CSC 471 / 371 Mobile Application Development for iOS

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Table & Navigation Views

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Outline

- Table views
  - Static table views
  - Dynamic table views
- Navigation views

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Table Views

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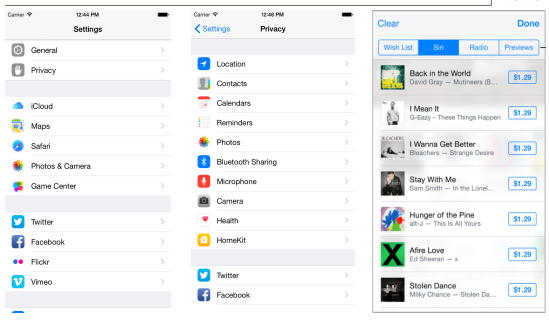
Table View Apps



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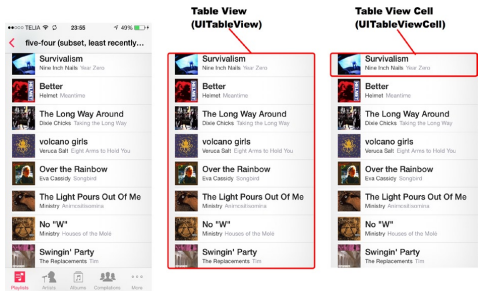
Parts of a Table View



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Static Table Views

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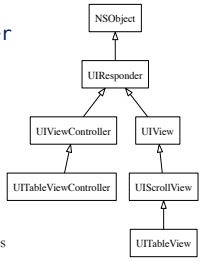
Use Table View

- View: `UITableView`
- Controller: `UITableViewController`
- Two types of *Table View*
  - Static:
    - Fixed number of rows
    - Each row can have a unique design
  - Dynamic:
    - Flexible number of rows, data driven
      - Can accommodate a large number of rows
    - A fixed number of designs of rows – prototypes



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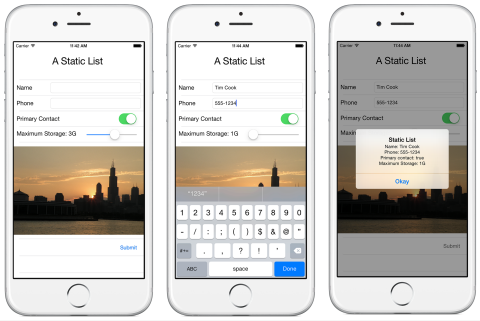
A Static Table View App



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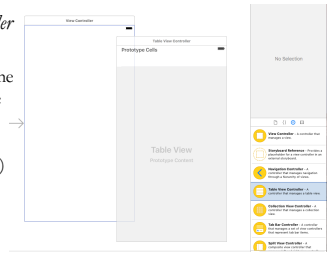
New App: Static List – Simple

- New Project | App
- Add a *Table View Controller* scene to the storyboard
  - Move the *Start Arrow* to the *Table View Controller* scene
  - Delete the original *View Controller* scene and the *View Controller* class (swift)



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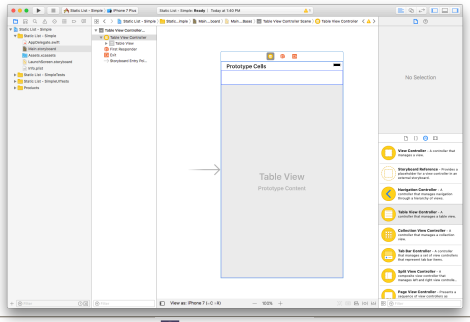
The Storyboard



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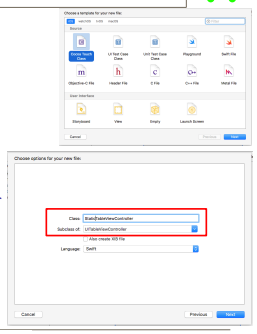
Add Table View Controller

- Add a new custom *Table View Controller*
- New File | iOS Source | Cocoa Touch class
- New file options:
  - Class: `StaticTableViewController`
  - Superclass: `UITableViewController`
  - Uncheck: Also create XIB file
  - Language: Swift



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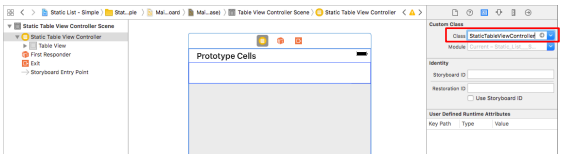
Set Table View Controller Class

- In the storyboard, select the *Table View Controller*
  - In the *Identity Inspector*, set the class to `StaticTableViewController`



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Design Static Table Cells

- In the storyboard, select the *Table View*
  - In the *Attribute Inspector*, change the *Content* field from *Dynamic Prototypes* to *Static Cells*
- Edit the static cells
  - Add widgets and constraints in each table cell
  - Name field:
    - keyboard type: *Default*
  - Phone field:
    - keyboard type: *Numbers and Punctuations*

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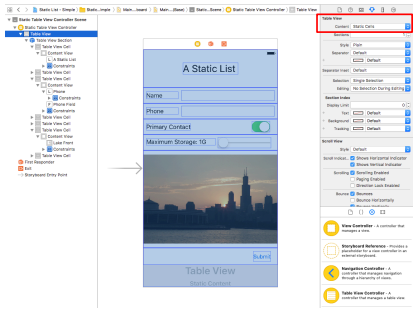
Design Static Table Cells



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The Static Table View Controller

- Comment out methods
  - `numberOfSections(in:)`
  - `tableView(numberOfRowsInSection:)`

Only needed for dynamic lists

- Connect outlets

```
@IBOutlet weak var nameField: UITextField!
@IBOutlet weak var phoneField: UITextField!
@IBOutlet weak var primaryContact: UISwitch!
@IBOutlet weak var maxStorage: UISlider!
@IBOutlet weak var storageLabel: UILabel!
```


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The Static Table View Controller

- Connect an action to the "Did End on Exit" event of both text field

```
@IBAction func doneEditing(_ sender: UITextField) {
    sender.resignFirstResponder()
}
```

- Connect an action to the slider

```
@IBAction func sliderChanged(_ sender: UISlider) {
    storageLabel.text =
        "Maximum Storage: \(Int(sender.value))G"
}
```


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The Submit Action

```
@IBAction func formSubmitted(_ sender: UIButton) {
    let title = "Static List"
    let name = nameField.text ?? ""
    let phone = phoneField.text ?? ""
    let message = "Name: \(name)\nPhone: \(phone)\n" +
        "Primary contact: \(primaryContact.isOn)\n" +
        "Maximum Storage: \(Int(maxStorage.value))G"
    let alertController = UIAlertController(
        title: title, message: message,
        preferredStyle: .alert)
    let okayAction = UIAlertAction(title: "Okay",
        style: .default, handler: nil)
    alertController.addAction(okayAction)
    present(alertController,
        animated: true, completion: nil)
}
```


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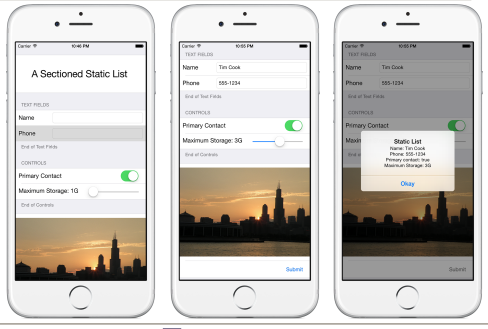
A Variation – Static Table View with Groups



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App: Static List – Groups

- In storyboard, select *Table View*
- In the *Attribute Inspector*,
  - Change *Style* from *Plain* to *Grouped* (optional)
  - Change *Sections* to 4
- In each *Table View Section*
  - Remove duplicate cells
- Enter the *Header* and *Footer* for each *Table View Section*

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Dynamic Table Views

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Dynamic Table Views

- The *Table View* may contain a flexible number of rows
  - Data driven, usually backed by an Array or a database
  - Designed to efficiently handle vary large tables
  - Table view *data source* and *delegate*
- The rows are populated from the data
  - The design of the rows are based on *prototype cells*
  - One or more prototype cells must be defined
  - Prototype cells are identified by the *reusable cell identifiers*

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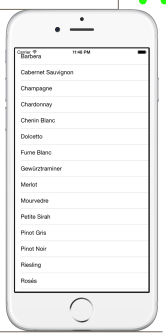
A Simple Table View App – Wine List – Basic

- A simple *Table View* app
- A list of wines, titles only.
- The wine data is stored in an array
- Use the *Basic* table view cell as the prototype cell
- Scrollable and selectable
- No other action.



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New App: Wine List – Basic

- New Project | App
- Add a *Table View Controller* scene to the storyboard
  - Move the *Start Arrow* to the *Table View Controller* scene
  - Delete the original *View Controller* scene and the *View Controller* class (swift)
- Add a new custom *Table View Controller* class
  - New File | iOS Source | Cocoa Touch class
  - Class: `WineListViewController`
  - Superclass: `UITableViewController`
- Set the class of the *Table View Controller* to the new class

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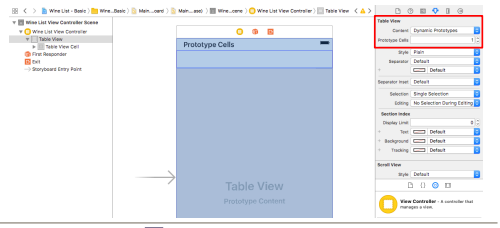
The Table View

- Select the *Table View*, in the *Attribute Inspector*
  - Set *Content* to *Dynamic Prototypes*
  - Set *Prototype Cells* to 1



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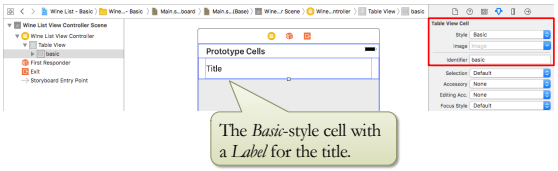
The Prototype Cell

- Select the *Table View Cell*, in the *Attribute Inspector*
  - Set *Style* to *Basic*
  - Set *Identifier* to *basic*

The *reusable cell identifier*



The *Basic*-style cell with a *Label* for the title.

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The Table View Controller – The Data Source

```
let wines = [ "Barbera", "Cabernet Sauvignon", …
    "Syrah", "Viognier", "Zinfandel" ]

class WineListViewController: UITableViewController {
    override func numberOfSections(in tableView: UITableView)
                 -> Int {
        return 1
    }
    override func tableView(_ tableView: UITableView,
                 numberOfRowsInSection section: Int) -> Int {
        return wines.count
    }
    …
}
```

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The Table View Controller – Configure Cells

- Uncomment and modify the method

```
override func tableView(_ tableView: UITableView,
                 cellForRowAt indexPath: IndexPath)
                 -> UITableViewCell {
    let cell = tableView.dequeueReusableCell(
                 withIdentifier: "basic" ,
                 for: indexPath)

    // Configure the cell...
    cell.textLabel?.text = wines[indexPath.row]
    return cell
}
```

The *reusable cell identifier*

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Customize the Prototype Cells

- Select the *Title* label in the prototype cell
  - Customize the font and color

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The Table View Controller – Handle Row Selection

```
override func tableView(_ tableView: UITableView,
                 didSelectRowAt indexPath: IndexPath) {
    let title = "Wine List"
    let message = "You have selected \(wines[indexPath.row])"
    let alertController = UIAlertController(title: title,
        message: message, preferredStyle: .alert)
    let okayAction = UIAlertAction(title: "Okay",
        style: .default, handler: nil)
    alertController.addAction(okayAction)
    present(alertController, animated: true,
        completion: nil)
    self.tableView.deselectRow(at: indexPath, animated: true)
}
```

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Prototype Cell with a Subtitle – Wine List – Subtitle

- A *Table View* app using *Subtitle* prototype cells with
  - A subtitle and
  - An image
- A list of wines with titles, types, and descriptions.
  - A custom *Wine* class
  - An array of *Wine* objects

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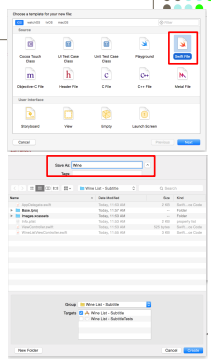
The Wine Class

- New File | iOS Source | Swift File
- Click *Next*
- Choose a file name: *Wine*
- Click *Create*



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The Wine Class

```
class Wine {
    enum `Type`: String {
        case red = "red"
        case white = "white"
        case rosé = "rose"
        case sparkling = "sparkling"
    }
    var name: String
    var type: Type
    var shortDescription: String
    var longDescription: String
    init(name: String, type: Type, shortDescription: String,
        longDescription: String) { … }
}
```

Each wine type will be represented by a prototype cell with an image. The raw values correspond to the *reusable identifier* of the cell.

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The Wine List Data

```
let wines = [
    Wine(name: "Barbera",
        type: .red,
        shortDescription: "Full-bodied Italian Red",
        longDescription: "Barbera is a red wine …"),
    Wine(name: "Cabernet Sauvignon",
        type: .red,
        shortDescription: "Full-bodied, intense Red",
        longDescription: "Cabernet Sauvignon is a red …"),
    …
    Wine(name: "Zinfandel",
        type: .red,
        shortDescription: "Medium to full-bodied Red",
        longDescription: "Zinfandel is a medium to …"),
]
```


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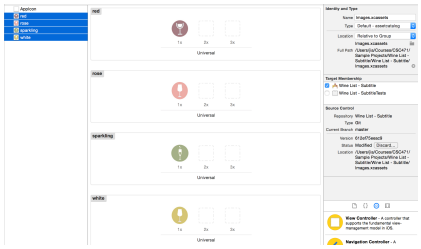
The Prototype Cells

- Add images for each type of wines to the assets catalog



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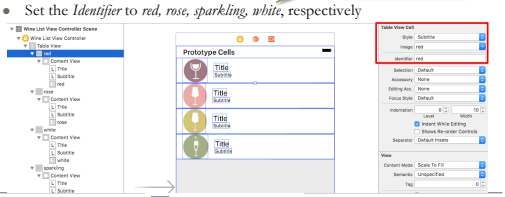
The Prototype Cells

- In storyboard, select the *Table View*,
  - Set *Prototype Cells* to 4
- Select each *Table View Cell*, edit each cell
  - Set *Style* to *Subtitle*
  - Select an image
  - Set the *Identifier* to *red, rose, sparkling, white*, respectively

Correspond to the raw values of the wine type enum.



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The Table View Controller – The Data Source

- Same as before.

```
class WineListViewController: UITableViewController {
    override func numberOfSections(in tableView: UITableView)
                 -> Int {
        return 1
    }
    override func tableView(_ tableView: UITableView,
                 numberOfRowsInSection section: Int) -> Int {
        return wines.count
    }
    …
}
```

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The Table View Controller – Configure Cells

```
override func tableView(_ tableView: UITableView,
                 cellForRowAt indexPath: IndexPath)
                 -> UITableViewCell {
    let wine = wines[indexPath.row]
    let cell = tableView.dequeueReusableCell(
                 withIdentifier: wine.type.rawValue,
                 for: indexPath)

    // Configure the cell...
    cell.textLabel?.text = wine.name
    cell.detailTextLabel?.text = wine.shortDescription
    return cell
}
```

The *reusable cell identifier*

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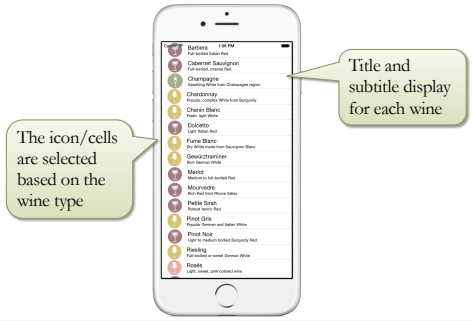
Run …



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Customize Prototype Cells

- Change the font and color of the *Title* label

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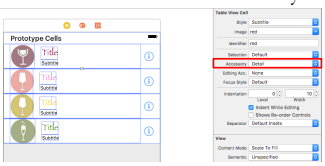
Accessories of the Cell

- Each Table View Cell also has an optional accessory button.
  - Accessory types: *Disclosure Indicator, Detail Disclosure, Checkmark, Detail*
- You may associate an action to accessory button tap



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The Table View Controller – Handle Accessory Button Tap

```
override func tableView(_ tableView: UITableView,
     accessoryButtonTappedForRowWith indexPath: IndexPath) {
    let wine = wines[indexPath.row]
    let title = wine.name
    let message = wine.longDescription
    let alertController = UIAlertController(title: title,
        message: message, preferredStyle: .actionSheet)
    let okayAction = UIAlertAction(title: "Okay",
        style: .default, handler: nil)
    alertController.addAction(okayAction)
    present(alertController, animated: true, completion: nil)
    self.tableView.deselectRow(at: indexPath, animated: true)
}
```

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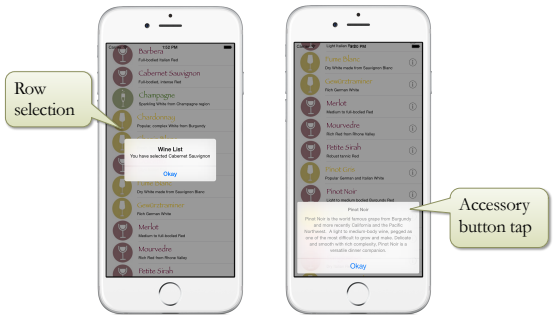
Run …



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Navigation Controller

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Navigation Controller

- Class: `UINavigationController`
- Displays a *navigation bar,* with a back button
- Manages a stack of view controllers
  - The first view controller is the *root view controller*
  - Go one level down
    - Push a view controller to the stack
  - Go one level back up
    - Pop the view controller at the top
- Commonly used with table views
  - To present a hierarchical structure

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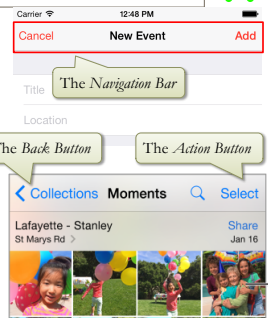
Navigation Bar

- Translucent
- Generally appears at the top of an app screen
- Contains
  - A title
  - A back button, system default
  - An action button



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Wine List – Navigation + Selection

- New Project | App
- Add a new *Navigation Controller*
  - It's a combo of a *Navigation View Controller* and a *Table View Controller*, the *root* view controller
  - Move the start arrow to the *Navigation View Controller*
- Add a new subclass of *Table View Controller*
  - `WineListViewController` and link it to the *Root View Controller*
  - Change the title from *Root View Controller* to *Wine List*
- Add the *Wine* class and the wine list data
- Rename the *View Controller* to `DetailViewController`

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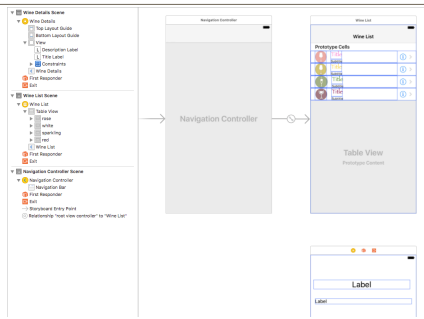
The Navigation and Table View



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The Detail View Scene

- Two labels for the name and the detail descriptions of the selected wine

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Segues to Detail View – Selection

- Add segues from the *Wine List* scene to the *Wine Detail* scene
  - Ctrl-Drag from each *Prototype Cell* in the *Wine List* scene to the *Wine Detail* scene
  - Choice of *Selection Segue* or *Accessory Action*
  - Choose: *Selection Segue* | *Show*
- Add a *Navigation Item* to the *Wine Detail* scene, which will appear on the *Navigation Bar*

Perform segue when a cell is selected

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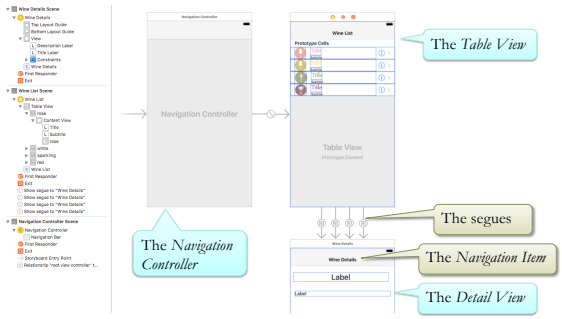
The Segues From Table View to Detail View



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The Detail View Controller

```
class DetailViewController: UIViewController {
    @IBOutlet weak var titleLabel: UILabel!
    @IBOutlet weak var descriptionLabel: UILabel!
    var wine: Wine?

    override func viewWillAppear(_ animated: Bool) {
        if let w = wine {
            titleLabel.text = w.name
            descriptionLabel.text = w.longDescription
        }
    }
    …
}
```


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The Wine List View Controller – Prepare Segue for Selection

```
override func prepare(for segue: UIStoryboardSegue,
                      sender: Any?) {
    if let detailViewController =
           segue.destination as? DetailViewController {
        if let indexPath =
            self.tableView.indexPathForSelectedRow {
            detailViewController.wine =
                wines[indexPath.row]
        }
    }
}
```


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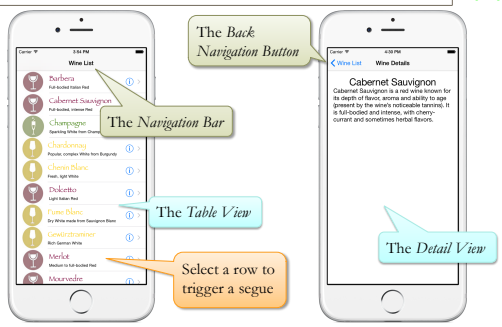
Run …



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Wine List – Navigation + Accessory

- A variation of the last app
- Use the *accessory buttons* of the table cells to trigger segues
- Same set up as the last app, except
  - The segues from the *Wine List* scene to the *Wine Detail* scene
  - The *prepare for segue* method in the *Wine List View Controller*

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Segues to Detail View – Accessory

- Add segues from the *Wine List* scene to the *Wine Detail* scene
  - Ctrl-Drag from each *Prototype Cell* in the *Wine List* scene to the *Wine Detail* scene
  - Choice of *Selection Segue* or *Accessory Action*
  - Choose: *Accessory Action* | *Show*

Perform segue when an accessory button is tapped

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The Wine List View Controller – Prepare Segue for Accessory

```
override func prepare(for segue: UIStoryboardSegue,
                      sender: Any?) {
    if let detailViewController =
           segue.destination as? DetailViewController {
        if let cell = sender as? UITableViewCell {
            if let indexPath =
                self.tableView.indexPath(for: cell) {
                detailViewController.wine =
                    wines[indexPath.row]
            }
        }
    }
}
```

When an accessory button is tapped, the row is not selected. Must use the *sender* to determine which row is tapped.

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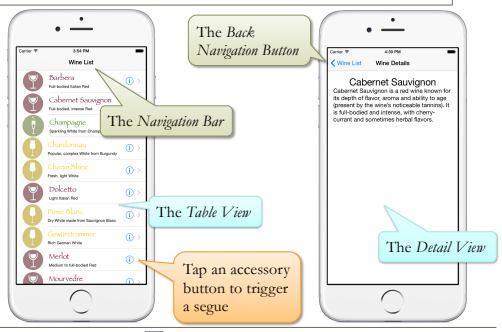
Run …



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Prepare Segue for Accessory – A Pyramid of If's

```
override func prepare(for segue: UIStoryboardSegue,
                      sender: Any?) {
    if let detailViewController =
           segue.destination as? DetailViewController {
        if let cell = sender as? UITableViewCell {
            if let indexPath =
                self.tableView.indexPath(for: cell) {
                detailViewController.wine =
                    wines[indexPath.row]
            }
        }
    }
}
```

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Prepare Segue for Accessory – An Alternative with Guards

```
override func prepare(for segue: UIStoryboardSegue,
                      sender: Any?) {
    guard let detailViewController =
        segue.destination as? DetailViewController
        else { return }
    guard let cell = sender as? UITableViewCell
        else { return }
    guard let indexPath = self.tableView.indexPath(for: cell)
        else { return }
    detailViewController.wine = wines[indexPath.row]
}
```

Guar against the condition being false. The else block must exit the current scope.

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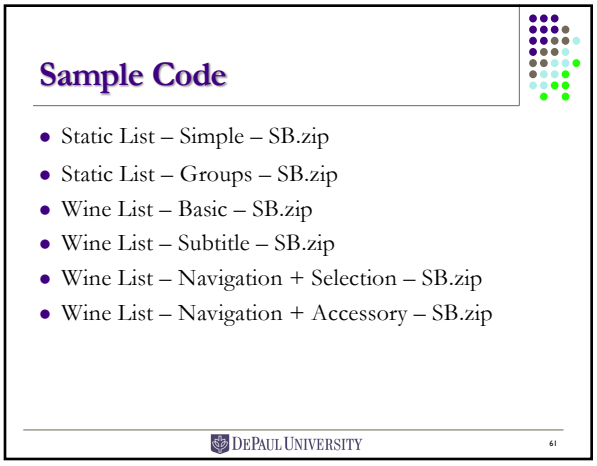
Sample Code
Static List – Simple – SB.zip
Static List – Groups – SB.zip
Wine List – Basic – SB.zip
Wine List – Subtitle – SB.zip
Wine List – Navigation + Selection – SB.zip
Wine List – Navigation + Accessory – SB.zip
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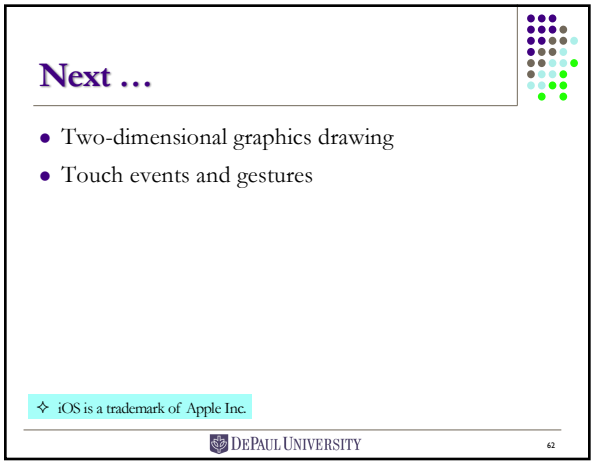
Next …
Two-dimensional graphics drawing
Touch events and gestures
iOS is a trademark of Apple Inc.
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