App Frameworks

#WWDC15

WatchKit Tips and Tricks

Optimizing Watch apps

Session 228

Jake Behrens watchOS Frameworks Evangelist

TO:
CNN
JAL

Agenda

Agenda

Data and communication

Agenda

Data and communication

Interface elements

Agenda

Data and communication

Interface elements

Notifications

Agenda

Data and communication

Interface elements

Notifications

Glances

Data and Communication

Data and Communication

Networking

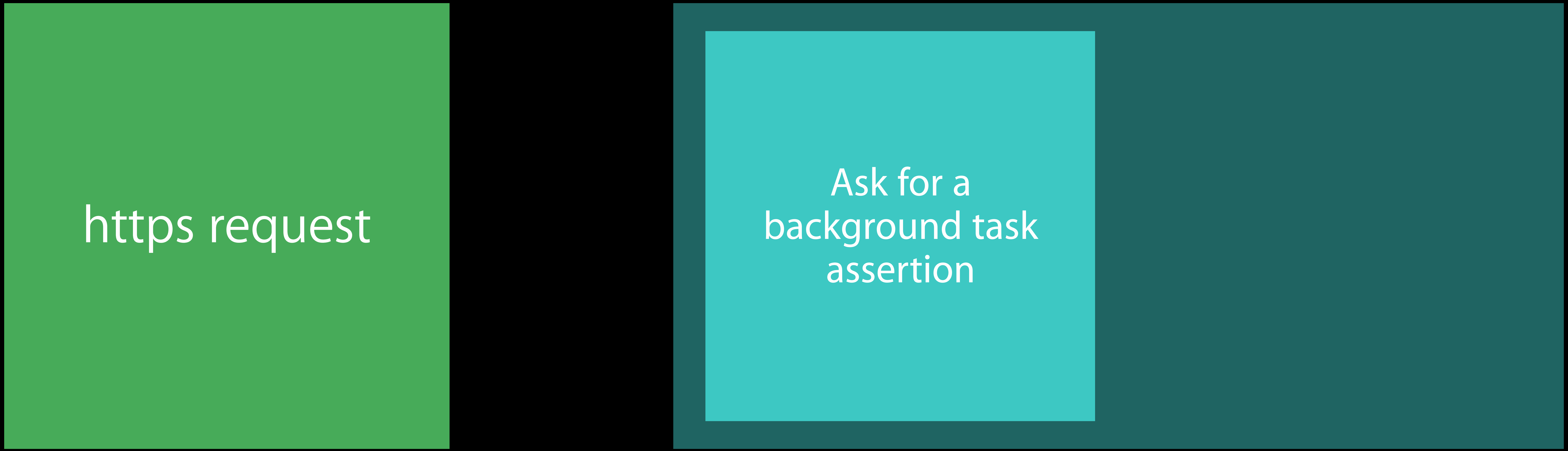
Data and Communication

Networking

https request

Data and Communication

Networking

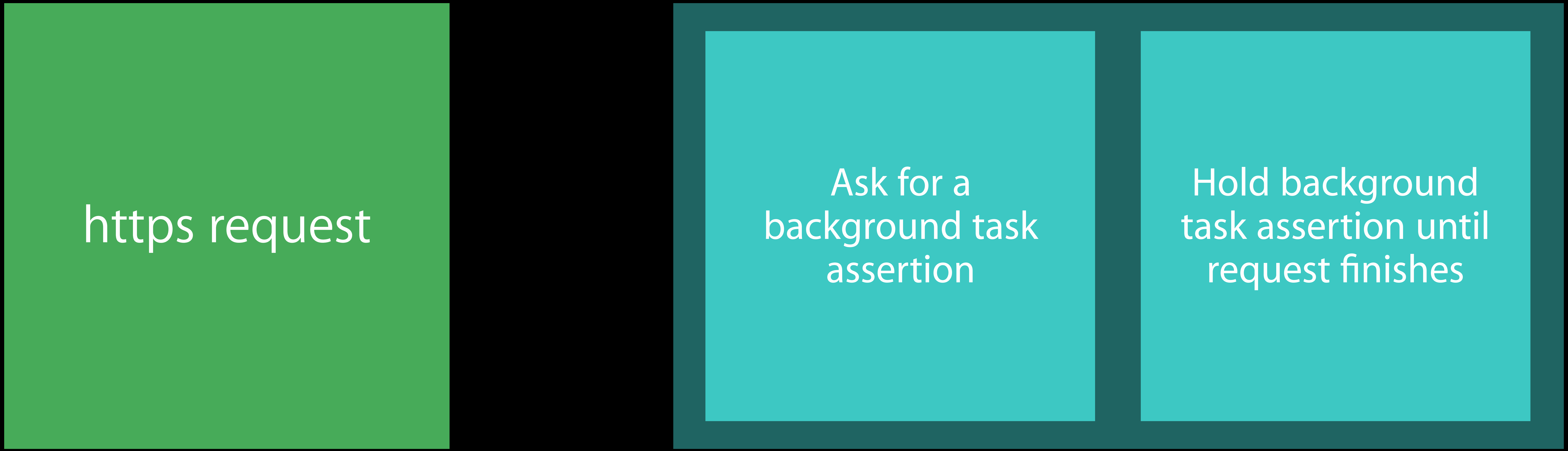


https request

Ask for a background task assertion

Data and Communication

Networking



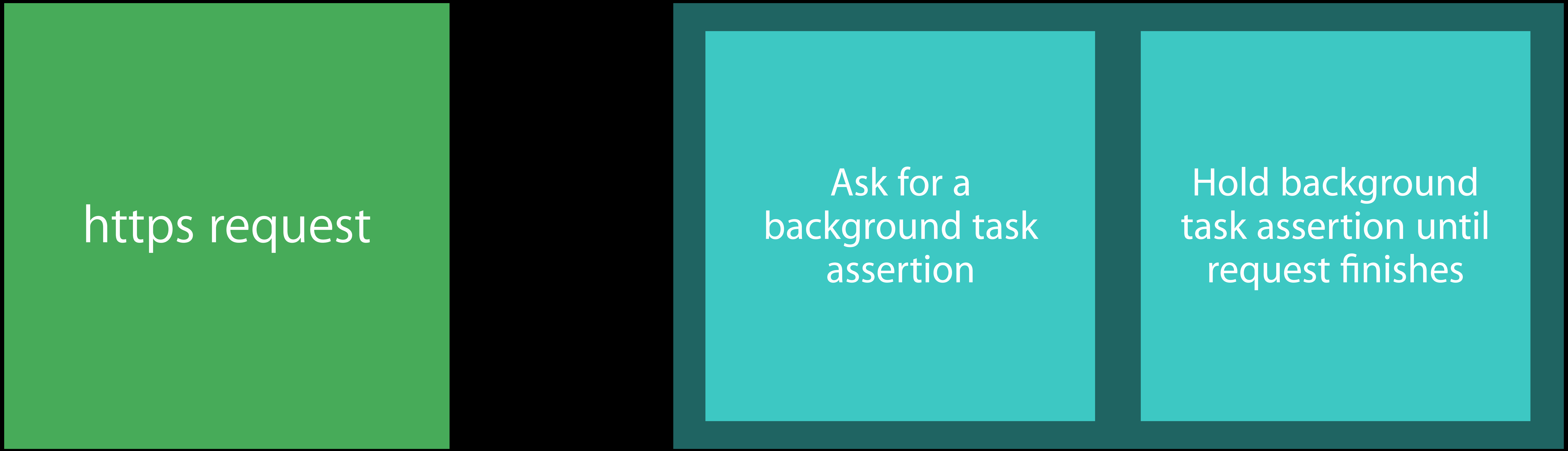
https requests

Ask for a background task assertion

Hold background task assertion until request finishes

Data and Communication

Networking



https request

Ask for a background task assertion

Hold background task assertion until request finishes

Default NSURLSession

Data and Communication

Networking

Data and Communication

Networking

Request a background task assertion

```
NSProcessInfo.processInfo().performExpiringActivityWithReason("networkReq")
{ expired in
   if !expired {
       // We have a background task assertion.
    } else {
       // No background task assertion was given or we’re out of time.
    }
}
```

Data and Communication

Networking

Request a background task assertion

Executes block when called

- Block executes on an asynchronous queue

```
NSProcessInfo.processInfo().performExpiringActivityWithReason("networkReq")
{ expired in
   if !expired {
       // We have a background task assertion.
    } else {
       // No background task assertion was given or we’re out of time.
    }
}
```

Data and Communication

Networking

Data and Communication

Networking

dispatch_semaphore

Data and Communication

Networking

dispatch_semaphore

dispatch_semaphore_wait pauses execution

```
Queue to pause:
let time = dispatch_time(DISPATCH_TIME_NOW, Int64(30 * Double(NSEC_PER_SEC)))
dispatch_semaphore_wait(semaphore, time)
```

Data and Communication

Networking

dispatch_semaphore

dispatch_semaphore_wait pauses execution

Signaling the semaphore resumes execution

```
Queue to pause:
let time = dispatch_time(DISPATCH_TIME_NOW, Int64(30 * Double(NSEC_PER_SEC)))
dispatch_semaphore_wait(semaphore, time)
```

```
Other Queue:
dispatch_semaphore_signal(semaphore)
```

Demo

Data and Communication

Across processes

Data and Communication

Across processes

```
openParentApplication(reply:)
```

Data and Communication

Across processes

```
openParentApplication(reply:)
application(handleWatchKitExtensionRequest:reply:)
```

Data and Communication

Across processes

```
openParentApplication(reply:)
application(handleWatchKitExtensionRequest:reply:)
```

- Begin a background task for asynchronous work

Data and Communication

Across processes

```
openParentApplication(reply:)
application(handleWatchKitExtensionRequest:reply:)
```

- Begin a background task for asynchronous work
- Turn custom objects into NSData for reply

Data and Communication

Device to device

NEW

Data and Communication

Device to device

NEW

`openParentApplication(reply:)` is unavailable in watchOS 2

Data and Communication

Device to device

NEW

`openParentApplication(reply:)` is unavailable in watchOS 2

Use WatchConnectivity in watchOS 2

Data and Communication

NEW

Device to device

`openParentApplication(reply:)` is unavailable in watchOS 2

Use WatchConnectivity in watchOS 2

Introducing Watch Connectivity Pacific Heights Thursday 11:00AM

Data and Communication

Shared data

Data and Communication

Shared data

Make use of app groups in existing watchOS apps

Data and Communication

Shared data

Make use of app groups in existing watchOS apps

Use NSUserDefaults for state data, not model data

Data and Communication

Shared data

Make use of app groups in existing watchOS apps

Use NSUserDefaults for state data, not model data

Think of simplifying your model for watchOS

PhotoRepresentation

Photo

Event

SessionFilter

SessionFavorite

SessionAsset

Keyword

SessionInstance

SessionFeedback

Track

Session

Focus

Room

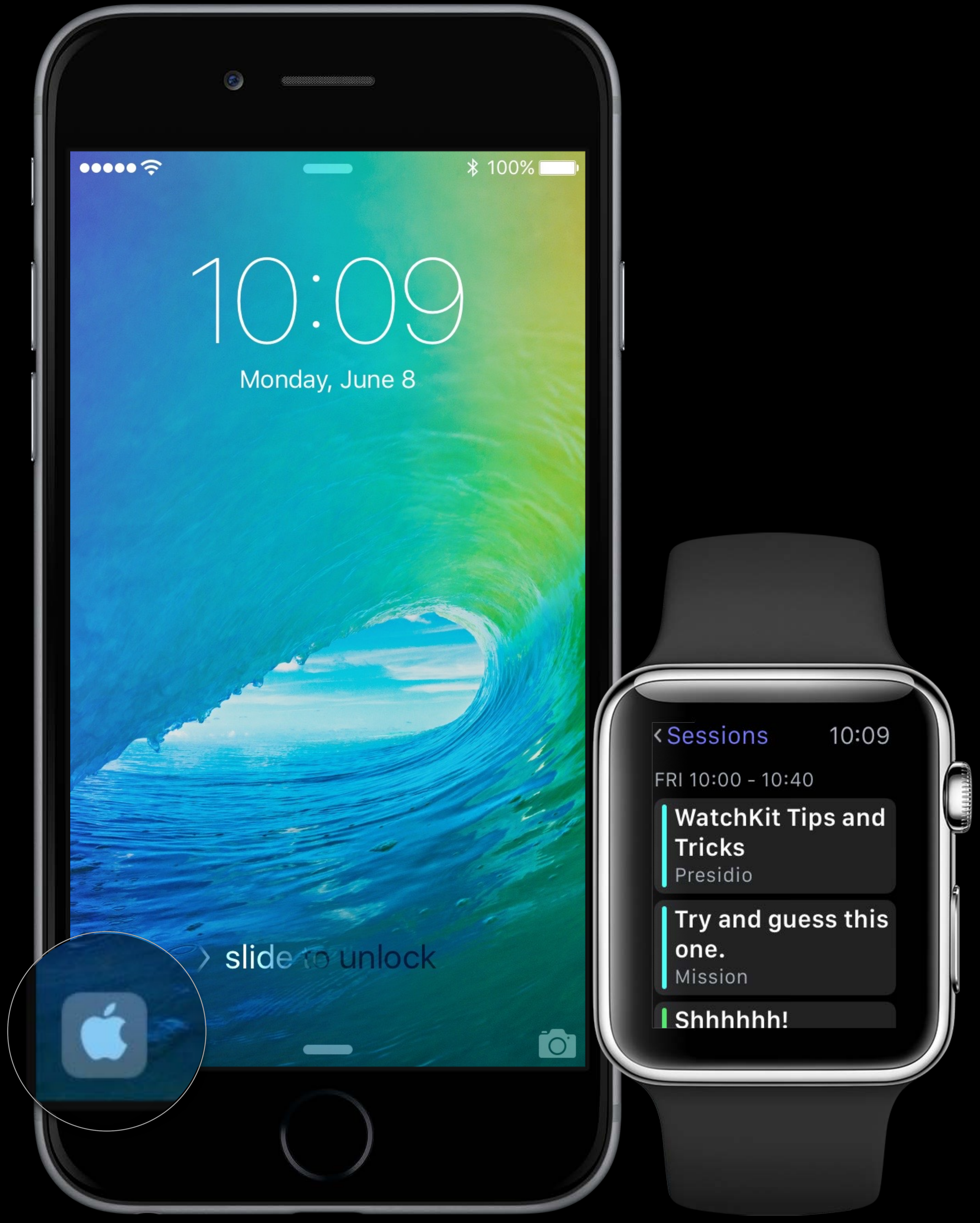
User

NewsItem

Sessions

Favorites

100%
10:09
Monday, June 8
slide to unlock
MON 8
57°
NONE



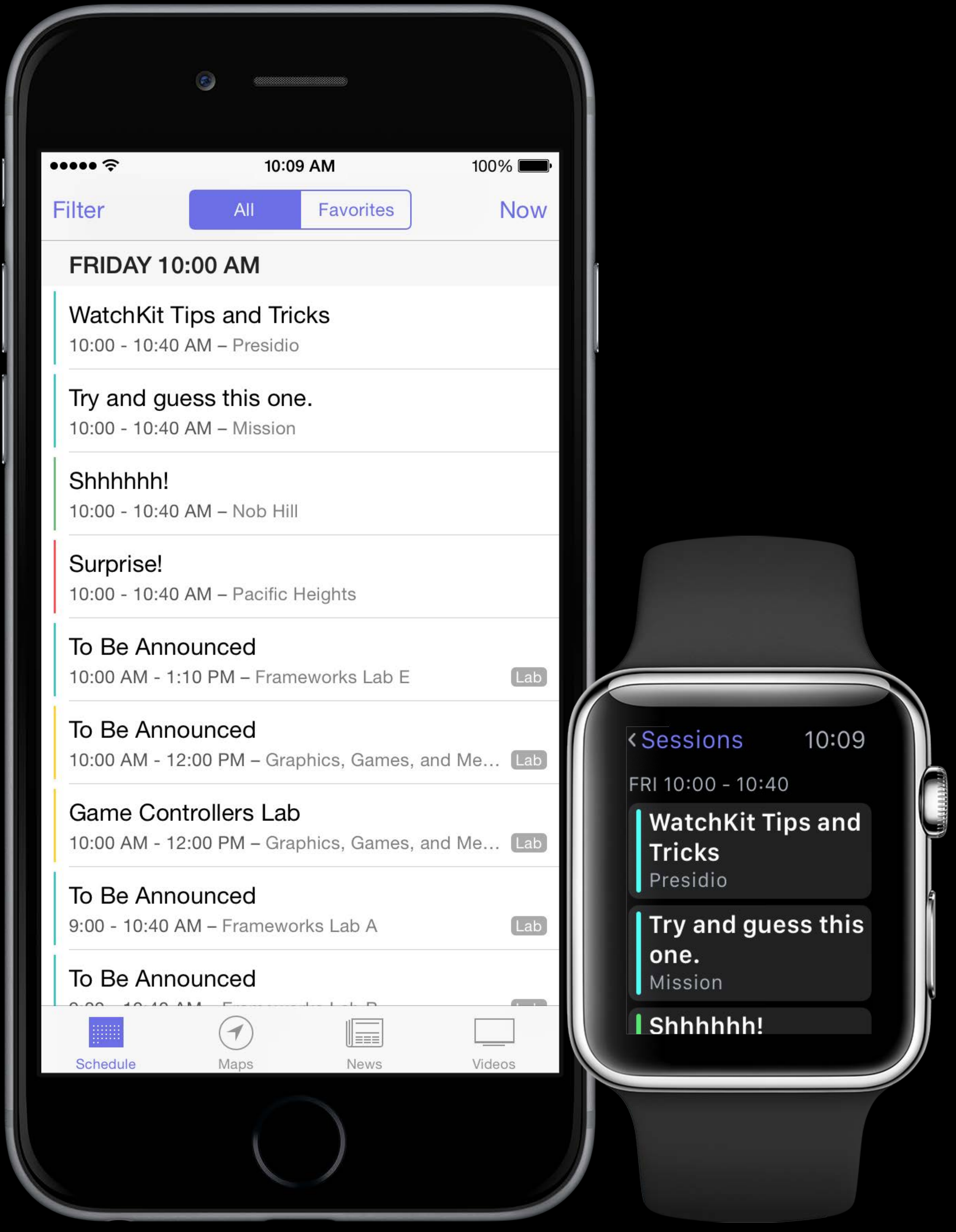
Sessions 10:09

FRI 10:00 - 10:40

WatchKit Tips and Tricks
Presidio

Try and guess this one.
Mission

Shhhhhh!



FRIDAY 10:00 AM

WatchKit Tips and Tricks
10:00 - 10:40 AM – Presidio

Try and guess this one.
10:00 - 10:40 AM – Mission

Shhhhhh!
10:00 - 10:40 AM – Nob Hill

Surprise!
10:00 - 10:40 AM – Pacific Heights

To Be Announced
10:00 AM - 1:10 PM – Frameworks Lab E Lab

To Be Announced
10:00 AM - 12:00 PM – Graphics, Games, and Me… Lab

Game Controllers Lab
10:00 AM - 12:00 PM – Graphics, Games, and Me… Lab

To Be Announced
9:00 - 10:40 AM – Frameworks Lab A Lab

To Be Announced

FRI 10:00 - 10:40

WatchKit Tips and Tricks
Presidio

Try and guess this one.
Mission

Shhhhhh!

Data and Communication

Handoff

Data and Communication

Handoff

```
updateUserActivity(userInfo:webpageURL:)
```

Data and Communication

Handoff

`updateUserActivity(userInfo:webpageURL:)`

System invalidates user activities automatically

Data and Communication

Handoff

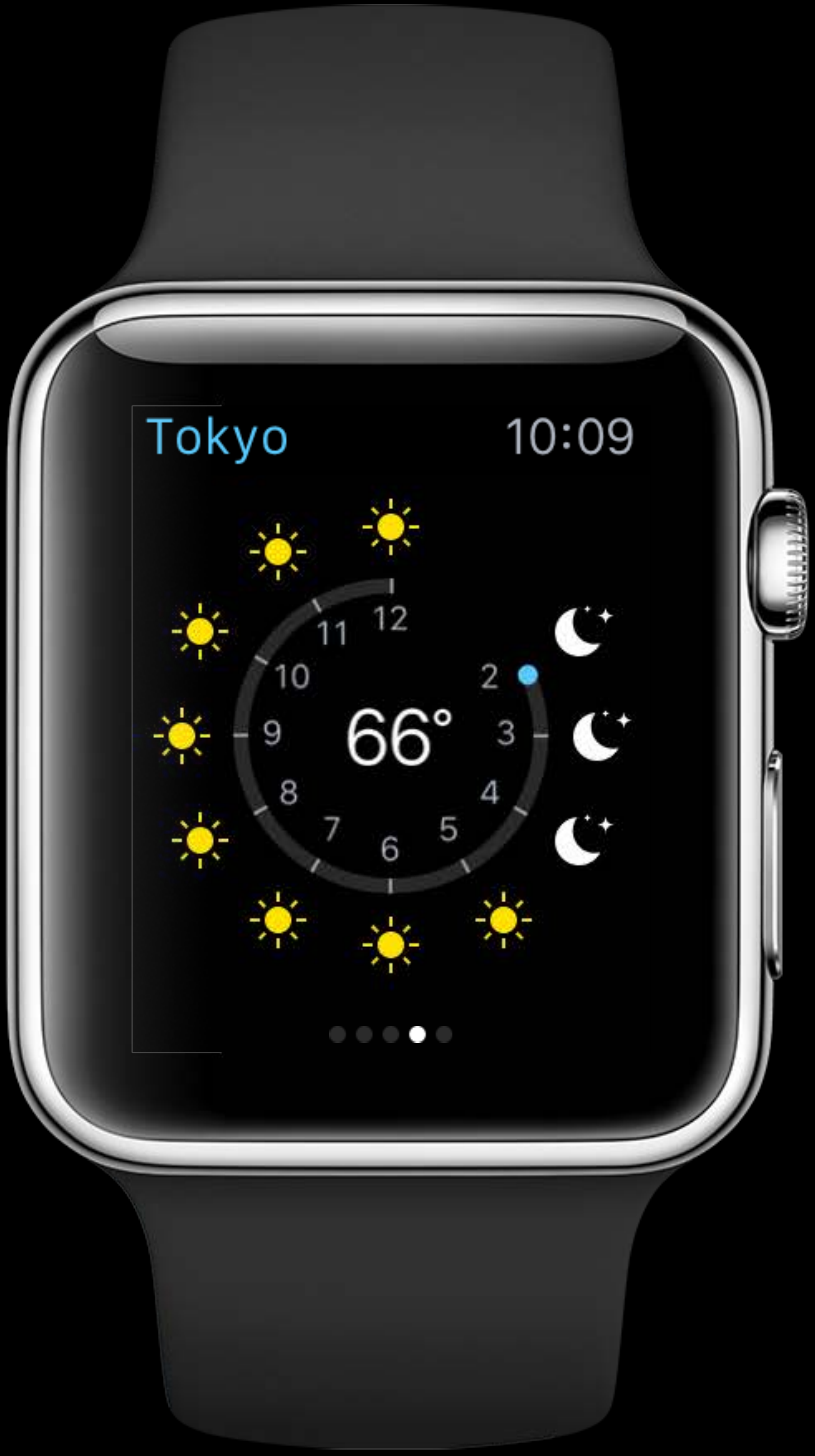
`updateUserActivity(userInfo:webpageURL:)`

System invalidates user activities automatically

- You can manually invalidate user activities, if needed

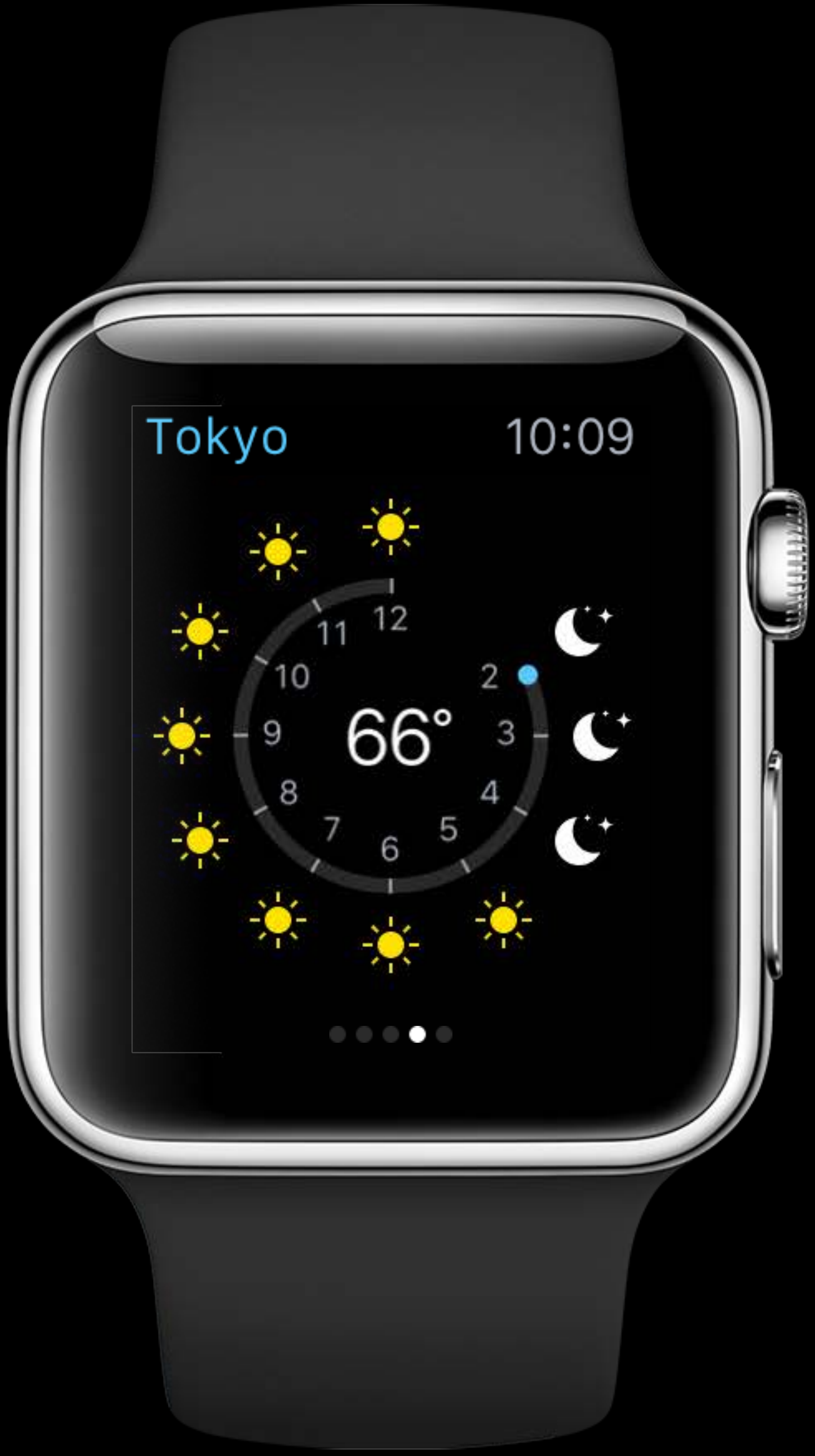
Interface Elements

Interface Elements



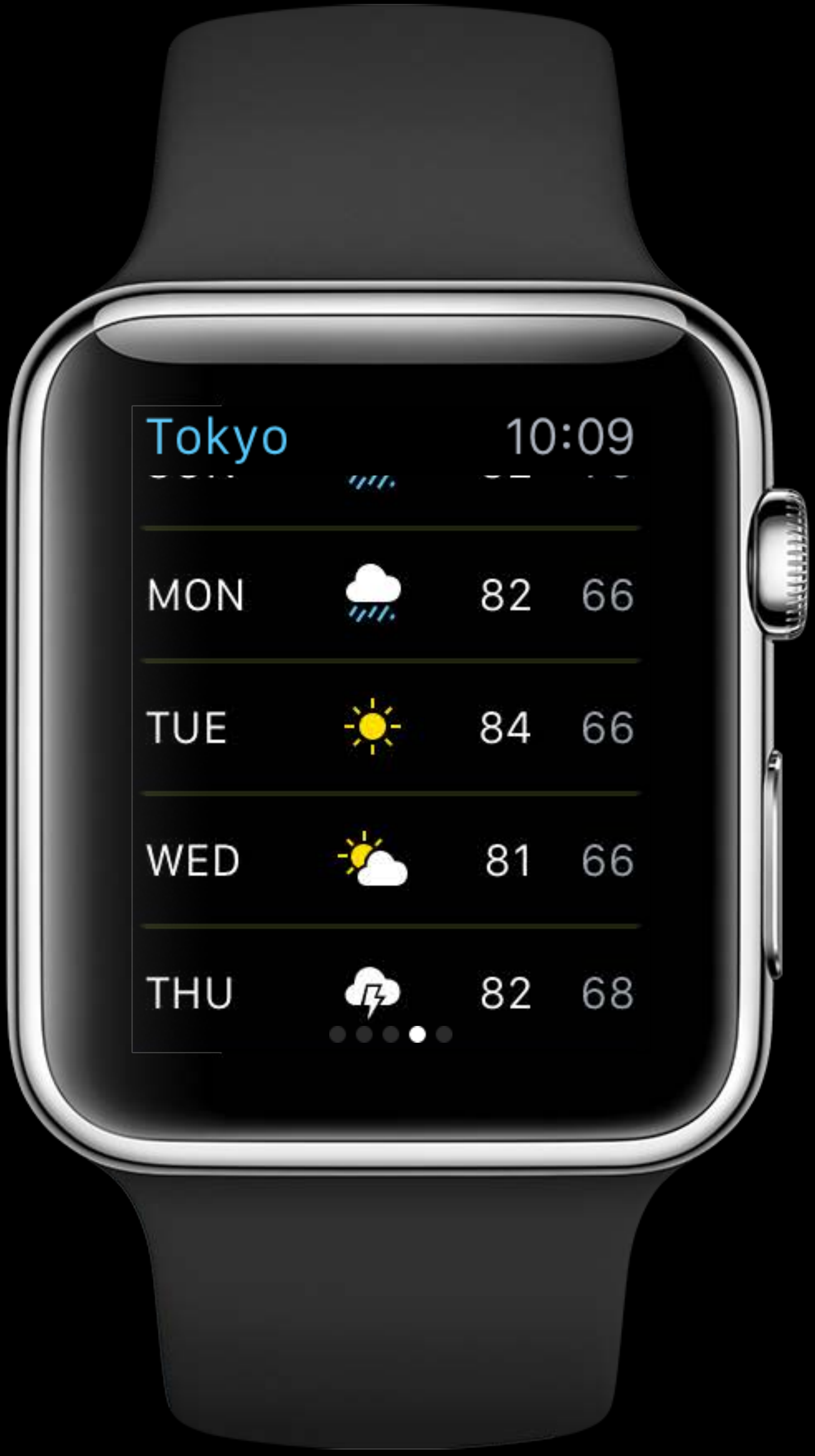
Interface Elements

Prioritize content loading



Interface Elements

Prioritize content loading



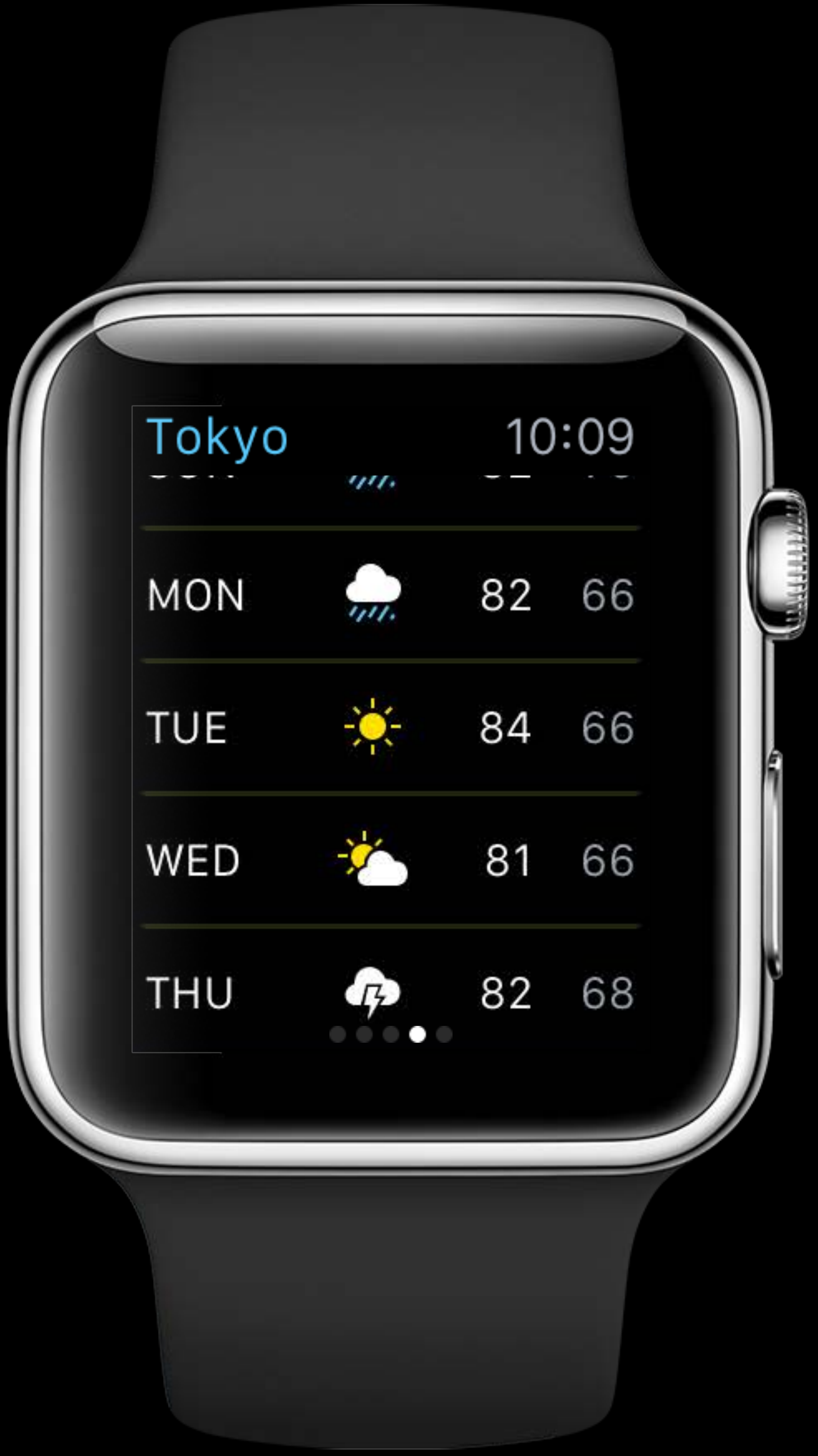
Tokyo 10:09

MON	🌧	82	66
TUE	☀	84	66
WED	⛅	81	66
THU	⛈	82	68

Interface Elements

Prioritize content loading

- Use `dispatch_async()` in `willActivate()`



Tokyo 10:09

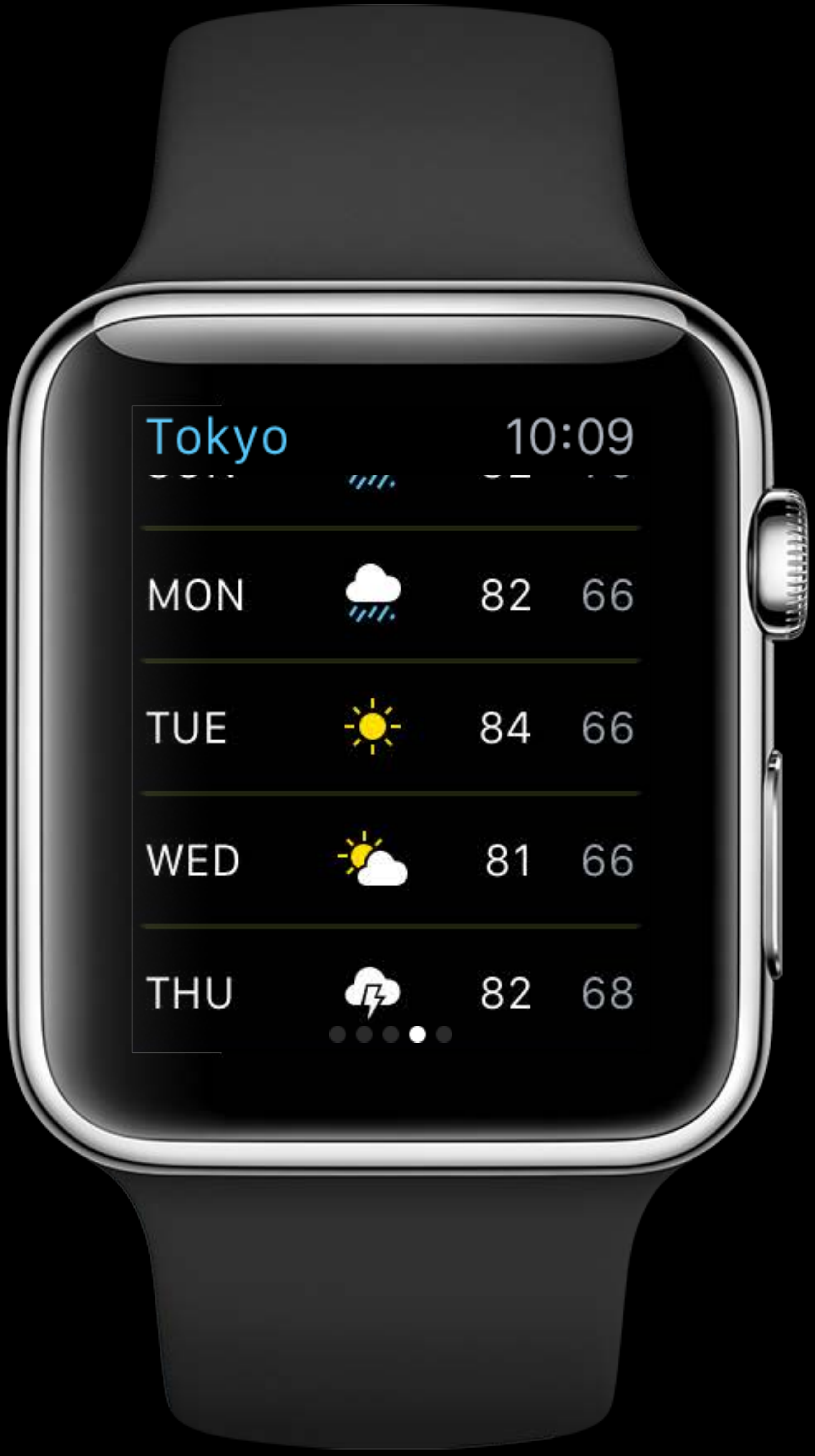
MON	82	66
TUE	84	66
WED	81	66
THU	82	68

Interface Elements

Prioritize content loading

- Use `dispatch_async()` in `willActivate()`

Load fewer table cells up front



Tokyo 10:09

MON	🌧	82	66
TUE	☀	84	66
WED	⛅	81	66
THU	⛈	82	68

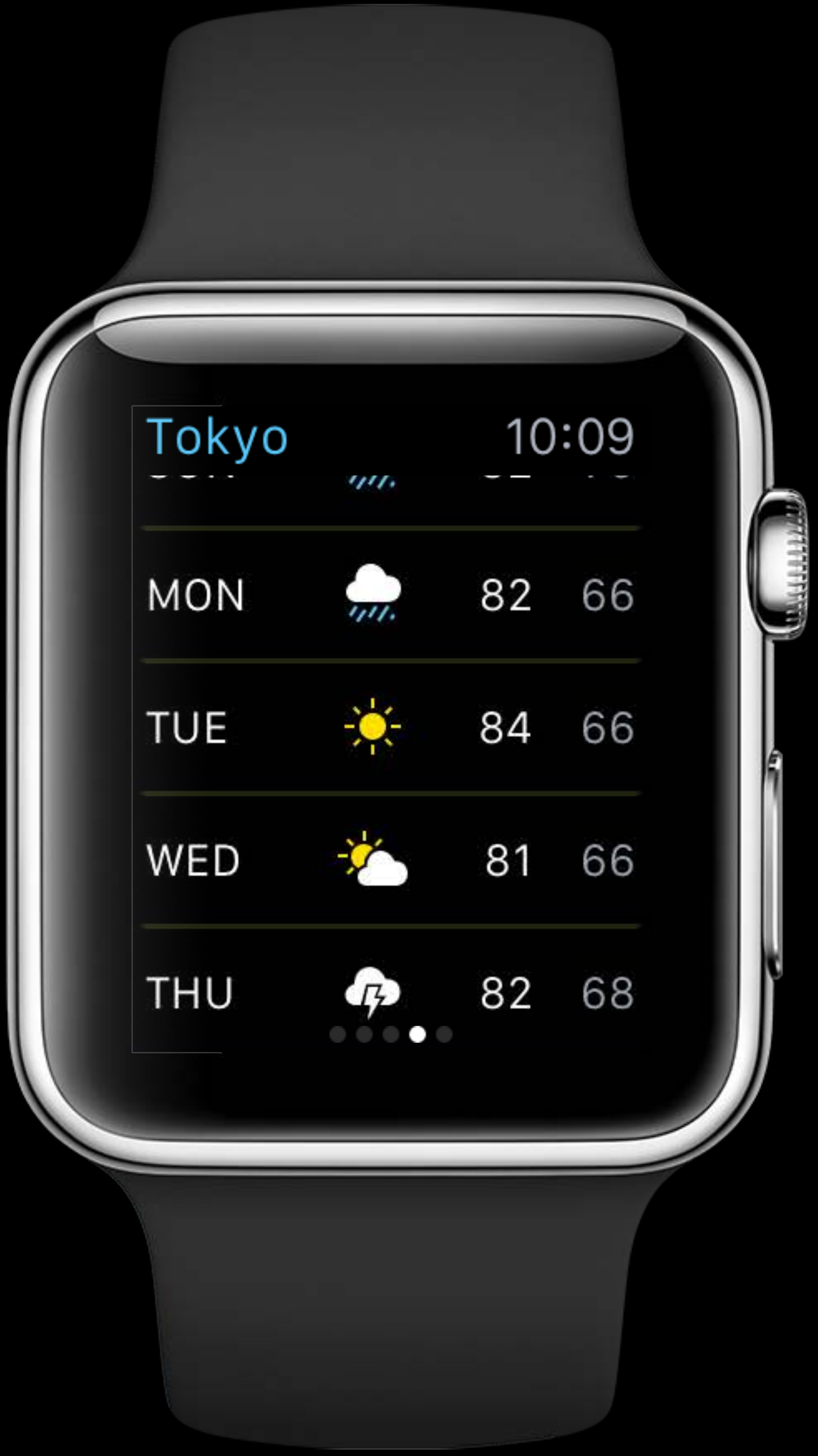
Interface Elements

Prioritize content loading

- Use `dispatch_async()` in `willActivate()`

Load fewer table cells up front

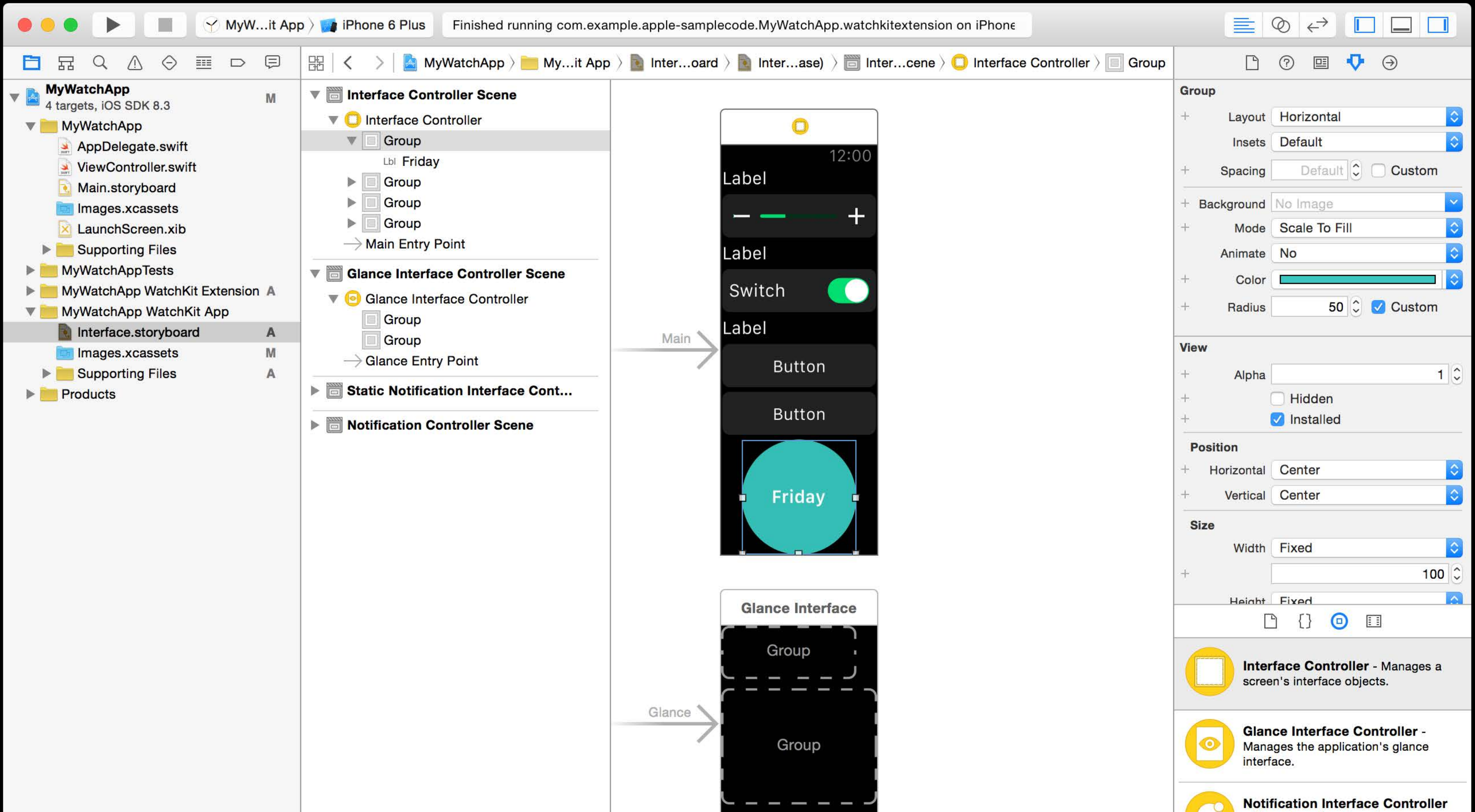
Update information that has changed



Tokyo 10:09

MON	82	66
TUE	84	66
WED	81	66
THU	82	68

Interface Elements



Finished running com.example.apple-samplecode.MyWatchApp.watchkitextension on iPhone

Group

- Layout: Horizontal
- Insets: Default
- Spacing: Default □ Custom
- Background: No Image
- Mode: Scale To Fill
- Animate: No
- Color: 🟦
- Radius: 50 ☑ Custom

View

- Alpha: 1
- □ Hidden
- ☑ Installed

Position

- Horizontal: Center
- Vertical: Center

Size

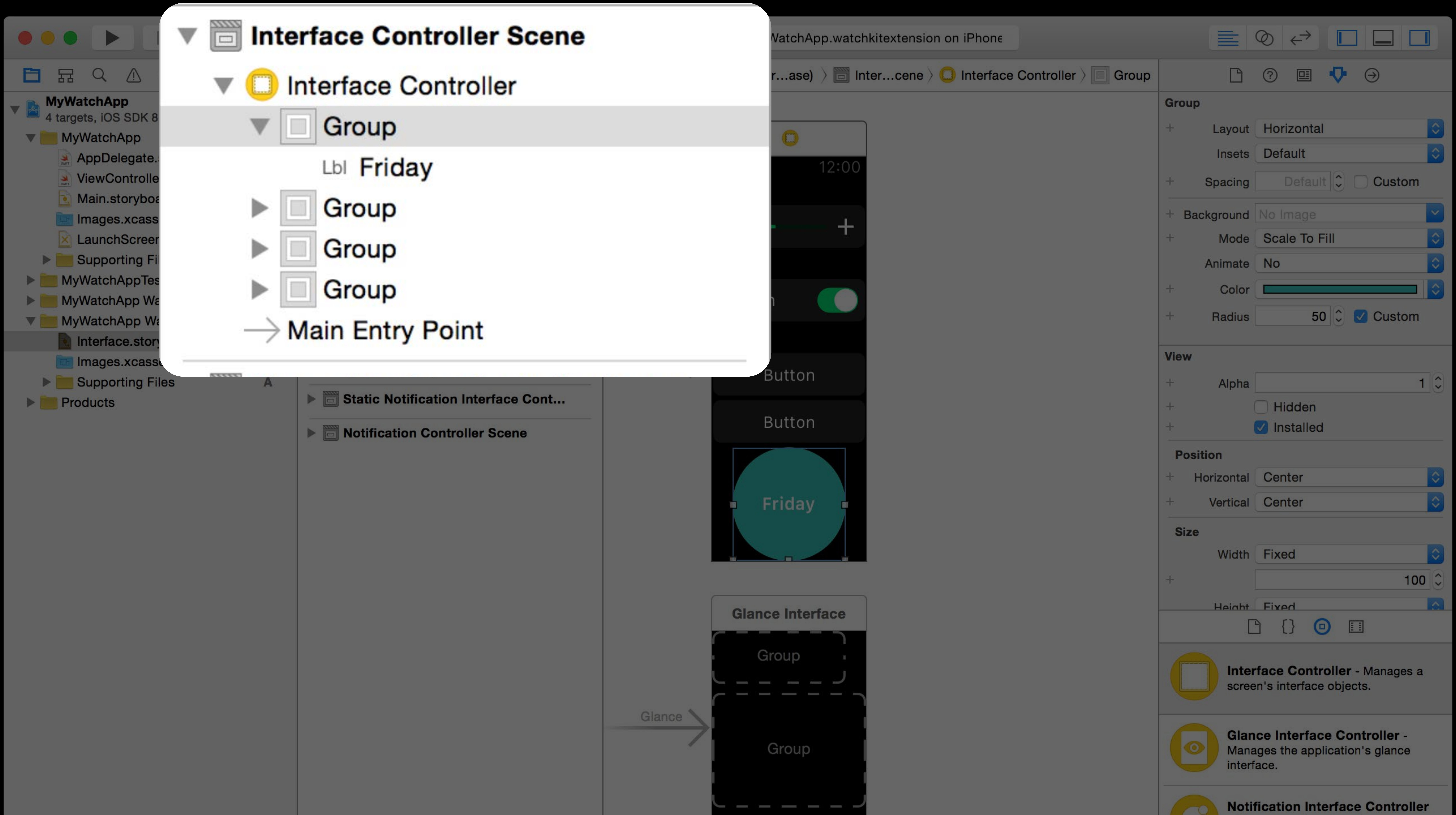
- Width: Fixed
- 100
- Height: Fixed

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements



Interface Controller Scene
- Interface Controller
  - Group
    - Lbl Friday
  - Group
  - Group
  - Group
- Main Entry Point

Group

Layout	Horizontal
Insets	Default
Spacing	Default □ Custom
Background	No Image
Mode	Scale To Fill
Animate	No
Color	
Radius	50 ☑ Custom

View

Alpha	1
	□ Hidden
	☑ Installed

Position

Horizontal	Center
Vertical	Center

Size

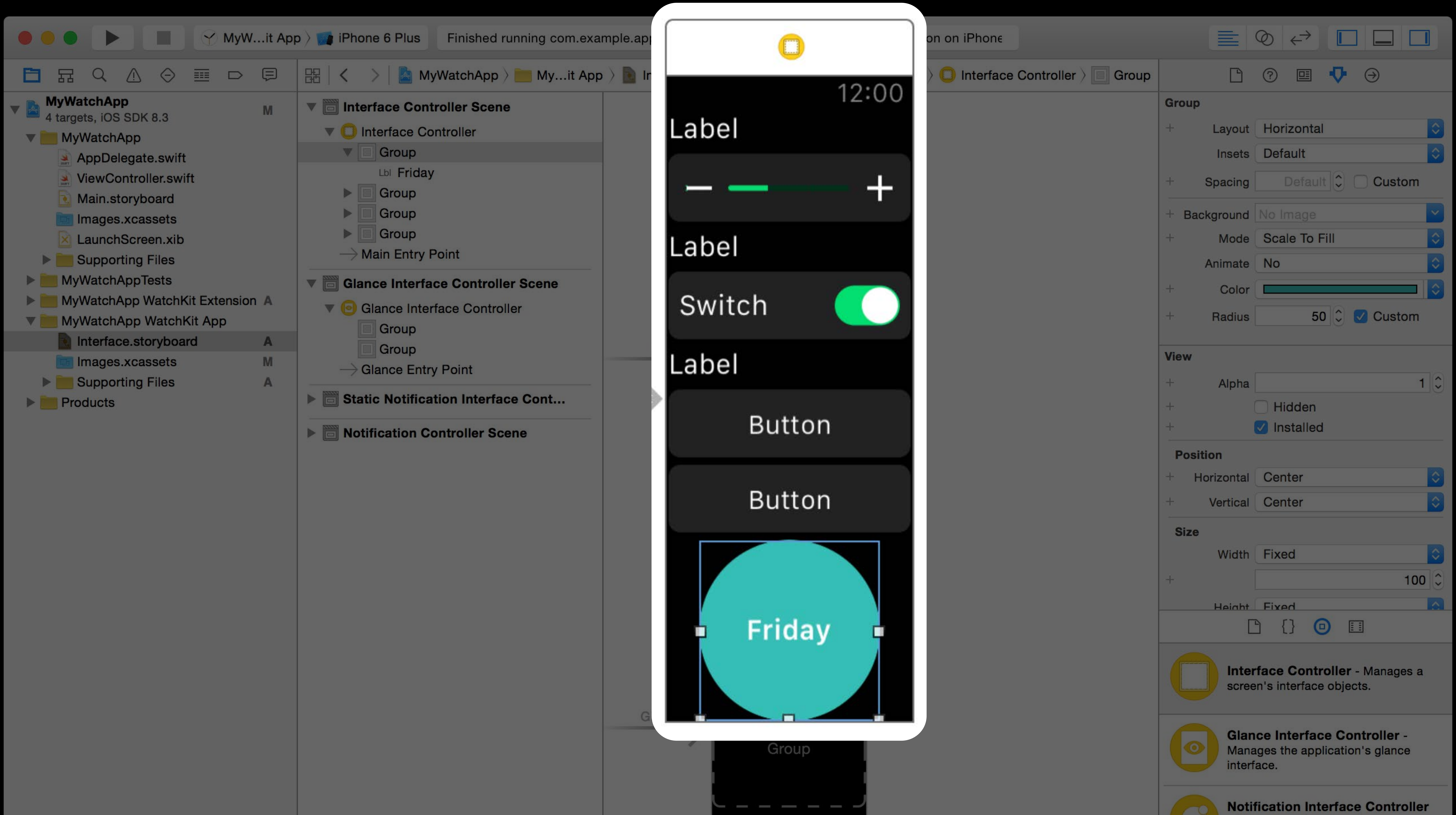
Width	Fixed
	100
Height	Fixed

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements



Group

Layout: Horizontal
Insets: Default
Spacing: Default □ Custom
Background: No Image
Mode: Scale To Fill
Animate: No
Color
Radius: 50 ☑ Custom

View

Alpha: 1
□ Hidden
☑ Installed

Position

Horizontal: Center
Vertical: Center

Size

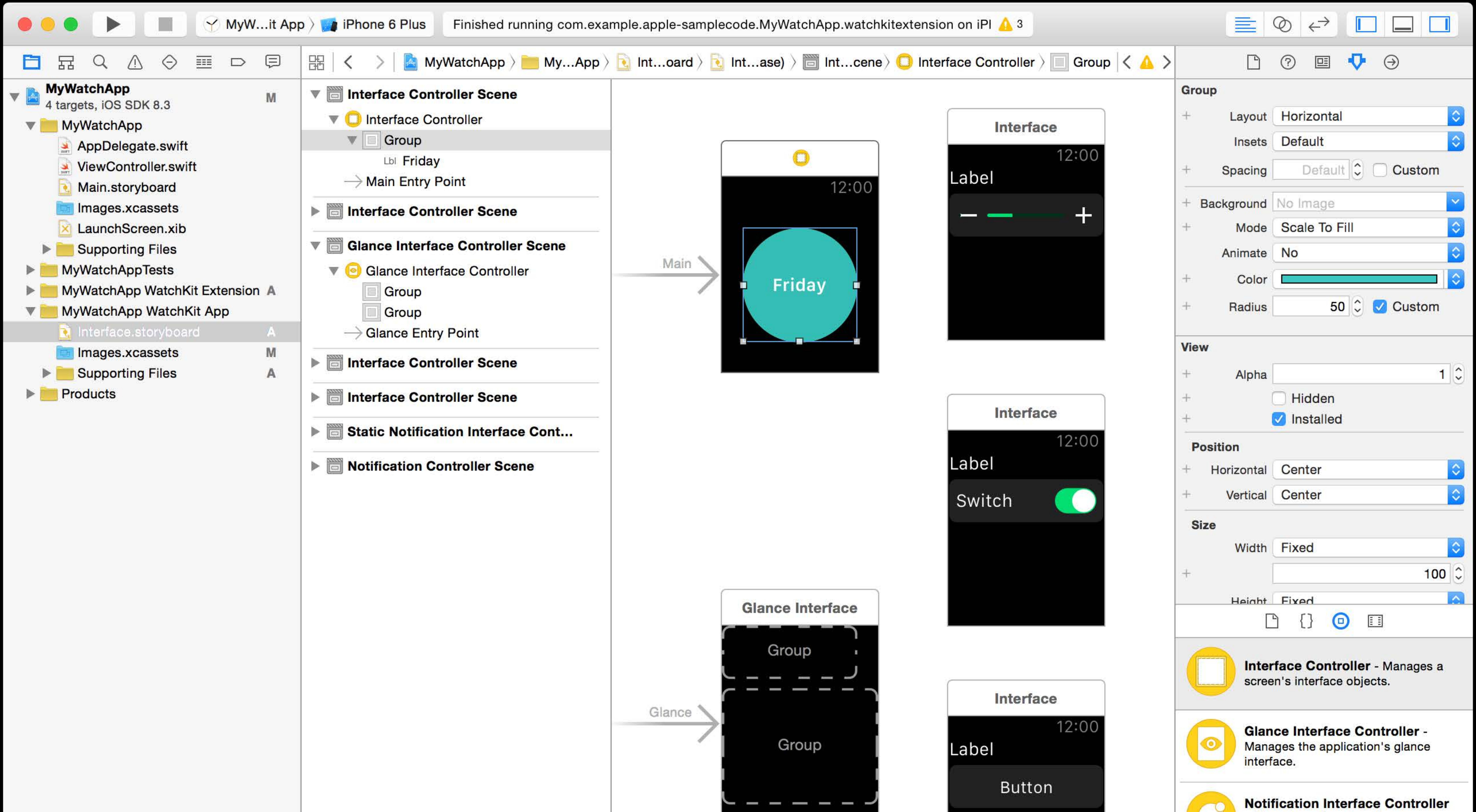
Width: Fixed
100
Height: Fixed

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements



Finished running com.example.apple-samplecode.MyWatchApp.watchkitextension on iPl ⚠ 3

Group

- Layout: Horizontal
- Insets: Default
- Spacing: Default □ Custom
- Background: No Image
- Mode: Scale To Fill
- Animate: No
- Color: 🟩
- Radius: 50 ☑ Custom

View

- Alpha: 1
- □ Hidden
- ☑ Installed

Position

- Horizontal: Center
- Vertical: Center

Size

- Width: Fixed
- 100
- Height: Fixed

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements

Interface Elements

Use properly sized assets from your server/app

Interface Elements

Use properly sized assets from your server/app

Optimize images using `setImageData()`

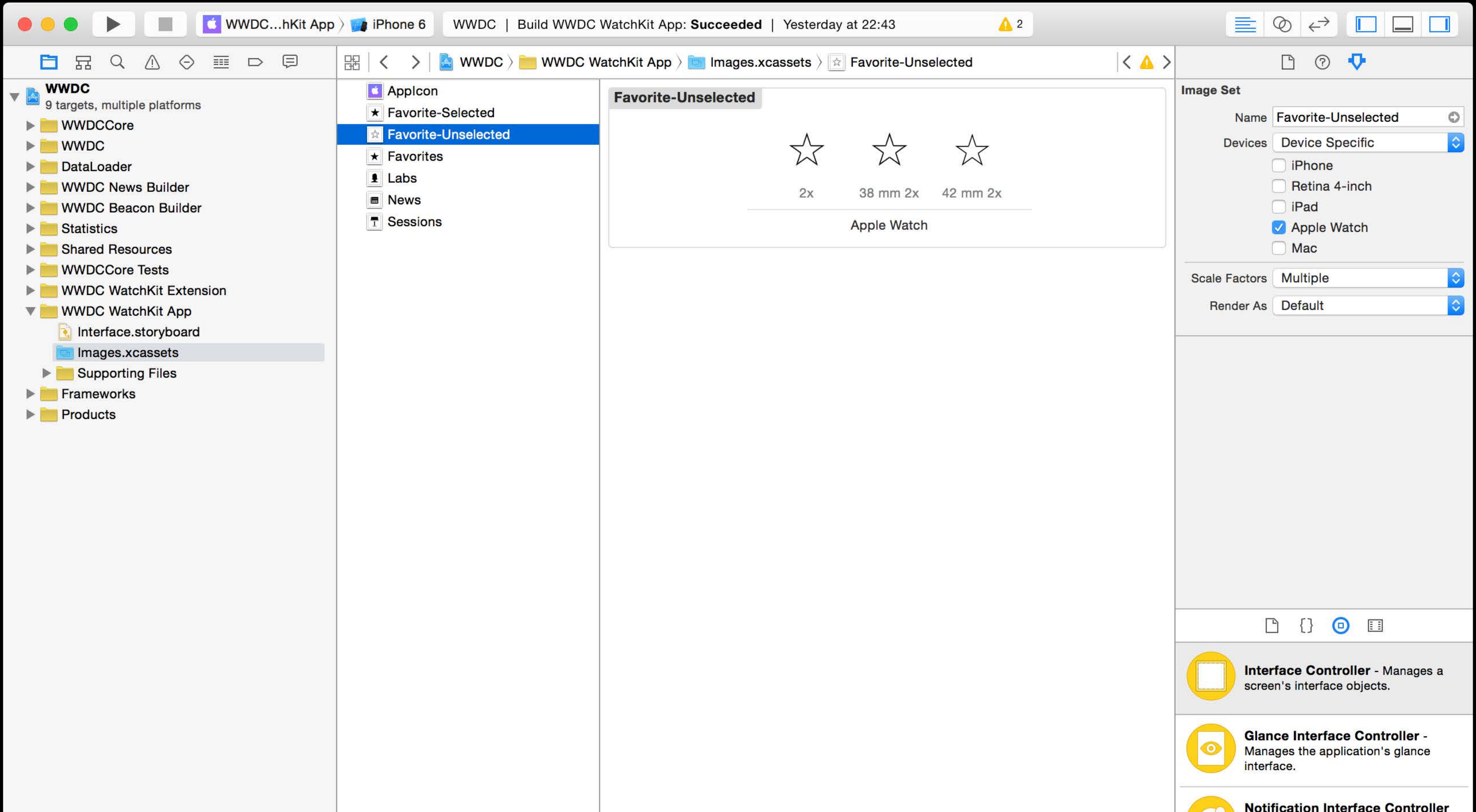
Interface Elements

Use properly sized assets from your server/app

Optimize images using `setImageData()`

Use asset catalogs

Interface Elements



WWDC | Build WWDC WatchKit App: **Succeeded** | Yesterday at 22:43

2
WWDC › WWDC WatchKit App › Images.xcassets › Favorite-Unselected

- **WWDC**
  9 targets, multiple platforms
  - WWDCCore
  - WWDC
  - DataLoader
  - WWDC News Builder
  - WWDC Beacon Builder
  - Statistics
  - Shared Resources
  - WWDCCore Tests
  - WWDC WatchKit Extension
  - WWDC WatchKit App
    - Interface.storyboard
    - Images.xcassets
    - Supporting Files
  - Frameworks
  - Products

- AppIcon
- Favorite-Selected
- Favorite-Unselected
- Favorites
- Labs
- News
- Sessions

Favorite-Unselected

Image Set

Name: Favorite-Unselected

Devices: Device Specific

- □ iPhone
- □ Retina 4-inch
- □ iPad
- ☑ Apple Watch
- □ Mac

Scale Factors: Multiple

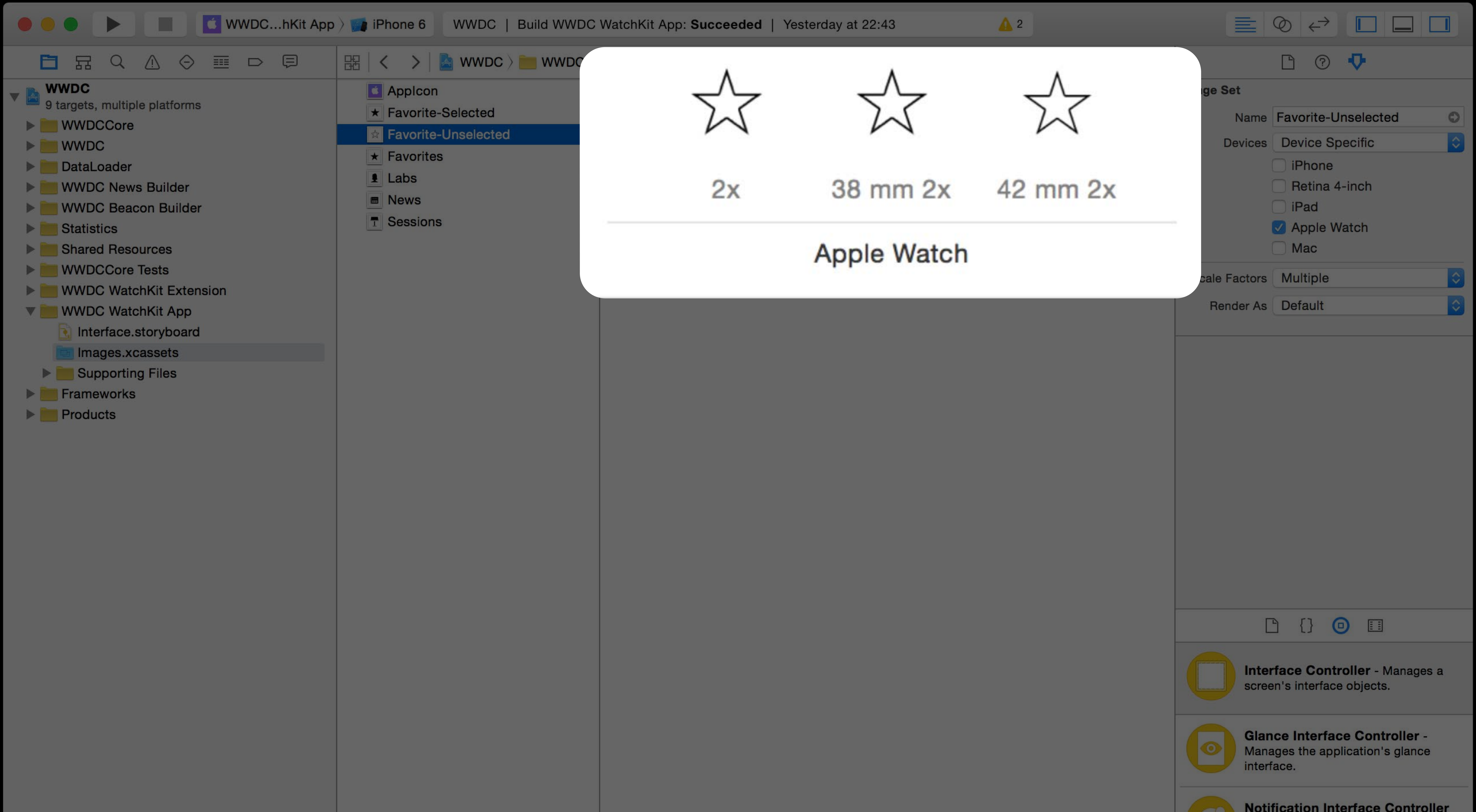
Render As: Default

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements



WWDC...hKit App 〉 iPhone 6

WWDC | Build WWDC WatchKit App: **Succeeded** | Yesterday at 22:43 ⚠ 2

WWDC 〉 WWDC

- **WWDC**
  9 targets, multiple platforms
  - WWDCCore
  - WWDC
  - DataLoader
  - WWDC News Builder
  - WWDC Beacon Builder
  - Statistics
  - Shared Resources
  - WWDCCore Tests
  - WWDC WatchKit Extension
  - WWDC WatchKit App
    - Interface.storyboard
    - Images.xcassets
    - Supporting Files
  - Frameworks
  - Products

- AppIcon
- Favorite-Selected
- Favorite-Unselected
- Favorites
- Labs
- News
- Sessions

ge Set

Name: Favorite-Unselected

Devices: Device Specific

- ☐ iPhone
- ☐ Retina 4-inch
- ☐ iPad
- ☑ Apple Watch
- ☐ Mac

cale Factors: Multiple

Render As: Default

Interface Controller - Manages a screen's interface objects.

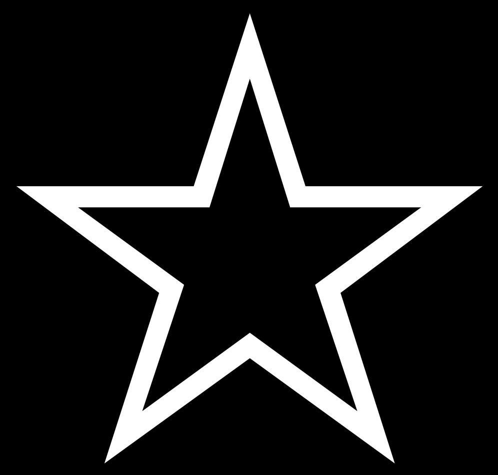
Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements

Apple Watch

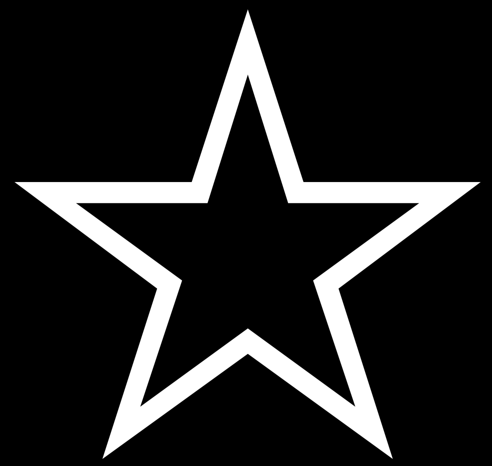
Interface Elements



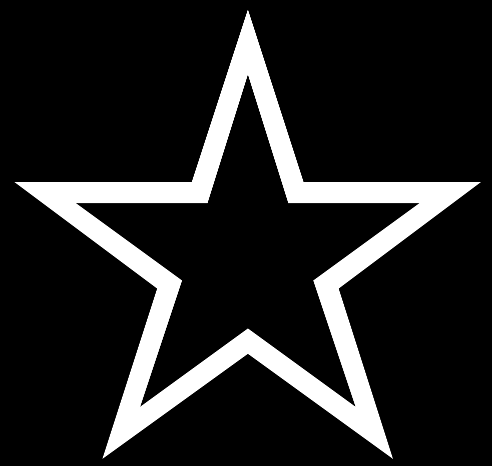
2x

Apple Watch

Interface Elements



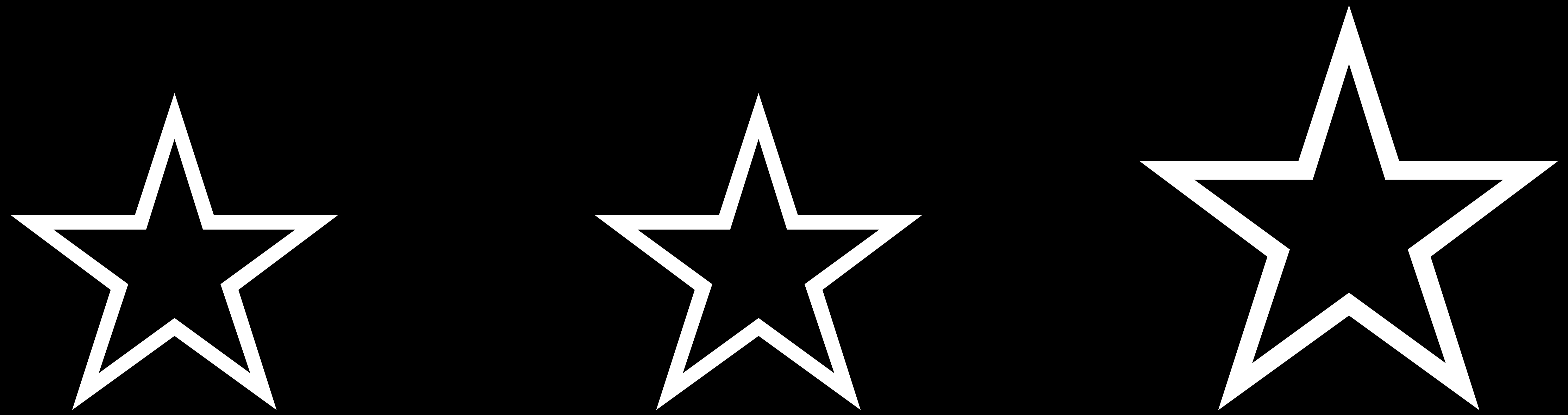
2x



38 mm 2x

Apple Watch

Interface Elements



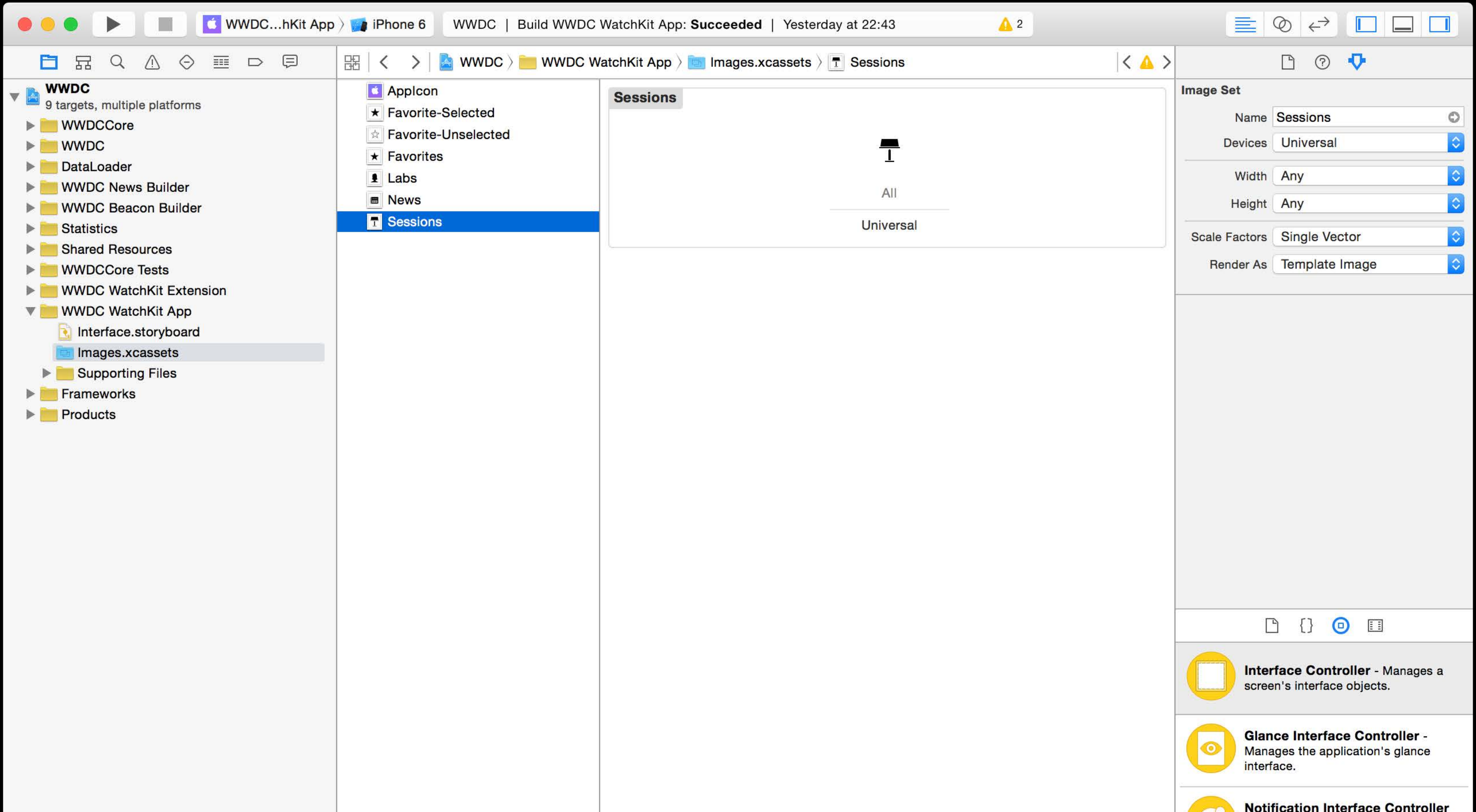
2x

38 mm 2x

42 mm 2x

Apple Watch

Interface Elements



WWDC...hKit App 〉 iPhone 6

WWDC | Build WWDC WatchKit App: **Succeeded** | Yesterday at 22:43 ⚠ 2

WWDC 〉 WWDC WatchKit App 〉 Images.xcassets 〉 Sessions

WWDC
9 targets, multiple platforms

- WWDCCore
- WWDC
- DataLoader
- WWDC News Builder
- WWDC Beacon Builder
- Statistics
- Shared Resources
- WWDCCore Tests
- WWDC WatchKit Extension
- WWDC WatchKit App
  - Interface.storyboard
  - Images.xcassets
  - Supporting Files
- Frameworks
- Products

- AppIcon
- Favorite-Selected
- Favorite-Unselected
- Favorites
- Labs
- News
- Sessions

Sessions

All

Universal

Image Set

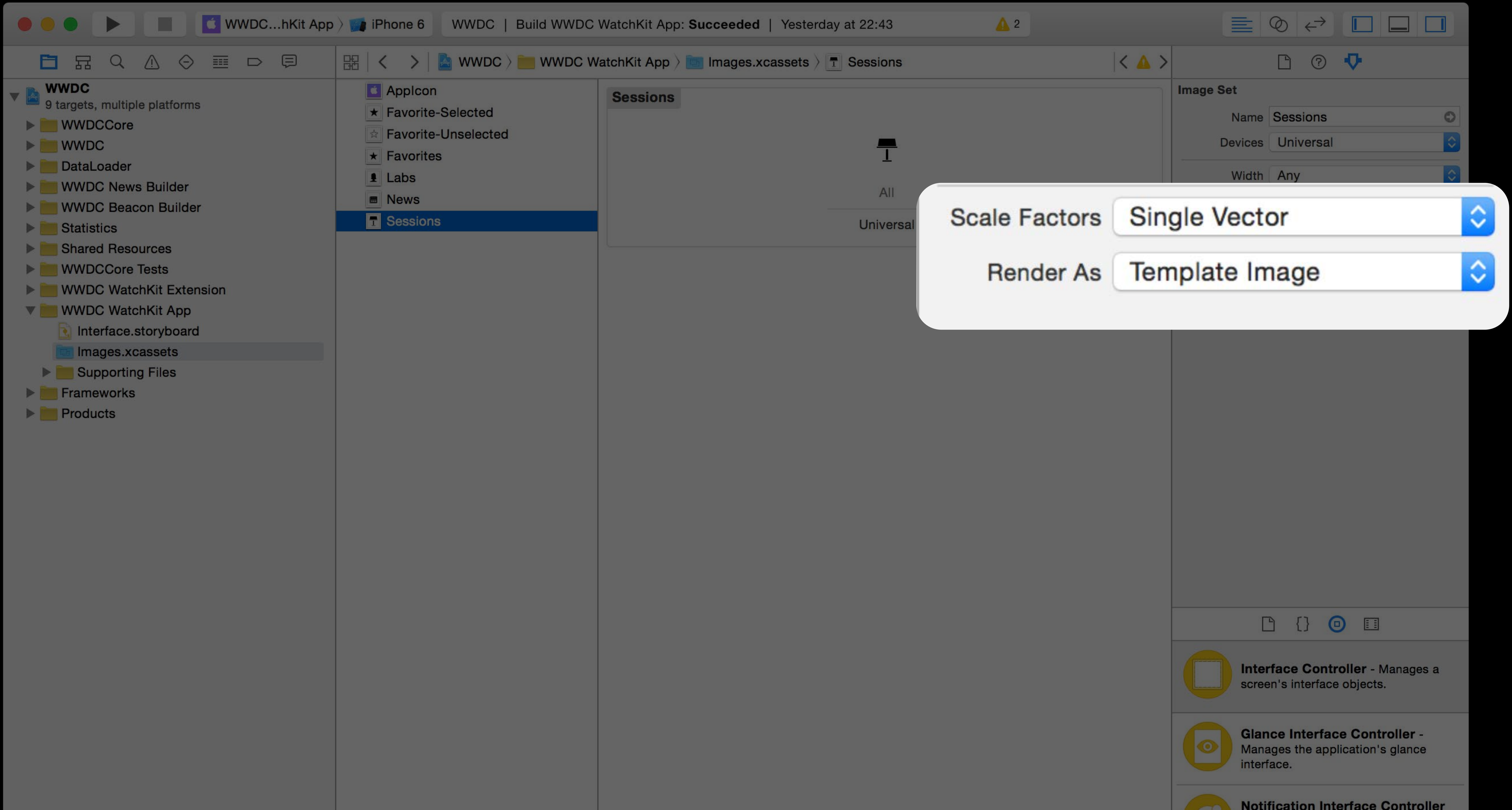
Name	Sessions
Devices	Universal
Width	Any
Height	Any
Scale Factors	Single Vector
Render As	Template Image

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

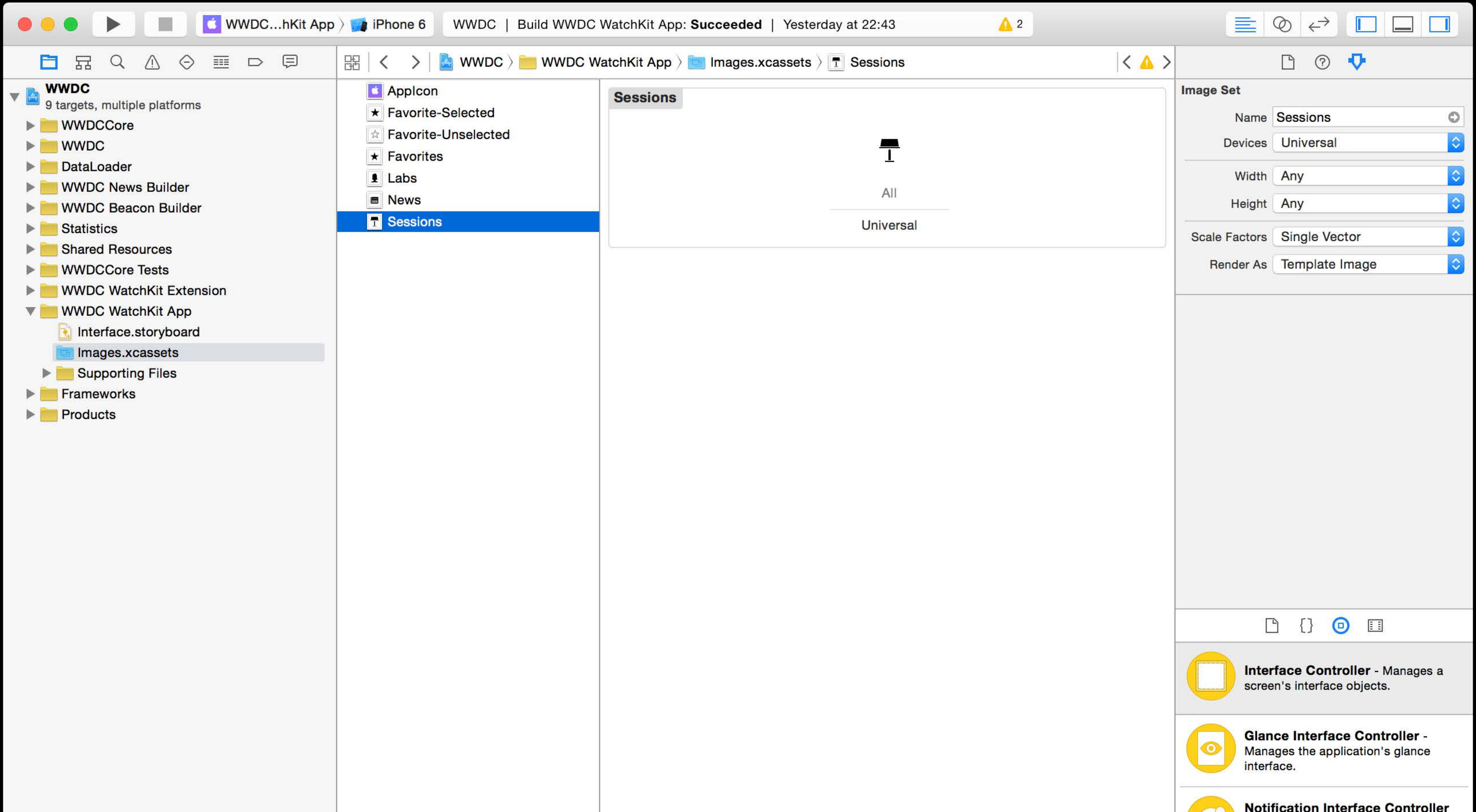
Interface Elements



Scale Factors: Single Vector

Render As: Template Image

Interface Elements



Name: Sessions
Devices: Universal
Width: Any
Height: Any
Scale Factors: Single Vector
Render As: Template Image

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Interface Elements

Interface Elements

Multiple animated images means more processing and rendering

Interface Elements

Multiple animated images means more processing and rendering

Reduce size and FPS for animated images

Interface Elements

Multiple animated images means more processing and rendering

Reduce size and FPS for animated images

Run animated images in reverse

```
backgroundGroup.startAnimatingWithImagesInRange(NSRange(location: 0,
    length: 15), duration: -1, repeatCount: 0)
```

Interface Elements

NEW

Interface Elements

NEW

Animation API in watchOS 2

Interface Elements

NEW

Animation API in watchOS 2

- Similar to UIView animations

Interface Elements

NEW

Animation API in watchOS 2

- Similar to UIView animations
- Animate height, width, alpha, insets, and more

Interface Elements

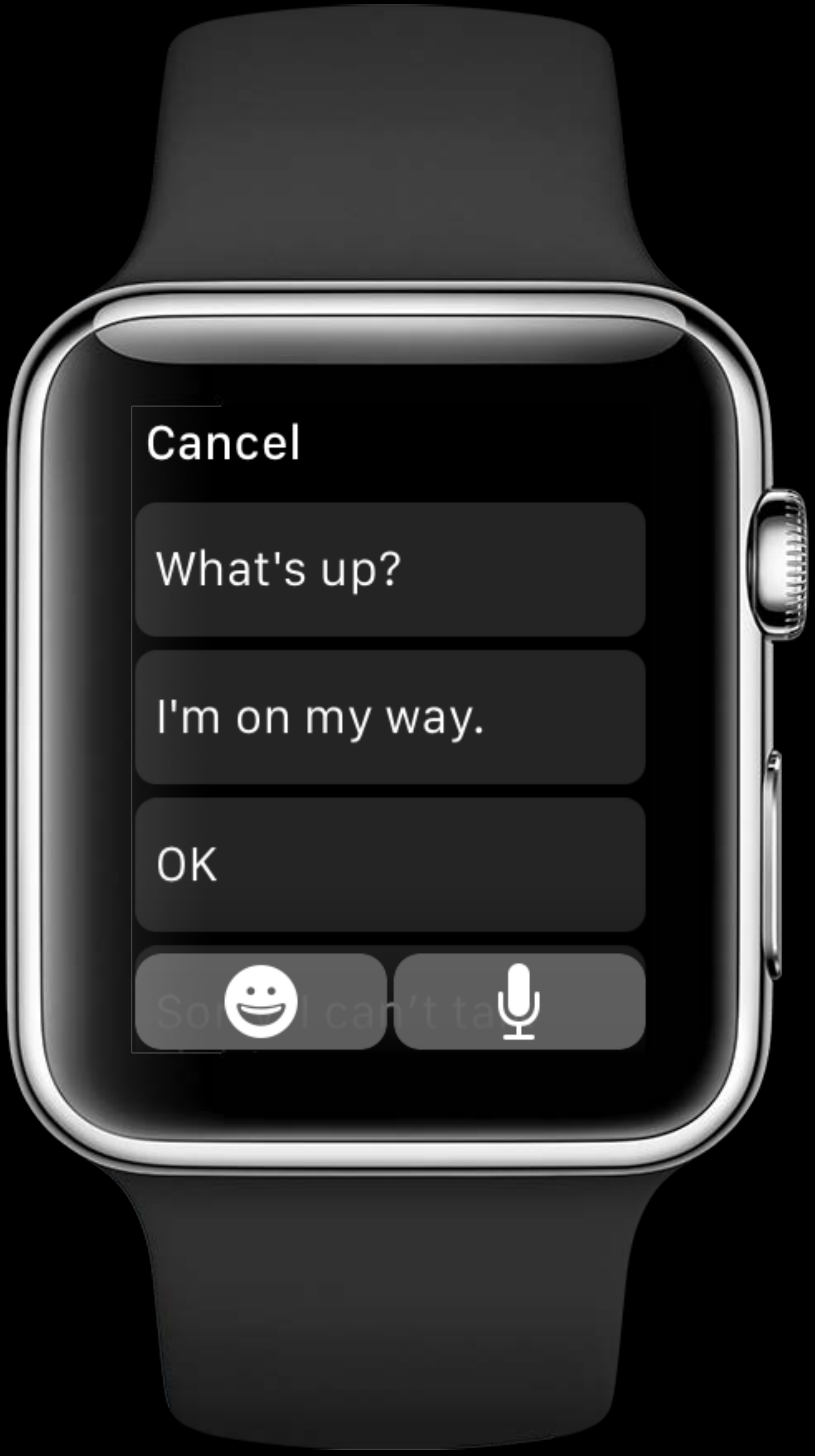
NEW

Animation API in watchOS 2

- Similar to UIView animations
- Animate height, width, alpha, insets, and more

Layout and Animation Techniques for WatchKit	Pacific Heights	Thursday 10:00AM
Apple Watch Design Tips and Tricks	Presidio	Friday 3:30PM

Interface Elements



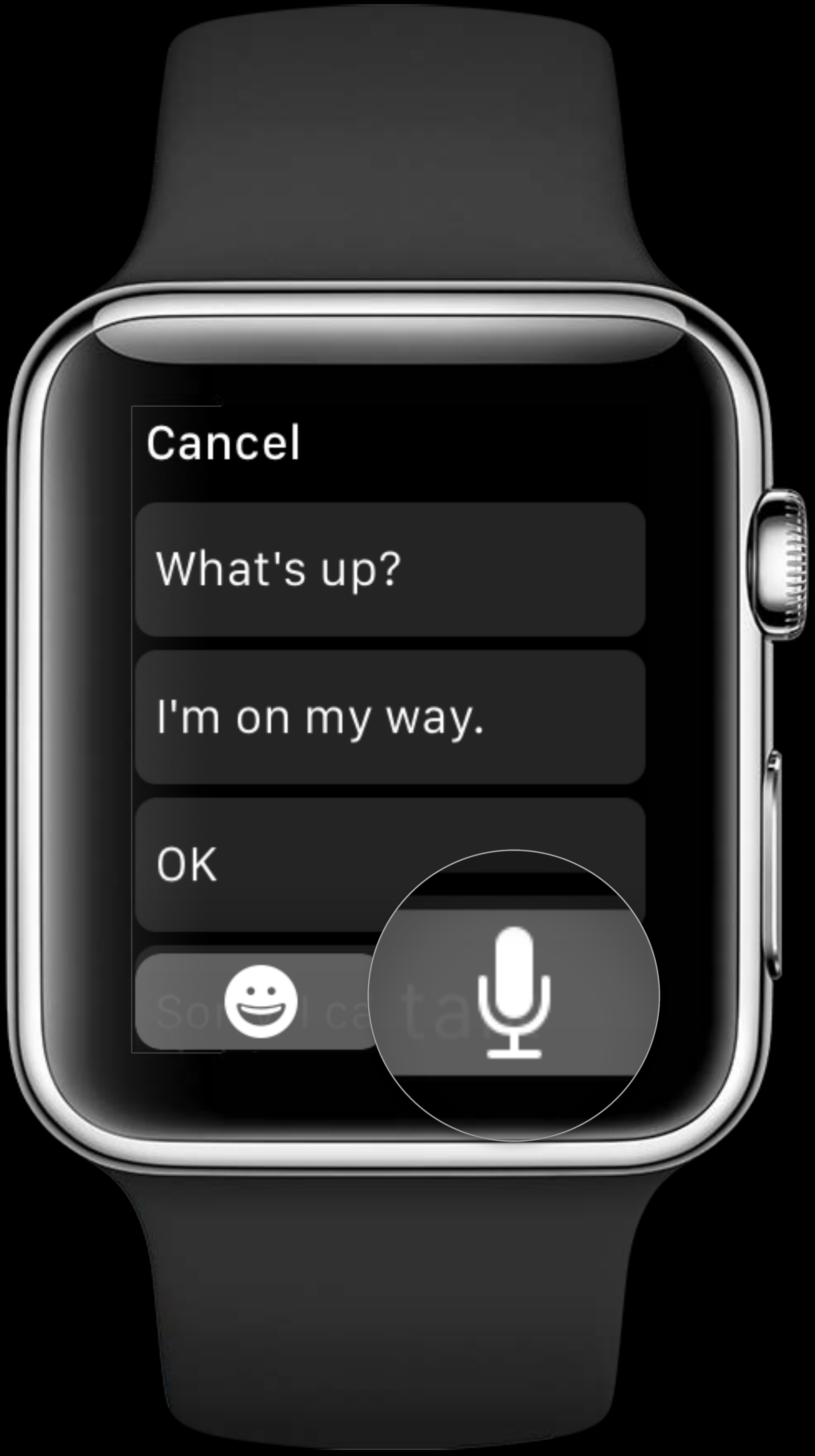
Cancel

What's up?

I'm on my way.

OK

Interface Elements



Cancel

What's up?

I'm on my way.

OK

Interface Elements

Take users directly to voice dictation

```
presentTextInputControllerWithSuggestions(nil, allowedInputMode: .Plain,
completion: { result in
    // Work with result
})
```

Notifications

Notifications

```
{
    "aps": {
        "alert": {
            "body": "This shows in the notification.",
            "title": "Short-Look Title"
        },
        "category": "mainCategory",
        "sound": "default"
    }
}
```

Notifications

```
{
    "aps": {
        "alert": {
            "body": "This shows in the notification.",
            "title": "Short-Look Title"
        },
        "category": "mainCategory",
        "sound": "default"
    }
}
```

Notifications

```
{
    "aps": {
        "alert": {
            "body": "This shows in the notification.",
            "title": "Short-Look Title"
        },
        "category": "mainCategory",
        "sound": "default"
    }
}
```

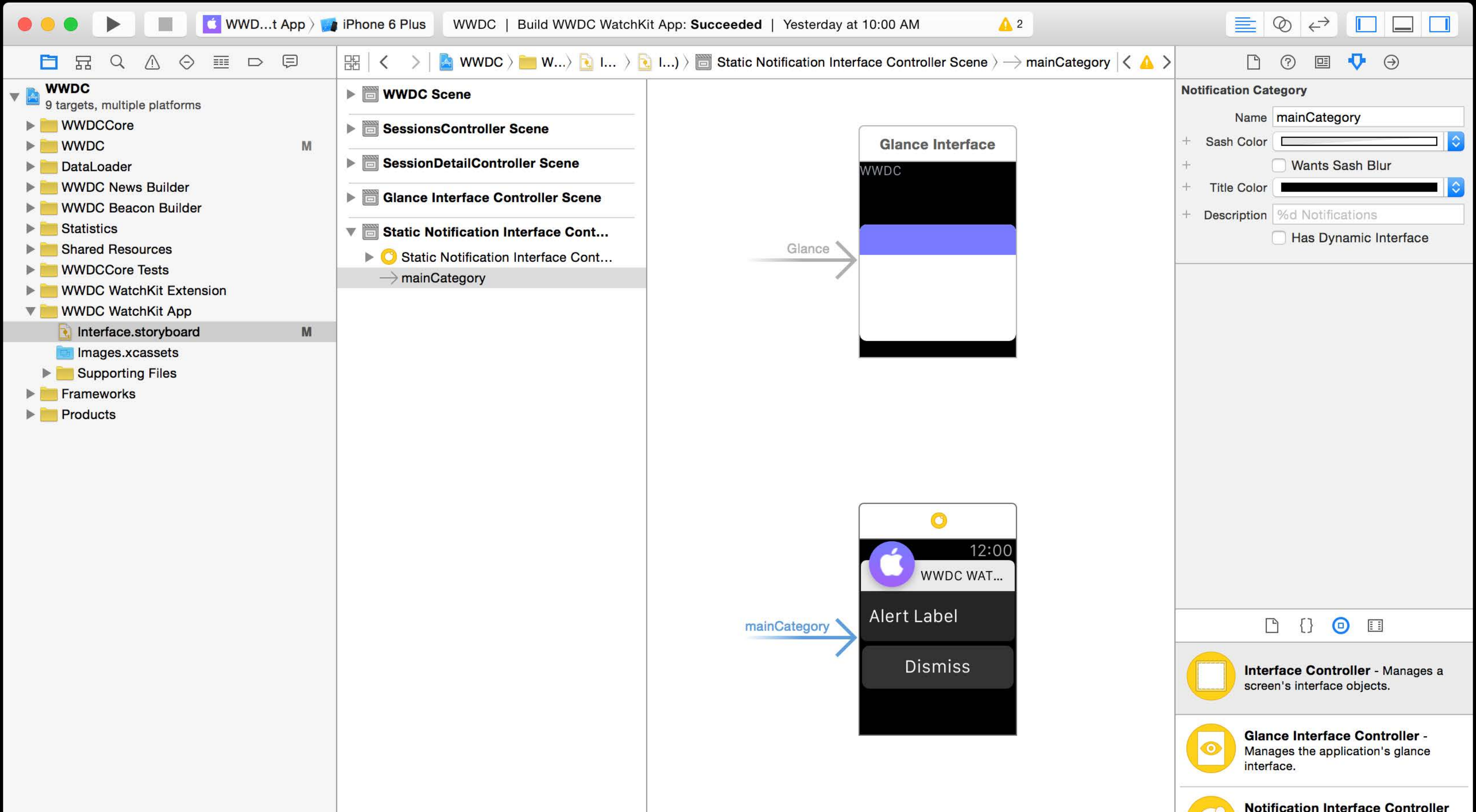
Notifications

Notifications

Notifications

```
{
    "aps": {
        "alert": {
            "body": "This shows in the notification.",
            "title": "Short-Look Title"
        },
        "category": "mainCategory",
        "sound": "default"
    }
}
```

Notifications



WWD...t App 〉 iPhone 6 Plus | WWDC | Build WWDC WatchKit App: **Succeeded** | Yesterday at 10:00 AM ⚠ 2

WWDC 〉 W...〉 I... 〉 I...) 〉 Static Notification Interface Controller Scene 〉 → mainCategory

- **WWDC**
  - 9 targets, multiple platforms
  - WWDCCore
  - WWDC M
  - DataLoader
  - WWDC News Builder
  - WWDC Beacon Builder
  - Statistics
  - Shared Resources
  - WWDCCore Tests
  - WWDC WatchKit Extension
  - WWDC WatchKit App
    - Interface.storyboard M
    - Images.xcassets
    - Supporting Files
  - Frameworks
  - Products

- **WWDC Scene**
- **SessionsController Scene**
- **SessionDetailController Scene**
- **Glance Interface Controller Scene**
- **Static Notification Interface Cont...**
  - Static Notification Interface Cont...
  - → mainCategory

Notification Category

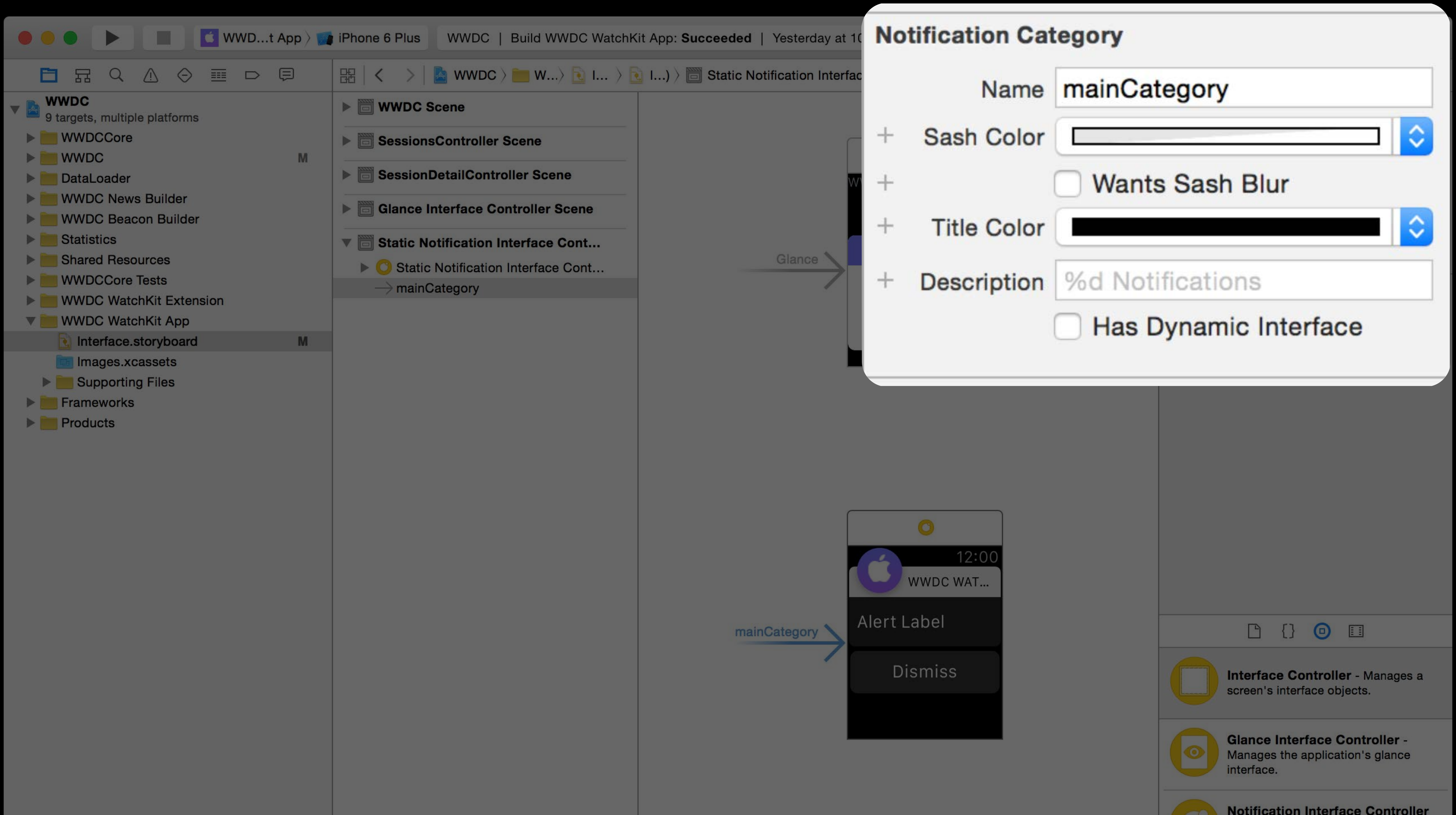
Name	mainCategory
Sash Color	
	□ Wants Sash Blur
Title Color	
Description	%d Notifications
	□ Has Dynamic Interface

Interface Controller - Manages a screen's interface objects.

Glance Interface Controller - Manages the application's glance interface.

Notification Interface Controller

Notifications



Notification Category

Name: mainCategory

Sash Color

□ Wants Sash Blur

Title Color

Description: %d Notifications

□ Has Dynamic Interface

WWD...t App
iPhone 6 Plus
WWDC | Build WWDC WatchKit App: Succeeded | Yesterday at 10
WWDC
W...
I...
I...)
Static Notification Interfac
WWDC
9 targets, multiple platforms
WWDCCore
WWDC
M
DataLoader
WWDC News Builder
WWDC Beacon Builder
Statistics
Shared Resources
WWDCCore Tests
WWDC WatchKit Extension
WWDC WatchKit App
Interface.storyboard
M
Images.xcassets
Supporting Files
Frameworks
Products
WWDC Scene
SessionsController Scene
SessionDetailController Scene
Glance Interface Controller Scene
Static Notification Interface Cont...
Static Notification Interface Cont...
mainCategory
Glance
mainCategory
12:00
WWDC WAT...
Alert Label
Dismiss
Interface Controller - Manages a screen's interface objects.
Glance Interface Controller - Manages the application's glance interface.
Notification Interface Controller

Notifications

```
{
    "aps": {
        "alert": {
            "body": "This shows in the notification.",
            "title": "Short-Look Title"
        },
        "category": "mainCategory",
        "sound": "default"
    }
}
```

Notifications

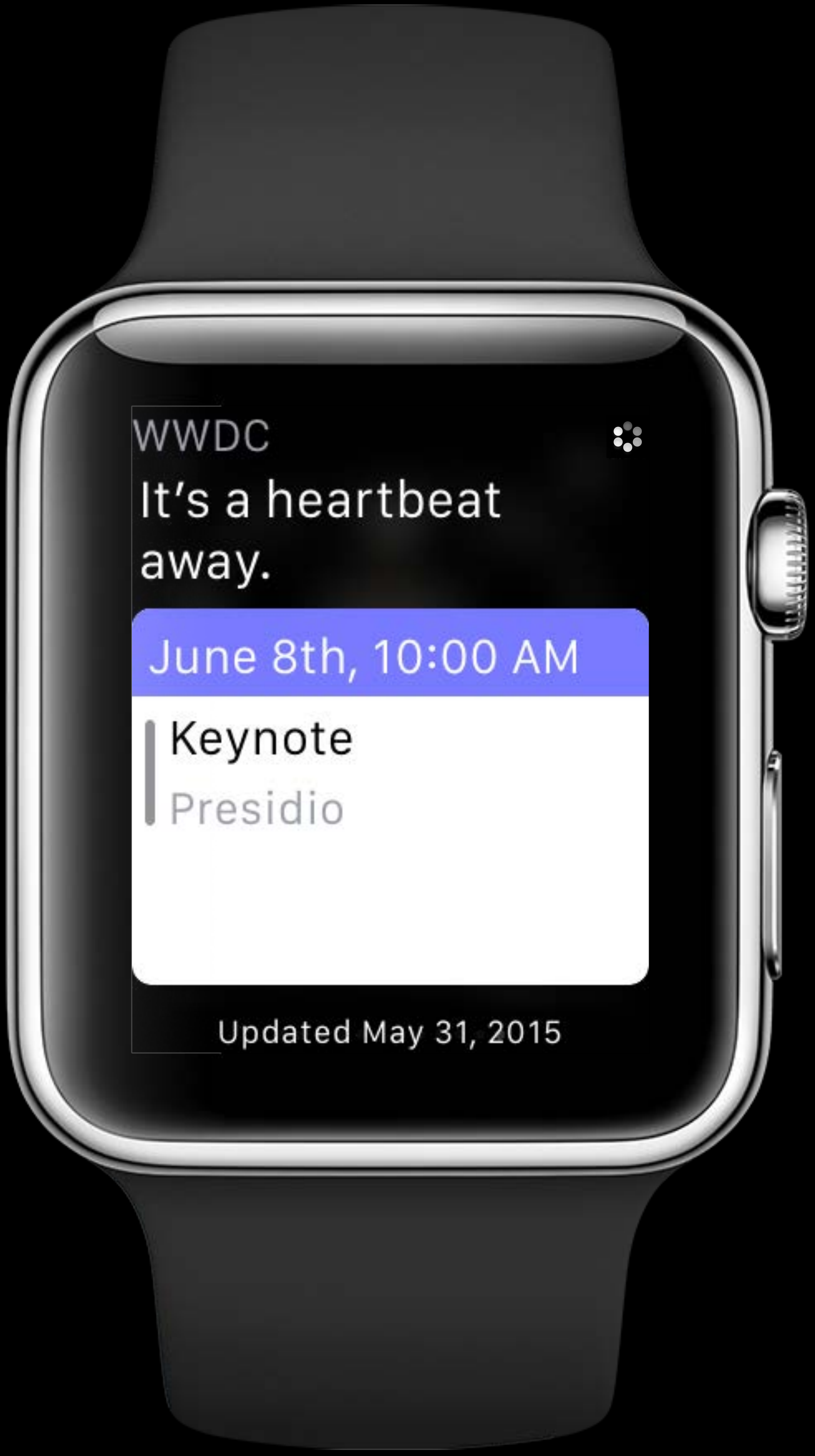
```
let notification = UILocalNotification()
notification.fireDate = futureNotificationFireDate
notification.alertBody = "This shows in the notification."
notification.alertTitle = "Short-Look Title"
notification.category = "mainCategory"
notification.soundName = UILocalNotificationDefaultSoundName
```

Notifications

Notifications

Glances

Glances



WWDC

It's a heartbeat away.

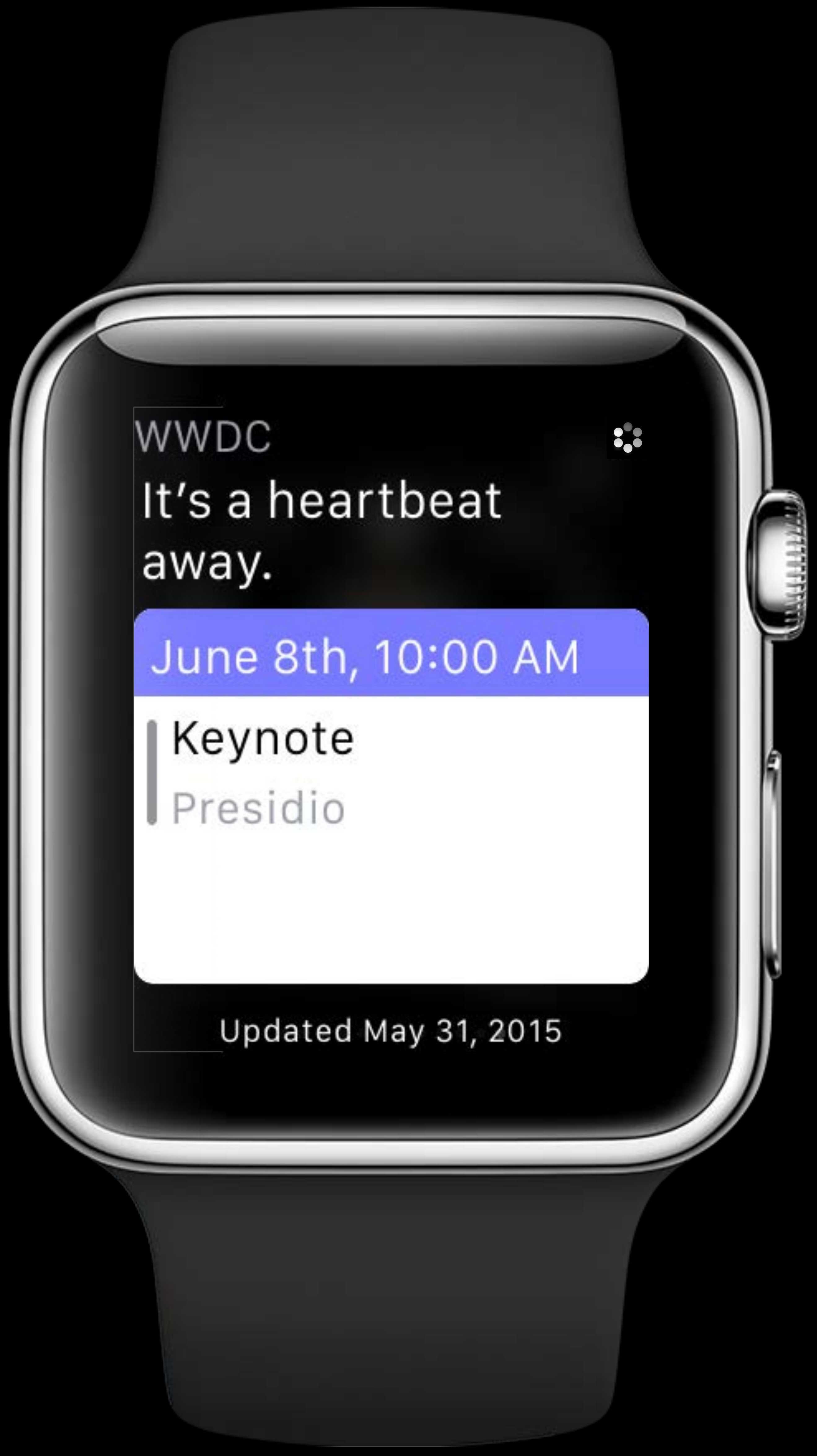
June 8th, 10:00 AM

Keynote

Presidio

Updated May 31, 2015

Glances



WWDC

It's a heartbeat away.

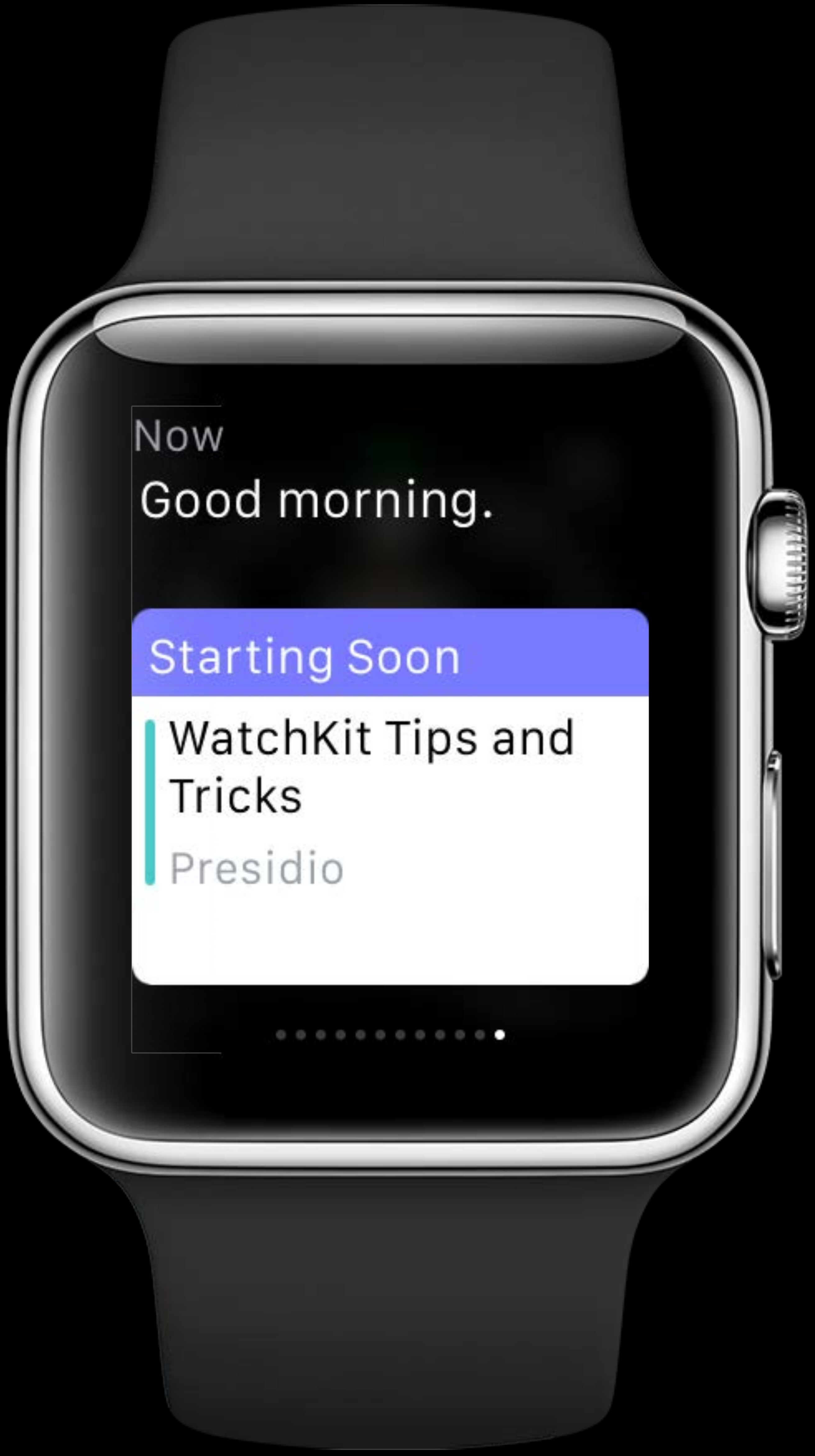
June 8th, 10:00 AM

Keynote

Presidio

Updated May 31, 2015

Glances



Now

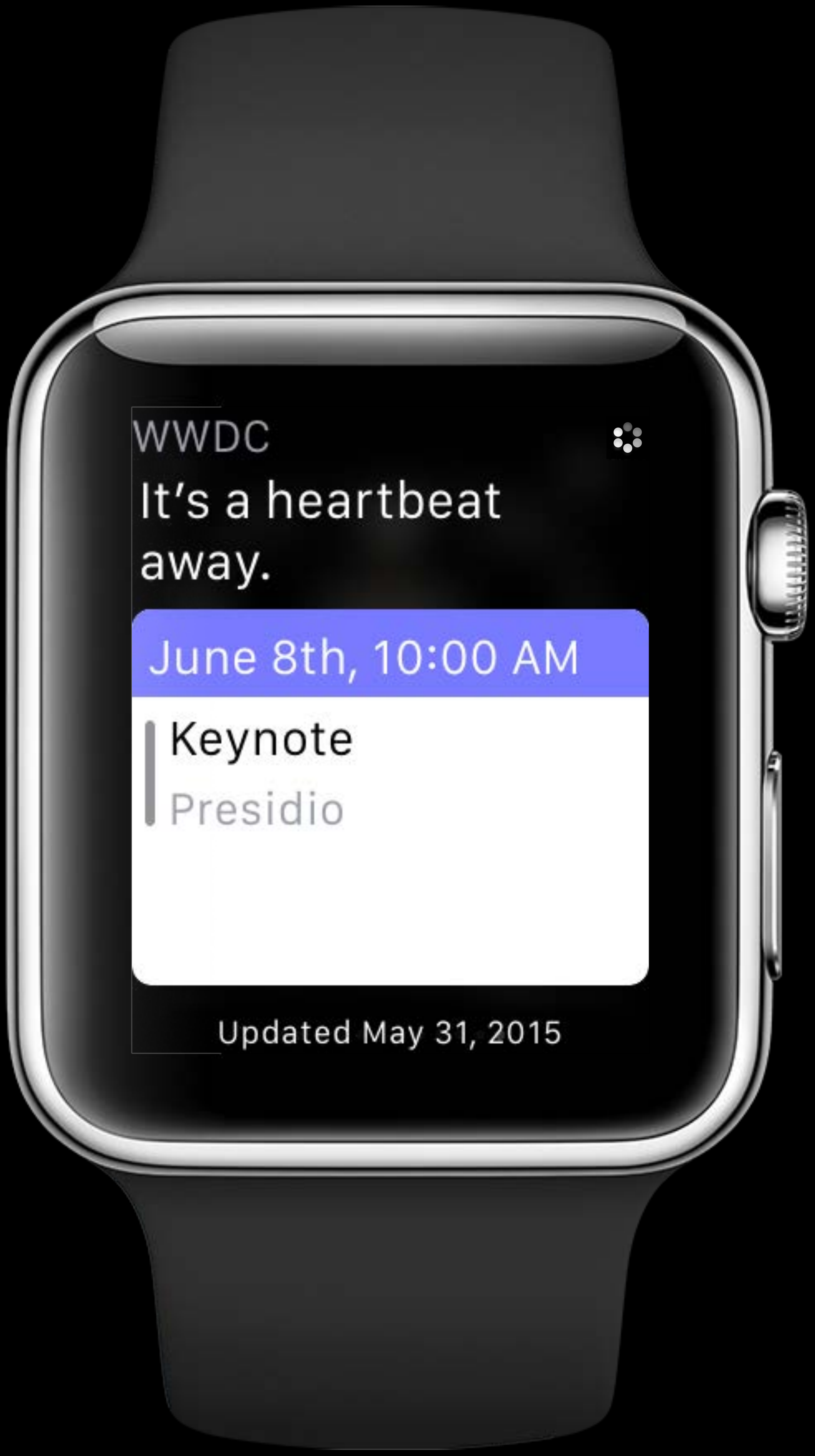
Good morning.

Starting Soon

WatchKit Tips and Tricks

Presidio

Glances



WWDC

It's a heartbeat away.

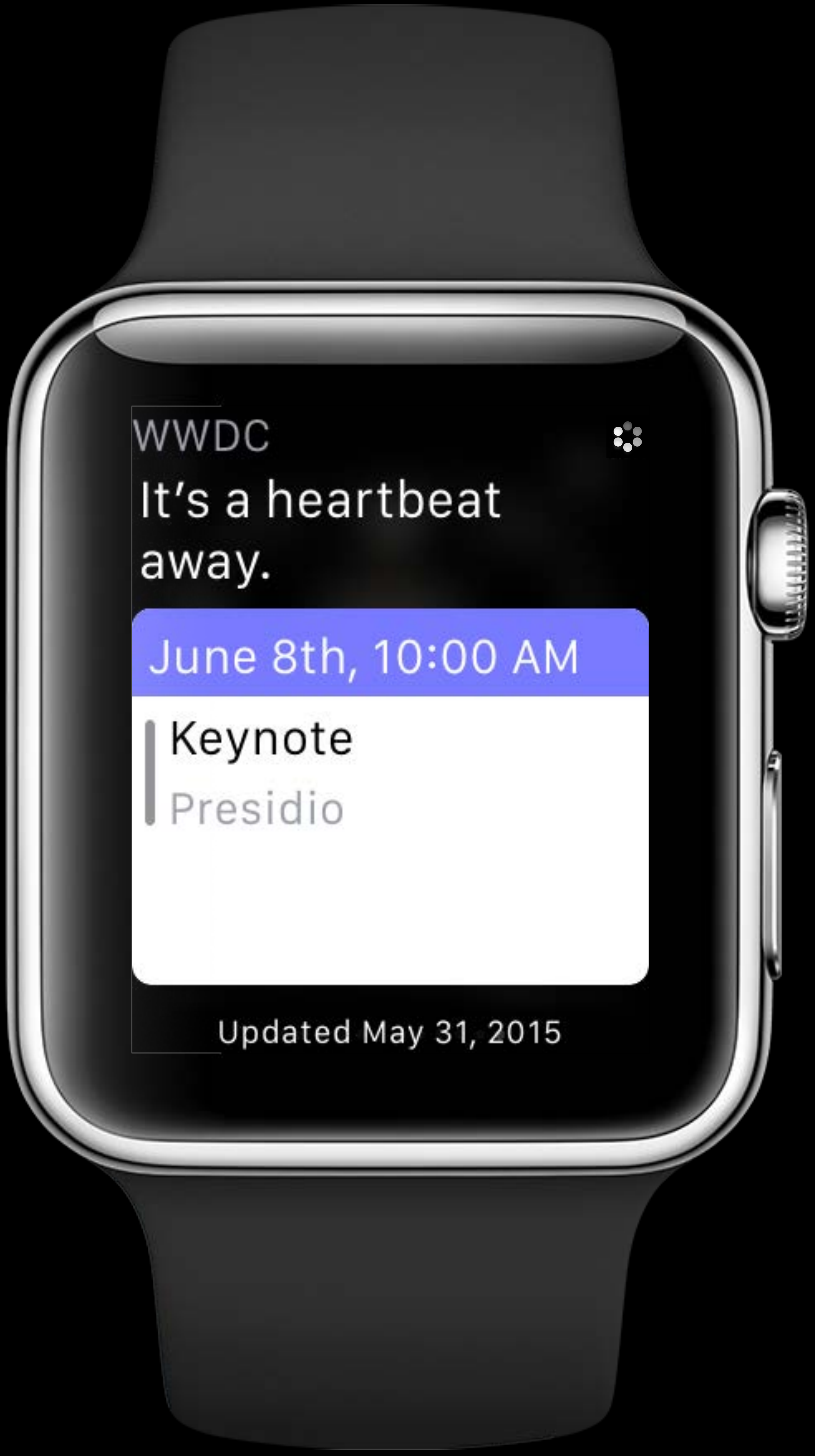
June 8th, 10:00 AM

Keynote

Presidio

Updated May 31, 2015

Glances



WWDC

It's a heartbeat away.

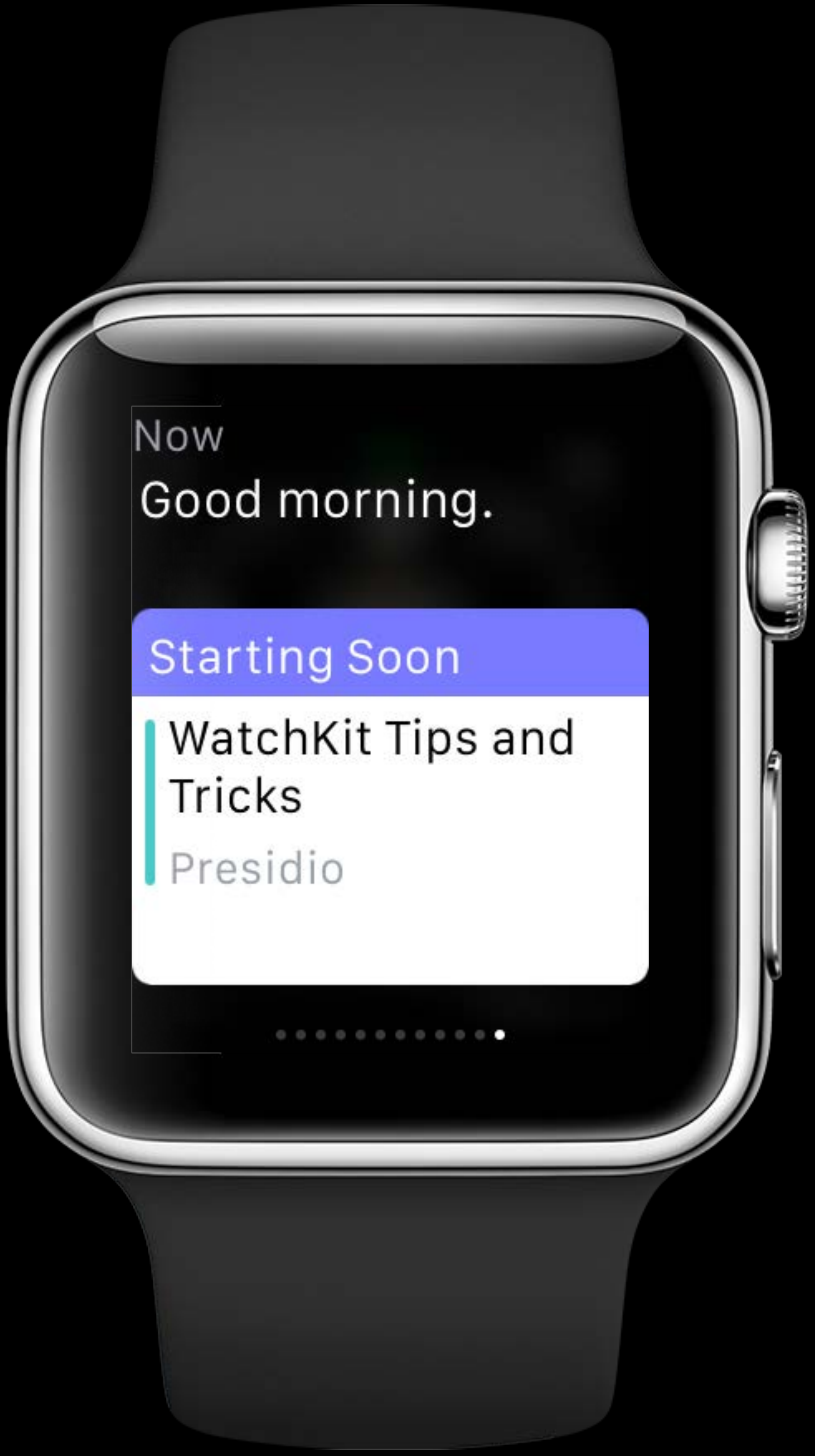
June 8th, 10:00 AM

Keynote

Presidio

Updated May 31, 2015

Glances



Now

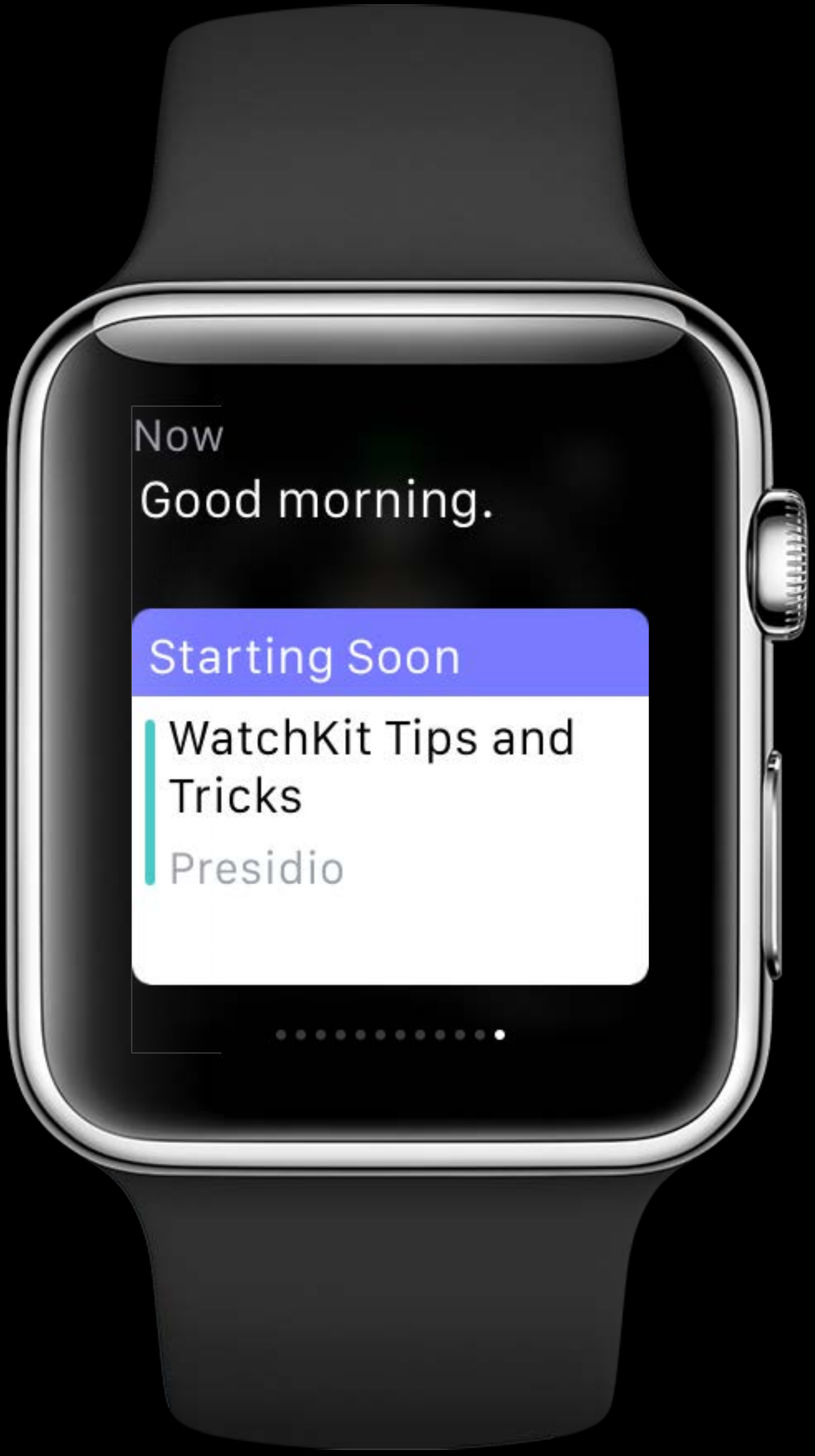
Good morning.

Starting Soon

WatchKit Tips and Tricks

Presidio

Glances



Now

Good morning.

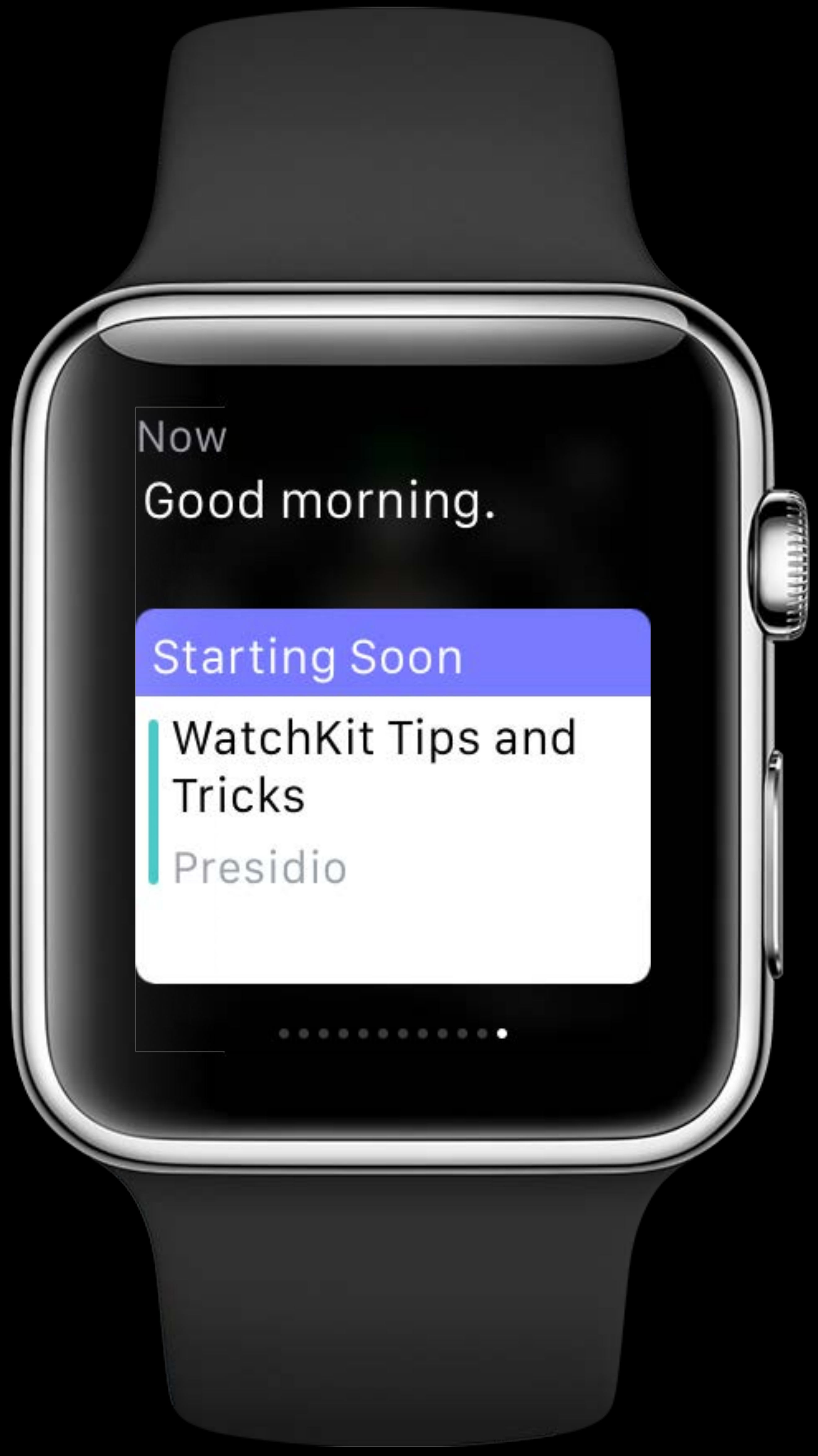
Starting Soon

WatchKit Tips and Tricks

Presidio

Glances

```
willActivate()
```



Now

Good morning.

Starting Soon

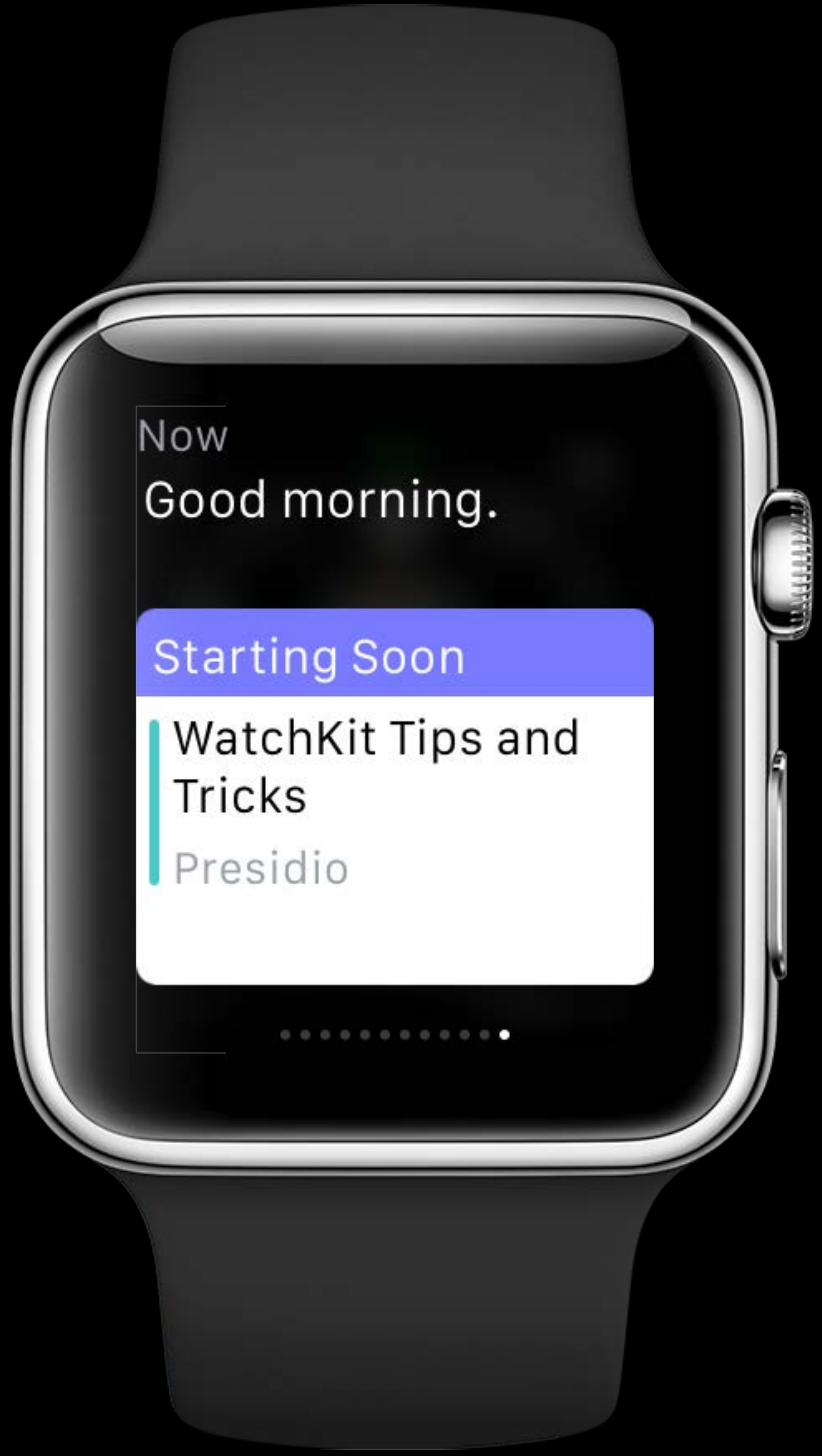
WatchKit Tips and Tricks

Presidio

Glances

`willActivate()`

- Do full setup before `willActivate()` finishes



Now

Good morning.

Starting Soon

WatchKit Tips and Tricks

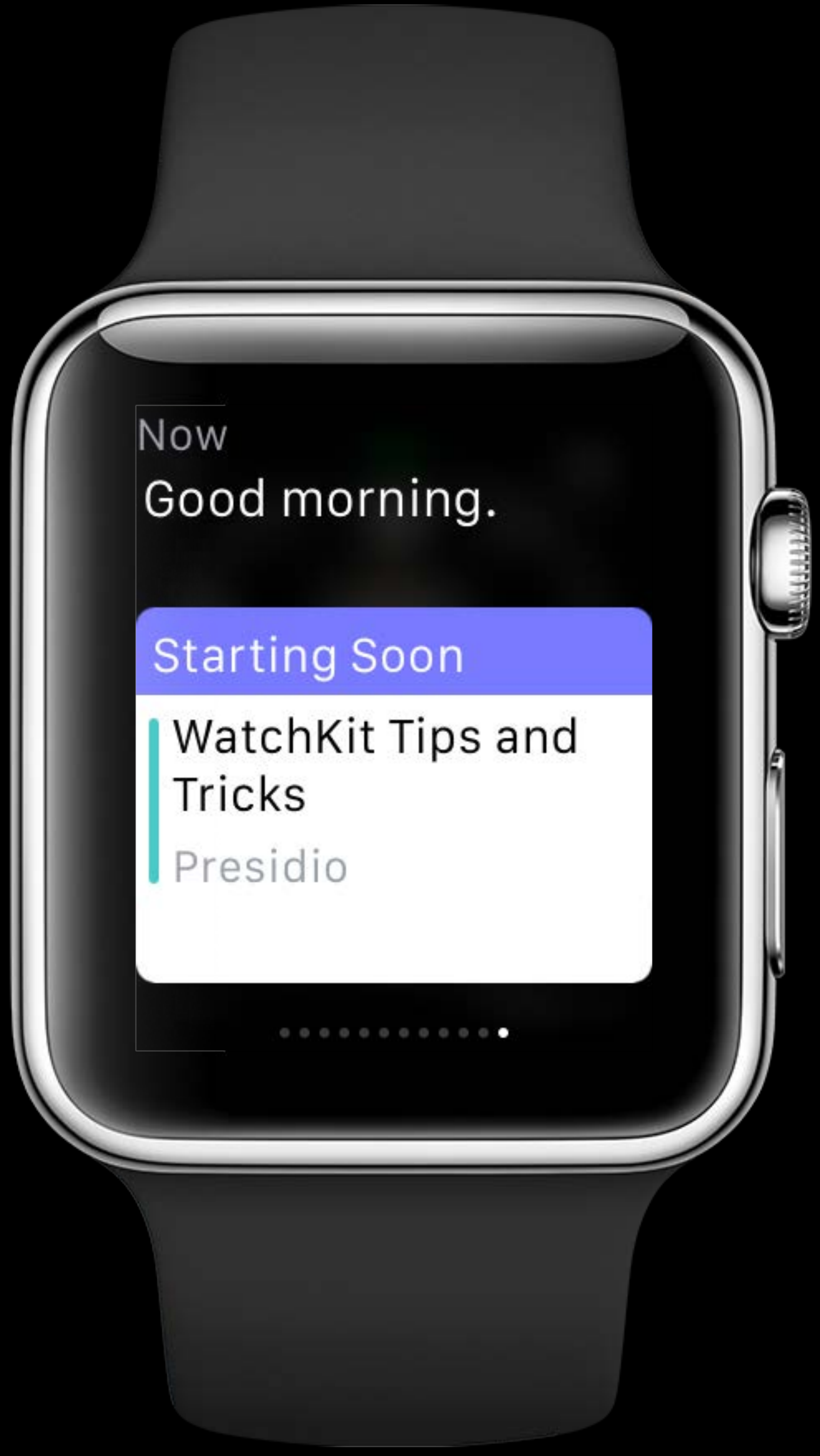
Presidio

Glances

`willActivate()`

- Do full setup before `willActivate()` finishes

Reload deliberately



Now

Good morning.

Starting Soon

WatchKit Tips and Tricks

Presidio

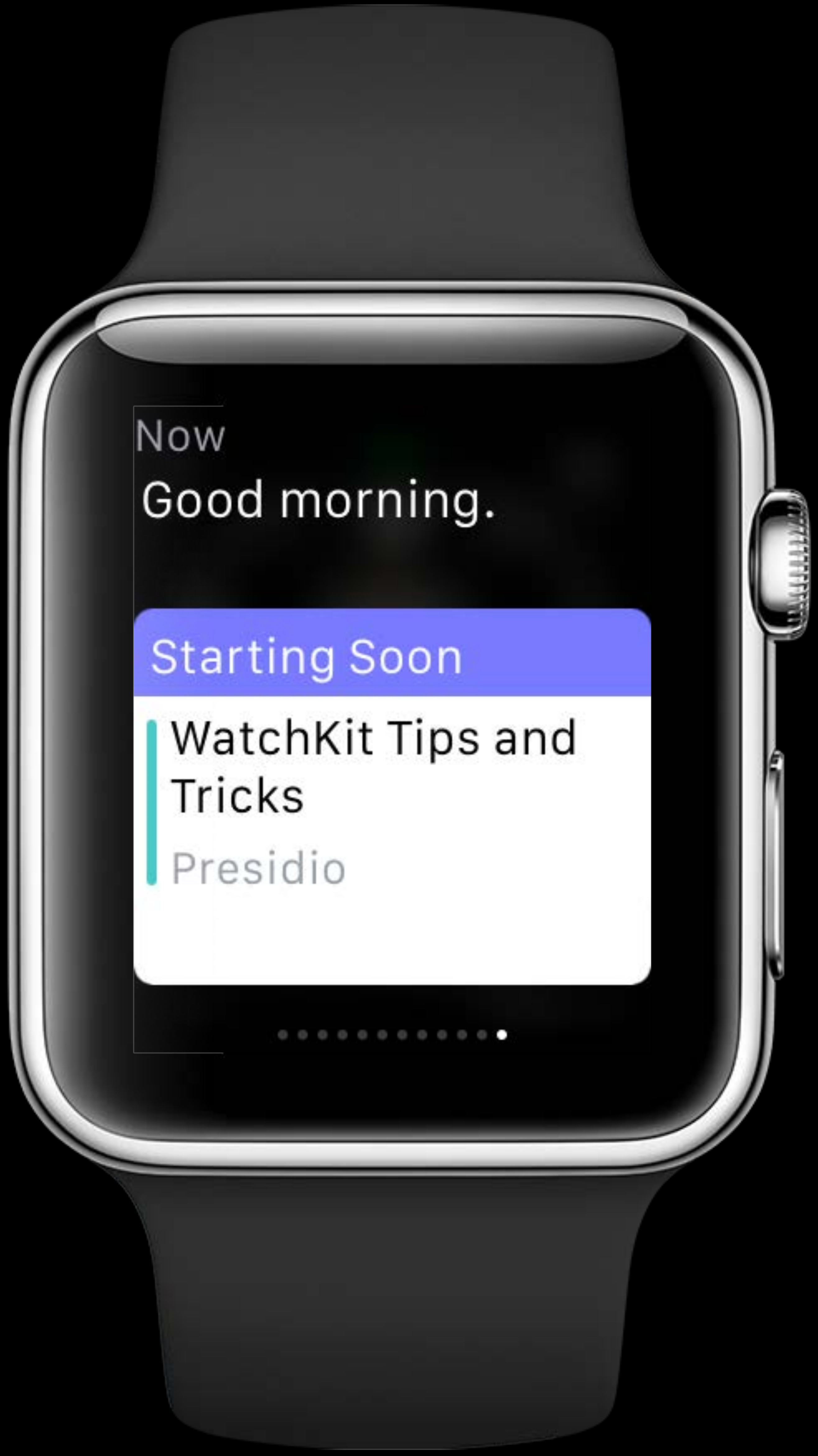
Glances

`willActivate()`

- Do full setup before `willActivate()` finishes

Reload deliberately

Limit number of alternate layouts



Now

Good morning.

Starting Soon

WatchKit Tips and Tricks

Presidio

Glances

`willActivate()`

- Do full setup before `willActivate()` finishes

Reload deliberately

Limit number of alternate layouts

Use WKInterfaceDate or absolute times/dates

Now

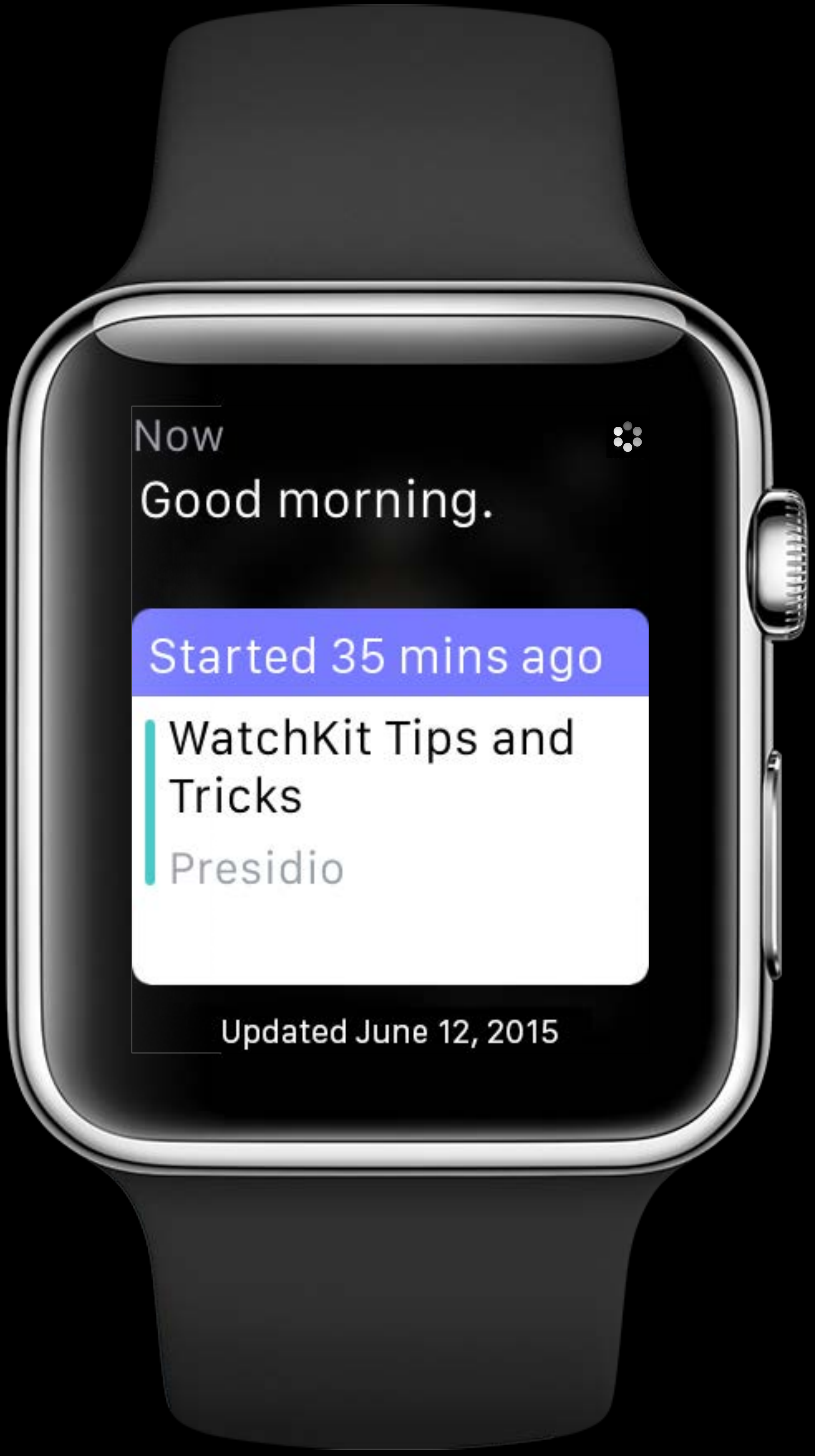
Good morning.

Starting Soon

WatchKit Tips and Tricks

Presidio

Glances



Now

Good morning.

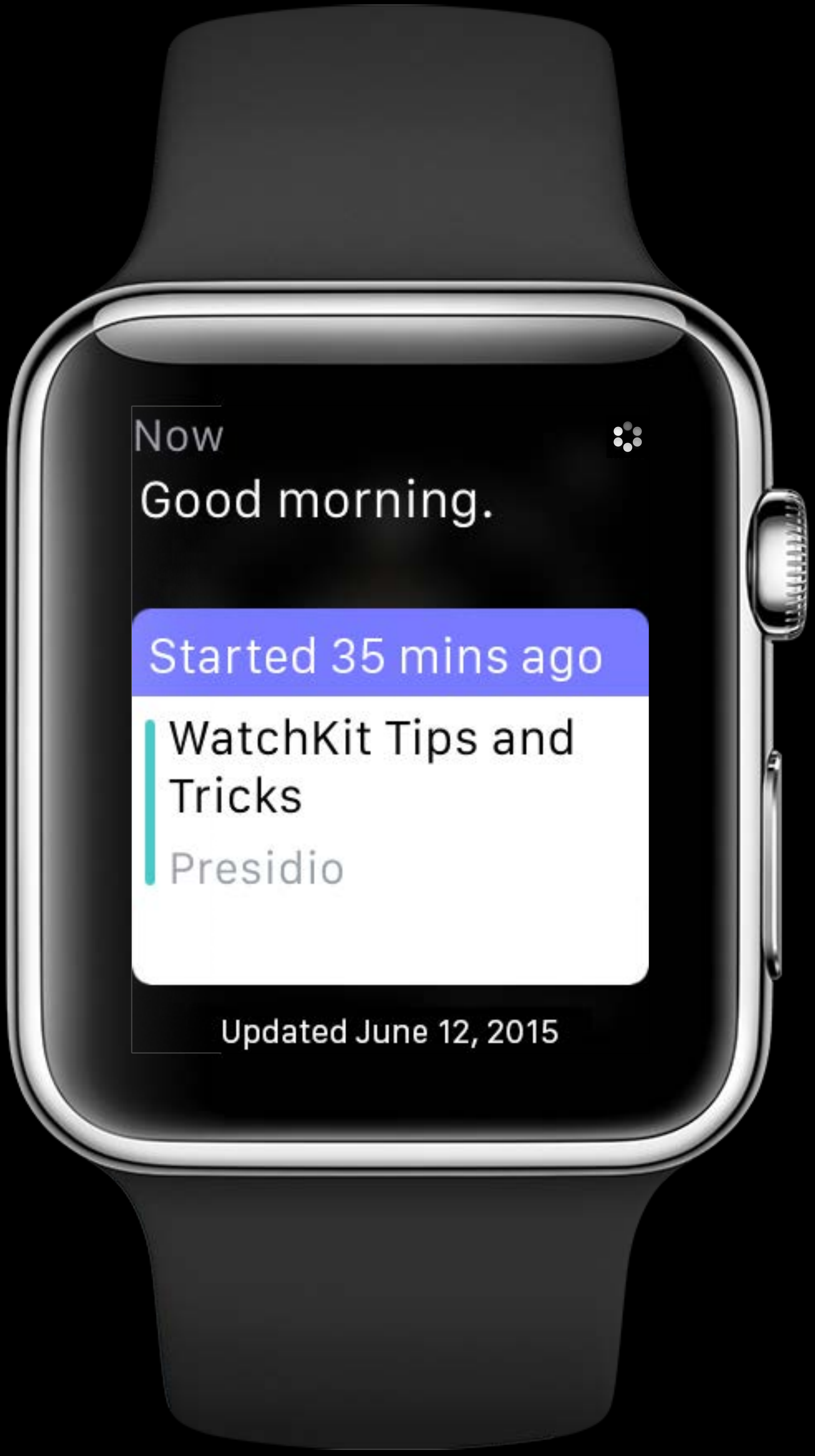
Started 35 mins ago

WatchKit Tips and Tricks

Presidio

Updated June 12, 2015

Glances



Now

Good morning.

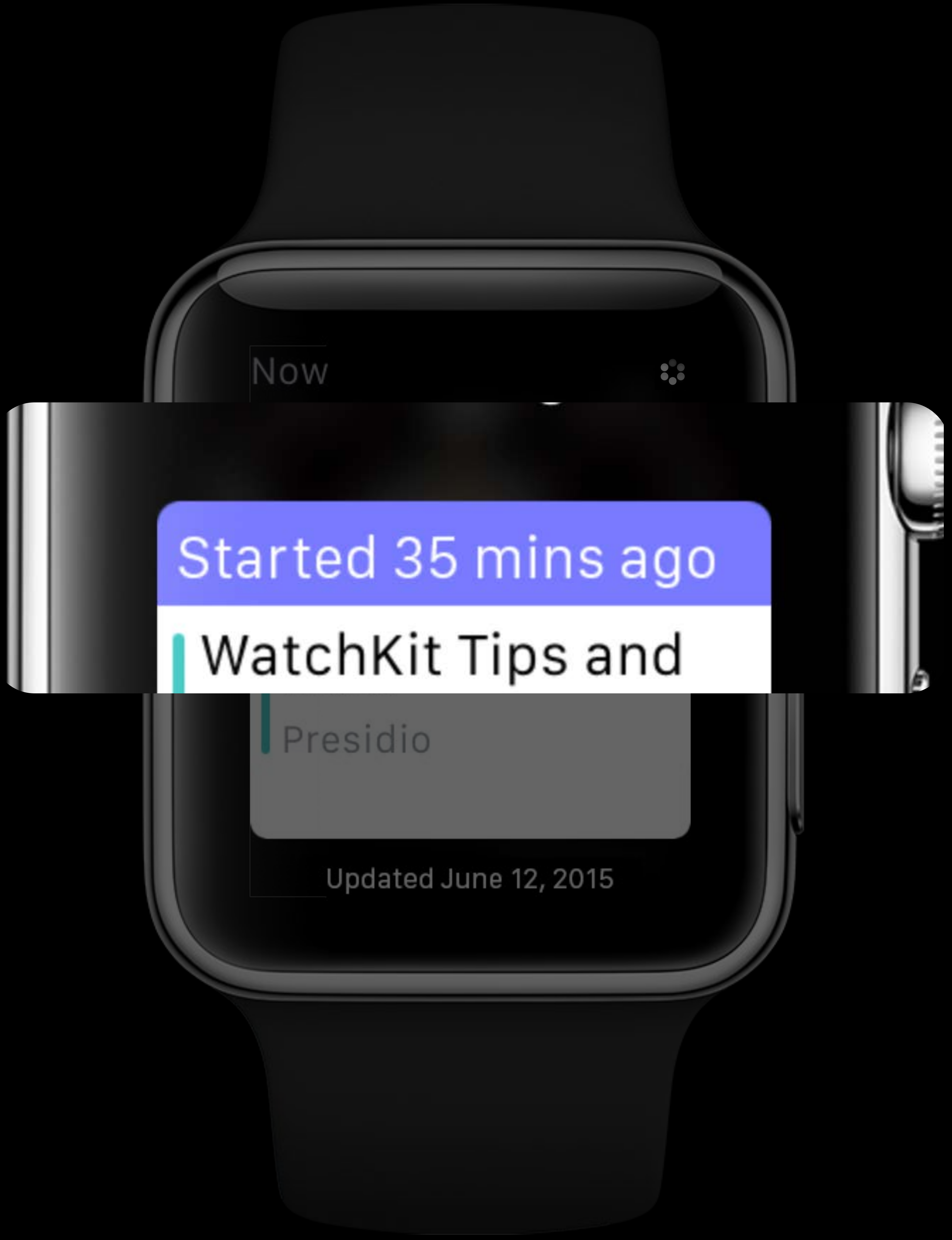
Started 35 mins ago

WatchKit Tips and Tricks

Presidio

Updated June 12, 2015

Glances



Now

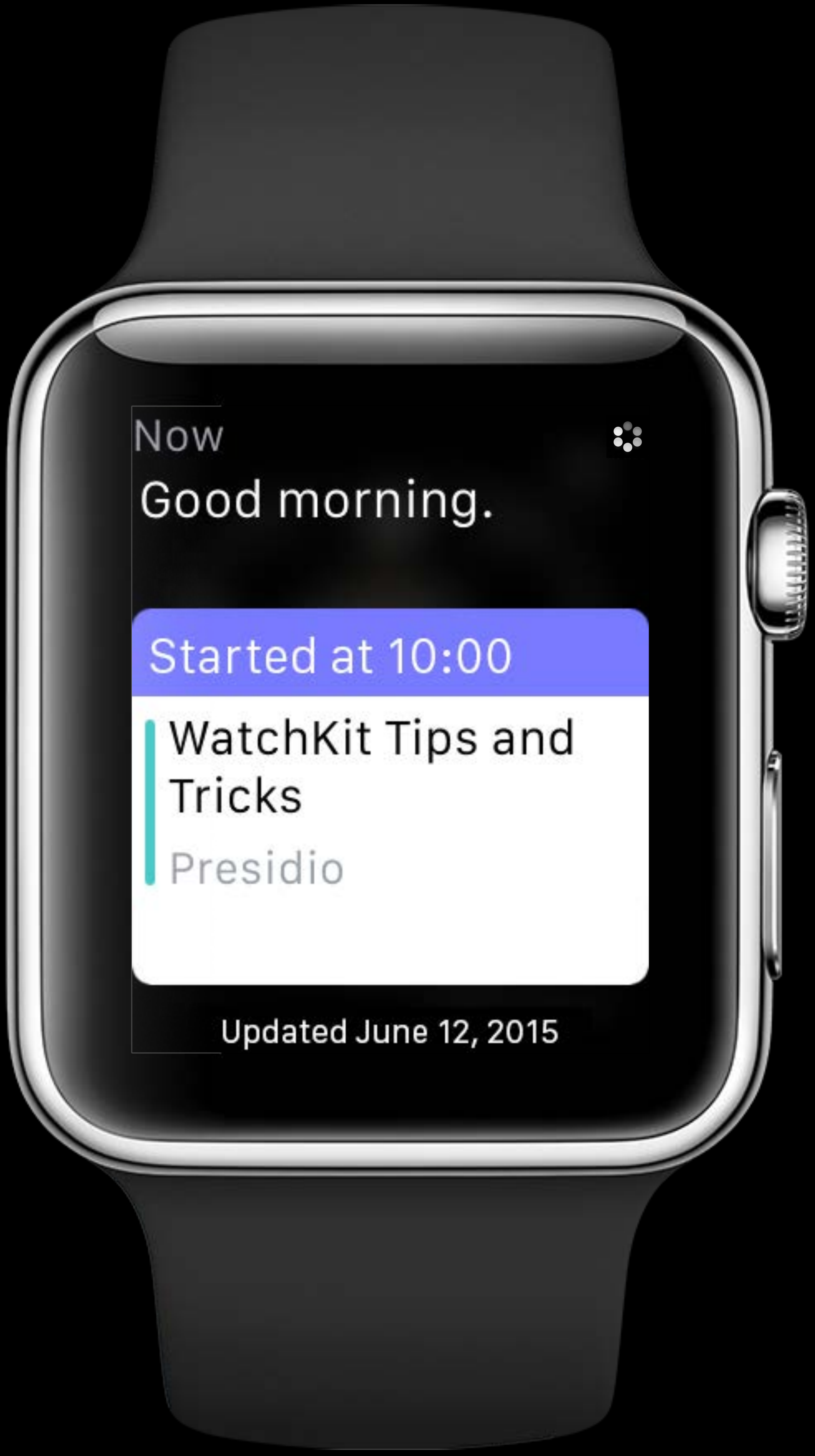
Started 35 mins ago

WatchKit Tips and

Presidio

Updated June 12, 2015

Glances



Now

Good morning.

Started at 10:00

WatchKit Tips and Tricks

Presidio

Updated June 12, 2015

Summary

Summary

Optimize networking with NSURLSession

Summary

Optimize networking with NSURLSession

Improve layouts for performance

Summary

Optimize networking with NSURLSession

Improve layouts for performance

Ensure Glance always has content visible

Summary

Optimize networking with NSURLSession

Improve layouts for performance

Ensure Glance always has content visible

Become familiar with watchOS 2

More Information

Documentation and Videos

watchOS 2 Transition Guide
WatchKit Programming Guide
http://developer.apple.com/watchOS

Sample Code

Lister
WatchKit Catalog
http://developer.apple.com/watchOS

Technical Support

Apple Developer Forums
http://developer.apple.com/forums

Developer Technical Support
http://developer.apple.com/support/technical

General Inquiries

Jake Behrens, watchOS Frameworks Evangelist
behrens@apple.com

Related Sessions

Apple Watch Design Tips and Tricks	Presidio	Friday 3:30PM
Designing for Apple Watch	Presidio	Wednesday 4:30PM
Introducing WatchKit for watchOS 2	Presidio	Tuesday 10:00AM
WatchKit In-Depth, Part 1	Pacific Heights	Wednesday 9:00AM
WatchKit In-Depth, Part 2	Pacific Heights	Wednesday 10:00AM
Building Watch Apps	Pacific Heights	Tuesday 4:30PM
App Extension Best Practices	Presidio	Thursday 4:30PM

Lab

WatchKit and ClockKit Complications Lab	Frameworks Lab A	Friday 1:30PM

WWDC15