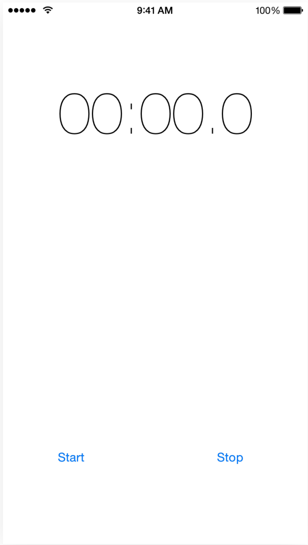
Stopwatch
Lesson 1

Description

Build the application interface using Interface Builder, and learn how to adjust interface elements with the Size Inspector and Auto Layout constraints.



Learning Outcomes

- Describe the Model-View-Controller pattern and identify the view and controller in an Xcode project.
- Analyze a user interface and subdivide it into components.
- Assemble an iOS app interface using Interface Builder.
- Use Auto Layout constraints to position multiple interface elements.
- Experiment with Interface Builder previews.

Vocabulary

user interface	Model-View-Controller	view
view controller	Interface Builder	IB Object Library
Auto Layout	constraint	Attributes Inspector
Size Inspector		

Materials

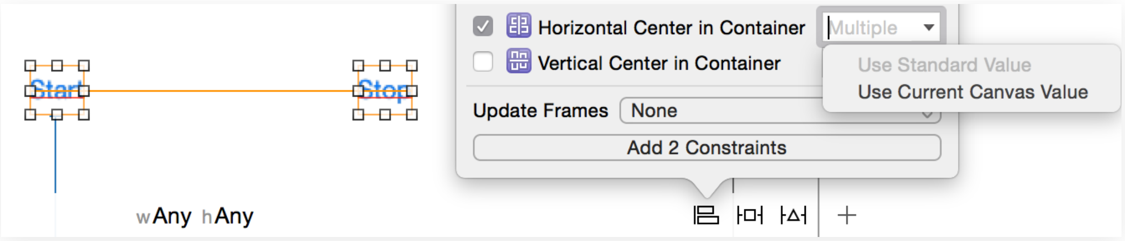
- **Stopwatch Lesson 1** Xcode project
- **Model-View-Controller** presentation

Opening

Once we have a clear idea for an app, how do we start building the user interface?

Agenda

- Present the concepts of Model-View-Controller, focusing on views and view controllers, and how they work together to present the UI of an iOS app.
- With Interface Builder, use the Object Library (⌥⌘L) to add a Label for displaying the elapsed time, and change its contents to **00:00.0**.
- Use the Attributes Inspector (⌥⌘4) and Size Inspector (⌥⌘5) to adjust the Label position, size, color and typeface.
- Add constraints to the Label by Control-dragging upwards from the Label to the main view, and selecting *Center Horizontally in Container* to create a Center X Alignment constraint. Use the Pin tool (⊢□⊣) to create a top Vertical Space constraint.
- Resolve any constraint issues using the menu item *Editor* > *Resolve Auto Layout Issues* > *Update Frames* (⌥⌘=).
- Use the Object Library (⌥⌘L) again to add two Buttons, labeled **Start** and **Stop**, to the main view. Adjust their size and position with the Size Inspector (⌥⌘5).
- Add a Center Y Alignment constraint to the Buttons by Control-dragging from the Start button to the Stop button, and selecting *Center Y*. Add a Vertical Space constraint by Control-dragging downward from the Start button to the main view, and selecting *Bottom Space to Bottom Layout Guide*.
- Add Center X Alignment constraints to both buttons by selecting them both together (⌘-click), and using the Align tool (⊫) to select *Horizontal Center in Container* and *Use Current Canvas Value*.



☑ Horizontal Center in Container: Multiple
□ Vertical Center in Container
Update Frames: None

- Resolve any constraint issues using the menu item *Editor* > *Resolve Auto Layout Issues* > *Update Frames* (⌥⌘=).
- Using the Assistant Editor (⌥⌘↩), add different devices to the Preview, and observe how the interface elements adapt to the different size classes.
- Run the app (⌘R) to witness the interface displayed within the iOS Simulator.

Closing

What are the benefits and drawbacks to starting the construction of an app with the interface first?

Modifications And Extensions

- Delete the existing constraints, and experiment with using different constraints to achieve a desired layout that works well in multiple size classes. Use the Assistant Editor Preview to view the results.
- Add the label and buttons to the interface using only code, and critique the benefits and drawbacks of this procedural approach with the declarative approach supported by Interface Builder.

Resources

Cocoa Core Competencies: Model-View-Controller https://developer.apple.com/library/ios/documentation/General/Conceptual/DevPedia-CocoaCore/MVC.html

Interface Builder Help: Building User Interfaces https://developer.apple.com/library/ios/recipes/xcode_help-interface_builder/Chapters/AboutInterfaceBuilder.html

Start Developing iOS Applications Today: Designing the User Interface https://developer.apple.com/library/ios/referencelibrary/GettingStarted/RoadMapiOS/DesigningaUserInterface.html

Adaptive User Interfaces https://developer.apple.com/design/adaptivity/

Adding Auto Layout Constraints with the Pin and Align Tools https://developer.apple.com/library/ios/recipes/xcode_help-IB_auto_layout/chapters/pin-constraints.html

Auto Layout Guide: Working with Constraints in Interface Builder https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/AutolayoutPG/WorkingwithConstraints/WorkingwithConstraints.html

About Designing for Multiple Size Classes https://developer.apple.com/library/ios/recipes/xcode_help-IB_adaptive_sizes/chapters/AboutAdaptiveSizeDesign.html

View Programming Guide for iOS https://developer.apple.com/library/ios/documentation/WindowsViews/Conceptual/ViewPG_iPhoneOS/

Interface Builder Help: Previewing Your Layout https://developer.apple.com/library/ios/recipes/xcode_help-interface_builder/Chapters/PreviewingLayouts.html#//apple_ref/doc/uid/TP40009971-CH5-SW1