Argument labels
External names

```
func sayHello(to person: String, and anotherPerson: String) {
  print("Hello \(person) and \(anotherPerson)")
}

sayHello(to: "Luke", and: "Dave")
```

Argument labels
Omitting labels

```
print("Hello, world!")
```

```
func add(_ firstNumber: Int, to secondNumber: Int) -> Int {
    return firstNumber + secondNumber
}

let total = add(14, to: 6)
```

Default parameter values

```
func display(teamName: String, score: Int = 0) {
  print("\(teamName): \(score)")
}

display(teamName: "Wombats", score: 100)
display(teamName: "Wombats")
```

```
Wombats: 100
Wombats: 0
```

Unit 2—Lesson 2
Lab: Functions

There is a short Playground lab (called “Quick functions.playground”) in

Try that.

If you have problems with that, work through chapter 2.2 from the book, and try the function exercises in the Longer Functions playground in your own time.

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Session 5: Prototyping an app interface

- Deciding what goes into the app
- Making the screens for a multi-screen app and joining them
- Trying out the app on potential users
- Taking Apple design considerations and HCI guidelines into account
- *Lab 5: Building an app prototype without code*

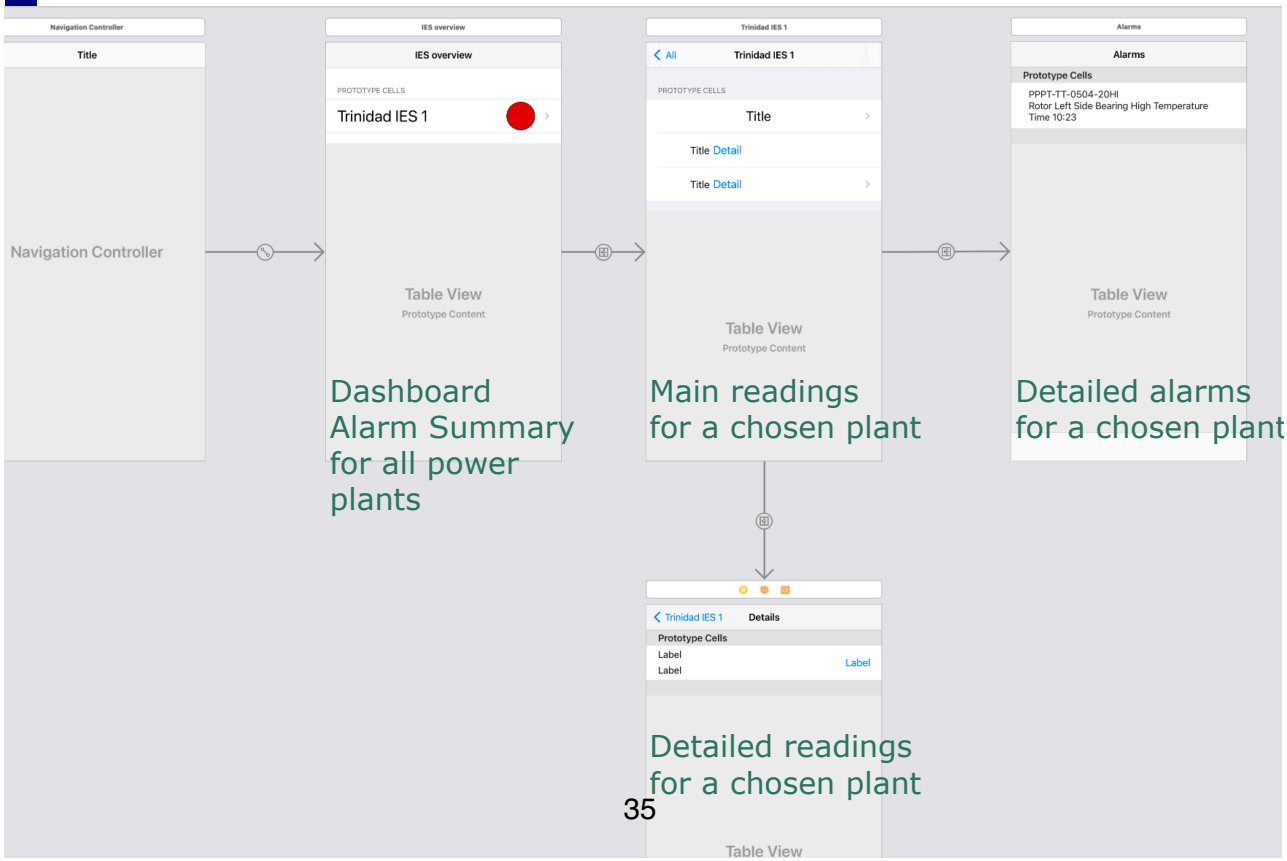
- This material not well covered in Apple coding books

Party Talk

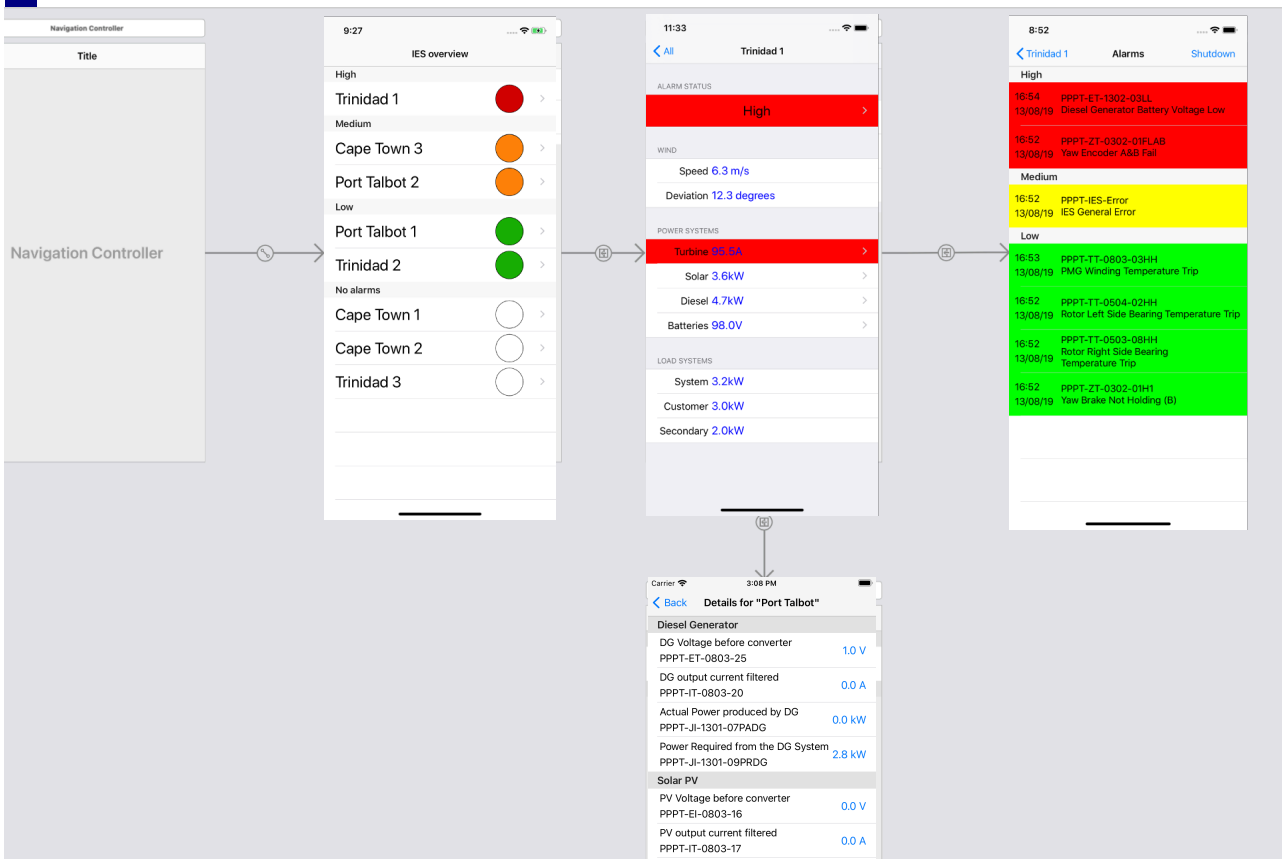
How do we turn an idea into an app

- Prototyping
- Xcode and Interface Builder can do this very efficiently and very effectively
- Build the views and add realistic data
- When we agree on the screens that will make up the app, we have made several steps towards having a real app
- Lets look at the Crossflow example again

4 types of screen in app



4 types of screen in app



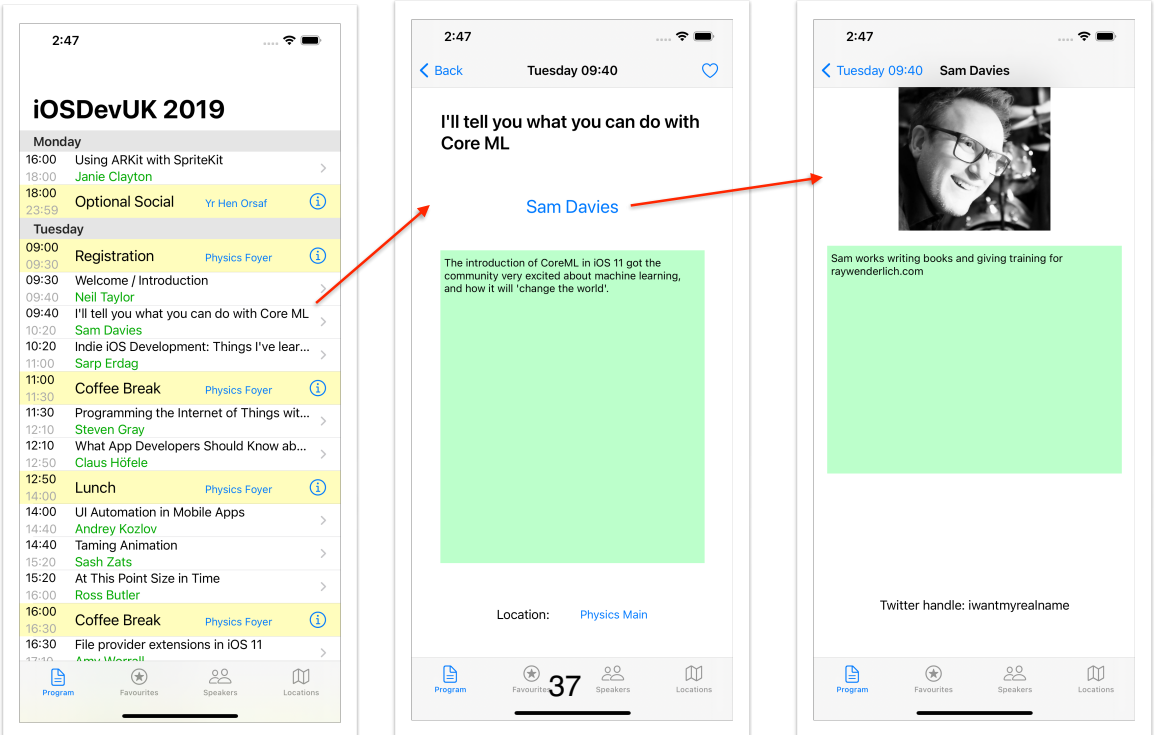
Having done this prototype

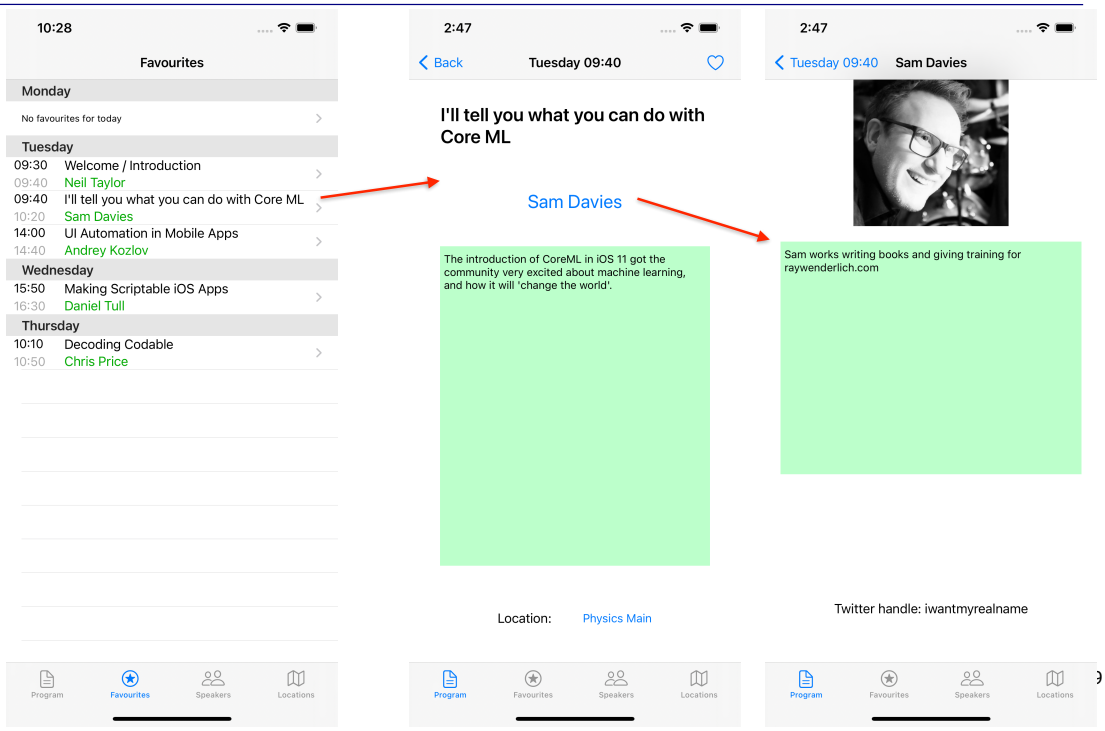
- Users can try out the prototype
- They can interact with the prototype as if it was the real app (but with static data)
- We can assess whether they have all the info they need in specific situations
- We can produce screenshots and use them in a design document
- We can make view controllers to fill out the app with its actual behaviour

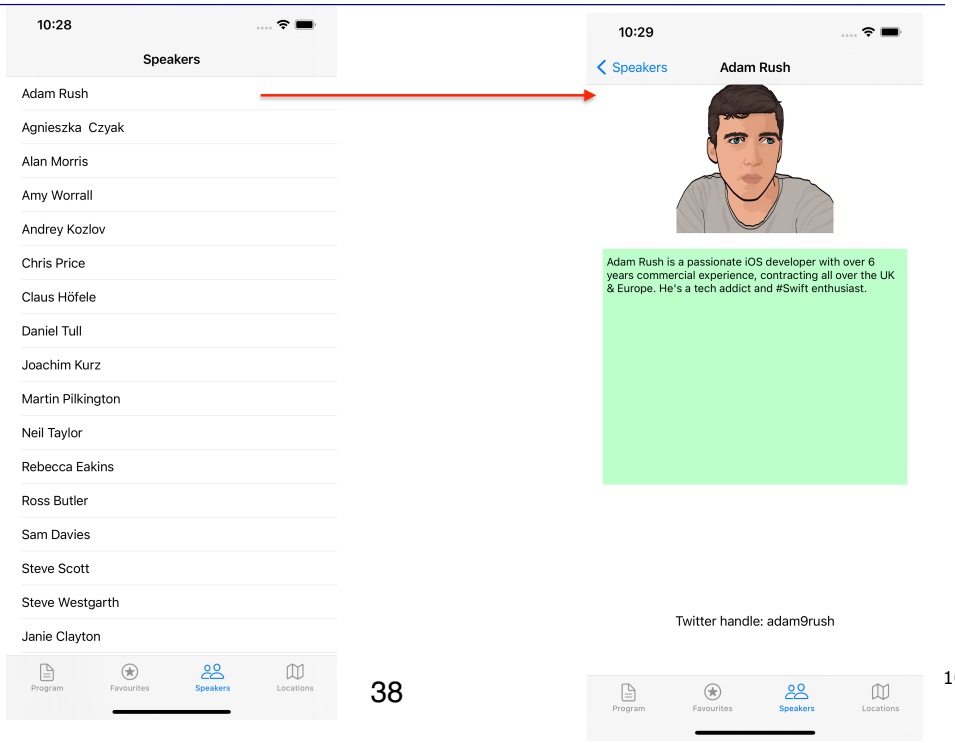
Conference Attendee App
A case study through the course

- I run the UK's largest iOS development conference each year (iosdevuk.com)
- We make an app each year so that the attendees can see:
  - the schedule of the conference
  - the details of talks
  - The details of speakers
  - Where talks, dinners etc are being held
  - And can bookmark what sessions they want to attend

We are ready to make a non-functional prototype

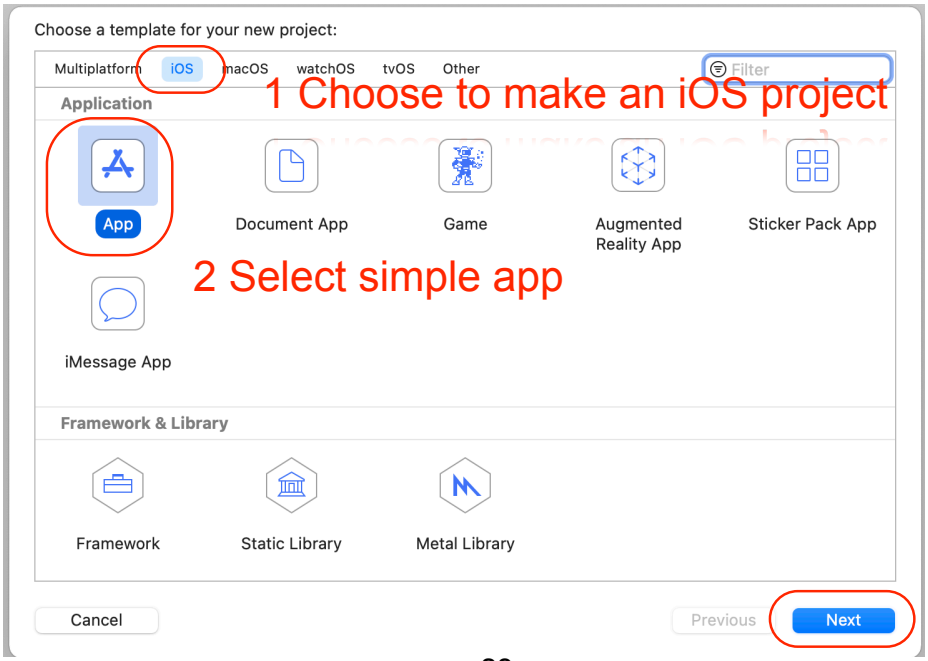



10:28
Favourites
Monday
No favourites for today
Tuesday
09:30 Welcome / Introduction
09:40 Neil Taylor
09:40 I'll tell you what you can do with Core ML
10:20 Sam Davies
14:00 UI Automation in Mobile Apps
14:40 Andrey Kozlov
Wednesday
15:50 Making Scriptable iOS Apps
16:30 Daniel Tull
Thursday
10:10 Decoding Codable
10:50 Chris Price
Program
Favourites
Speakers
Locations
2:47
Back
Tuesday 09:40
I'll tell you what you can do with Core ML
Sam Davies
The introduction of CoreML in iOS 11 got the community very excited about machine learning, and how it will 'change the world'.
Location:
Physics Main
2:47
Tuesday 09:40
Sam Davies
Sam works writing books and giving training for raywenderlich.com
Twitter handle: iwantmyrealname


10:28
Speakers
Adam Rush
Agnieszka Czyak
Alan Morris
Amy Worrall
Andrey Kozlov
Chris Price
Claus Höfele
Daniel Tull
Joachim Kurz
Martin Pilkington
Neil Taylor
Rebecca Eakins
Ross Butler
Sam Davies
Steve Scott
Steve Westgarth
Janie Clayton
Program
Favourites
Speakers
Locations
10:29
Speakers
Adam Rush
Adam Rush is a passionate iOS developer with over 6 years commercial experience, contracting all over the UK & Europe. He's a tech addict and #Swift enthusiast.
Twitter handle: adam9rush

Making prototype app - Step 1

- In Xcode, choose File/New/Project
- Following screen will show:



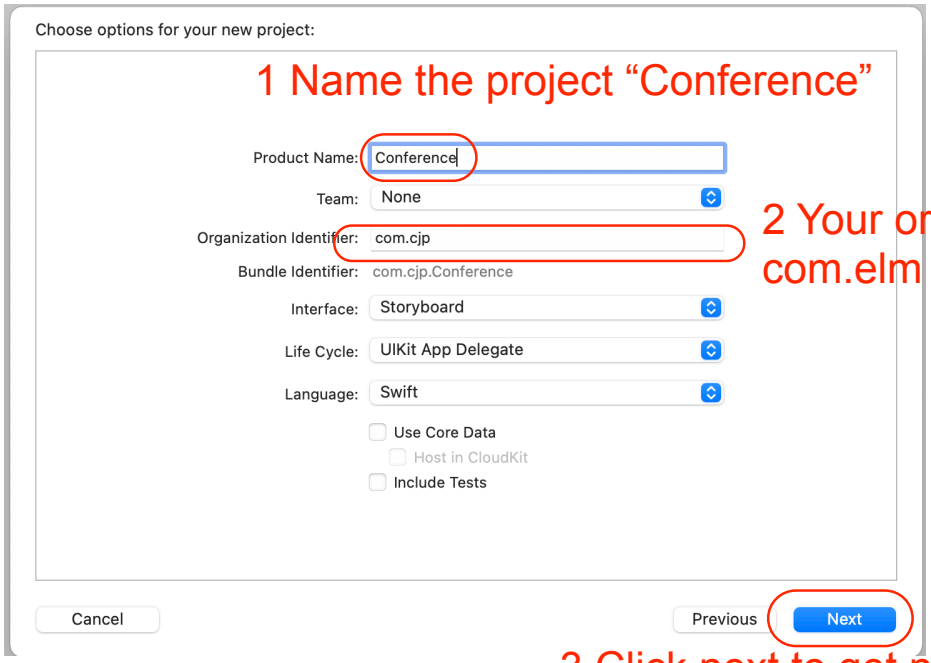
1 Choose to make an iOS project

2 Select simple app

3 Click next to get next slide

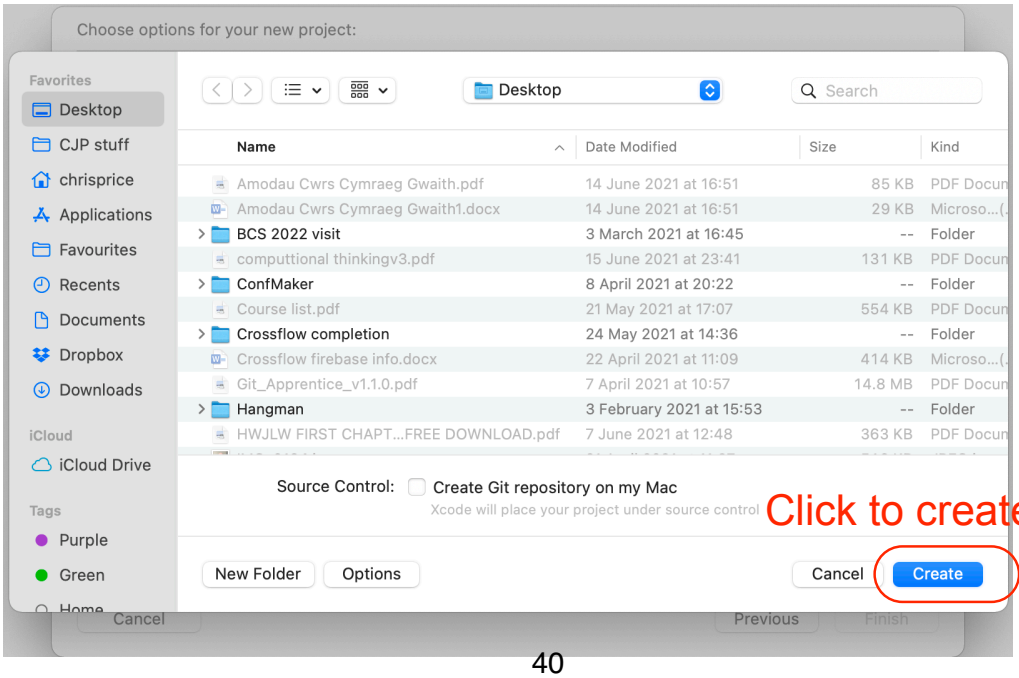
Step 2

- On this screen we fill in project details
- You need to check all details are right



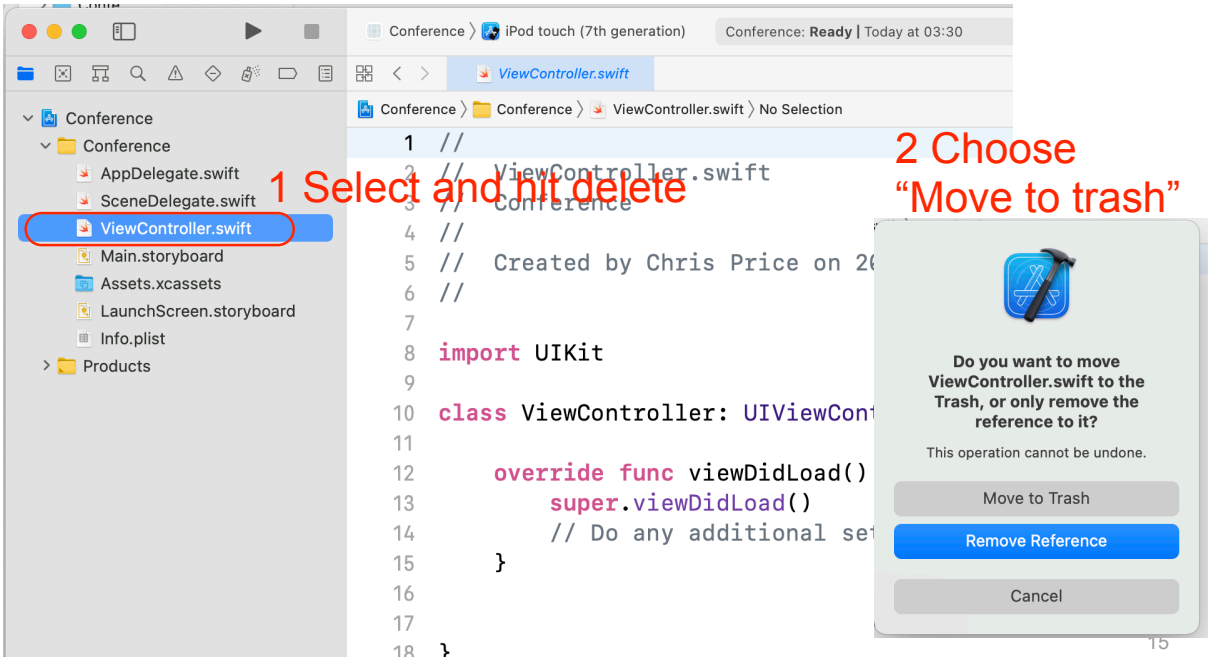
Step 3

- Final setup screen - we decide where we want to save the project, and whether we are using Git



Step 4

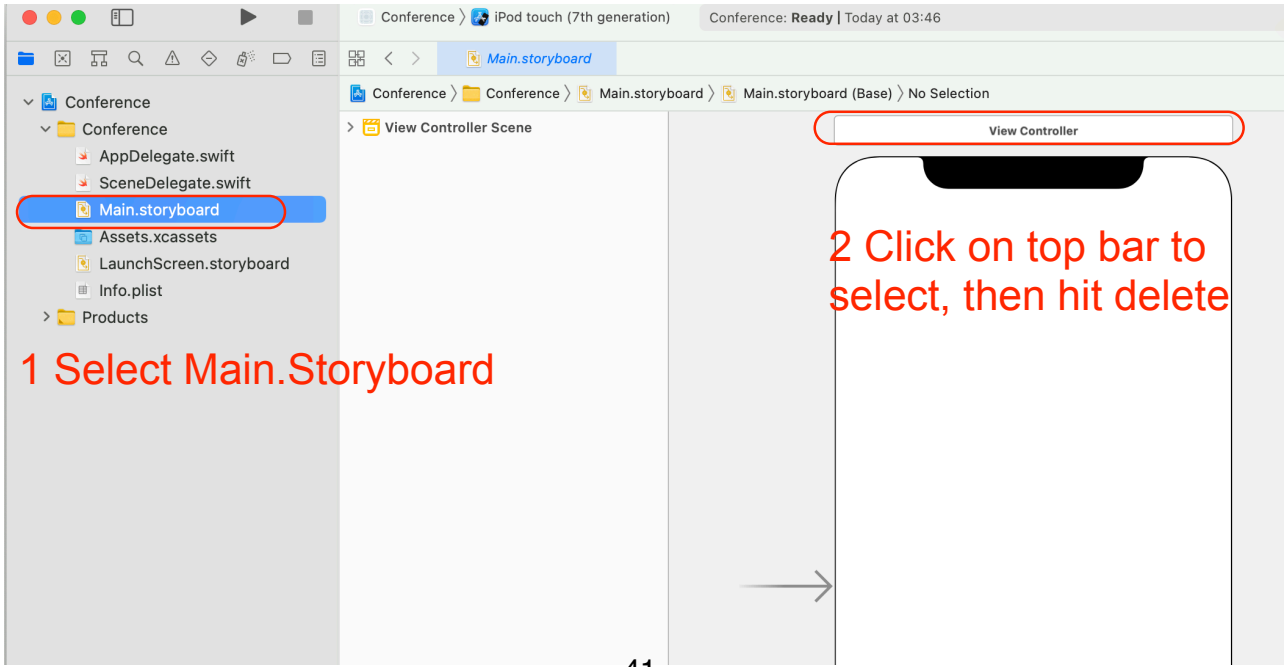
Delete ViewController.swift as we won't be using it.
•Select the file and hit delete it - choose “Move to Trash” at the prompt



15

Step 5

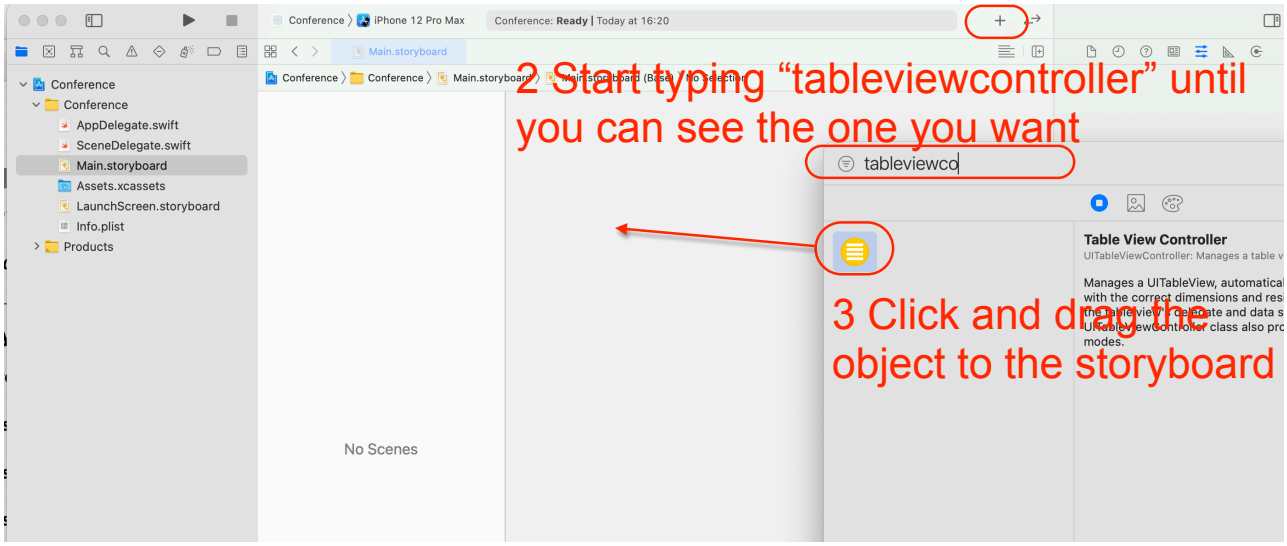
- Select Main.storyboard, then select the view controller shown in the storyboard, and hit delete



16

Step 6

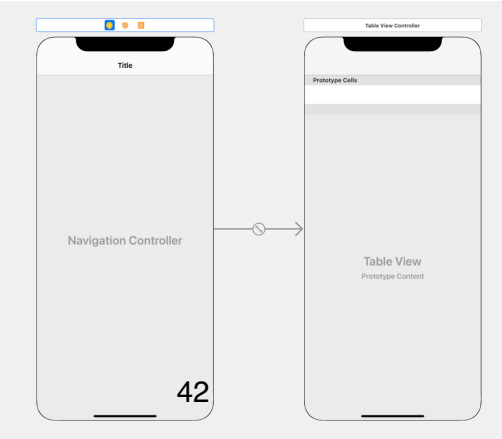
- Add a table view controller to the storyboard



Step 7

Embed the table view controller in a navigation controller

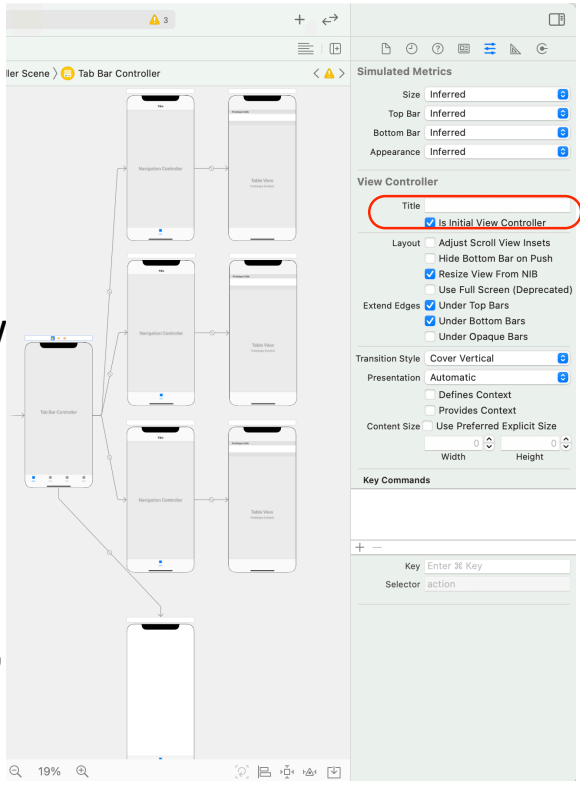
- Select the table view controller (by clicking the bar at the top in the storyboard)
- Choose menu Editor/Embed in/NavigationController
- It will then look like the screen below
- Make another two table controllers and embed each of them in a navigation controller



Step 8

Add another view controller, and make them tabs

- Add another view controller from the “+” object library
- Select all three navigation controllers and the simple view controller (click on storyboard and drag over them)
- Choose menu Editor/Embed in/TabController
- Select the tab controller and in the attribute editor on the right, select *Is InitialViewcontroller*
- This will make the tab appear when the app starts up

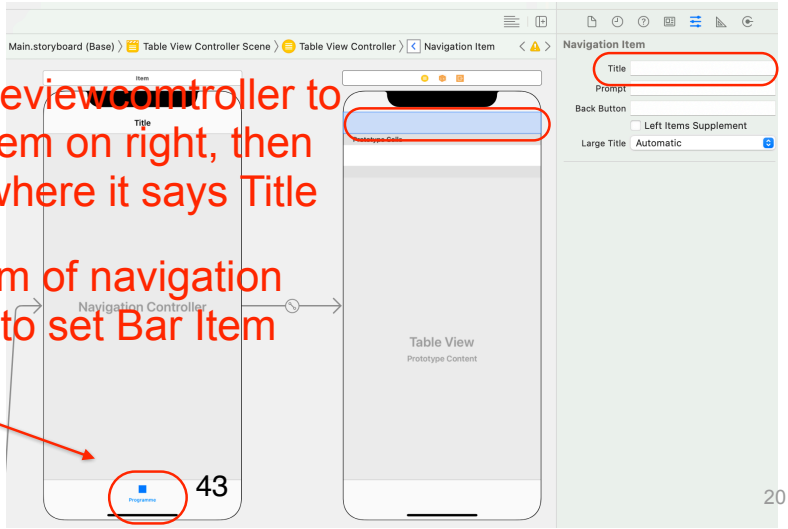


Step 9

- Click at the top of the first table view controller
- Insert the title “Programme”
- Click at the bottom of the associated navigation bar
- Type “Programme” there for the bar item. It has an associated image - select “doc.text”

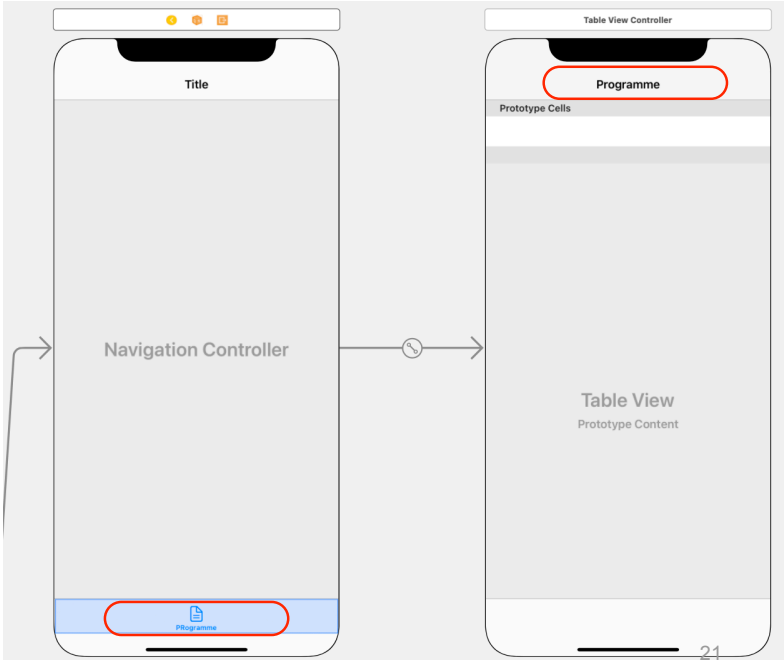
1 Click at top of tableviewcontroller to get the navigation item on right, then type “Programme” where it says Title

2 Then click at bottom of navigation controller to be able to set Bar Item values



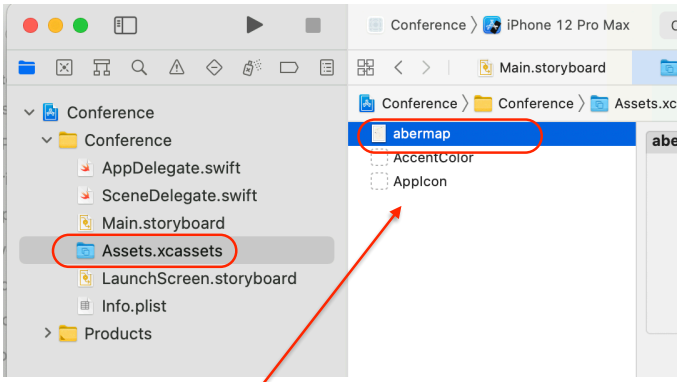
Step 10

- After step 9, the first navigation pair looks as shown
- Repeat for 2nd pair with Favourites and image star.circle
- Same for 3rd Table view controller with Speakers and image person.2

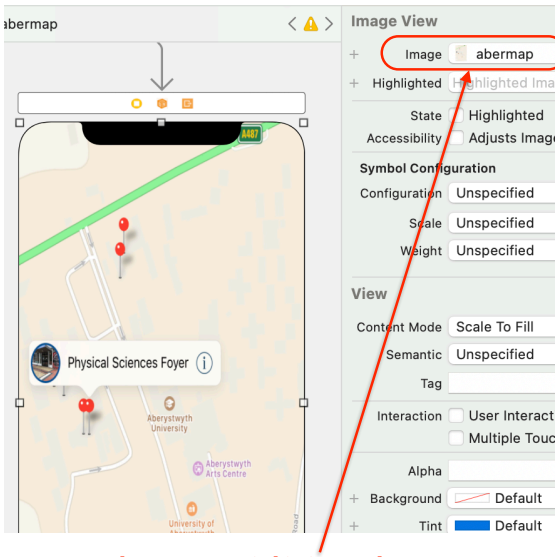


Step 11

- For the simple view controller, add the abermap.jpg provided in Session 5 to Assets, then add a image view from the object library to the view controller, and initialise it with the jpg



1 Drag abermap.jpg here



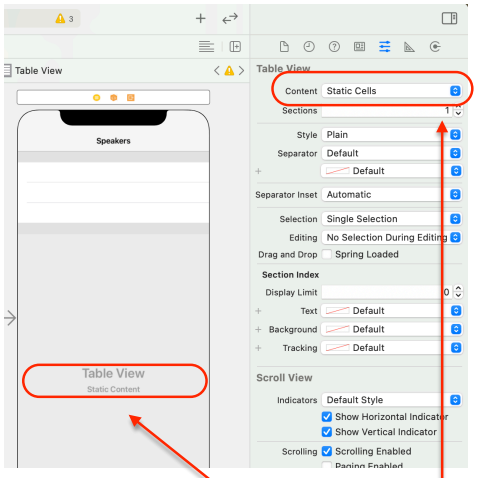
2 Having added image view, set it to abermap

Where are we?

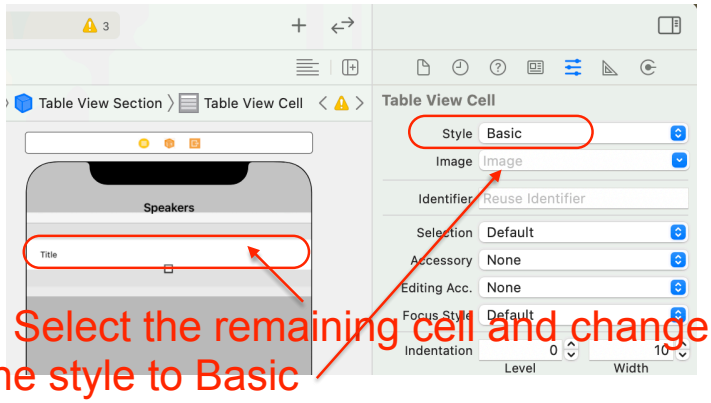
- If you run your app, it has four tabs - when you select each of the first three, you get an empty screen except for the header, and the fourth shows a map
- Next we will populate the Speaker tab with a list of Speakers, and link it to the details of a single speaker

Step 12

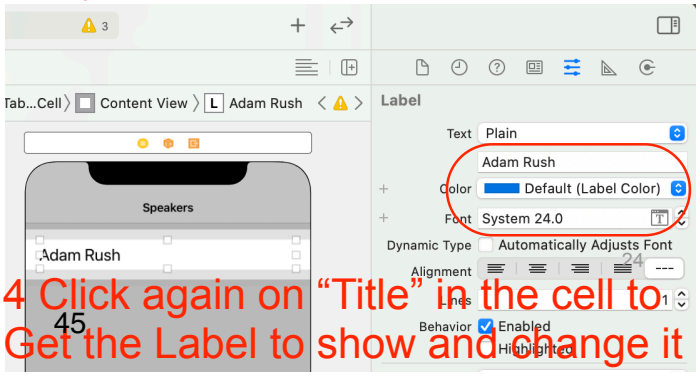
- We are going to add some static cells to the Speaker tableview controller



1 Select the Table View and set the Content to static cells
2 Click on two of the three cells created and hit delete



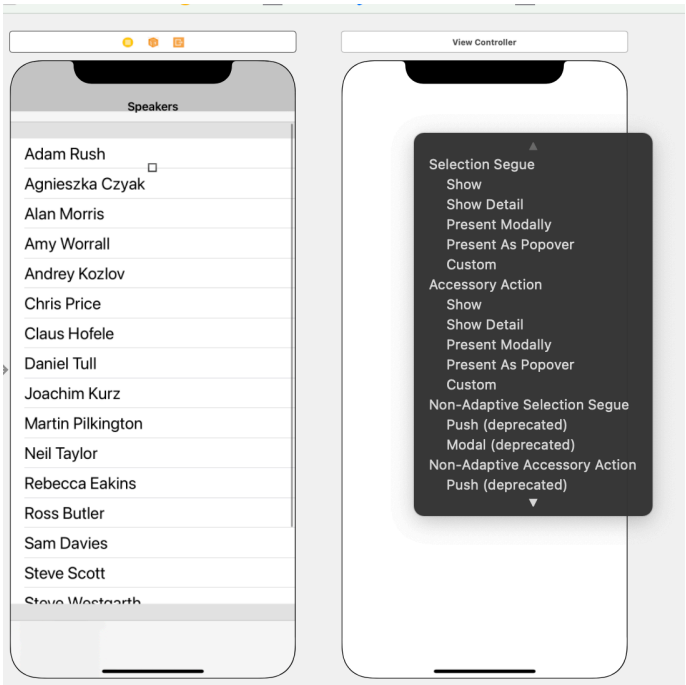
3 Select the remaining cell and change the style to Basic



4 Click again on "Title" in the cell to Get the Label to show and change it

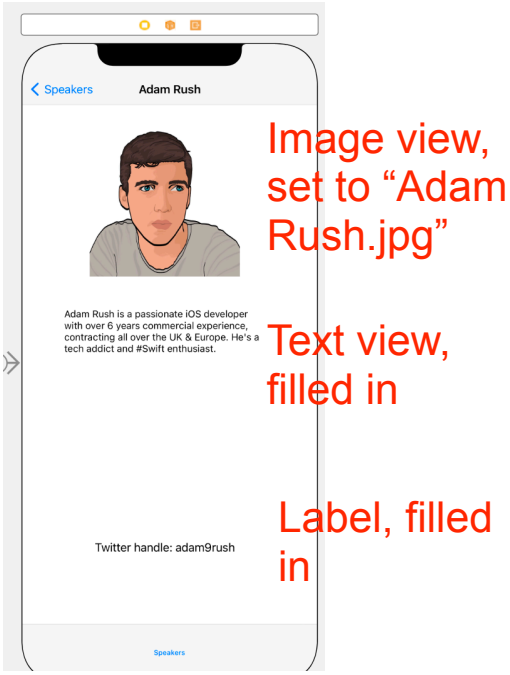
Step 13

- Click off the table cell, then you can select it again
- You can then type command-d to duplicate the cell into a whole screen of cells, and put different names in
- Add another view controller to the right of the Speakers screen
- Click and drag from the Adam Rush cell to the new screen and choose Show on the pop up menu
- Click on the title space at the top of the new screen and add Adam Rush as a title



Step 14

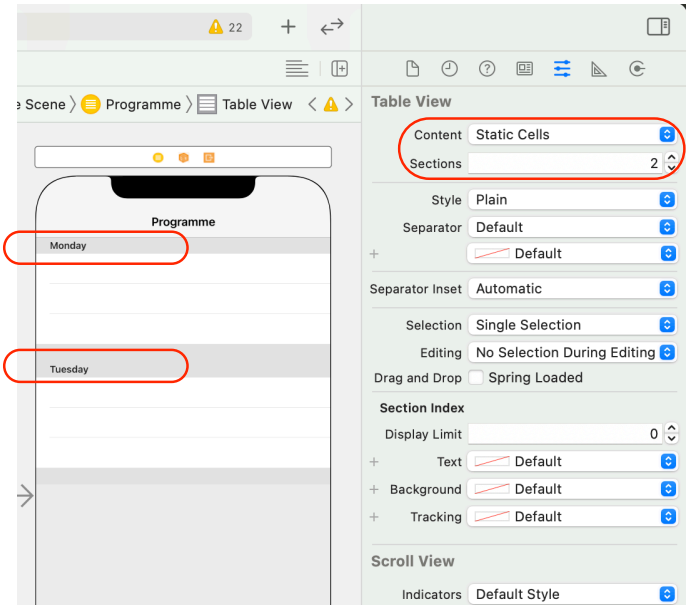
- Add an image view, a text view and a label to the new screen
- Add the Adam Rush jpg to Assets, then select it to be shown on the image view
- Put some text about him in the text view
- Put his twitter handle in the label



- We now have the third and fourth tab choices looking good - next we will fill in the Programme

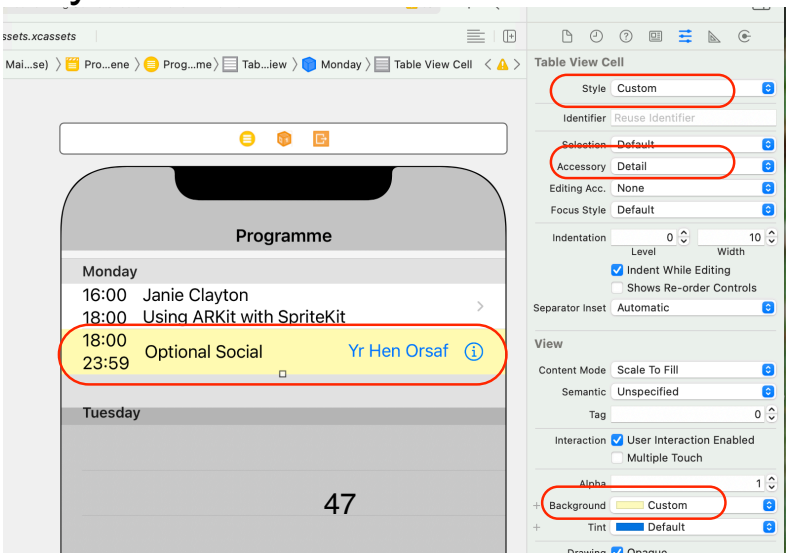
Step 15

- Make the Programme table view into static cells (as we did for Speakers in step 12)
- Change number of sections to 2
- Make section headers say “Monday” and “Tuesday”



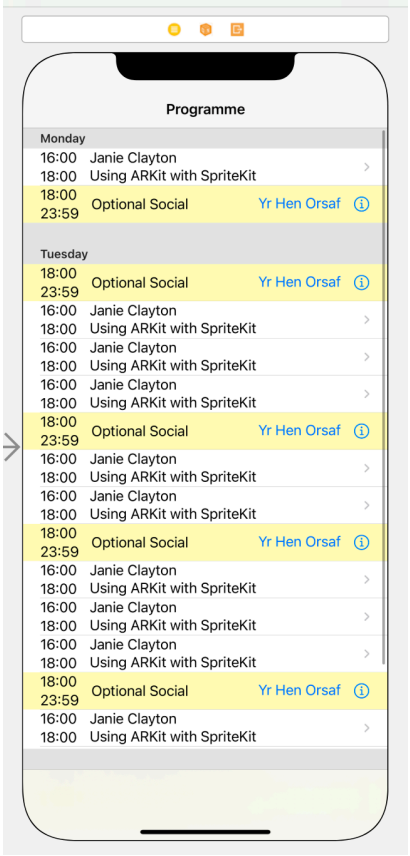
Step 16

- Add 4 labels to two types of custom table cell as shown (one cell for a talk slot, one for a break)
- Set background of break cell coloured yellow
- Add Accessory disclosure indicator to talk cell
- Add Accessory Detail to break cell



Step 17

- Having made the two types of cell, we can copy them, and paste many of them to make the correct structure for the Programme page
- We then need to change the data in the cells into representative data for our app



Finishing the app

- From here, there is nothing new to complete the prototype
- We add a talk screen with two labels, a textview and a button and we link the talk screen button to the speaker screen (or a copy of it with the correct data)
- We make the Favourites screen like the Programme screen but with less cells showing, and link it to the talk screen

We now have a complete set of app screens that we can try out on our users

We can gradually replace these fixed screens with real screens as we implement the app

30

Apple Human Interface guidelines

- Many of choices we have made might have been different on Android
- e.g. use of tabs and back buttons
- Apple have guidance for how to build apps on different platforms:
  - https://developer.apple.com/design/human-interface-guidelines/
- Worth reading to give apps native feel e.g. see navigation section for iOS

31

Session 6: Structures

- Creating structs and initialising them
- Properties and access
- Methods and using them
- Lab 6: Creating and using Structs

- This covers lesson 2.3 of Development in Swift Fundamentals

Unit 2—Lesson 3: Structures

Structures

```
struct Person {
  var name: String
}
```

Capitalize type names

Use lowercase for property names

Structures
Accessing property values

```
struct Person {
  var name: String
}

let person = Person(name: "Jasmine")
print(person.name)
```

```
Jasmine
```

Structures
Adding functionality

```
struct Person {
  var name: String

 func sayHello() {
    print("Hello there! My name is \(name)!")
  }

}

let person = Person(name: "Jasmine")
person.sayHello()
```

```
Hello there! My name is Jasmine!
```

Instances

```
struct Shirt {
  var size: String
  var color: String
}

let myShirt = Shirt(size: "XL", color: "blue")

let yourShirt = Shirt(size: "M", color: "red")
```

```
struct Car {
  var make: String
  var year: Int
  var color: String

  func startEngine() {...}

  func drive() {...}

  func park() {...}

  func steer(direction: Direction) {...}
}

let firstCar = Car(make: "Honda", year: 2010, color: "blue")
let secondCar = Car(make: "Ford", year: 2013, color: "black")

firstCar.startEngine()
firstCar.drive()
```

Initializers

```
let string = String.init() // ""
let integer = Int.init() // 0
let bool = Bool.init() // false
```

Initializers

```
var string = String() // ""
var integer = Int() // 0
var bool = Bool() // false
```

Initializers
Default values

```
struct Odometer {
  var count: Int = 0
}

let odometer = Odometer()
print(odometer.count)
```

```
0
```

Initializers
Memberwise initializers

```
let odometer = Odometer(count: 27000)
print(odometer.count)
```

```
27000
```

Initializers
Memberwise initializers

```
struct Person {
  var name: String
}
```

Initializers
Memberwise initializers

```
struct Person {
  var name: String

  func sayHello() {
    print("Hello there!")
  }
}

let person = Person(name: "Jasmine") // Memberwise initializer
```

```
struct Shirt {
  let size: String
  let color: String
}

let myShirt = Shirt(size: "XL", color: "blue") // Memberwise initializer


struct Car {
  let make: String
  let year: Int
  let color: String
}

let firstCar = Car(make: "Honda", year: 2010, color: "blue") // Memberwise initializer
```

Initializers
Custom initializers

```
struct Temperature {
  var celsius: Double
}

let temperature = Temperature(celsius: 30.0)
```

```
let fahrenheitValue = 98.6
let celsiusValue = (fahrenheitValue - 32) / 1.8

let newTemperature = Temperature(celsius: celsiusValue)
```

```
struct Temperature {
  var celsius: Double

  init(celsius: Double) {
    self.celsius = celsius
  }

  init(fahrenheit: Double) {
    celsius = (fahrenheit - 32) / 1.8
  }
}

let currentTemperature = Temperature(celsius: 18.5)
let boiling = Temperature(fahrenheit: 212.0)

print(currentTemperature.celsius)
print(boiling.celsius)

18.5
100.0
```

Unit 2—Lesson 3
Lab: Structures

Open and complete the exercises on page 1 of `Lab – Structures.playground`:

- Exercise - Structs, Instances, and Default Values

Instance methods

```
struct Size {
  var width: Double
  var height: Double

  func area() -> Double {
    return width * height
  }
}

var someSize = Size(width: 10.0, height: 5.5)

let area = someSize.area() // Area is assigned a value of 55.0
```

Mutating methods

```
struct Odometer {
  var count: Int = 0 // Assigns a default value to the 'count' property.
}
```

Need to

- Increment the mileage
- Reset the mileage

```
struct Odometer {
  var count: Int = 0 // Assigns a default value to the 'count' property.

  mutating func increment() {
    count += 1
  }

  mutating func increment(by amount: Int) {
    count += amount
  }

  mutating func reset() {
    count = 0
  }
}

var odometer = Odometer() // odometer.count defaults to 0
odometer.increment() // odometer.count is incremented to 1
odometer.increment(by: 15) // odometer.count is incremented to 16
odometer.reset() // odometer.count is reset to 0
```

Computed properties

```
struct Temperature {
  let celsius: Double
  let fahrenheit: Double
  let kelvin: Double
}

let temperature = Temperature(celsius: 0, fahrenheit: 32, kelvin: 273.15)
```

```
struct Temperature {
  var celsius: Double
  var fahrenheit: Double
  var kelvin: Double

  init(celsius: Double) {
    self.celsius = celsius
    fahrenheit = celsius * 1.8 + 32
    kelvin = celsius + 273.15
  }

  init(fahrenheit: Double) {
    self.fahrenheit = fahrenheit
    celsius = (fahrenheit - 32) / 1.8
    kelvin = celsius + 273.15
  }

  init(kelvin: Double) {
    self.kelvin = kelvin
    celsius = kelvin - 273.15
    fahrenheit = celsius * 1.8 + 32
  }
}

let currentTemperature = Temperature(celsius: 18.5)
let boiling = Temperature(fahrenheit: 212.0)
let freezing = Temperature(kelvin: 273.15)
```

```
struct Temperature {
  var celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }
}

let currentTemperature = Temperature(celsius: 0.0)
print(currentTemperature.fahrenheit)

32.0
```

Challenge

Add support for Kelvin

Modify the following to allow the temperature to be read as Kelvin

```
struct Temperature {
  let celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }

}
```

Hint: Temperature in Kelvin is Celsius + 273.15

```
struct Temperature {
  let celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }

  var kelvin: Double {
    return celsius + 273.15
  }

}

let currentTemperature = Temperature(celsius: 0.0)
print(currentTemperature.kelvin)

273.15
```

Property observers

```
struct StepCounter {
    var totalSteps: Int = 0 {
        willSet {
            print("About to set totalSteps to \(newValue)")
        }
        didSet {
            if totalSteps > oldValue  {
                print("Added \(totalSteps - oldValue) steps")
            }
        }
    }
}
```

Property observers

```
var stepCounter = StepCounter()
stepCounter.totalSteps = 40
stepCounter.totalSteps = 100
```

```
About to set totalSteps to 40
Added 40 steps
About to set totalSteps to 100
Added 60 steps
```

Type properties and methods

```
struct Temperature {
  static var boilingPoint = 100.0

  static func convertedFromFahrenheit(_ temperatureInFahrenheit: Double) -> Double {
    return(((temperatureInFahrenheit - 32) * 5) / 9)
  }

}

let boilingPoint = Temperature.boilingPoint

let currentTemperature = Temperature.convertedFromFahrenheit(99)

let biggestInt = Int.max
```

Copying

```
var someSize = Size(width: 250, height: 1000)
var anotherSize = someSize

someSize.width = 500

print(someSize.width)
print(anotherSize.width)
```

```
500
250
```

self

```
struct Car {
  var color: Color

  var description: String {
    return "This is a \(self.color) car."
  }
}
```

self
When not required

Not required when property or method names exist on the current object

```
struct Car {
  var color: Color

  var description: String {
    return "This is a \(color) car."
  }
}
```

self
When required

```
struct Temperature {
  var celsius: Double

  init(celsius: Double) {
    self.celsius = celsius
  }
}
```

Unit 2—Lesson 3
Lab: Structures

Open again and complete exercises on pages 3 and 5 of
`Lab - Structures.playground`

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Session 7: Classes

- Inheritance in Swift
- Initializers
- Methods and properties
- Overriding methods and properties
- Difference between classes and structs
- When to use classes and structs
- Lab 7: Writing classes

- This covers lesson 2.4 of Development in Swift Fundamentals

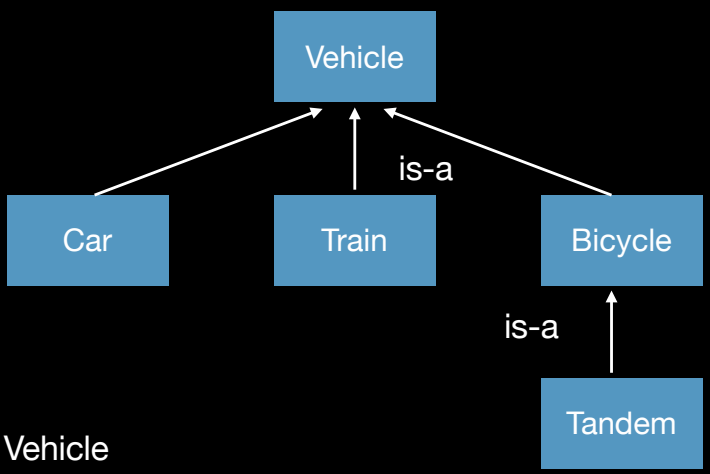
1

Unit 2—Lesson 4: Classes, Inheritance

```swift
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }

  func sayHello() {
    print("Hello there!")
  }
}

let person = Person(name: "Jasmine")
print(person.name)
person.sayHello()

Jasmine
Hello there!
```

Inheritance

Base class



Car is Subclass of Vehicle

Vehicle is Superclass of Car

Inheritance
Defining a base class

```
class Vehicle {
   var currentSpeed = 0.0

   var description: String {
      return "traveling at \(currentSpeed) miles per hour"
   }

   func makeNoise() {
      // do nothing - an arbitrary vehicle doesn't necessarily make a noise
   }
}

let someVehicle = Vehicle()
print("Vehicle: \(someVehicle.description)")
```

```
Vehicle: traveling at 0.0 miles per hour
```

Inheritance
Create a subclass

```
class SomeSubclass: SomeSuperclass {
    // subclass definition goes here
}
```

```
class Bicycle: Vehicle {
    var hasBasket = false
}
```

Inheritance
Create a subclass

```
class Bicycle: Vehicle {
    var hasBasket = false
}

let bicycle = Bicycle()
bicycle.hasBasket = true

bicycle.currentSpeed = 15.0
print("Bicycle: \(bicycle.description)")
```

```
Bicycle: traveling at 15.0 miles per hour
```

Inheritance
Create a subclass

```
class Tandem: Bicycle {
    var currentNumberOfPassengers = 0
}
```

Inheritance
Create a subclass

```
class Tandem: Bicycle {
    var currentNumberOfPassengers = 0
}

let tandem = Tandem()
tandem.hasBasket = true
tandem.currentNumberOfPassengers = 2
tandem.currentSpeed = 22.0
print("Tandem: \(tandem.description)")
```

```
Tandem: traveling at 22.0 miles per hour
```

Inheritance
Override methods and properties

```
class Train: Vehicle {
    override func makeNoise() {
        print("Choo Choo!")
    }
}

let train = Train()
train.makeNoise()
```

```
Choo Choo!
```

Inheritance
Override methods and properties

```
class Car: Vehicle {
    var gear = 1
    override var description: String {
        return super.description + " in gear \(gear)"
    }
}
```

Inheritance
Override methods and properties

```
class Car: Vehicle {
    var gear = 1
    override var description: String {
        return super.description + " in gear \(gear)"
    }
}

let car = Car()
car.currentSpeed = 25.0
car.gear = 3
print("Car: \(car.description)")
```

```
Car: traveling at 25.0 miles per hour in gear 3
```

Inheritance
Override initializer

```
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }
}

class Student: Person {
  var favoriteSubject: String
}
```

Class ‘Student’ has no initializers

Inheritance
Override initializer

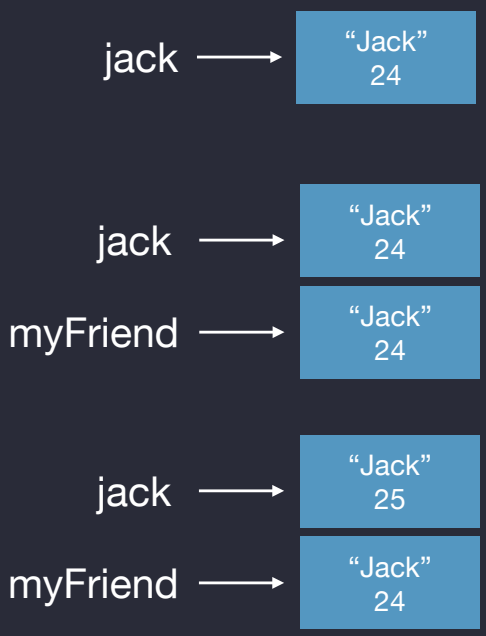
```
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }
}

class Student: Person {
  var favoriteSubject: String
  init(name: String, favoriteSubject: String) {
    self.favoriteSubject = favoriteSubject
    super.init(name: name)
  }
}
```

References

- When you create an instance of a class:
  - Swift returns the address of that instance
  - The returned address is assigned to the variable
- When you assign the address of an instance to multiple variables:
  - Each variable contains the same address
  - Update one instance, and all variables refer to the updated instance

```
class Person {
  let name: String
  var age: Int

  init(name: String, age: Int) {
    self.name = name
    self.age = age
  }
}

var jack = Person(name: "Jack", age: 24)
var myFriend = jack

jack.age += 1

print(jack.age)
print(myFriend.age)

25
25
```

```swift
struct Person {
  let name: String
  var age: Int
}

var jack = Person(name: "Jack", age: 24)
var myFriend = jack

jack.age += 1

print(jack.age)
print(myFriend.age)


25
24
```



Memberwise initializers

- Swift does not create memberwise initializers for classes
- Common practice is for developers to create their own for their defined classes

Class or structure?

- Start new types as structures
- Use a class:
  - When you're working with a framework that uses classes
  - When you want to refer to the same instance of a type in multiple places
  - When you want to model inheritance

Unit 2, Lesson 4

Lab: Classes.playground

Open and complete the exercises on pages 1 and 2 in `Lab – Classes.playground`

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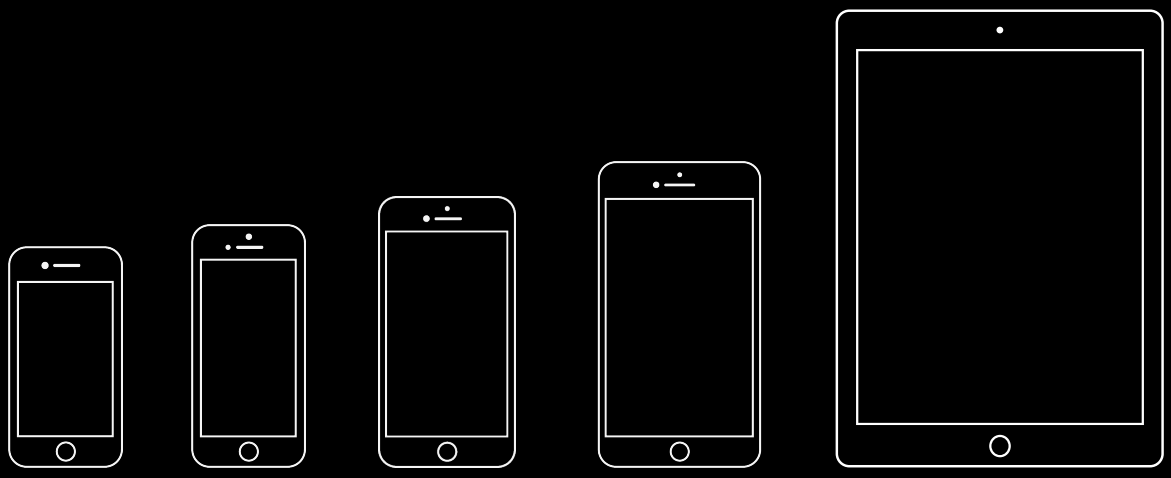
Session 8: Working with different screen sizes

- Autolayout
- Stack layout
- Lab 8: Fitting many items on different size screens
- Further exercises on Autolayout
- This covers lesson 2.10 of Development in Swift Fundamentals

1

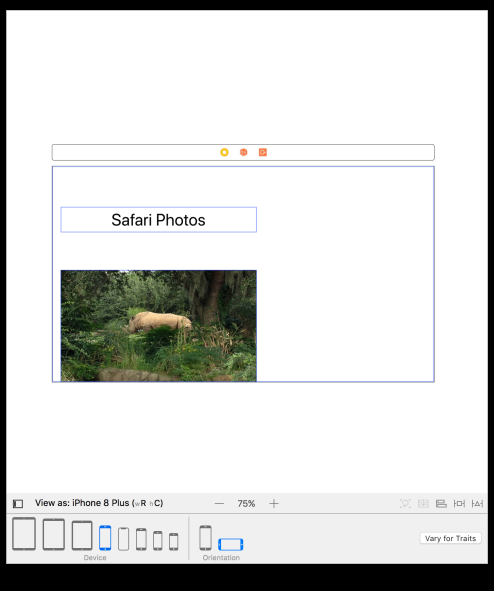
Lesson 2—10:
Auto Layout and Stack Views

Layout for multiple sizes

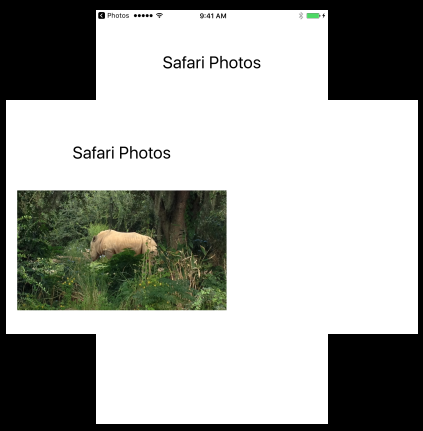


Interface Builder

View as:

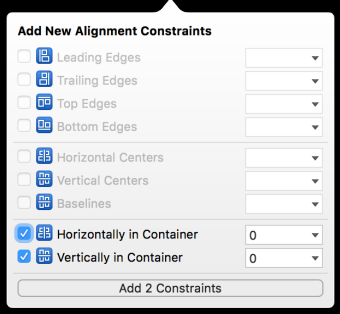


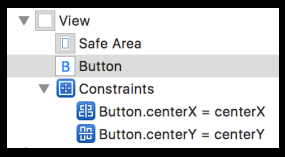
Why Auto Layout?

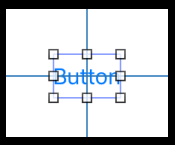


Create alignment constraints

Text

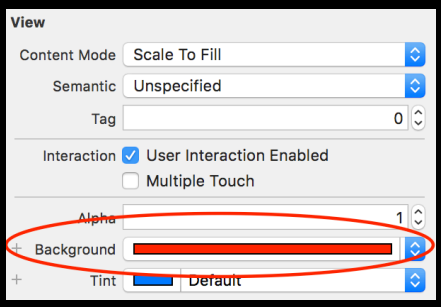


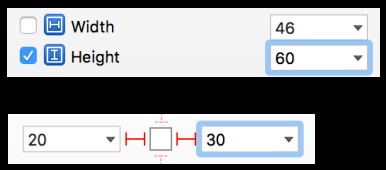




Create size constraints

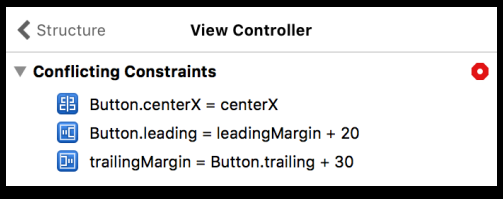
Text

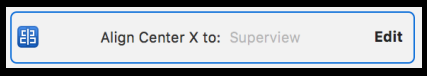




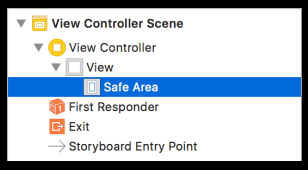
Resolve constraint issues

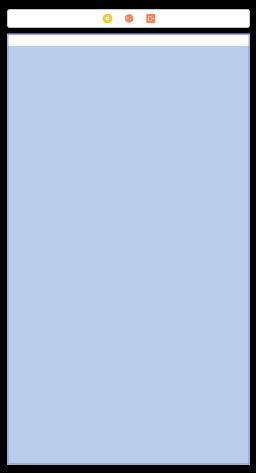
Text





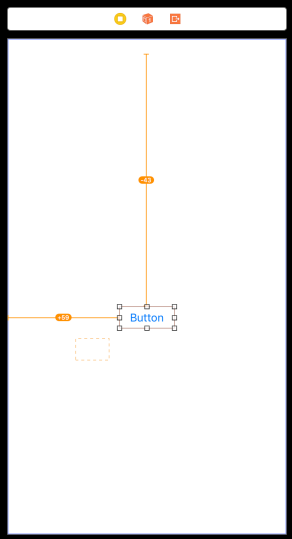
Safe area layout guide

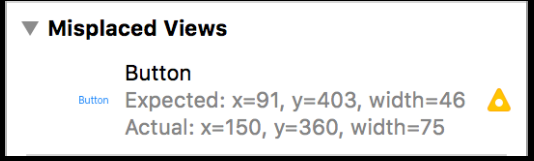




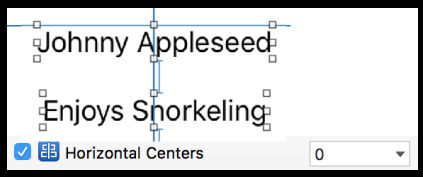
Resolve constraint warnings

Text





Constraints between siblings

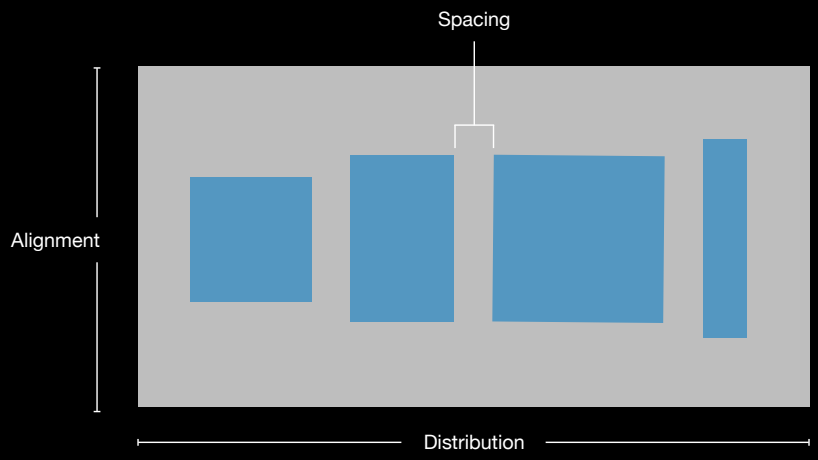


Stack views

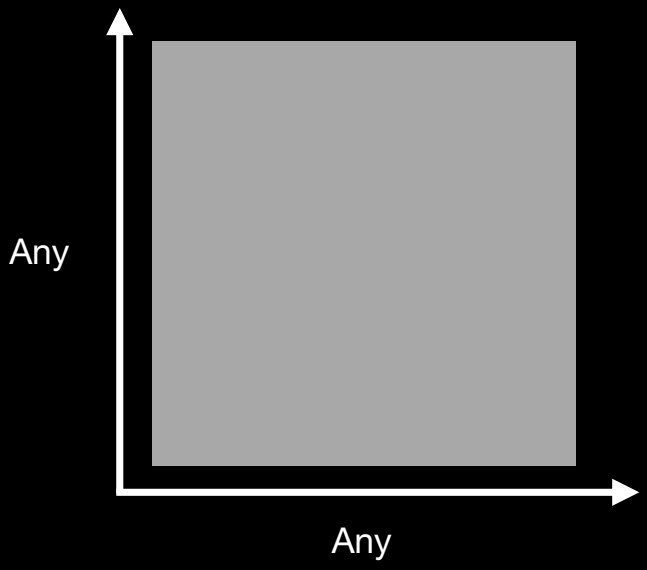
Text

Stack views

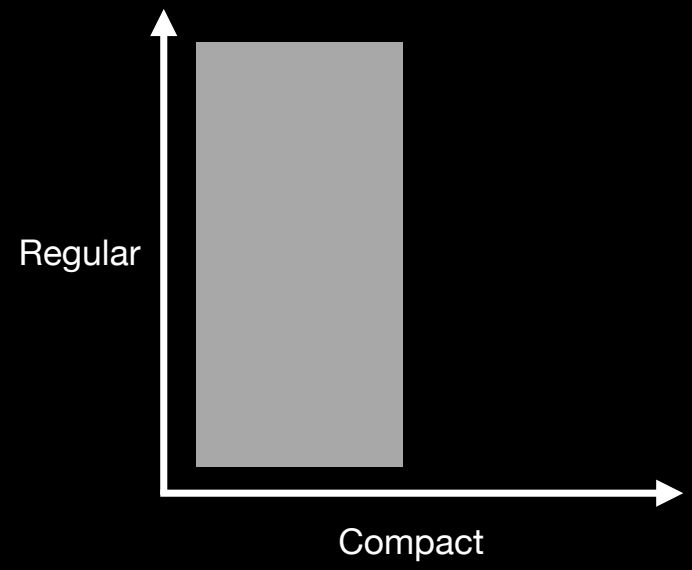
Stack view attributes



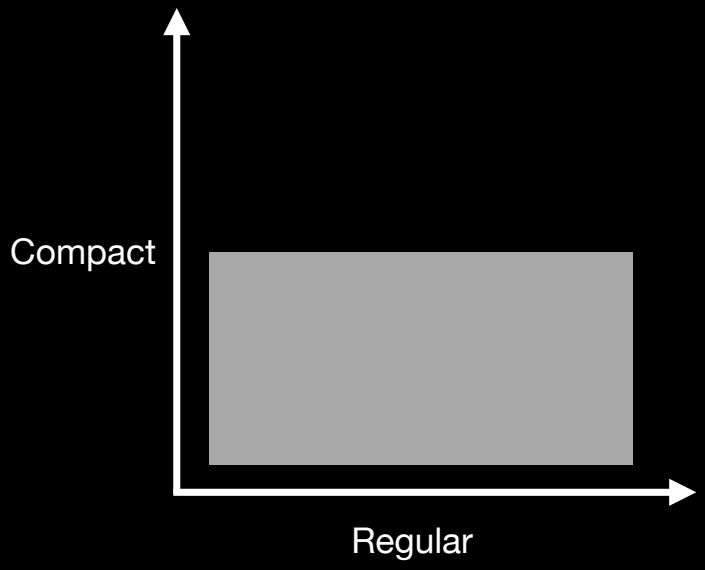
Size classes



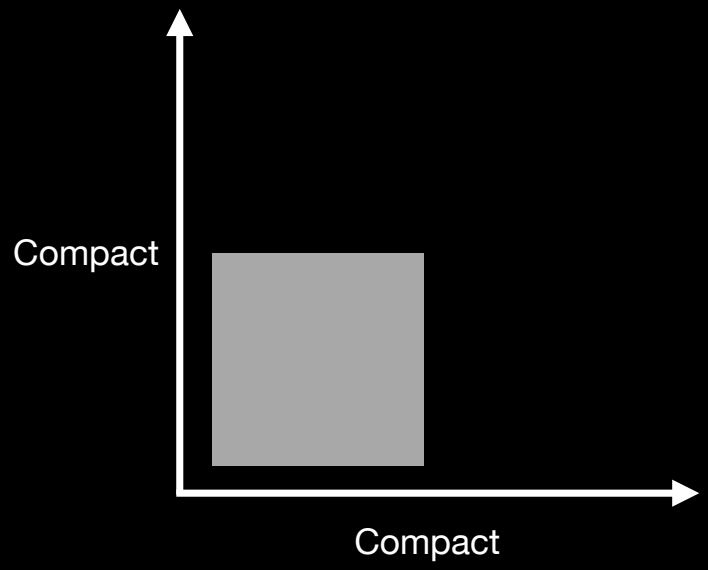
Size classes



Size classes

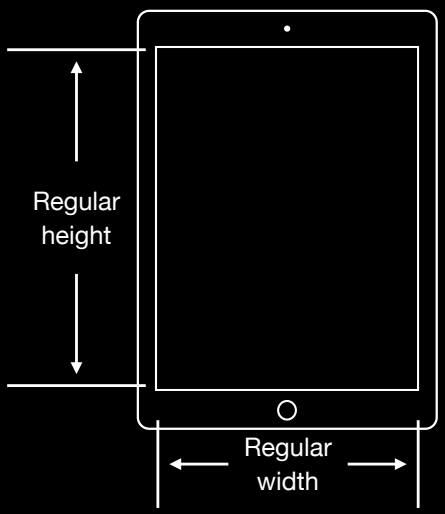


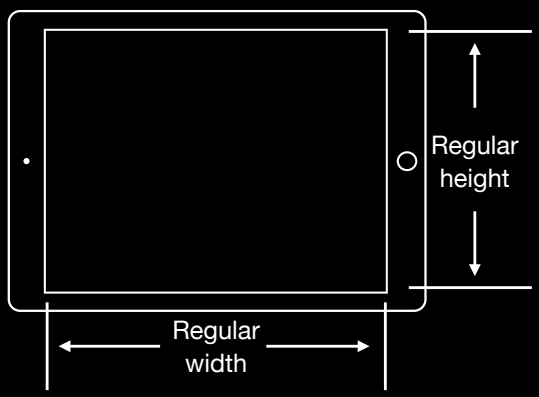
Size classes



Size classes

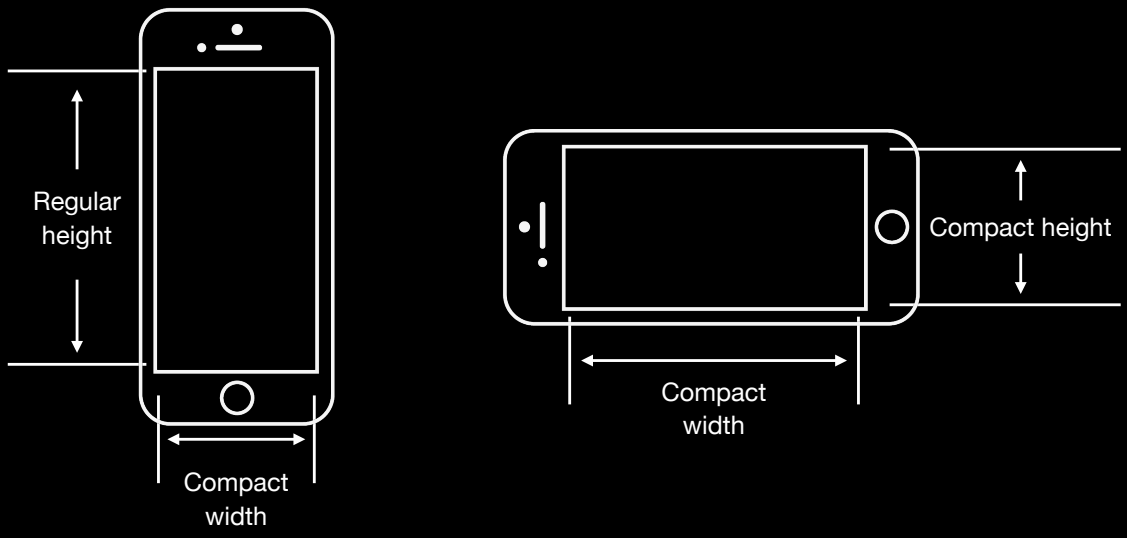
iPad





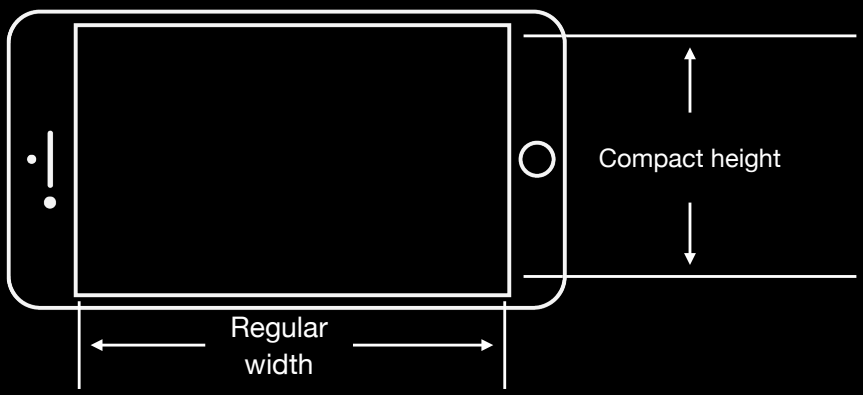
Size classes

iPhone



Size classes

iPhone 6 Plus, iPhone 7 Plus, and iPhone 8 Plus

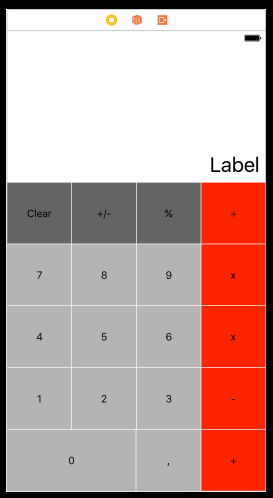


Unit 2—Lesson 10
Auto Layout and Stack Views

Learn the fundamentals of Auto Layout for building precisely designed user interfaces.

Unit 2—Lesson 10
Lab: Calculator

Use view objects, constraints, and stack views to create a simple calculator that maintains its layout on all device sizes.



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Session 9: Dictionaries/Optionals / Guard / Scope

- Dictionaries/why we need optionals
- How to use them correctly
- Making code tidy with Guard
- Understanding scope of variables
- Lab 9: Optionals and Guard

- This covers lessons 2.5, 3.1, 3.3, 3.4 of Development in Swift Fundamentals

1

Unit 2—Lesson 5: Collections

(We have done Arrays, so will just do Dictionaries, page 175)

Dictionaries

```
[key1 : value1, key2: value2, key3: value3]
```

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]
```

```
var myDictionary = [String: Int]()
var myDictionary = Dictionary<String, Int>()
var myDictionary: [String: Int] = [:]
```

Add/remove/modify a dictionary

Adding or modifying

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399

let oldValue = scores.updateValue(100, forKey: "Richard")
```

Add/remove/modify a dictionary
Adding or modifying

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399

if let oldValue = scores.updateValue(100, forKey: "Richard") {
  print("Richard's old value was \(oldValue)")
}
```

```
Richard's old value was 500
```

Add/remove/modify a dictionary
Removing

```
var scores = ["Richard": 100, "Luke": 400, "Cheryl": 800]
scores["Richard"] = nil
print(scores)

if let oldValue = scores.removeValue(forKey: "Luke") {
  print("Luke's score was \(oldValue) before he stopped playing")
}
print(scores)
```

```
["Cheryl": 800, "Luke": 400]
Luke's score was 400 before he stopped playing
["Cheryl": 800]
```

Accessing a dictionary

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

let players = Array(scores.keys) //["Richard", "Luke", "Cheryl"]
let points = Array(scores.values) //[500, 400, 800]

if let myScore = scores["Luke"] {
  print(myScore)
}
```

```
400
```

```
if let henrysScore = scores["Henry"] {
  print(henrysScore)
}
```

Unit 2—Lesson 5
Lab: Collections

Open and complete exercise 3 (Dictionaries) in

`Lab - Collections.playground`

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Unit 3—Lesson 1: Optionals

Last week we saw this stuff with Dictionaries
This is an example of Optionals

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399

if let oldValue = scores.updateValue(100, forKey: "Richard") {
  print("Richard's old value was \(oldValue)")
}
```

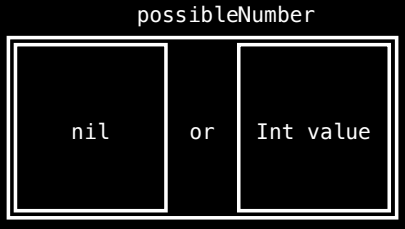
```
Richard's old value was 500
```

Functions and optionals
Return values

```
let numberString = "123"
let possibleNumber = Int(numberString)
```

```
let numberString = "Cynthia"
let possibleNumber = Int(numberString)
```

Type of Int(String) is an Optional Integer



Working with optional values

Force-unwrap - dangerous if value is nil

```
let possibleNumber = Int(numberString)
if possibleNumber != nil {
  let actualNumber = possibleNumber!
  print(actualNumber)
}

let unwrappedNumber = possibleNumber!
```

error: Execution was interrupted

Specifying the type of an optional

```
var serverResponseCode = 404
```

```
var serverResponseCode = nil
```

'nil' requires a contextual type

```
var serverResponseCode: Int? = 404
```

```
var serverResponseCode: Int? = nil
```

Working with optional values
Optional binding

```
if let constantName = someOptional {
  //constantName has been safely unwrapped for use within the braces.
}
```

```
if let possibleNumber = Int(numberString) {
  print("The value of the string was \(possibleNumber)")
}
else {
  print("That was not a legal integer value")
}
```

Functions and optionals
Defining

```
func printFullName(firstName: String, middleName: String?, lastName: String)
```

```
func textFromURL(url: URL) -> String?
```

Optional chaining

```
class Person {
  var age: Int
  var residence: Residence?
}

class Residence {
  var address: Address?
}

class Address {
  var buildingNumber: String?
  var streetName: String?
  var apartmentNumber: String?
}
```

Optional chaining

```
if let theResidence = person.residence {
  if let theAddress = theResidence.address {
    if let theApartmentNumber = theAddress.apartmentNumber {
      print("He/she lives in apartment number \(theApartmentNumber).")
    }
  }
}
```

Optional chaining

```
if let theApartmentNumber = person.residence?.address?.apartmentNumber {
  print("He/she lives in apartment number \(theApartmentNumber).")
}
```

Implicitly Unwrapped Optionals

```
class ViewController: UIViewController {
  @IBOutlet weak var label: UILabel!
}
```

Unwraps automatically

Should only be used when need to initialize an object without supplying the value and you'll be giving the object a value soon afterwards

Unit 3—Lesson 3: Guard

```
func singHappyBirthday() {
  if birthdayIsToday {
    if invitedGuests > 0 {
      if cakeCandlesLit {
        print("Happy Birthday to you!")
      } else {
        print("The cake candle's haven't been lit.")
      }
    } else {
      print("It's just a family party.")
    }
  } else {
    print("No one has a birthday today.")
  }
}
```

```
func singHappyBirthday() {
  guard birthdayIsToday else {
    print("No one has a birthday today.")
    return
  }

  guard invitedGuests > 0 else {
    print("It's just a family party.")
    return
  }

  guard cakeCandlesLit else {
    print("The cake's candles haven't been lit.")
    return
  }

  print("Happy Birthday to you!")
}
```

guard

```
guard condition else {
  //false: execute some code
}

//true: execute some code
```

guard

```
func divide(_ number: Double, by divisor: Double) {
  if divisor != 0.0 {
    let result = number / divisor
    print(result)
  }
}
```

```
func divide(_ number: Double, by divisor: Double) {
  guard divisor != 0.0 else { return }

  let result = number / divisor
  print(result)
}
```

guard with optionals

```
if let eggs = goose.eggs {
  print("The goose laid \(eggs.count) eggs.")
}
//`eggs` is not accessible here
```

```
guard let eggs = goose.eggs else { return }
//`eggs` is accessible hereafter
print("The goose laid \(eggs.count) eggs.")
```

guard with optionals

```
func processBook(title: String?, price: Double?, pages: Int?) {
  if let theTitle = title, let thePrice = price, let thePages = pages {
    print("\(theTitle) costs $\(thePrice) and has \(thePages) pages.")
  }
}
```

```
func processBook(title: String?, price: Double?, pages: Int?) {
  guard let theTitle = title, let thePrice = price, let thePages = pages else { return }
  print("\(theTitle) costs $\(thePrice) and has \(thePages) pages.")
}
```

Unit 3—Lesson 4:
Constant and Variable Scope

Scope

Global scope—Defined outside of a function

Local scope—Defined within braces (`{` `}`)

```
var globalVariable = true

if globalVariable {
 let localVariable = 7
}
```

Scope

```
var age = 55

func printMyAge() {
  print("My age: \(age)")
}

print(age)
printMyAge()
```

```
55
My age: 55
```

Scope

```
func printBottleCount() {
    let bottleCount = 99
    print(bottleCount)
}

printBottleCount()
print(bottleCount)
```

Use of unresolved identifier 'bottleCount'

Scope

```
func printTenNames() {
  var name = "Richard"
  for index in 1...10 {
    print("\(index): \(name)")
  }
  print(index)
  print(name)
}

printTenNames()
```

Use of unresolved identifier 'index'