
Build
watchOS Apps
DEVELOP AND DESIGN
Mark Goody
Maurice Kelly

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Build watchOS Apps: Develop and Design
Mark Goody and Maurice Kelly

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To my darling wife, Rebecca, and our sons,
Reuben and Joel, who give us so much joy. Thank you for your love, patience,
and support as I kept disappearing to "work on the book" at what
turned out to be a particularly busy time in our family's life.
The three of you are my world.

—Mark Goody

I am ever grateful once more to my beautiful wife, Fiona,
who showed me so much support in getting through another
one of these books, and for giving us our sensitive angel Aoibhínn,
and our cheeky little monkey Caoimhe.

—Maurice Kelly

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Once again, we have had the utmost pleasure in working with Robyn Thomas on this book. This time, we ganged up on Robyn and tried to force the UK/US English matter, but she along with our copyeditor, Scout Festa, held firm. We *sympathise* greatly with them.

This time around, we had a new project editor: Connie Jeung-Mills. We're very pleased to have had the opportunity to work with Connie and extremely grateful that she was able to wrangle us some more pages when we couldn't stick to our page budget. Thanks also to Clifford Colby for starting the project off (twice, actually); we miss you in our weekly conference calls, though you still owe Robyn an Apple Watch.

ABOUT THE AUTHORS

Mark Goody spends most of his time writing software, concentrating on Apple platforms—though he can be tempted to experiment with most things. He lives just outside Belfast, Northern Ireland, with his wife and two sons. They look after him by making sure he remembers to step away from his computer from time to time. Mark blogs sporadically at marramgrass.org.uk and more reliably tweets as @marramgrass.

Maurice Kelly has been engineering software since leaving university in 2001. After spending many years working on server software for mobile telecoms, he took a change of direction to work at the user-facing end by becoming an iOS developer. He has a love for synthesizers and music, and still dreams of owning a Land Rover Defender someday. He lives with his wife and children just outside Dromara, a small village in Northern Ireland.

CONTENTS

PART II Creating Apps

PART III Making the Most of the Platform

INTRODUCTION

For some, the idea of a smartwatch is characterized by the wrist-borne communicator devices in *Dick Tracy* cartoons, but for a child of the eighties few pop-culture memories remain as vivid as seeing Michael Knight communicating with his car K.I.T.T. through his wristwatch. The idea of being able to see information that had been beamed to your wrist, to talk with an intelligent car, and to sport such a perm was to remain a symbol of the future for many children who grew up as fans of the TV show *Knight Rider*.

THE WATCH OF OUR DREAMS

The announcement that Apple had been working on a watch that could respond to voice commands and also run apps and communicate with the Internet via an iPhone set the Mac and iOS developer community alight. Not only did it signal the potential for yet another app gold rush, but it tickled the imaginations of those former children for whom the wristwatch was the perfect device on which to control your digital life.

Sure, the iPhone was revolutionary, but it was still just a phone, and we've always had phones (depending on your age, of course). The iPad has changed the face of personal computing, but it's still just a computer, albeit a lot smaller than the ones we had when we were kids.

The Apple Watch is different. We never needed the other devices in the same way that we wanted the ability to talk to our watches. We dreamed of being able to tap the watch face and have it respond to the commands. We yearned for the day that critical information would arrive directly to our wrists.

THE APPLE WATCH OF OUR REALITIES

As developers, we have been spoiled by what we can achieve using iOS. The first iPhones were not accessible to developers (at least not officially), but with the release of iPhoneOS 2.0 in 2008, Apple gave third-party developers the ability to create fully fledged apps that took advantage of the full hardware of the devices.

In many ways, watchOS has followed the same pattern; the first release of watchOS (which wasn't even called watchOS at the time) provided a somewhat restricted subset of functionality. Rather than running full apps, the watch ran iOS app extensions that were much more restricted in the level of processing they could do and the range of interactivity available to them.

watchOS 2 is the release that developers have really been waiting for. We now get access to fully native apps that run directly on the watch and have access to much more in the way of software APIs and hardware features.

ABOUT THIS BOOK

In this book, we aim to get you up to speed on how to create and design watchOS apps. We'll guide you through the process of creating apps and illustrate how to visualize and interact with user interfaces for the Apple Watch using storyboards. We delve into communications between the Apple Watch and the iPhone and how to present quick summaries of information to the user using glances.

This book is not an introduction to iOS or CocoaTouch programming and is instead aimed at existing developers who want a guide to the features available in watchOS. We'll also be presenting most of our code samples in Apple's new Swift programming language. In many cases, it will be apparent what the code is doing and how it can be re-implemented in Objective-C if necessary. If you have not yet delved into the world of Swift, you may find *Swift Translation Guide for Objective-C Developers* (also published by Peachpit) to be a helpful companion.

HOW TO USE THIS BOOK

Writing and distributing watchOS apps requires that you have a solid foundation in iOS development. We assume that you have intermediate knowledge of iOS development as well as of provisioning and configuring iOS devices in the Apple Developer Center.

ORGANIZATION

We have split this book into three main sections:

Part 1, "Getting Started"

We start with a quick example project before taking the time to examine the structure of watchOS apps in more detail, and then we provide an overview of the main user interface controls available to your apps.

Part 2, "Creating Apps"

This section begins a deeper examination of what you can do with WatchKit, and it offers guidance on how to design and optimize the interface of your app, as well as how to entice your users through glances, complications, and notifications.

Part 3, "Making the Most of the Platform"

In the third section, we go deeper into the platform and look at how to take advantage of the hardware and software features that make watchOS the most compelling developer platform that Apple has produced in many years.

CODE SAMPLES

Many of the chapters feature short example projects that you can follow along with in order to gain a better understanding of the material. We have published the source code repositories to the GitHub account that accompanies the book, at github.com/bwa-book. Each chapter that has a sample project has a companion repository, and we have endeavored to make the commits to the repositories logically follow the progress in the book.

TEXT FORMATS

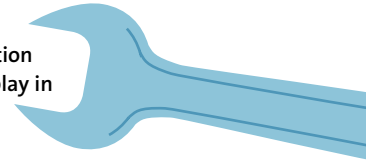
Code samples that you should enter will be marked as follows:

```
@IBAction func saySomething() {
    messageLabel.setText("Hello Wrist!")
}
```

Highlighted code identifies changes to a snippet of code or is meant to draw your attention to specific sections of code:

```
@IBAction func buttonTapped() {
    spinnerImage.startAnimating()
}
```

You'll also find notes containing additional information about the topics:



NOTE: The Utility face (and others) actually features a fourth complication when you enter its customization mode. It corresponds to the date display in Figure 7.3, and we won't consider it here because it can show only the date (in a number of styles) or be turned off. It is not yet open to third-party developers.

SOFTWARE VERSIONS

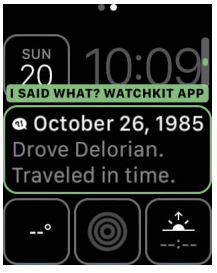
All the code samples have been tested with watchOS 2.0 and iOS 9.0. To follow along with the examples in the book, you should ensure that you are using at least Xcode 7.0. Where there are incompatibilities with future versions of watchOS, we will endeavor to post corrections to our website, http://watchosapps.build.

WELCOME TO WATCHOS

Apple's watchOS could be its most exciting new operating system since the introduction of iOS in 2007. It introduces new ways for users to interact with your applications and provides you with new and improved methods of getting up-to-date information in front of your users.

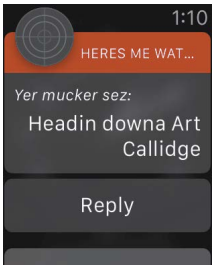
GLANCES

Present critical information to your users at a glance. A summary of everything they need to know is just a swipe away.



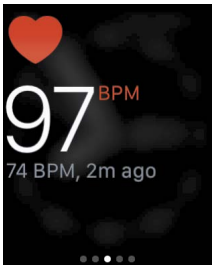
COMPLICATIONS

Display small pieces of information directly on the main watch face. Complications also provide a compelling way to quickly launch your application.



NOTIFICATIONS

With a push notification service, you can send the latest data directly to your users. With a flick of their wrist they can see, and even act upon, the information as they receive it.



HARDWARE INTEGRATION

New APIs allow for interaction with watch hardware features, such as the accelerometer, the heart rate sensor, and the Taptic feedback engine.

CHAPTER 4

Exploring Controls

iOS has always had a place for innovative custom UIs, but it's often a good idea to start with the standard controls provided by the platform. On Apple Watch, standard controls are (for now) the only option—but as we take a tour of the available interface elements, you'll see that there's still plenty to work with on the new platform.

HOUSE RULES

As we take a look through the Object Library and the APIs, almost everything has a similar and direct analog available on the larger iOS devices. But let's pause for a moment and review some small but important differences in the Watch environment (which we are sure will be no trouble to an intelligent, creative, and insightful developer such as you, dear reader).

- The user interface and the controls it contains are defined during development using the storyboard editor. In contrast to iOS, you can't create the UI in code. If you are one of those developers who prefer to avoid the visual editor, then you'll find it's time to dip your proverbial toe in its waters.
- Even so, some properties of the controls can be set at run time (how else would you update a label to give your user information that you didn't have at build time?), but only some. Others can be set only in the storyboard editor. We'll identify which properties on each control can be dynamically updated as we examine each.
- Where values can be set to controls, they cannot be read by your Watch app. For example, you can set a switch to on from your interface controller, but you cannot read from it whether it is on or off. Instead, you must wire up the switch's change event to an `@IBAction` method in your controller and keep track of state changes in a property.

This might sound like the Watch presents an even more restrictive environment than we're used to as developers for iOS platforms, but as you saw when exploring the available navigation options (Chapter 3), you *can* do a lot with what's available.

WATCHKIT CONTROLS

All interface objects (what we refer to as "controls") in WatchKit are subclasses of `WKInterfaceObject`. Apps are limited to using and configuring the standard controls, so we can't work with our own subclasses of `WKInterfaceObject`—or of any of its subclasses (which are the controls in the following sections). Any configuration is done in the storyboard editor or via `@IBOutlet` properties in your interface controllers.

`WKInterfaceObject` provides common methods for hiding and showing the control, changing its size, and setting its accessibility attributes. We'll refer to hiding, showing, and changing size methods as you learn about the available controls, and we'll look in detail at the accessibility options in Chapter 6.

SIMPLE DISPLAY CONTROLS

The following controls are for *displaying* data to the user. They do not accept user interaction.

LABELS

Where would we be without labels in our user interfaces? The humble label is the first option to display text to the user in any iOS app, and it's the first option in your Watch app as well.

The `WKInterfaceLabel` is analogous to `UILabel` and is configurable in some of the same ways: text (of course), text color, font, minimum scale and maximum number of lines (to handle long text values), and alignment. Additionally, text color can be set at run time with the label's `setTextColor(_:)` method. The text displayed by the label can be updated with the `setText(_:)` and `setAttributedText(_:)` methods. The latter, as you'd expect, allows configuration of the text's style.

`WKInterfaceDate` and `WKInterfaceTimer` (**Figures 4.1** and **4.2**) are two special label classes that are a new idea to WatchKit.

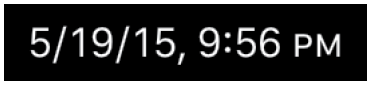


FIGURE 4.1 `WKInterfaceDate`

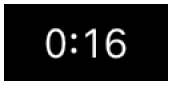


FIGURE 4.2 `WKInterfaceTimer`

`WKInterfaceDate` always displays the current date, the current time, or both. The storyboard editor is used to configure the format of the displayed date–time information, using `setTextColor(_:)`, `setTimeZone(_:)`, and `setCalendar(_:)`, which are available at run time. This control makes it trivial to display the current date and time in your app.

`WKInterfaceTimer` is equally specialized. It manages, displays, and updates a countdown timer, with the format and displayed units configurable in the storyboard editor. The Enabled check box in the Timer (**Figure 4.3**) specifies whether the timer starts counting down immediately when the interface is initialized.

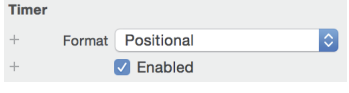
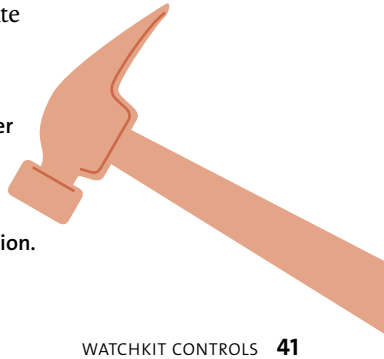


FIGURE 4.3 The timer's Enabled setting

The timer label is managed programmatically using its `setDate(_:)`, `setTextColor(_:)`, `start()`, and `stop()` methods. Once started, the timer will count down to its target date without any further management from your app.



TIP: Your app receives no notification or callback when the timer reaches zero. If your app needs to take any action when the timer is up, you should run an `NSTimer` object set to the same target date. Remember that your interface control has no way to communicate with the code running in your WatchKit extension.

IMAGES

The `WKInterfaceImage` is used to display an image, or an animation made up of a series of images, in your Watch app's interface. Use the storyboard editor to configure the initial image, its content mode, the tint color for template images, and whether the control is able to animate. At run time, a number of methods are available to set the image or images, to set the tint color, and to start and stop animation.

As has been the case since the early days of the web (on iOS and other platforms), the humble image control is a very powerful tool for setting the look and feel of your app, communicating information, or even adding a little whimsy or delight for the user. We'll spend significant time in Chapters 5 and 6 looking at how to get the best out of `WKInterfaceImage`.

MAPS

The `WKInterfaceMap` control (**Figure 4.4**) takes much of the pain out of displaying a map to the user. Its output is essentially a specialized image—the map is not interactive. However, you can configure it to launch the Maps app to the location in the map control—simply set it to Enabled in the storyboard editor.

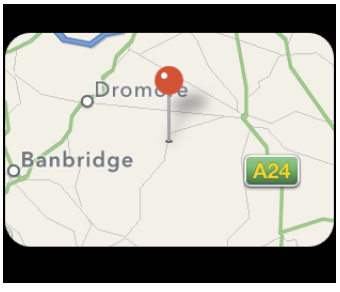
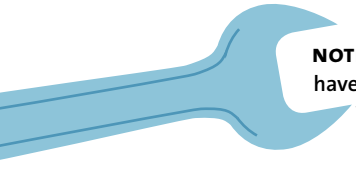


FIGURE 4.4 `WKInterfaceMap`

The Enabled property is the only configuration available in the storyboard editor—all other configuration must be made at run time from your interface controller.

The area covered by the map is set either with its `setVisibleMapRect(_:)` method or with `setRegion(_:)`. Which you use depends on how your app defines its areas—with an `MKMapRect` or with an `MKCoordinateRegion`. In either case, the map control adjusts the area it displays and its zoom level to make sure the area specified is visible.

It is also possible to add image annotations to the map (`addAnnotation(_:withImage:centerOffset:)` and `addAnnotation(_:withImageNamed:centerOffset:)`) or to add pins (`addAnnotation(_:withPinColor:)`). The method `removeAllAnnotations()` does what it says, clears the map of annotations.



NOTE: Remember that the map will not display if the user's phone doesn't have a network connection. As with the Maps apps on iPhone and on the Watch, map data is downloaded as needed.

INTERACTIVE CONTROLS

Displaying information to the user is, of course, only half the story. WatchKit offers buttons, switches, and sliders for all your users' tapping needs.

BUTTONS

`WKInterfaceButton` is a tappable control that should be connected to an `@IBAction` method in an interface controller. The signature of this method is slightly different from the equivalent on iOS, taking no parameters:

```
@IBAction func buttonTapped()
```

The other notable difference is that a button can contain multiple other interface objects, acting as a group (see the "Control Groups" section later in this chapter for a discussion of `WKInterfaceGroup`), as well as the expected single text label. This is configured using the Content property in the storyboard editor.

You can configure buttons with different fonts, text colors, background colors, and background images, as well as with the title text itself. You may also enable or disable the button. These properties can be set programmatically as well as in the storyboard—title color and font being managed via the `setAttributedTitle(_:)` method, whereas the background is updated using the `setBackgroundColor(_:)`, `setBackgroundImage(_:)`, `setBackgroundImageData(_:)`, and `setBackgroundImageNamed(_:)` methods. **Figure 4.5** shows examples of how a button can be configured.

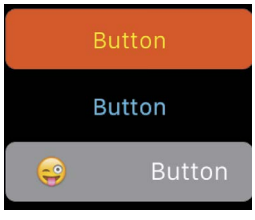


FIGURE 4.5 Examples of differently configured buttons

SWITCHES

`WKInterfaceSwitch` is a control that displays the familiar on/off switch with a label beside it. The class and its properties manage both the switch itself and the label for you (**Figure 4.6**).

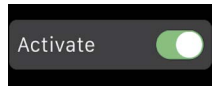


FIGURE 4.6 A switch and its title

Because it's not possible to query controls for their state, the switch's action method takes the following form:

```
@IBAction func switchSwitched(value: Bool)
```

When the method is called, your interface controller should stash the state of the switch in a property if necessary. When creating the switch in the storyboard editor, you may configure its initial state, the color of the switch's On state, whether it is initially enabled, and the text, color, and font for the switch's label.

At run time you can use `setTitle(_:)` or `setAttributedTitle(_:)` to update the switch's label, `setOn(_:)` and `setEnabled(_:)` to update its state and whether it's active, and `setColor(_:)` to update its On color.

SLIDERS

`WKInterfaceSlider` allows the user to select a value within a defined range—think of the volume slider in iPhone's Music app or the volume control in the Watch's Now Playing glance (**Figure 4.7**).

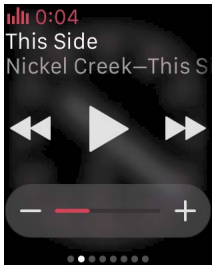


FIGURE 4.7 The slider in the Now Playing glance

The minus and plus buttons visible in Figure 4.7 are provided by default. They can be replaced with custom images, which must be part of the WatchKit App bundle when distributed.

The value of the slider is represented as a `Float` and is delivered to your interface controller via an action method with the following signature:

```
@IBAction func sliderSlid(value: Float)
```

As with the switch control, your interface controller should store the state value as necessary.

The slider presents quite a number of configuration options, most of which must be managed in the storyboard editor:

- The value of the slider is initially set in the storyboard and can be updated at run time with the `setValue(:_)` method.
- The minimum and maximum possible values.
- The number of steps the slider recognizes between those two values. This can also be set in code with `setNumberOfSteps(_:)`.
- Whether the slider displays as a continuous, solid bar or as a row of segments.
- The color of the slider bar, also configurable with the `setColor(_:)` method at run time.
- Custom min image and max image for the slider's minus and plus buttons.
- Whether or not the slider is enabled. You can update this state at run time with `setEnabled(_:)`.

MOVIES

Your app can play video via a `WKInterfaceMovie` control. This control displays a poster image and a play button for the video file (**Figure 4.8**); tapping the play button plays the video in a modal presentation.

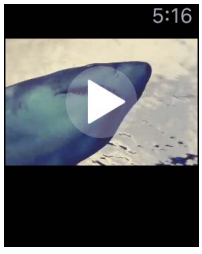


FIGURE 4.8 A `WKInterfaceMovie` control

We'll demonstrate using `WKInterfaceMovie` when exploring the media capabilities of Apple Watch in Chapter 12.

STRUCTURAL CONTROLS

A `WKInterfaceController`'s user interface is arranged quite differently from a view hierarchy on iOS in that it takes a series of controls and flows them down the screen. If you've ever written HTML for a webpage, this might feel familiar. As with HTML, there are options (although not nearly as many as on the web) for managing this flow by using some structure controls.

CONTROL GROUPS

`WKInterfaceGroup` is an interface object designed to contain other interface objects, and although it may not sound very exciting (it's a box!), this control enables a great deal of customization for how its members are displayed (**Figure 4.9**).

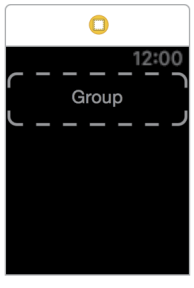


FIGURE 4.9 An interface group in the storyboard

Figure 4.10 shows the configuration options available for an interface group. A group can display a background of a solid color or an image—the image can even be animated! If used, the background has a default corner radius of 6 points. Modifying the group's edge insets and spacing will vary how much of the background is visible around and between items in

the group. The interface group's layout can also be configured to flow its contained items horizontally or vertically.

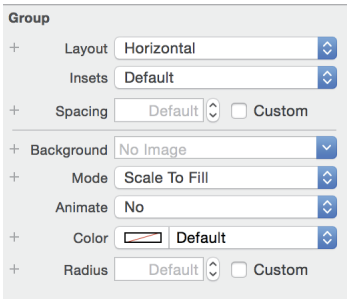


FIGURE 4.10 Interface group configuration

The properties that can be updated at run time are

- Background color, with `setBackgroundColor(_:)`.
- Background image, with `setBackgroundImage(_:)`, `setBackgroundImageData(_:)`, and `setBackgroundImageNamed(_:)`.
- Corner radius, with `setCornerRadius(_:)`.
- Background image animation can be controlled with methods that mirror those on `WKInterfaceImage`: `startAnimating()`, `startAnimatingWithImagesInRange(_: duration:repeatCount:)`, and `stopAnimating()`.

SEPARATORS

After the whirl of options available on an interface group, `WKInterfaceSeparator` is delightfully simple. It's a horizontal line to separate controls, and you can set its color in the storyboard editor and in code via its `setColor(_:)` method. That's it.

TABLES

Working with table views is the bread and butter of many iOS developers. `WKInterfaceTable` is different enough from `UITableView` that we'll take some time to work with it and its API.

1. In Xcode, create a new iOS project, and add a WatchKit App target.
2. In the WatchKit App's storyboard, add a table to the interface controller scene (**Figures 4.11** and **4.12**).

FIGURE 4.11 The table in the storyboard editor

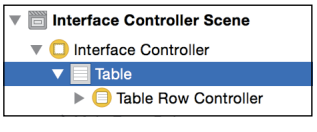


FIGURE 4.12 The table in the interface controller scene

3. Add the source file for a class named `RowController` to the WatchKit extension. It should be a subclass of `NSObject` (**Figure 4.13**).

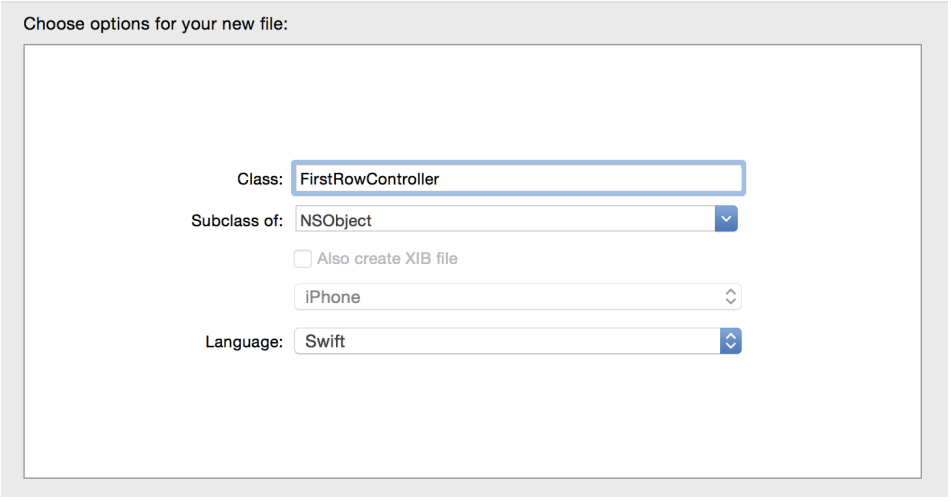


FIGURE 4.13 Creating a row controller

4. Update the contents of `RowController.swift` to the following:

```
import WatchKit

class RowController: NSObject {
    @IBOutlet weak var listLabel: WKInterfaceLabel! {
        didSet(oldValue) {
            listLabel.setTextColor(UIColor.greenColor())
        }
    }
}
```

5. In the WatchKit App's `Interface.storyboard`, select the table's table row controller in the left sidebar. Open the Identity inspector and set the table row controller's Class setting to `RowController` (**Figure 4.14**). The Module setting will update automatically.

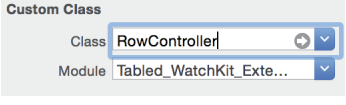


FIGURE 4.14 Setting the table row controller's class

6. Open the table row controller's Attribute inspector, and set its Identifier to `RowController`.

7. Add a label to the row controller's group, and connect it to the row controller's `listLabel` property (**Figure 4.15**).

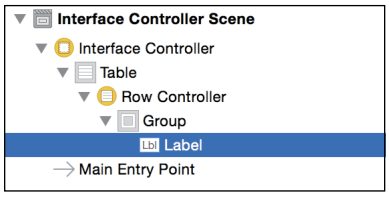


FIGURE 4.15 The interface controller's hierarchy of interface objects

8. Replace the contents of `InterfaceController.swift` with the following:

```
import WatchKit
import Foundation


class InterfaceController: WKInterfaceController {
    @IBOutlet weak var listTable: WKInterfaceTable!
}
```

9. Connect the table in the storyboard to the `@IBOutlet` you have just defined.
10. Add the following two methods to the `InterfaceController` class:

```
override func awakeWithContext(context: AnyObject?) {
    super.awakeWithContext(context)
    updateTableItems()
}

func updateTableItems() {
    let listOfThings = [
        "Apple", "Banana", "Pear", "Orange", "Lemon",
        "Guava", "Melon", "Starfruit", "Grape"
    ]
    let numberOfThings = listOfThings.count

    listTable.setNumberOfRows(numberOfThings, withRowType: "RowController")

    for i in 0..<numberOfThings {
        let rowController = listTable.rowControllerAtIndex(i) as!
RowController
        rowController.listLabel.setText(listOfThings[i])
    }
}
```

11. Add the following method to the same class:

```
override func table(table: WKInterfaceTable, didSelectRowAtIndex rowIndex:
Int) {
    let rowController = listTable.rowControllerAtIndex(rowIndex) as!
RowController
    rowController.listLabel.setTextColor(UIColor.redColor())
}
```

12. Run the WatchKit App, you should see a list of fruit (**Figure 4.16**). Tapping a row will turn its label red.

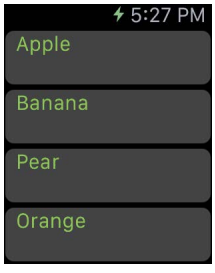


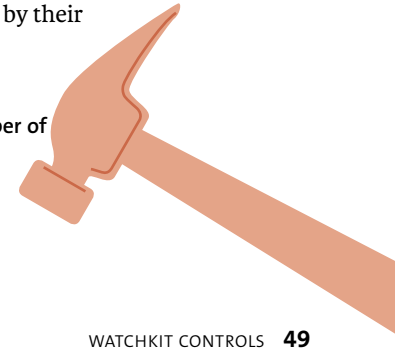
FIGURE 4.16 The table in the Watch simulator

This example demonstrates the basics of setting up and populating a `WKInterfaceTable`. Note the following details of using a table:

- The table is populated all at once when the data is available. This is in contrast to the approach taken on iOS, where the `UITableView` asks its data source for each cell to display in turn as needed.
- Access to an individual row, perhaps to update some property of its UI, is simple using `rowControllerAtIndex(_:)`.
- The idea of a "row controller" is implemented in two parts. First, in the storyboard, the row controller is created and its UI is defined. Then, it's necessary to create a custom class (`RowController` in our example) to associate with that UI. Instances of this class are how you interact with the interface items of a given row. The table identifies the row controller types by their Identifier properties and instantiates them according to their Class settings.

In this example, we have used only a single type of row in the table. However, you can define multiple row controllers on a table by increasing its Rows attribute in the storyboard editor. Interface controller code can then reference the different row controller types by their differing Identifier attributes.

TIP: In the storyboard, a table's Rows attribute represents the number of different row controllers, whereas the actual number of rows in the table at run time is provided by your interface controller.



Three methods on `WKInterfaceTable` allow you to specify which row types to use:

- `setNumberOfRows(_:withRowType:)`, the method used in the example, specifies the number of rows in the table and assigns the same row type to each of them.
- `setRowTypes(_:)` takes an array of strings that are the identifiers for the row controllers. The array should contain one string for each row that should be displayed in the table.
- `insertRowsAtIndexes(_:withRowType:)` takes the identifier of the row controller to use for the inserted rows.

In each case, as seen in the example, you access the row controller object for a given row using the table's `rowControllerAtIndex(_:)` method.

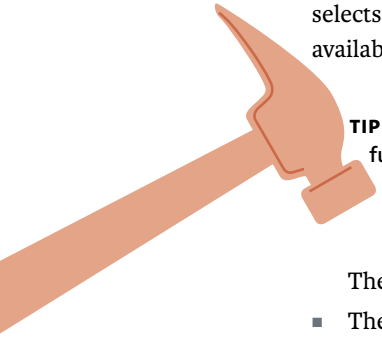
It's possible to add and remove table rows without re-creating the row set for the whole table. This is done using the methods `insertRowsAtIndexes(_:withRowType:)` and `removeRowsAtIndexes(_:)`. The interface controller can trigger a scroll to a specified row by calling `scrollToRowAtIndex(_:)` on the table.

Finally, it's possible to define segues in the storyboard that are triggered by taps on table rows. (This will be familiar to you if you've ever configured a `UITableView` to trigger a segue on iOS.) When one of these segues is triggered, the table's interface controller receives one of the table segue callbacks asking for the context to be received by the incoming interface controller's `awakeWithContext(_:)` method. These callback methods are `contextForSegueWithIdentifier(_:inTable:rowIndex:)` and `contextsForSegueWithIdentifier(_:inTable:rowIndex:)`. Which is called depends on the target and type of the segue, the latter being the method called when transitioning to a modal presentation of paged interface controllers.

PICKERS

One of the features of Apple Watch most talked about when it was announced was its digital crown, which provides a smooth, intuitive hardware interface for the user to scroll onscreen content. Developer access to the digital crown's scrolling action is via the `WKInterfacePicker` control.

`WKInterfacePicker` allows your app to define a series of options (represented by instances of the class `WKPickerItem`), providing text, an image, or both for each. The user selects the picker by tapping it. They can then use the digital crown to scroll through the available options, and then tap the control again to select the current option.



TIP: Interacting with pickers in the Apple Watch simulator is delightfully intuitive. Simply click the picker to give it focus (if it is not already focused), then use your normal scrolling action via the trackpad or mouse to simulate the movement of the digital crown.

There are three types of picker your app can use:

- The List picker (**Figure 4.17**) displays a list of options and allows the user to scroll through them and select one. Each item may have an accessory image, a title, both an accessory image and a title, or a content image.

- The Stacked picker animates through a virtual stack of cards, displaying one at a time onscreen, with a whimsical transition between items. Each item should be assigned a content image.
- The Image Sequence picker cycles through a series of images according to the user's scrolling of the digital crown, displaying one at a time. The images are supplied via the picker items' `contentImage` properties. This picker type differs from the behavior of the Stacked picker in that the transition isn't animated. If the picker's focus highlight (the green outline visible in Figure 4.17) is disabled and the sequence of images is constructed with care, this option might give you all kinds of ideas for custom UI. (See Chapter 6 for another approach to using a picker to control an animation: with its `setCoordinatedAnimations(_:)` method.)

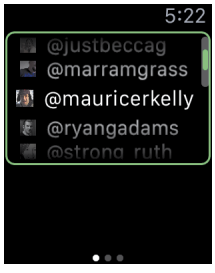


FIGURE 4.17 A List picker with a focus highlight

Note that the Stacked and Image Sequence pickers (**Figures 4.18** and **4.19**) look identical. The difference is in the transition—or lack of transition, in the Image Sequence picker—between the items.

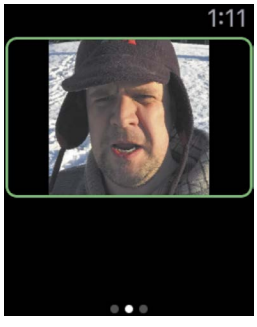


FIGURE 4.18 A Stacked picker with a focus highlight

FIGURE 4.19 An Image Sequence picker with a focus highlight

Each type of picker is configurable in two ways in the storyboard editor:

- The Focus property of the picker in the storyboard editor controls whether the picker is outlined to show when it is in focus (responding to digital crown input), whether it shows its caption in addition to its focus ring (**Figure 4.20**), or whether there is no indication that the picker has focus.

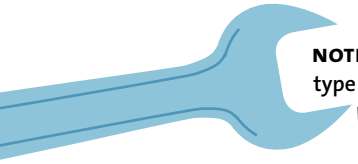
- The Indicator property specifies whether or not the picker gives an indication of its current display in the list of items. The indicator can be seen in Figure 4.17, and is reminiscent of `UIScrollView`'s scroll indicators on iOS.

FIGURE 4.20 A List picker with a caption

As with other controls, `WKInterfacePicker` has a `setEnabled(_:)` method to set whether or not it is available for the user to interact with. It can be given focus programmatically with a call to its regally named `focusForCrownInput()` method.

The picker's items are set via its `setItems(_:)` method, which accepts an array of `WKPickerItem` instances. The currently selected item is specifiable by its index, via the `setSelectedItemIndex(_:)` method. Each picker item has the following properties available for configuration:

- `contentImage` is available to all three types of picker: it's the only property used by Stacked and Image Sequence pickers, and if it's set in the `WKPickerItems` to be consumed by a List picker, then the other properties should not be set.
- `title` is the text used by a List picker.
- `accessoryImage` is the small image used by a List picker, displayed next to its title.
- `caption` is the text used in the picker's caption area, if it's enabled (Figure 4.20).



NOTE: The images accepted by `WKPickerItem`'s image properties are of the type `WKImage`. These can be created from instances of `UIImage` by calling `WKImage`'s `init(image:)` initializer.

Finally, to let your app respond to the changing selection of the picker, the picker can send an action method to its interface controller. The method takes the form `@IBAction func pickerAction(index: Int)` and receives the index of the picker item selected by the user.

ALERTS

It's possible to display an alert, with options for the user, in much the same way as using `UIAlertController` (or the older, deprecated API `UIAlertView`) on iOS. Although alerts don't involve subclasses of `WKInterfaceObject`, we include them here because they are a natural fit in our tour of UI controls.

An alert is triggered with a call to `WKInterfaceController`'s method `presentAlertControllerWithTitle(_:message:preferredStyle:actions:)`. The actions parameter takes an array of `WKAlertAction` instances.

To see the alerts in action, carry out the following steps:

1. Create a new iOS App with WatchKit App project (File > New > Project).
2. In the WatchKit App's `Interface.storyboard`, add a button as shown in **Figure 4.21**.

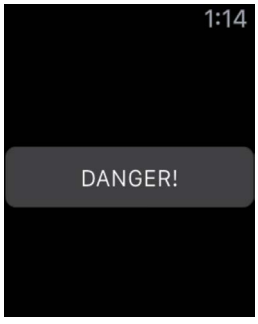


FIGURE 4.21 The DANGER! button

3. Update your `InterfaceController.swift` file to have an empty implementation, as follows:

```
import WatchKit
import Foundation

class InterfaceController: WKInterfaceController {

}
```

   The button will be updated depending on the option chosen by the user when the alert is presented.

4. Add the following enum and property inside (since Swift allows nested types, and this enum is of interest only inside the class—yay!) the curly brackets of the `InterfaceController` class:

```
enum ButtonState {
    case OutOfDanger, Danger, Exploded
}

var buttonState = ButtonState.Danger
```

5. Create the following `@IBAction` and `@IBoutlet` in `InterfaceController`, and connect both to the button in the storyboard:

```
@IBOutlet var dangerButton: WKInterfaceButton!

@IBAction func dangerTapped() {
    presentAlertControllerWithTitle("Danger!",
        message: "What will you do?",
        preferredStyle: .Alert,
        actions: alertActions())
}
```

We then need to define the actions for the alert.

6. Define the method referenced in the previous call:

```
func alertActions() -> [WKAlertAction] {
    return [
        WKAlertAction.init(title: "Deal with it",
            style: .Default) {self.buttonState = .OutOfDanger},
        WKAlertAction.init(title: "Ignore it",
            style: .Cancel) {self.buttonState = .Danger},
        WKAlertAction.init(title: "Explode it",
            style: .Destructive) {self.buttonState = .Exploded}
    ]
}
```

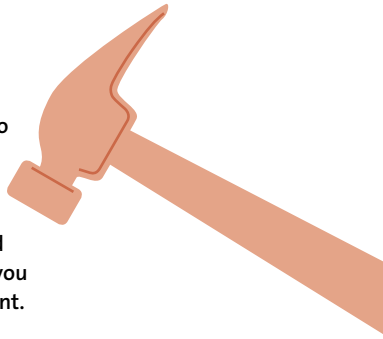
Next, the button needs to be updated according to the value of the `buttonState` property. The time to do this is in the `willActivate()` method.

7. Add the following code to the interface controller:

```
override func willActivate() {
    super.willActivate()
    updateButton()
}

func updateButton() {
    switch buttonState {
    case .OutOfDanger: outOfDanger()
    case .Danger: danger()
    case .Exploded: exploded()
    }
}
```

8. Add the following three methods to set the different button states:

```
func outOfDanger() {
    dangerButton.setTitle("Phew")
    dangerButton.setEnabled(false)
}

func danger() {
    dangerButton.setTitle("DANGER!")
    dangerButton.setEnabled(true)
}

func exploded() {
    dangerButton.setTitle("BOOM!")
    dangerButton.setBackgroundColor(.redColor())
    dangerButton.setEnabled(false)
}
```



TIP: The `InterfaceController` class here uses an enumeration to track the state of the button and update the UI accordingly because the interface controller will be deactivated while the alert is shown. This means the button will not respond to the calls to its setters in the alert handlers, and needs to be updated when `willActivate()` is called on the controller. To save future-you some debugging pain, you might want to remember this moment.

9. Run the app and tap the button. You should see the alert appear, as in **Figure 4.22**.

FIGURE 4.22 An alert, asking the important question

The `preferredStyle` parameter in the call to `presentAlertControllerWithTitle(_:message:preferredStyle:actions:)` in step 5 is a case of the `WKAlertControllerStyle` enumeration. The available cases are

- `Alert` dispays a simple, flexible alert with a variable number of actions. This is the style used in the example.
- `SideBySideButtonsAlert` accepts only two actions and displays their buttons side by side (**Figure 4.23**).
- `ActionSheet` accepts either one or two custom actions and comes with a standard Cancel button in its top corner (**Figure 4.24**).

As an exercise, we suggest you try modifying the previous example to display alerts matching those in Figures 4.23 and 4.24.

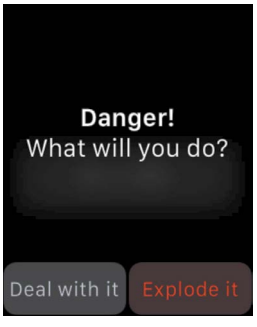


FIGURE 4.23 An alert of style `SideBySideButtonsAlert`

FIGURE 4.24 An alert of style `ActionSheet`

USER INPUT

You might have noticed that none of the interface objects is anything like our old friends `UITextField` or `UITextView` from iOS. Textual input on the Watch is a *very* different proposition from other devices. We'll look at it in detail in Chapter 11.

WRAPPING UP

This chapter skimmed over all the interface controls available from WatchKit. Knowing the blocks from which you build your user interface is only part of the story. Designing UI for the Watch is a very different prospect from doing so for larger devices. Read on to Chapter 5 to learn how to effectively combine these pieces in your app.

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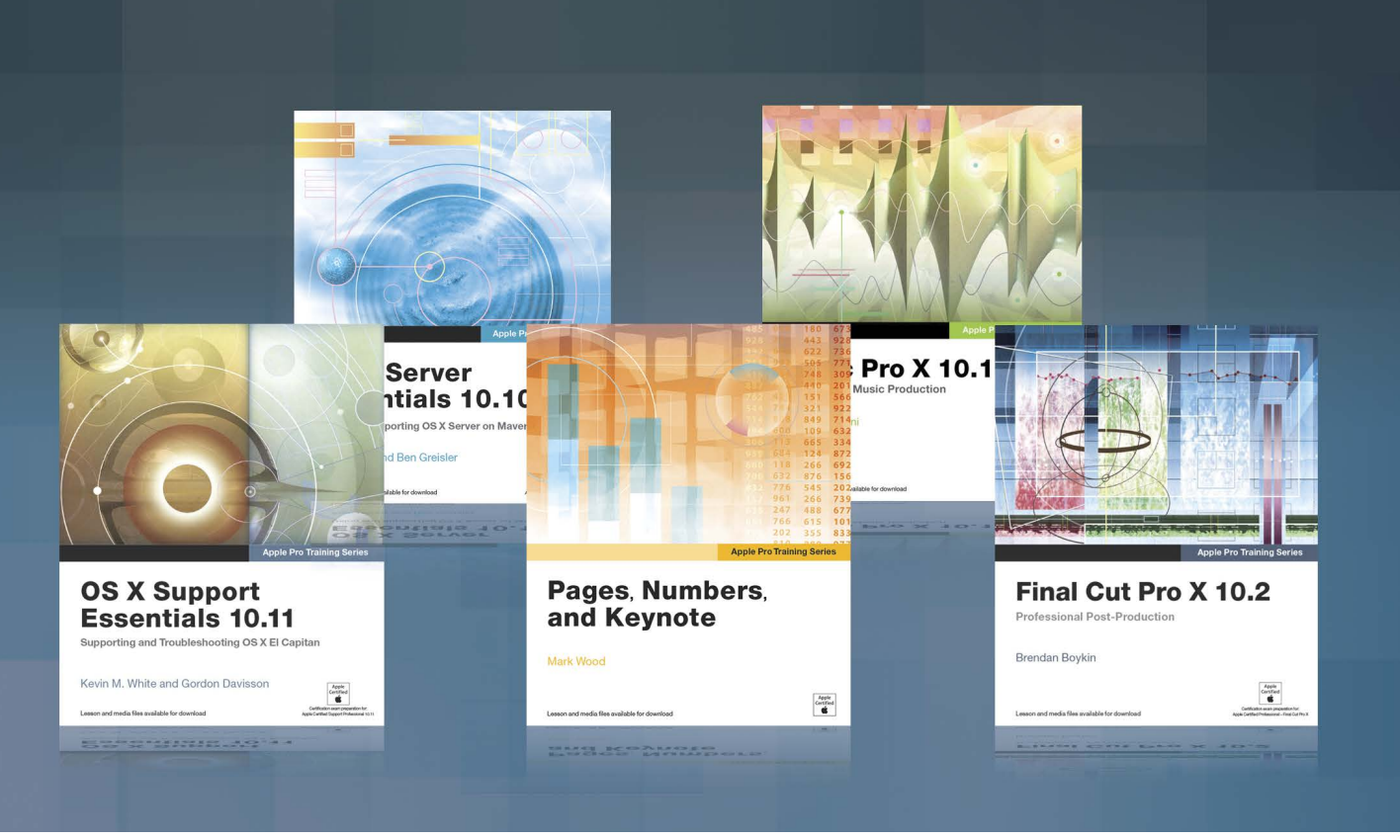

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