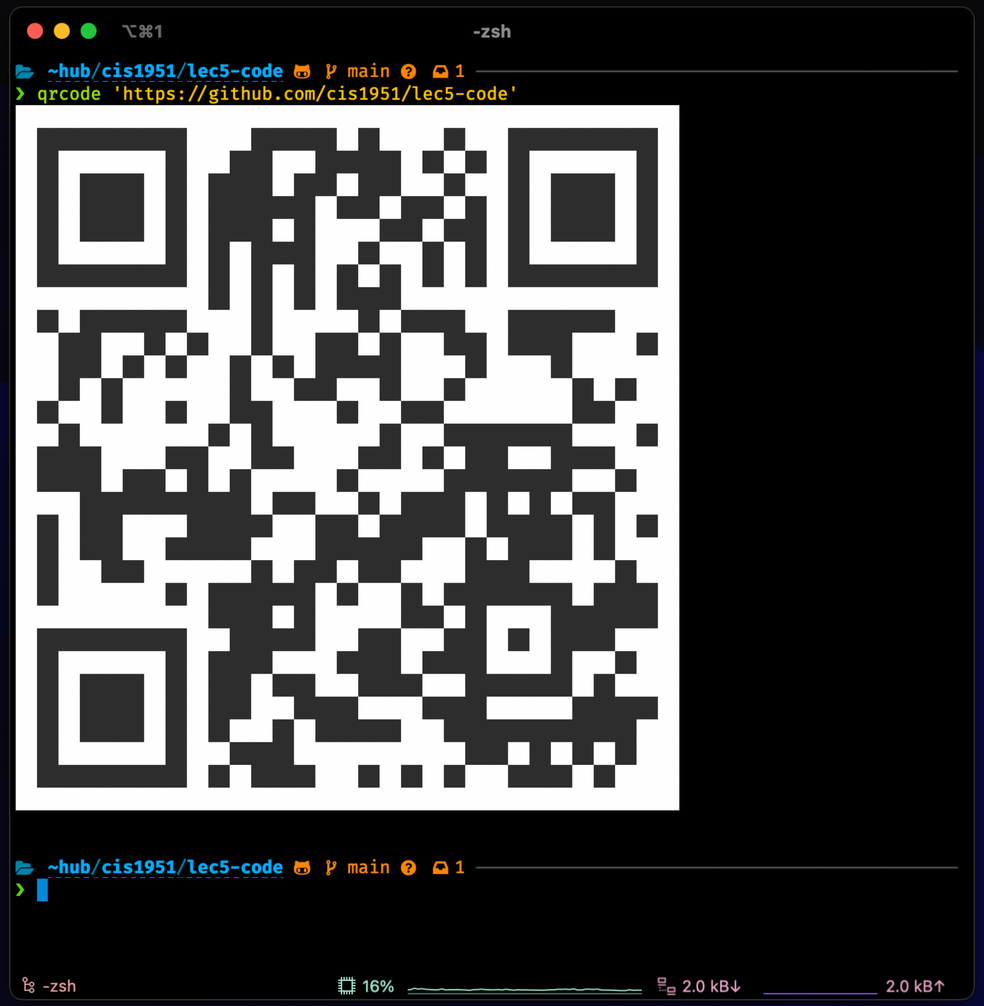
App Structure

Lecture 5

CIS 1951

https://github.com/cis1951/lec5-code



Previously, on CIS 1951...

SwiftUI State Management

- View hierarchy
- Property wrappers
  - @State, @Binding
  - @ObservedObject, @StateObject, @EnvironmentObject
- .onChange modifier
- Animations and transitions
- **Questions? Comments?**

So far, we've only made simple, single-screen apps.

That changes today.

This week

The tools you need to create larger apps

Navigation & modal presentations

MVVM

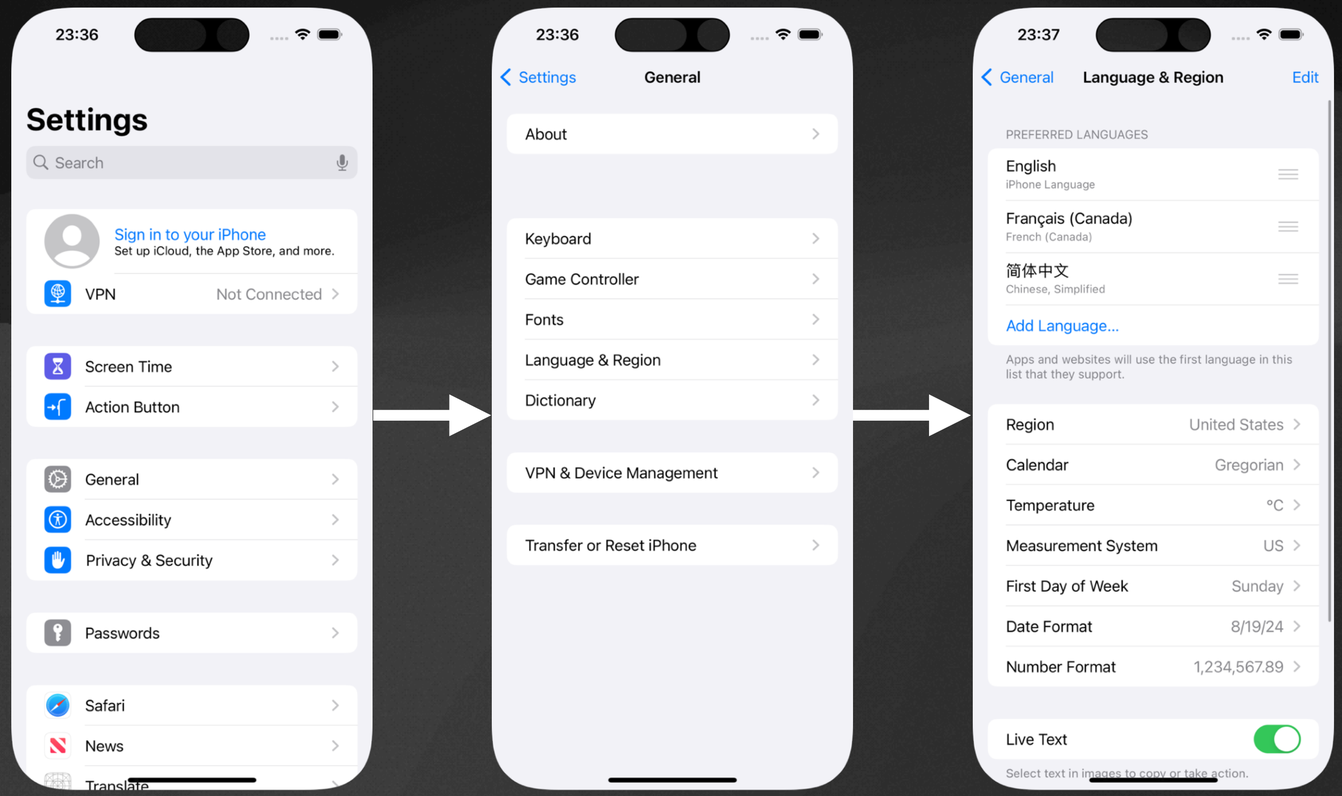
Lifecycle events

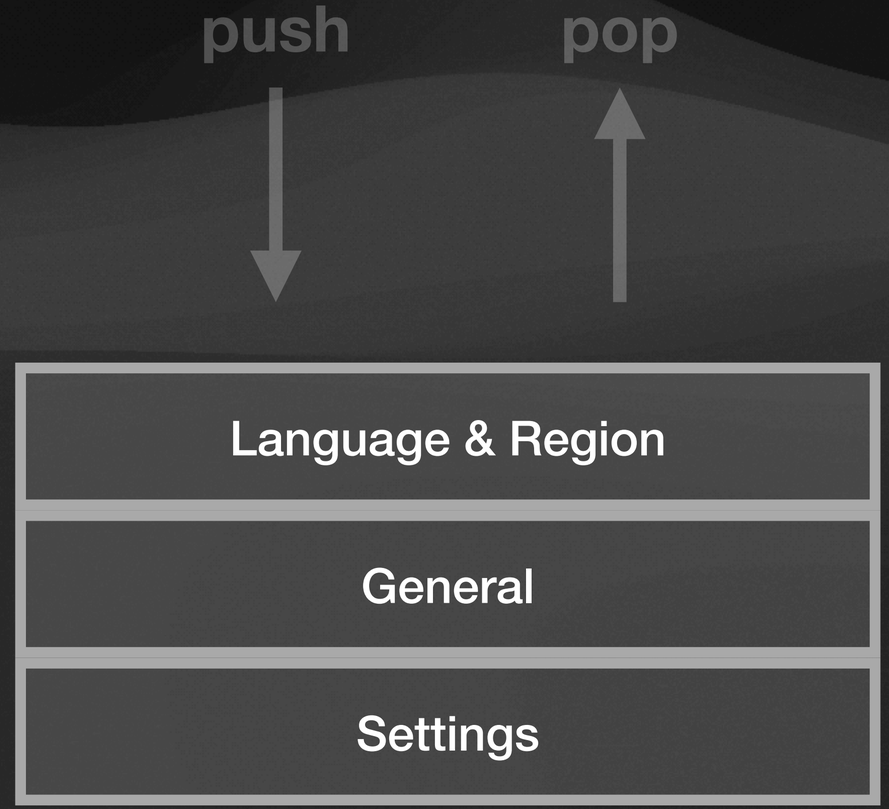
Navigation & Modal Presentations

How do we organize multiple screens?

Hierarchical Navigation

Example: Settings App



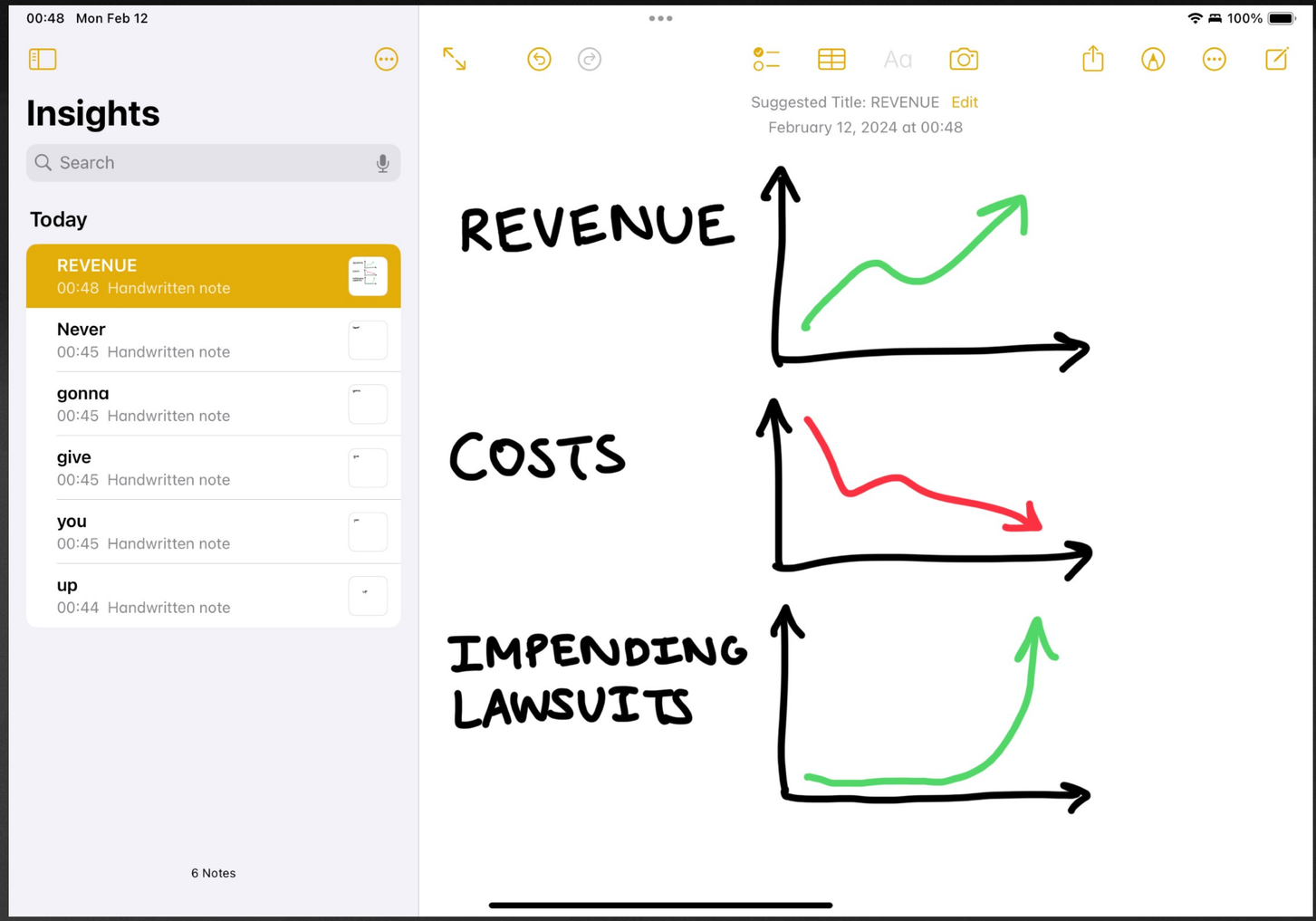


Master-Detail Navigation

Example: Notes App

Master

List of notes

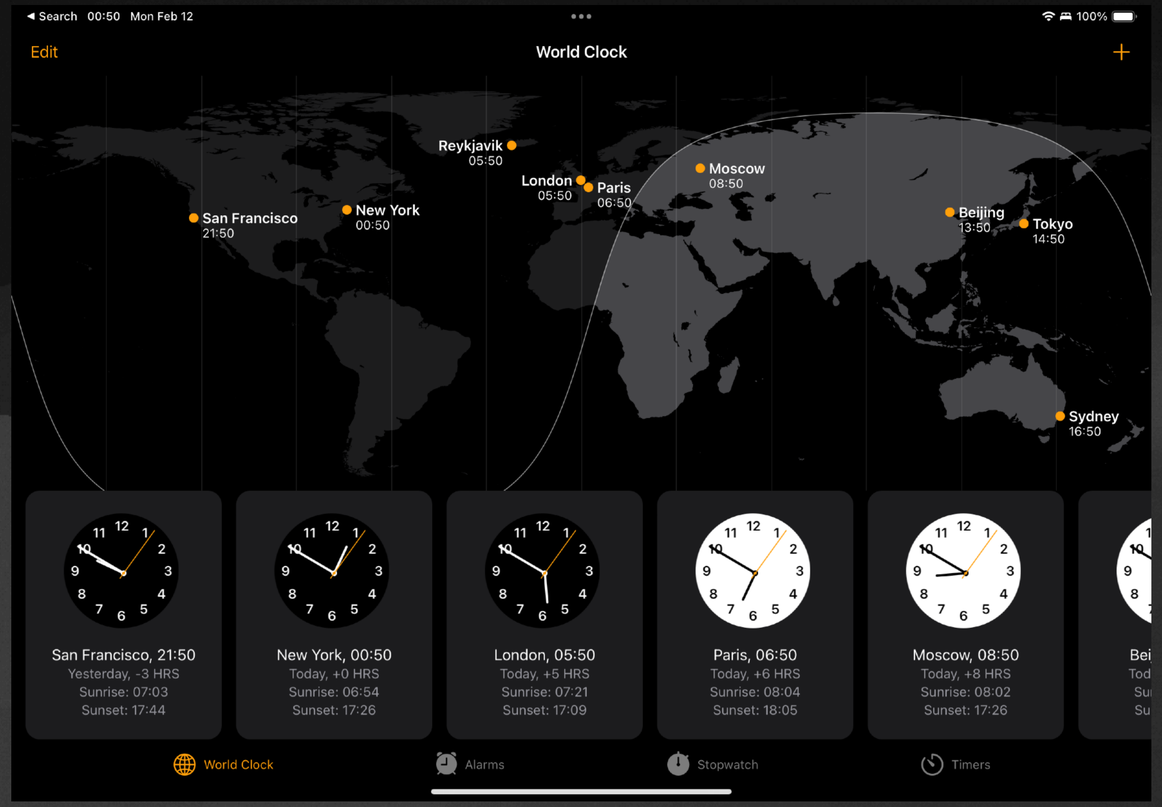


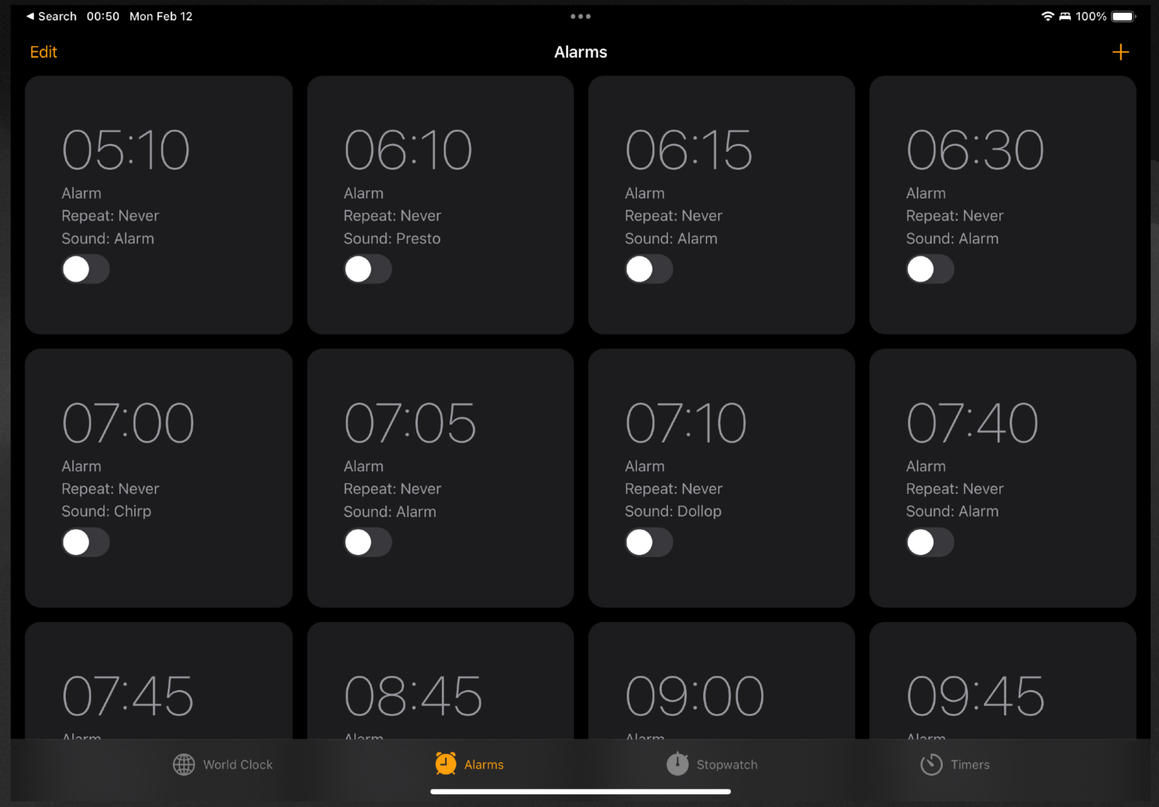
Detail

Single note

Tab Bar Navigation

Example: Clock App

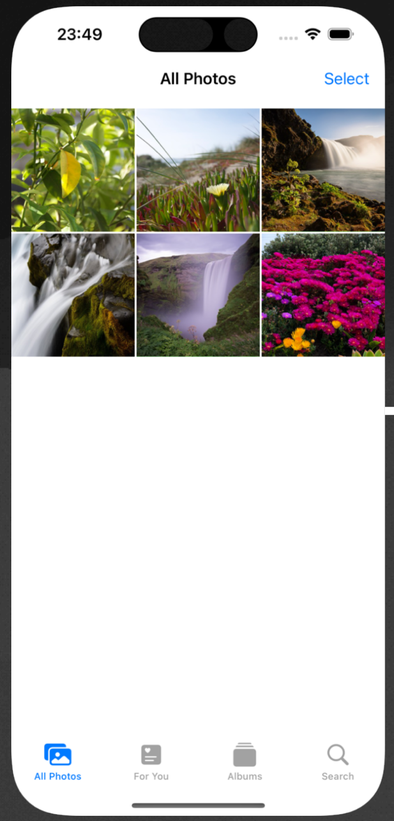




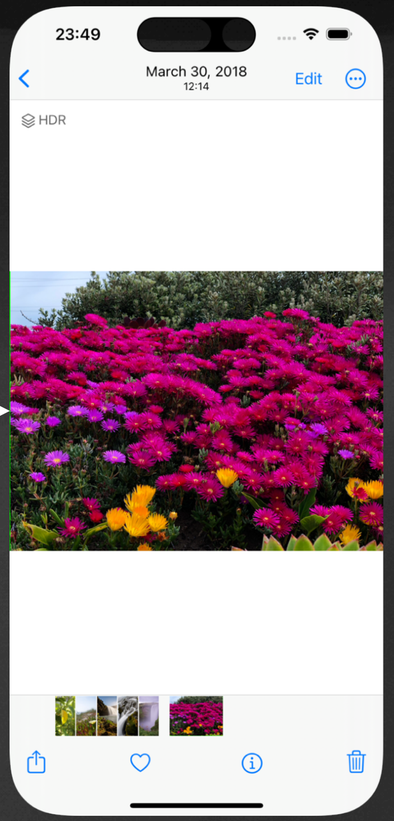
Bottom bar for **quick navigation**

Hybrid Navigation

Example: Photos App

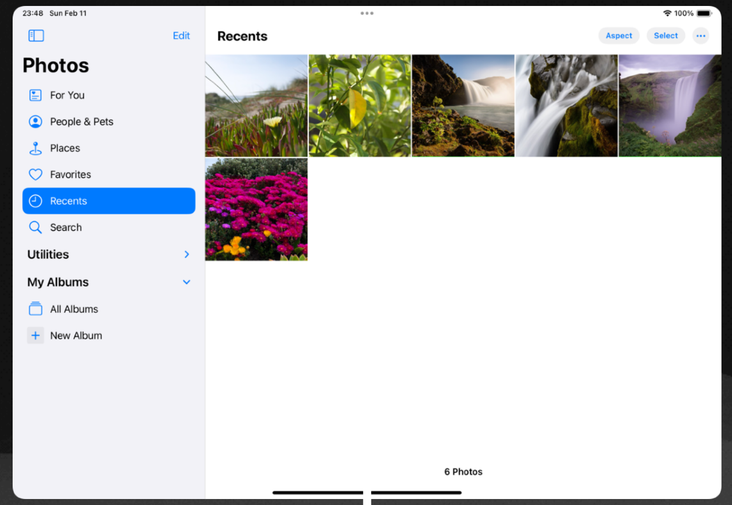


Tab bar

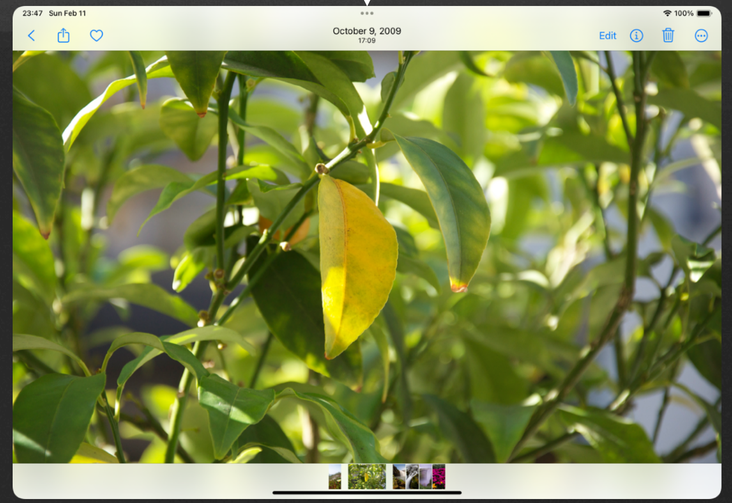


Hierarchical

Master-detail

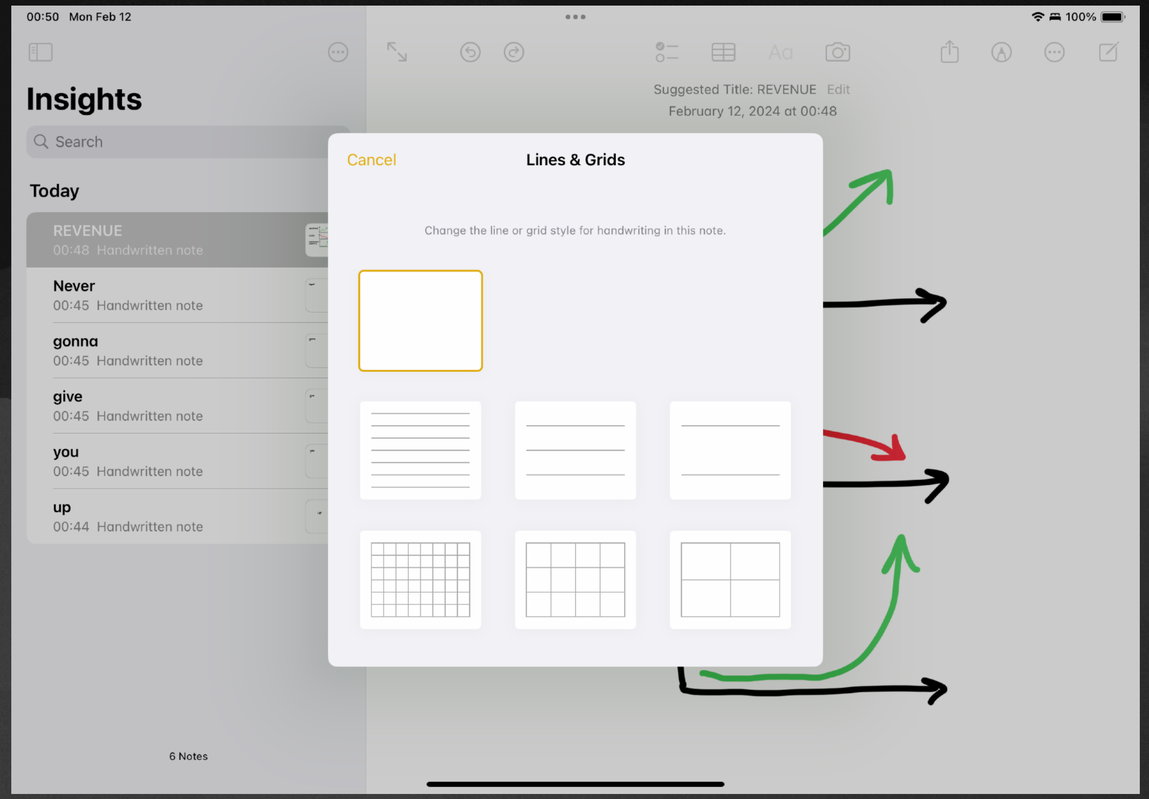


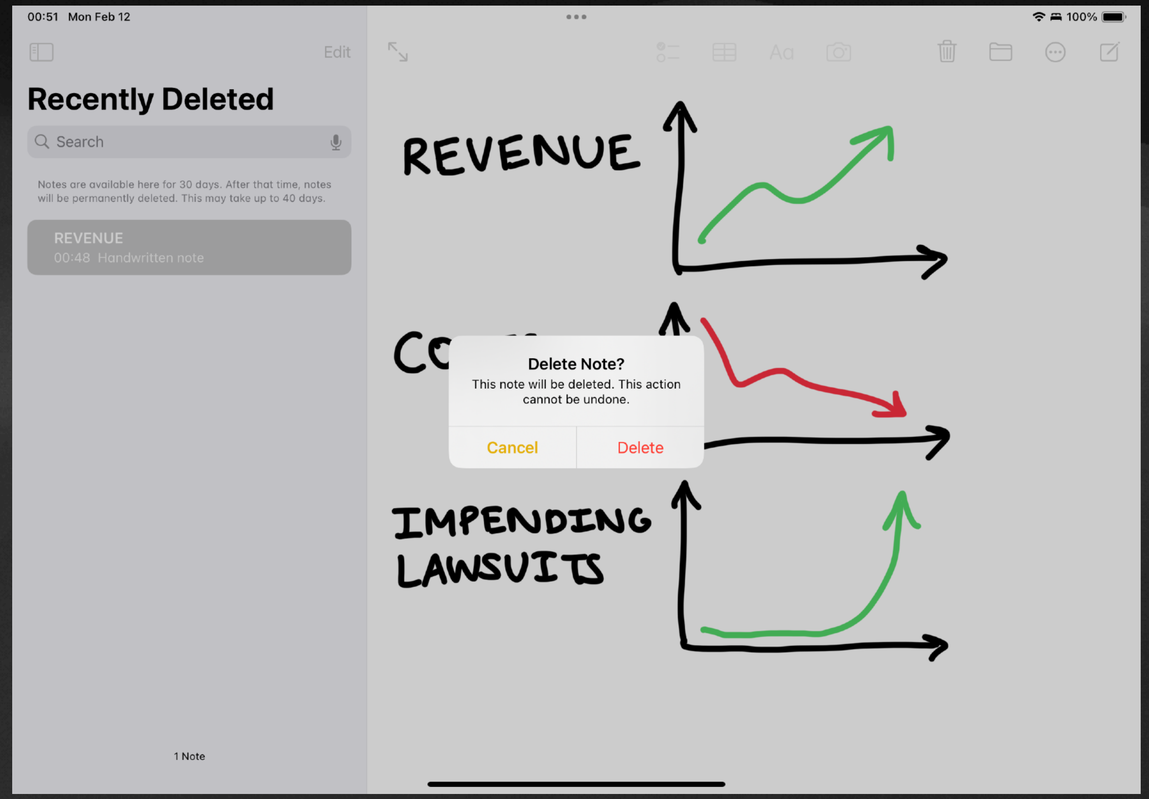
Hierarchical



Modals

Example: Notes App





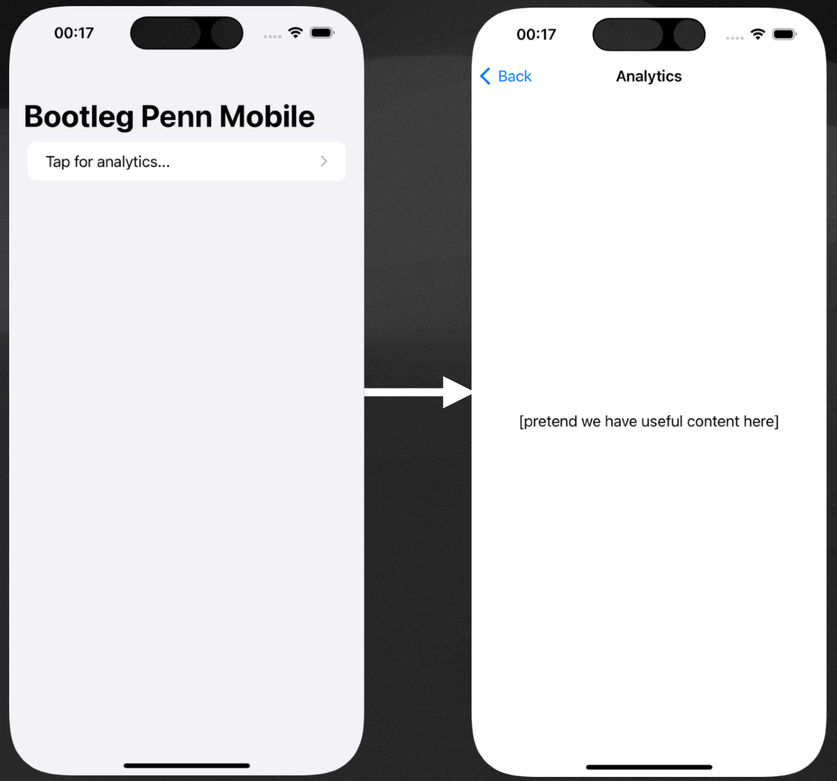
Lightweight and **focused** interactions

Implementation

NavigationView

Deprecated in recent versions of iOS

```
NavigationView {
    List {
        NavigationLink("Tap for analytics...") {
            Text("[pretend we have useful content here]")
                .navigationTitle("Analytics")
                .navigationBarTitleDisplayMode(.inline)
        }
    }
    .navigationTitle("Bootleg Penn Mobile")
}
```



NavigationStack

Directly linking to views

```
NavigationStack {
    List {
        NavigationLink("Tap for analytics...") {
            Text("[pretend we have useful content here]")
                .navigationTitle("Analytics")
                .navigationBarTitleDisplayMode(.inline)
        }
    }
    .navigationTitle("Bootleg Penn Mobile")
}
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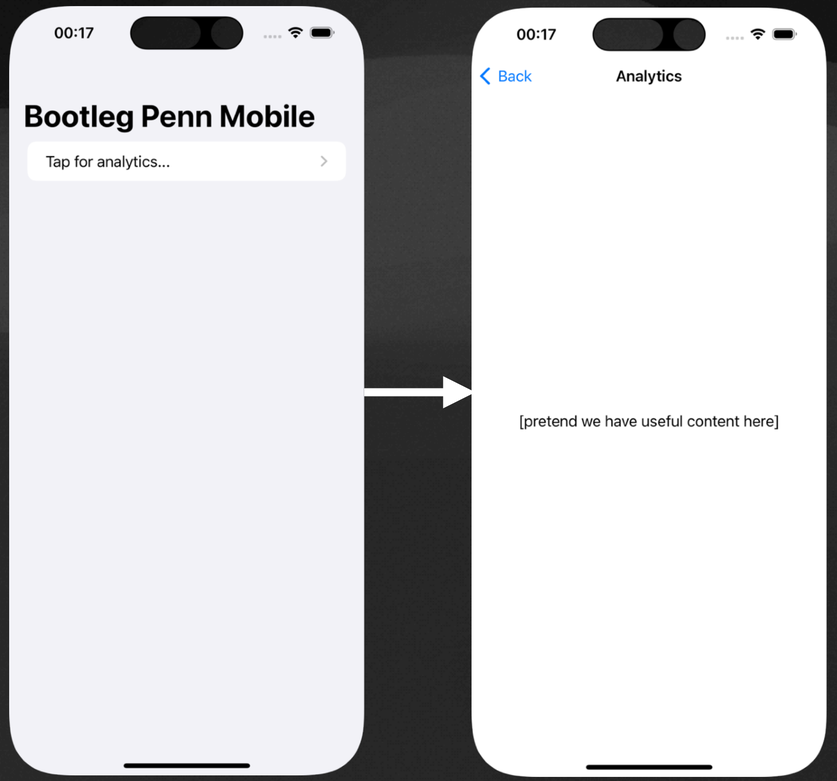
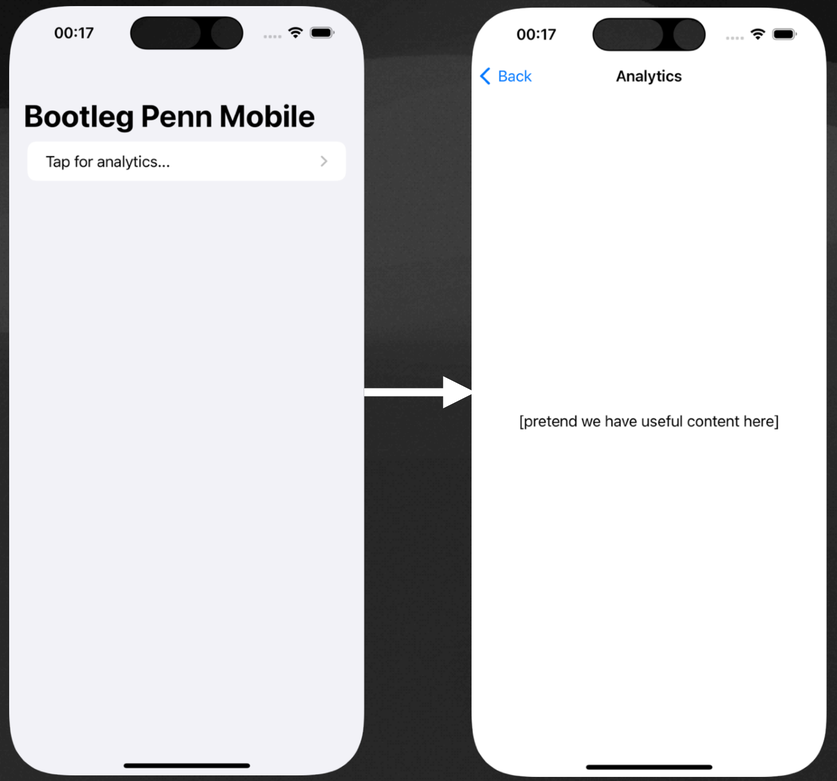


NavigationStack

Presenting based on data

```
NavigationStack(path: $path) {
    List {
        NavigationLink("Tap for analytics…",
                       value: "Analytics")
    }
    .navigationTitle("Bootleg Penn Mobile")
    .navigationDestination(for: String.self) { value in
        Text("[pretend we have useful content here]")
            .navigationTitle(value)
            .navigationBarTitleDisplayMode(.inline)
    }
}
```



NavigationStack

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    .navigationDestination(for: String.self) { value in
        Text("[pretend we have useful content here]")
            .navigationTitle(value)
            .navigationBarTitleDisplayMode(.inline)
    }
}
```
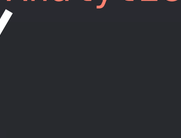



Allows you to modify path programmatically

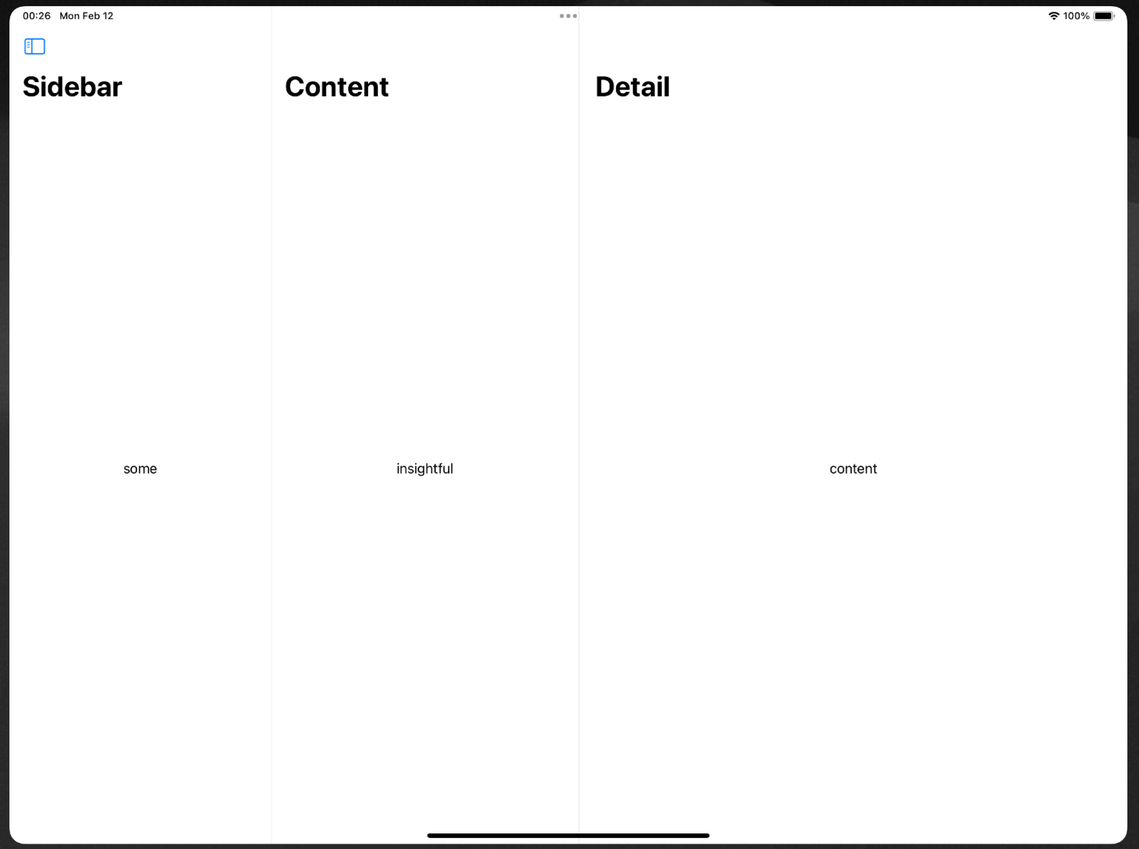
`value` is passed into **`.navigationDestination`**

Can help make code cleaner

NavigationSplitView

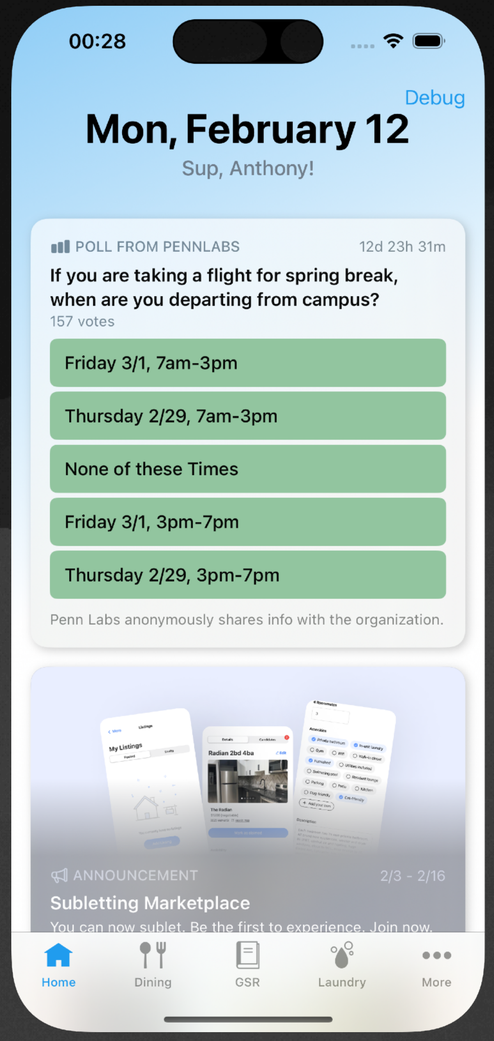
Multi-column layouts

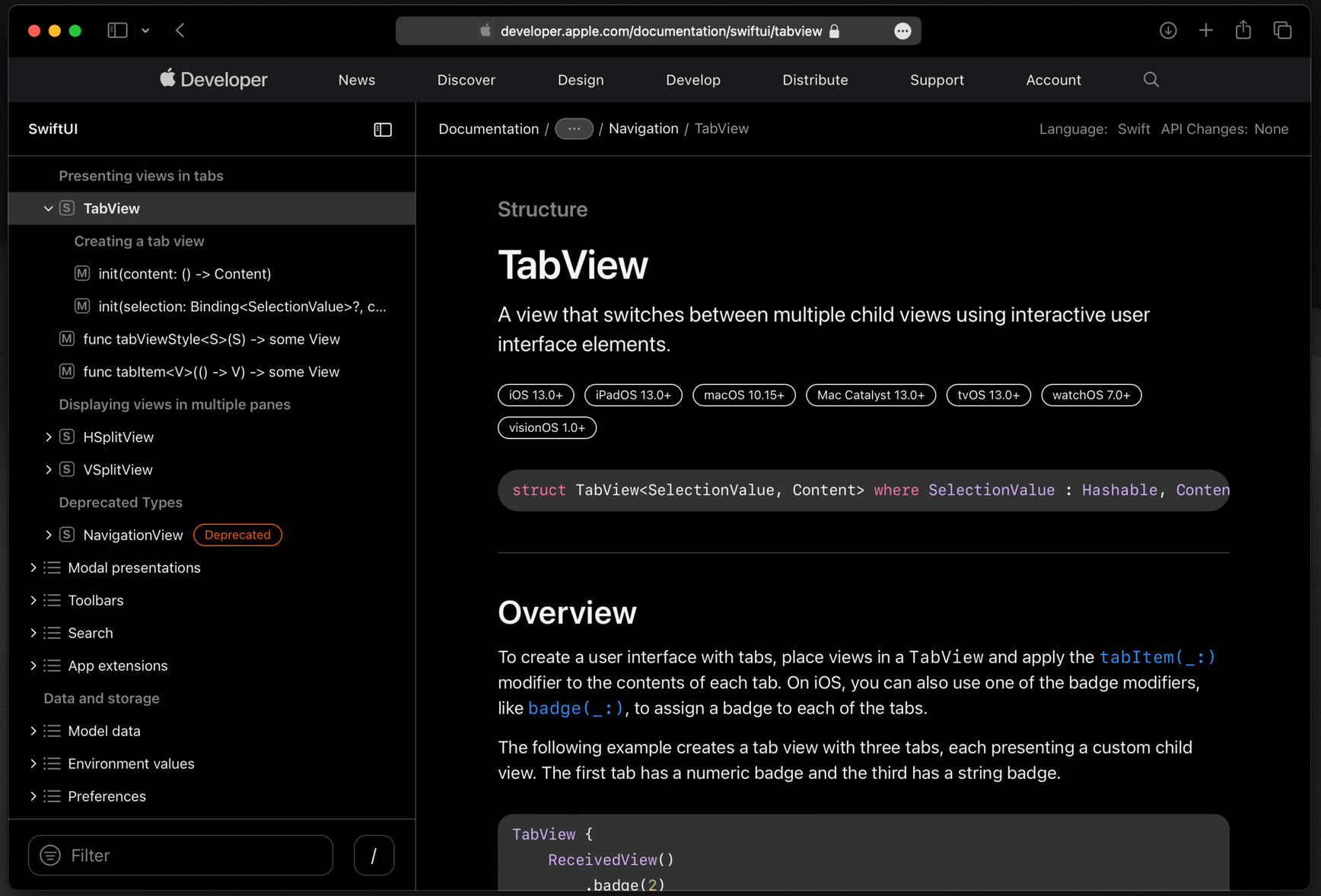
```
NavigationSplitView(sidebar: {
    Text("Sidebar")
}, content: {
    Text("Content")
}, detail: {
    Text("Detail")
})
.font(.largeTitle)
```



Appears as a NavigationStack on iPhone

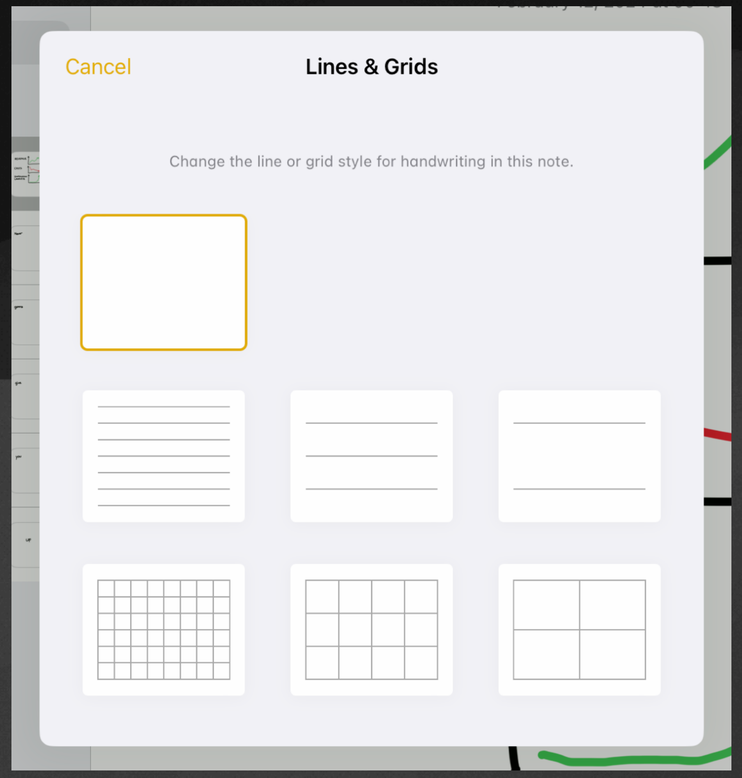
TabView


00:28
Debug
Mon, February 12
Sup, Anthony!
POLL FROM PENNLABS
12d 23h 31m
If you are taking a flight for spring break, when are you departing from campus?
157 votes
Friday 3/1, 7am-3pm
Thursday 2/29, 7am-3pm
None of these Times
Friday 3/1, 3pm-7pm
Thursday 2/29, 3pm-7pm
Penn Labs anonymously shares info with the organization.
ANNOUNCEMENT
2/3 - 2/16
Subletting Marketplace
Home
Dining
GSR
Laundry
More

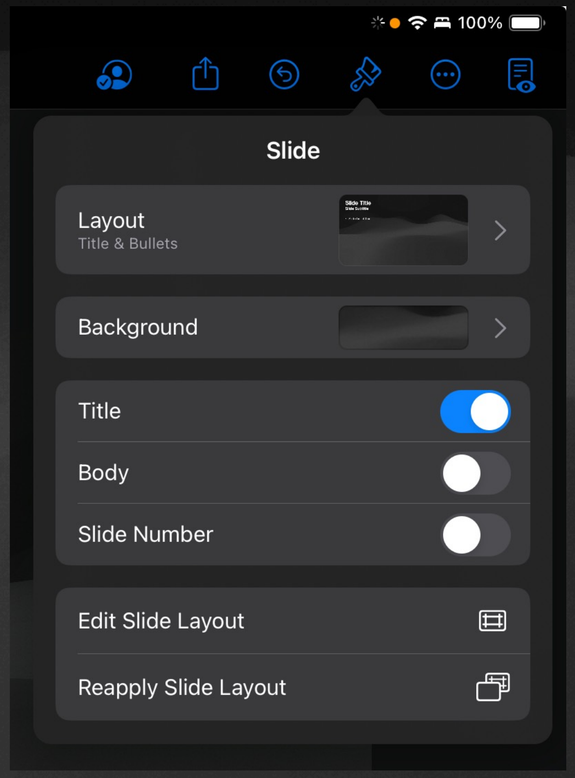

developer.apple.com/documentation/swiftui/tabview
Developer
News
Discover
Design
Develop
Distribute
Support
Account
SwiftUI
Documentation / ··· / Navigation / TabView
Language: Swift API Changes: None
Presenting views in tabs
TabView
Creating a tab view
init(content: () -> Content)
init(selection: Binding<SelectionValue>?, c...
func tabViewStyle<S>(S) -> some View
func tabItem<V>(() -> V) -> some View
Displaying views in multiple panes
HSplitView
VSplitView
Deprecated Types
NavigationView
Deprecated
Modal presentations
Toolbars
Search
App extensions
Data and storage
Model data
Environment values
Preferences
Filter
/
Structure
TabView
A view that switches between multiple child views using interactive user interface elements.
iOS 13.0+
iPadOS 13.0+
macOS 10.15+
Mac Catalyst 13.0+
tvOS 13.0+
watchOS 7.0+
visionOS 1.0+
struct TabView<SelectionValue, Content> where SelectionValue : Hashable, Conten
Overview
To create a user interface with tabs, place views in a TabView and apply the tabItem(_:) modifier to the contents of each tab. On iOS, you can also use one of the badge modifiers, like badge(_:), to assign a badge to each of the tabs.
The following example creates a tab view with three tabs, each presenting a custom child view. The first tab has a numeric badge and the third has a string badge.
TabView {
ReceivedView()
.badge(2)

Modal presentations

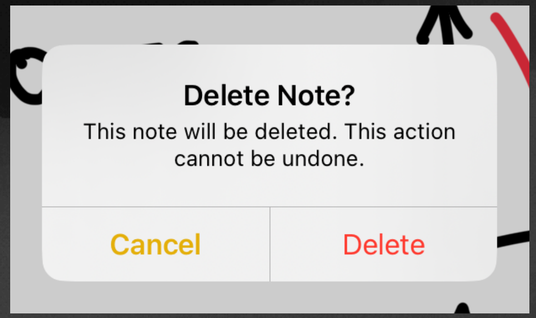
For lightweight, focused interactions



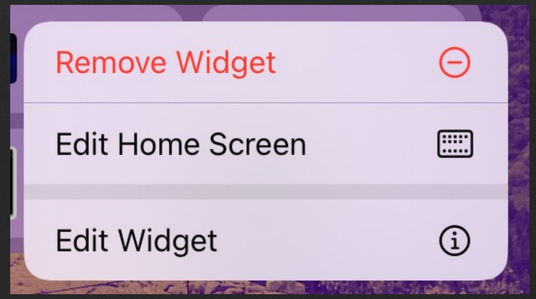
.sheet



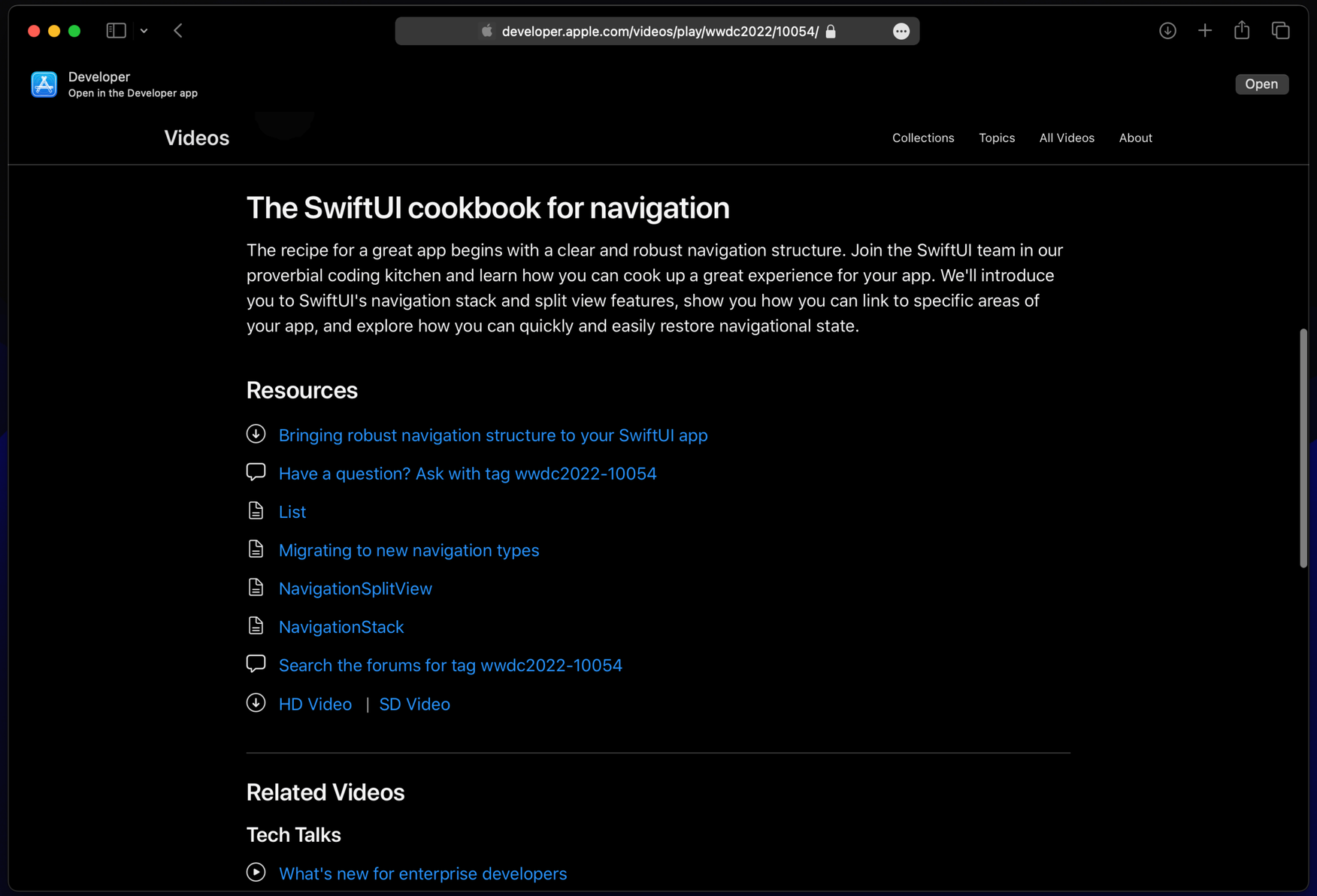
.popover



.alert



Menu
– OR –
.contextMenu


developer.apple.com/videos/play/wwdc2022/10054/
Developer
Open in the Developer app
Open
Videos
Collections
Topics
All Videos
About
The SwiftUI cookbook for navigation
The recipe for a great app begins with a clear and robust navigation structure. Join the SwiftUI team in our proverbial coding kitchen and learn how you can cook up a great experience for your app. We'll introduce you to SwiftUI's navigation stack and split view features, show you how you can link to specific areas of your app, and explore how you can quickly and easily restore navigational state.
Resources
Bringing robust navigation structure to your SwiftUI app
Have a question? Ask with tag wwdc2022-10054
List
Migrating to new navigation types
NavigationSplitView
NavigationStack
Search the forums for tag wwdc2022-10054
HD Video | SD Video
Related Videos
Tech Talks
What's new for enterprise developers

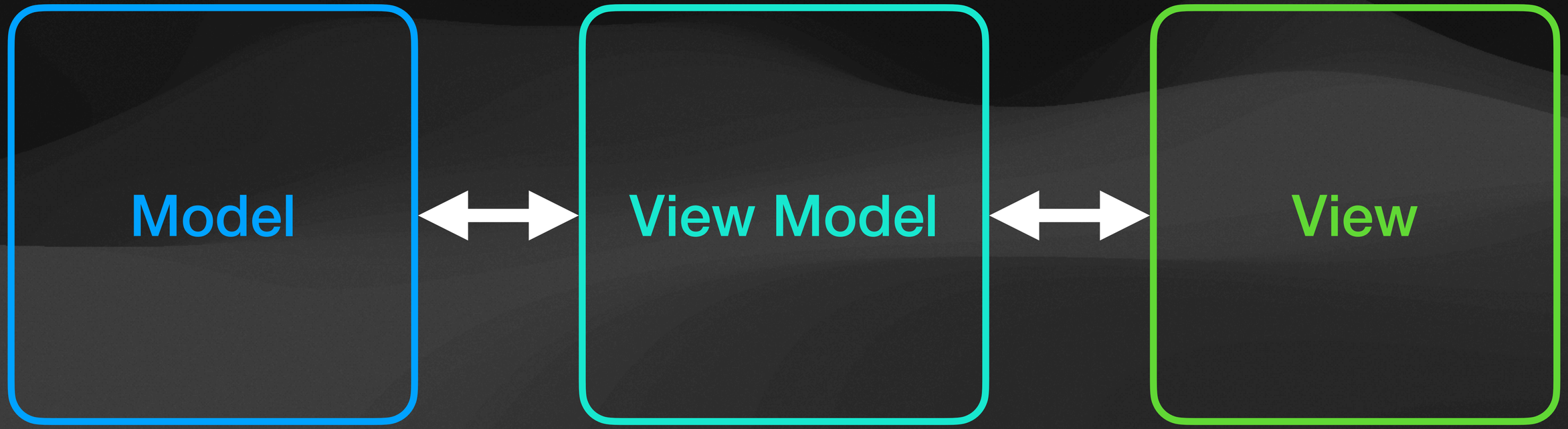
MVVM

Separation of Concerns

- Split code into **modular components**
- Each component only **handles one thing** (a "concern")
- Why? More testable, readable, maintainable code

MVVM

Model-View-View Model



Represents **the app's data**

Coordinates between the two

Defines **what the user sees**

MVVM

The View Model

View Model

Lets the view **bind to data** and **send commands**

Notifies the view of any changes

Converts data to and from what the view wants

Isolates the view from its underlying data

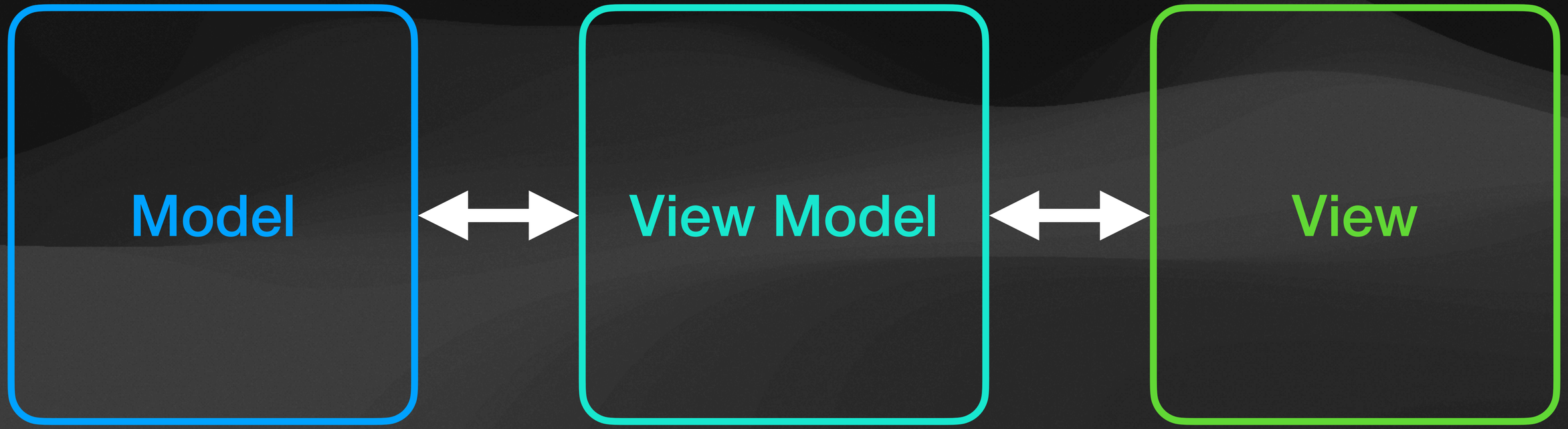
Usually **a class**

Coordinates
between the two

https://learn.microsoft.com/en-us/previous-versions/msp-n-p/hh848246(v=pandp.10)

MVVM

How we'll use it



Course

Contains the actual course data

CoursesViewModel

Manages favorited courses and filters them for the view

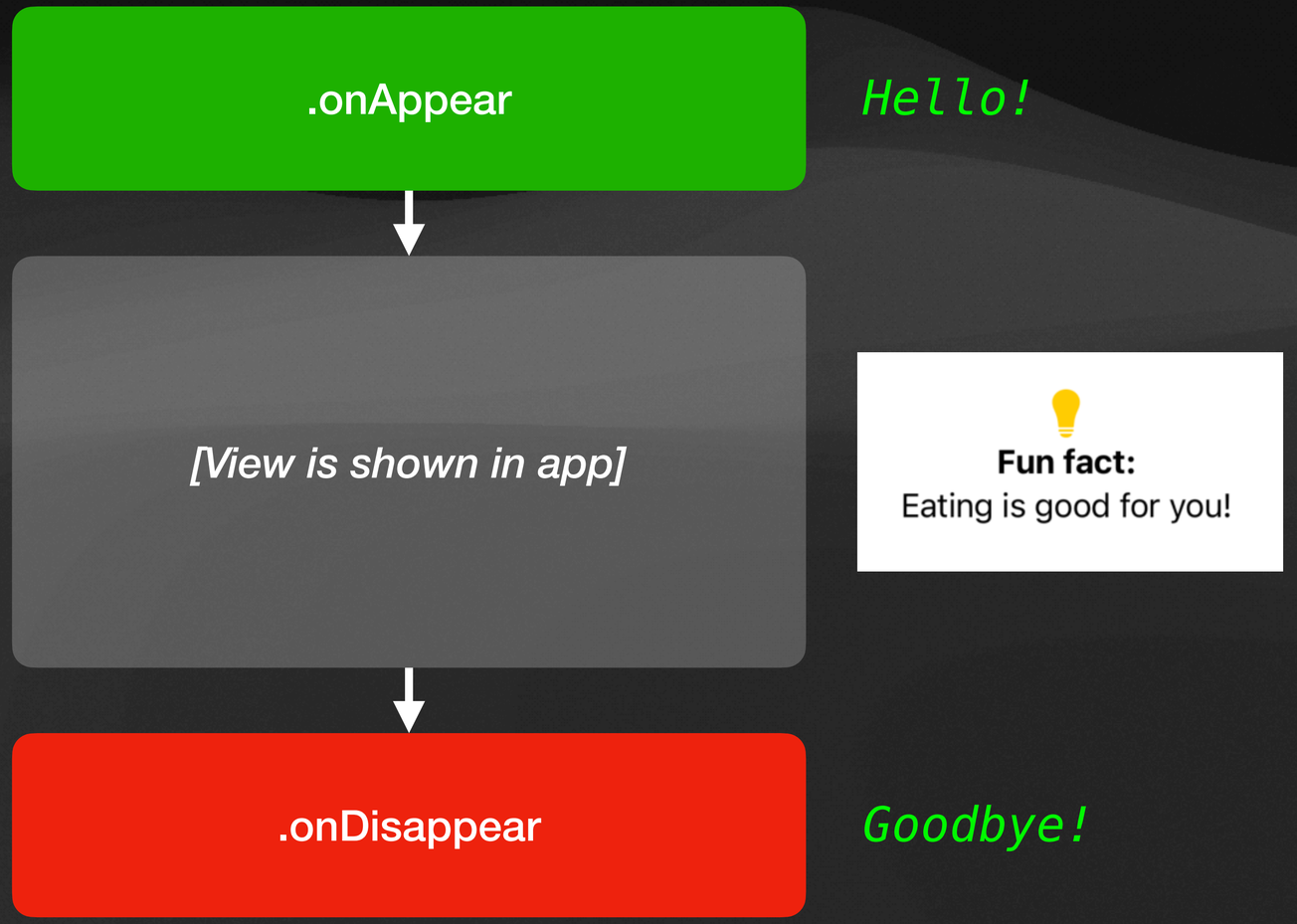
CoursesView

Displays the list of courses to the user

Lifecycle Events

.onAppear and .onDisappear

```
VStack {
    Image(systemName: "lightbulb.fill")
        .imageScale(.large)
        .foregroundStyle(.yellow)
    Text("Fun fact:")
        .fontWeight(.bold)
    Text("Eating is good for you!")
}
.onAppear {
    print("Hello!")
}
.onDisappear {
    print("Goodbye!")
}
```



Why should I use lifecycle events?

Side effects

EXAMPLES

Loading or saving data
Making network requests
Triggering animations
Requesting access to sensor data
Cleaning up resources
And more!

Recap

- **Navigation and modal presentation views** let us organize multiple screens
- **Model-view-view model** enables separation of concerns
- **Lifecycle events** let us trigger side effects in response to views appearing and disappearing

Homework 2

Trivia Game

- Will be released **Monday, 2/19**
- Due on **Monday, 3/11**
  - Includes break — start early!
- Focuses on **lectures 3-5**
- [details pending]