iOS Mobile Development

Today

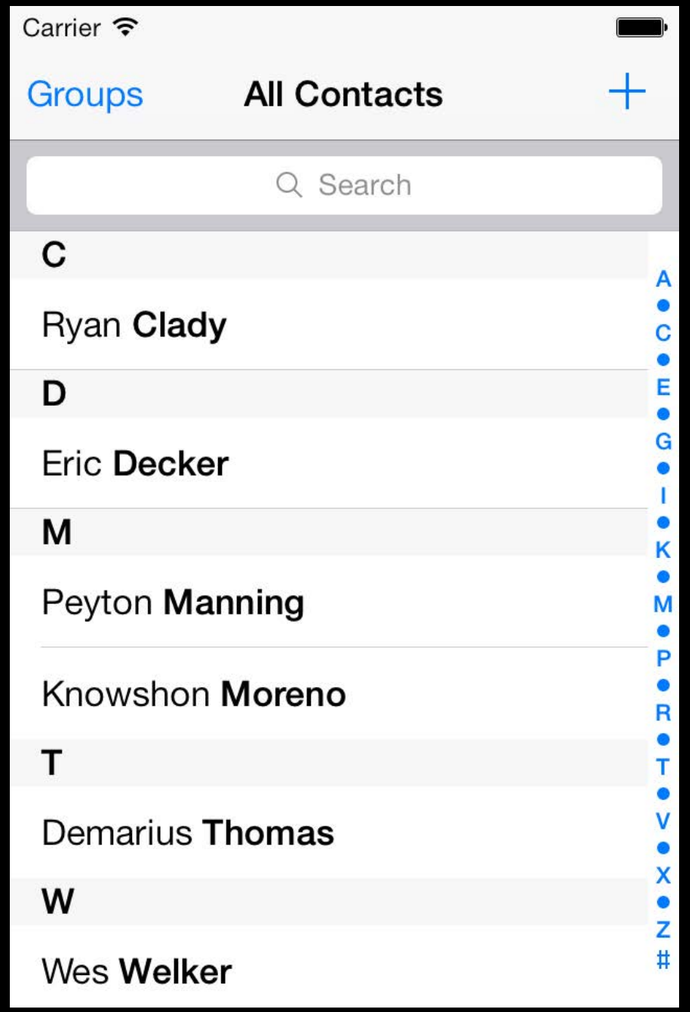
- UITableView
  Data source-driven vertical list of views.
- iPad
  Device-specific UI idioms.
- Demo
  Shutterbug

UITableView

- Very important class for displaying data in a table
  - One-dimensional table.
  - It's a subclass of `UIScrollView`.
  - Table can be static or dynamic (i.e. a list of items).
  - Lots and lots of customization via a `dataSource` protocol and a `delegate` protocol.
  - Very efficient even with very large sets of data.
- Displaying multi-dimensional tables …
  - Usually done via a `UINavigationController` with multiple MVC's where View is `UITableView`
- Kinds of `UITableViews`
  - Plain or Grouped
  - Static or Dynamic
  - Divided into sections or not
  - Different formats for each row in the table (including completely customized)

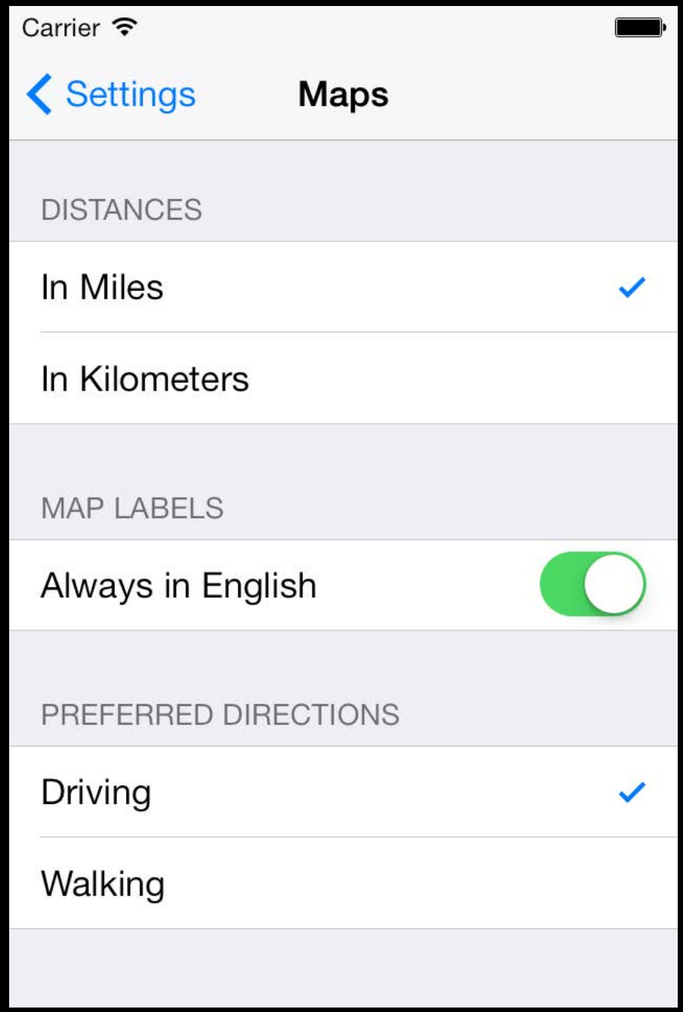
UITableView

UITableViewStylePlain



Dynamic (List) & Plain (ungrouped)

UITableViewStyleGrouped

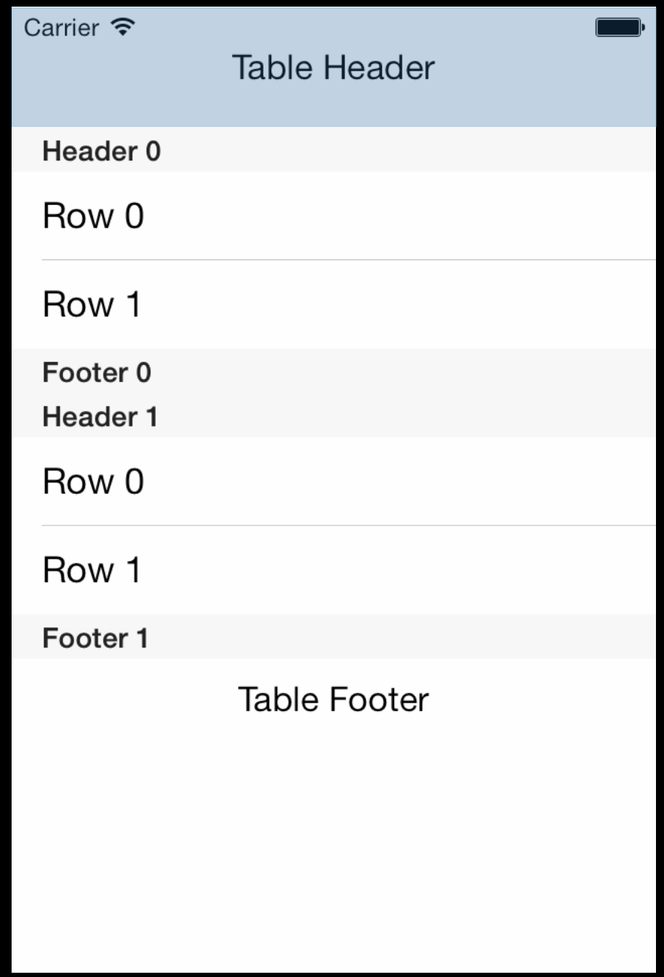


Static & Grouped

UITableView

Plain Style

Table Header




```
@property UIView *tableHeaderView;
```

UITableView

Plain Style

Table Header

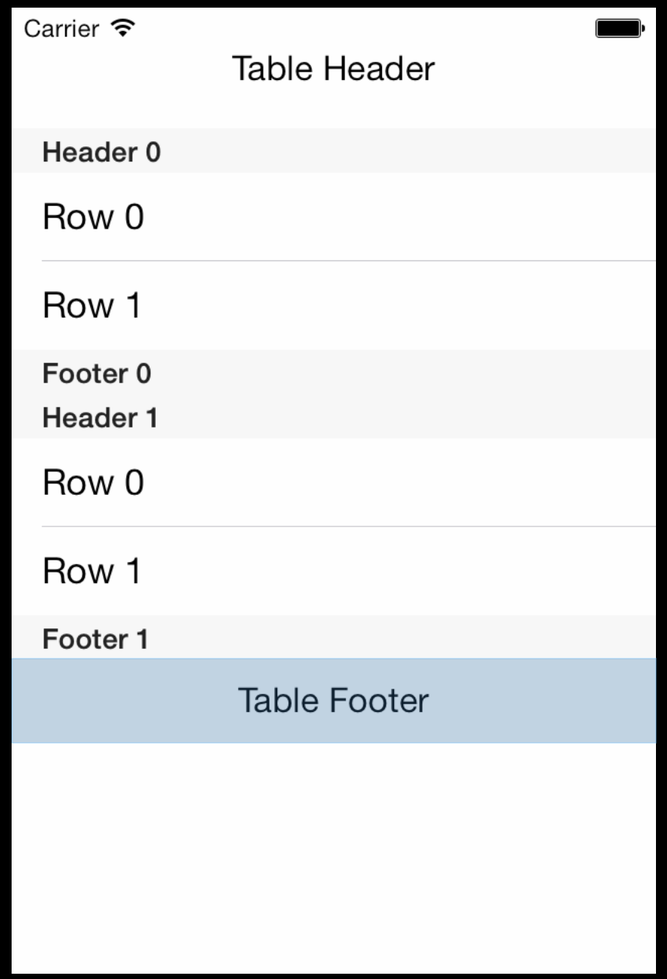
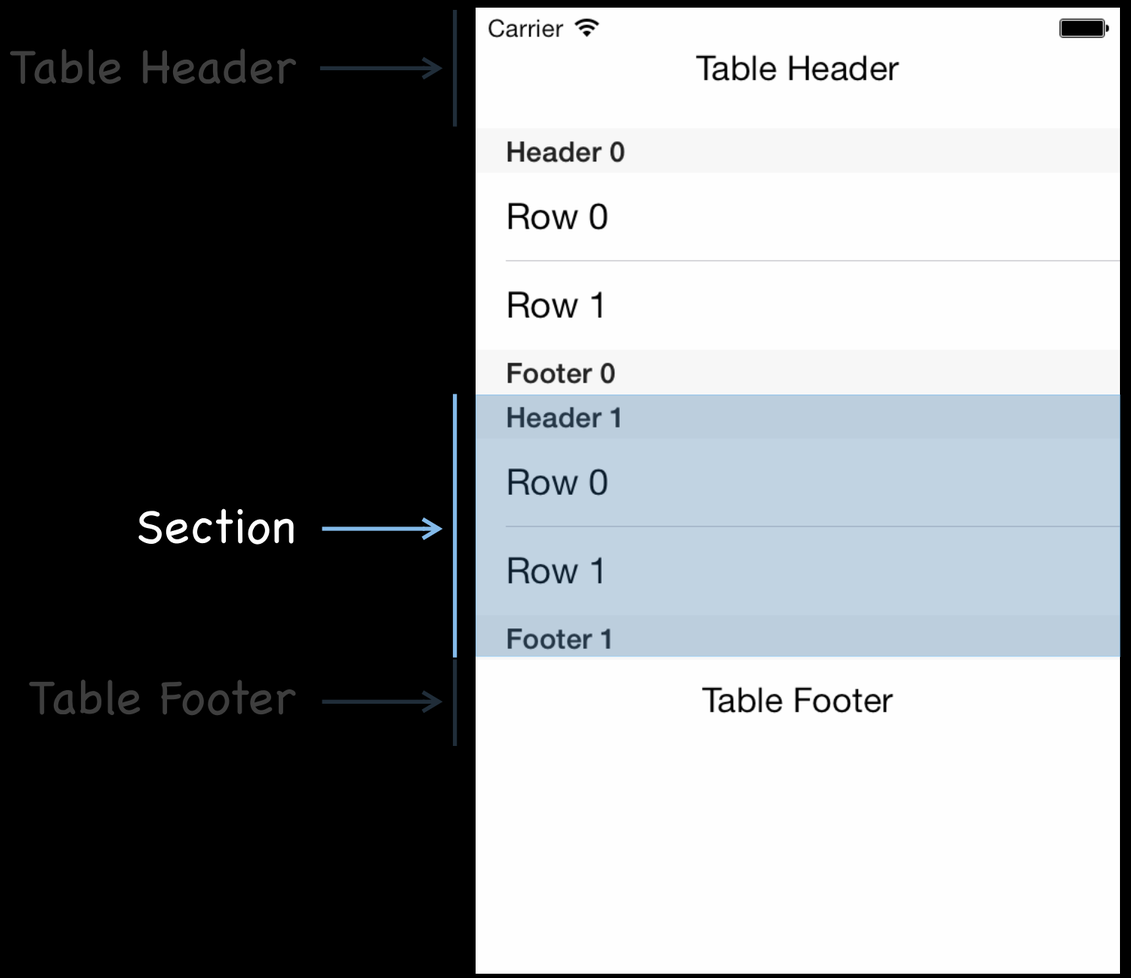


Table Footer

```
@property UIView *tableFooterView;
```

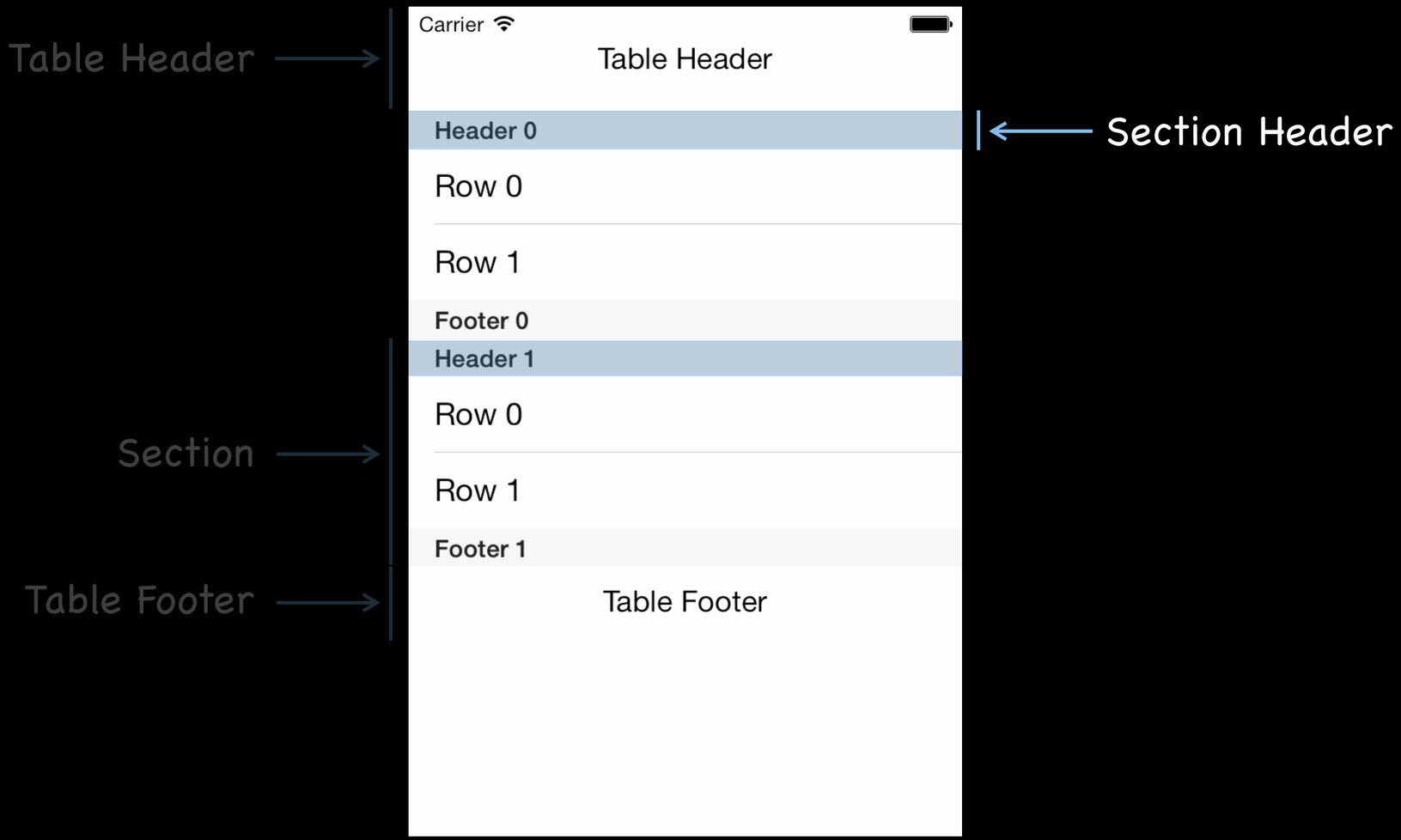
UITableView

Plain Style



UITableView

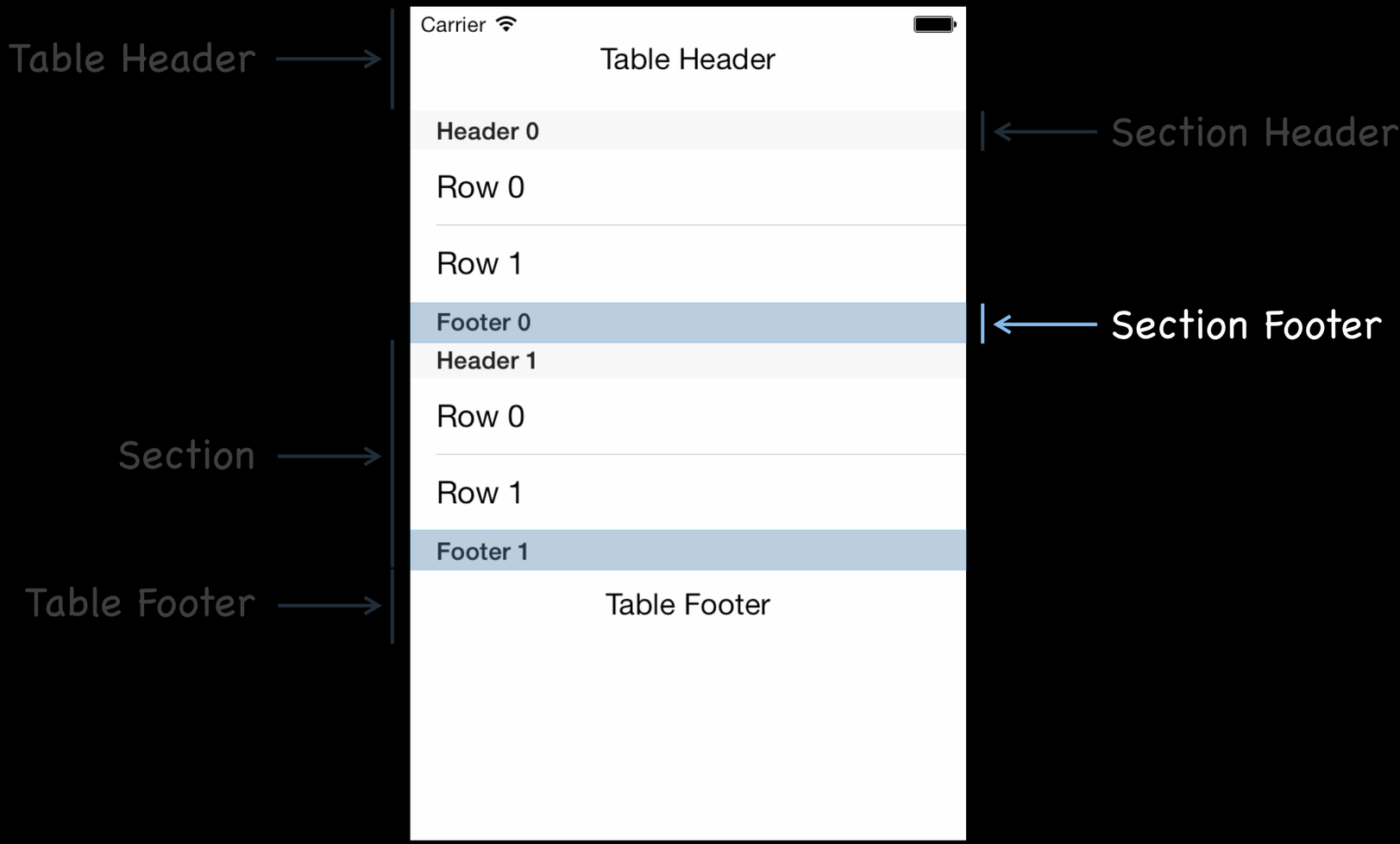
Plain Style



`UITableViewDataSource's tableView:titleForHeaderInSection:`

UITableView

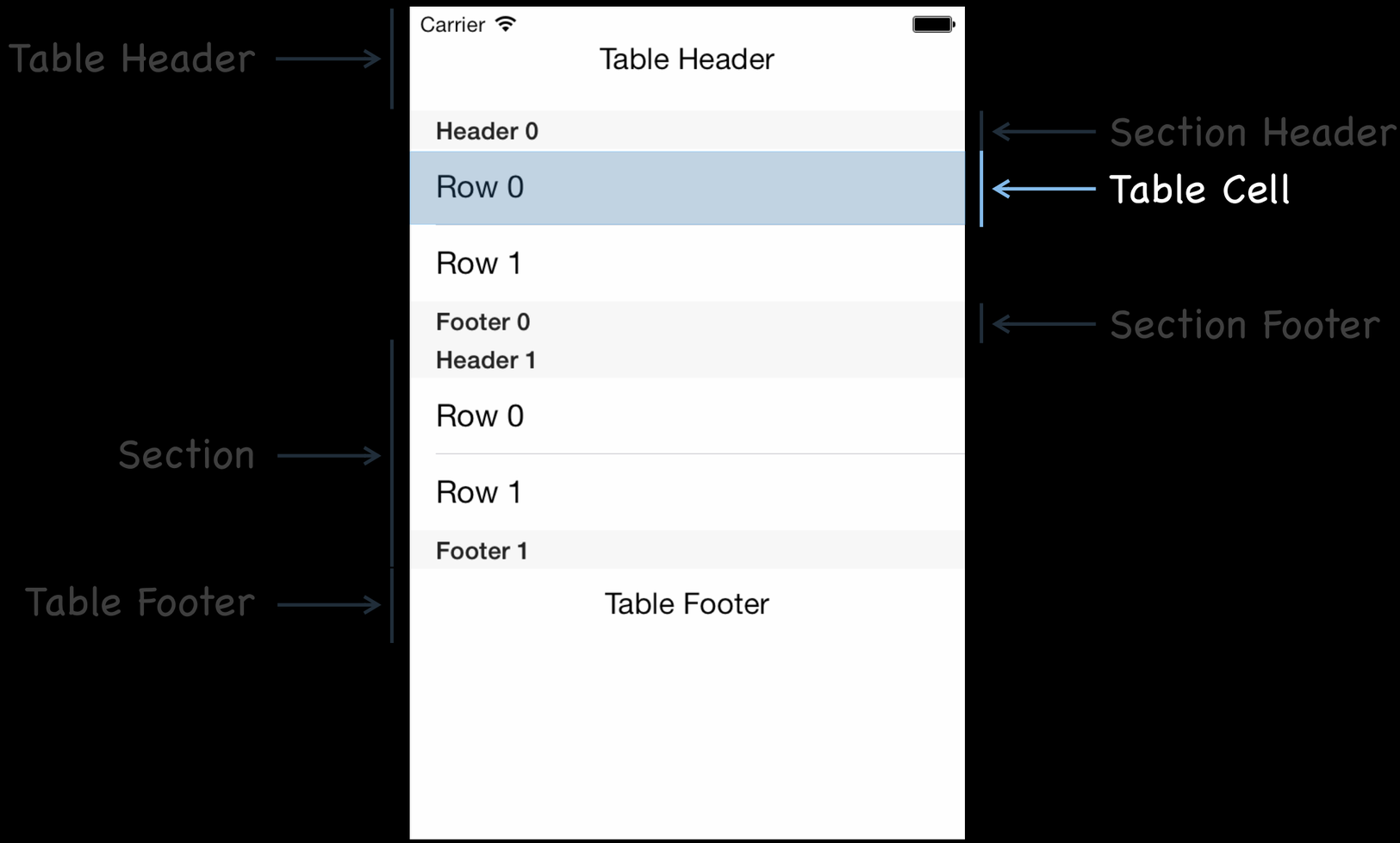
Plain Style



`UITableViewDataSource's tableView:titleForFooterInSection:`

UITableView

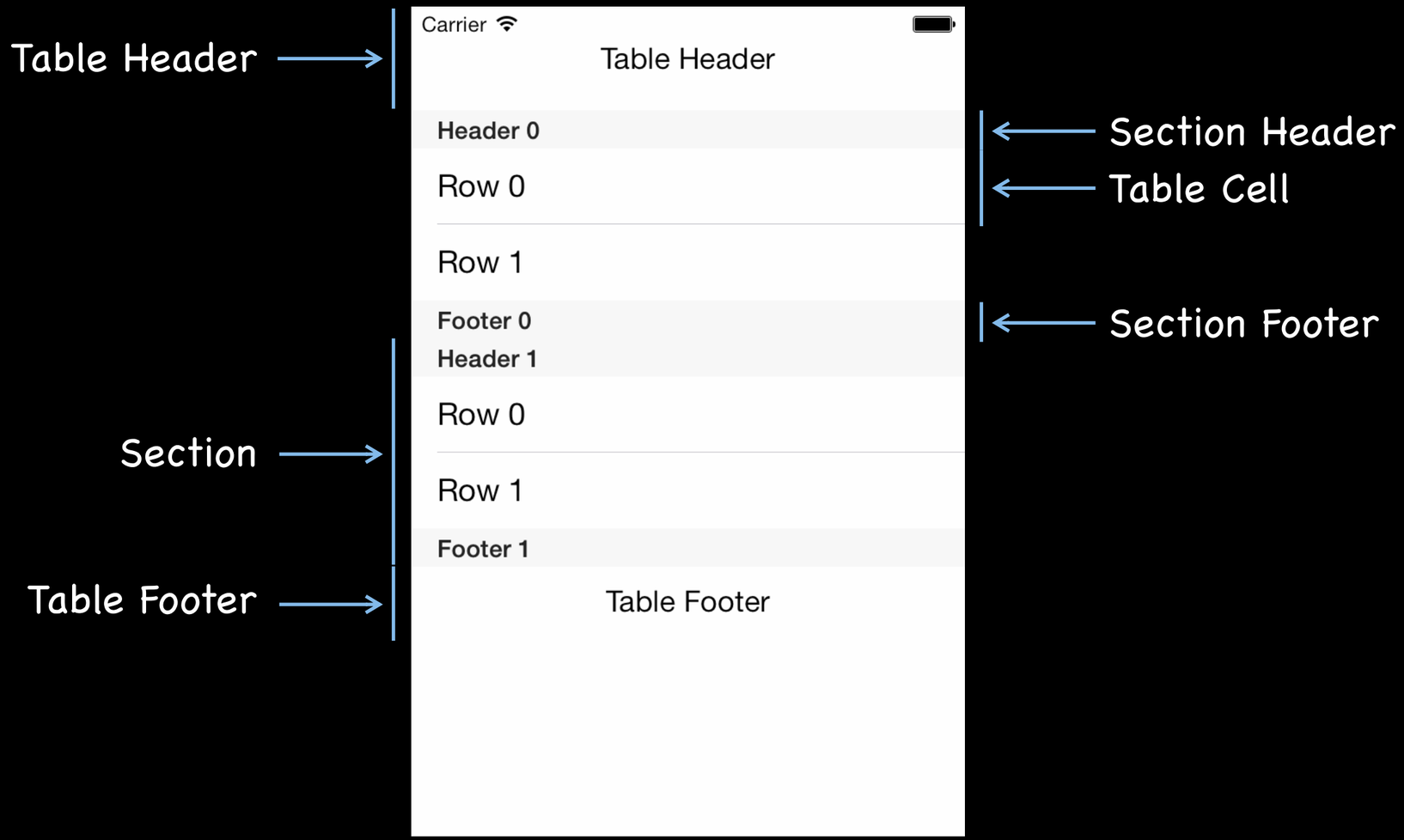
Plain Style



`UITableViewDataSource's tableView:cellForRowAtIndexPath:`

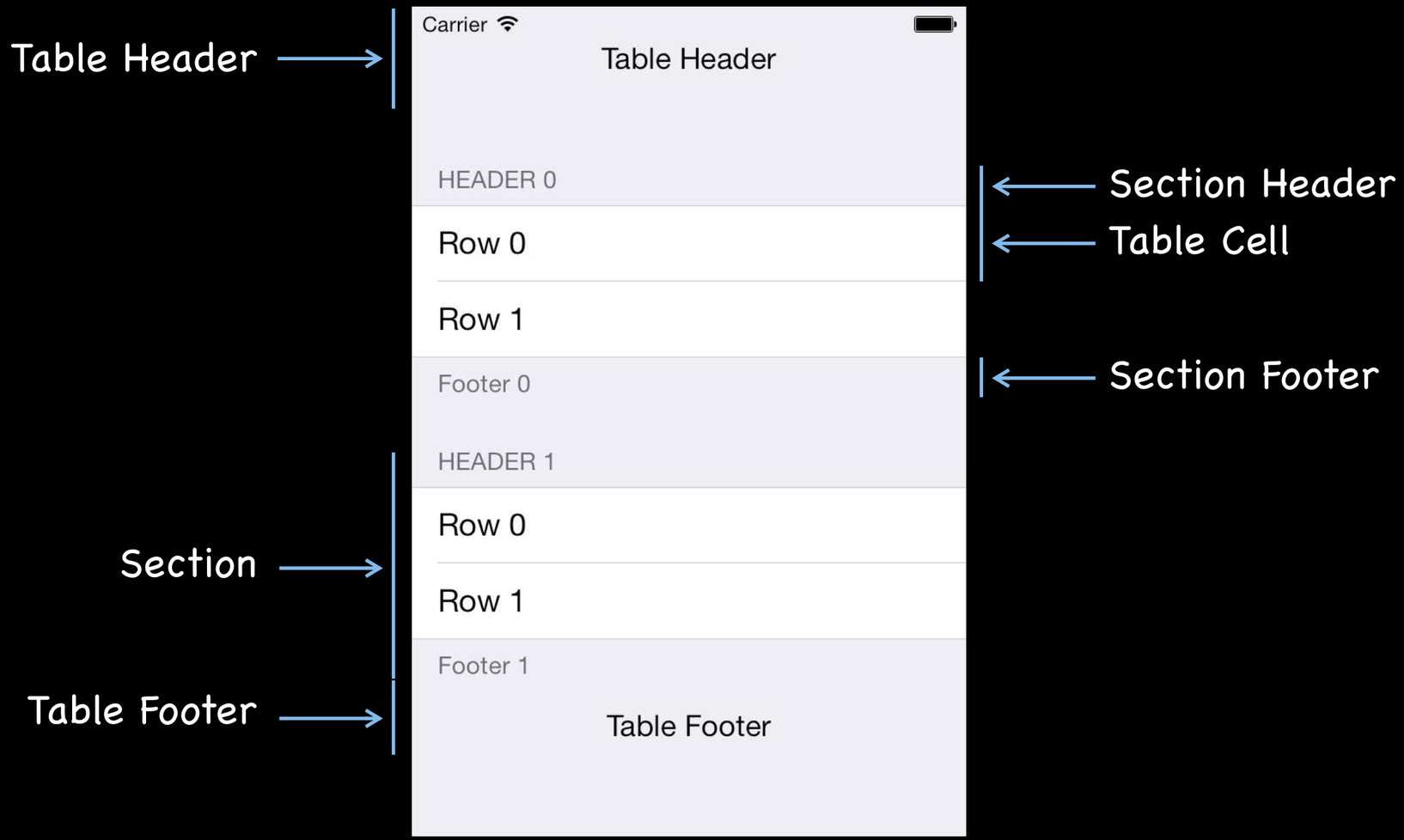
UITableView

Plain Style

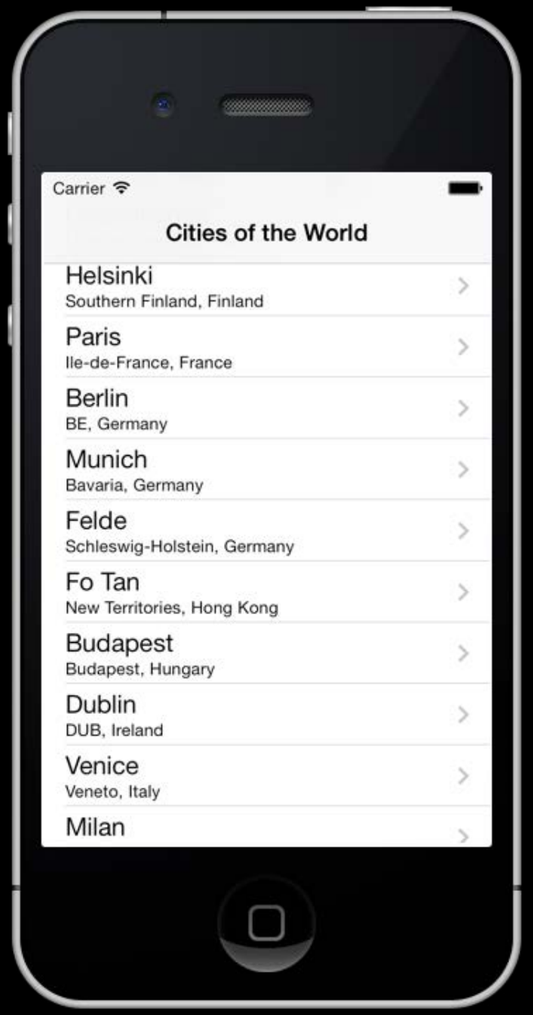


UITableView

Grouped Style



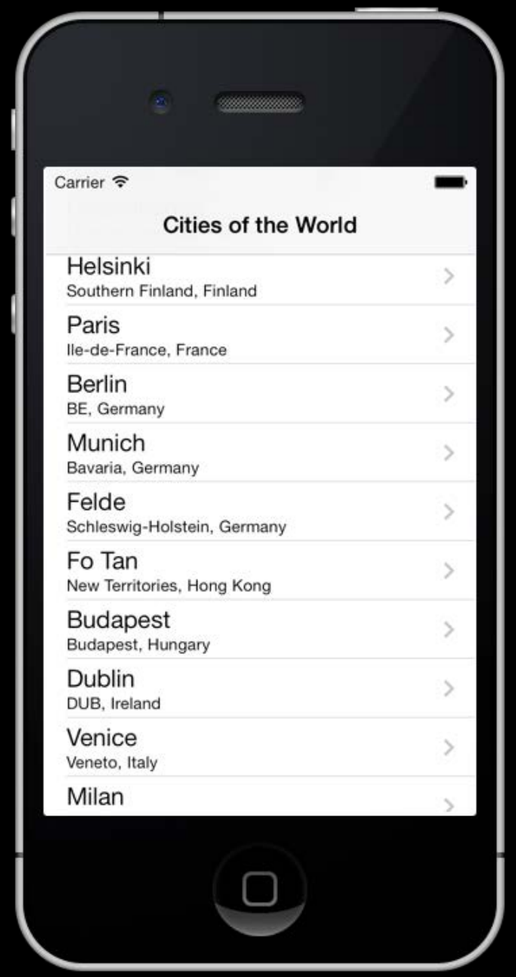
Sections or Not



No Sections

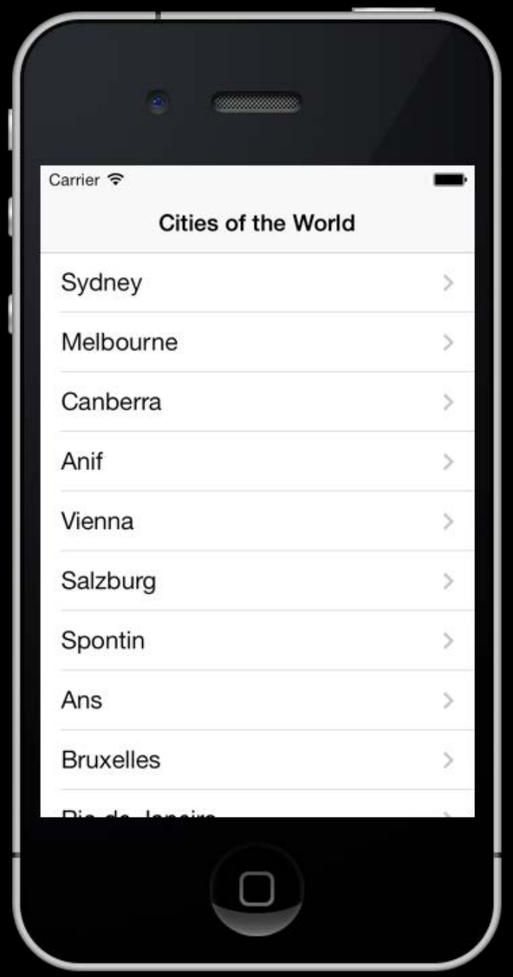
Sections

Cell Type



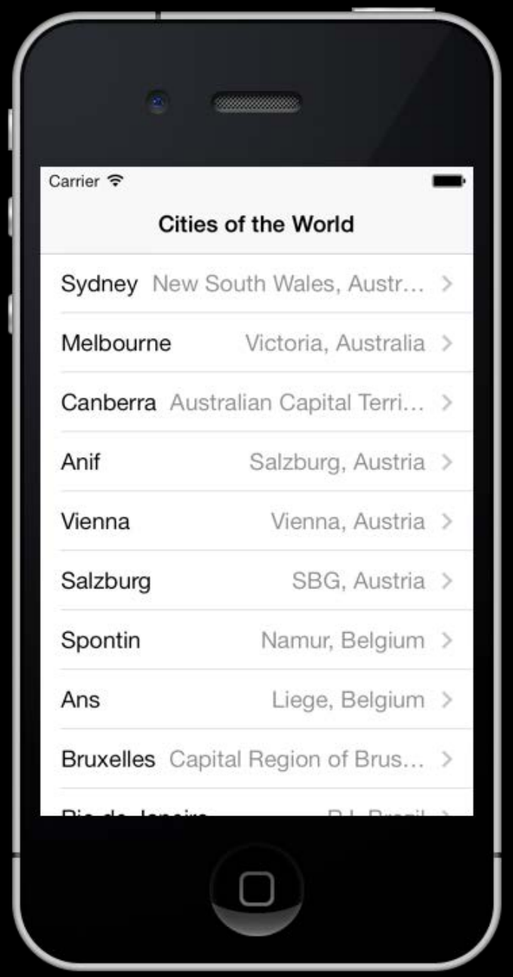
Subtitle

`UITableViewCellStyleSubtitle`



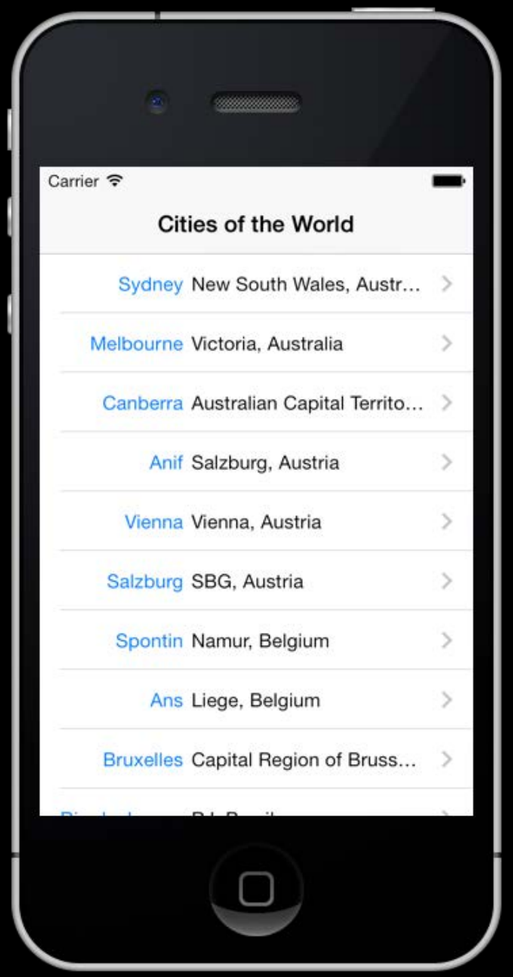
Basic

`UITableViewCellStyleDefault`



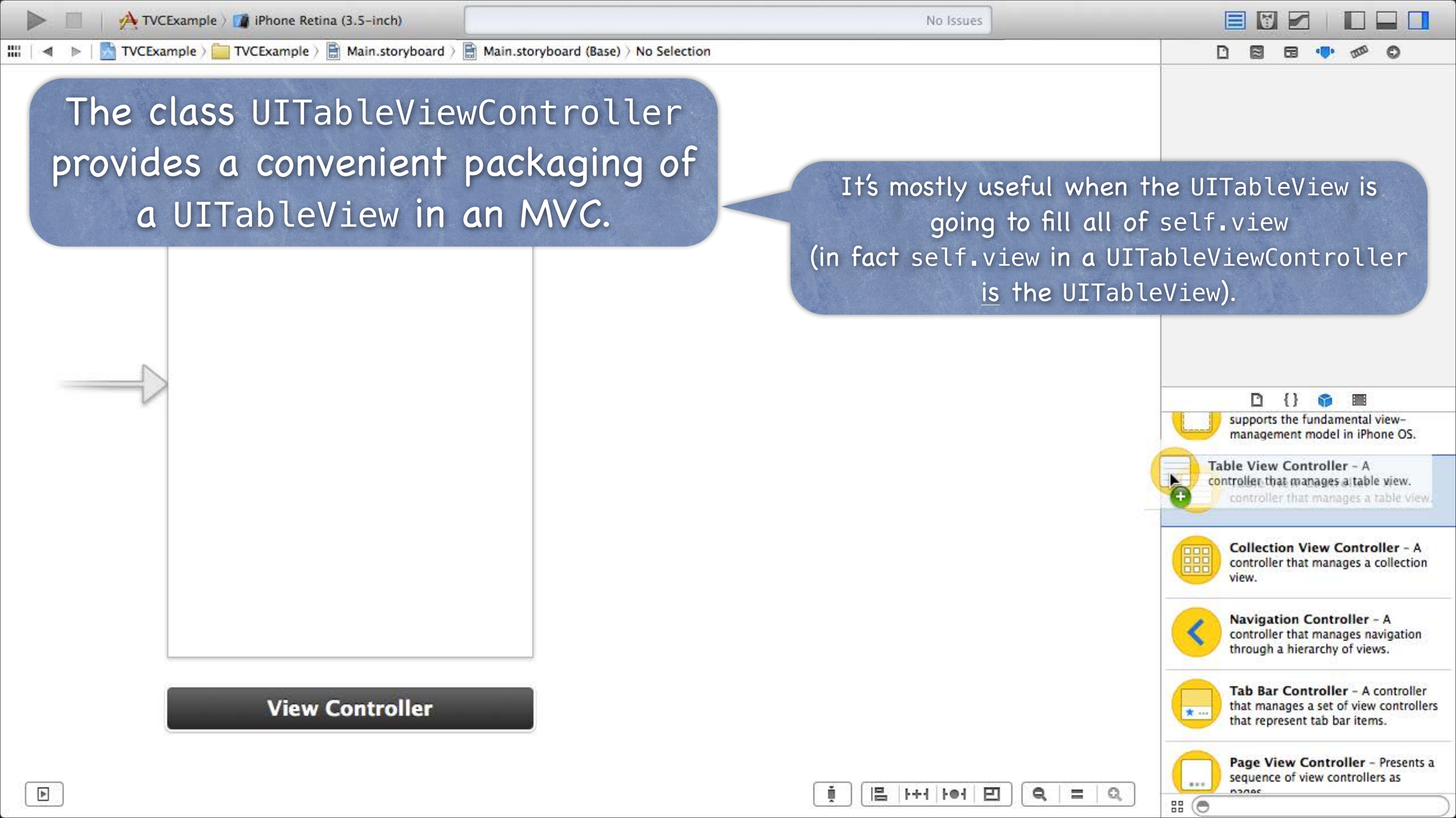
Right Detail

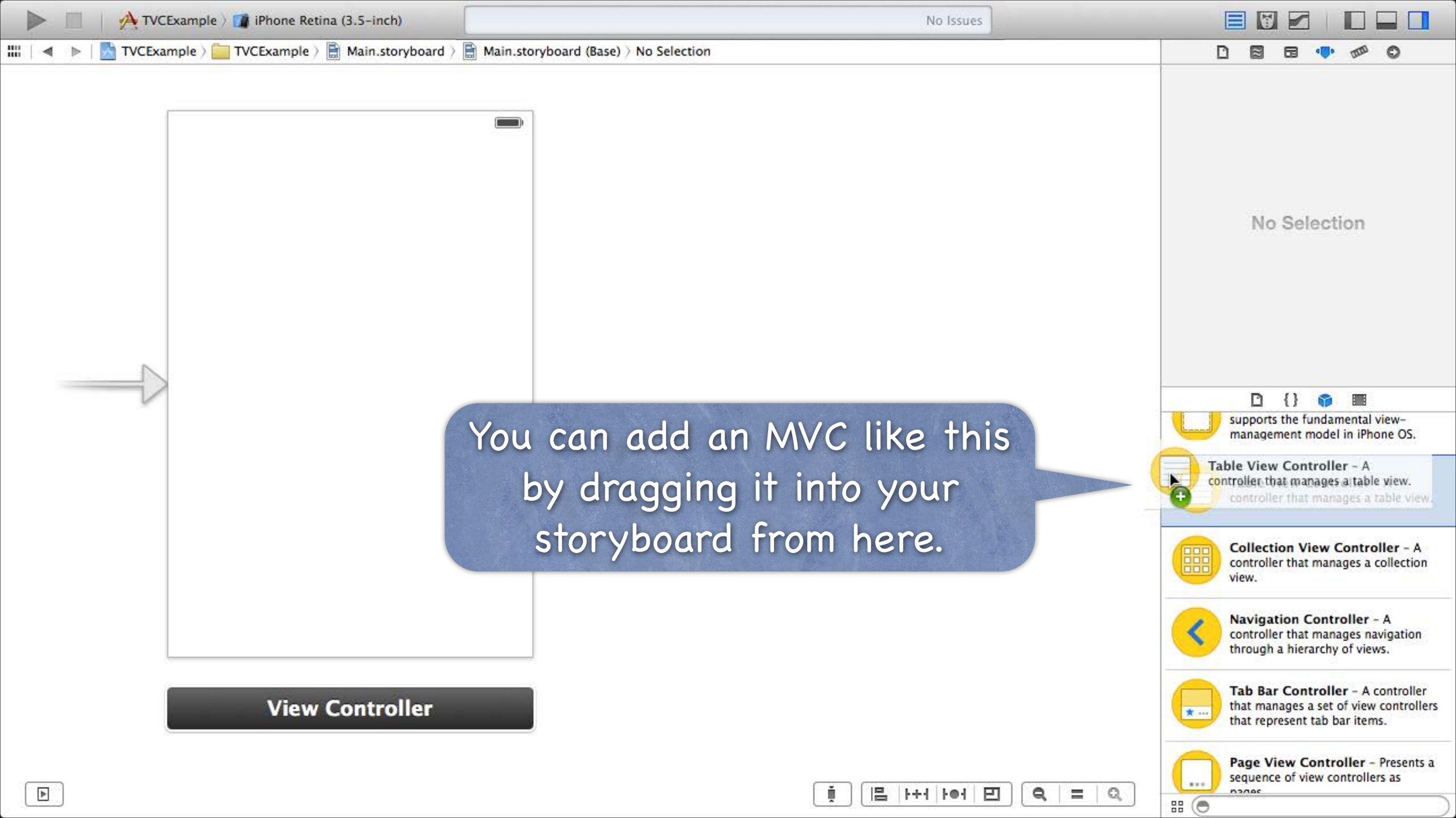
`UITableViewCellStyleValue1`



Left Detail

`UITableViewCellStyleValue2`


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
No Selection
The class UITableViewController provides a convenient packaging of a UITableView in an MVC.
It's mostly useful when the UITableView is going to fill all of self.view
(in fact self.view in a UITableViewController is the UITableView).
View Controller
supports the fundamental view-management model in iPhone OS.
Table View Controller – A controller that manages a table view.
Collection View Controller – A controller that manages a collection view.
Navigation Controller – A controller that manages navigation through a hierarchy of views.
Tab Bar Controller – A controller that manages a set of view controllers that represent tab bar items.
Page View Controller – Presents a sequence of view controllers as


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
No Selection
No Selection
View Controller
You can add an MVC like this by dragging it into your storyboard from here.
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Tab Bar Controller – A controller that manages a set of view controllers that represent tab bar items.
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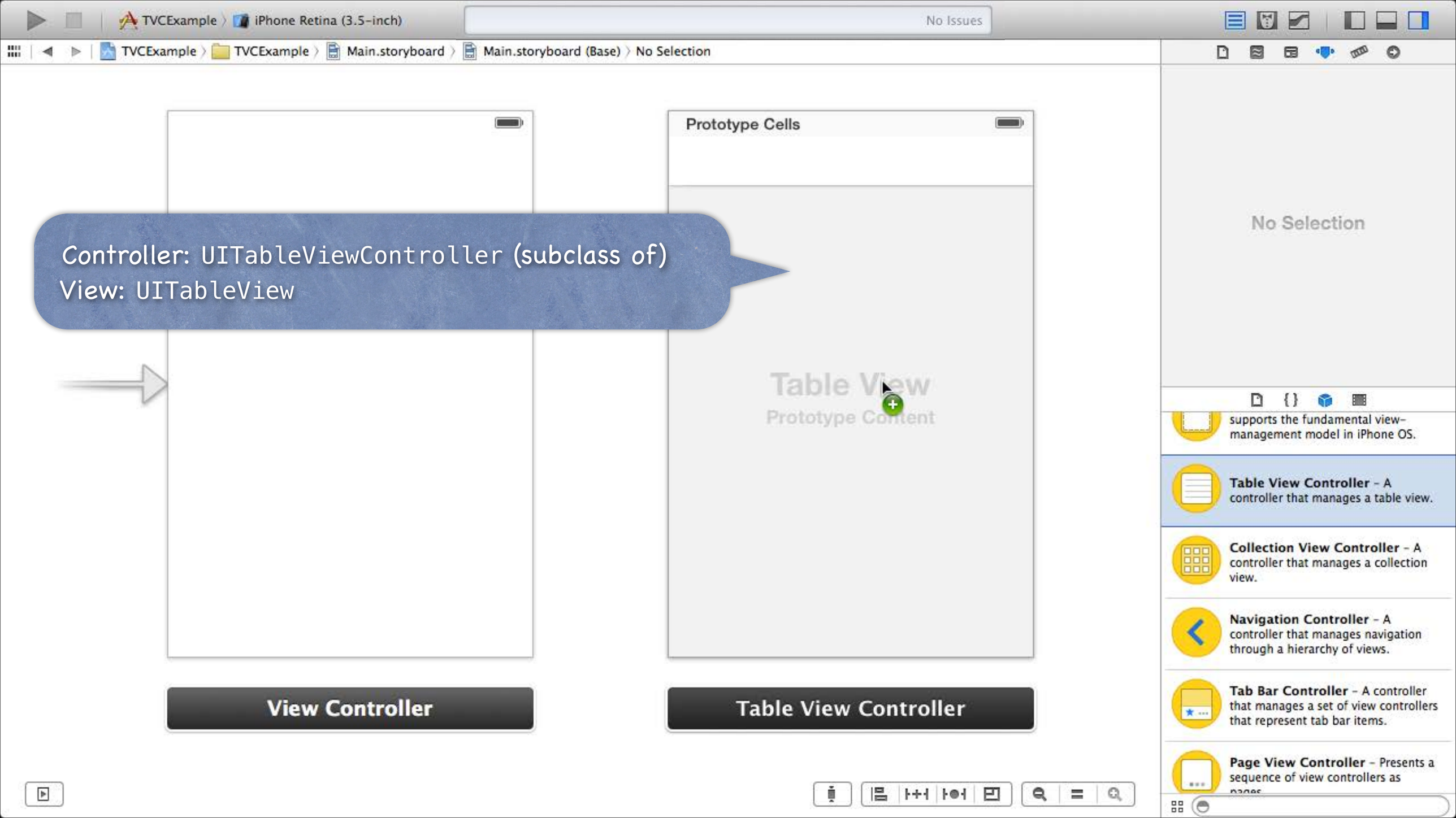
TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
No Selection
Prototype Cells
Table View
Prototype Content
Controller: UITableViewController (subclass of)
View: UITableView
View Controller
Table View Controller
No Selection
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Table View Controller – A controller that manages a table view.
Collection View Controller – A controller that manages a collection view.
Navigation Controller – A controller that manages navigation through a hierarchy of views.
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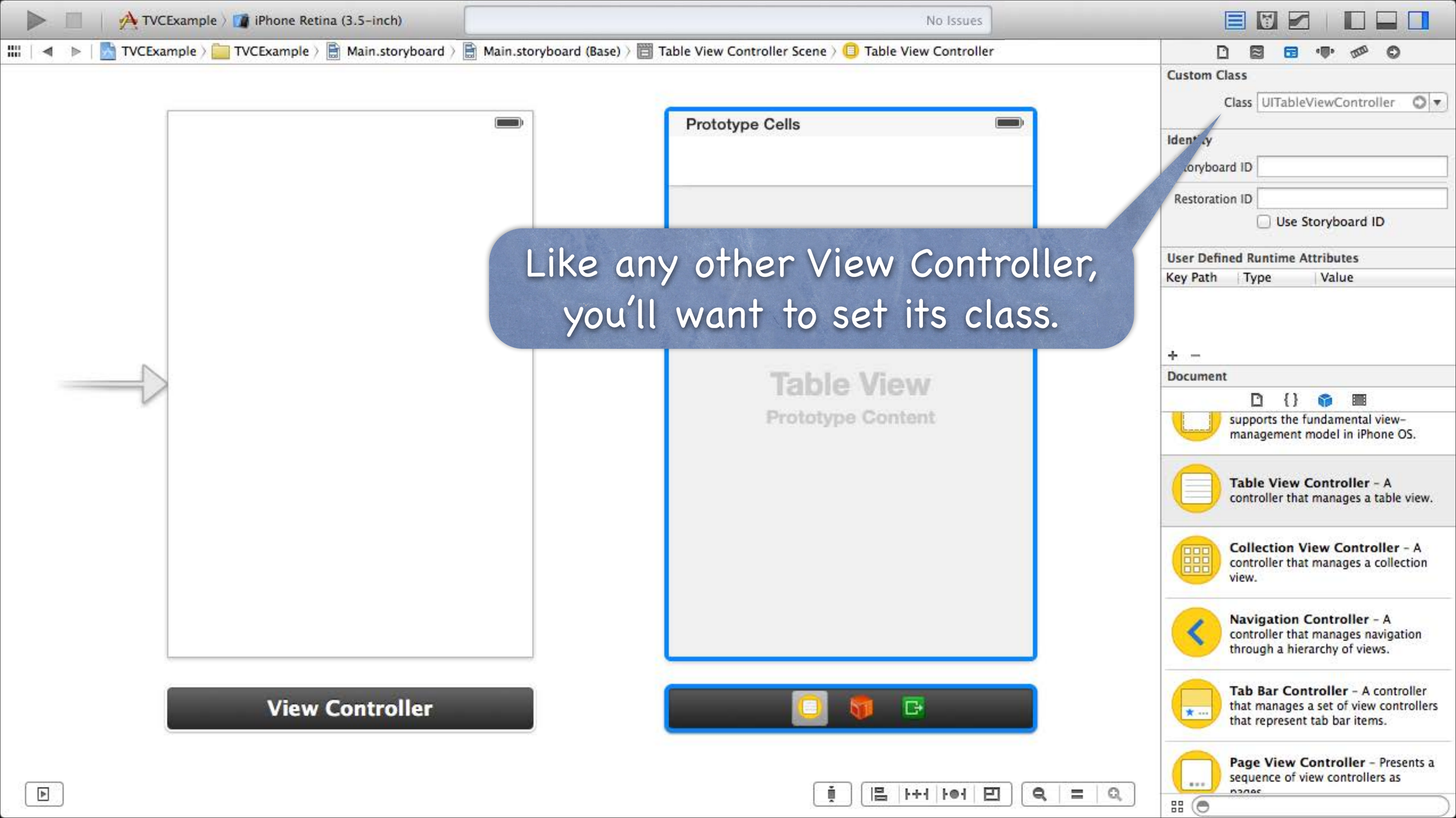
TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
Table View Controller
Prototype Cells
Table View
Prototype Content
View Controller
Like any other View Controller, you'll want to set its class.
Custom Class
Class
UITableViewController
Restoration ID
Use Storyboard ID
User Defined Runtime Attributes
Key Path
Type
Value
Document
supports the fundamental view-management model in iPhone OS.
Table View Controller – A controller that manages a table view.
Collection View Controller – A controller that manages a collection view.
Navigation Controller – A controller that manages navigation through a hierarchy of views.
Tab Bar Controller – A controller that manages a set of view controllers that represent tab bar items.
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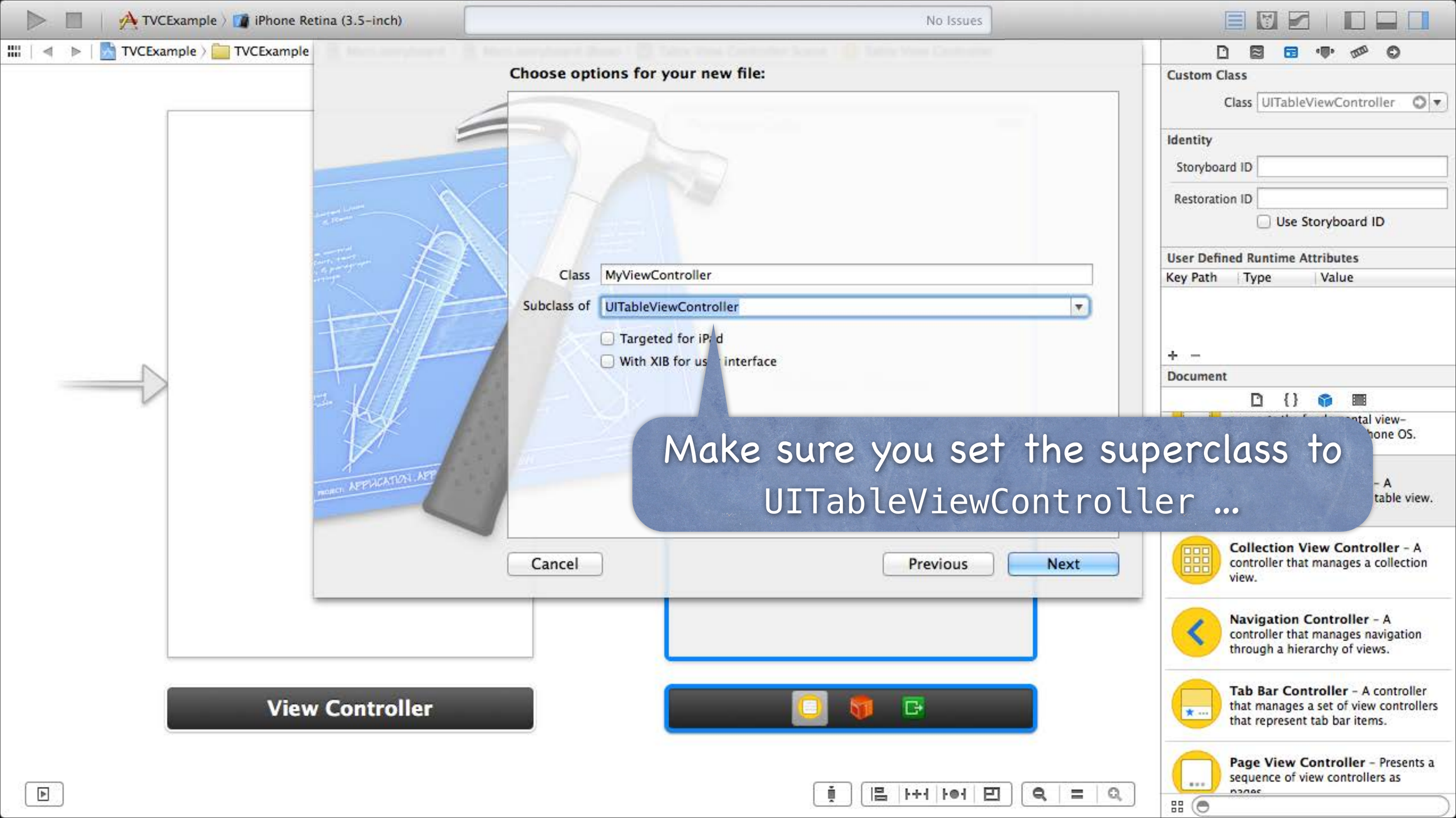
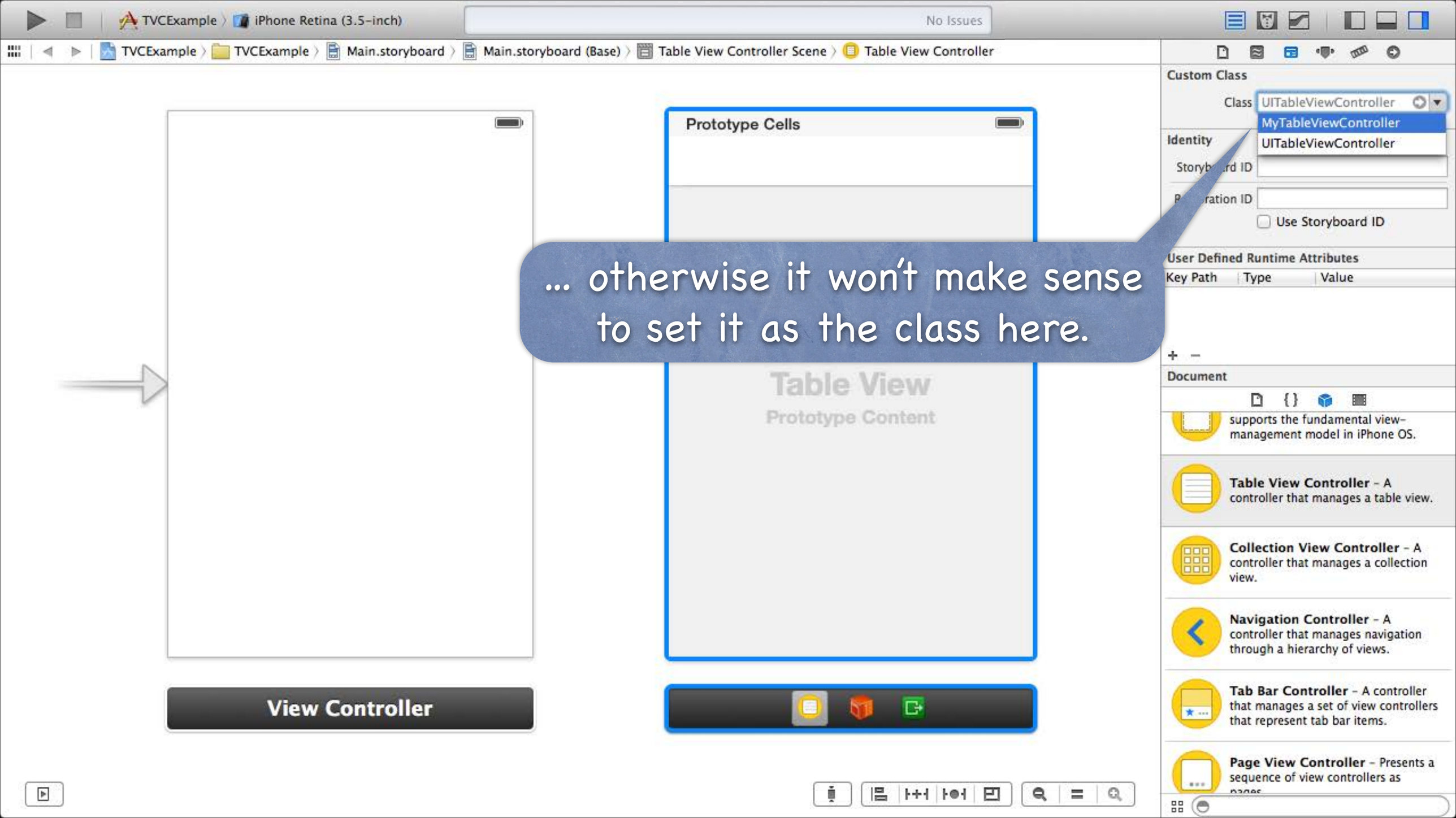
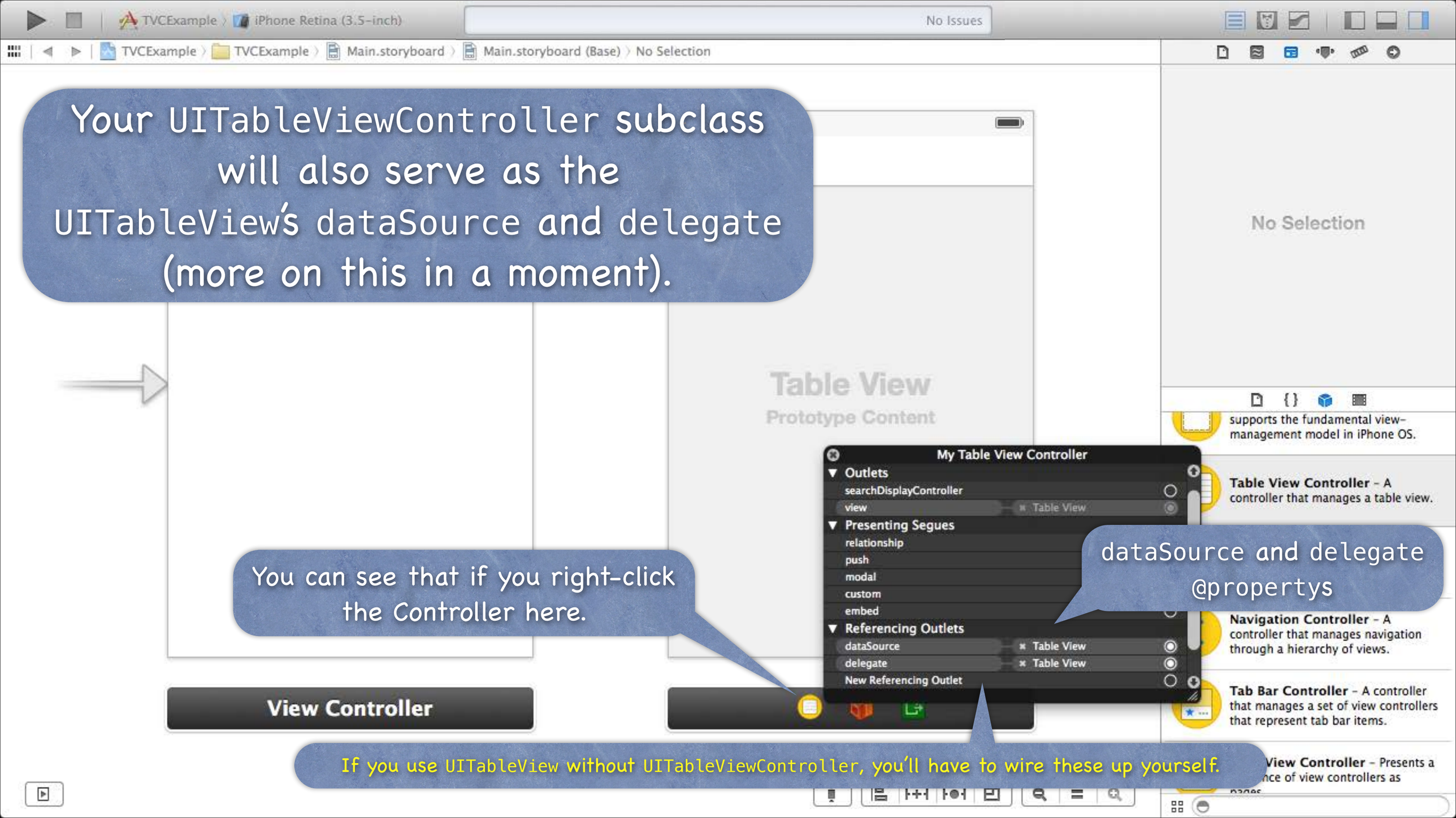
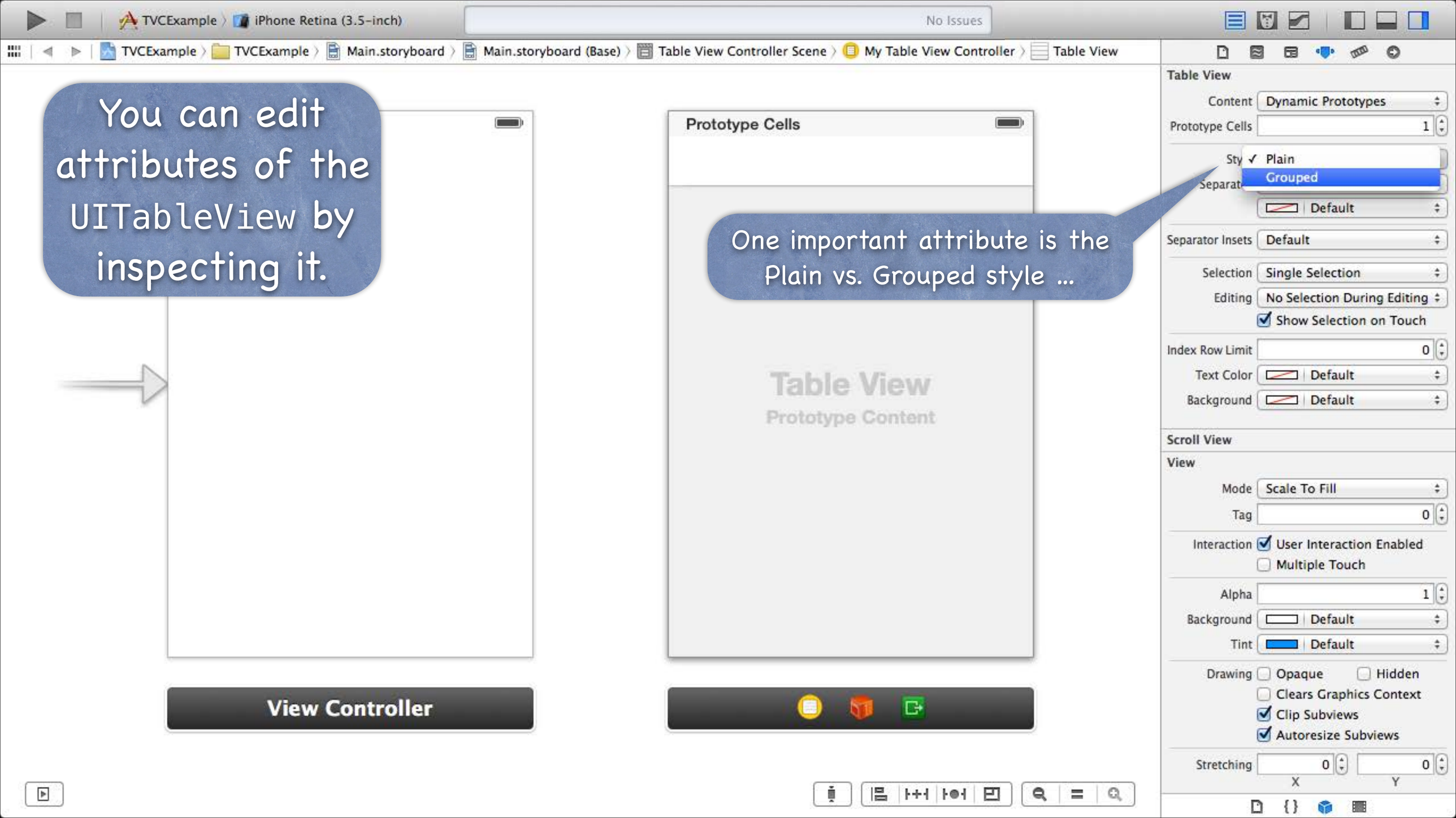
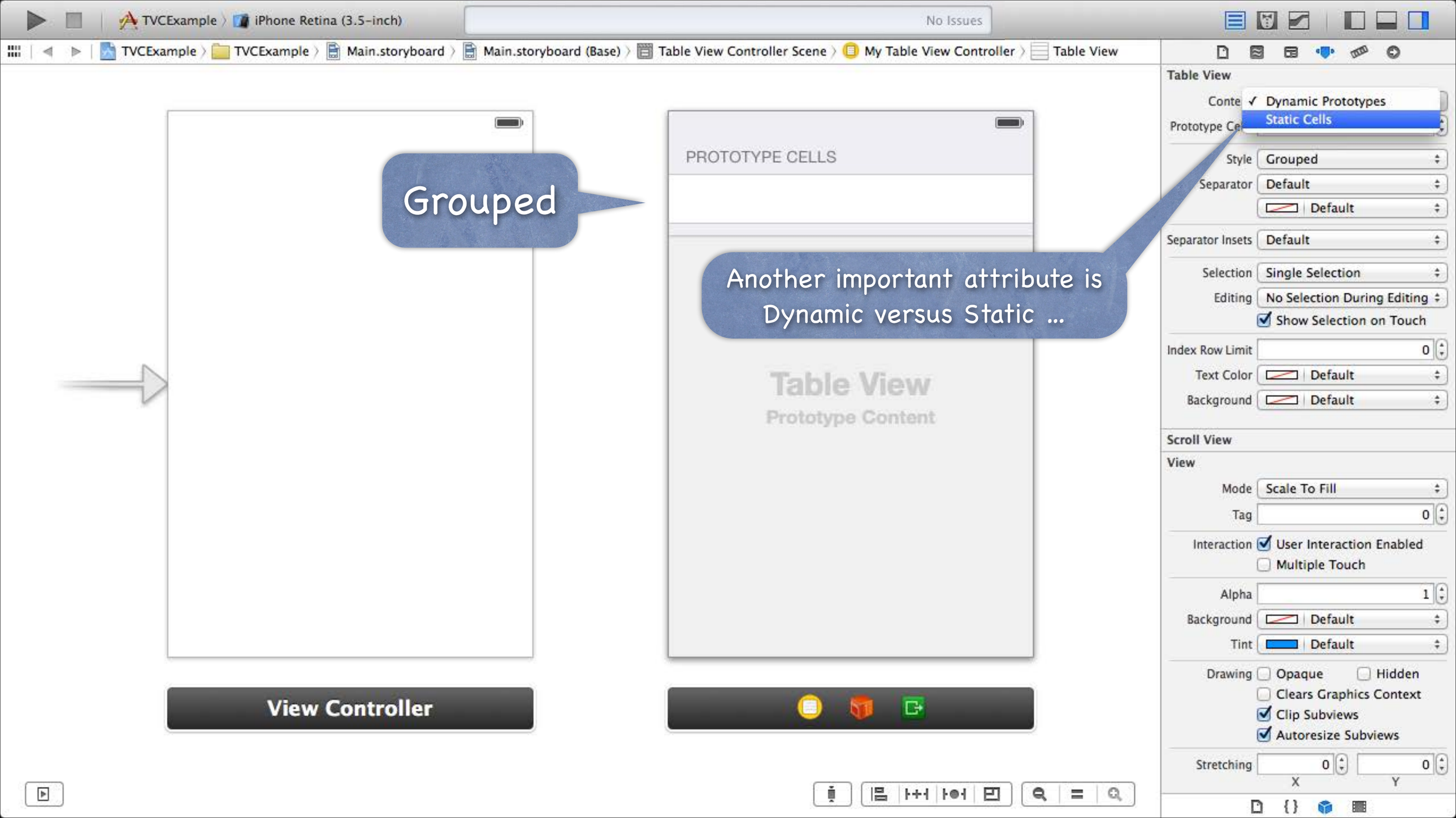

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Choose options for your new file:
Class
MyViewController
Subclass of
UITableViewController
Targeted for iPad
With XIB for user interface
Cancel
Previous
Next
Make sure you set the superclass to UITableViewController …
View Controller
Custom Class
Class
UITableViewController
Identity
Storyboard ID
Restoration ID
Use Storyboard ID
User Defined Runtime Attributes
Key Path
Type
Value
Document
Collection View Controller – A controller that manages a collection view.
Navigation Controller – A controller that manages navigation through a hierarchy of views.
Tab Bar Controller – A controller that manages a set of view controllers that represent tab bar items.
Page View Controller – Presents a sequence of view controllers as

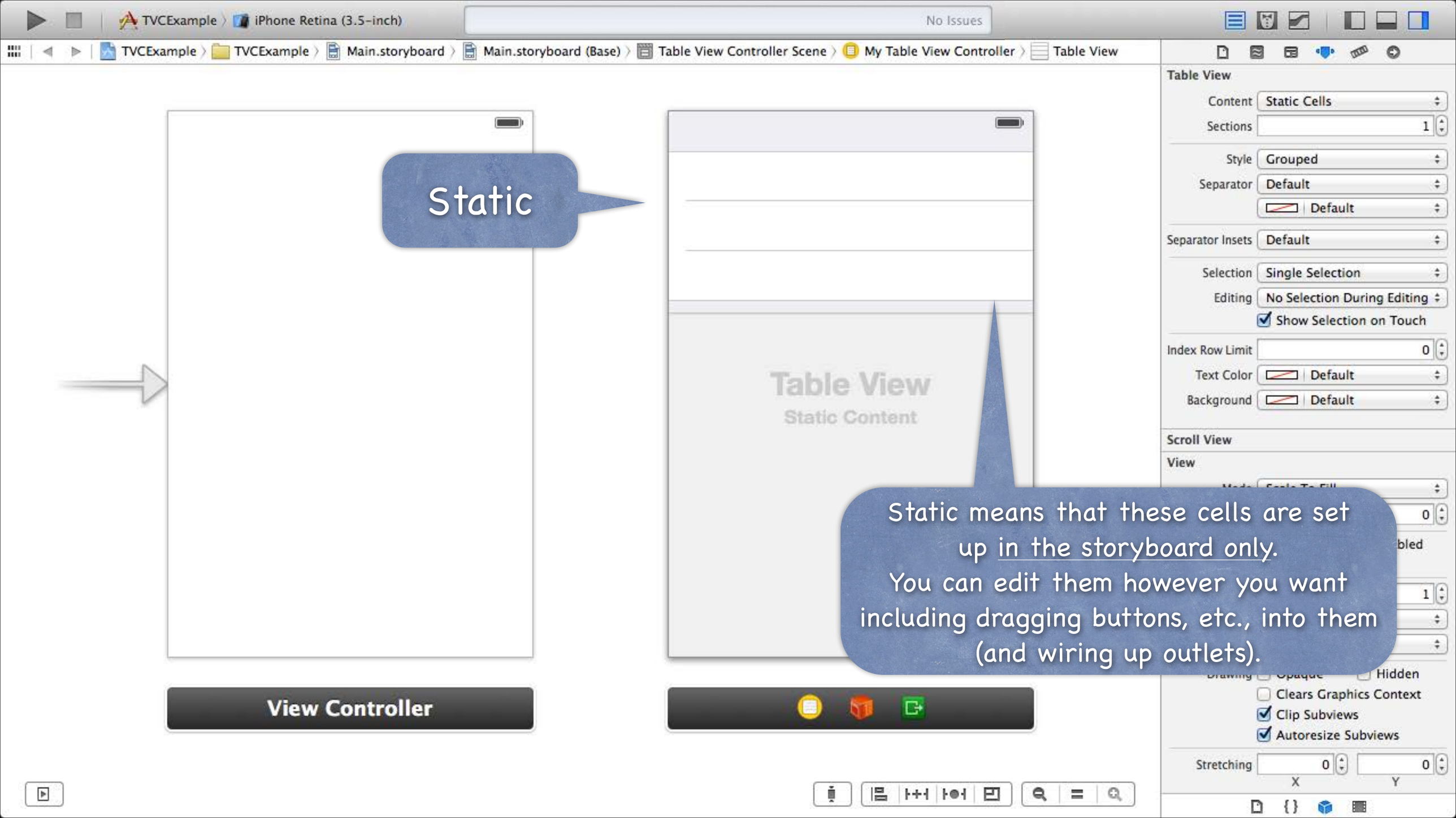


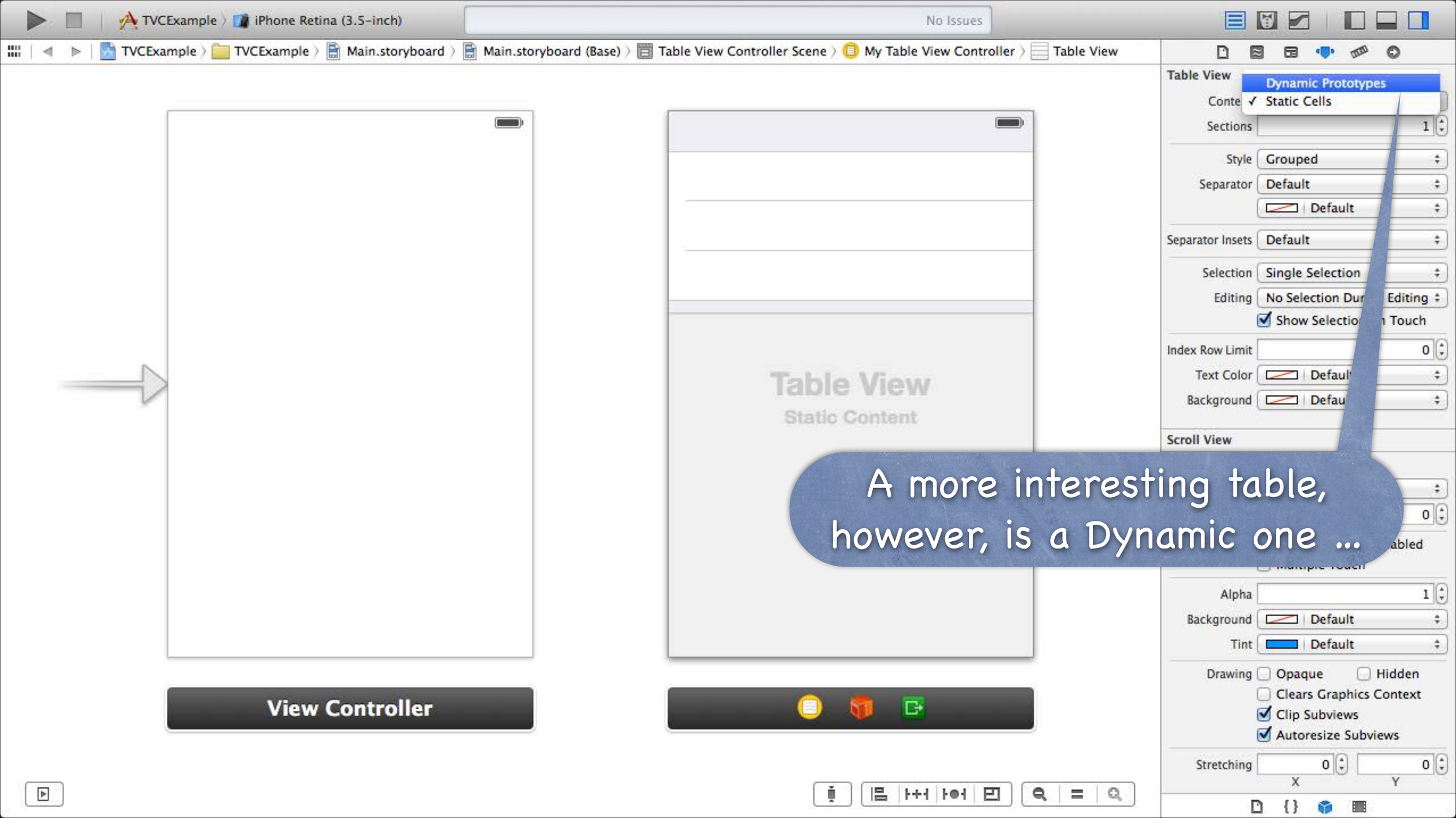
… otherwise it won't make sense to set it as the class here.

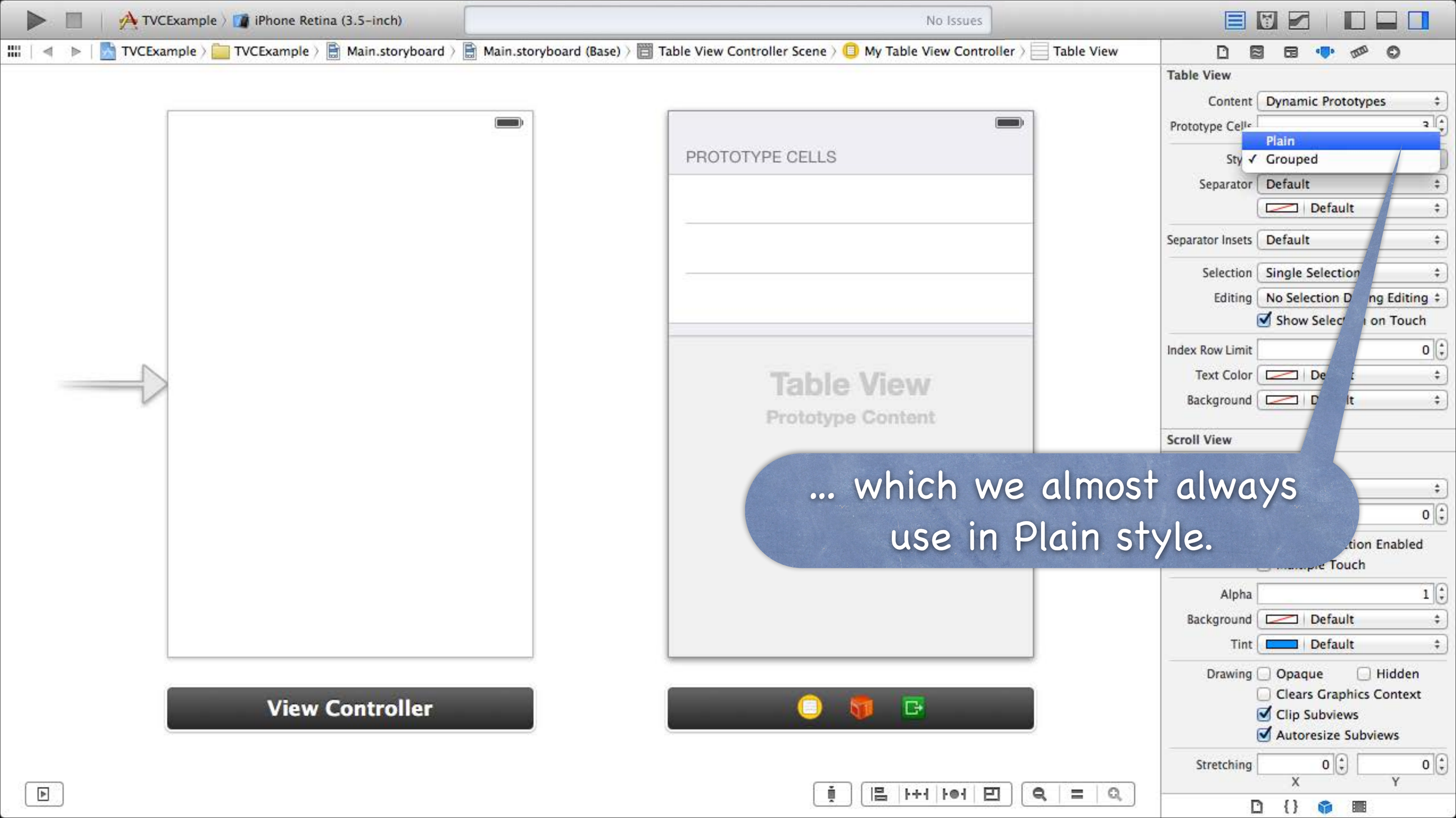

Your UITableViewController subclass will also serve as the UITableView's dataSource and delegate (more on this in a moment).
TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
No Selection
Table View
Prototype Content
View Controller
My Table View Controller
Outlets
searchDisplayController
view
Table View
Presenting Segues
relationship
push
modal
custom
embed
Referencing Outlets
dataSource
Table View
delegate
Table View
New Referencing Outlet
You can see that if you right-click the Controller here.
dataSource and delegate @propertys
If you use UITableView without UITableViewController, you'll have to wire these up yourself.
No Selection
supports the fundamental view-management model in iPhone OS.
Table View Controller – A controller that manages a table view.
Navigation Controller – A controller that manages navigation through a hierarchy of views.
Tab Bar Controller – A controller that manages a set of view controllers that represent tab bar items.

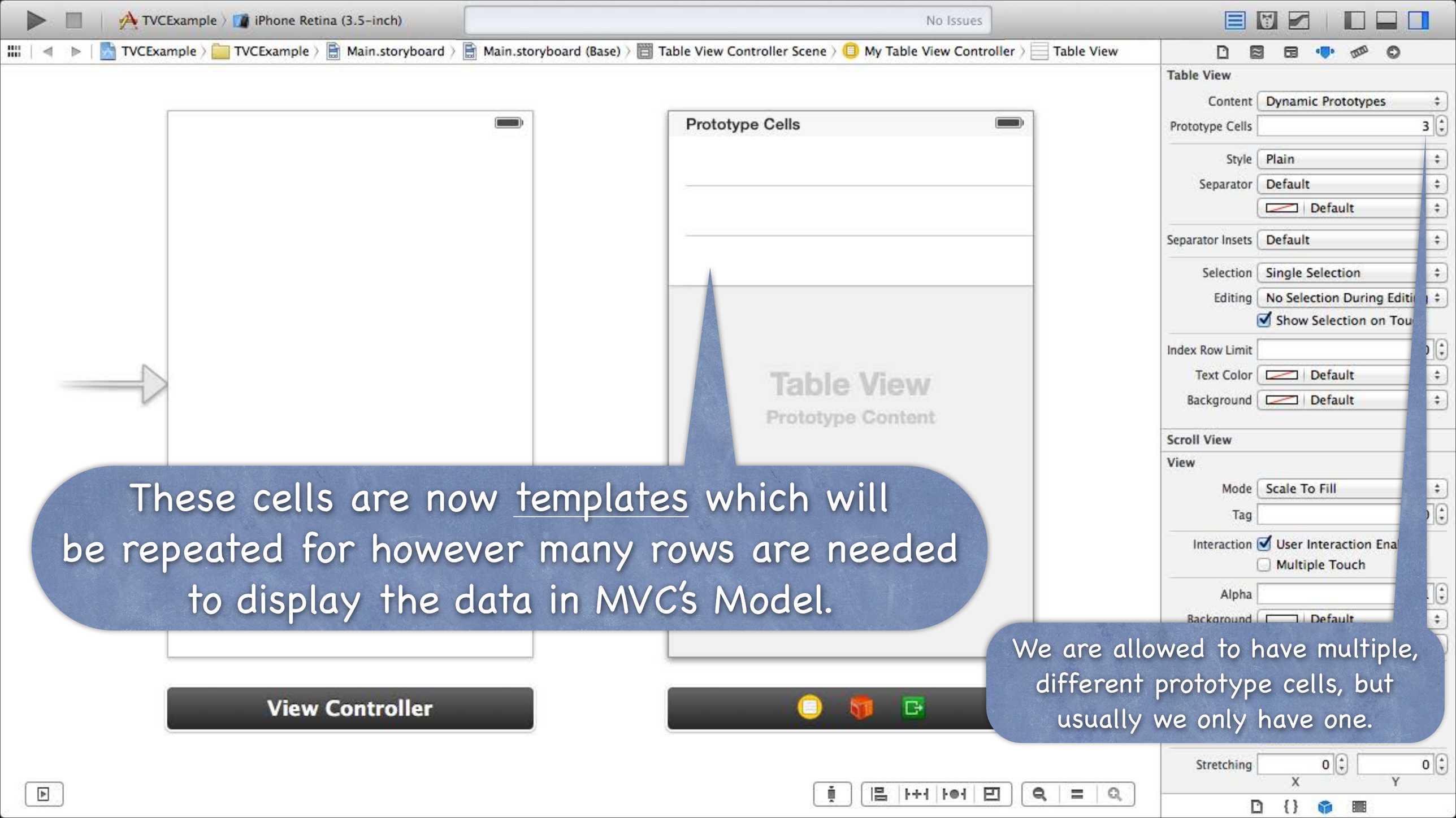

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
You can edit attributes of the UITableView by inspecting it.
Prototype Cells
One important attribute is the Plain vs. Grouped style ...
Table View
Prototype Content
View Controller
Table View
Content
Dynamic Prototypes
Prototype Cells
1
Sty
Plain
Grouped
Separat
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Default
Background
Default
Scroll View
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y

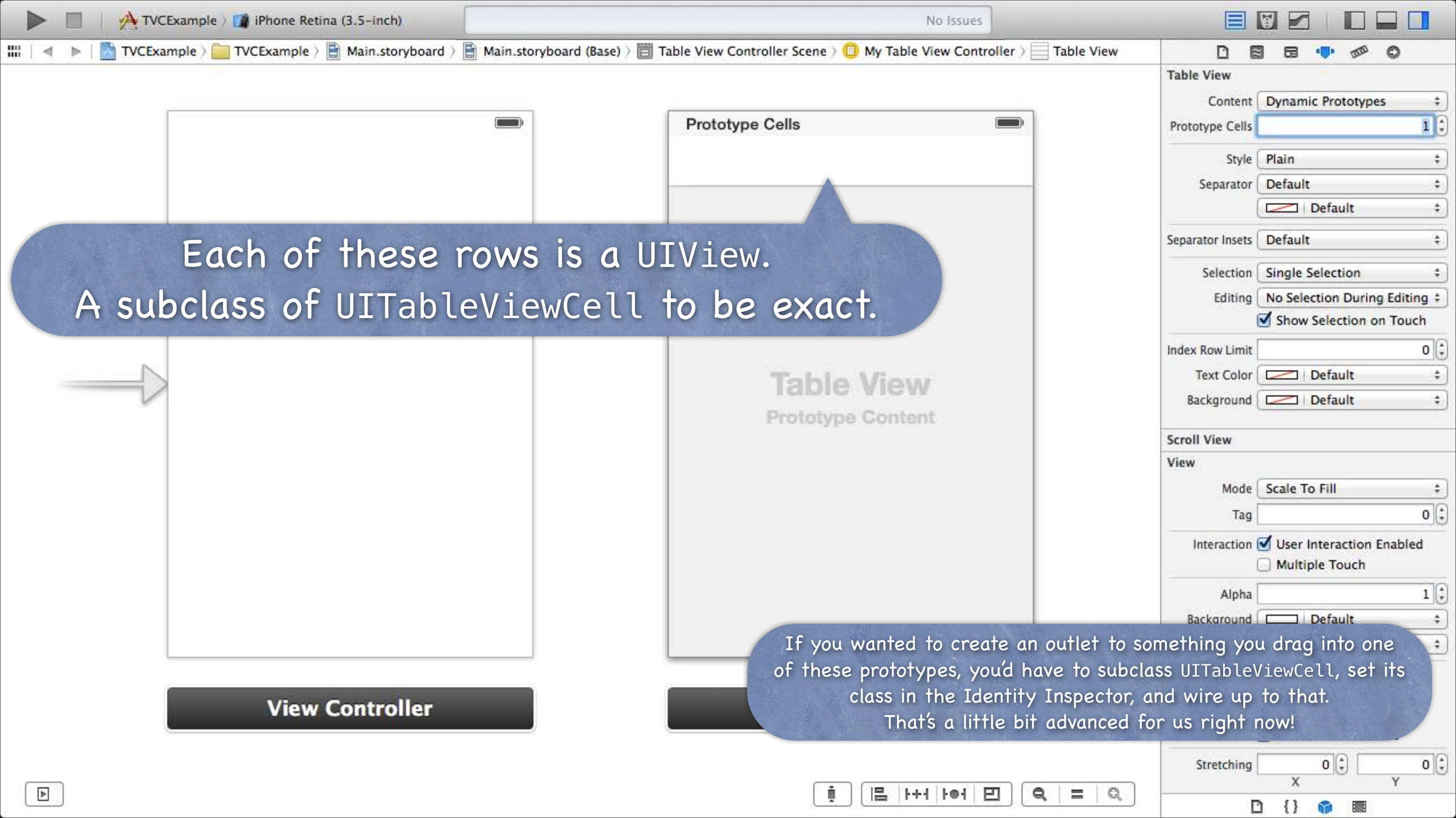

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Grouped
PROTOTYPE CELLS
Another important attribute is Dynamic versus Static ...
Table View
Prototype Content
View Controller
Table View
Conte
Dynamic Prototypes
Static Cells
Prototype Ce
Style
Grouped
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Default
Background
Default
Scroll View
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y

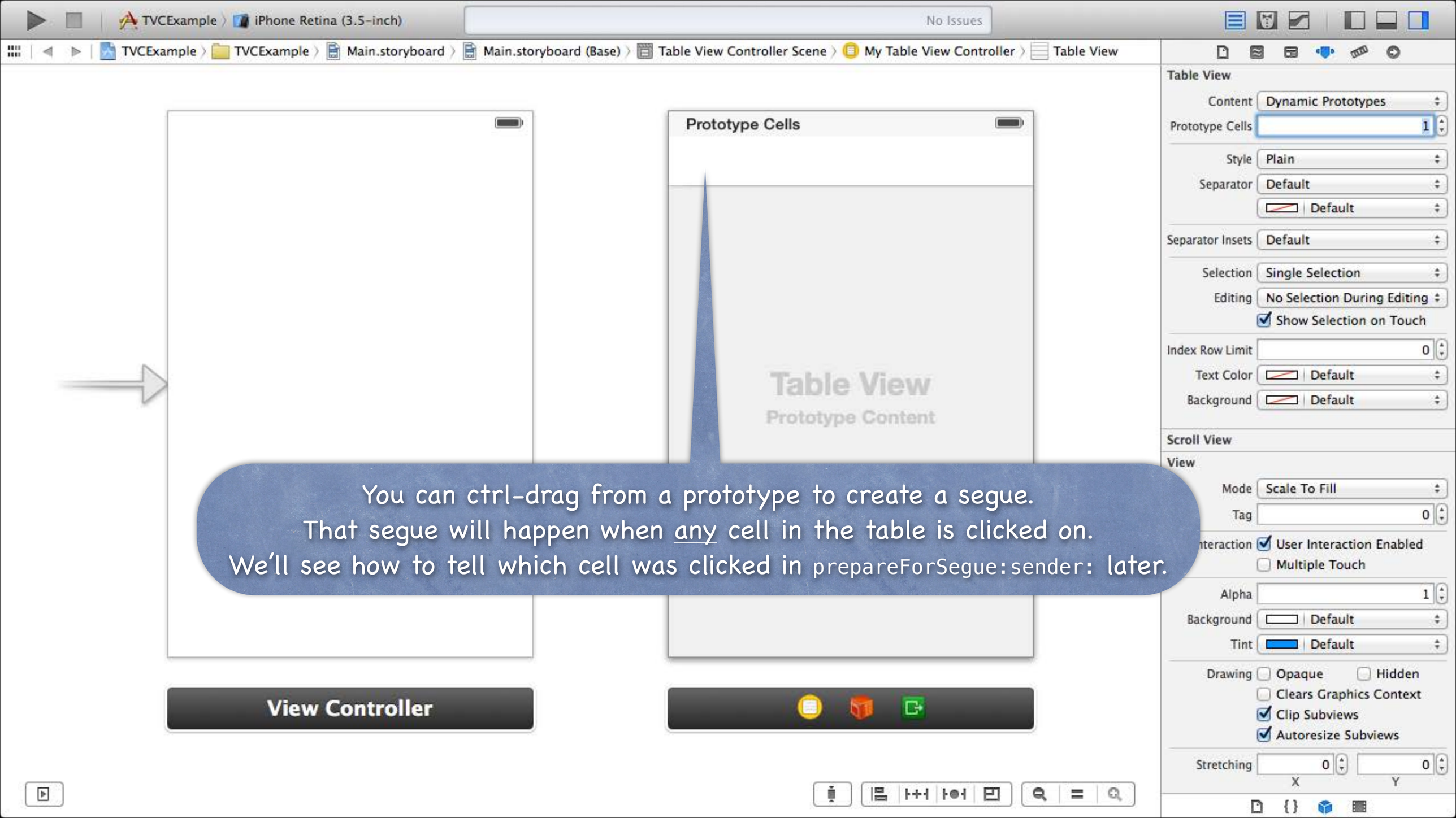

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Static
Table View
Static Content
View Controller
Static means that these cells are set up in the storyboard only.
You can edit them however you want including dragging buttons, etc., into them (and wiring up outlets).
Table View
Content
Static Cells
Sections
1
Style
Grouped
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Default
Background
Default
Scroll View
View
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y

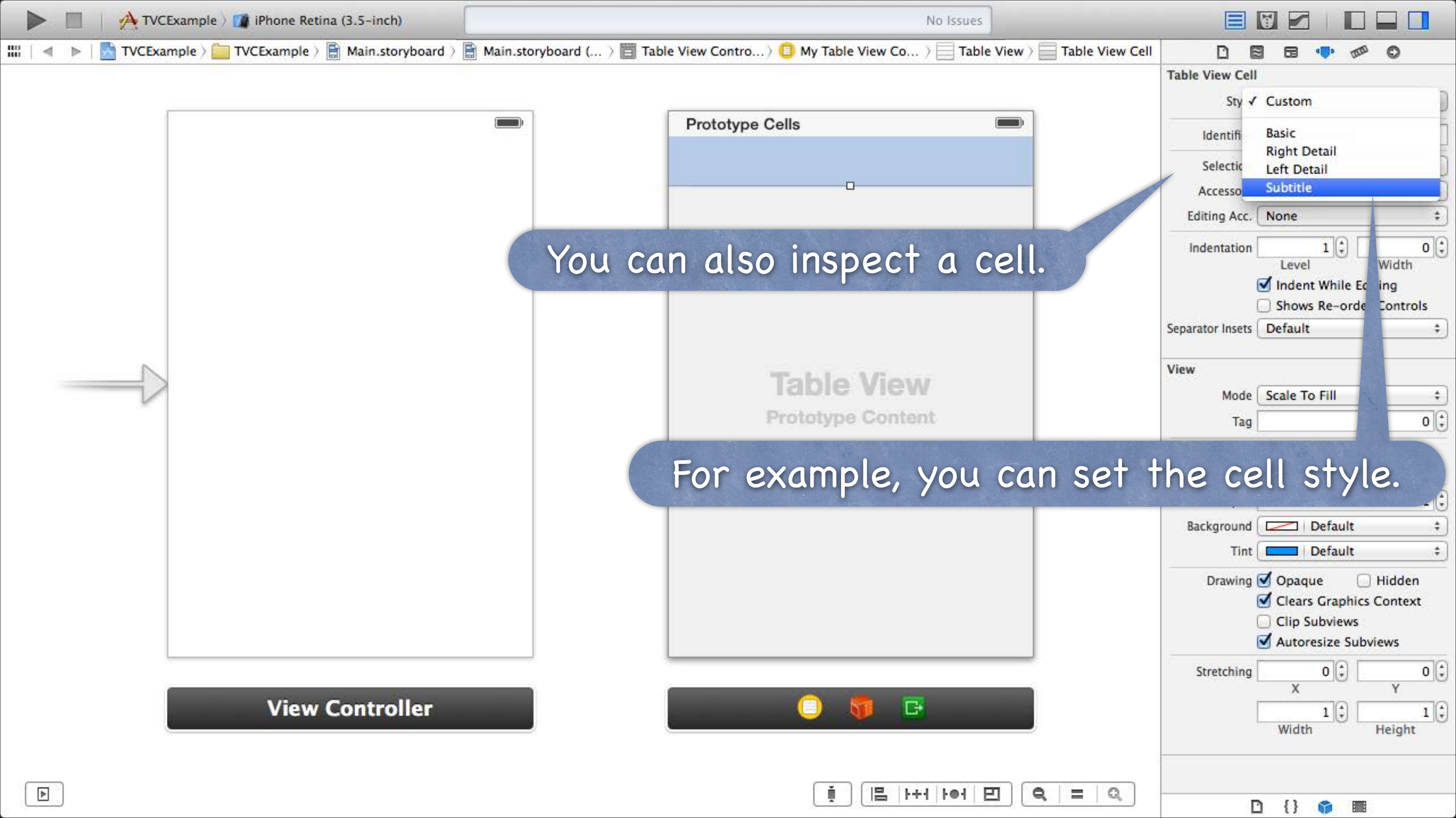

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Table View
Dynamic Prototypes
Static Cells
Content
Sections
1
Style
Grouped
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection Dur
Editing
Show Selectio
Touch
Index Row Limit
0
Text Color
Default
Background
Defau
Scroll View
Table View
Static Content
A more interesting table,
however, is a Dynamic one ...
0
abled
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y
View Controller

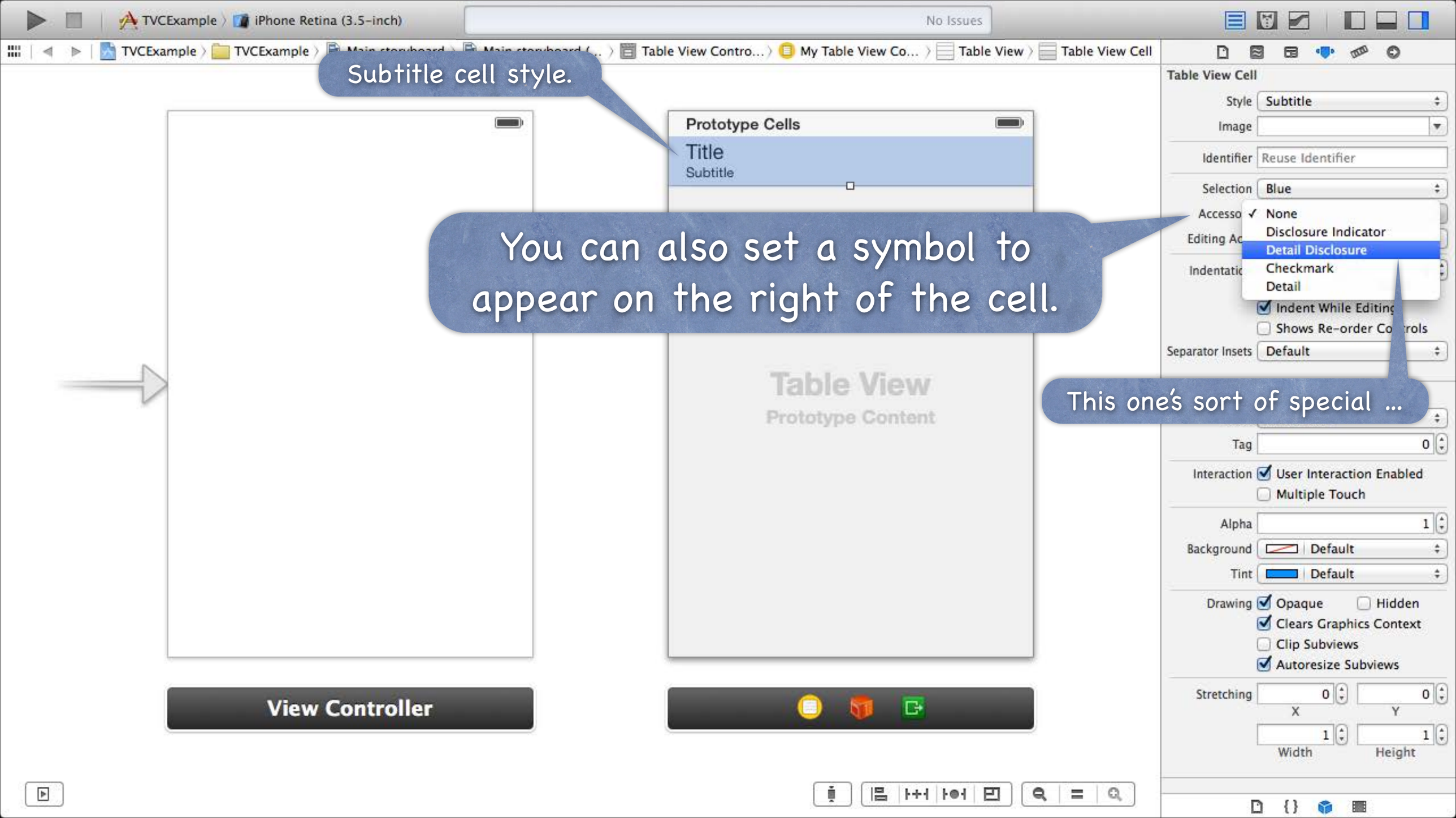

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
PROTOTYPE CELLS
Table View
Prototype Content
View Controller
Table View
Content
Dynamic Prototypes
Prototype Cells
Plain
Grouped
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Background
Scroll View
0
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y
... which we almost always use in Plain style.

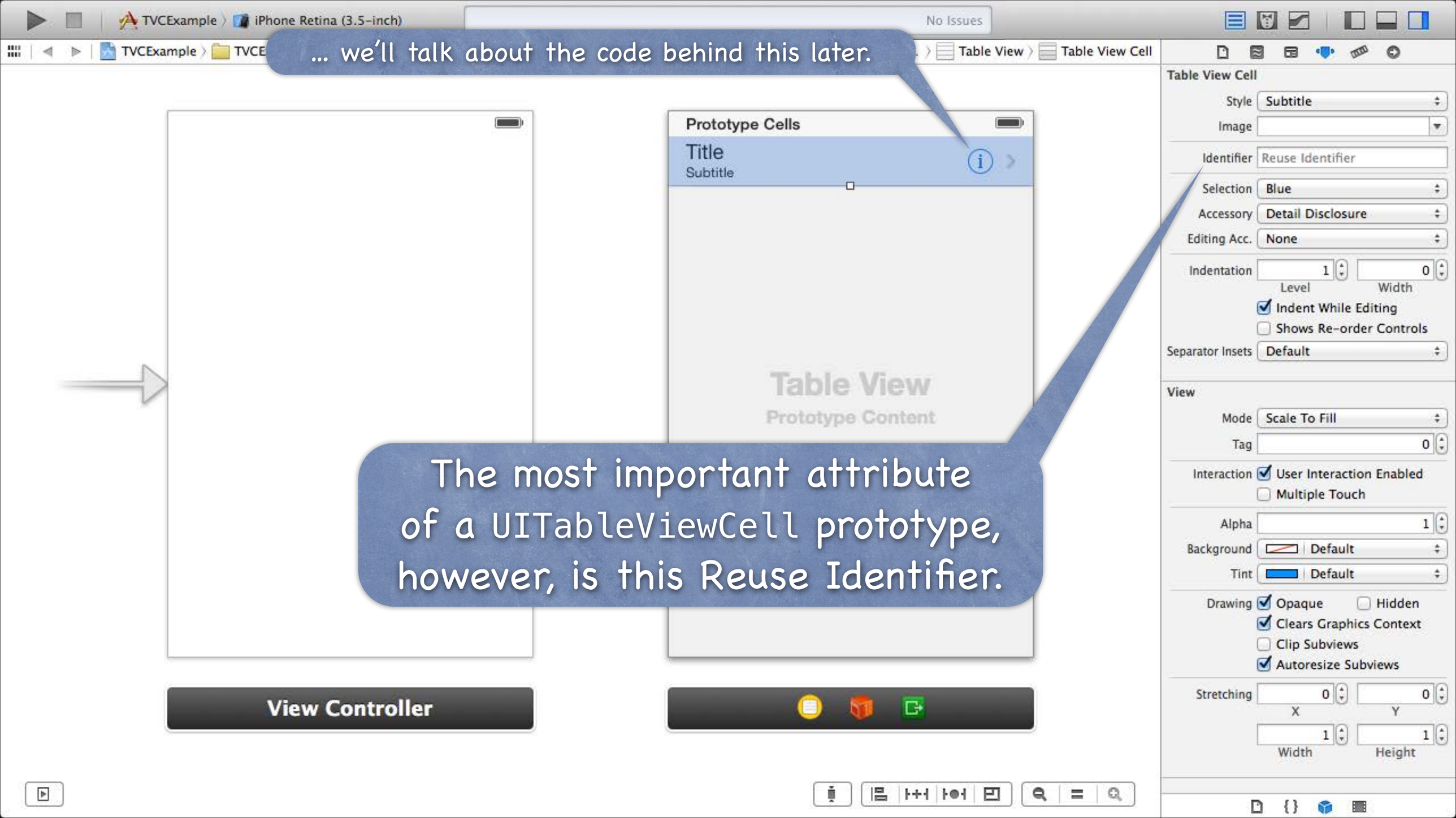

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Table View
Content
Dynamic Prototypes
Prototype Cells
3
Style
Plain
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editi
Show Selection on Tou
Index Row Limit
Text Color
Default
Background
Default
Scroll View
View
Mode
Scale To Fill
Tag
Interaction
User Interaction Ena
Multiple Touch
Alpha
Background
Default
Prototype Cells
Table View
Prototype Content
View Controller
These cells are now templates which will be repeated for however many rows are needed to display the data in MVC's Model.
We are allowed to have multiple, different prototype cells, but usually we only have one.
Stretching
0
0
X
Y

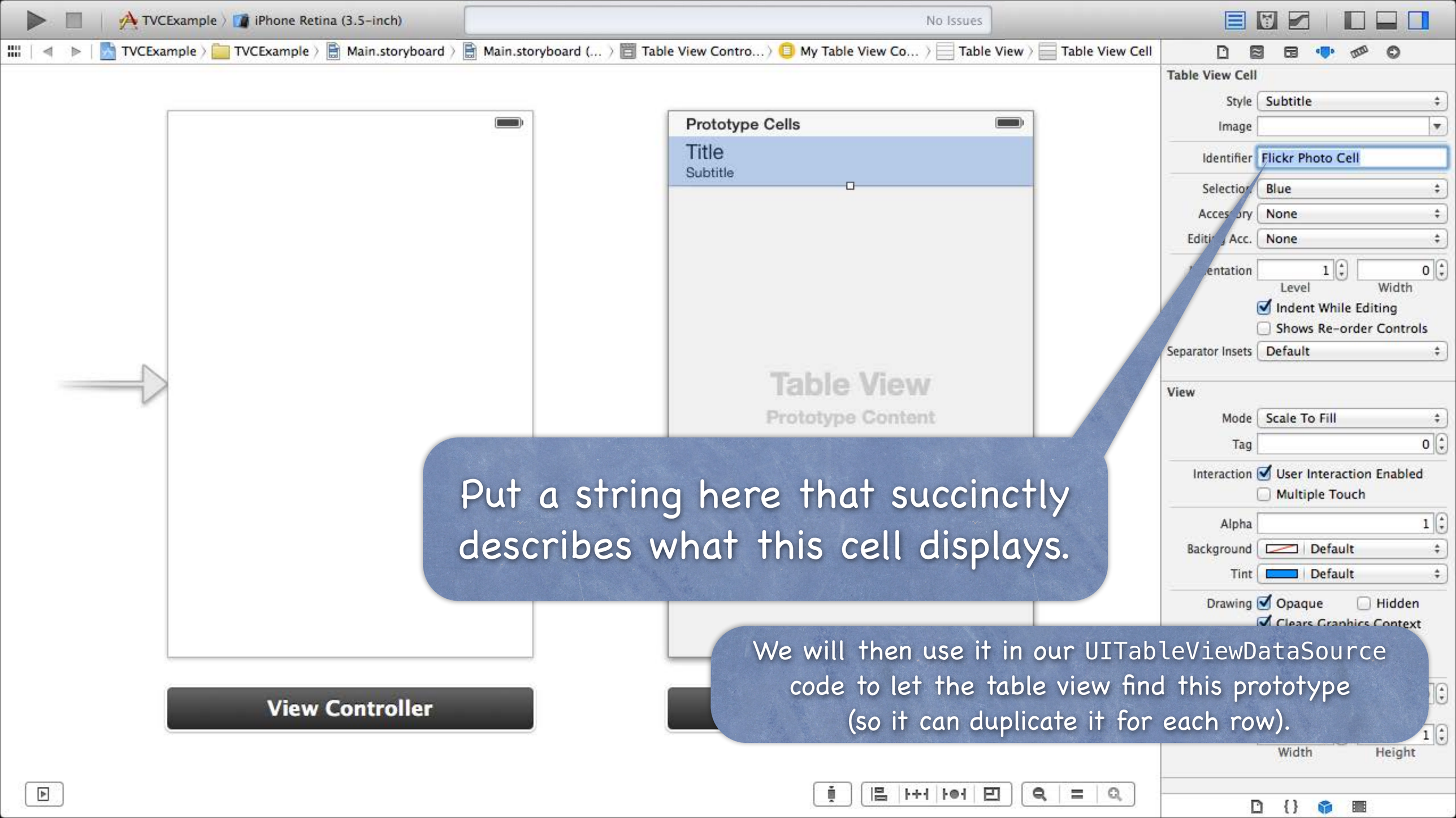

TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Prototype Cells
Each of these rows is a UIView.
A subclass of UITableViewCell to be exact.
Table View
Prototype Content
View Controller
If you wanted to create an outlet to something you drag into one of these prototypes, you'd have to subclass UITableViewCell, set its class in the Identity Inspector, and wire up to that.
That's a little bit advanced for us right now!
Table View
Content
Dynamic Prototypes
Prototype Cells
1
Style
Plain
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Default
Background
Default
Scroll View
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Default
Stretching
0
0
X
Y


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (Base)
Table View Controller Scene
My Table View Controller
Table View
Table View
Content
Dynamic Prototypes
Prototype Cells
1
Style
Plain
Separator
Default
Default
Separator Insets
Default
Selection
Single Selection
Editing
No Selection During Editing
Show Selection on Touch
Index Row Limit
0
Text Color
Default
Background
Default
Scroll View
View
Mode
Scale To Fill
Tag
0
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y
Prototype Cells
Table View
Prototype Content
You can ctrl-drag from a prototype to create a segue.
That segue will happen when any cell in the table is clicked on.
We'll see how to tell which cell was clicked in prepareForSegue:sender: later.
View Controller


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (...
Table View Contro...
My Table View Co...
Table View
Table View Cell
Prototype Cells
Table View
Prototype Content
View Controller
Table View Cell
Custom
Basic
Right Detail
Left Detail
Subtitle
Editing Acc.
None
Indentation
Level
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
X
Y
Width
Height
You can also inspect a cell.
For example, you can set the cell style.


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Table View Contro...
My Table View Co...
Table View
Table View Cell
Subtitle cell style.
Prototype Cells
Title
Subtitle
Table View
Prototype Content
You can also set a symbol to appear on the right of the cell.
This one's sort of special ...
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Reuse Identifier
Selection
Blue
Accesso
None
Disclosure Indicator
Detail Disclosure
Checkmark
Detail
Editing Ac
Indentatic
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
0
X
Y
1
1
Width
Height


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
Table View
Table View Cell
... we'll talk about the code behind this later.
Prototype Cells
Title
Subtitle
Table View
Prototype Content
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Reuse Identifier
Selection
Blue
Accessory
Detail Disclosure
Editing Acc.
None
Indentation
1
Level
0
Width
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
X
0
Y
1
Width
1
Height
The most important attribute of a UITableViewCell prototype, however, is this Reuse Identifier.


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (...
Table View Contro...
My Table View Co...
Table View
Table View Cell
Prototype Cells
Title
Subtitle
Table View
Prototype Content
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Flickr Photo Cell
Selection
Blue
Accessory
None
Editing Acc.
None
Indentation
1
0
Level
Width
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Width
Height
Put a string here that succinctly describes what this cell displays.
We will then use it in our UITableViewDataSource code to let the table view find this prototype (so it can duplicate it for each row).

UITableView Protocols

- How do we connect to all this stuff in our code?

  Via the `UITableView`'s `dataSource` and `delegate`.

  The `delegate` is used to control how the table is displayed.

  The `dataSource` provides the data what is displayed inside the cells.

- `UITableViewController`

  Automatically sets itself as its `UITableView`'s `delegate` & `dataSource`.

  Also has a property pointing to its `UITableView`:

  ```
  @property (nonatomic, strong) UITableView *tableView;
  ```

  (this property is actually == `self.view` in `UITableViewController`!)

UITableViewDataSource

- Important `dataSource` methods

  We have to implement these 3 to be a "dynamic" (arbitrary number of rows) table …

  How many `section`s in the table?

  How many `row`s in each `section`?

  Give me a `UITableViewCell` to use to draw each cell at a given row in a given section.

  Let's cover the last one first (since the first two are very straightforward) …

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{


}
```

In a static table, you do not need to implement this method (though you can if you want to ignore what's in the storyboard).

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{


}
```

`NSIndexPath` is just an object with two important properties for use with `UITableView`: `row` and `section`.

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
    // get a cell to use (instance of UITableViewCell)
    // set @propertys on the cell to prepare it to display
}
```

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
   UITableViewCell *cell;
   cell = [self.tableView dequeueReusableCellWithIdentifier:@“Flickr Photo Cell”
                                                forIndexPath:indexPath];
   // set @propertys on the cell to prepare it to display

}
```

This MUST match what is in your storyboard if you want to use the prototype you defined there!

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
   UITableViewCell *cell;
   cell = [self.tableView dequeueReusableCellWithIdentifier:@“Flickr Photo Cell”
                                                forIndexPath:indexPath];
   // set @propertys on the cell to prepare it to display

}
```

The cells in the table are actually reused.
When one goes off-screen, it gets put into a “reuse pool.”
The next time a cell is needed, one is grabbed from the reuse pool if available.
If none is available, one will be put into the reuse pool if there’s a prototype in the storyboard.
Otherwise this `dequeue` method will return `nil`.

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
   UITableViewCell *cell;
   cell = [self.tableView dequeueReusableCellWithIdentifier:@“Flickr Photo Cell”
                                                forIndexPath:indexPath];
   cell.textLabel.text = [self getMyTitleForRow:indexPath.row inSection:indexPath.section];
   return cell;
}
```

There are obviously other things you can do in the cell besides setting its text (detail text, image, checkmark, etc.).

UITableViewDataSource

- How do we control what is drawn in each cell in a dynamic table?

  Each row is drawn by its own instance of `UITableViewCell` (a `UIView` subclass).

  Here is the `UITableViewDataSource` method to get that cell for a given row in a section …

```
- (UITableViewCell *)tableView:(UITableView *)sender
        cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
    UITableViewCell *cell;
    cell = [self.tableView dequeueReusableCellWithIdentifier:@“Flickr Photo Cell”
                                                forIndexPath:indexPath];
    cell.textLabel.text = [self getMyTitleForRow:indexPath.row inSection:indexPath.section];
    return cell;
}
```

See how we are using `indexPath.section` and `indexPath.row` to get Model information to set up this cell.

UITableViewDataSource

- How does a dynamic table know how many rows there are?
  - And how many sections, too, of course?
  - Via these two UITableViewDataSource methods …
  - `- (NSInteger)numberOfSectionsInTableView:(UITableView *)sender;`
  - `- (NSInteger)tableView:(UITableView *)sender numberOfRowsInSection:(NSInteger)section;`
- Number of sections is 1 by default
  - In other words, if you don't implement `numberOfSectionsInTableView:`, it will be 1.
- No default for `tableView:numberOfRowsInSection:`
  - This is a required method in this protocol (as is `tableView:cellForRowAtIndexPath:`).
- What about a static table?
  - Do not implement these `dataSource` methods for a static table.
  - `UITableViewController` will take care of that for you.

UITableViewDataSource

- There are a number of other methods in this protocol
  - But we're not going to cover them today.
  - They are mostly about getting the headers and footers for sections.
  - And about keeping the Model in sync with table edits (moving/deleting/inserting rows).

UITableViewDelegate

- All of the above was the UITableView's dataSource
  - But UITableView has another protocol-driven delegate called its delegate.
- The delegate controls how the UITableView is displayed
  - Not what it displays (that's the dataSource's job).
- Common for dataSource and delegate to be the same object
  - Usually the Controller of the MVC in which the UITableView is part of the View.
  - This is the way UITableViewController sets it up for you.
- The delegate also lets you observe what the table view is doing
  - The classic "will/did" sorts of things.
  - An important one is "user did select a row."
  - Usually we don't need this because we simply segue when a row is touched.
  - But there are some occasions where it will be useful …

UITableView "Target/Action"

- UITableViewDelegate method sent when row is selected

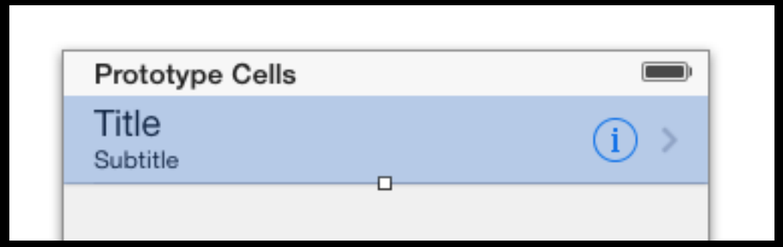
  This is sort of like "table view target/action" (only needed if you're not segueing, of course).

  On the iPad, where the table might be on screen with what it updates, you might need this.

```
- (void)tableView:(UITableView *)sender didSelectRowAtIndexPath:(NSIndexPath *)path
{
    // go do something based on information about my Model
    //   corresponding to indexPath.row in indexPath.section
}
```

UITableView Detail Disclosure

- Remember the little circled i?
  Clicking on this will not segue.

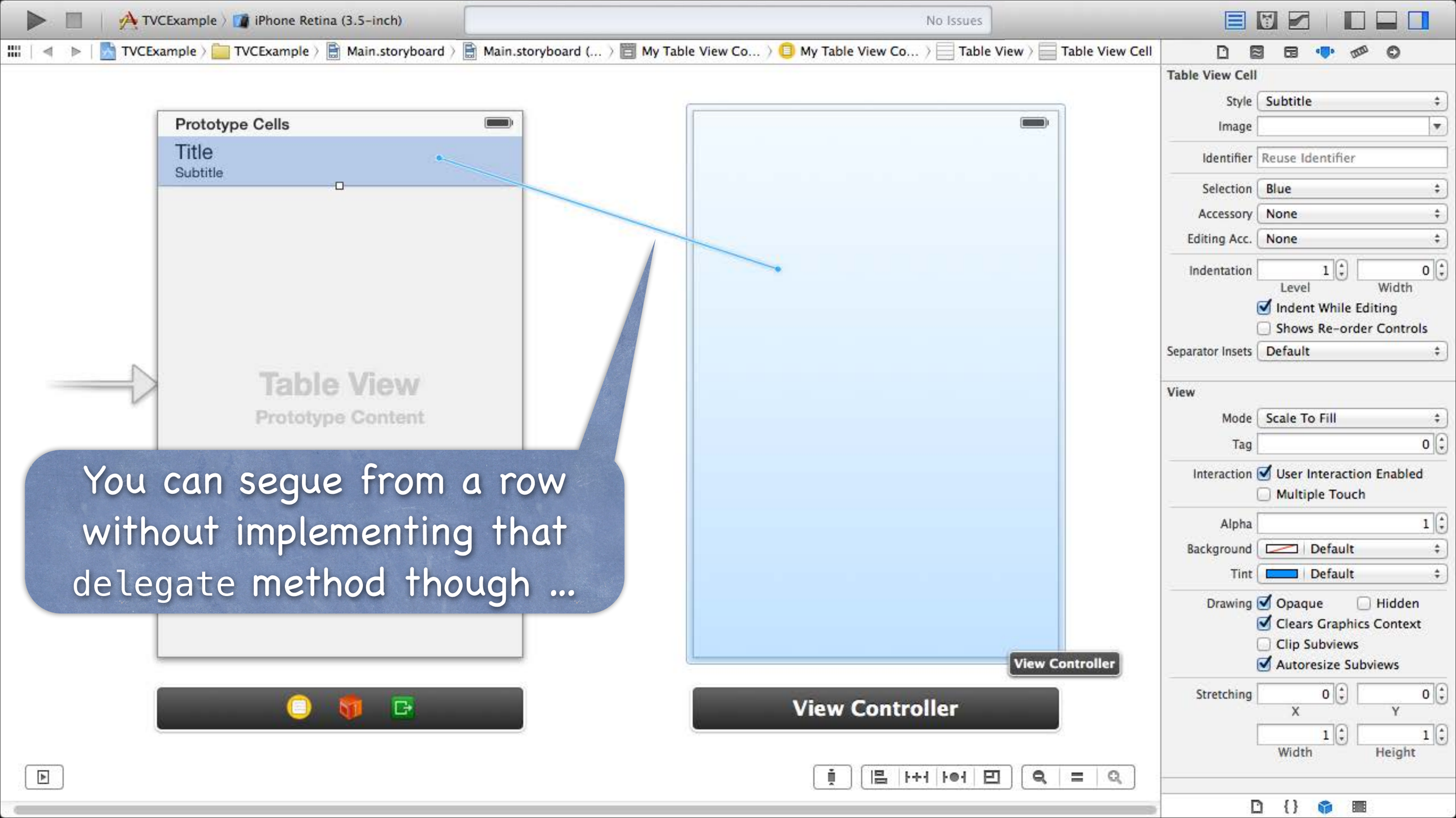


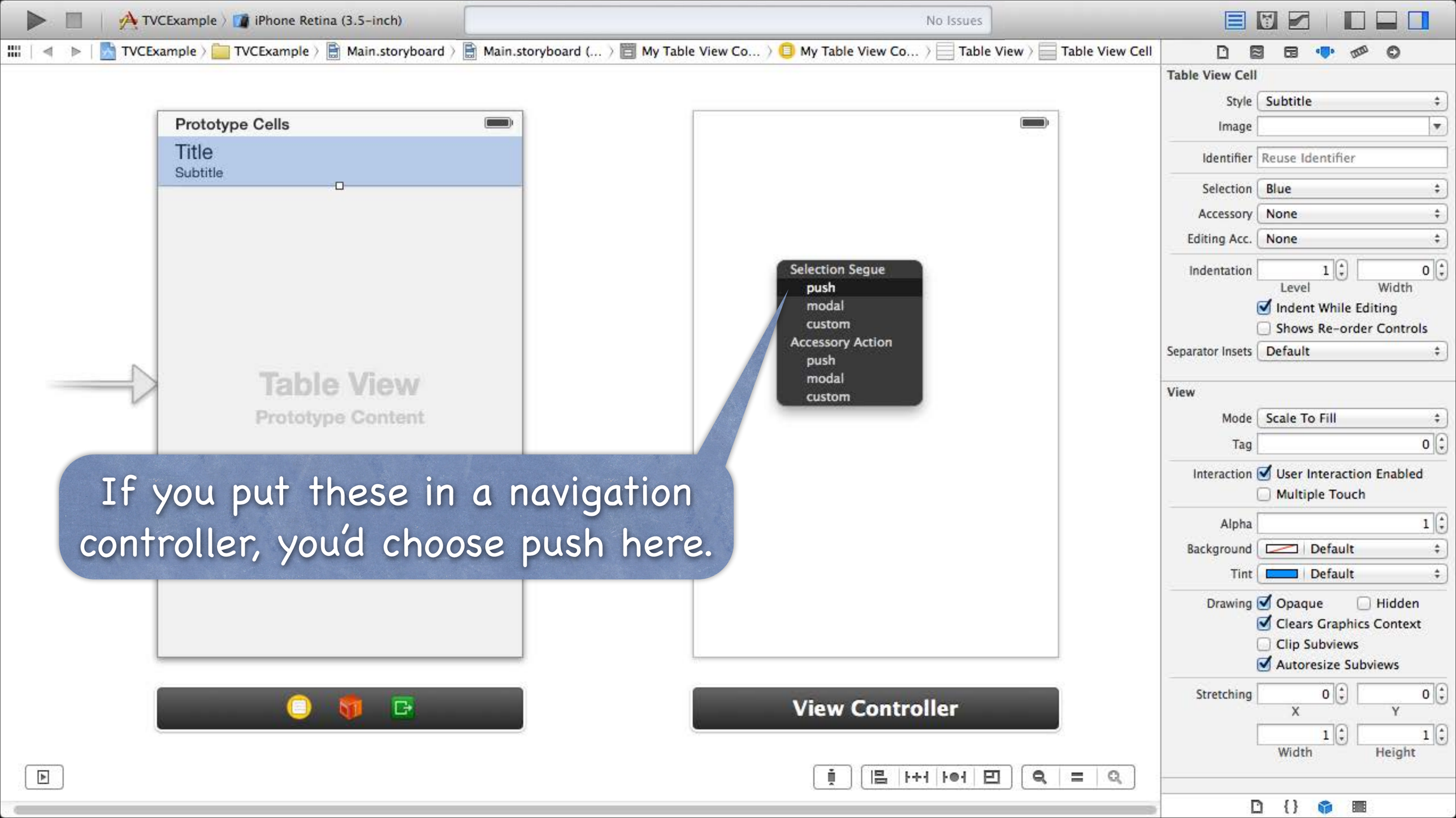
Instead it will invoke this method in the UITableViewDelegate protocol …

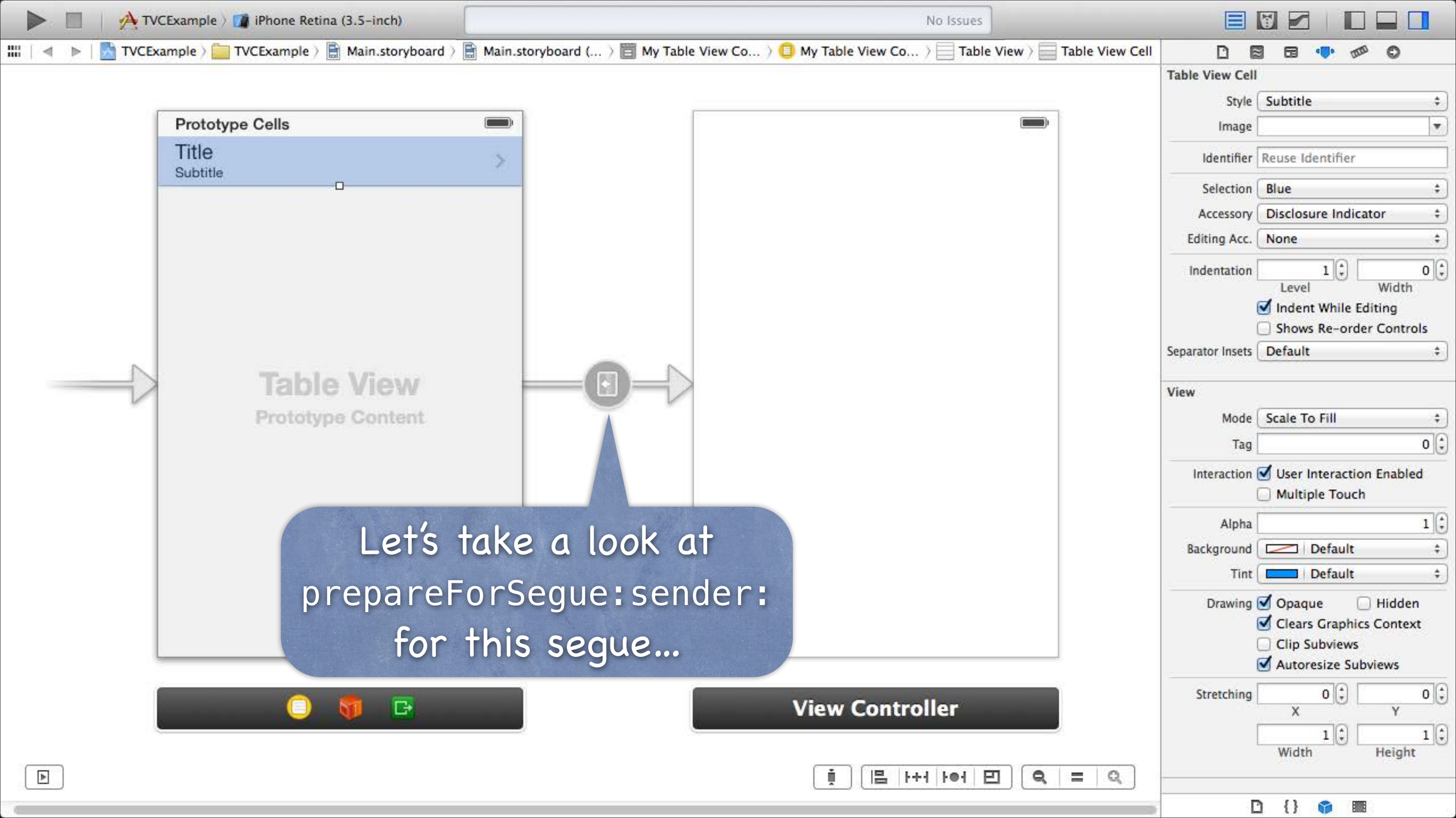
```
- (void)tableView:(UITableView *)sender
          accessoryButtonTappedForRowWithIndexPath:(NSIndexPath *)indexPath
{
    // Do something related to the row at indexPath,
    //  but not the primary action associated with touching the row
}
```

UITableViewDelegate

- Lots and lots of other `delegate` methods
  - `will`/`did` methods for both selecting and deselecting rows.
  - Providing `UIView` objects to draw section headers and footers.
  - Handling editing rows (moving them around with touch gestures).
  - `willBegin`/`didEnd` notifications for editing (i.e. removing/moving) rows.
  - Copying/pasting rows.


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (...
My Table View Co...
My Table View Co...
Table View
Table View Cell
Prototype Cells
Title
Subtitle
Table View
Prototype Content
You can segue from a row without implementing that delegate method though ...
View Controller
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Reuse Identifier
Selection
Blue
Accessory
None
Editing Acc.
None
Indentation
1
Level
0
Width
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
X
0
Y
1
Width
1
Height


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (...
My Table View Co...
My Table View Co...
Table View
Table View Cell
Prototype Cells
Title
Subtitle
Table View
Prototype Content
Selection Segue
push
modal
custom
Accessory Action
push
modal
custom
If you put these in a navigation controller, you'd choose push here.
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Reuse Identifier
Selection
Blue
Accessory
None
Editing Acc.
None
Indentation
1
Level
0
Width
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
X
0
Y
1
Width
1
Height


TVCExample
iPhone Retina (3.5-inch)
No Issues
TVCExample
TVCExample
Main.storyboard
Main.storyboard (...
My Table View Co...
My Table View Co...
Table View
Table View Cell
Prototype Cells
Title
Subtitle
Table View
Prototype Content
Let's take a look at
prepareForSegue:sender:
for this segue...
View Controller
Table View Cell
Style
Subtitle
Image
Identifier
Reuse Identifier
Selection
Blue
Accessory
Disclosure Indicator
Editing Acc.
None
Indentation
1
Level
0
Width
Indent While Editing
Shows Re-order Controls
Separator Insets
Default
View
Mode
Scale To Fill
Tag
0
Interaction
User Interaction Enabled
Multiple Touch
Alpha
1
Background
Default
Tint
Default
Drawing
Opaque
Hidden
Clears Graphics Context
Clip Subviews
Autoresize Subviews
Stretching
0
X
0
Y
1
Width
1
Height

UITableView Segue

- The sender of prepareForSegue:sender: is the UITableViewCell

  Use the important method indexPathForCell: to find out the indexPath of the row that's segueing.

```
- (void)prepareForSegue:(UIStoryboardSegue *)segue sender:(id)sender
{
    NSIndexPath *indexPath = [self.tableView indexPathForCell:sender];
    // prepare segue.destinationController to display based on information
    //   about my Model corresponding to indexPath.row in indexPath.section
}
```

UITableView Spinner

- UITableViewController has an "activity indicator" built in

  You get it via this property in UITableViewController …

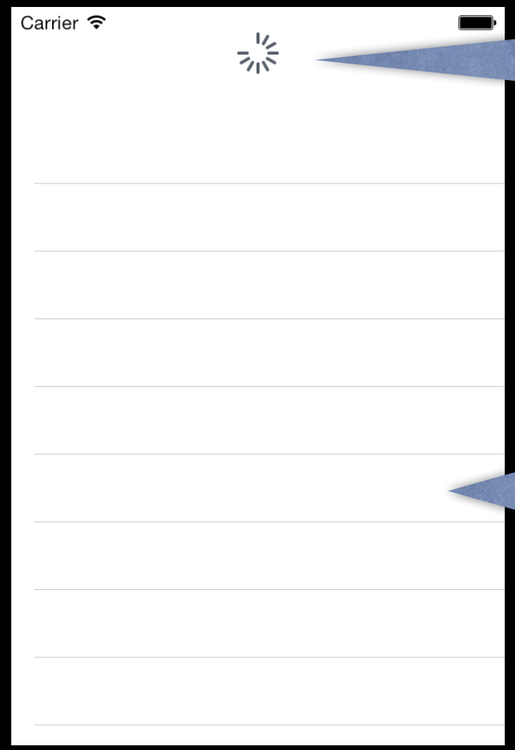
  ```
  @property (strong) UIRefreshControl *refreshControl;
  ```

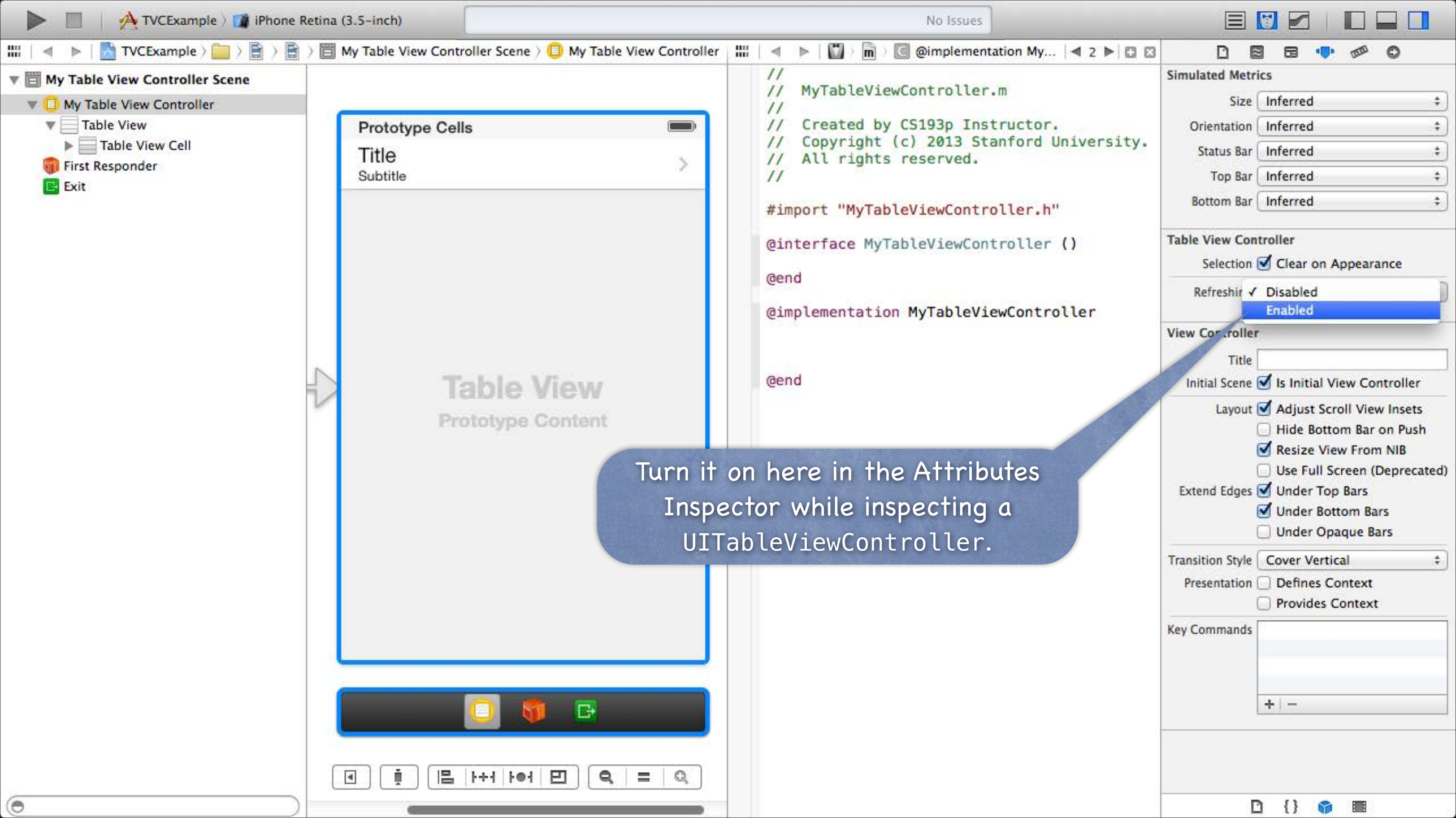
  Start it with …

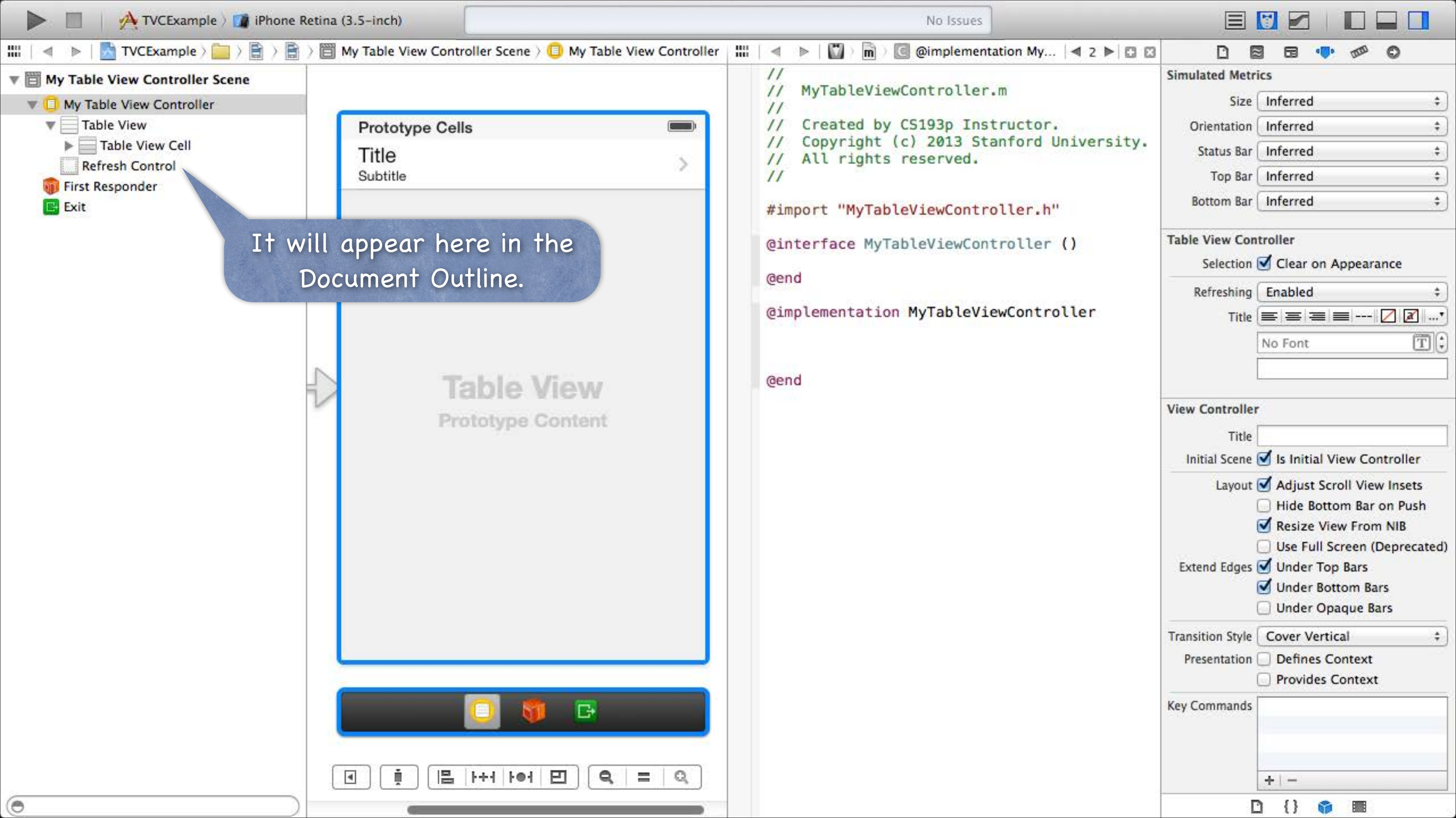
  ```
  - (void)beginRefreshing;
  ```

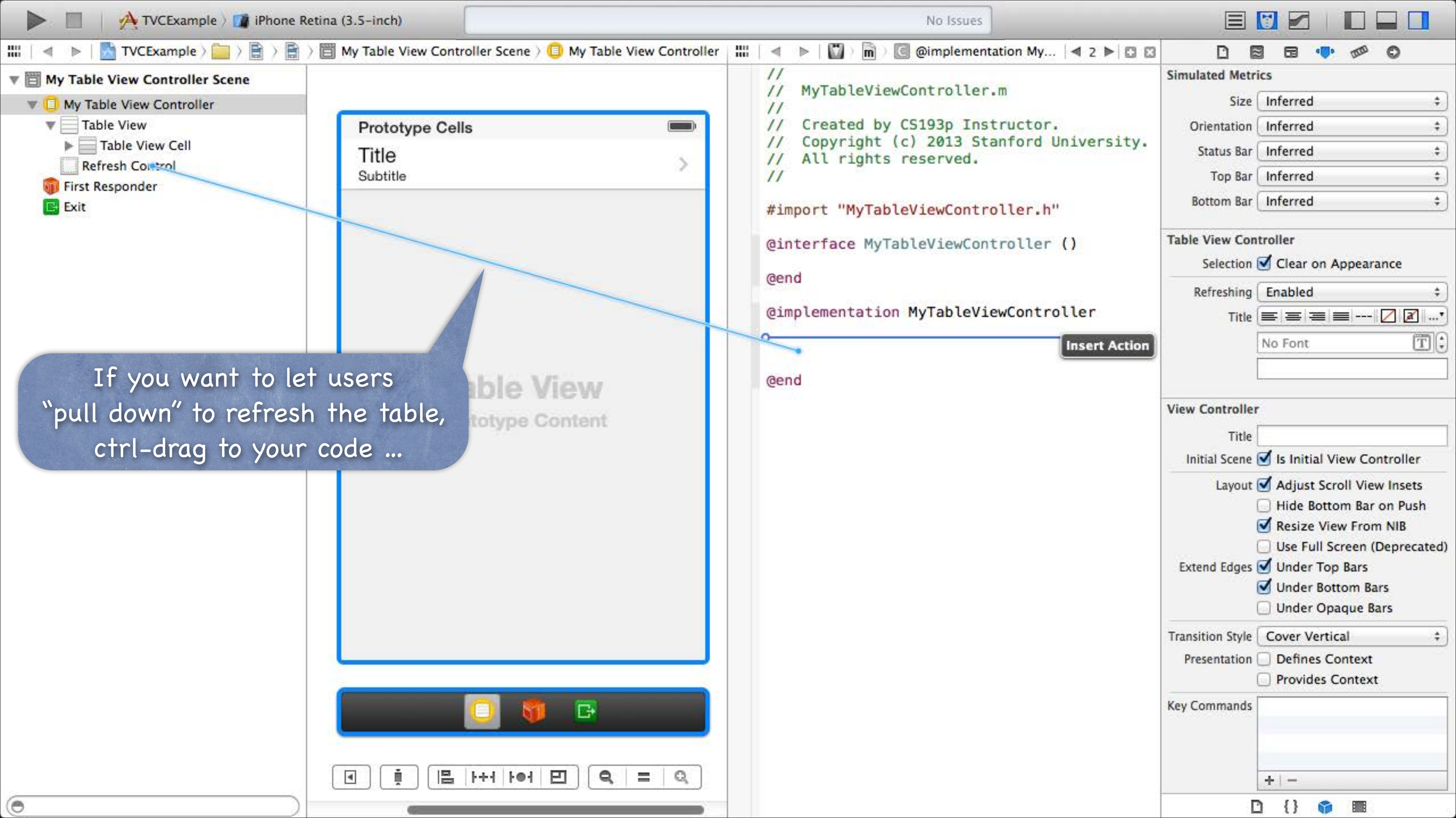
  Stop it with …

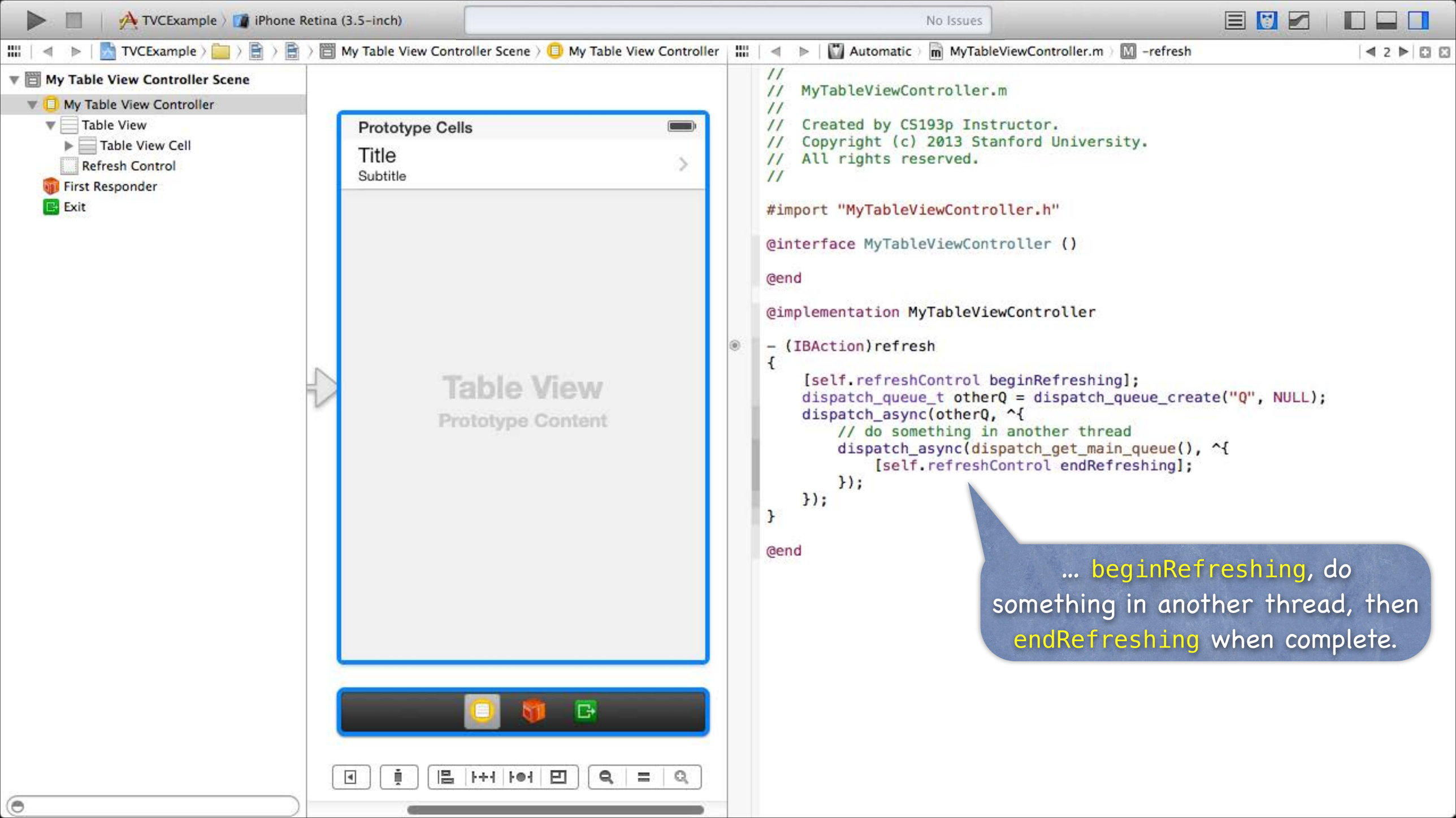
  ```
  - (void)endRefreshing;
  ```




TVCExample
iPhone Retina (3.5-inch)
No Issues
My Table View Controller Scene
My Table View Controller
Table View
Table View Cell
First Responder
Exit
Prototype Cells
Title
Subtitle
Table View
Prototype Content
//
// MyTableViewController.m
//
// Created by CS193p Instructor.
// Copyright (c) 2013 Stanford University.
// All rights reserved.
//
#import "MyTableViewController.h"
@interface MyTableViewController ()
@end
@implementation MyTableViewController
@end
Simulated Metrics
Size Inferred
Orientation Inferred
Status Bar Inferred
Top Bar Inferred
Bottom Bar Inferred
Table View Controller
Selection Clear on Appearance
Disabled
Enabled
Title
Initial Scene Is Initial View Controller
Layout Adjust Scroll View Insets
Hide Bottom Bar on Push
Resize View From NIB
Use Full Screen (Deprecated)
Extend Edges Under Top Bars
Under Bottom Bars
Under Opaque Bars
Transition Style Cover Vertical
Presentation Defines Context
Provides Context
Key Commands
Turn it on here in the Attributes Inspector while inspecting a UITableViewController.


TVCExample
iPhone Retina (3.5-inch)
No Issues
My Table View Controller Scene
My Table View Controller
Table View
Table View Cell
Refresh Control
First Responder
Exit
It will appear here in the Document Outline.
Prototype Cells
Title
Subtitle
Table View
Prototype Content
@implementation My...
//
// MyTableViewController.m
//
// Created by CS193p Instructor.
// Copyright (c) 2013 Stanford University.
// All rights reserved.
//
#import "MyTableViewController.h"
@interface MyTableViewController ()
@end
@implementation MyTableViewController
@end
Simulated Metrics
Size Inferred
Orientation Inferred
Status Bar Inferred
Top Bar Inferred
Bottom Bar Inferred
Table View Controller
Selection Clear on Appearance
Refreshing Enabled
Title
No Font
View Controller
Title
Initial Scene Is Initial View Controller
Layout Adjust Scroll View Insets
Hide Bottom Bar on Push
Resize View From NIB
Use Full Screen (Deprecated)
Extend Edges Under Top Bars
Under Bottom Bars
Under Opaque Bars
Transition Style Cover Vertical
Presentation Defines Context
Provides Context
Key Commands


TVCExample
iPhone Retina (3.5-inch)
No Issues
My Table View Controller Scene
My Table View Controller
Table View
Table View Cell
Refresh Control
First Responder
Exit
Prototype Cells
Title
Subtitle
If you want to let users "pull down" to refresh the table, ctrl-drag to your code ...
//
// MyTableViewController.m
//
// Created by CS193p Instructor.
// Copyright (c) 2013 Stanford University.
// All rights reserved.
//
#import "MyTableViewController.h"
@interface MyTableViewController ()
@end
@implementation MyTableViewController
Insert Action
@end
Simulated Metrics
Size Inferred
Orientation Inferred
Status Bar Inferred
Top Bar Inferred
Bottom Bar Inferred
Table View Controller
Selection Clear on Appearance
Refreshing Enabled
Title
No Font
View Controller
Title
Initial Scene Is Initial View Controller
Layout Adjust Scroll View Insets
Hide Bottom Bar on Push
Resize View From NIB
Use Full Screen (Deprecated)
Extend Edges Under Top Bars
Under Bottom Bars
Under Opaque Bars
Transition Style Cover Vertical
Presentation Defines Context
Provides Context
Key Commands


TVCExample
iPhone Retina (3.5-inch)
No Issues
My Table View Controller Scene
My Table View Controller
Table View
Table View Cell
Refresh Control
First Responder
Exit
Prototype Cells
Title
Subtitle
Table View
Prototype Content
Automatic
MyTableViewController.m
-refresh
//
// MyTableViewController.m
//
// Created by CS193p Instructor.
// Copyright (c) 2013 Stanford University.
// All rights reserved.
//
#import "MyTableViewController.h"
@interface MyTableViewController ()
@end
@implementation MyTableViewController
- (IBAction)refresh
{
[self.refreshControl beginRefreshing];
dispatch_queue_t otherQ = dispatch_queue_create("Q", NULL);
dispatch_async(otherQ, ^{
// do something in another thread
dispatch_async(dispatch_get_main_queue(), ^{
[self.refreshControl endRefreshing];
});
});
}
@end
… beginRefreshing, do something in another thread, then endRefreshing when complete.

UITableView

- What if your Model changes?

  `- (void)reloadData;`

  Causes the table view to call `numberOfSectionsInTableView:` and `numberOfRowsInSection:` all over again and then `cellForRowAtIndexPath:` on each visible cell.

  Relatively heavyweight, but if your entire data structure changes, that's what you need.

  If only part of your Model changes, there are lighter-weight reloaders, for example …

  ```
  - (void)reloadRowsAtIndexPaths:(NSArray *)indexPaths
                withRowAnimation:(UITableViewRowAnimation)animationStyle;
  ```

- There are dozens of other methods in `UITableView`

  Setting headers and footers for the entire table.

  Controlling the look (separator style and color, default row height, etc.).

  Getting cell information (cell for index path, index path for cell, visible cells, etc.).

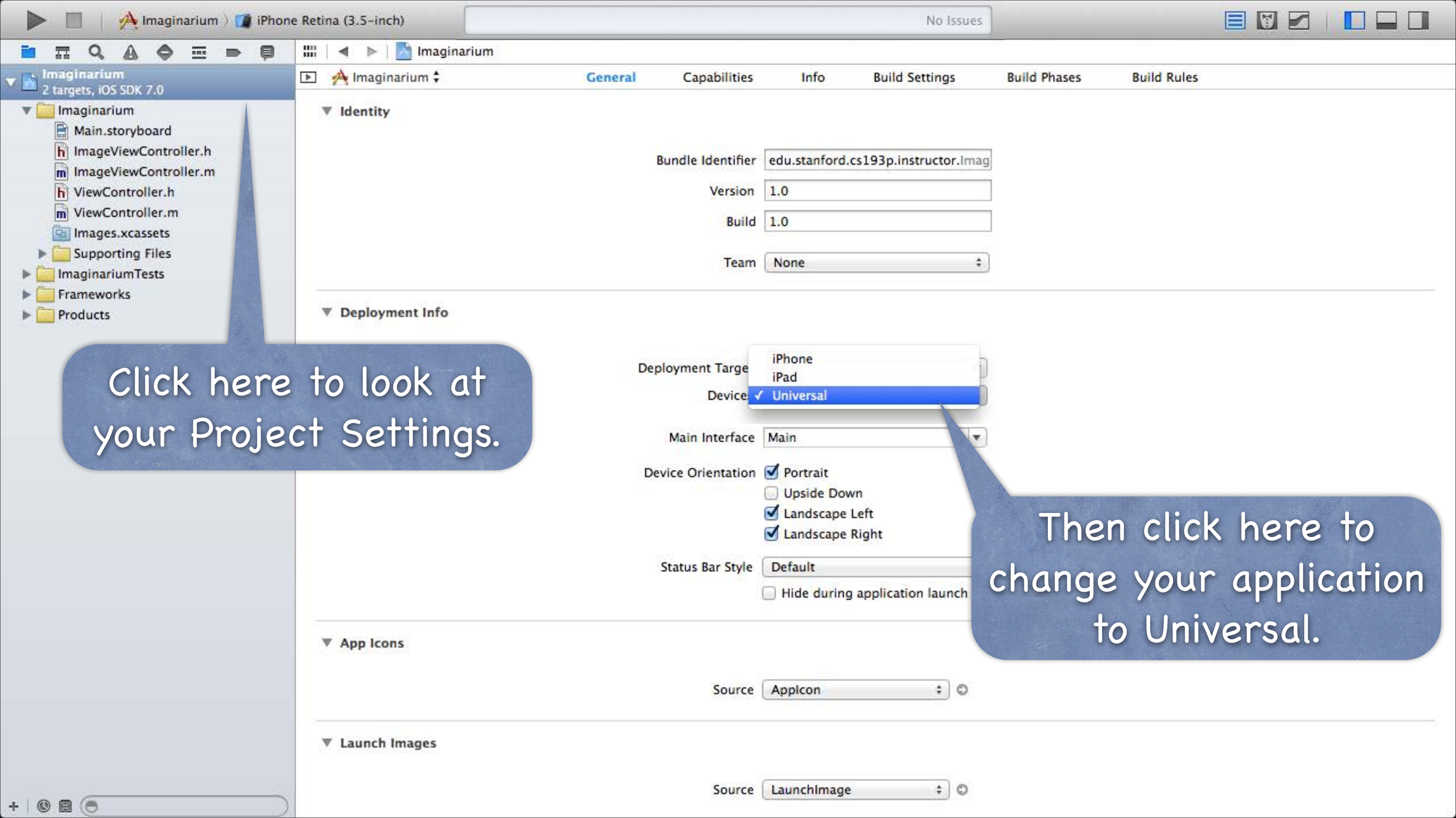
  Scrolling to a row.

  Selection management (allows multiple selection, getting the selected row, etc.).

  Moving, inserting and deleting rows, etc.

Universal Applications

- A "Universal" Application will run on both iPhone and iPad
  - It might look different on each.
  - But it's a single binary image (i.e. it's one app, not two).
  - Two different storyboards.
- How to create one
  - When you create the project, pick Universal instead of iPhone or iPad.
  - If you have an existing iPhone- or iPad-only project, you must edit your Project Settings …


Imaginarium
iPhone Retina (3.5-inch)
No Issues
Imaginarium
Imaginarium
2 targets, iOS SDK 7.0
Imaginarium
Main.storyboard
ImageViewController.h
ImageViewController.m
ViewController.h
ViewController.m
Images.xcassets
Supporting Files
ImaginariumTests
Frameworks
Products
Imaginarium
General
Capabilities
Info
Build Settings
Build Phases
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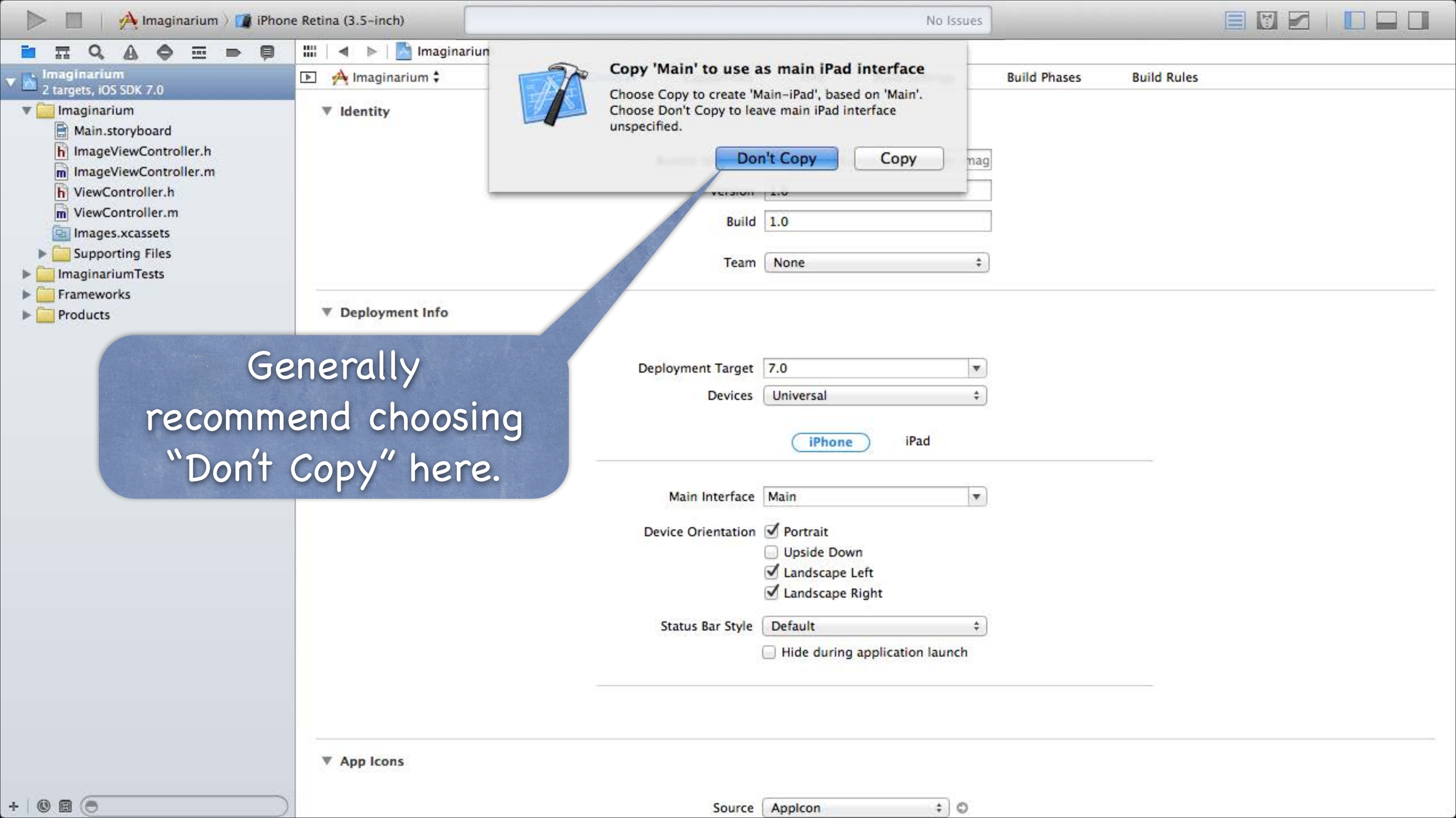
Click here to look at your Project Settings.
Then click here to change your application to Universal.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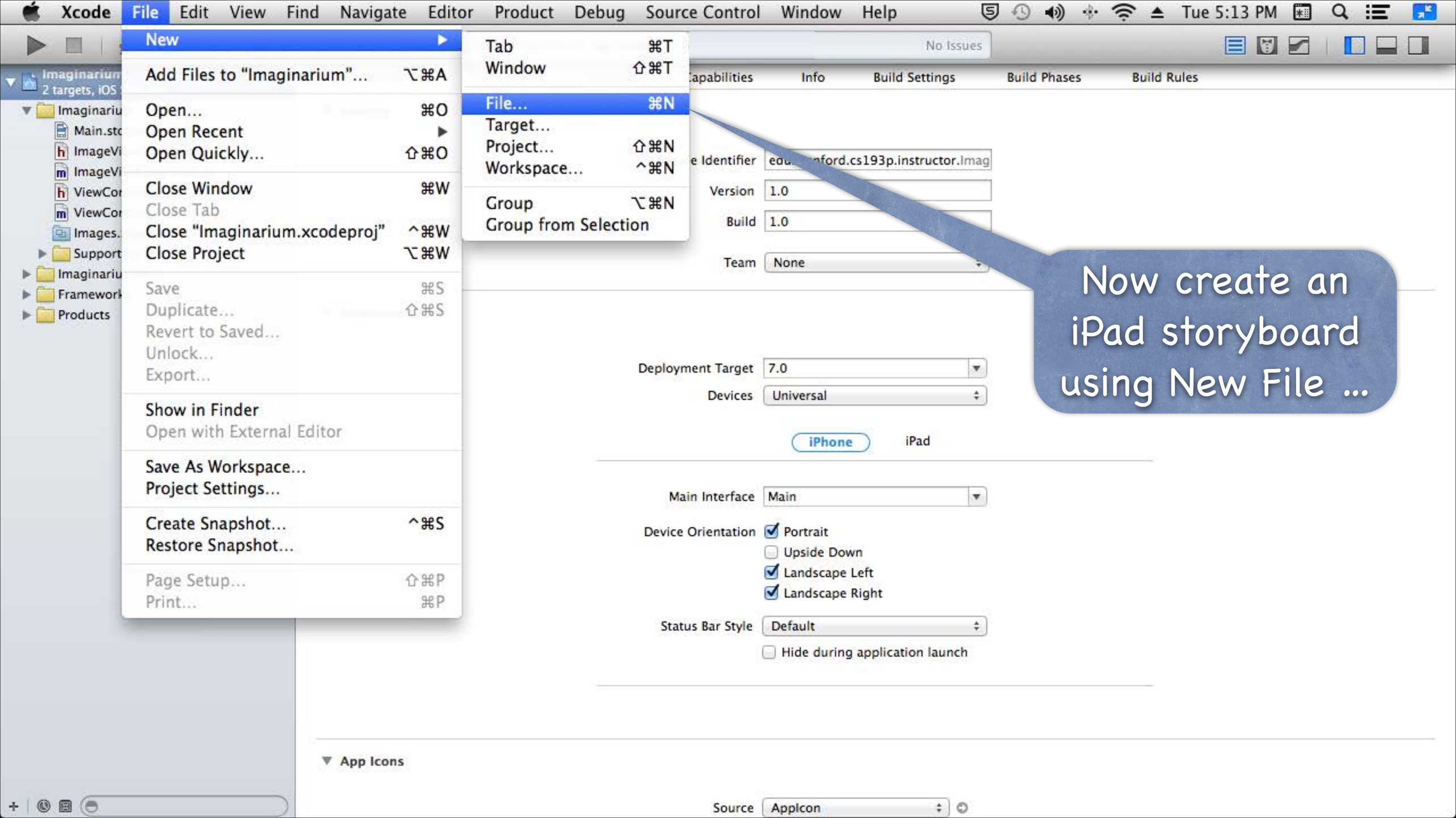
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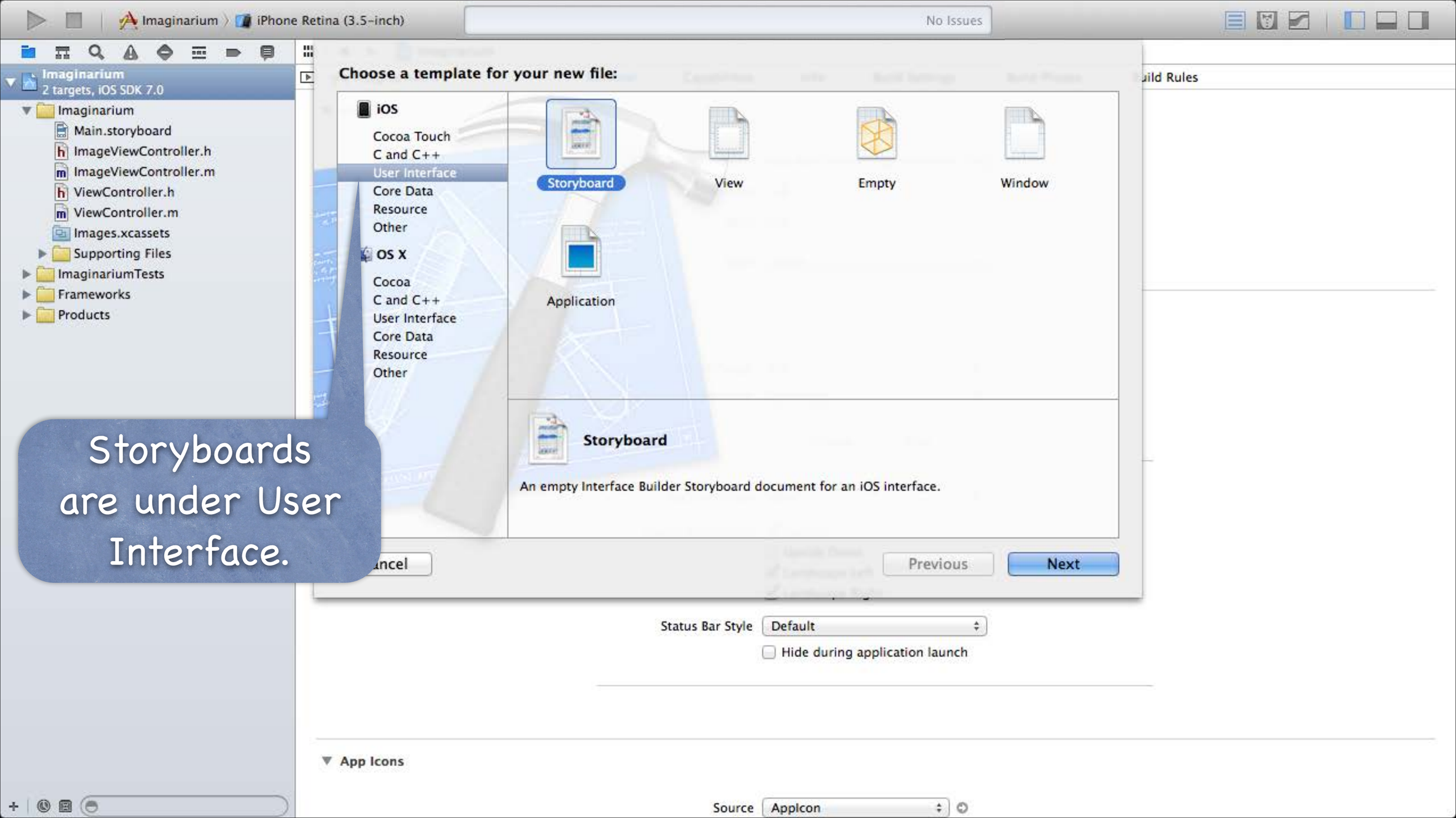
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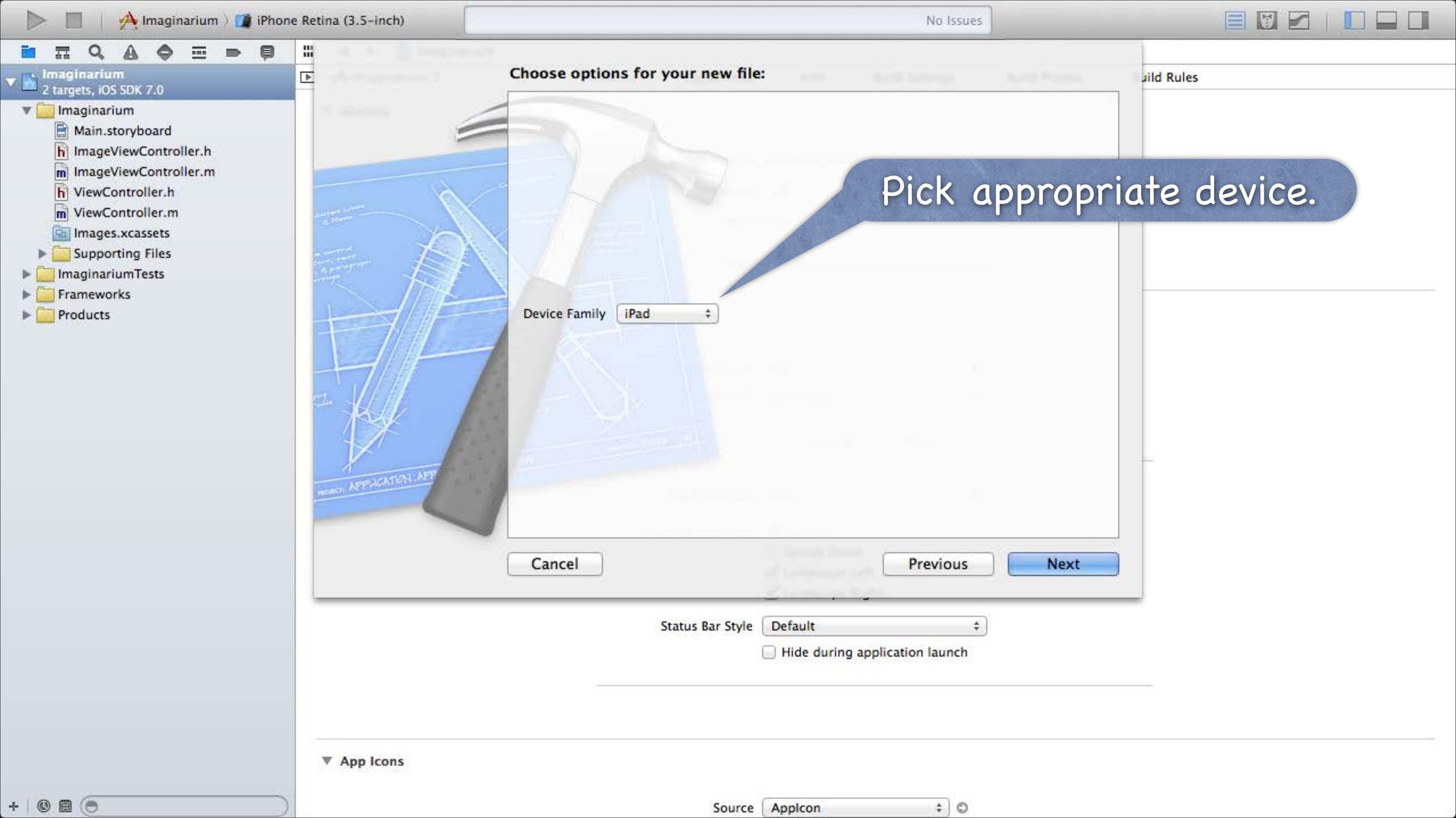
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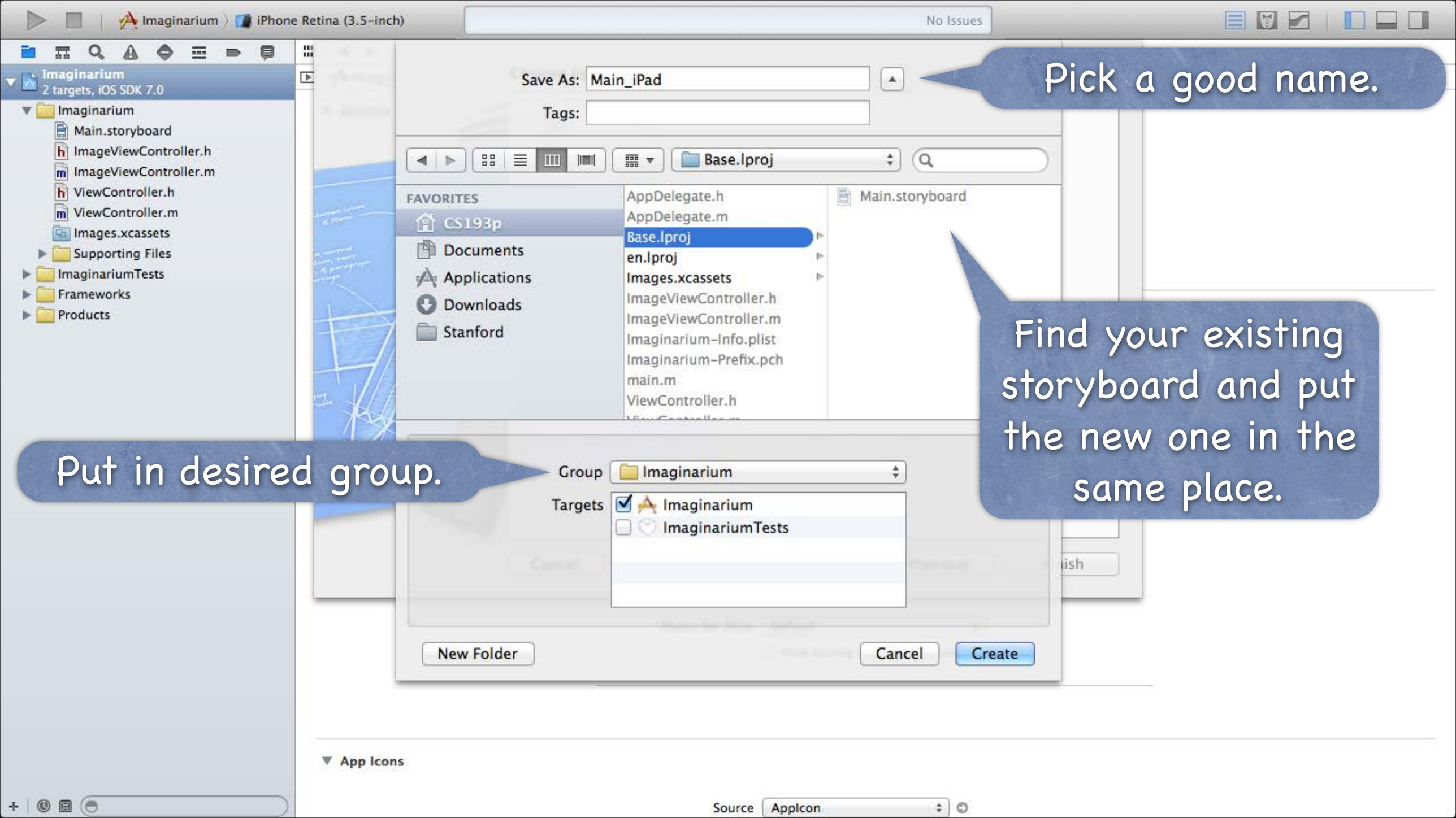
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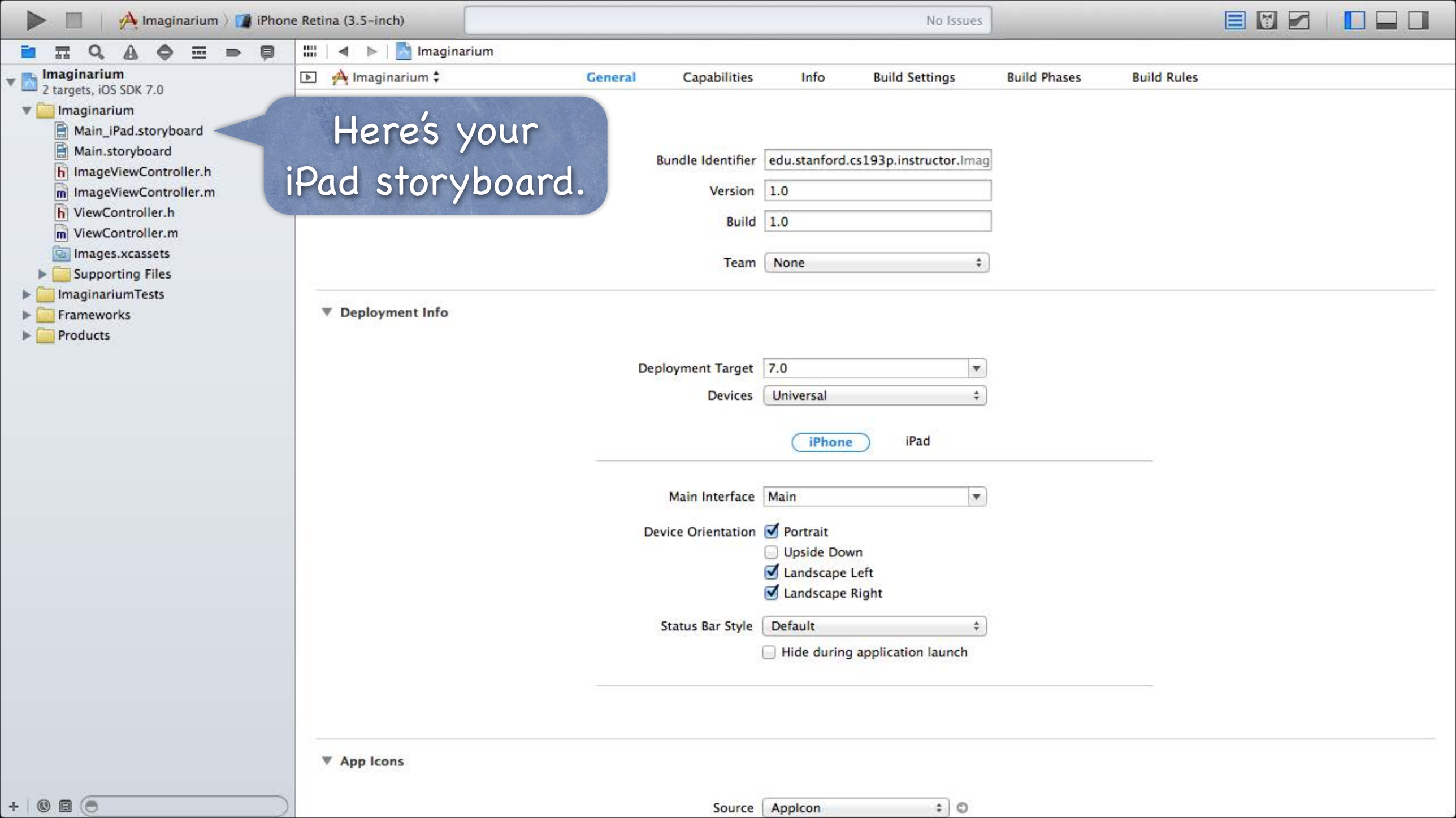
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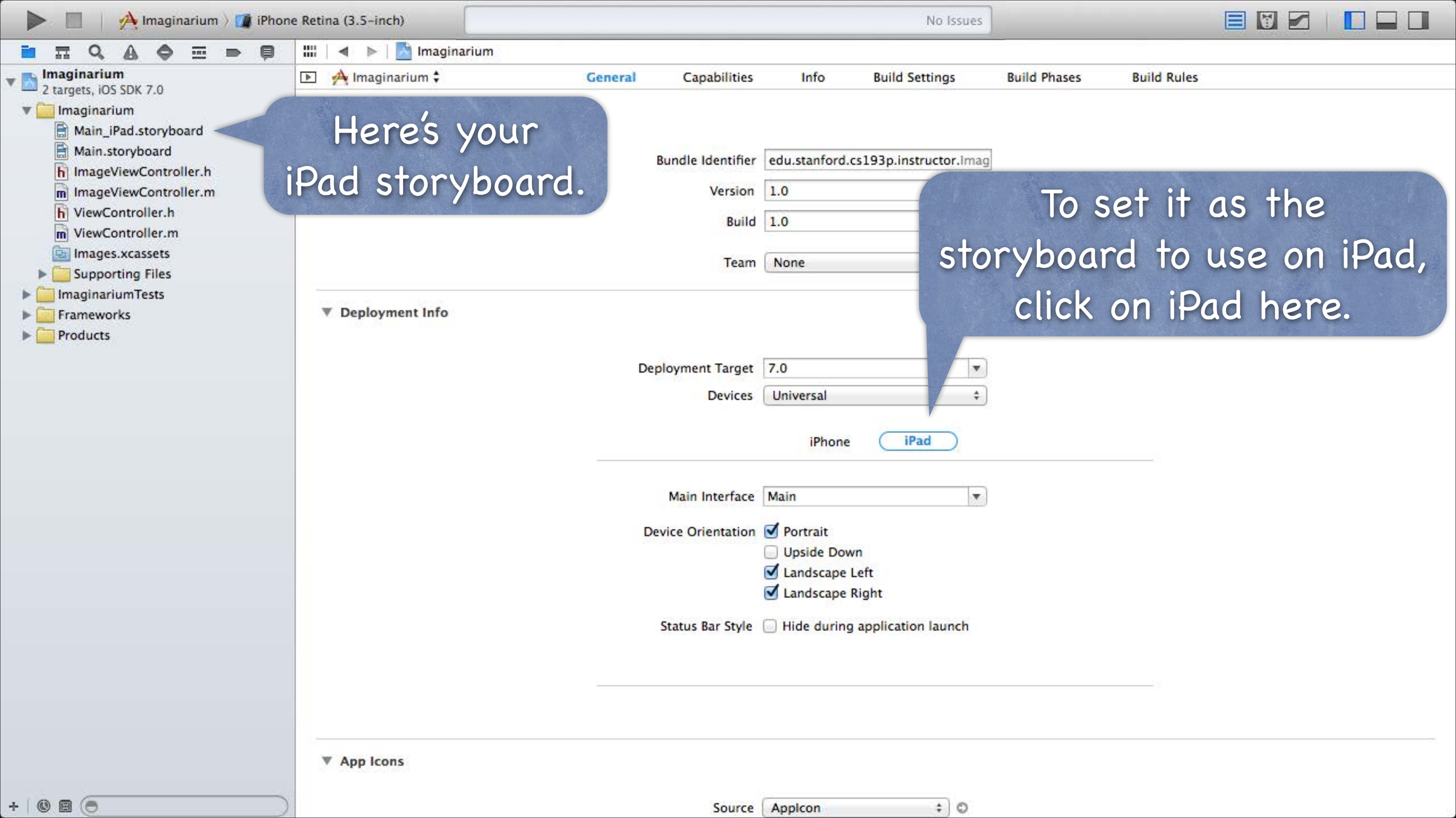
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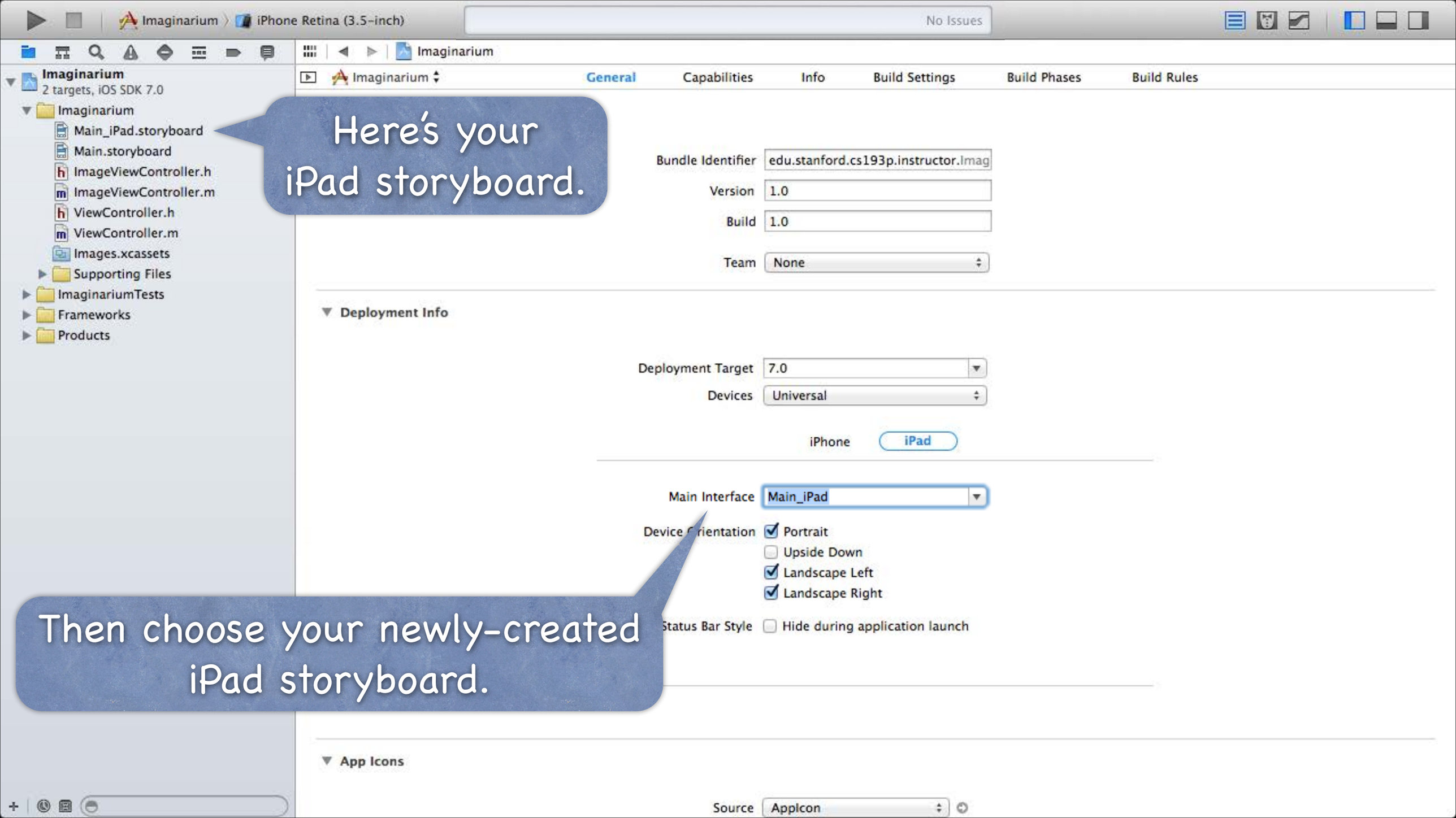
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Landscape Right
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Hide during application launch
Then choose your newly-created iPad storyboard.
App Icons
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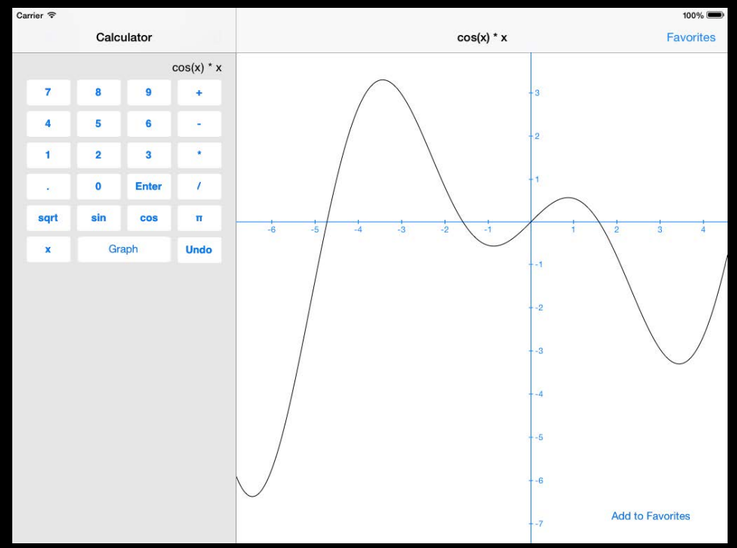
Universal Applications

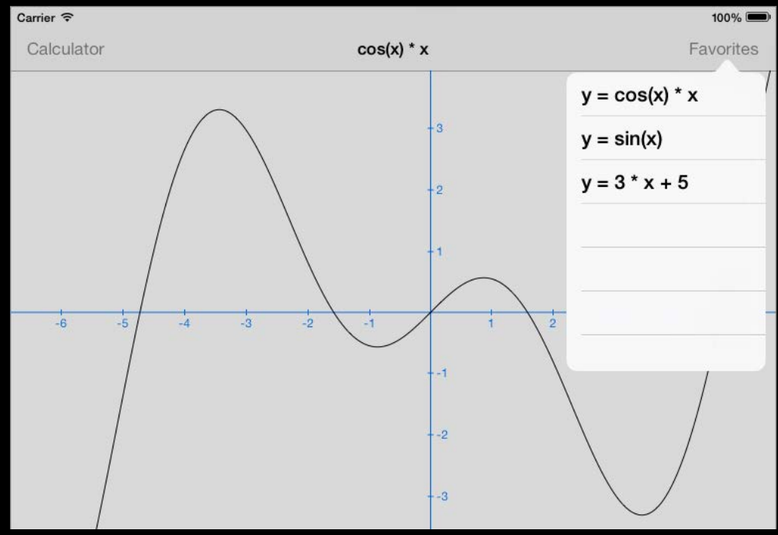
- iPad user-interface idioms

  The iPad has more screen real estate, so it can present MVCs in a couple of other ways.

Split View



Popover



Universal Applications

- How do I figure out "am I on an iPad?"

  ```
  BOOL iPad = ([[UIDevice currentDevice] userInterfaceIdiom] == UIUserInterfaceIdiomPad);
  ```

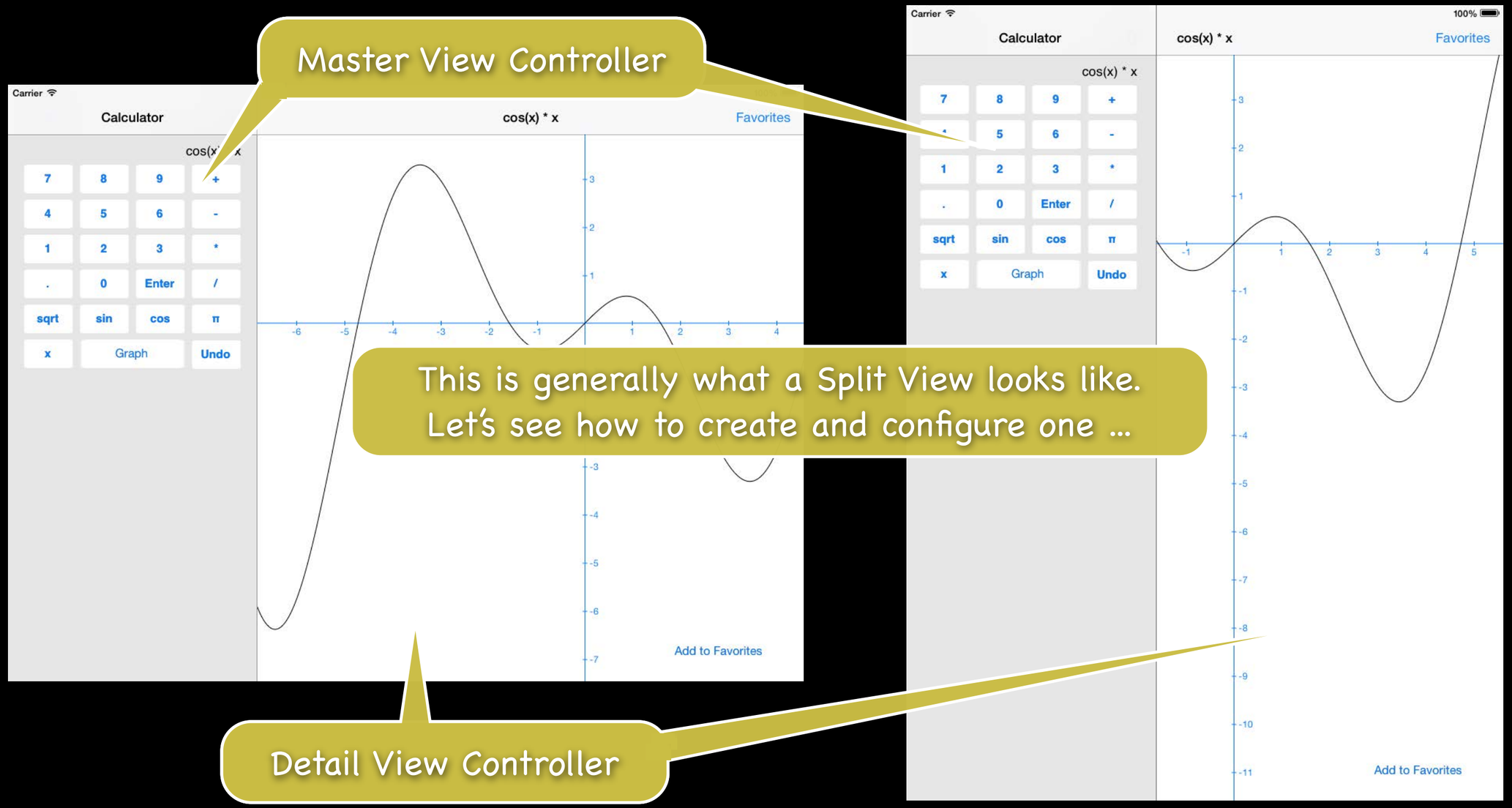
  Use this sparingly!

  Checking other things (like whether you are in a split view or popover) might be better design.

  Or maybe check to see if your MVC or another MVC are "on screen" now
  (because with more screen real estate, iPad can often have multiple MVCs showing at once).

  Remember this? `if (self.view.window == nil) { /* I am not on screen right now */ }`

UISplitViewController



UISplitViewController

- Designed to be at the top-level of your storyboard
  - Don't try to put it inside a tab bar controller or navigation controller!
  - But you can put either of those inside either side of the split view.
- Simple to add to your storyboard
  - Just drag it out (and usually delete the "free" Master and Detail it gives you).
  - If you don't see a Split View in your Object Palette, then you're not editing an iPad storyboard.
  - Then ctrl-drag to each of the two sides (Master and Detail) of the split view.

UISplitViewController

- Accessing the Master and Detail MVCs from code

  All UIViewControllers know the UISplitViewController they are contained in (if in one):

  ```
  @property (strong) UISplitViewController *splitViewController;
  ```

  e.g. `if (self.splitViewController) { /* I am in a UISplitViewController */ }`

  The UISplitViewController has a property which is an array containing Master and Detail:

  ```
  @property (copy) NSArray *viewControllers; // index 0 is Master, 1 is Detail
  ```

  This property is not `readonly`, so you can change the Master & Detail of a Split View.

  The array is immutable though, so you must set both Master & Detail together at once.

  Usually you set this by ctrl-dragging in your storyboard though, not in code.

  e.g. A Master VC wants to get ahold of the Detail VC of the Split View both are in …

  ```
  UIViewController *detailVC = self.splitViewController.viewControllers[1];
  ```

  If the Master VC is not in a Split View, this would nicely return `nil`.

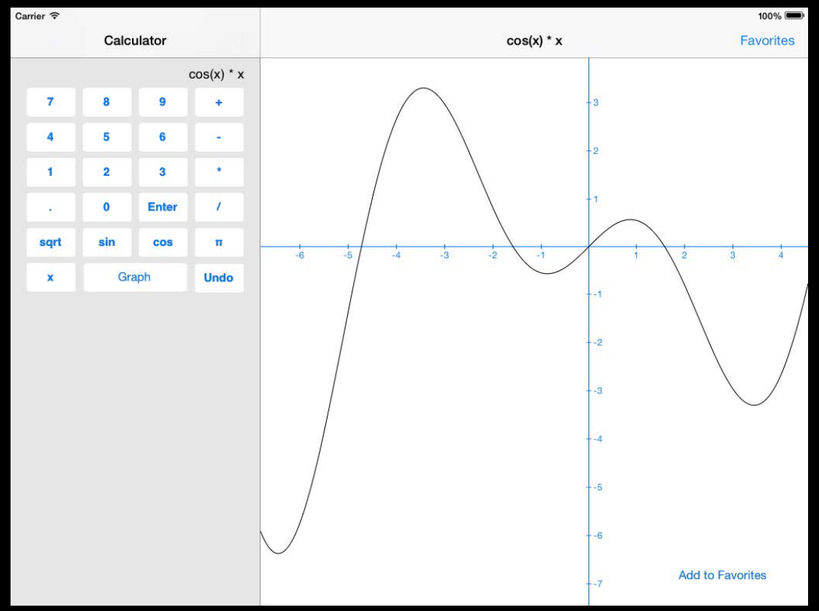
UISplitViewControllerDelegate

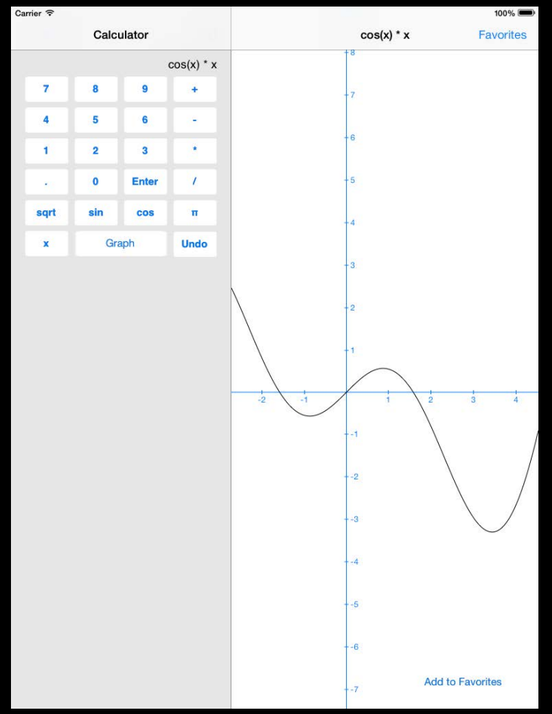
- UISplitViewController requires its delegate to be set
  - Or, at least, if you don't set it, then in portrait mode, the Master will be inaccessible.
  - `@property (assign) id <UISplitViewControllerDelegate> delegate;`
  - By the way, "assign" above is like "weak" except it doesn't set to nil when it leaves the heap!
  - Seems dangerous (and it can be), except that a Controller is almost always the delegate.
  - And a Controller is unlikely to leave the heap before elements of the View do.
- You must set this delegate very early!
  - Probably in awakeFromNib.
  - e.g., UISplitViewController starts sending its delegate methods way before viewDidLoad.
  - And then, unfortunately, when its delegate methods get sent to you, your outlets aren't set yet!
  - This can make being a UISplitViewController's delegate a real pain.
- What is the delegate's responsibility?
  - To control how the Master and Detail are presented when device rotation occurs …

UISplitViewControllerDelegate

- Never hide the left side (Master) behind a bar button

```
- (BOOL)splitViewController:(UISplitViewController *)sender
   shouldHideViewController:(UIViewController *)master
              inOrientation:(UIInterfaceOrientation)orientation
{
    return NO; // never hide it
}
```

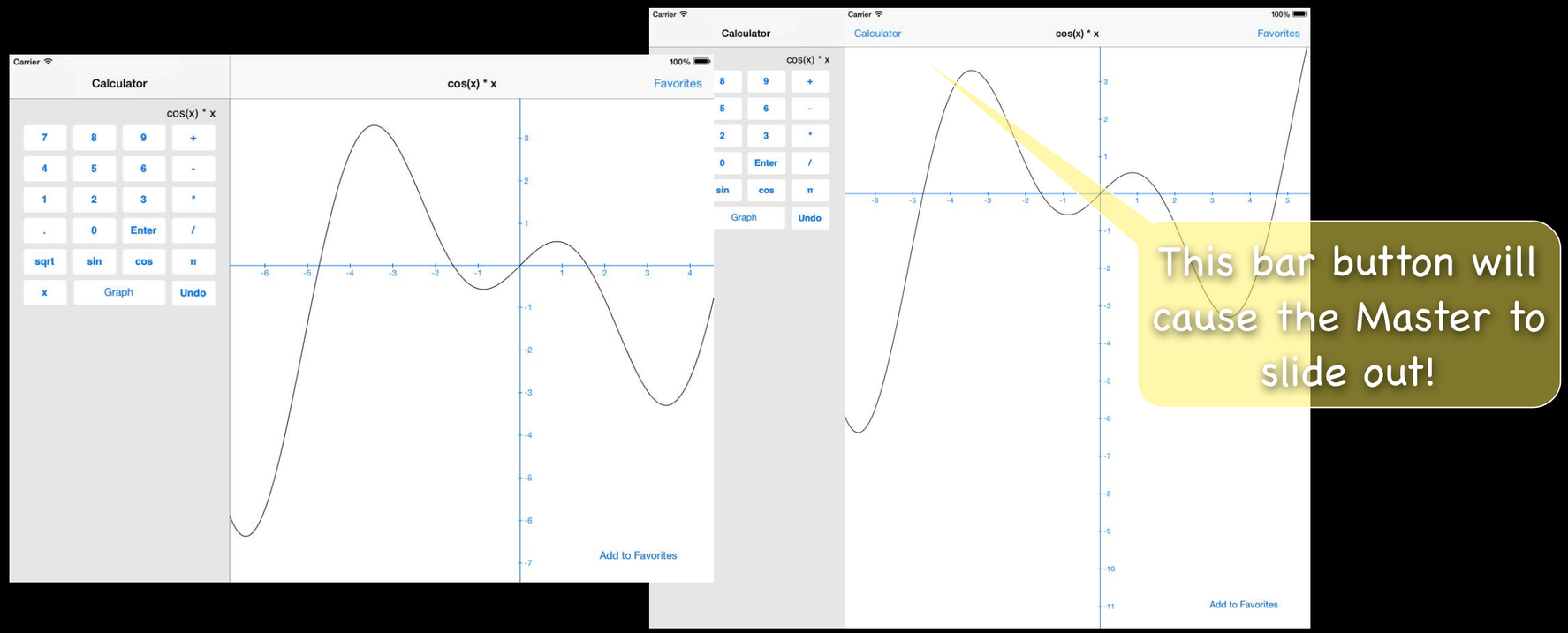




UISplitViewControllerDelegate

- Hide Master in portrait orientation only (the default)

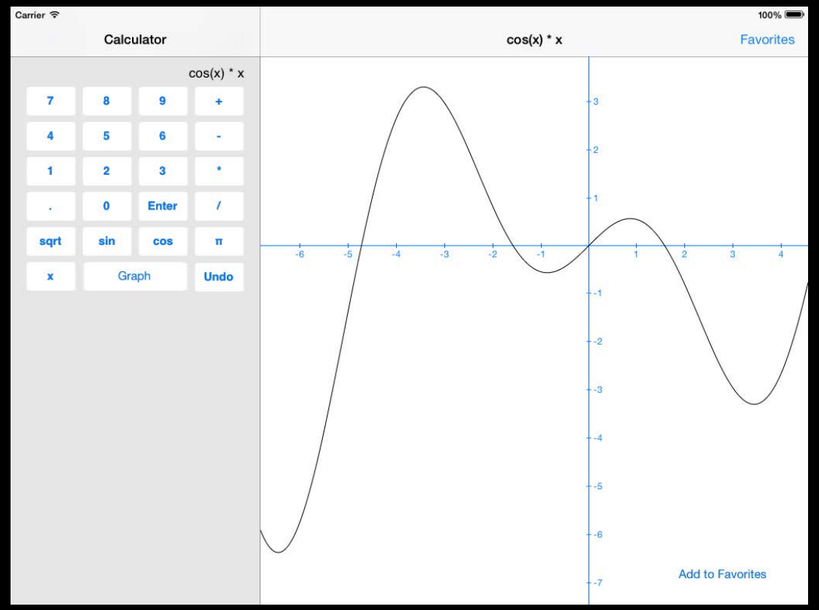
```
- (BOOL)splitViewController:(UISplitViewController *)sender
   shouldHideViewController:(UIViewController *)master
              inOrientation:(UIInterfaceOrientation)orientation
{
    return UIInterfaceOrientationIsPortrait(orientation);
}
```

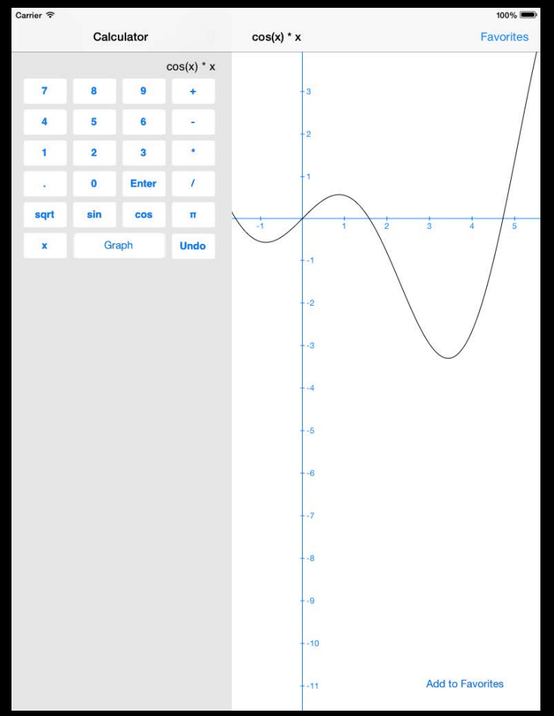


UISplitViewControllerDelegate

- Hide Master in portrait orientation only (the default)

```
- (BOOL)splitViewController:(UISplitViewController *)sender
   shouldHideViewController:(UIViewController *)master
              inOrientation:(UIInterfaceOrientation)orientation
{
    return UIInterfaceOrientationIsPortrait(orientation);
}
```

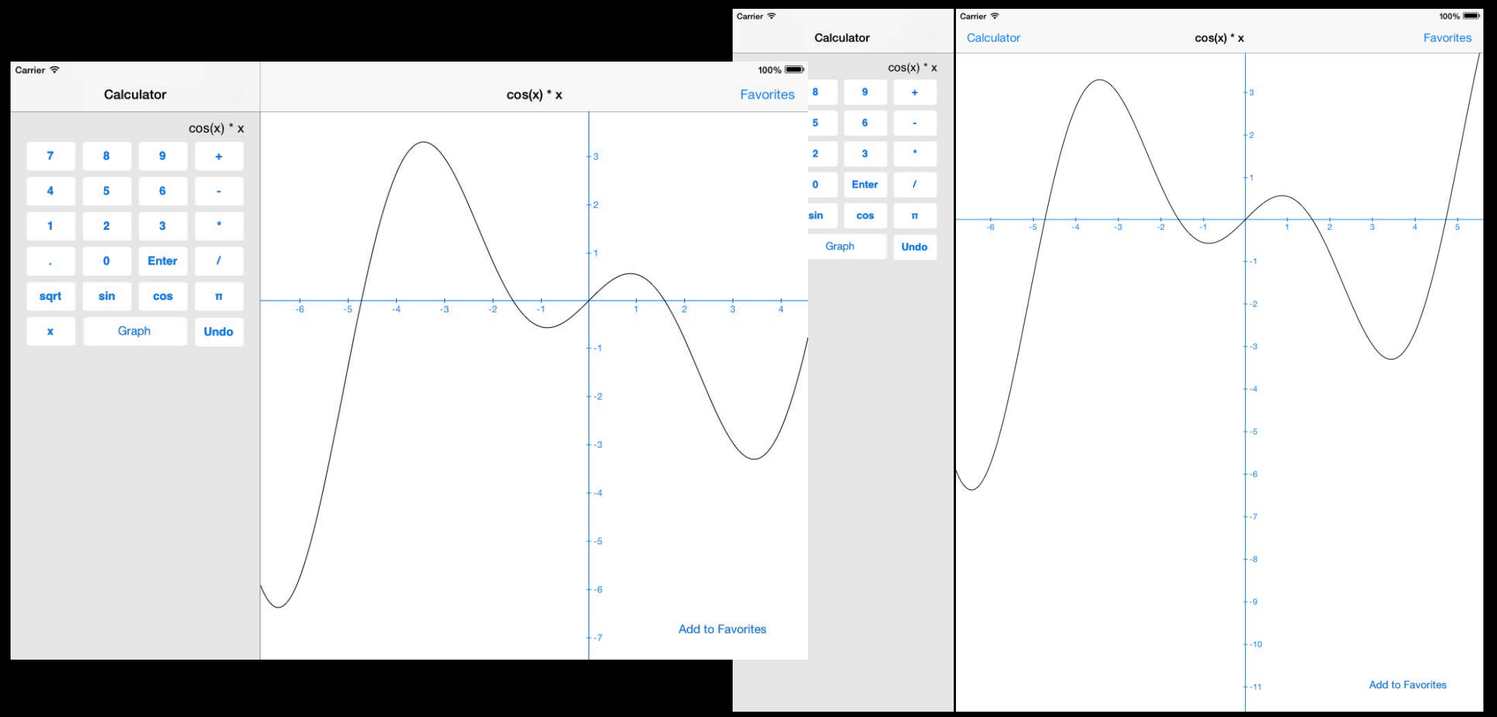




UISplitViewControllerDelegate

- Hide Master in portrait orientation only (the default)

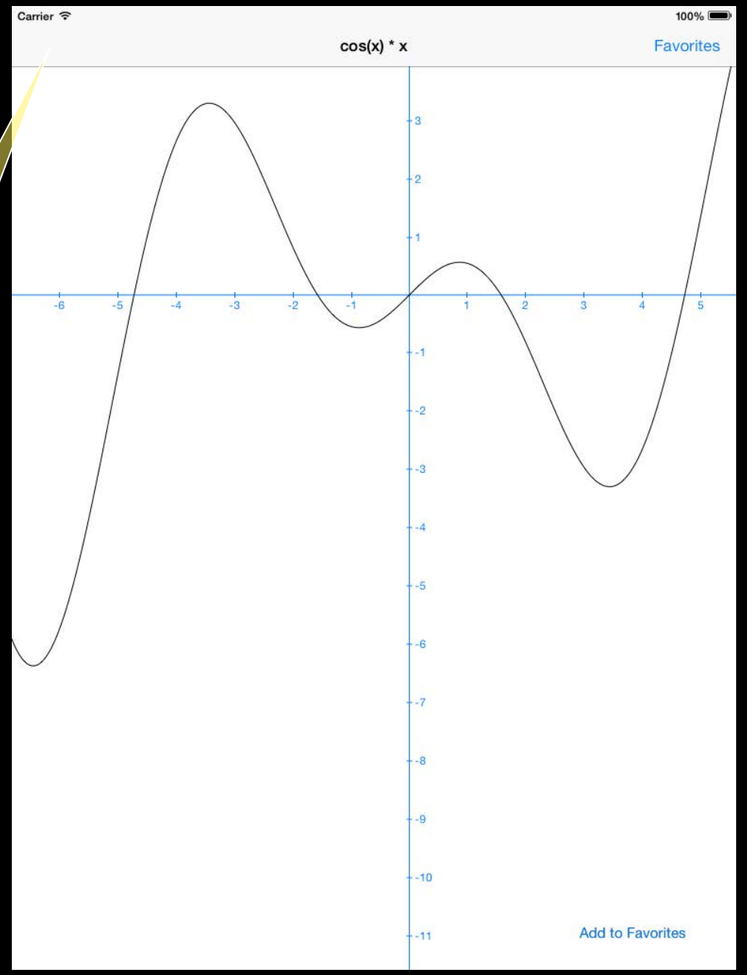
```
- (BOOL)splitViewController:(UISplitViewController *)sender
   shouldHideViewController:(UIViewController *)master
              inOrientation:(UIInterfaceOrientation)orientation
{
    return UIInterfaceOrientationIsPortrait(orientation);
}
```



UISplitViewControllerDelegate

- If you forget to set the `delegate`, you'll get this …

No button to slide the Master on screen!



UISplitViewControllerDelegate

- Split View helps you by providing that bar button

This gets called in your delegate when the master gets hidden …

```
- (void)splitViewController:(UISplitViewController *)sender
     willHideViewController:(UIViewController *)master
          withBarButtonItem:(UIBarButtonItem *)barButtonItem
       forPopoverController:(UIPopoverController *)popover
{
    barButtonItem.title = master.title;
    // this next line would only work in the Detail
    // and only if it was in a UINavigationController
    self.navigationItem.leftBarButton = barButtonItem;
}
```

See? You are being provided the bar button item. You just need to put it on screen somewhere.

UISplitViewControllerDelegate

- When it's time for the bar button to go away …

  This gets called in your delegate when the master reappears …

```
- (void)splitViewController:(UISplitViewController *)sender
     willShowViewController:(UIViewController *)master
  invalidatingBarButtonItem:(UIBarButtonItem *)barButtonItem
{
    // this next line would only work in the Detail
    // and only if it was in a UINavigationController
    self.navigationItem.leftBarButton = nil;
}
```

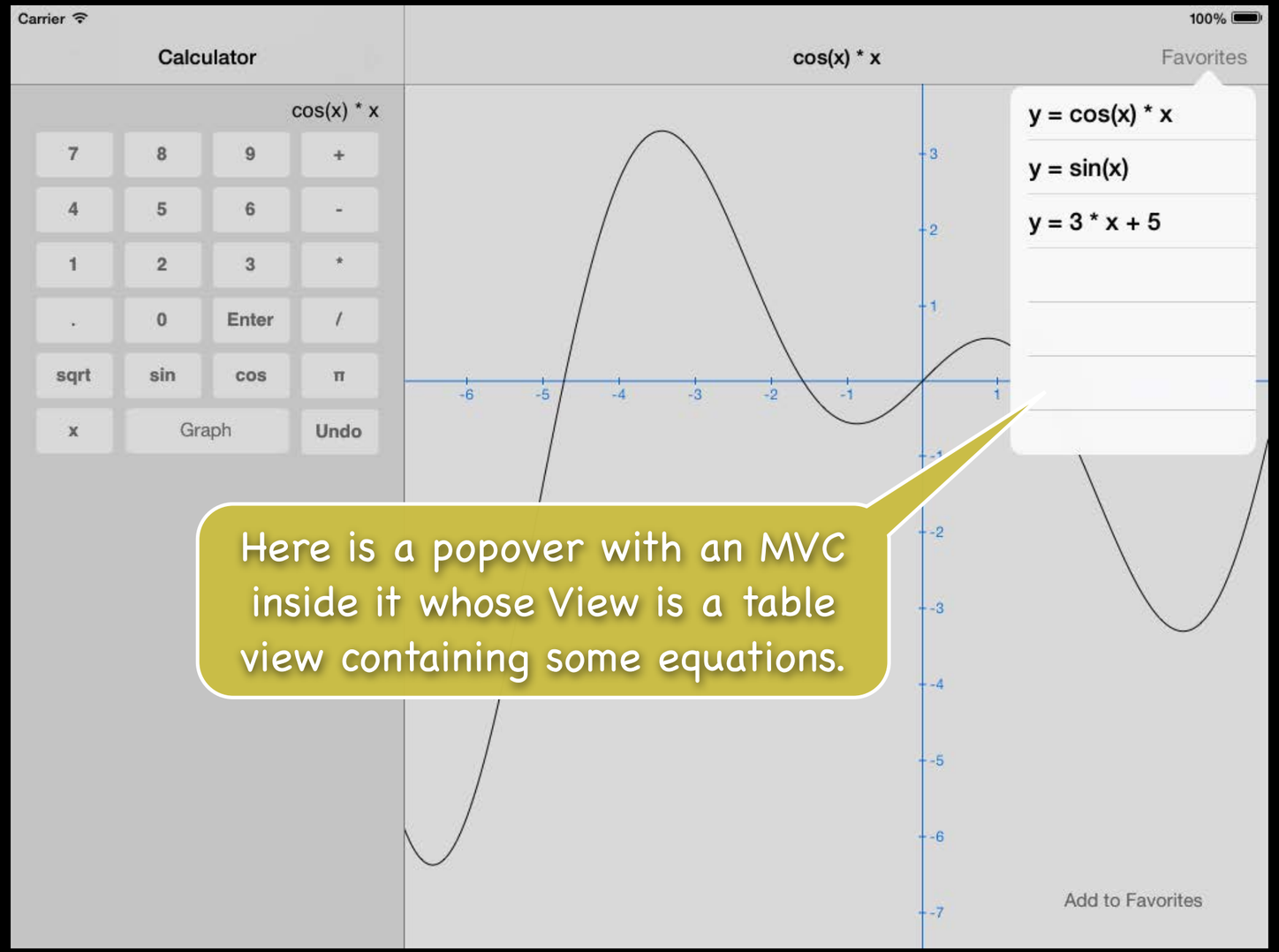
UISplitViewController

- Updating the Detail when the Master is touched?
  There are 2 choices for how to do this: Target/Action or Replace Segue
- Target/Action
  Example (code in the Master view controller) …

```
- (IBAction)doit
{
    id detailViewController = self.splitViewController.viewControllers[1];
    [detailViewController setSomeProperty:…]; // might want some Introspection first
}
```

- Replace Segue (entirely replaces the Detail view controller)
  Remember, segues always instantiate a view controller (split view stops pointing to old one).
  Can Replace either side, but much more common to replace the right side (since it's the "detail").
  Be careful! You might lose the `UIBarButtonItem` used for revealing the hidden Master!
  (you'd need to be sure to put it back into the newly instantiated view controller)

Popovers


Carrier
100%
Calculator
cos(x) * x
Favorites
cos(x) * x
7
8
9
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4
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6
-
1
2
3
*
.
0
Enter
/
sqrt
sin
cos
π
x
Graph
Undo
y = cos(x) * x
y = sin(x)
y = 3 * x + 5
Here is a popover with an MVC inside it whose View is a table view containing some equations.
Add to Favorites

Popovers

- UIPopoverController is not, itself, a UIViewController
  - Instead it has a @property that holds the UIViewController that is inside it …
  - `@property (nonatomic, strong) UIViewController *contentViewController;`
  - This is usually wired up in a storyboard …

Popovers

- Creating a Popover Segue in your Storyboard

  Just drag from the UI element you want to cause the popover to the scene you want to pop up.

  In your prepareForSegue:sender:, the argument will be isKindOf:UIStoryboardPopoverSegue.
  And UIStoryboardPopoverSegue has a @property you can use to get the UIPopoverController:

```
- (UIPopoverController *)popoverController;
```

  Example:

```
- (void)prepareForSegue:(UIStoryboardSegue *)segue sender:(id)sender
{
    if ([segue isKindOfClass:[UIStoryboardPopoverSegue class]]) {
        UIPopoverController *popoverController =
            ((UIStoryboardPopoverSegue *)segue).popoverController;
        . . .
    }
}
```

Popover

- You can also present a popover from code

  Popover has a little arrow that points to what (rectangle or button) brought it up.

  You can specify which directions it is valid to point (and thus where the popover will pop up).

```
UIPopoverController *popover =
    [[UIPopoverController alloc] initWithContentViewController:myPoppedUpVC];
[popover presentPopoverFromRect:(CGRect)aRect // little arrow points to aRect in view's coords
                         inView:(UIView *)view
       permittedArrowDirections:(UIPopoverArrowDirection)direction
                       animated:(BOOL)flag];
```

  … or (points to a bar button item) …

```
[popover presentPopoverFromBarButtonItem:(UIBarButtonItem *)barButtonItem
                permittedArrowDirections:(UIPopoverArrowDirection)direction
                                animated:(BOOL)flag;
```

  * the "casts" on the arguments above are only for educational purposes, they are not required

Popover

- But don't forget to keep a `strong` pointer to the popover controller!

  Example: a target/action method attached to a `UIBarButtonItem` that presents a popover …

```
- (IBAction)presentPopover:(UIBarButtonItem *)item
{
    UIPopoverController *pop = [[UIPopoverController alloc] initWithViewController:vc];
    [pop presentPopoverFromBarButtonItem:item …];
}
```

  The above is bad because there is no strong pointer kept to the `UIPopoverController`!

Popover

- But don't forget to keep a `strong` pointer to the popover controller!

  Example: a target/action method attached to a `UIBarButtonItem` that presents a popover …

```
- (IBAction)presentPopover:(UIBarButtonItem *)item
{
    if (!self.popover) {
        self.popover = [[UIPopoverController alloc] initWithViewController:vc];
        [self.popover presentPopoverFromBarButtonItem:item …];
    }
}
// then set self.popover to nil when the popover is dismissed at a later time
```

  Speaking of which … how do we dismiss a popover (or find out that the user has dismissed it)?

Popover

- The user dismisses a popover by touching outside of it

  Unless the user touches in one of the views in this array property in UIPopoverController:

  ```
  @property (copy) NSArray *passthroughViews;
  ```

- Dismissing a popover from code

  UIPopoverController method:

  ```
  - (void)dismissPopoverAnimated:(BOOL)animated;
  ```

- Finding out that the user dismissed the popover

  UIPopoverController has a delegate too and it will be sent this message:

  ```
  - (void)popoverControllerDidDismissPopover:(UIPopoverController *)sender;
  ```

  This is only sent if the user dismisses the popover.

Demo

- Shutterbug
  - `UITableView`
  - Flickr
  - Universal Application
  - `UISplitViewController`
  - `UIRefreshControl`
  - GCD
  - No Popover, sorry, but you will not be asked to do that in your homework assignment.

Coming Up

- Next Week
  - Core Data (Object-Oriented Database)
  - Maybe some Multitasking API