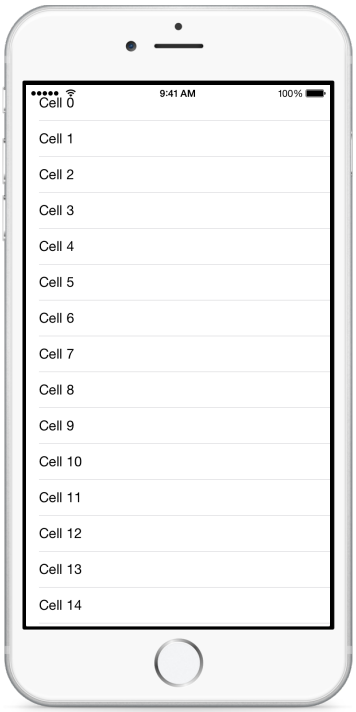
Journal
Lesson 4

Description

Illustrate table cell reuse by adding sample data to the table view.



Learning Outcomes

- Discover how to add rows of data to a table view.
- Illustrate `UITableViewDelegate` methods and table cell reuse.
- Explore the relationship between optional types, optional binding and forced unwrapping.
- Assess different ways of declaring and initializing property values.
- Apply `map` and a closure to create a transformation of data.

Vocabulary

`UITableViewDataSource`	array	property
`NSIndexPath`	array subscripting	optional
optional binding	forced unwrapping	`for-in` loop
range	`map`	closure expression
trailing closure		

Materials

- **Journal Lesson 4** Xcode project

Opening

How can we get some data to appear in the table?

Agenda

- Begin an experiment with using a simple array of strings to illustrate how the `UITableViewDataSource` method `tableView:cellForRowAtIndexPath:` will work.
- Add a naive array property to the `JournalTableViewController` class.

```
var sampleData: [String]?
```

- Update the implementation of `viewDidLoad` to naively populate the array.

```
override func viewDidLoad() {
   super.viewDidLoad()
   sampleData = [String]()
   for var index = 0; index < 1000; ++index {
      sampleData!.append("Cell \(index)")
   }
}
```

- Discuss that the `sampleData` property is an optional type, since the initializer will not assign the property its initial value; how `viewDidLoad` assigns the `sampleData` property an empty `String` array; and how a C-style `for` loop appends 1000 `String` values to the array, after a forced unwrapping.
- Update the implementation of `tableView:NumberOfRowsInSection:`.

```
override func tableView(tableView: UITableView,
   numberOfRowsInSection section: Int) -> Int {
   if let data = sampleData {
      return data.count
   } else {
      return 0
   }
}
```

- Discuss how the `tableView:NumberOfRowsInSection:` method uses optional binding to ensure the existence of the `sampleData` array, and uses the size of the array to determine the number of rows in the table view.
- Update the implementation of `tableView:cellForRowAtIndexPath:`.

```
override func tableView(tableView: UITableView,
   cellForRowAtIndexPath indexPath: NSIndexPath) -> UITableViewCell {
   let cell =
      tableView.dequeueReusableCellWithIdentifier(cellReuseIdentifier,
         forIndexPath: indexPath)
   if let data = sampleData {
      if let label = cell.textLabel {
         label.text = data[indexPath.row]
      }
   }
   return cell
}
```

- Explain how optional binding is used to unwrap the `sampleData` array and the optional `textLabel` property of a table cell; and how the `indexPath.row` is used as the index for the array.
- Add a custom breakpoint to the body of the `tableView:cellForRowAtIndexPath:` method that uses a Log Message action to print `obtaining reusable cell @indexPath.row@` and automatically continue.
- Run the app (⌘R), scroll the table rows up and down, observe the different cells appear, and observe the console output.
- Explain how the table view only maintains enough `UITableViewCell` objects in memory to present the visible cells and animate the table view efficiently.
- Discuss the naive declaration of the `sampleData` property, the generation of values in the `sampleData` array, and the multiple occurrences of unwrapping.
- Improve the implementation of the `sampleData` property declaration and `viewDidLoad` with a default property value and a `for-in` loop; and remove the occurrences of unwrapping the `sampleData` property.

```
var sampleData = [String]()

override func viewDidLoad() {
   super.viewDidLoad()
   for index in 0..<1000 {
      sampleData.append("Cell \(index)")
   }
}
...
override func tableView(tableView: UITableView,
   numberOfRowsInSection: Int) -> Int {
   return sampleData.count
}
```

```
override func tableView(tableView: UITableView,
   cellForRowAtIndexPath indexPath: NSIndexPath) -> UITableViewCell {
   let cell =
      tableView.dequeueReusableCellWithIdentifier(cellReuseIdentifier,
         forIndexPath: indexPath)
   if let label = cell.textLabel {
      label.text = sampleData[indexPath.row]
   }
   return cell
}
```

- Discuss how the `for-in` loop is more succinct, and using a default property value for the `sampleData` property removes the need to use an optional type.
- Run the app (⌘R), and observe that the functionality remains the same.
- Discuss how `map` might be used to improve the property declaration.
- Improve the property declaration with a call of `map` and a closure expression.

```
let sampleData = (0..<1000).map( { (index: Int) -> String in
    return "Cell \(index)"
})

override func viewDidLoad() {
   super.viewDidLoad()
}
```

- Explain that the `sampleData` is now a constant with a default value generated by transforming a range of `Int` values into an array of `String` values.
- Run the app (⌘R), and observe that the functionality remains the same.
- Discuss how the closure expression can be more succinct by leveraging Swift type inference, implicit closure parameters and the trailing closure syntax.
- Replace the verbose closure expression in the `sampleData` property declaration with a succinct trailing closure expression.

```
let sampleData = (0..<1000).map { "Cell \($0)" }
```

- Run the app (⌘R), and observe that the functionality remains the same.

Closing

What happens when the cell reuse identifier string used in `tableView:cellForRowAtIndexPath:` does not match the identifier of the prototype cell specified in Interface Builder?

Modifications and Extensions

- Change the custom breakpoint to print the memory address of the `UITableViewCell` instance. Inspect the console output to confirm repeated memory addresses, and explain how this is related to cell reuse.

Resources

Table View Programming Guide for iOS https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/TableView_iPhone/AboutTableViewsiPhone/AboutTableViewsiPhone.html

Cocoa Core Competencies: Delegation https://developer.apple.com/library/ios/documentation/General/Conceptual/DevPedia-CocoaCore/Delegation.html

Cocoa Core Competencies: Protocol https://developer.apple.com/library/ios/documentation/General/Conceptual/DevPedia-CocoaCore/Protocol.html

UIKit User Interface Catalog: Table Views https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/UIKitUICatalog/UITableView.html

UITableViewController Class Reference https://developer.apple.com/library/ios/documentation/UIKit/Reference/UITableViewController_Class/index.html

UITableView Class Reference https://developer.apple.com/library/ios/documentation/UIKit/Reference/UITableView_Class/index.html

UITableViewDelegate Protocol Reference https://developer.apple.com/library/ios/documentation/UIKit/Reference/UITableViewDelegate_Protocol/index.html

UITableViewDataSource Protocol Reference https://developer.apple.com/library/ios/documentation/UIKit/Reference/UITableViewDataSource_Protocol/index.html

NSIndexPath Class Reference https://developer.apple.com/library/ios/documentation/Cocoa/Reference/Foundation/Classes/NSIndexPath_Class/index.html

The Swift Programming Language: Control Flow https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/ControlFlow.html

The Swift Programming Language: Closures https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/Closures.html