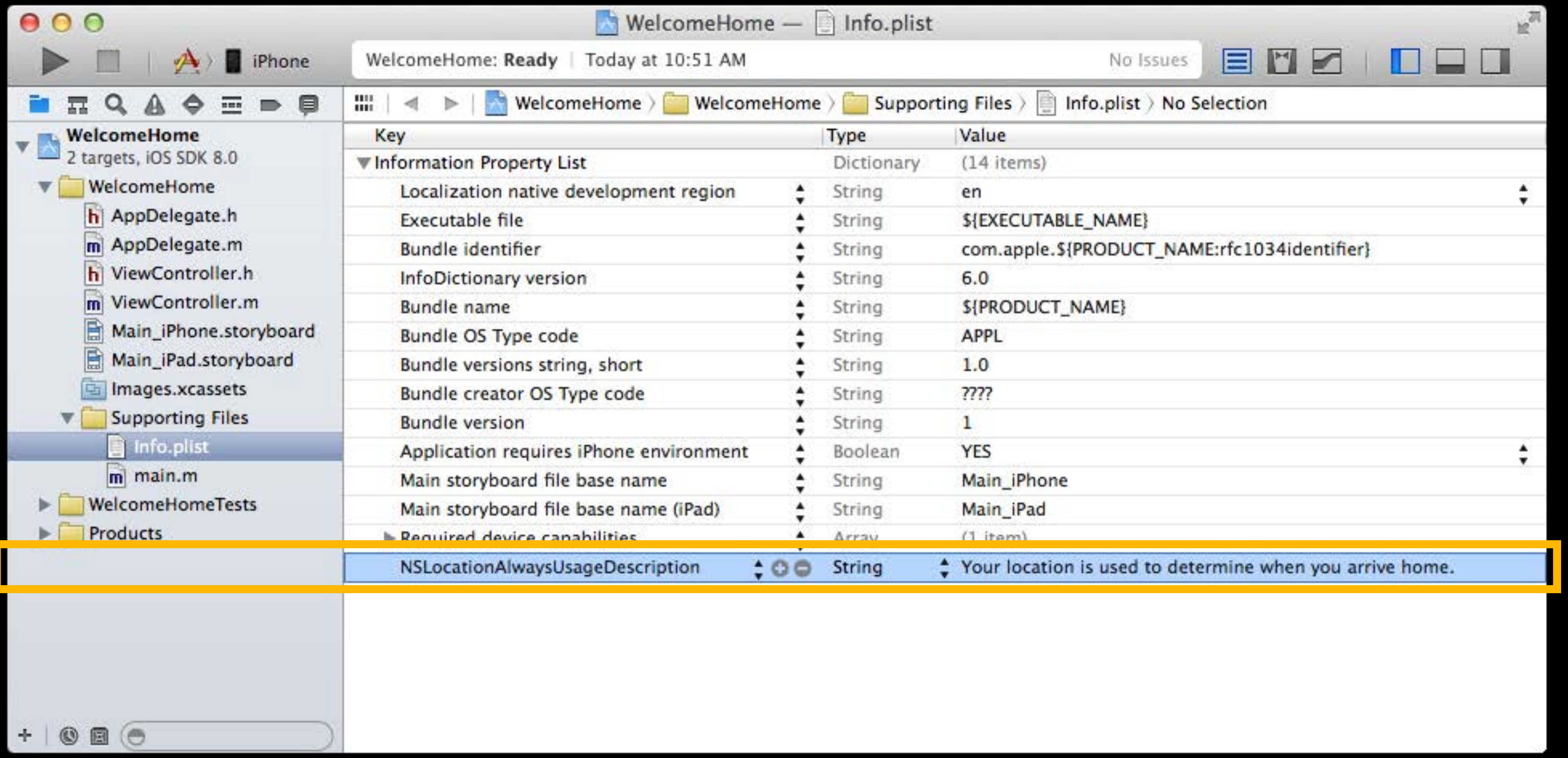
Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Add the key to the app's information property list



Key	Type	Value
▼ Information Property List	Dictionary	(14 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
▶ Required device capabilities	Array	(1 item)
NSLocationAlwaysUsageDescription	String	Your location is used to determine when you arrive home.

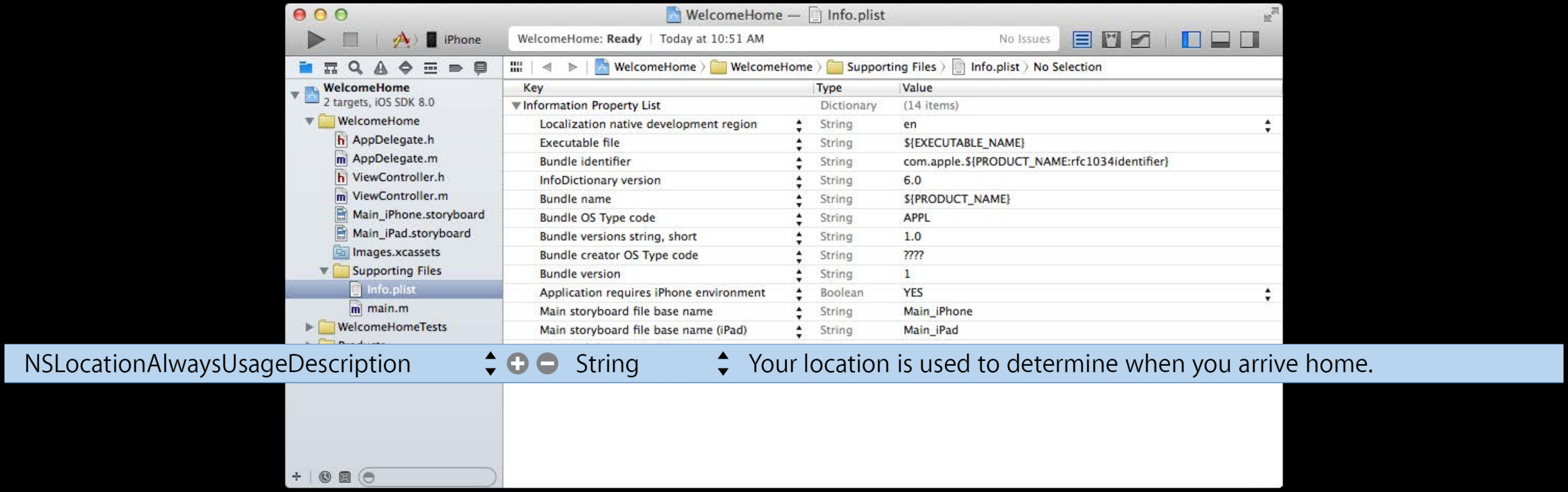
Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Add the key to the app's information property list



Key	Type	Value
Information Property List	Dictionary	(14 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
NSLocationAlwaysUsageDescription	String	Your location is used to determine when you arrive home.

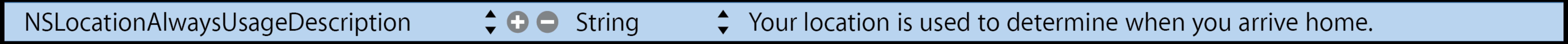
Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Add the key to the app's information property list



NSLocationAlwaysUsageDescription String Your location is used to determine when you arrive home.

Make the corresponding authorization request API call

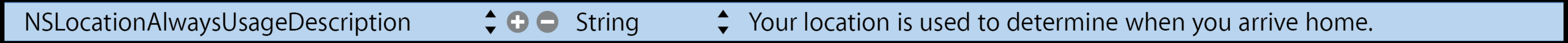
Location Authorization

Example—WelcomeHome app

Determine how location is used

- Region monitoring

Add the key to the app's information property list



NSLocationAlwaysUsageDescription ⇕ ⊕ ⊖ String ⇕ Your location is used to determine when you arrive home.

Make the corresponding authorization request API call

```
CLLocationManager *locationManager = [[CLLocationManager alloc] init];
locationManager.delegate = self;
CLCircularRegion *region = [[CLCircularRegion alloc] initWithCenter:center
                            radius:radius identifier:identifier];
[locationManager requestAlwaysAuthorization];
[locationManager startMonitoringForRegion:region];
```

Location Authorization

Example—AmusementPark app

Location Authorization

Example—AmusementPark app

Determine how location is used

Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app’s information property list

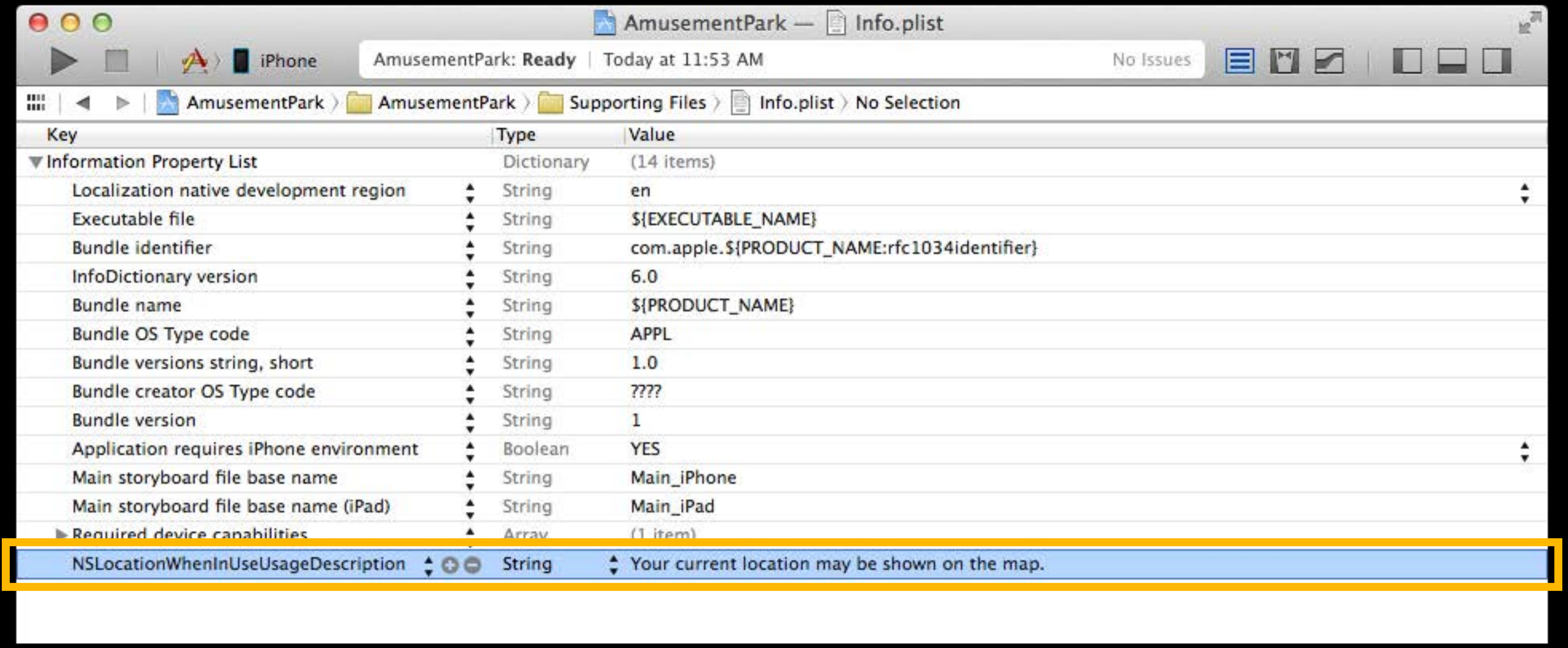
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app's information property list



AmusementPark — Info.plist
iPhone
AmusementPark: Ready | Today at 11:53 AM
No Issues
AmusementPark 〉 AmusementPark 〉 Supporting Files 〉 Info.plist 〉 No Selection

Key	Type	Value
▼ Information Property List	Dictionary	(14 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
▶ Required device capabilities	Array	(1 item)
NSLocationWhenInUseUsageDescription	String	Your current location may be shown on the map.

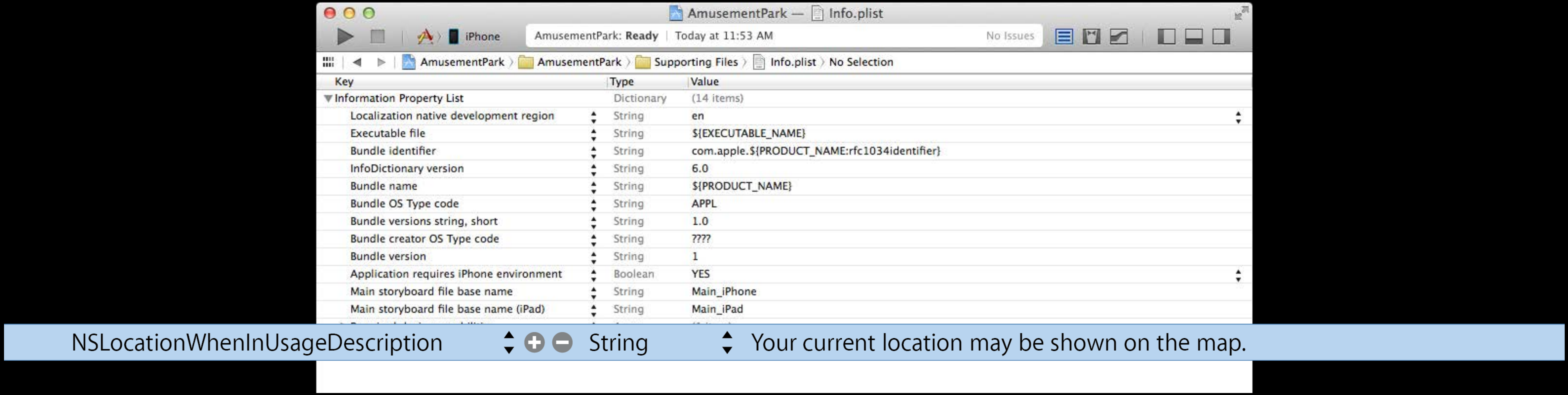
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app's information property list



AmusementPark — Info.plist
iPhone
AmusementPark: Ready | Today at 11:53 AM
No Issues
AmusementPark 〉 AmusementPark 〉 Supporting Files 〉 Info.plist 〉 No Selection

Key	Type	Value
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InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
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Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
NSLocationWhenInUsageDescription	String	Your current location may be shown on the map.

Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
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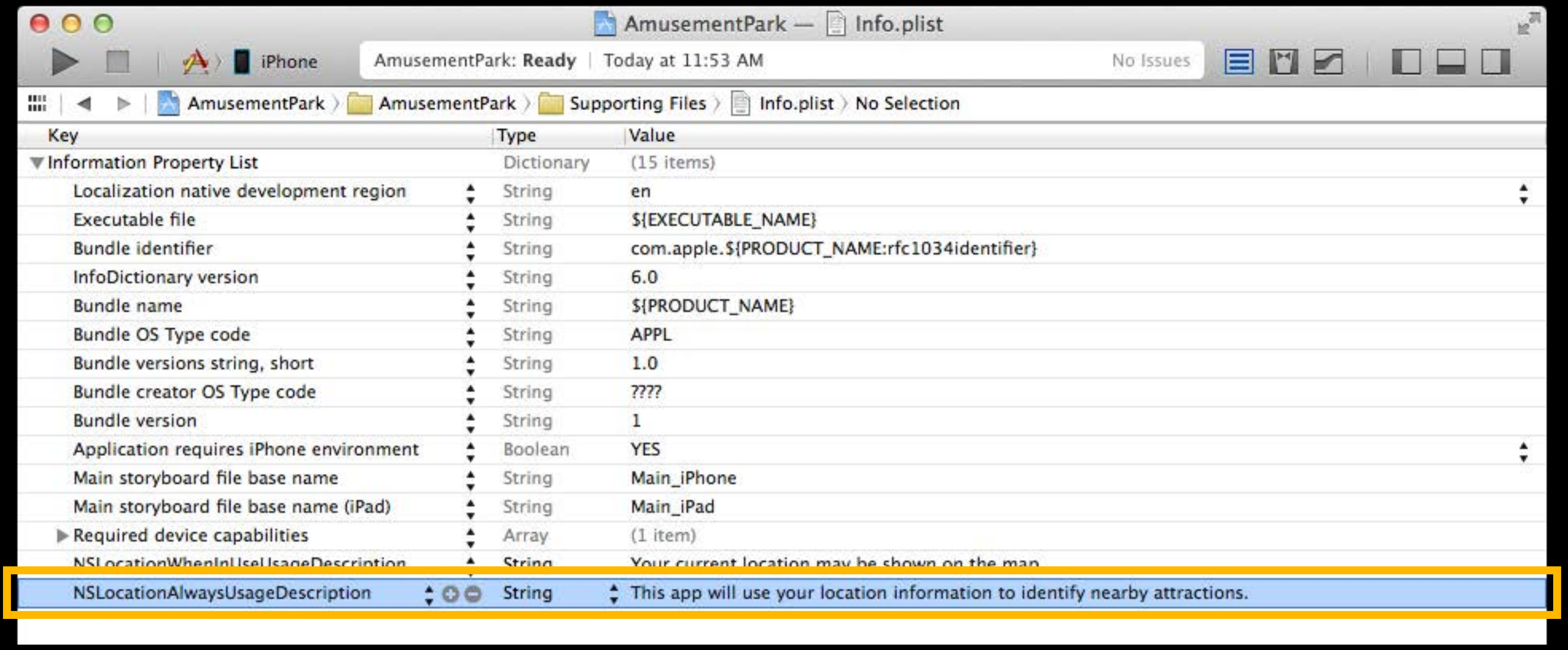

AmusementPark — Info.plist
iPhone
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Key	Type	Value
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Main storyboard file base name (iPad)	String	Main_iPad
▶Required device capabilities	Array	(1 item)
NSLocationWhenInUseUsageDescription	String	Your current location may be shown on the map.
NSLocationAlwaysUsageDescription	String	This app will use your location information to identify nearby attractions.

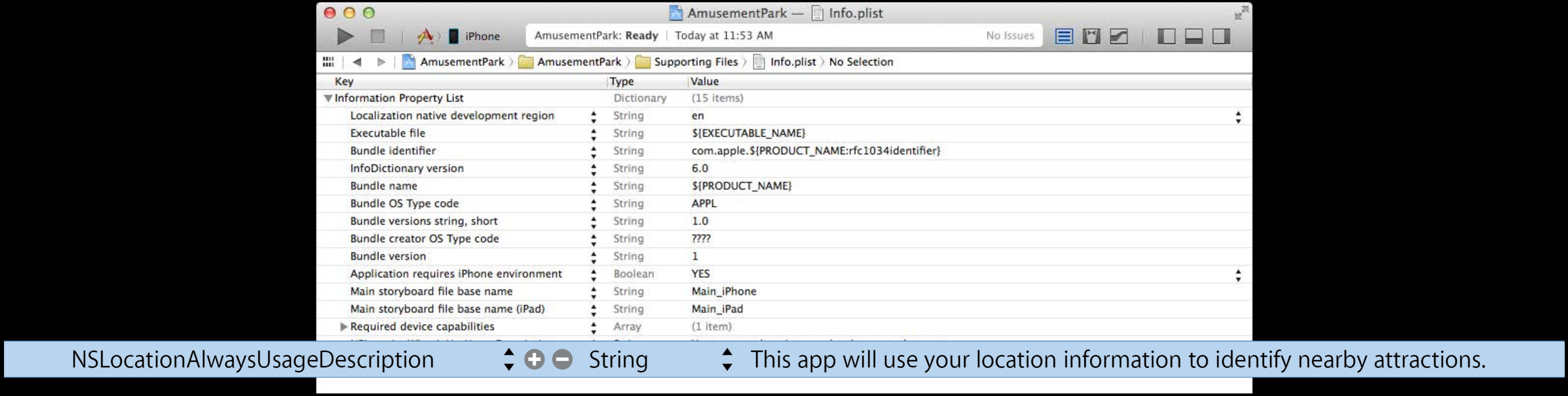
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app's information property list



AmusementPark — Info.plist

AmusementPark: **Ready** | Today at 11:53 AM

AmusementPark 〉 AmusementPark 〉 Supporting Files 〉 Info.plist 〉 No Selection

Key	Type	Value
▼Information Property List	Dictionary	(15 items)
Localization native development region	String	en
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Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
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Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
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Application requires iPhone environment	Boolean	YES
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Location Authorization

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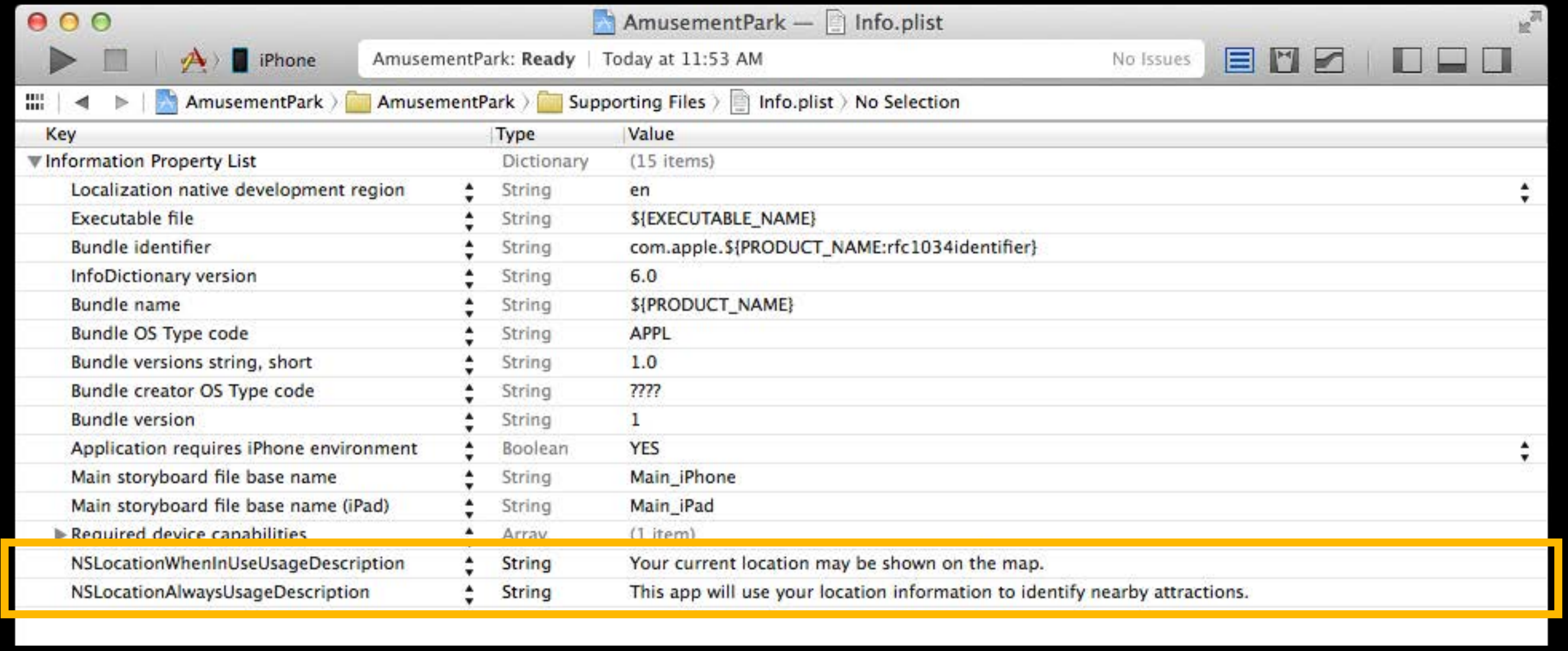

AmusementPark — Info.plist
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AmusementPark: Ready | Today at 11:53 AM
No Issues
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Key	Type	Value
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Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
▶ Required device capabilities	Array	(1 item)
NSLocationWhenInUseUsageDescription	String	Your current location may be shown on the map.
NSLocationAlwaysUsageDescription	String	This app will use your location information to identify nearby attractions.

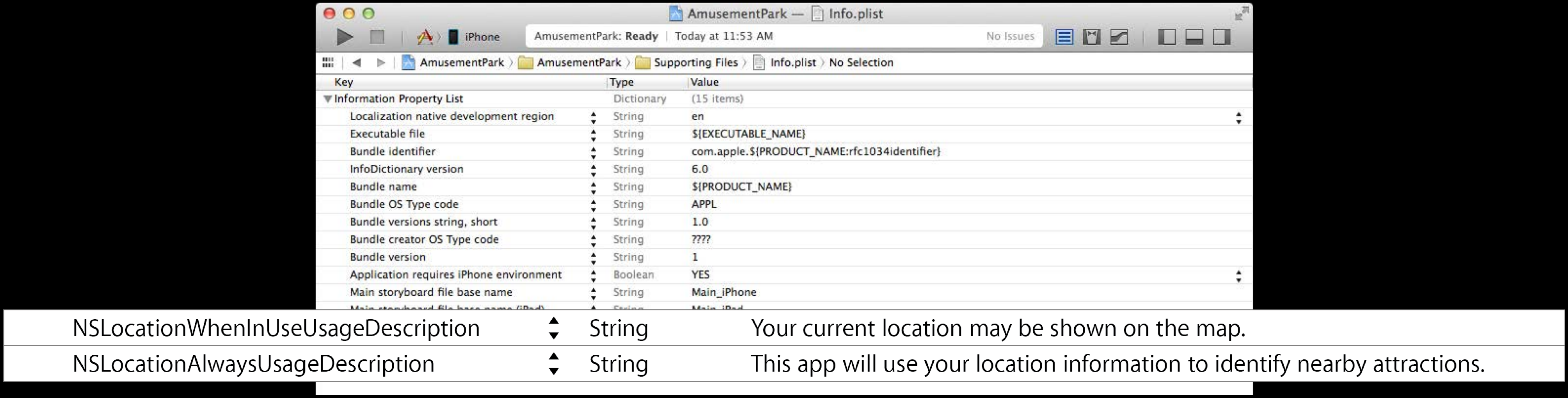
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app's information property list



AmusementPark — Info.plist
iPhone
AmusementPark: Ready | Today at 11:53 AM
No Issues
AmusementPark 〉 AmusementPark 〉 Supporting Files 〉 Info.plist 〉 No Selection

Key	Type	Value
▼ Information Property List	Dictionary	(15 items)
Localization native development region	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	com.apple.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone environment	Boolean	YES
Main storyboard file base name	String	Main_iPhone
Main storyboard file base name (iPad)	String	Main_iPad
NSLocationWhenInUseUsageDescription	String	Your current location may be shown on the map.
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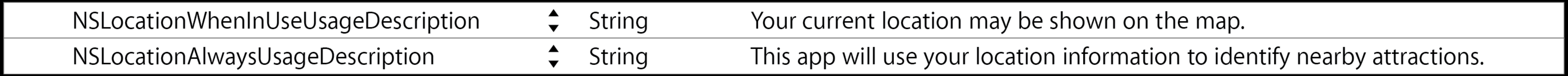
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app’s information property list



NSLocationWhenInUseUsageDescription	⬍	String	Your current location may be shown on the map.
NSLocationAlwaysUsageDescription	⬍	String	This app will use your location information to identify nearby attractions.

Make the corresponding authorization request API call

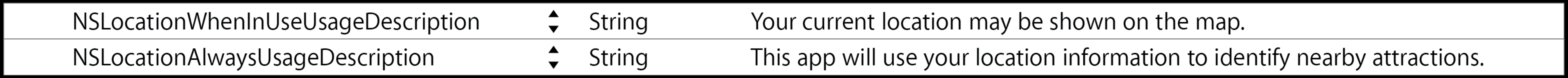
Location Authorization

Example—AmusementPark app

Determine how location is used

- Location
- Region monitoring

Add the keys to the app’s information property list



NSLocationWhenInUseUsageDescription	⬍	String	Your current location may be shown on the map.
NSLocationAlwaysUsageDescription	⬍	String	This app will use your location information to identify nearby attractions.

Make the corresponding authorization request API call

```
// user opened the map view
[locationManager requestWhenInUseAuthorization];
[locationManager startUpdatingLocation];
```

Location Authorization

Example—AmusementPark app

Location Authorization

Example—AmusementPark app

Make the corresponding authorization request API call

Location Authorization

Example—AmusementPark app

Make the corresponding authorization request API call

```
// user activated automatic attraction info mode
```

Location Authorization

Example—AmusementPark app

Make the corresponding authorization request API call

```
// user activated automatic attraction info mode
CLAuthorizationStatus status = [CLLocationManager authorizationStatus];
if (authorizationStatus == kCLAuthorizationStatusDenied ||
    authorizationStatus == kCLAuthorizationStatusWhenInUse) {
```

Location Authorization

Example—AmusementPark app

Make the corresponding authorization request API call

```
// user activated automatic attraction info mode
CLAuthorizationStatus status = [CLLocationManager authorizationStatus];
if (authorizationStatus == kCLAuthorizationStatusDenied ||
    authorizationStatus == kCLAuthorizationStatusWhenInUse) {
    // present an alert indicating location authorization required
    // and offer to take the user to Settings for the app via
    // UIApplication -openUrl: and UIApplicationOpenSettingsURLString
}
```

Location Authorization

Example—AmusementPark app

Make the corresponding authorization request API call

```
// user activated automatic attraction info mode
CLAuthorizationStatus status = [CLLocationManager authorizationStatus];
if (authorizationStatus == kCLAuthorizationStatusDenied ||
    authorizationStatus == kCLAuthorizationStatusWhenInUse) {
    // present an alert indicating location authorization required
    // and offer to take the user to Settings for the app via
    // UIApplication -openUrl: and UIApplicationOpenSettingsURLString
}
[locationManager requestAlwaysAuthorization];
[locationManager startMonitoringForRegion:region];
```

Location Authorization

Targeting iOS 7 and iOS 8

Location Authorization

Targeting iOS 7 and iOS 8

Continue to provide the deprecated `NSLocationUsageDescription`

Location Authorization

Targeting iOS 7 and iOS 8

Continue to provide the deprecated `NSLocationUsageDescription`

Guard the request authorization API calls with `respondsToSelector:`

Location Authorization

Targeting iOS 7 and iOS 8

Continue to provide the deprecated NSLocationUsageDescription

Guard the request authorization API calls with respondsToSelector:

```
if ([locationManager respondsToSelector:
    @selector(requestAlwaysAuthorization)]) {
    [locationManager requestAlwaysAuthorization];
}
```

Location Authorization

Targeting iOS 7 and iOS 8

Continue to provide the deprecated NSLocationUsageDescription

Guard the request authorization API calls with respondsToSelector:

```
if ([locationManager respondsToSelector:
    @selector(requestAlwaysAuthorization)]) {
    [locationManager requestAlwaysAuthorization];
}
```

Continue to use the deprecated kCLAuthorizationStatusAuthorized value

Location Authorization

Legacy app support

Location Authorization

Legacy app support

Legacy apps will still continue to work

Location Authorization

Legacy app support

Legacy apps will still continue to work

- Will use Always authorization

Location Authorization

Updating your app

Location Authorization

Updating your app

Can change supported authorizations between versions

Location Authorization

Updating your app

Can change supported authorizations between versions

- Will preserve user's authorization if still supported

Location Authorization

Updating your app

Can change supported authorizations between versions

- Will preserve user’s authorization if still supported
- Otherwise:

Location Authorization

Updating your app

Can change supported authorizations between versions

- Will preserve user’s authorization if still supported
- Otherwise:
    - Will go from Always to WhenInUse

Location Authorization

Updating your app

Can change supported authorizations between versions

- Will preserve user’s authorization if still supported
- Otherwise:
  - Will go from Always to WhenInUse
  - Will go from WhenInUse to prompt again

Location Authorization

Other frameworks

Location Authorization

UILocalNotification

Location Authorization

UILocalNotification

Now supports region-based triggering

Location Authorization

UILocalNotification

Now supports region-based triggering

```
@property(nonatomic,retain) CLRegion *region;
```

Location Authorization

UILocalNotification

Now supports region-based triggering

```
@property(nonatomic,retain) CLRegion *region;
```

Requires either authorization

Location Authorization

UILocalNotification

Now supports region-based triggering

```
@property(nonatomic,retain) CLRegion *region;
```

Requires either authorization

- Specify the desired key in the Info.plist

Location Authorization

UILocalNotification

Now supports region-based triggering

```
@property(nonatomic,retain) CLRegion *region;
```

Requires either authorization

- Specify the desired key in the Info.plist
- Call the corresponding authorization request API

Location Authorization

MKMapView

Location Authorization

MKMapView

When displaying the user's location

Location Authorization

MKMapView

When displaying the user's location

```
@property (nonatomic) BOOL showsUserLocation;
```

Location Authorization

MKMapView

When displaying the user’s location

```
@property (nonatomic) BOOL showsUserLocation;
```

Requires either authorization

Location Authorization

MKMapView

When displaying the user's location

```
@property (nonatomic) BOOL showsUserLocation;
```

Requires either authorization

- Specify the desired key in the Info.plist

Location Authorization

MKMapView

When displaying the user’s location

```
@property (nonatomic) BOOL showsUserLocation;
```

Requires either authorization

- Specify the desired key in the Info.plist
- Call the corresponding authorization request API

Location Authorization

Web views

Location Authorization

Web views

To allow web content that uses HTML5 `geolocation`

Location Authorization

Web views

To allow web content that uses HTML5 `geolocation`

Requires either authorization

Location Authorization

Web views

To allow web content that uses HTML5 `geolocation`

Requires either authorization

- Specify the desired key in the Info.plist

Location Authorization

Web views

To allow web content that uses HTML5 `geolocation`

Requires either authorization

- Specify the desired key in the Info.plist

WhenInUse authorization will be requested when needed

Location Authorization

Web views

To allow web content that uses HTML5 `geolocation`

Requires either authorization

- Specify the desired key in the Info.plist

WhenInUse authorization will be requested when needed

- Request Always authorization in advance if desired

Location Authorization

Adoption recap

Location Authorization

Adoption recap

Get ready for iOS 8

Location Authorization

Adoption recap

Get ready for iOS 8

- Think about how you use location

Location Authorization

Adoption recap

Get ready for iOS 8

- Think about how you use location
- Explain it to your users

Location Authorization

Adoption recap

Get ready for iOS 8

- Think about how you use location
- Explain it to your users
- Make the call to request authorization

Visit Monitoring

Brad Jensen
Software Engineer

Let’s Write a Journaling App

Let’s Write a Journaling App

Provide the user a list of places they’ve been

Let’s Write a Journaling App

Provide the user a list of places they’ve been

Low noise

Let’s Write a Journaling App

Provide the user a list of places they’ve been

Low noise

Suitable for 24/7 use

Existing API

Standard location service

Existing API

Standard location service

Requires keeping device awake

Existing API

Standard location service

Requires keeping device awake

Requires frequent wifi, cell, or GPS scans

Existing API

Standard location service

Requires keeping device awake

Requires frequent wifi, cell, or GPS scans

Lots of irrelevant data

Existing API

Standard location service

Requires keeping device awake

Requires frequent wifi, cell, or GPS scans

Lots of irrelevant data

Much better suited for navigation

Existing API

Improving standard location service

Existing API

Improving standard location service

Automatic pause

Existing API

Improving standard location service

Automatic pause

- Saves power while the device isn’t moving

Existing API

Improving standard location service

Automatic pause

- Saves power while the device isn’t moving
- Doesn’t help while it is moving

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- Saves power while the device isn’t moving
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Deferred location updates

Existing API

Improving standard location service

Automatic pause

- Saves power while the device isn’t moving
- Doesn’t help while it is moving
- Makes sense for navigation

Deferred location updates

- Saves power by waking your app less

Existing API

Improving standard location service

Automatic pause

- Saves power while the device isn’t moving
- Doesn’t help while it is moving
- Makes sense for navigation

Deferred location updates

- Saves power by waking your app less
- Generating locations is expensive

Existing API

Improving standard location service

Automatic pause

- Saves power while the device isn’t moving
- Doesn’t help while it is moving
- Makes sense for navigation

Deferred location updates

- Saves power by waking your app less
- Generating locations is expensive
- Great for fitness apps

Existing API

Significant location changes

Existing API

Significant location changes

Lower power cost than continuous updates

Existing API

Significant location changes

Lower power cost than continuous updates

Very coarse tracks

Existing API

Significant location changes

Lower power cost than continuous updates

Very coarse tracks

Hard to identify stops

Existing API

Region monitoring

Existing API

Region monitoring

Great power efficiency

Existing API

Region monitoring

Great power efficiency

Relevant data

Existing API

Region monitoring

Great power efficiency

Relevant data

Needs a specific region to monitor

Existing API

Region monitoring

Great power efficiency

Relevant data

Needs a specific region to monitor

Limited number of regions

Introducing Visit Monitoring

Introducing Visit Monitoring

Monitors for destinations

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

Requires always authorization

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

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Power efficient

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

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Power efficient

Opportunistic location use

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

Requires always authorization

Power efficient

Opportunistic location use

Utilizes information from the whole system

Introducing Visit Monitoring

Monitors for destinations

Launches your app when when it detects a visit

Requires always authorization

Power efficient

Opportunistic location use

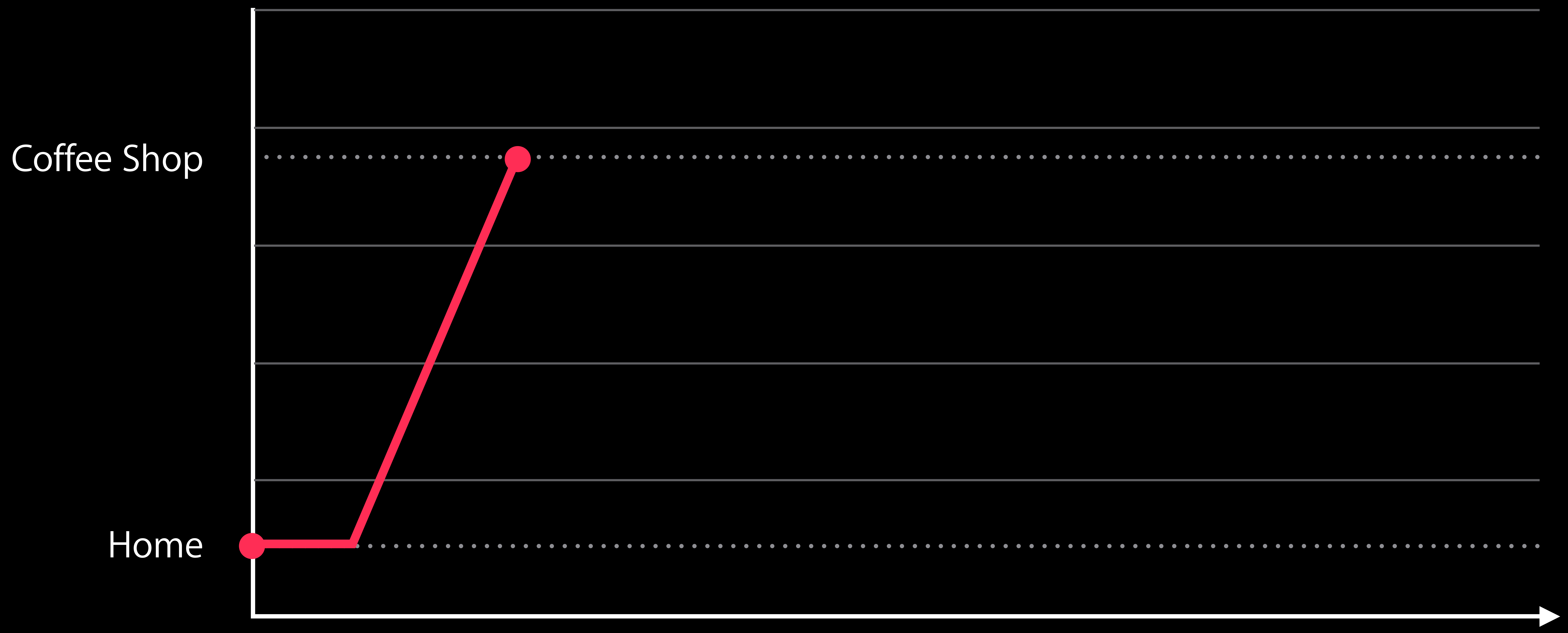
Utilizes information from the whole system

Not tied to landmarks

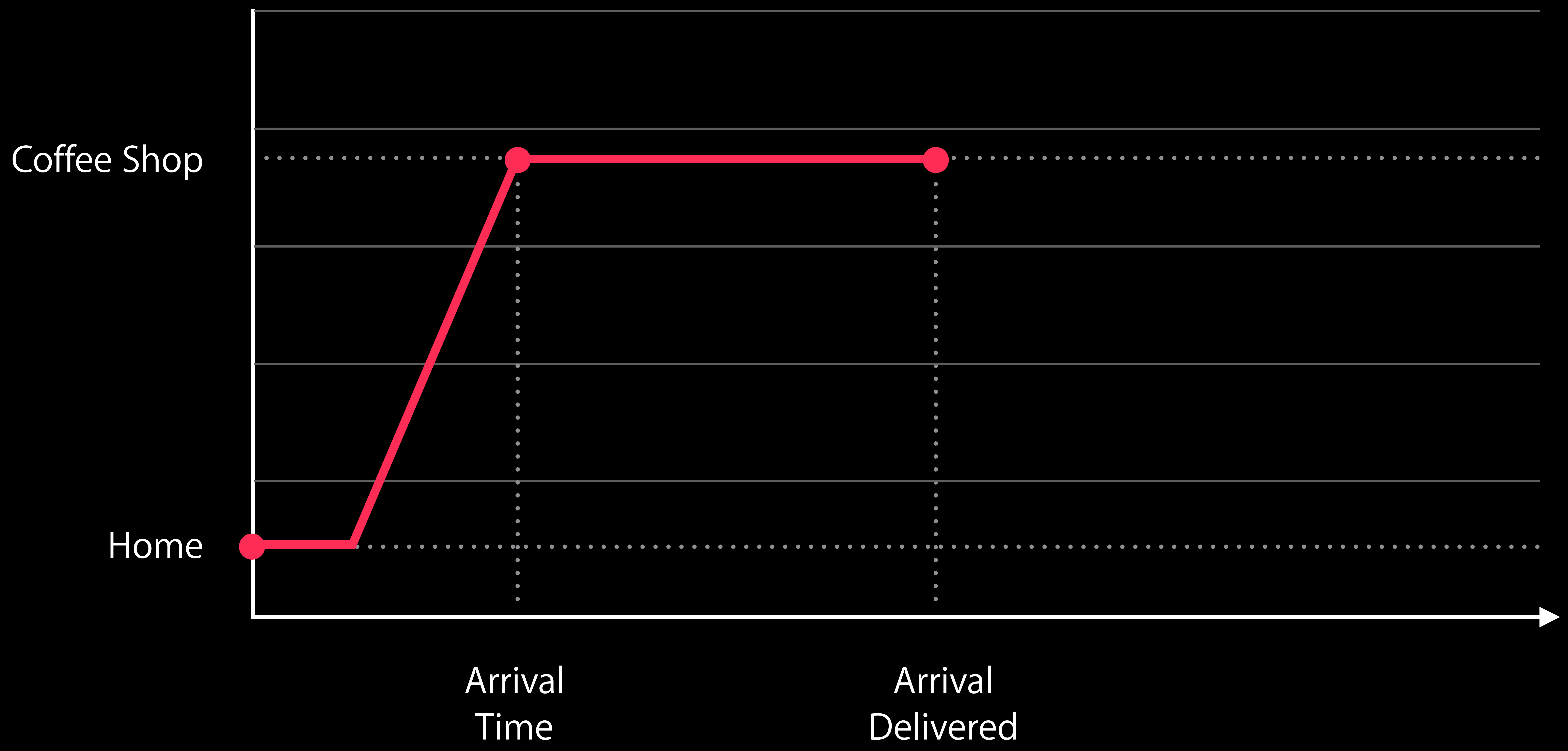
Anatomy of a Visit

Coffee Shop
Home

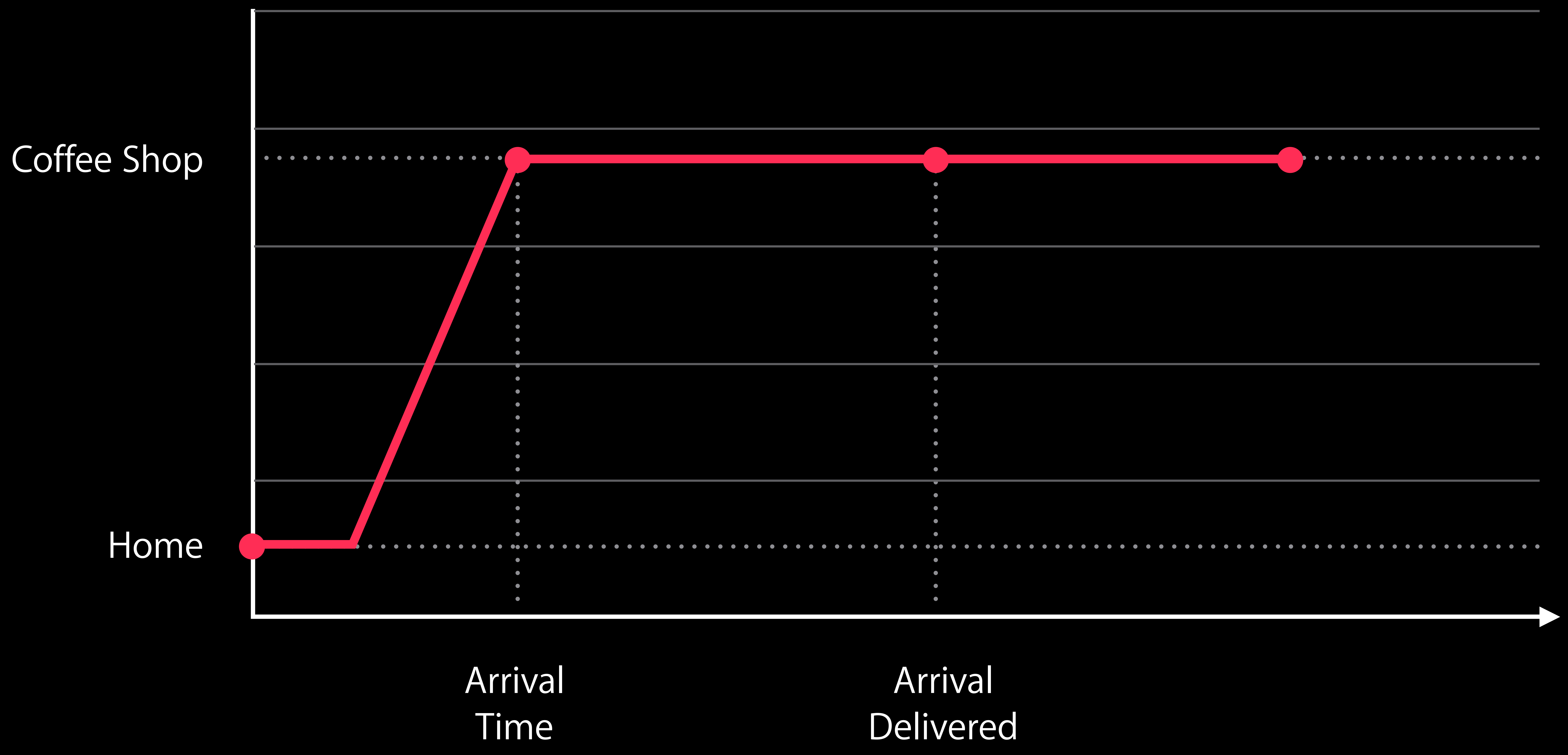
Anatomy of a Visit



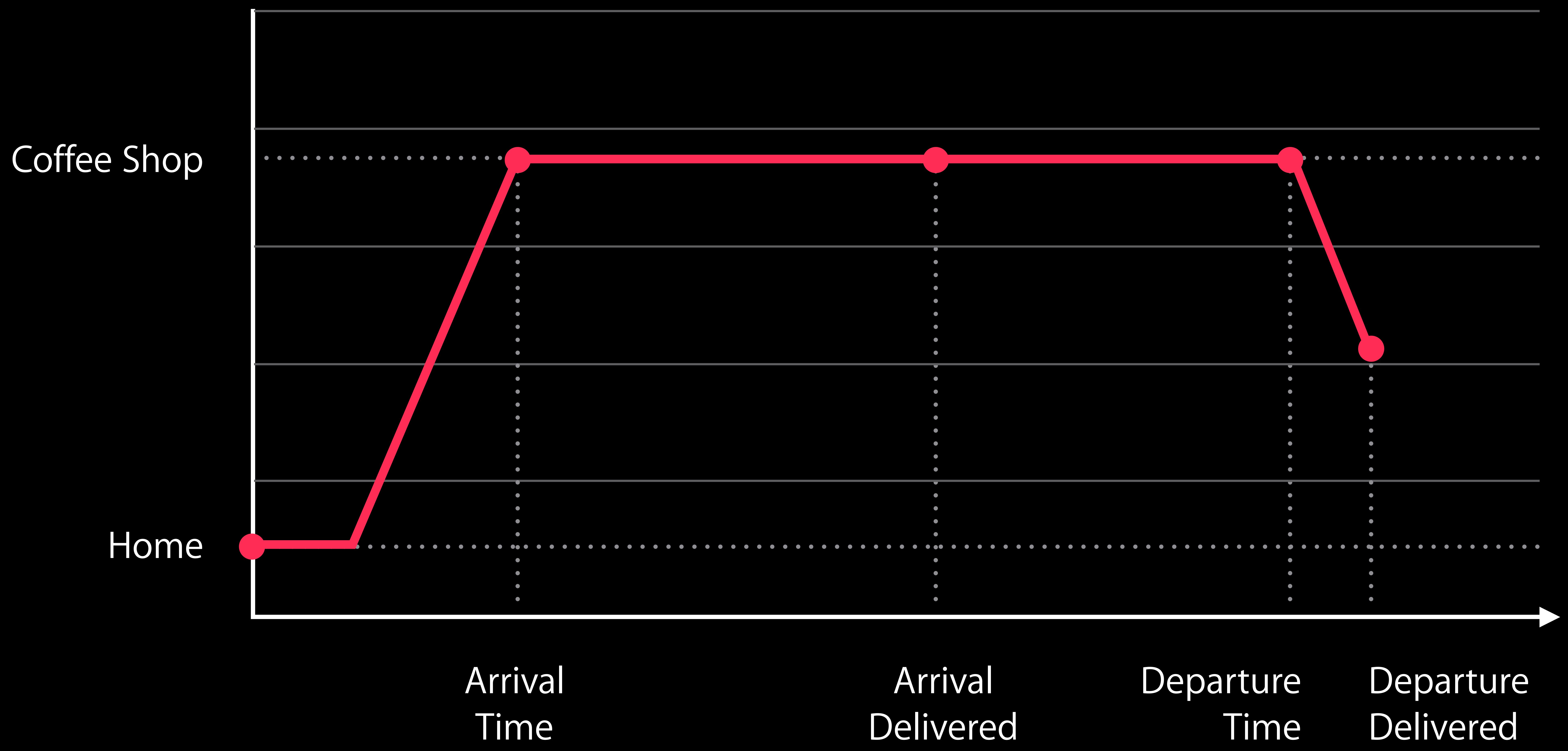
Anatomy of a Visit



Anatomy of a Visit



Anatomy of a Visit



Visit Monitoring API

CLLocationManager

Visit Monitoring API

CLLocationManager

```
@interface CLLocationManager (CLVisitExtensions)
- (void)startMonitoringVisits;
- (void)stopMonitoringVisits;
@end
```

Visit Monitoring API

CLLocationManager

```
@interface CLLocationManager (CLVisitExtensions)
- (void)startMonitoringVisits;
- (void)stopMonitoringVisits;
@end

@protocol CLLocationManagerDelegate<NSObject>
@optional
- (void)locationManager:(CLLocationManager *)manager
               didVisit:(CLVisit *)visit;
@end
```

Visit Monitoring API

CLVisit

```
@interface CLVisit : NSObject <NSSecureCoding, NSCopying>
@property (nonatomic, readonly, copy) NSDate *arrivalDate;
@property (nonatomic, readonly, copy) NSDate *departureDate;
@property (nonatomic, readonly) CLLocationCoordinate2D coordinate;
@property (nonatomic, readonly) CLLocationAccuracy horizontalAccuracy;
@end
```

Visit Monitoring API

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@interface CLVisit : NSObject <NSSecureCoding, NSCopying>
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Visit Monitoring API

Notes

Visit Monitoring API

Notes

Values of `horizontalAccuracy` and `coordinate` may differ

Visit Monitoring API

Notes

Values of `horizontalAccuracy` and `coordinate` may differ

Triggers app launches even when quit

Visit Monitoring API

Notes

Values of `horizontalAccuracy` and `coordinate` may differ

Triggers app launches even when quit

Multiple visits may be delivered

Identifying Arrivals

	arrivalDate	departureDate

Identifying Arrivals

	`arrivalDate`	`departureDate`
Arrival	Arrival estimate	`[NSDate distantFuture]`

Identifying Arrivals

	`arrivalDate`	`departureDate`
Arrival	Arrival estimate	`[NSDate distantFuture]`
Departure	`[NSDate distantPast]` OR arrival estimate	Departure estimate

Identifying Arrivals

	arrivalDate	departureDate
Arrival	Arrival estimate	[NSDate distantFuture]
Departure	[NSDate distantPast] OR arrival estimate	Departure estimate

```
- (BOOL)isArrivalVisit:(CLVisit *)visit {
   return [visit.departureDate isEqual:[NSDate distantFuture]];
}
```

Back to the App

Plan

Back to the App

Plan

Adopt new authorization

Back to the App

Plan

Adopt new authorization

Create a `CLLocationManager`

Back to the App

Plan

Adopt new authorization

Create a `CLLocationManager`

Write start and stop methods

Back to the App

Plan

Adopt new authorization

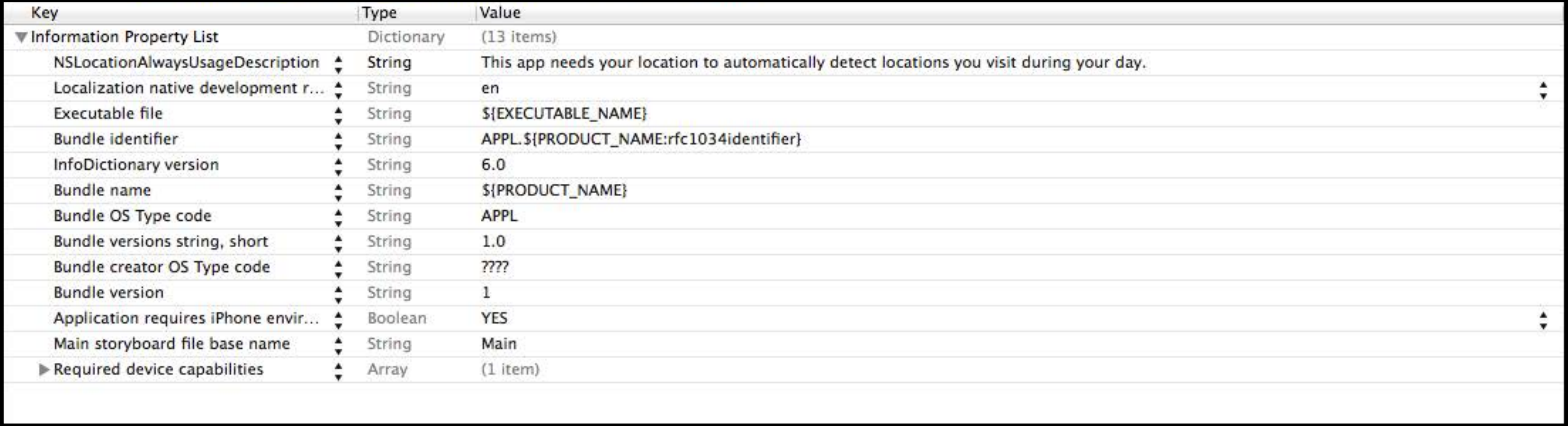
Create a `CLLocationManager`

Write start and stop methods

Handle visits

Back to the App

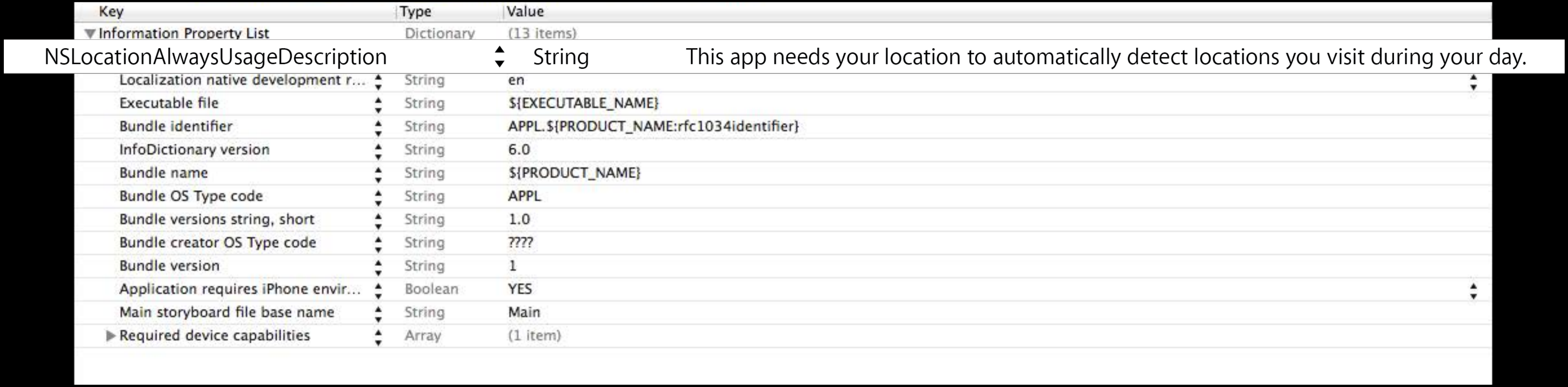
Adopt new authorization



Key	Type	Value
▼ Information Property List	Dictionary	(13 items)
NSLocationAlwaysUsageDescription	String	This app needs your location to automatically detect locations you visit during your day.
Localization native development r...	String	en
Executable file	String	${EXECUTABLE_NAME}
Bundle identifier	String	APPL.${PRODUCT_NAME:rfc1034identifier}
InfoDictionary version	String	6.0
Bundle name	String	${PRODUCT_NAME}
Bundle OS Type code	String	APPL
Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone envir...	Boolean	YES
Main storyboard file base name	String	Main
▶ Required device capabilities	Array	(1 item)

Back to the App

Adopt new authorization



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Bundle versions string, short	String	1.0
Bundle creator OS Type code	String	????
Bundle version	String	1
Application requires iPhone envir…	Boolean	YES
Main storyboard file base name	String	Main
▶ Required device capabilities	Array	(1 item)

Back to the App

Create a CLLocationManager

```
- (BOOL)application:(UIApplication *)application
didFinishLaunchingWithOptions:(NSDictionary *)launchOptions {

    self.locationManager = [[CLLocationManager alloc] init];
    self.locationManager.delegate = self;

    return YES;
}
```

Back to the App

Write start and stop methods

Back to the App

Write start and stop methods

```
- (void)startJournaling {
    [self.locationManager requestAlwaysAuthorization];
    [self.locationManager startMonitoringVisits];
}
```

Back to the App

Write start and stop methods

```
- (void)startJournaling {
    [self.locationManager requestAlwaysAuthorization];
    [self.locationManager startMonitoringVisits];
}

- (void)stopJournaling {
    [self.locationManager stopMonitoringVisits];
}
```

Back to the App

Handle visits

```
- (void)locationManager:(CLLocationManager *)manager
               didVisit:(CLVisit *)visit {
   // Your turn
}
```

Final Words

Advice

Final Words

Advice

Visit monitoring doesn’t replace region monitoring

Final Words

Advice

Visit monitoring doesn’t replace region monitoring

It also doesn’t replace significant location change monitoring

Final Words

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It also doesn’t replace significant location change monitoring

Try it out

Final Words

Advice

Visit monitoring doesn’t replace region monitoring

It also doesn’t replace significant location change monitoring

Try it out

See if visit monitoring can do what you need

Final Words

Advice

Visit monitoring doesn’t replace region monitoring

It also doesn’t replace significant location change monitoring

Try it out

See if visit monitoring can do what you need

Come to our lab session

Final Words

Advice

Visit monitoring doesn’t replace region monitoring

It also doesn’t replace significant location change monitoring

Try it out

See if visit monitoring can do what you need

Come to our lab session

Respect your users’ privacy

What’s Next?

Indoor Positioning

Indoor Positioning

●	Taking Core Location Indoors	Marina	Tuesday 3:15PM

Summary

Summary

Authorization

- Think about how you use location
- Explain it to your users
- Make the call to request authorization

Summary

Authorization

- Think about how you use location
- Explain it to your users
- Make the call to request authorization

Visit monitoring

- Assess your needs for location
- Respect your users' privacy
- Try it out

More Information

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MFi and I/O Technologies Evangelist
keithley@apple.com

Documentation
Core Location Framework Reference
http://developer.apple.com/library/ios/documentation/CoreLocation/Reference/CoreLocation_Framework/_index.html

Location and Maps Programming Guide
http://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/LocationAwarenessPG/Introduction/Introduction.html

Apple Developer Forums
http://devforums.apple.com

Related Sessions

Introducing the Modern WebKit API	Nob Hill	Tuesday 2:00PM
Taking Core Location Indoors	Marina	Tuesday 3:15PM
Writing Energy Efficient Code, Part 2	Russian Hill	Wednesday 11:30AM
What’s New in iOS Notifications	Nob Hill	Wednesday 2:00PM
User Privacy in iOS and OS X	Nob Hill	Thursday 2:00PM

Labs

●	Core Location Lab	Core OS Lab B	Thursday 12:45PM

WWDC14