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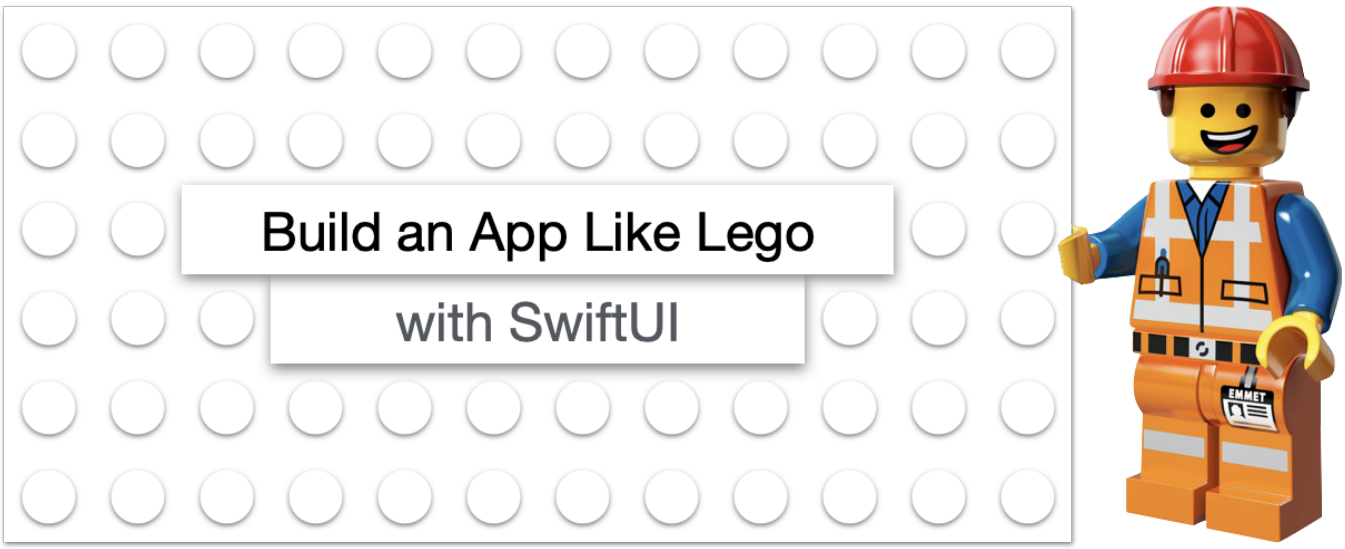
Create a new App from an Xcode Template

Build an App Like Lego, with SwiftUI — Tutorial 1



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1. Introduction

We all use apps every day to simplify and enrich our lives, but building them can seem like an overwhelming challenge. If you have an idea for an app — even a very simple idea — it could cost thousands of dollars to hire someone to create it. In reality, it's not that hard to get started. In this series, I'm going to demonstrate that you can create an app as easily as you can build something out of Lego.

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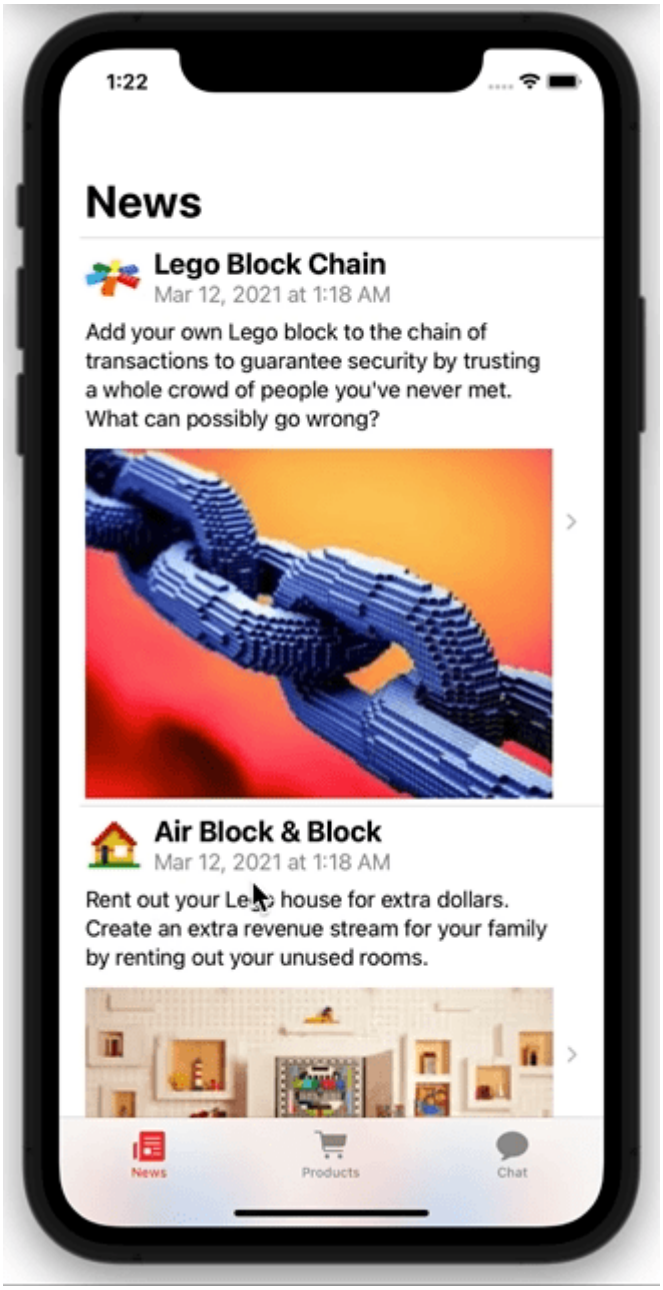
Together, we will:

1. Create real app components, using visual tools.

The app we build will be truly “native”. We will use Apple’s toolset to build an app that is “native” to the iOS platform. It will be a real app, not built with some prototyping tool or as a web page designed to look like an app.

The app will look something like this:



To follow along in this tutorial series, you don’t need to be an expert. You only need:

1. A Mac capable of running the latest software.
2. Good working knowledge of how to use a Mac, such as how to: launch an app

3. Xcode (which we will download together in this first tutorial).
4. A desire to learn how to build an app.

If you'd like to look ahead, you can peek at the whole tutorial series in the table of contents.

2. Install Xcode

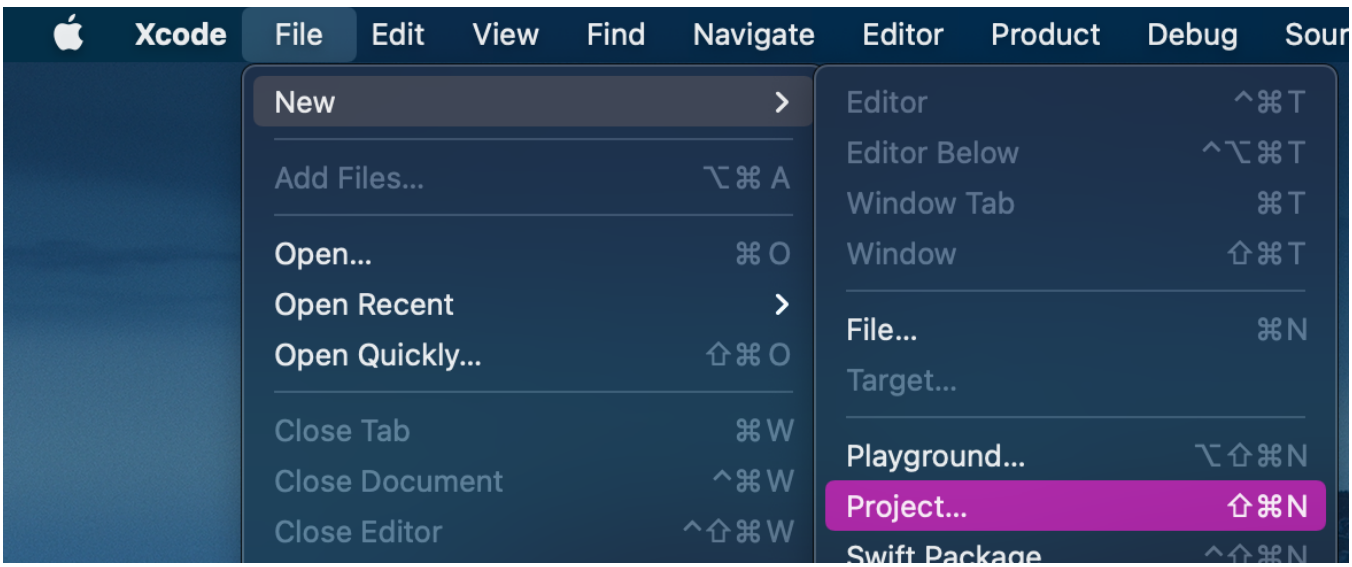
First, you will need Apple's Xcode software. It's free. I will be showing Xcode 12.5 in this tutorial.

Follow the instructions in the separate "Install and Configure Xcode" article. It is quick and easy. It shows you how to install Xcode and configure it, ready for this tutorial series.

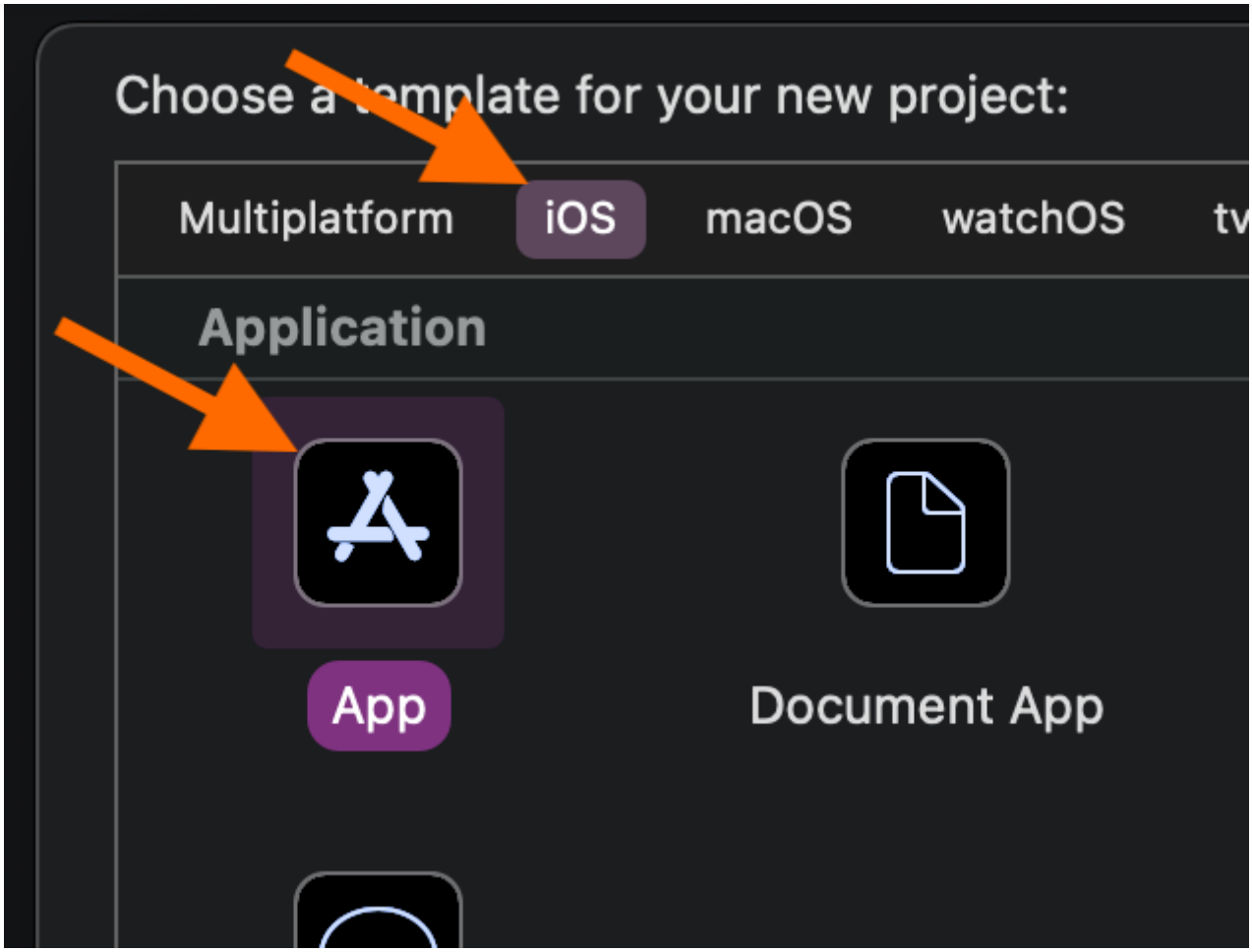
3. Create a New Project

Now let's start to build an app!

👉 In Xcode's `File` menu, select `New > Project`.



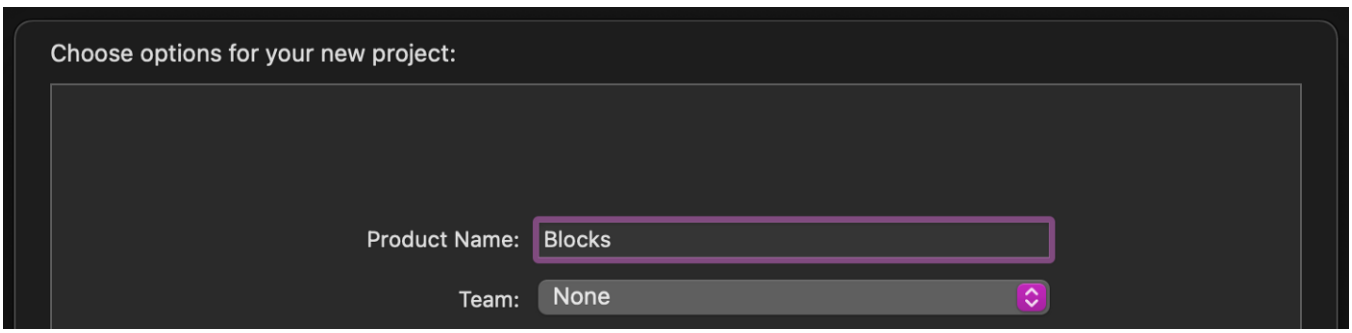
👉 Xcode shows a bunch of templates. Choose `iOS`, then `App`. Make sure you choose



👉 Click the `Next` button.

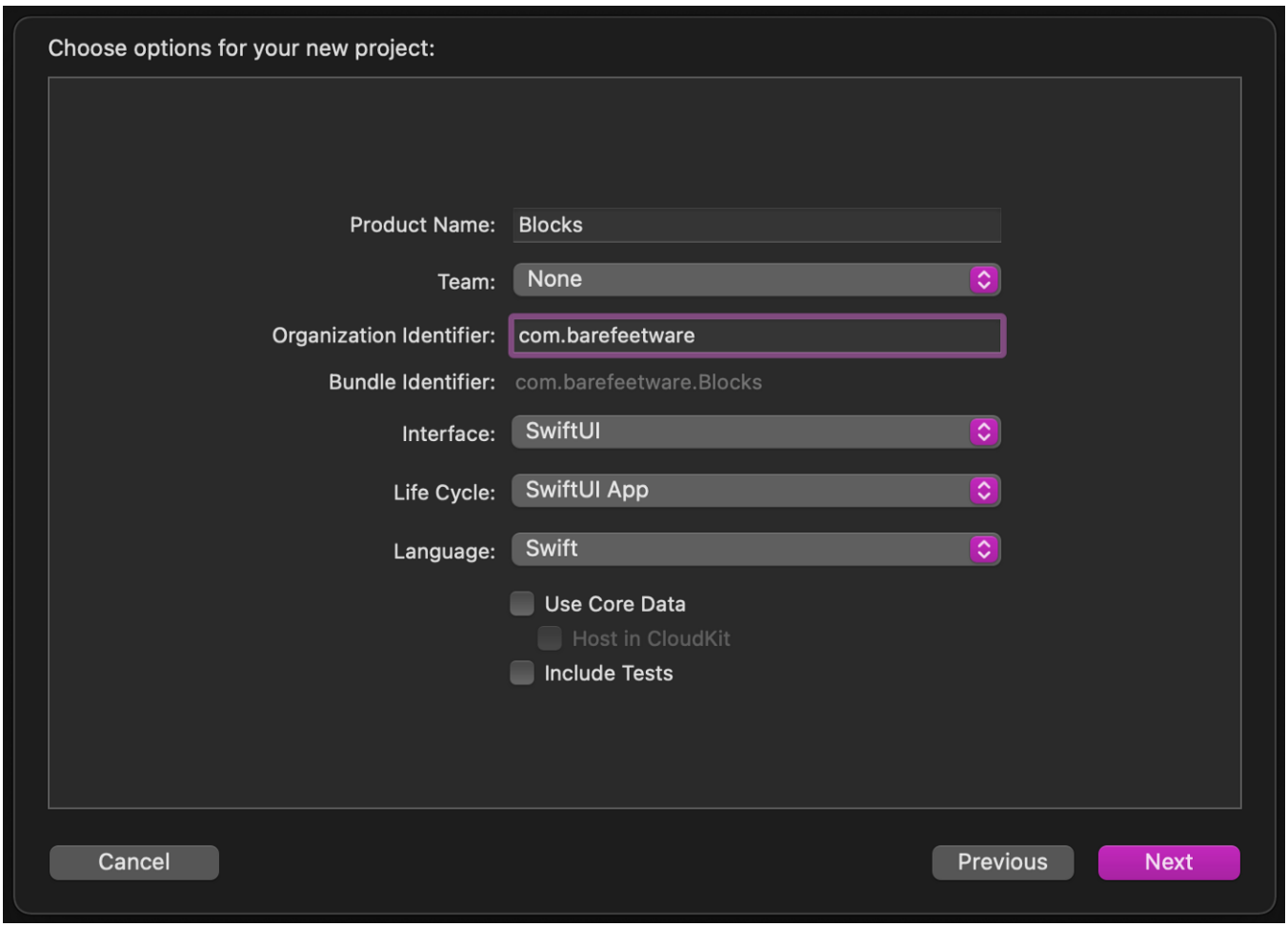
👁 Xcode asks you to `Choose options for your new project`.

👉 Enter the `Product Name` for your app as `Blocks`.



👉 You can leave the `Team` set to `None`. Or you can select a team if you have one. If it instead shows an `Add Account` button, then make sure that you completed the previous section “Enter Your Details”.

identifier as `com.mycompany`. If you don't have a domain name, you can just make one up or enter anything you like. You can change it later, but you can't leave it blank here.

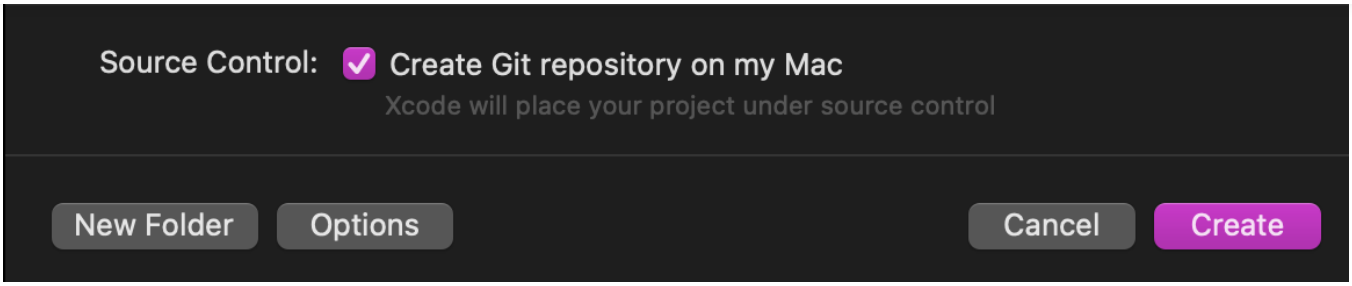


👉 Make sure that:

1. The `Interface` is set to `SwiftUI`.
2. The `Life Cycle` is set to `SwiftUI App`
3. The `Language` is set to `Swift`.
4. All the checkboxes are turned off.

👉 Click the `Next` button.

👉 Xcode asks where to save your new project. Turn on `Create Git repository`, so that we can commit changes. We'll discuss "commit" and "Git" later.

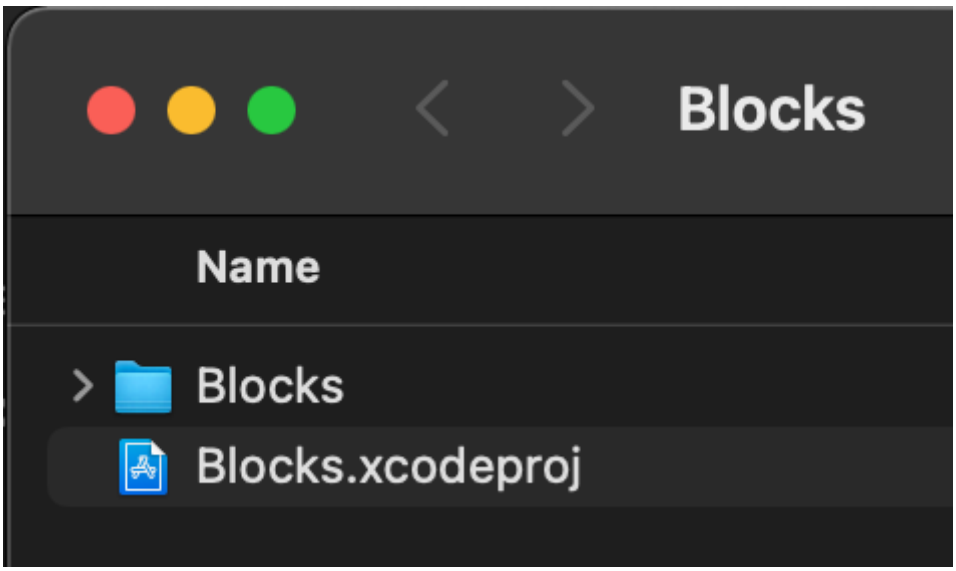


👉 Choose to save your new project in your Documents folder or wherever makes sense to you.

👉 Click the `Create` button to save it.

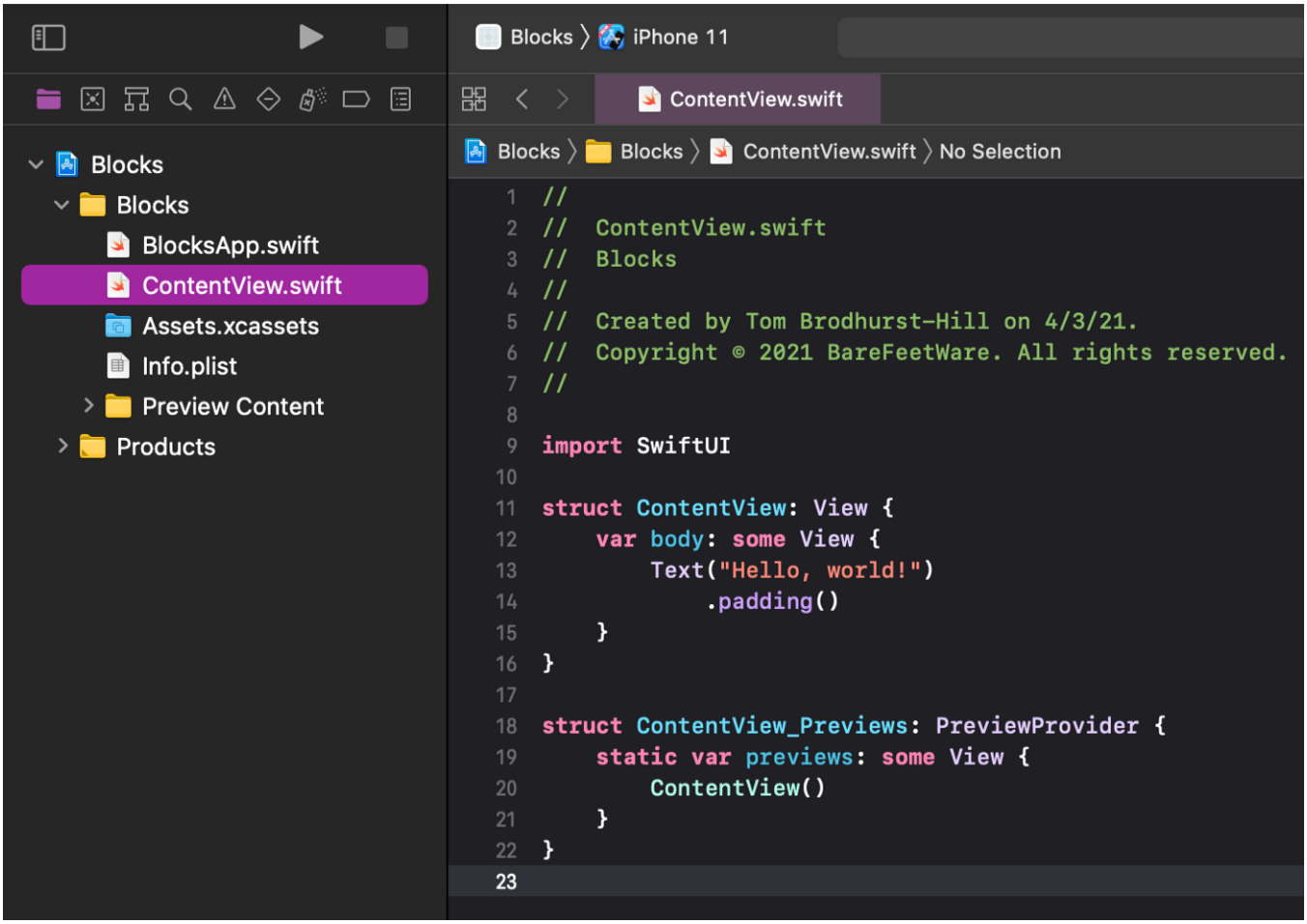
Xcode will create a folder (with the same name as your chosen `Product Name`) containing all of the files needed to build our app.

In the Finder, it looks like this:



Congratulations! You've just created a native iOS app!

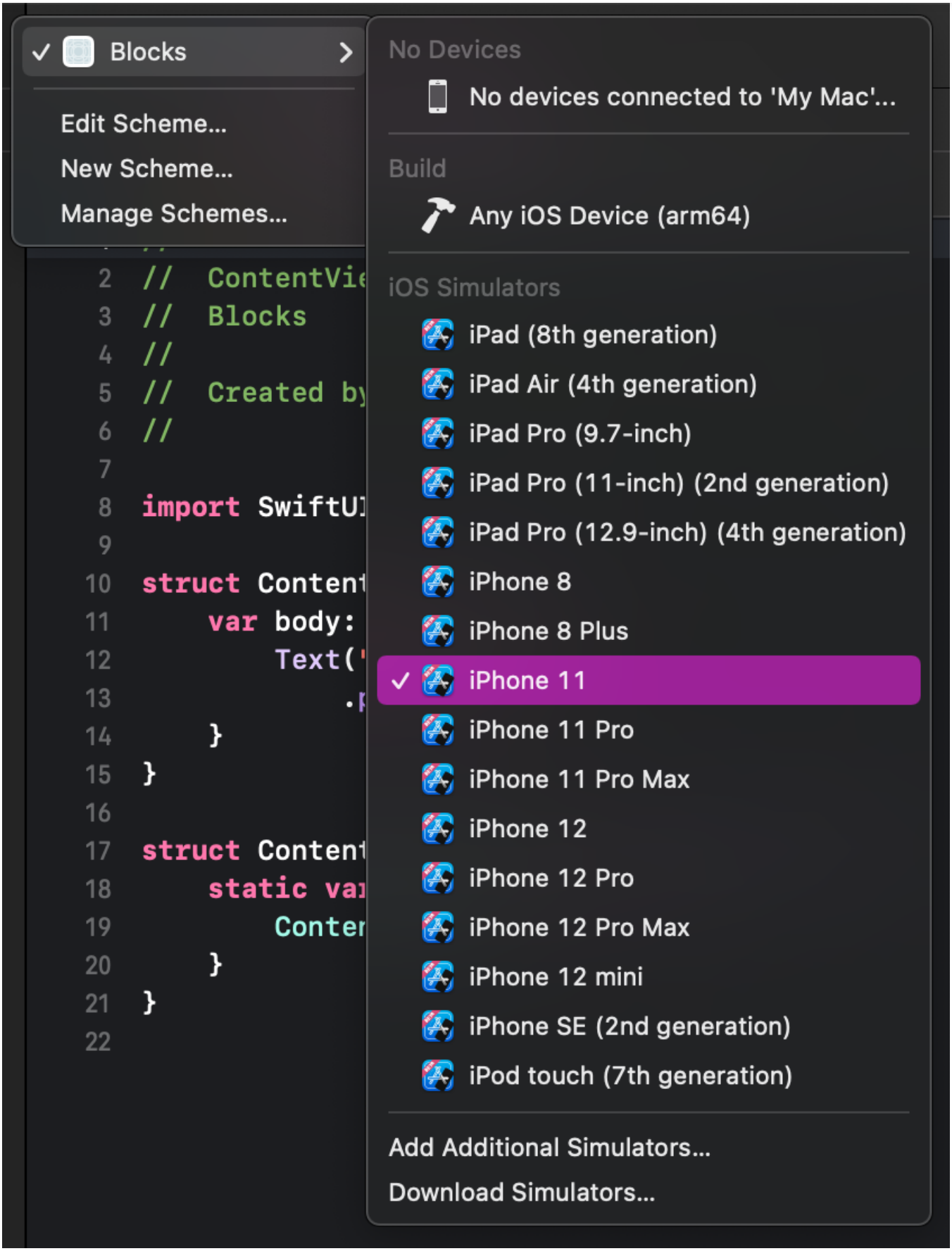
👁 Xcode now shows your project containing several files. It defaults to selecting the `ContentView.swift` file.



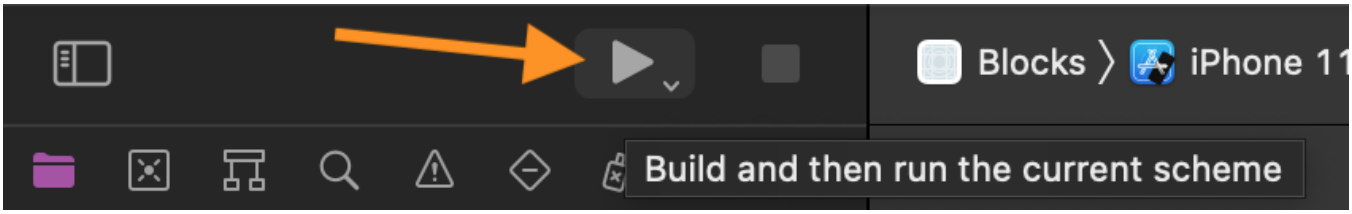
Let's check that we can run the app.

👉 Click on the `Blocks >` button.

👉 In the popup menu of devices, choose the `iPhone 11` simulator.



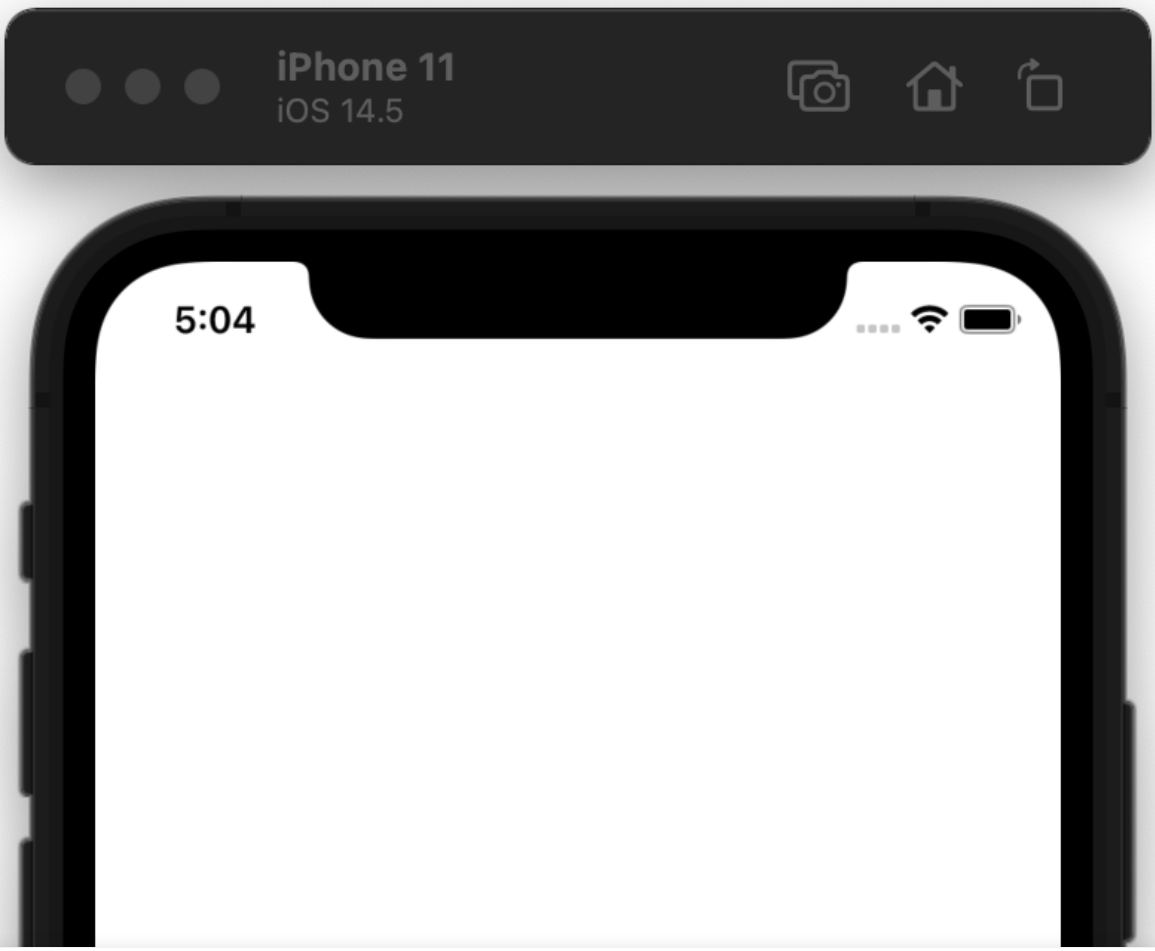
👉 Click on the `Build and Run` button (it looks like the “Play” button in iTunes) in the

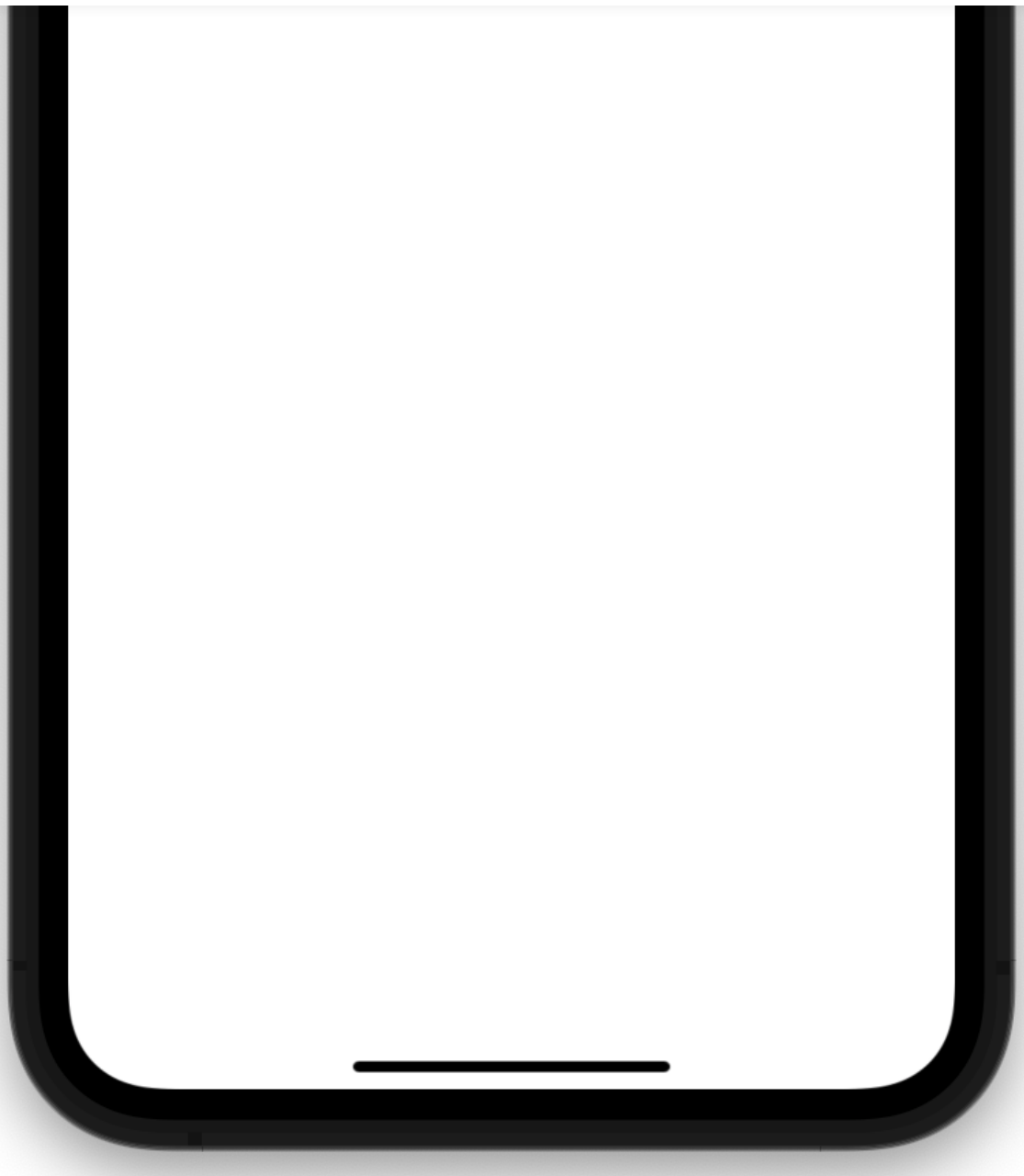


Be patient. It will take a few minutes for Xcode to build and run the app. Xcode will launch a new Mac app called “Simulator” in a window that looks like an iPhone. It is a simulated iPhone 11 (or whatever device appeared in the top left, next to the `Build and Run` button).

👁 At first, the iPhone screen will appear black. Eventually, you will see the app launch inside the simulated iPhone.

👉 If necessary, adjust the size of the simulator window to make it all visible. You can drag one of the corners, or select `Physical Size` from the `Window` menu.





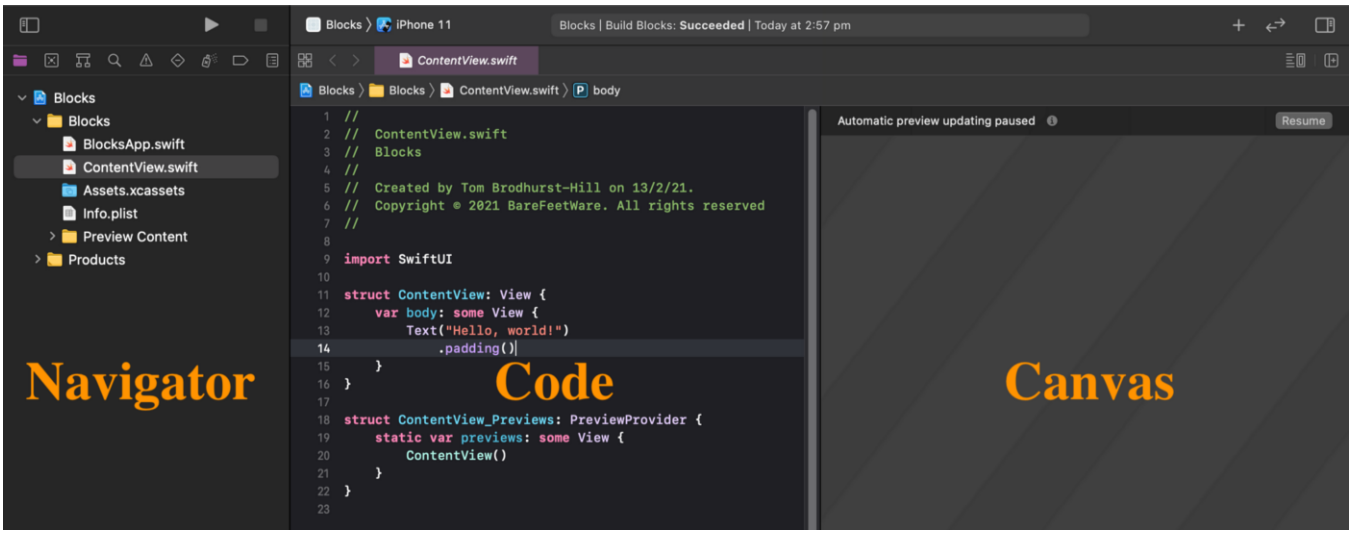
There — you've successfully built and run an app! It's not a prototype that tries to emulate a native app. It **is** a real native app. You could deploy this on the App Store. Well, you could try, but as you'd hope, Apple will reject it because it doesn't actually do anything useful — yet.

4. Xcode Panels

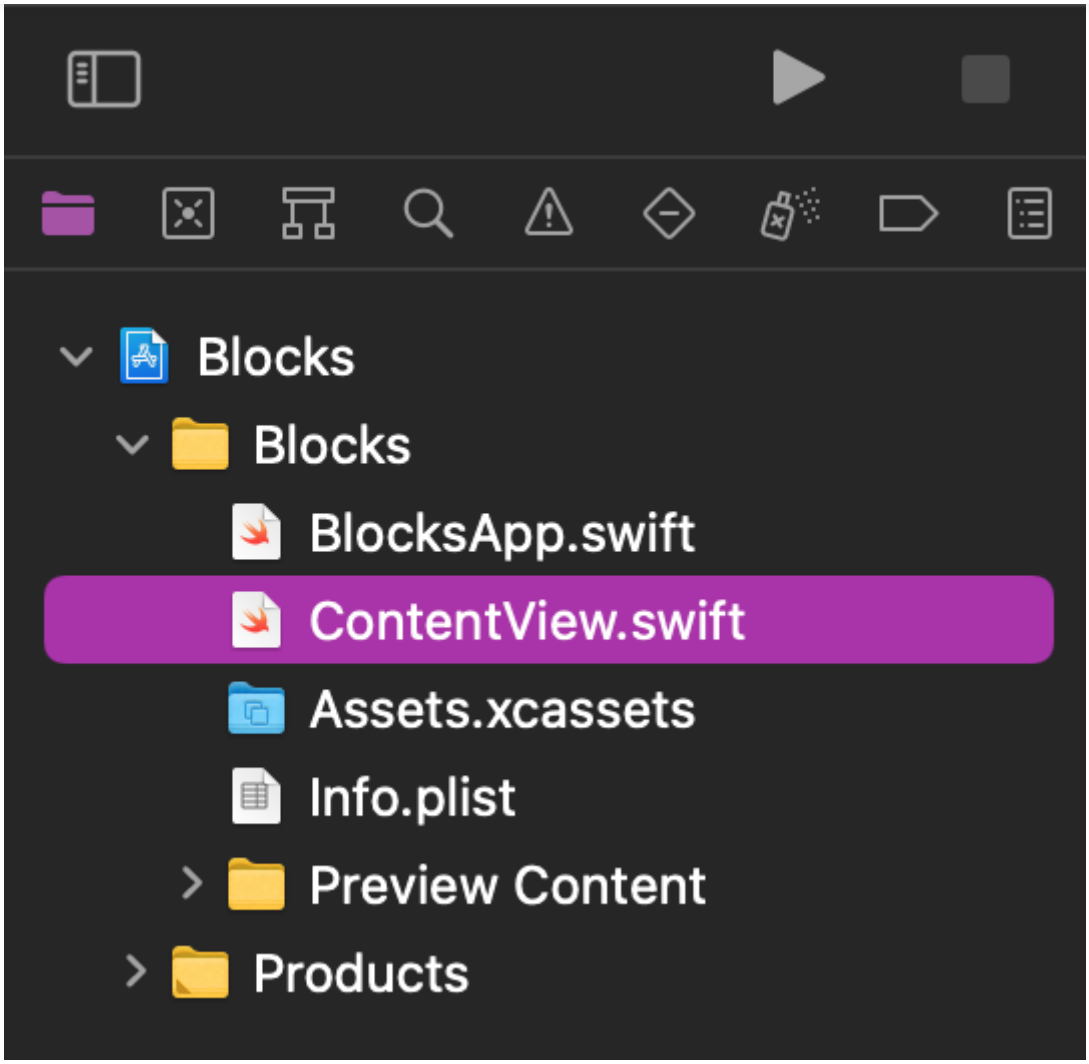
👉 Switch back to Xcode.

The Xcode window is divided into several panels. Let's run through some basic tips on how to move around, hide and show these panels. Don't worry about the content or purpose of these panels for now. We will discuss that later.

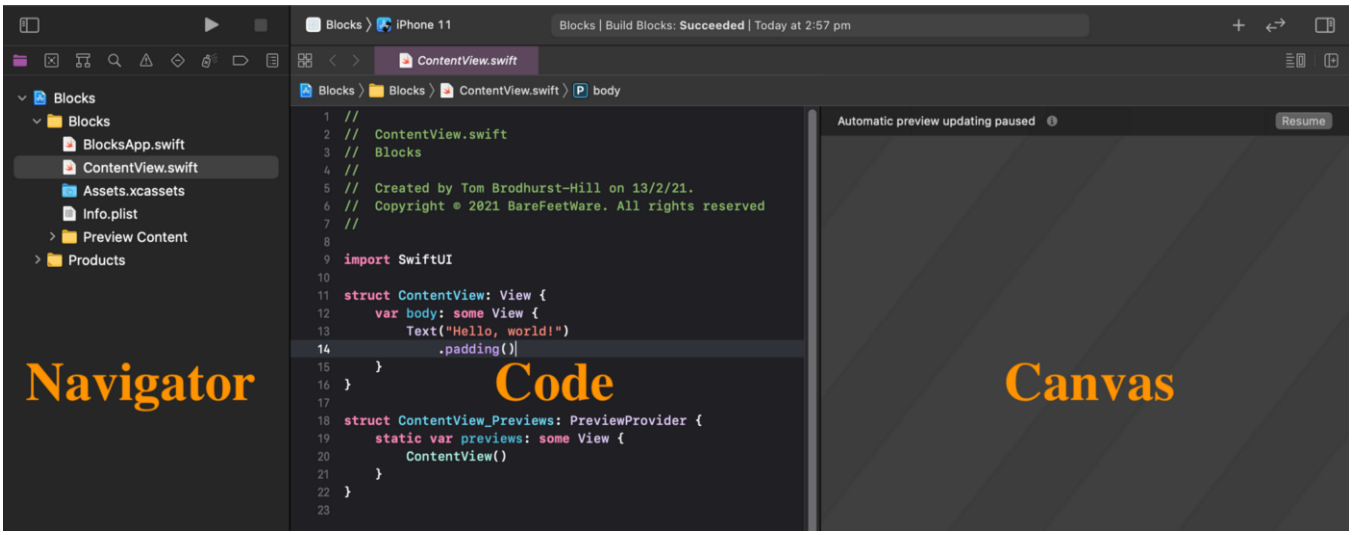
The left panel is the "Navigator", currently showing the "Project Navigator" (a list of files in the project). The right panel is the "Inspector".



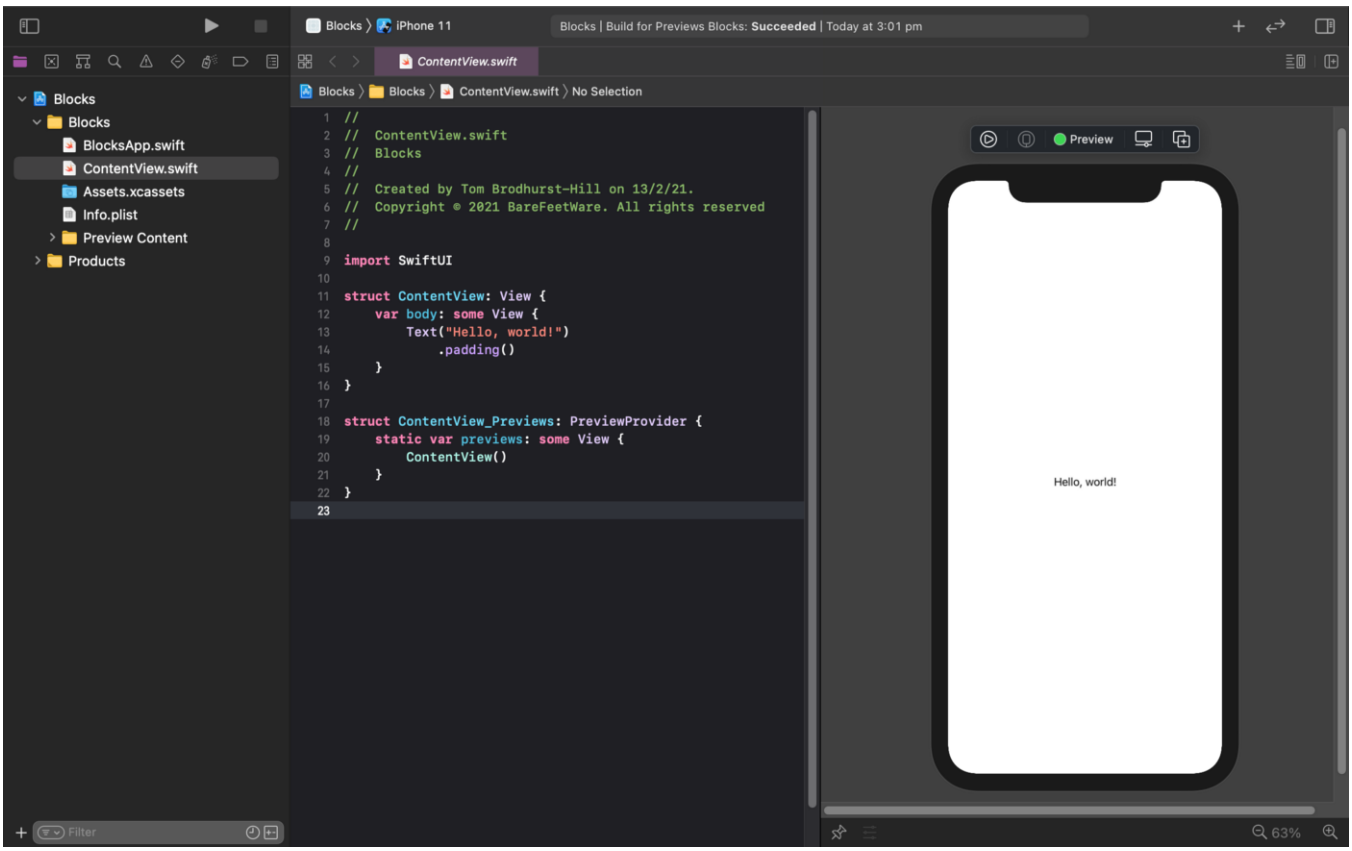
👉 Look at the Project Navigator (the left panel). The `ContentView.swift` file should be selected. If not, click **once** on it. **Don't double click**, or you'll open a new window (which you can easily close).



👁 The middle panel contains the content of the item selected in the navigator. In this case, the `ContentView.swift` file's programming code.



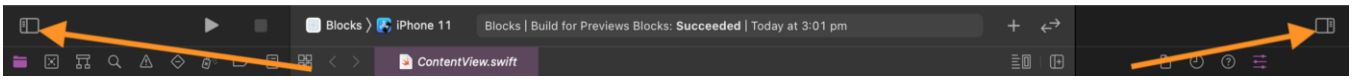
👉 Tap on the `Resume` button. After a few seconds, you should see a preview of the app:



👁️ This is a preview of what the app will look like when it runs the `ContentView.swift` code on the left.

Especially on a small screen, like a laptop, you might need some extra room for the code and preview panes. Fortunately, you can hide and show the left and right panels using the `Show/Hide Navigators and Inspectors` buttons in the top left and top right of the window.

👉 Click on the buttons to familiarise yourself with how to hide and show the Navigator and Inspector panels.



👉 Scroll around the preview pane (vertically and horizontally) using your trackpad or mouse. You can pinch to zoom or click on the `–` and `+` button at the bottom of the

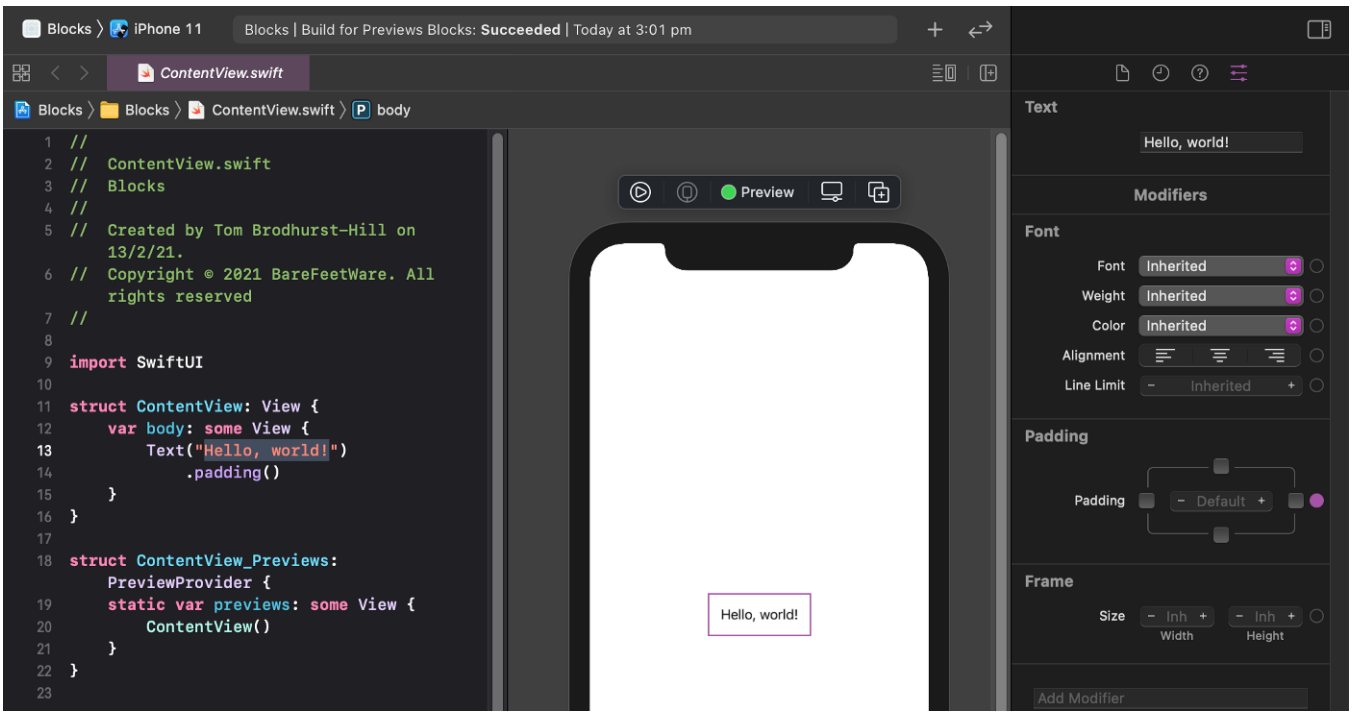
5. Edit Text

Now the fun begins!

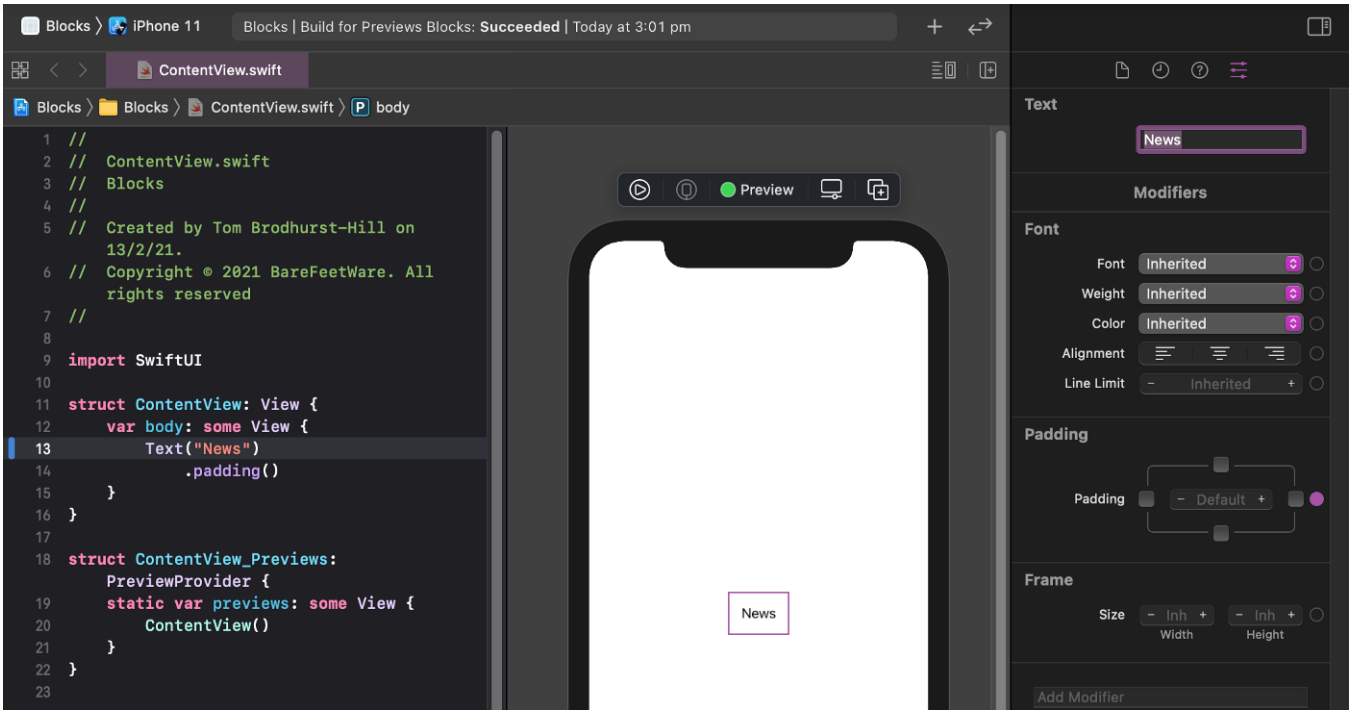
The preview panel on the right shows what the code on the left instructs it to do.

If you're new to coding or prefer to design visually, here's the good news: In many cases, you can edit items in the preview directly, and Xcode will rewrite the code for you!

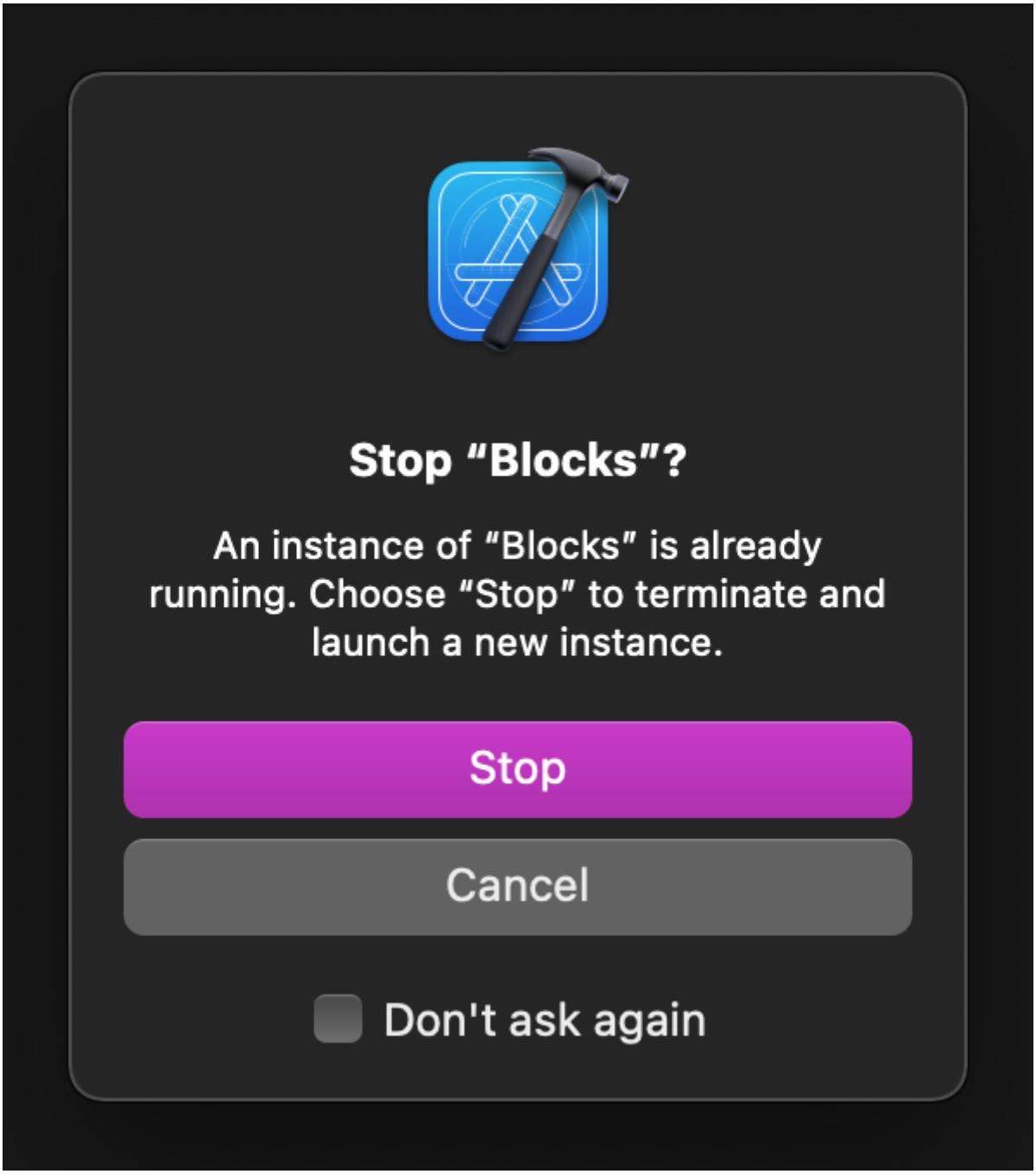
👉 Double click on the `Hello World` text in the preview, so that it shows a blue rectangle around it. Xcode will highlight the text in the code on the left and show it in the `Attributes Inspector` on the right.



👉 Now, type your own label text for this scene as `News` . Type it in the `Attributes Inspector` to be safe. Hit `Return` (on the keyboard) to make the change take effect. Alternatively, you can type it in the code, but then you must ensure that surrounding code, such as the quotation marks, remain intact, or it will cease to preview or run properly until you fix it. If you make a mistake, `Undo` is the easy way to backtrack.

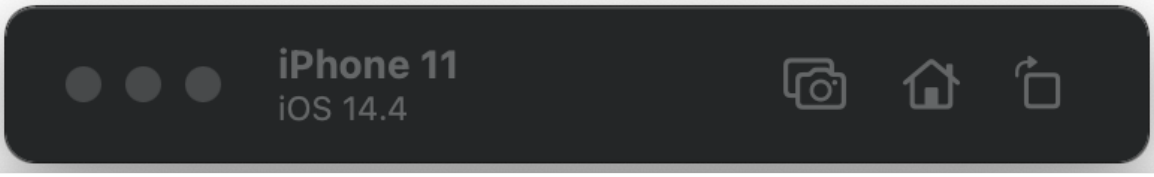


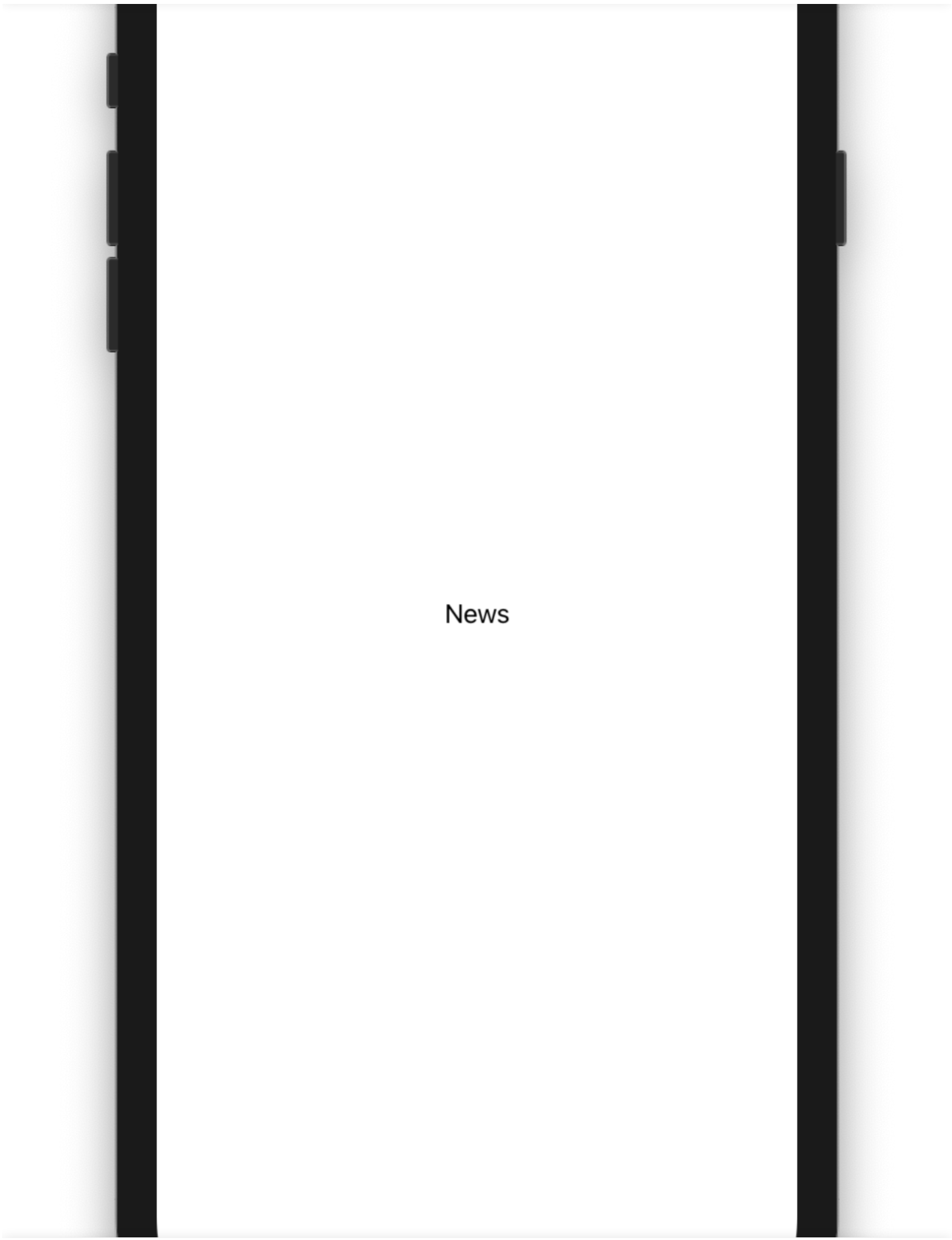
👉 Run the app again by clicking the `Build and Run` button in the top left of the Xcode window. If you already have the app running, Xcode will ask if you're happy for it to quit the old one in order to run the new one.



👉 Click `Stop`, so the new app can run.

👁 The app should now show the altered `News` text.





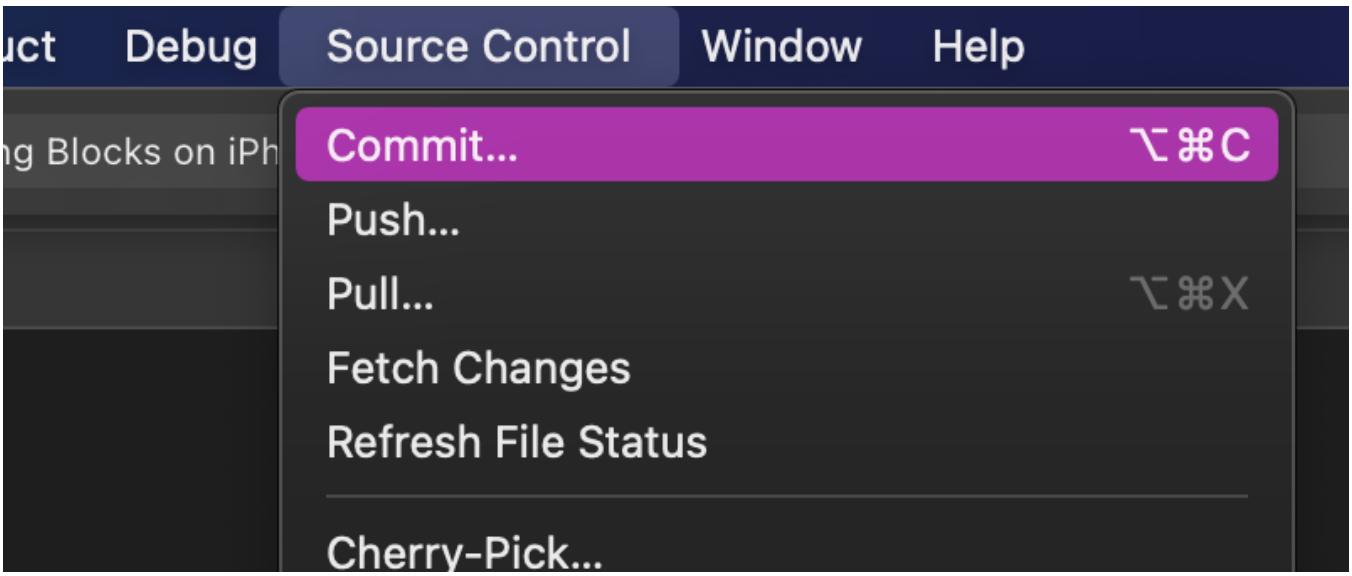
6. Commit the Changes

👉 Switch back to Xcode.

Xcode has already saved our changes, so we could quit Xcode, relaunch and pick up where we left off. However, along the way, we'll be making lots of changes and might like to experiment with different ideas or go back to a version of the project that we created a few days ago. To enable us to save particular versions or milestones, we can use the "Git" version control system. Git is widely used in all programming disciplines and document control in general. Xcode provides a few menu items to access some Git commands easily.

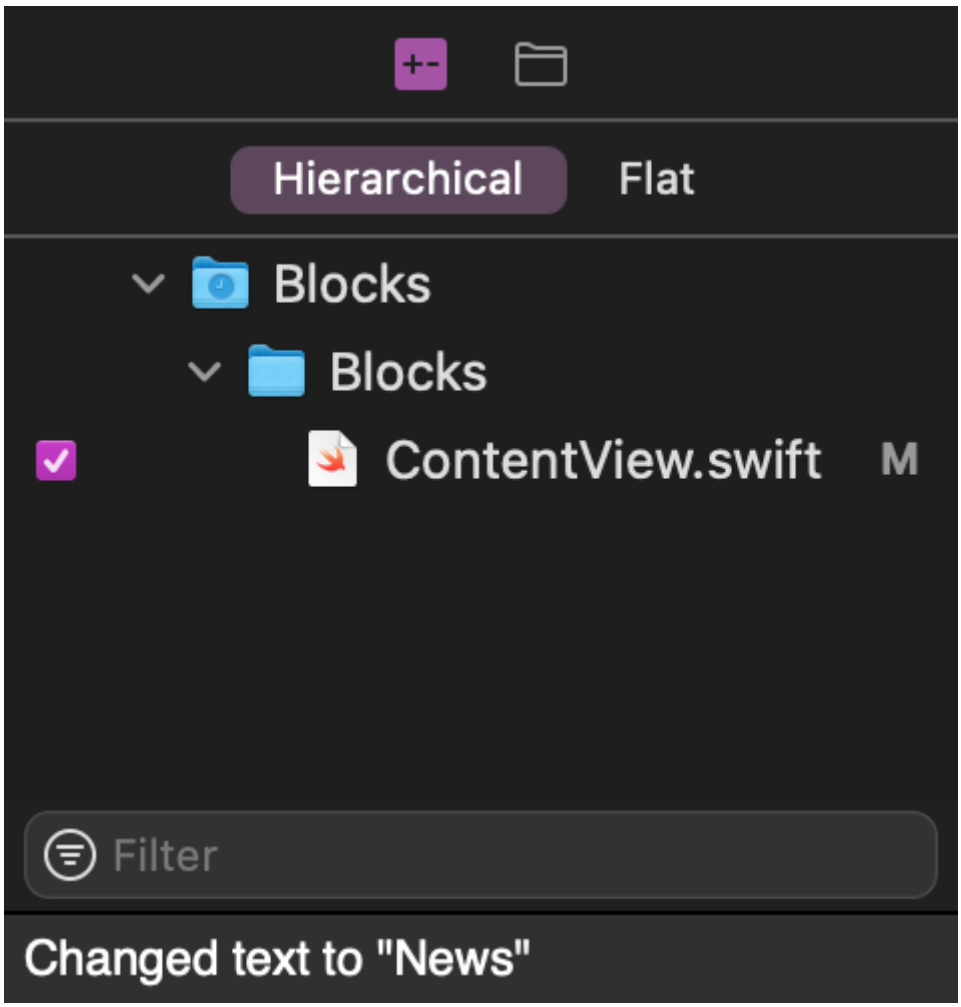
Let's commit the changes that we've done so far, with a description of what we changed. Later, we will be able to see this in the history of our app development and revert back if desired.

👉 In Xcode, in the `Source Control` menu (in the menu bar at the very top of the screen), select `Commit`.



👁 Xcode shows the files that we've changed. In this case, we've only changed the `ContentView.swift` file. Make sure that the checkbox next to the file is ticked.

👉 At the bottom of the window, where the cursor is flashing, type in a description of your changes, such as: `Changed text to "News"`.



👉 Click the `Commit` button.

7. Recap Tutorial 1

That brings us to the end of Tutorial 1. So far, we have:

1. Installed the Apple iPhone developer toolset (Xcode).
2. Created a native iOS app.
3. Modified just a bit of it.
4. Run the app on an iPhone simulator.
5. Committed changes through Git version control.

Now, move on to Tutorial 2, where we'll start to customize the navigation flow of our app.

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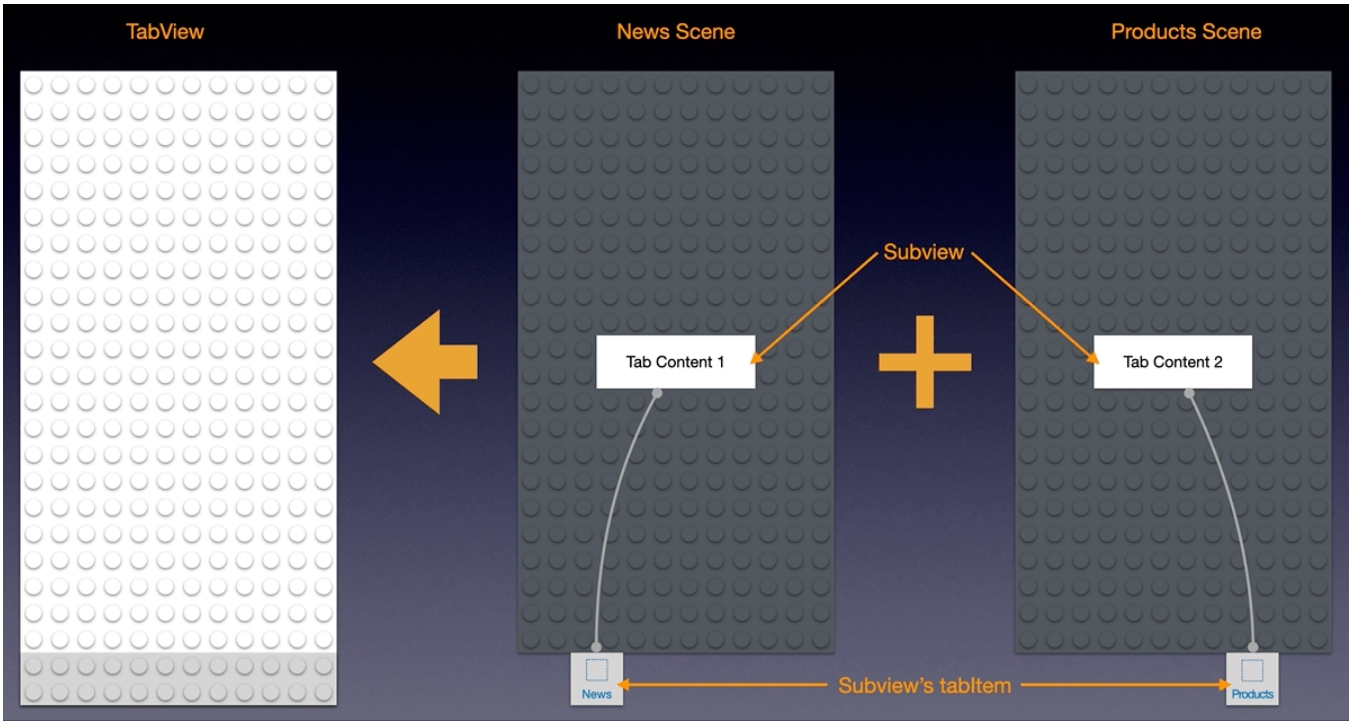
Scenes, Subviews, and Tab Views

Build an App Like Lego, with SwiftUI — Tutorial 2

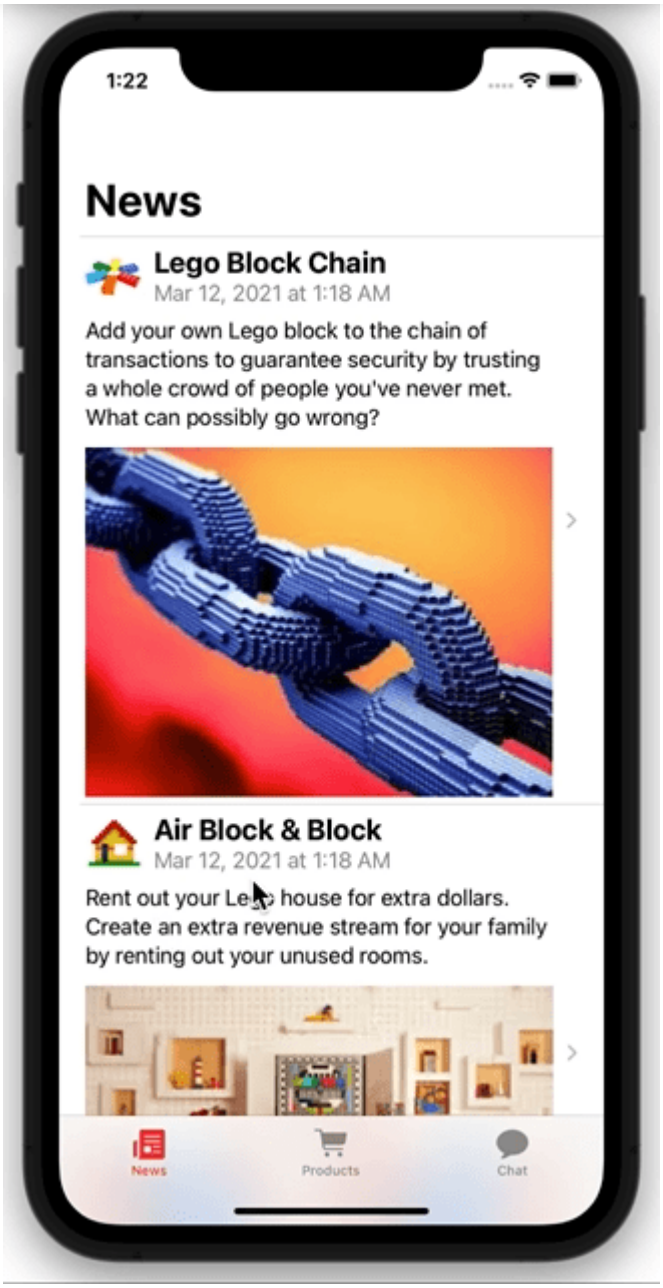


1. Introduction

Navigating a mobile app is fundamentally different from using a web browser. Customers love the simplicity and predictability of a mobile UI (user interface). They can move from one app to another while using the same navigation actions to switch between features, scroll through a list, drill down to something more specific, and so on.

In this Tutorial 2 of the series, we will learn how visual content is managed within other content, using “views”. We will introduce the “tab view”.

Recall that we’re aiming to build an app that looks something like this:



In Tutorial 1 we created a template app, with just one view that showed the text "News". As shown above, we need to instead show a tab bar with three tab items (News, Products, and Chat), each of which has its own view content. We also need a navigation bar for each. Each scene needs a scrolling list.

Make sure that you have completed Tutorial 1 in this series. We'll pick up here where the previous tutorial left off. Or, you can download the prepared project, ready to start this tutorial.

2. Scene and View

1. A **view** is a visual object, usually in a rectangular shape. It can be something small like a `Text` object, a `Switch` or `Slider`, or something large like a `ScrollView` or `TabView`.

2. A **scene** is a view that occupies the whole screen or a panel in the screen (such as in a split view).

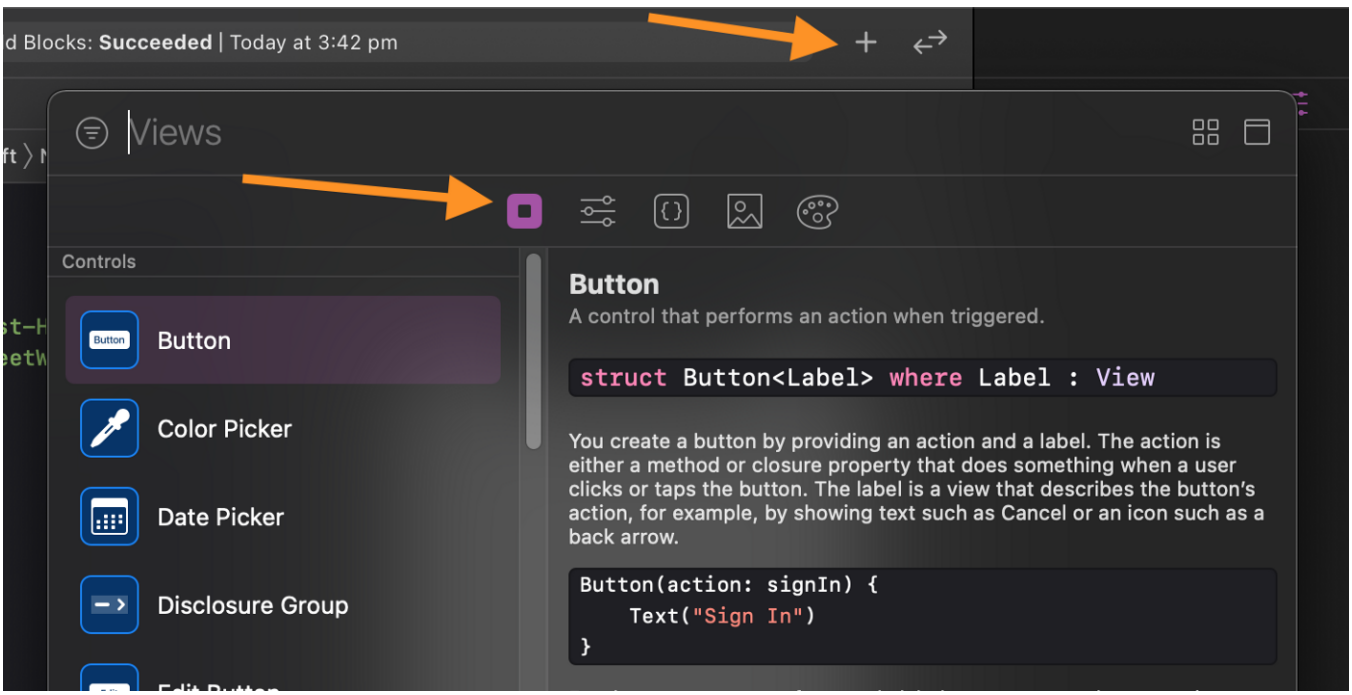
Informally, you may also hear people refer to a scene as a "page", "window", or "screen". Technically, however, the iPhone has just had one physical "screen" and each app usually exists inside just one "window".

3. Views Library

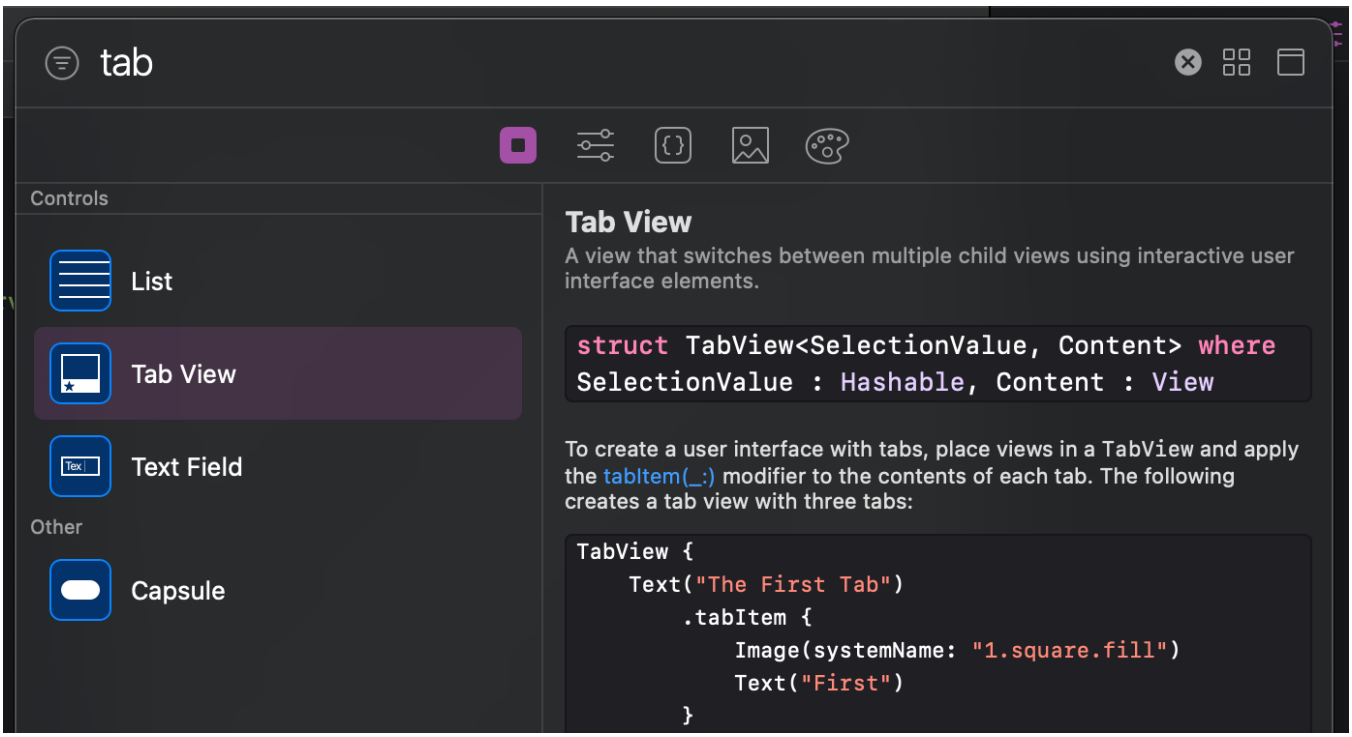
👉 In the Project Navigator, click on the `ContentView.swift` file to select it, if it's not already selected.

👉 Near the top right of the Xcode window, click on the "Library" button which has a `+` icon.

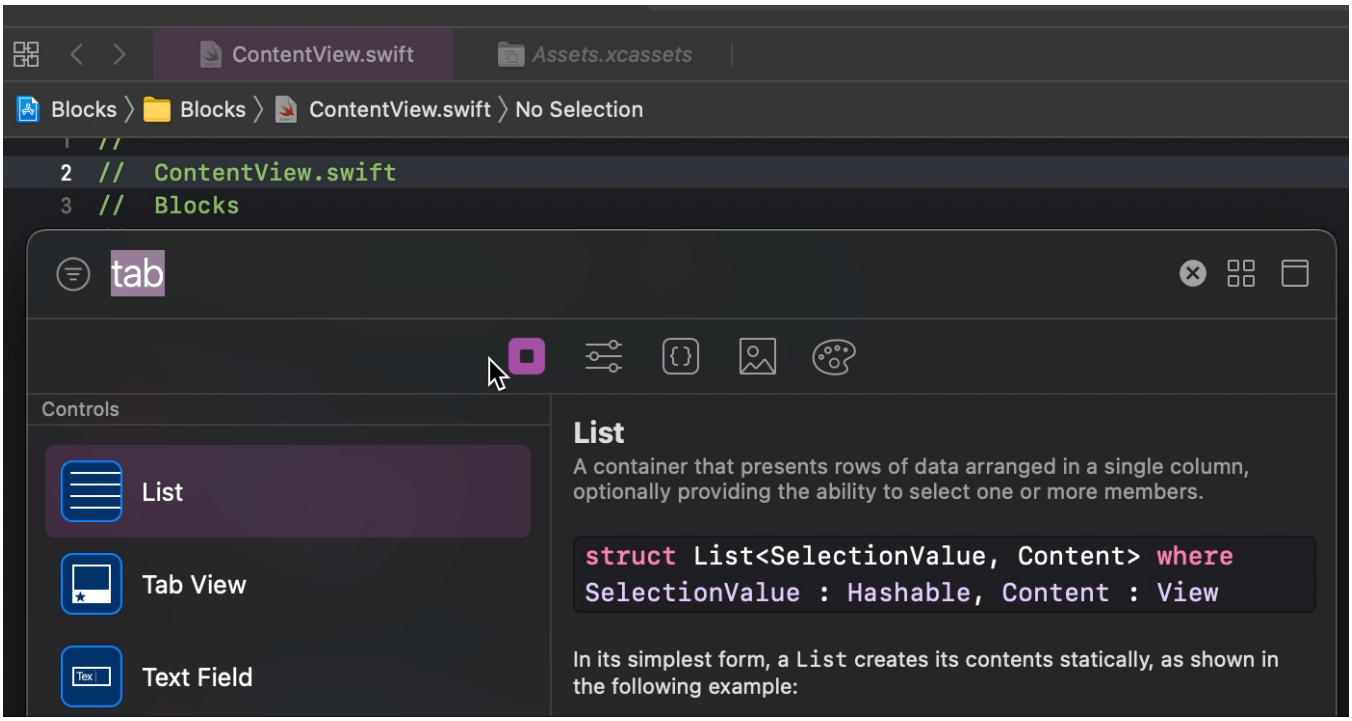
The `Library` panel appears. Ensure that the first icon in it is selected to show you the `Views` library.



👉 In the search field at the top, type `tab`. Xcode shows just the views related to “tab”:



👉 Drag the `Tab View` from the Views Library into the code, between the `var body` line and the `Text` line. When Xcode makes a new empty line between, then release the dragged object.



```
import SwiftUI

struct ContentView: View {
    var body: some View {
        TabView(selection: Selection) {
            Text("Tab Content 1").tabItem { Text("Tab Label 1") }.tag(1)
            Text("Tab Content 2").tabItem { Text("Tab Label 2") }.tag(2)
        }
        Text("News")
            .padding()
    }
}
```

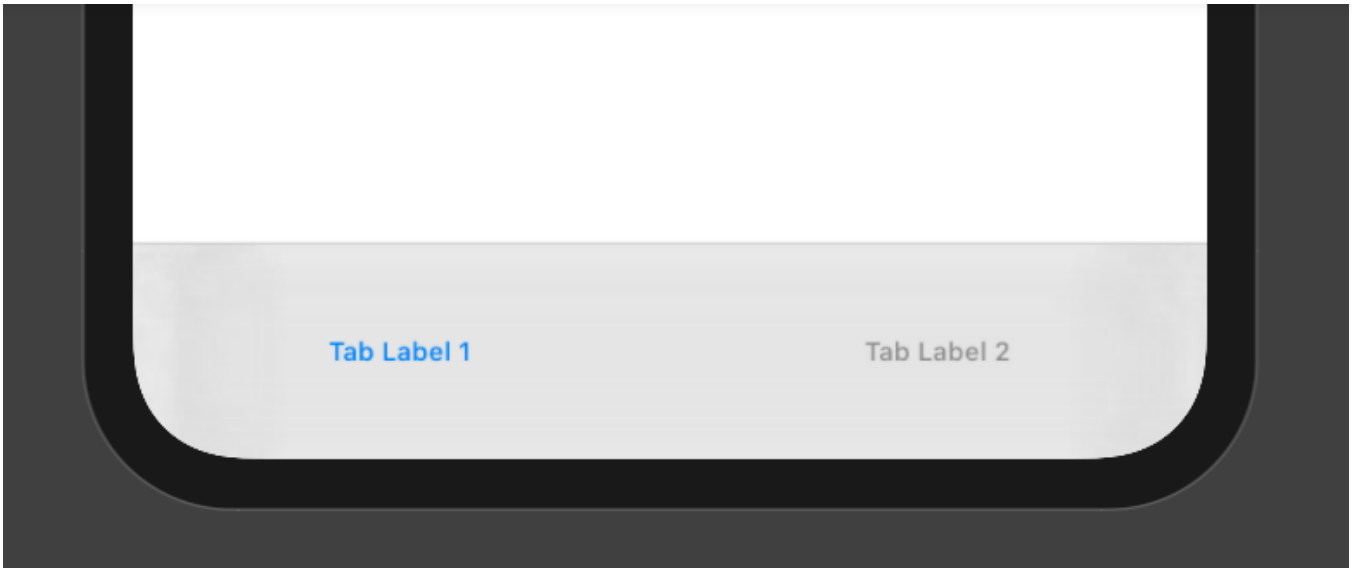
👉 If your Mac's screen is small, the code might soft wrap over more lines, making it harder to read. In that case, widen the code panel by dragging its vertical dividers, so the code looks similar to the above screenshot.

Dragging code from the Library has the same effect as just manually typing it. But dragging from the Library is obviously faster and more accurate.

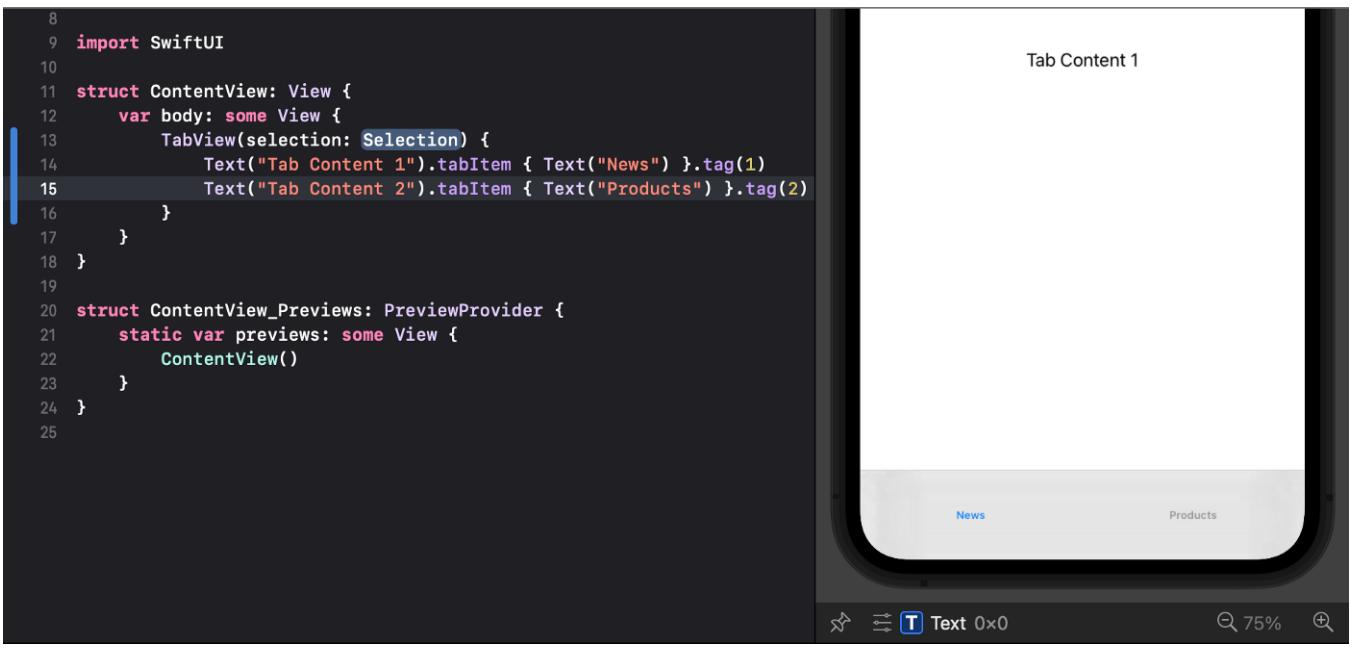
👉 We don't want the old `Text("News")` anymore, so delete it and the `.padding()`.

👁️ After deleting, check that your code looks like this:

```
struct ContentView: View {
    var body: some View {
        TabView(selection: Selection) {
            Text("Tab Content 1").tabItem { Text("Tab Label 1") }.tag(1)
            Text("Tab Content 2").tabItem { Text("Tab Label 2") }.tag(2)
        }
    }
}
```



👉 In the code, change the quoted text of the two `tabItem`s to `News` and `Products` respectively. You might need to double-click in the code to edit inside the quotes.



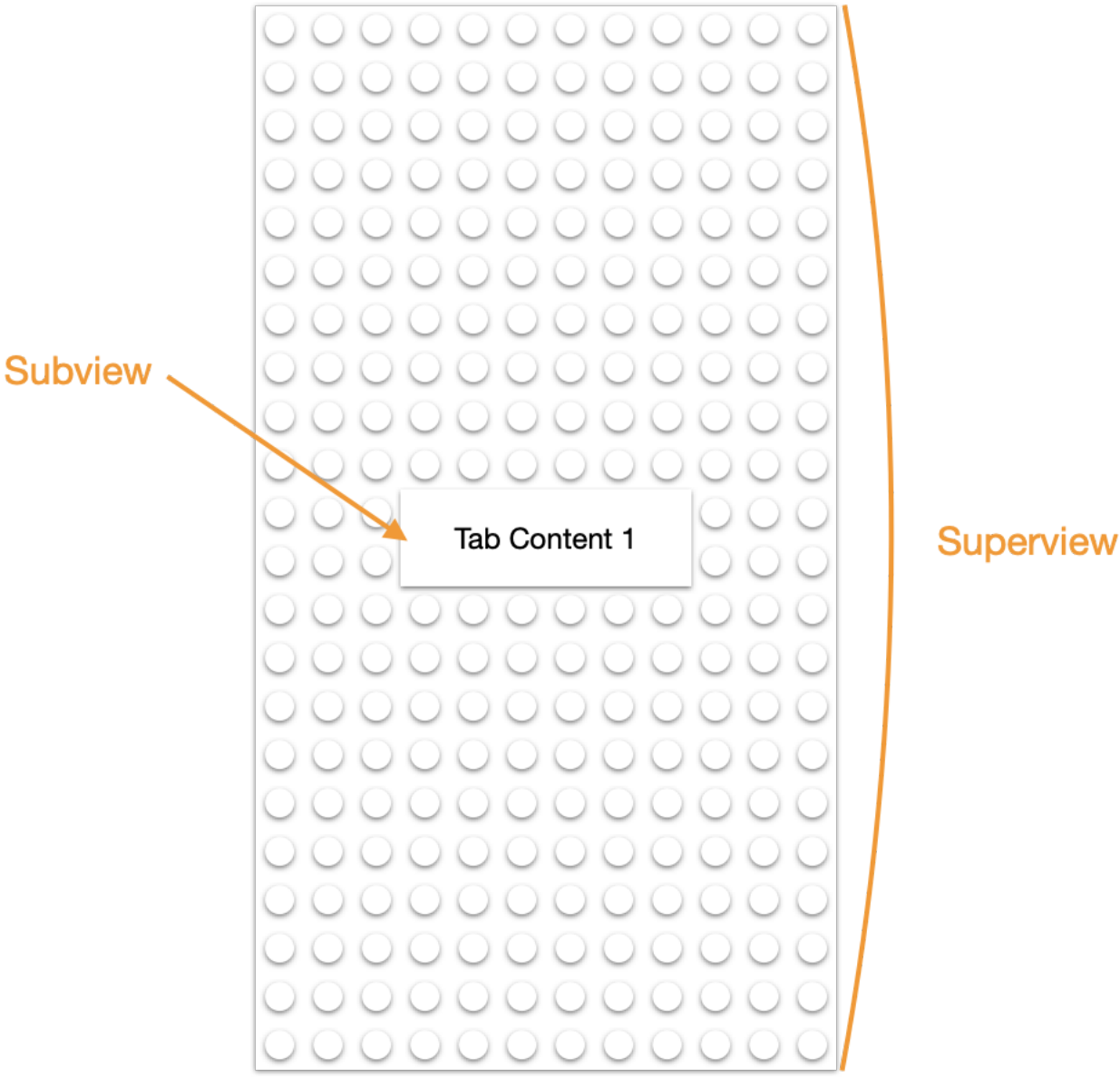
👁 Confirm that the preview shows the two tab items with the new text. If necessary, click on the `Resume` button to refresh it. If it shows any error, check that the code is correct.

3. Superview and Subviews

A view has a rectangular shape. A view may contain other views. The containing view is called the “superview” and the views within it are called its “subviews”.

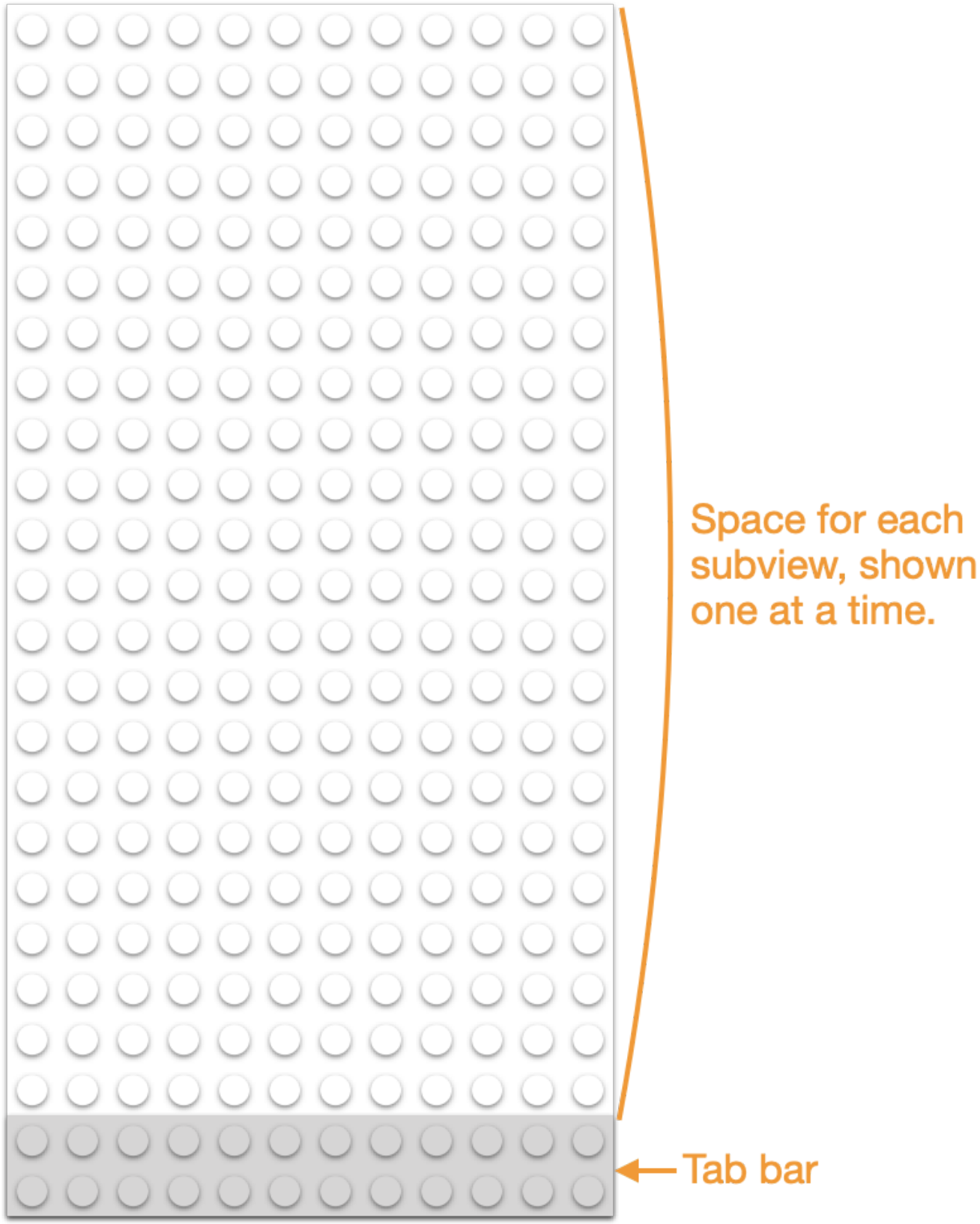
You can think of a superview as a large rectangular Lego block containing smaller Lego blocks as subviews. The subview blocks can only be placed within the rectangular bounds of the superview.

In the News scene, the `Text` subview is like a Lego block placed on top of the large rectangular scene's view.

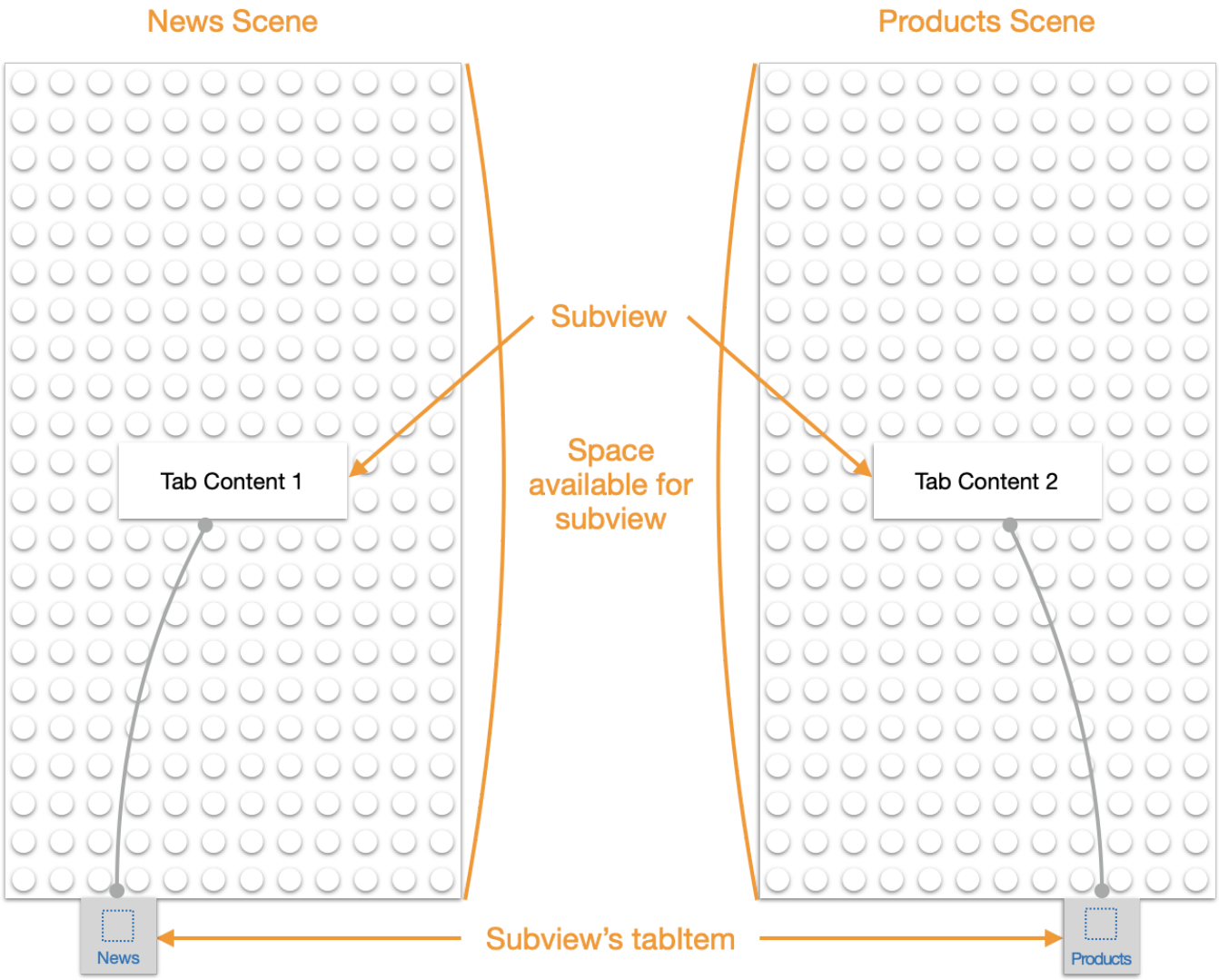


Some types of views don't have subviews. For instance, you don't add a subview in a `Text` view. In the Lego analogy, the `Text` views don't have connecting studs on top of them, as you can see in the above diagram since they don't accept subviews.

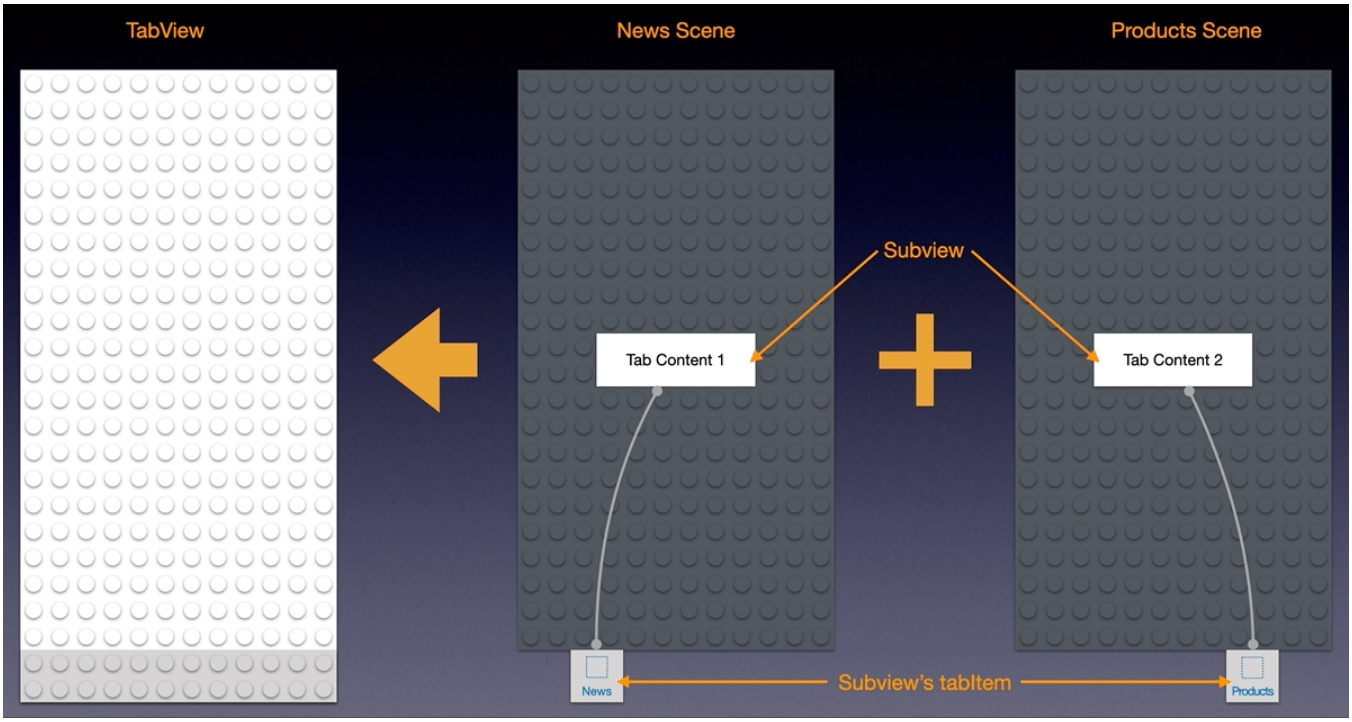
We can think of the `TabView` as a Lego base plate that provides a space for each subview and a tab bar at the bottom, which contains the `tabItem` label of each subview.



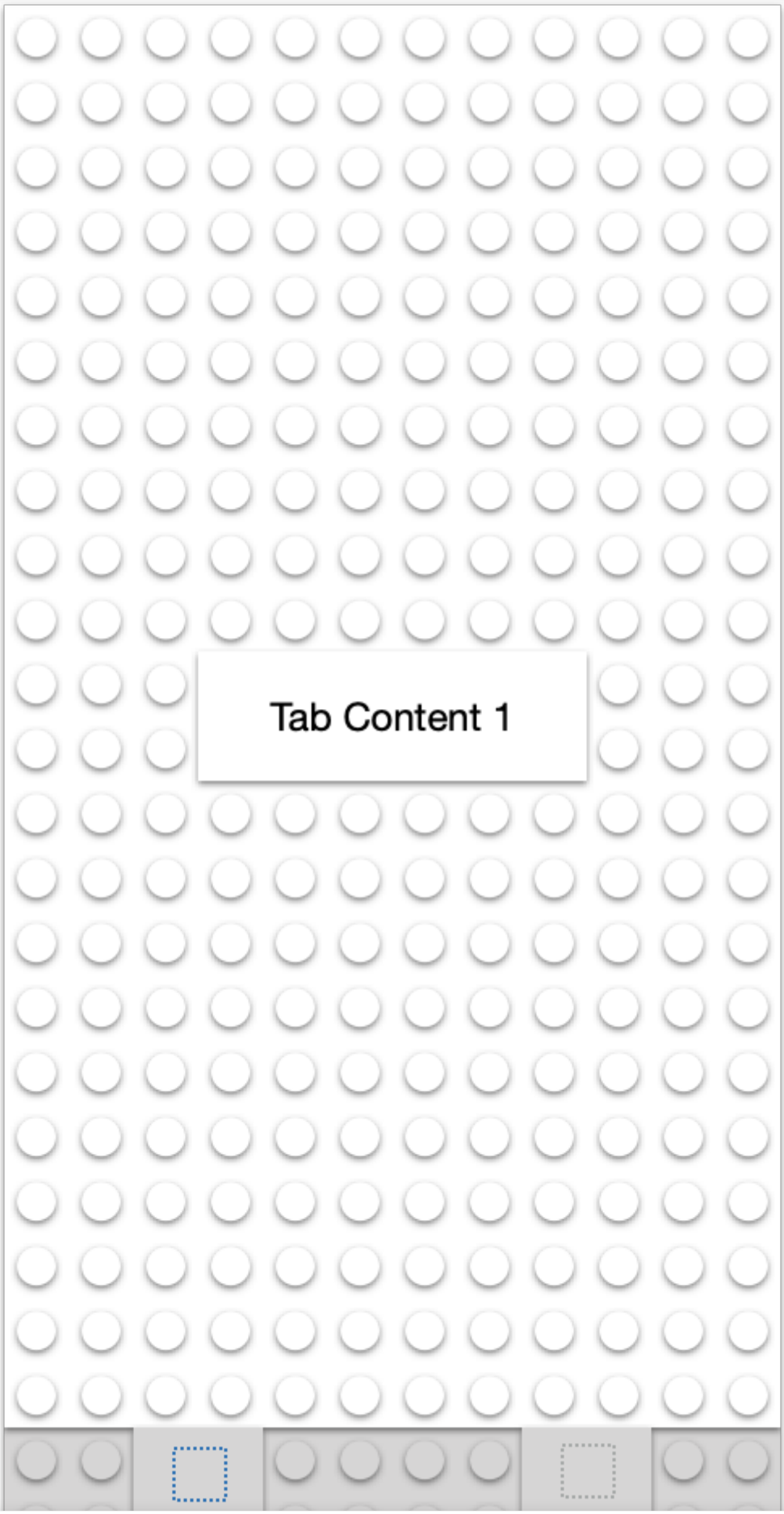
We can picture the News scene and Product scene as these Lego constructions, each with a view and a `tabItem`:



The `TabView` loads each subview when needed but shows the `tabItem` of all of the subviews at once.



For example, when the News tab item is selected, we can picture the composed tab view like this:



In summary, there are three parts to the tab view structure:

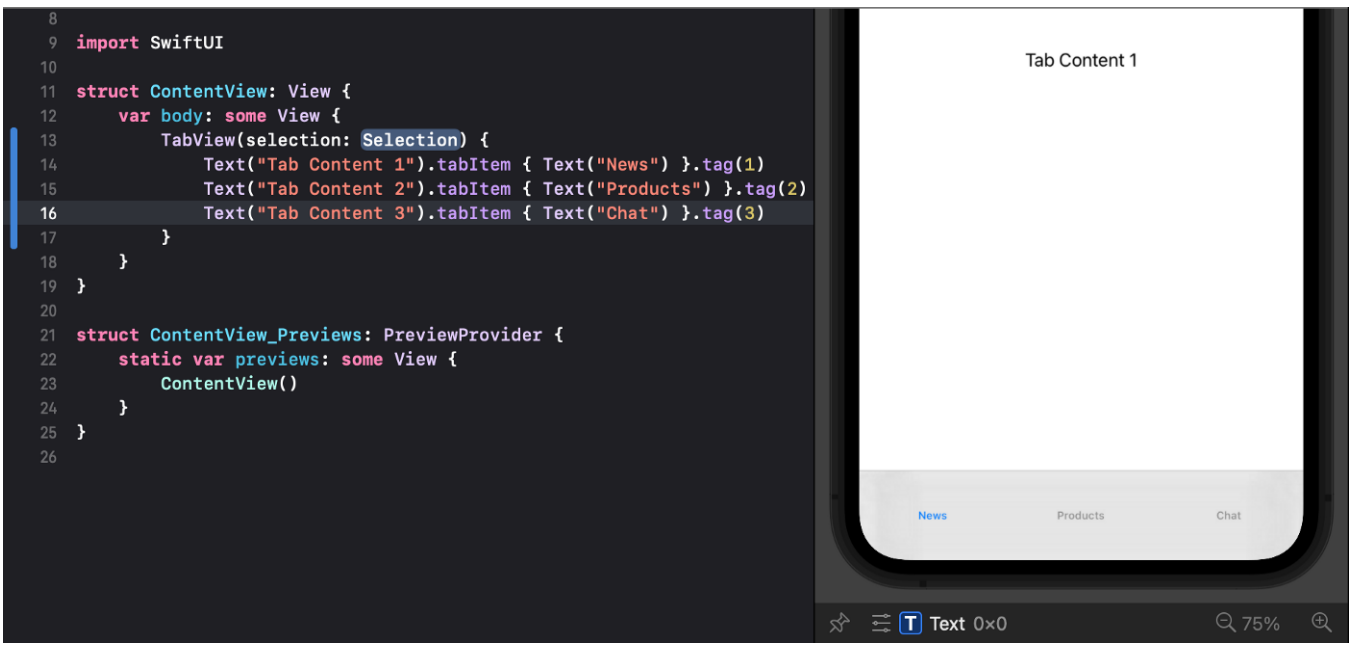
1. The **`TabView`**. It is responsible for showing the current scene's view inside it and the tab bar (at the bottom).
2. The **tab bar** sits at the bottom of the screen. It contains all of the tab items and usually changes the color of the currently selected one.
3. A **`tabItem`** (containing text and/or icon) for each scene.

You can see that the News scene contains a tab item with the text `News`. The Products scene contains a tab item with the text `Products`. The `TabView` shows its tab bar containing all of the tab items.

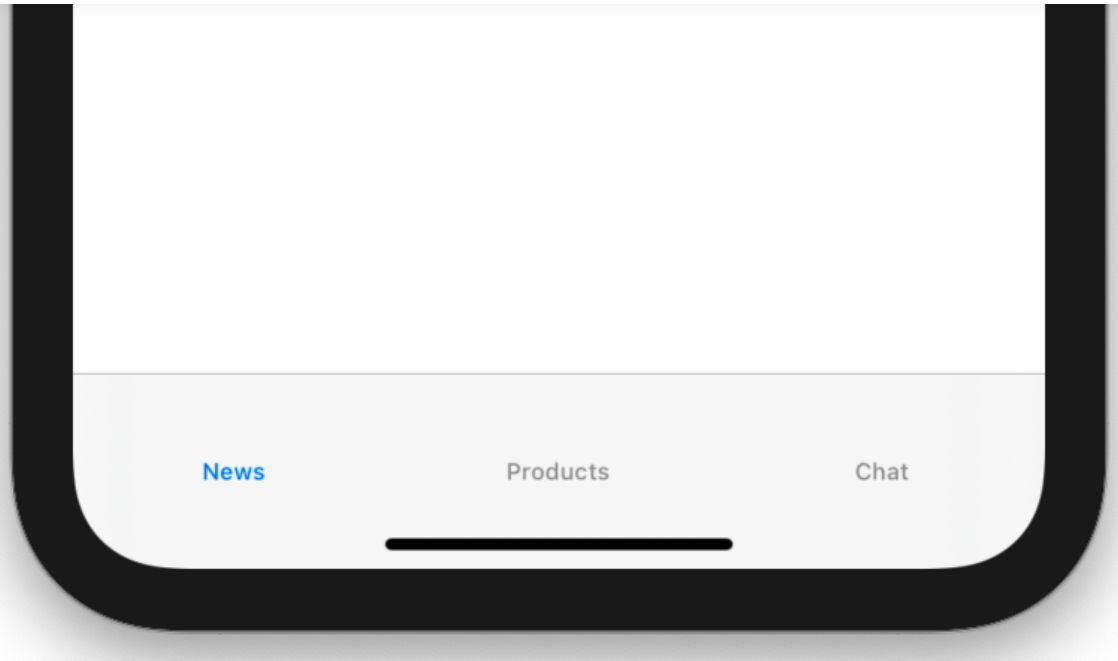
5. Add a New Scene

Let's add a new scene for "Chat". This will provide a third view in the `TabView` with its own `tabItem`.

👉 Select the second `tabItem` line of code (such as by triple-clicking in that line). Copy it and paste it into a new line below it. In the new line, change both of the `2`s to `3` and change `Products` to `Chat`.



👁️ Verify that the running app looks similar to the preview, showing three tab items. Use the mouse to tap/click on the `Products` and `Chat` tab items to switch the selected tab item and content in the tab view.



6. Commit Changes

Switch back to Xcode.

As we did in Tutorial 1:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Added TabView with three tabItems`
3. 👉 Click on the `Commit` button.

7. Recap

In this Tutorial 2 we have:

1. Discussed subviews in a superview.
2. Added a new “Chat” scene to the tab view.

In Tutorial 3 we will continue modifying the scene flow using navigation views.

⁉️ If you have any questions or comments, please add a response below.

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Tom Brodhurst-Hill · Following
Mar 25, 2021 · 7 min read ★

Navigation Views, Inside a Tab View

Build an App Like Lego, with SwiftUI — Tutorial 3

Photo by Michael Bader on Unsplash

1. Introduction

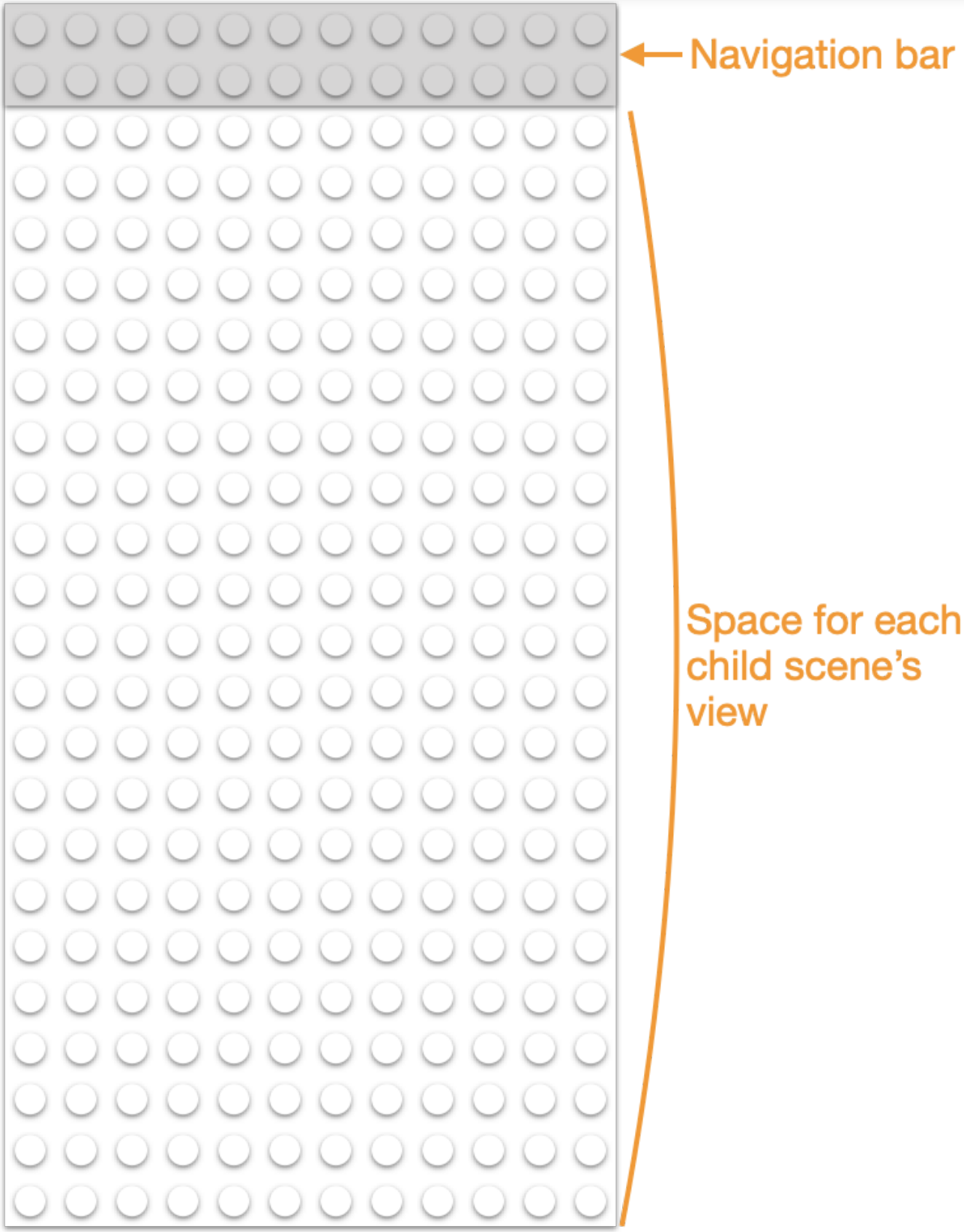
At the end of Tutorial 2 the News, Products and Chat scenes appeared as tabs in a tab view. In this Tutorial 3, we will embed each of those scenes in their own navigation view, and add navigation titles.

Make sure that you have completed the previous tutorials in this series. We'll pick up here where the last tutorial left off. Or, you can download the prepared project, ready to start this tutorial.

2. Navigation View

A navigation view presents a series of scenes, where tapping some button, cell, or link in the first scene navigates to the corresponding second scene, and so on. The second scene usually has a back button that returns to the first scene.

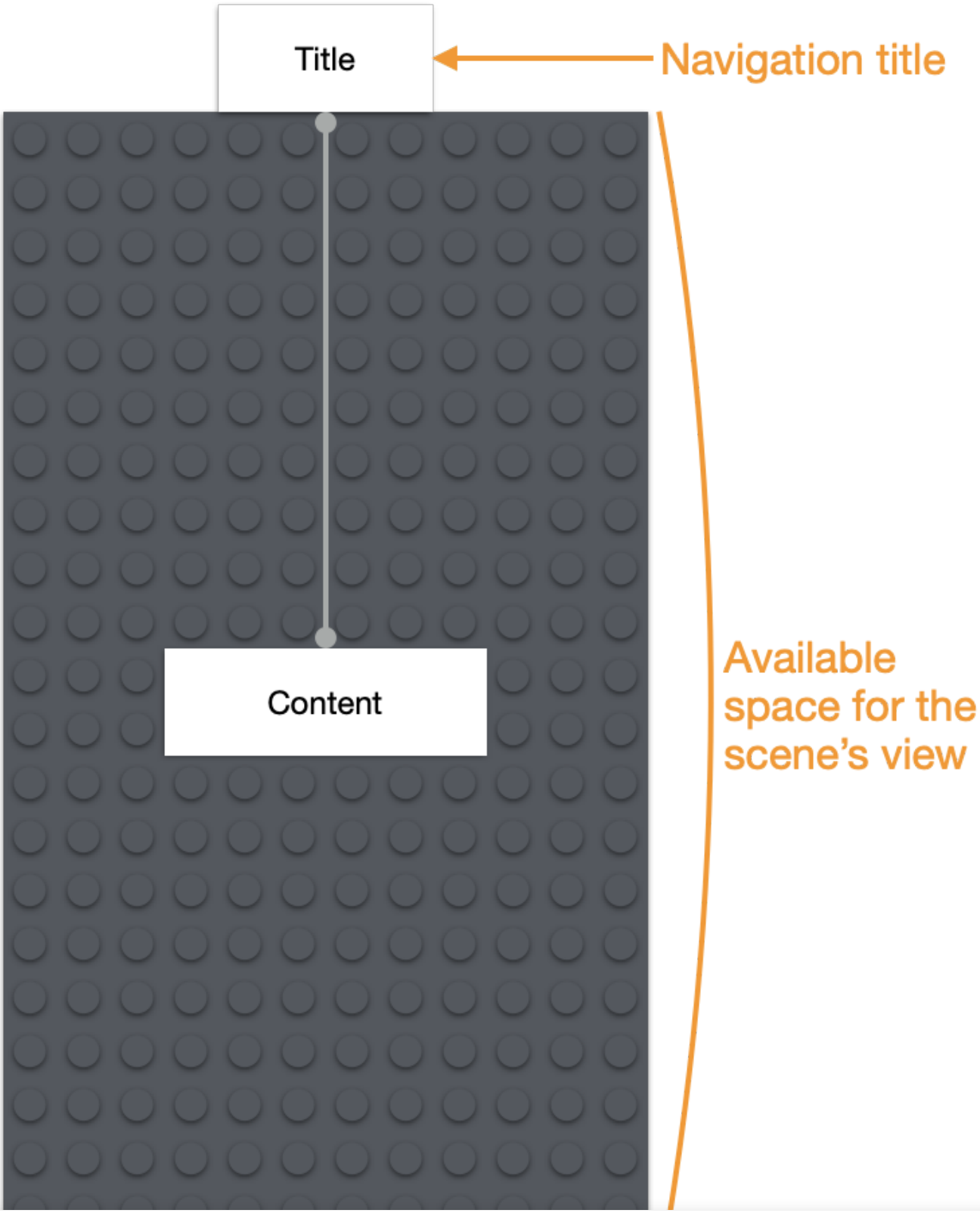
A navigation view is similar to the tab view that we discussed in Tutorial 2. It has a large space in which it shows the current child scene and a navigation bar (at the top) that shows the title of each child scene. Imagined as a Lego baseplate, it would look like this:



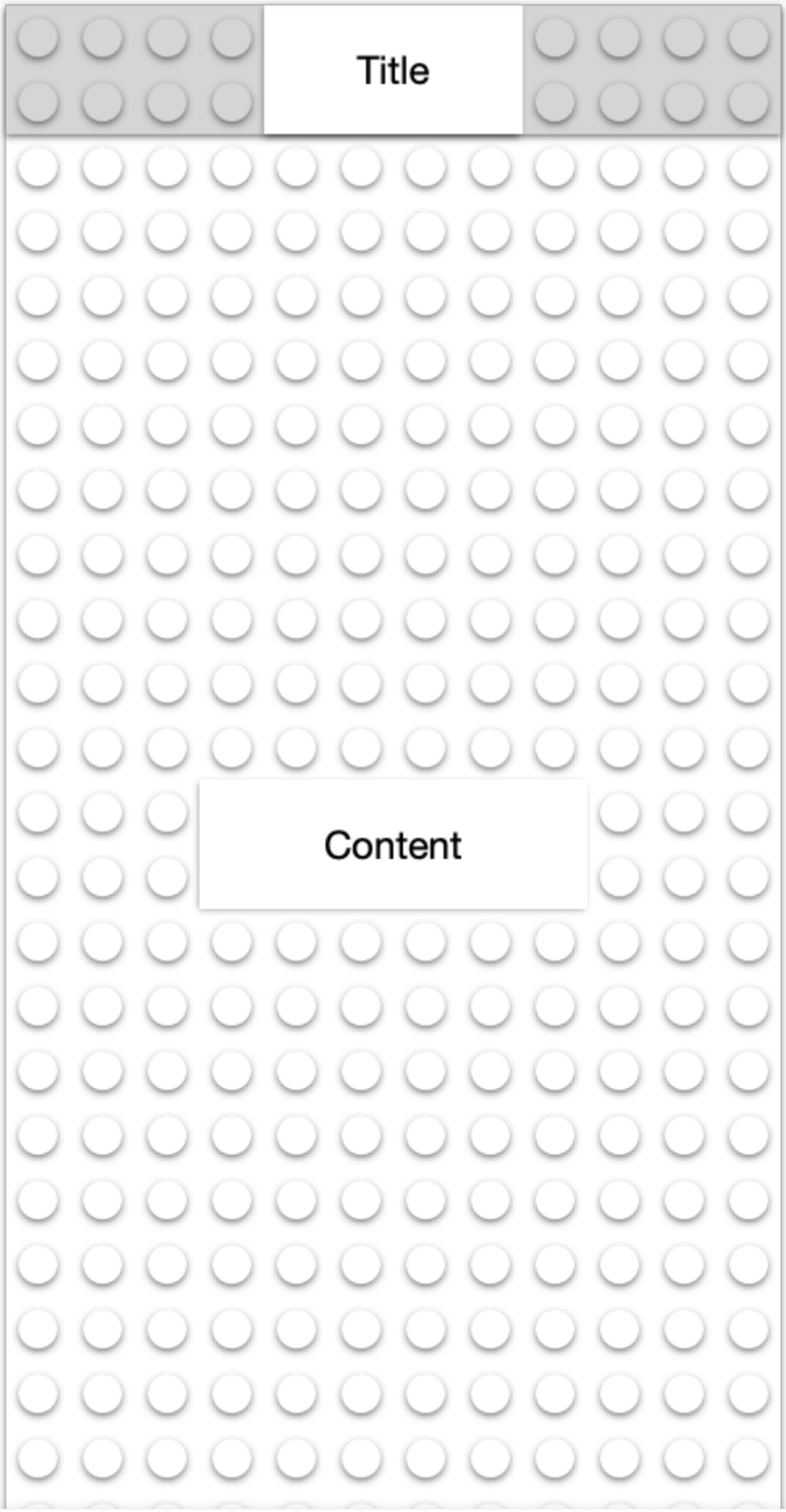
Like the tab view, the navigation view shows one child scene at a time. Each child scene can provide its own “navigation title” to appear in the navigation bar. Unlike the tab bar, the navigation bar only shows one navigation title at a time — the one belonging to

on the left and right, such as buttons, which we'll discuss later. For now, we'll just deal with the navigation title.

We can imagine a scene's view and navigation title as Lego blocks:



When we put the child scene in the navigation view, it is like adding the scene's Lego blocks (the content and title) onto the navigation view base plate. The navigation title appears on the navigation bar and the scene's content occupies as much of the rest of the space as it needs.

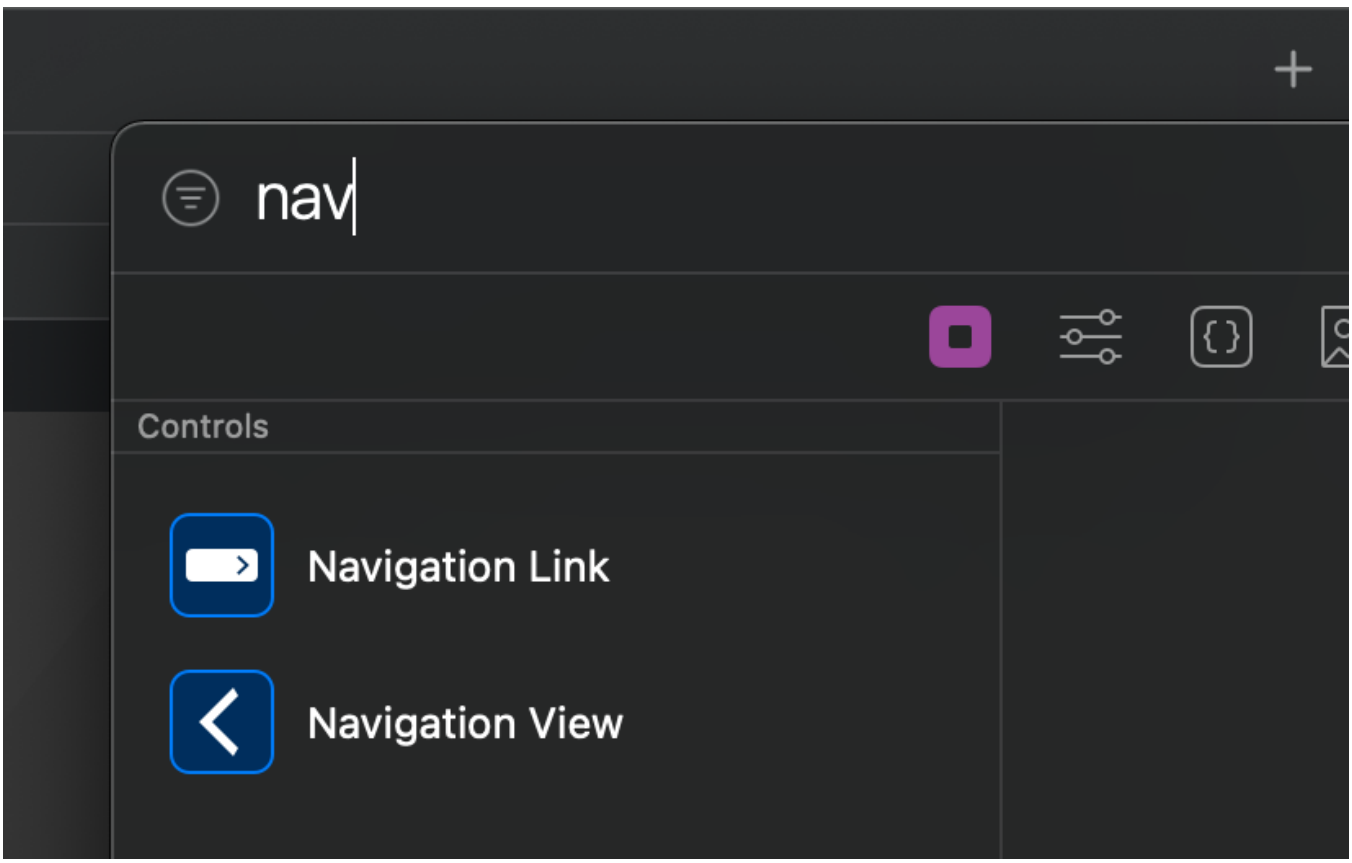


1. The **navigation view**. It is responsible for showing the navigation bar (at the top) and the current child scene inside it.
2. The **navigation bar**, which sits at the top of the screen. It contains the navigation title of the currently displayed scene within it.
3. A **navigation title** for each scene, which appears inside the navigation bar when that scene is active.

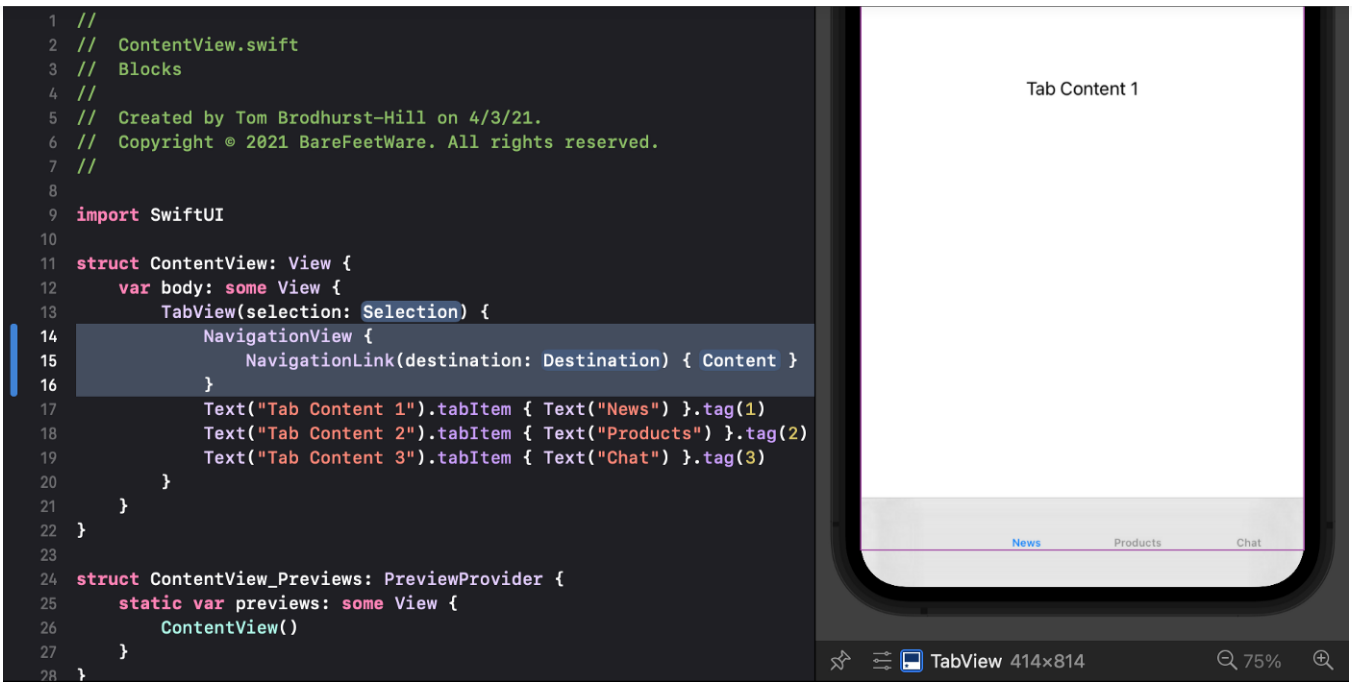
3. Add a Navigation View

Our News scene will eventually contain a list of news article summaries, where the user can tap a summary to navigate to a detailed scene for that article. For that, we will need to embed the News scene in a navigation view.

👉 Click on the `+` icon near the top right of the Xcode window, to show the Library again. Ensure that `Views` is selected and type `nav` to filter the list.



👉 Drag the `Navigation View` from the Library to be inserted just after the `TabView` line



👁 Note in the preview that there are now four tab items, with the first one before News having no label. The new `NavigationView` is currently the first subview of the `TabView`, so it has become the first tab item.

We need to move the first `Text` item into the `NavigationView`, replacing the default `NavigationLink` that came with the template code.

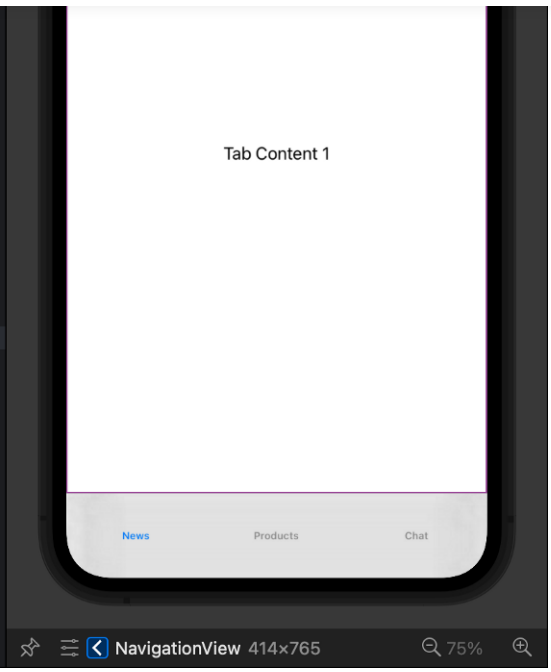
👉 Select the `Text("Tab Content 1")` code (not the `.tabItem` after it).

👉 Cut it (such as by selecting `Cut` from the `Edit` menu).

👉 Select the whole `NavigationLink` line of code. Paste over it.

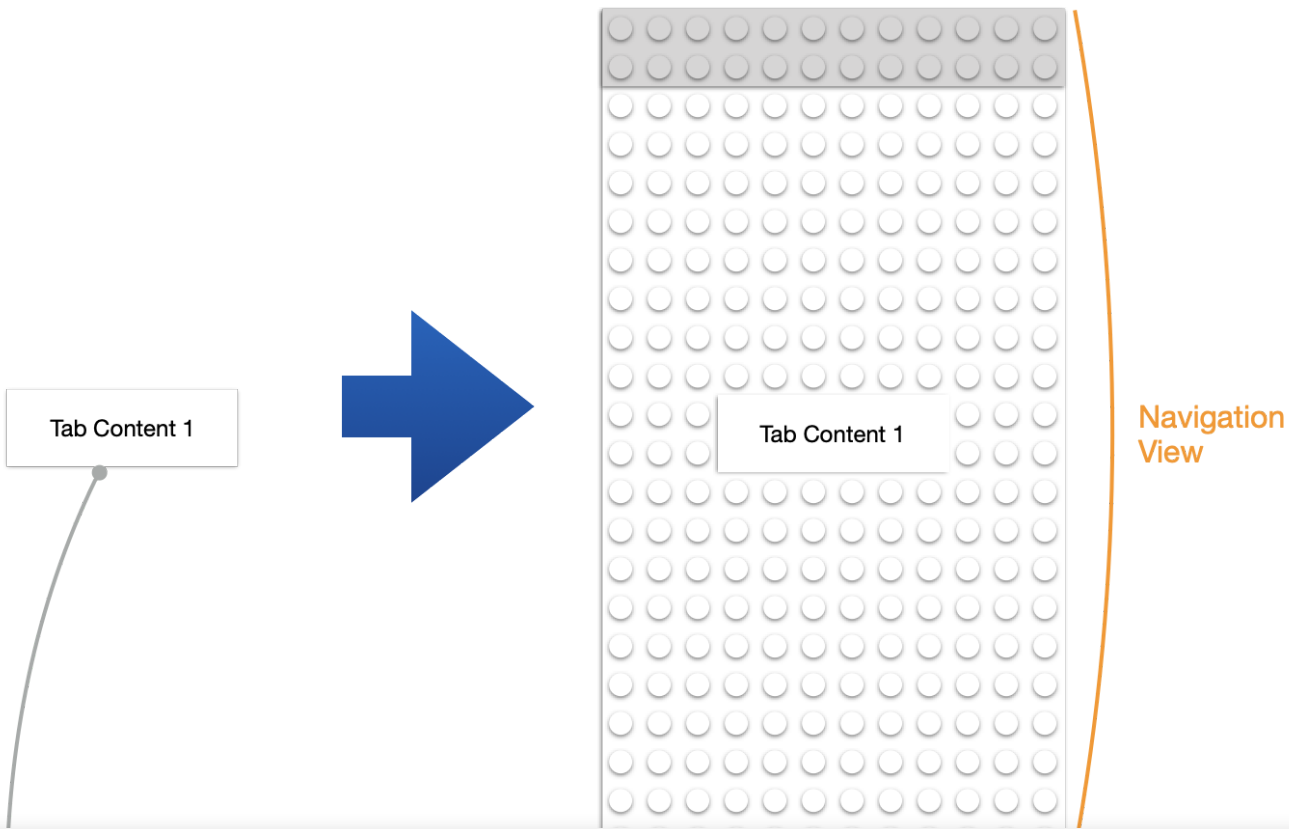
👉 Edit if necessary so your code looks like this:

```swift
//
//  ContentView.swift
//  Blocks
//
//  Created by Tom Brodhurst-Hill on 4/3/21.
//  Copyright © 2021 BareFeetWare. All rights reserved.
//

import SwiftUI

struct ContentView: View {
    var body: some View {
        TabView(selection: Selection) {
            NavigationView {
                Text("Tab Content 1")
            }
            .tabItem { Text("News") }.tag(1)
            Text("Tab Content 2").tabItem { Text("Products") }.tag(2)
            Text("Tab Content 3").tabItem { Text("Chat") }.tag(3)
        }
    }
}

struct ContentView_Previews: PreviewProvider {
    static var previews: some View {
        ContentView()
    }
}
```



👁 Confirm that the preview now shows the original three tab items again. If necessary, refresh the preview by clicking the `Resume` button.

👁 Note that the `.tabItem("News")` is now attached to the `NavigationView`, instead of directly to the `Text("Tab Content 1")`. In Lego, this change looks like this:



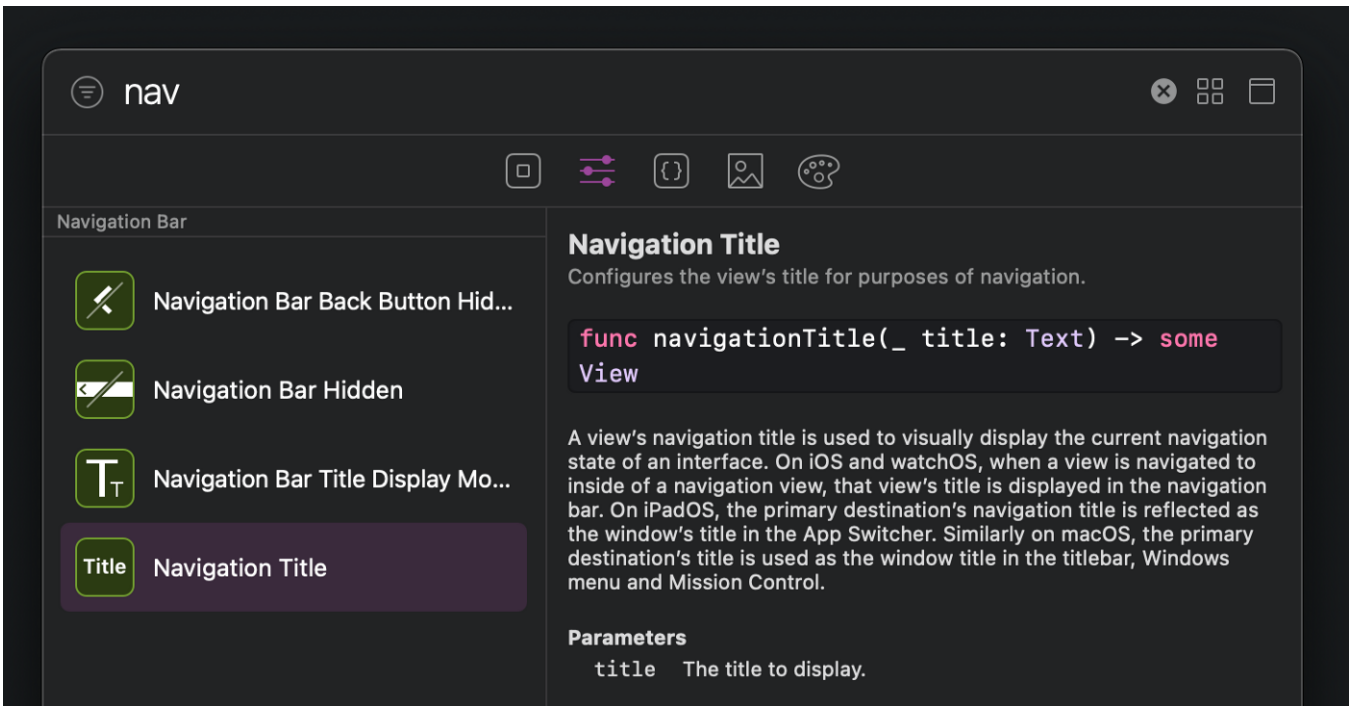
Now we again have three scenes in the `TabView`. The first scene is a `NavigationView`, which itself contains the `Text("Tab Content 1")`.

The preview doesn't yet look any different to how it was before we added the `NavigationView`. That's because there's not yet any navigation title or navigation links in the scene. Let's add a `navigationTitle` for the News scene.

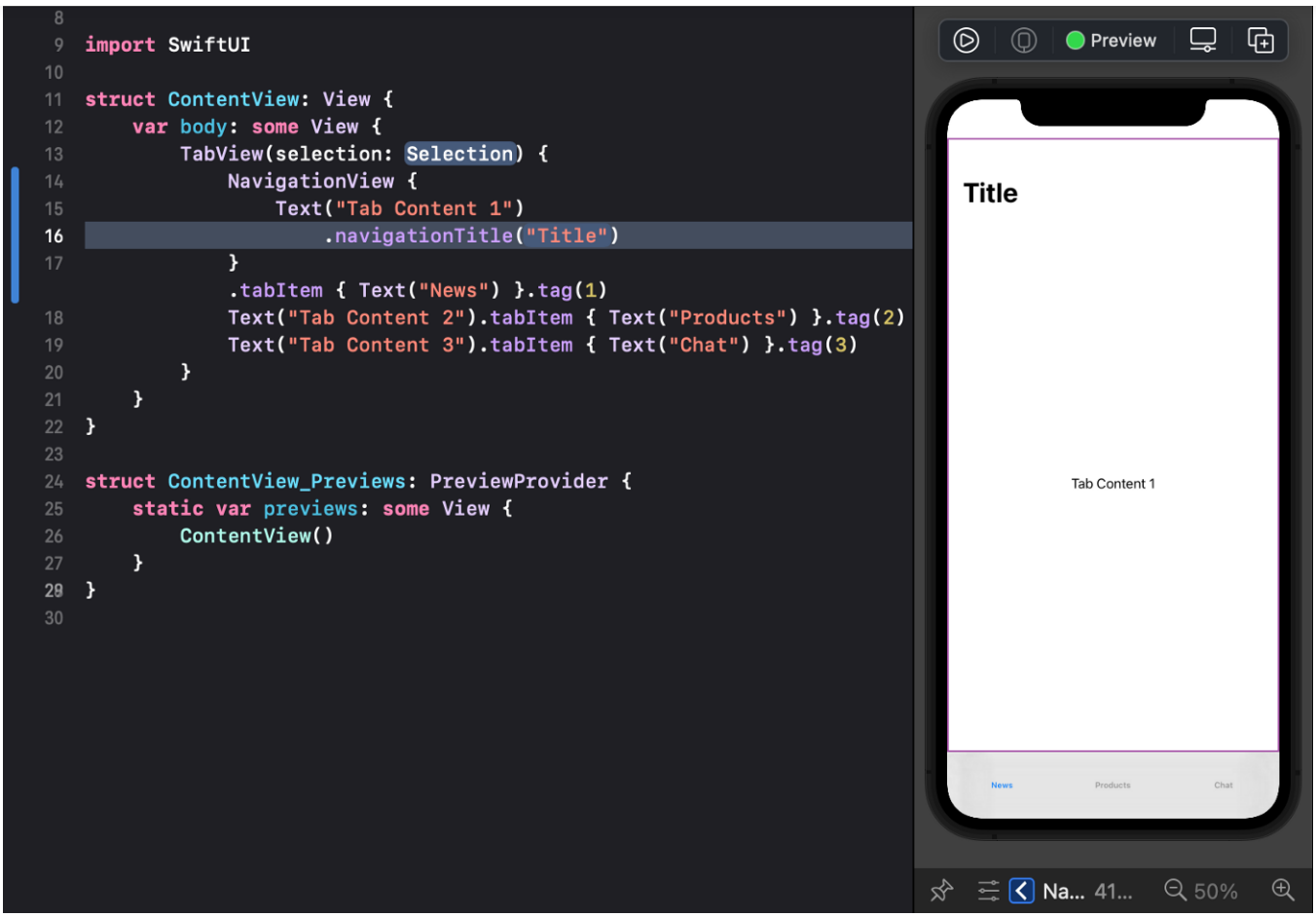
In the same way that the `tabItem`s must be inside the `TabView` that displays them, the `navigationTitle` must be inside the `NavigationView` that displays it.

`tabItem` and `navigationTitle` are "modifiers" of views. They modify an existing view to give it additional features.

👉 Show the Library and select the `Modifiers` tab (the second icon that looks like slider controls). Type `nav` into the search bar and select the `Navigation Title` item in the list.

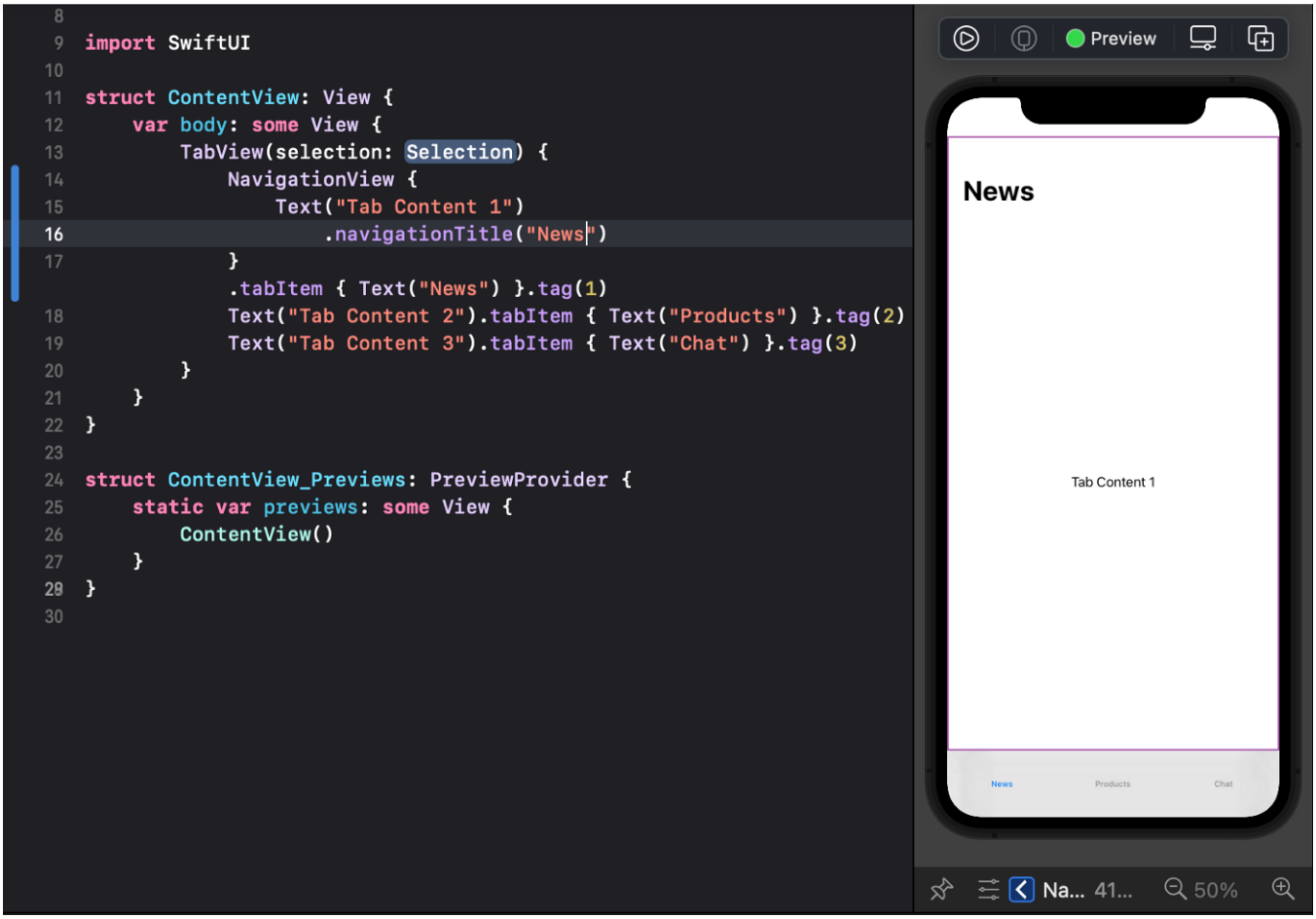


👉 Drag the `Navigation Title` into the code to insert a new line after the first `Text` line.



👁 The preview should show the `Title` at the top of the News scene, in the navigation bar.

👉 Change the `"Title"` to `"News"` and verify that it updates in the preview.



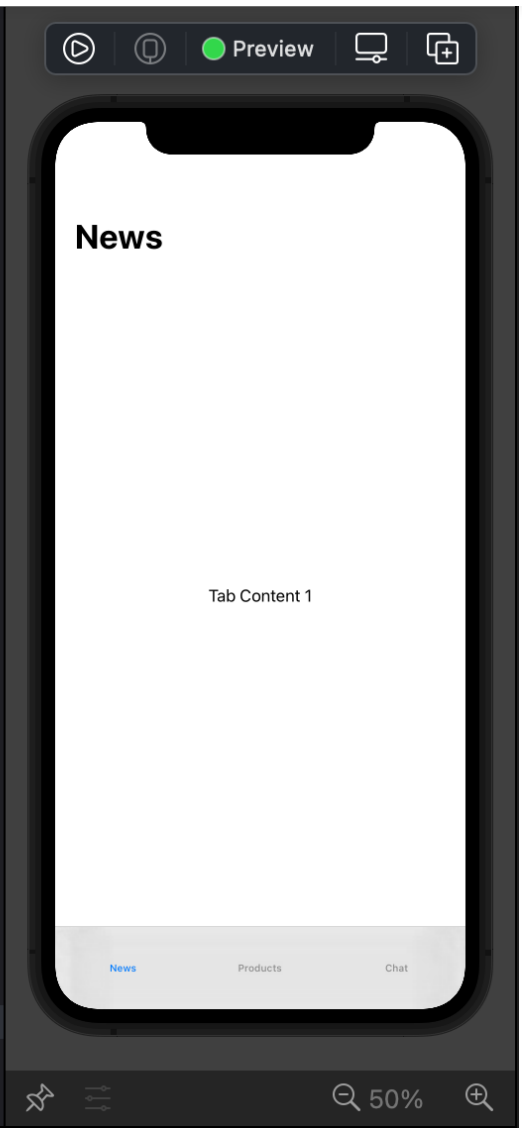
👉 Repeat the above process to add a `NavigationView` and `navigationTitle` to the Products and Chat scenes. You can drag from the library or copy and paste or type code — whatever you find easiest.

Notice that Xcode likes to indent the code a particular way. It is a handy way to check your code for any missing lines. You can apply Xcode's indenting at any time by:

1. In the `Edit` menu, select `Select All`. Or use `command-a` on the keyboard.
2. In the `Editor` menu, in the `Structure` submenu, select `Re-Indent`. Or use `control-i` on the keyboard.

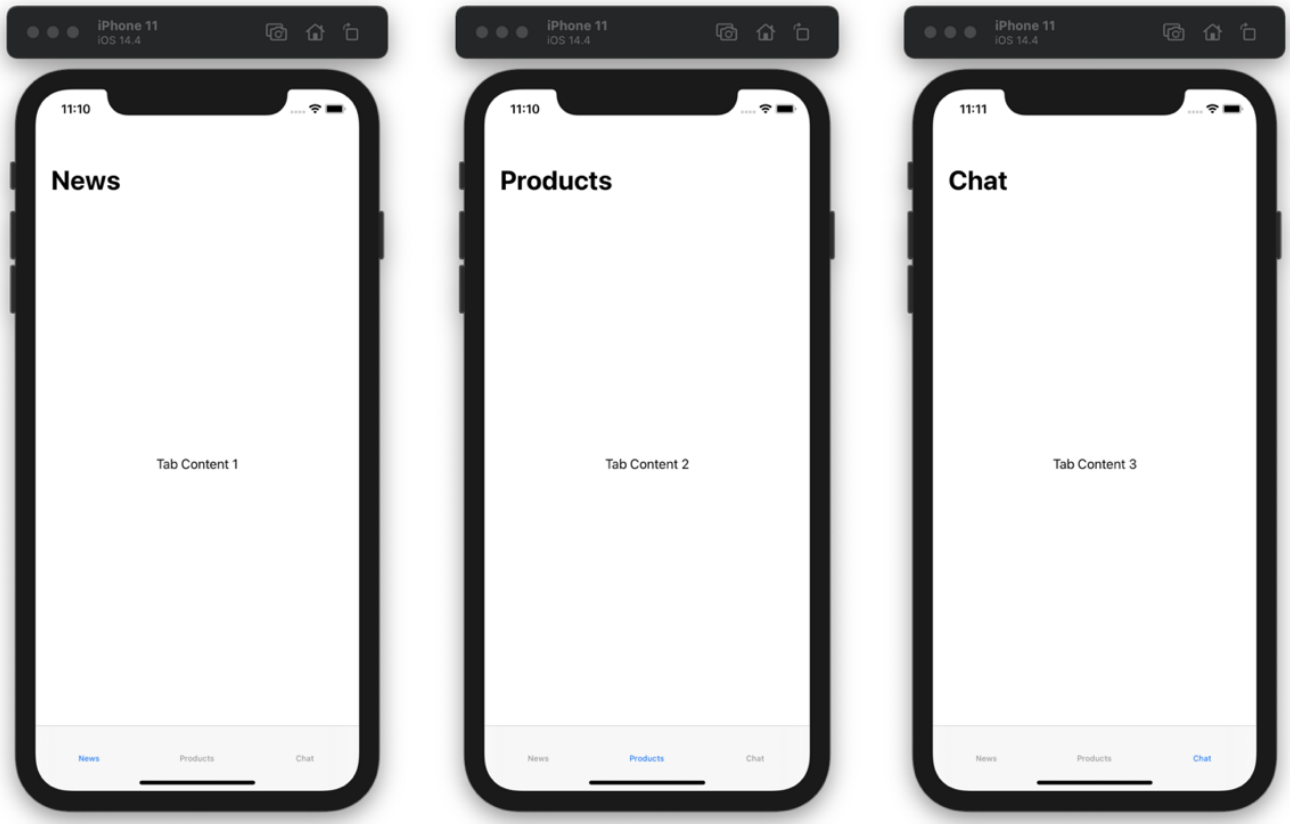
👁 When you're done, the code should look like below and the preview should refresh without any errors. If not, then meticulously check your code.

```swift
import SwiftUI

struct ContentView: View {
    var body: some View {
        TabView(selection: Selection) {
            NavigationView {
                Text("Tab Content 1")
                    .navigationTitle("News")
            }
            .tabItem { Text("News") }.tag(1)
            NavigationView {
                Text("Tab Content 2")
                    .navigationTitle("Products")
            }
            .tabItem { Text("Products") }.tag(2)
            NavigationView {
                Text("Tab Content 3")
                    .navigationTitle("Chat")
            }
            .tabItem { Text("Chat") }.tag(3)
        }
    }
}

struct ContentView_Previews: PreviewProvider {
    static var previews: some View {
        ContentView()
    }
}
```



👉 When the code and preview show no errors, click the `Run` button to run the app in the simulator.

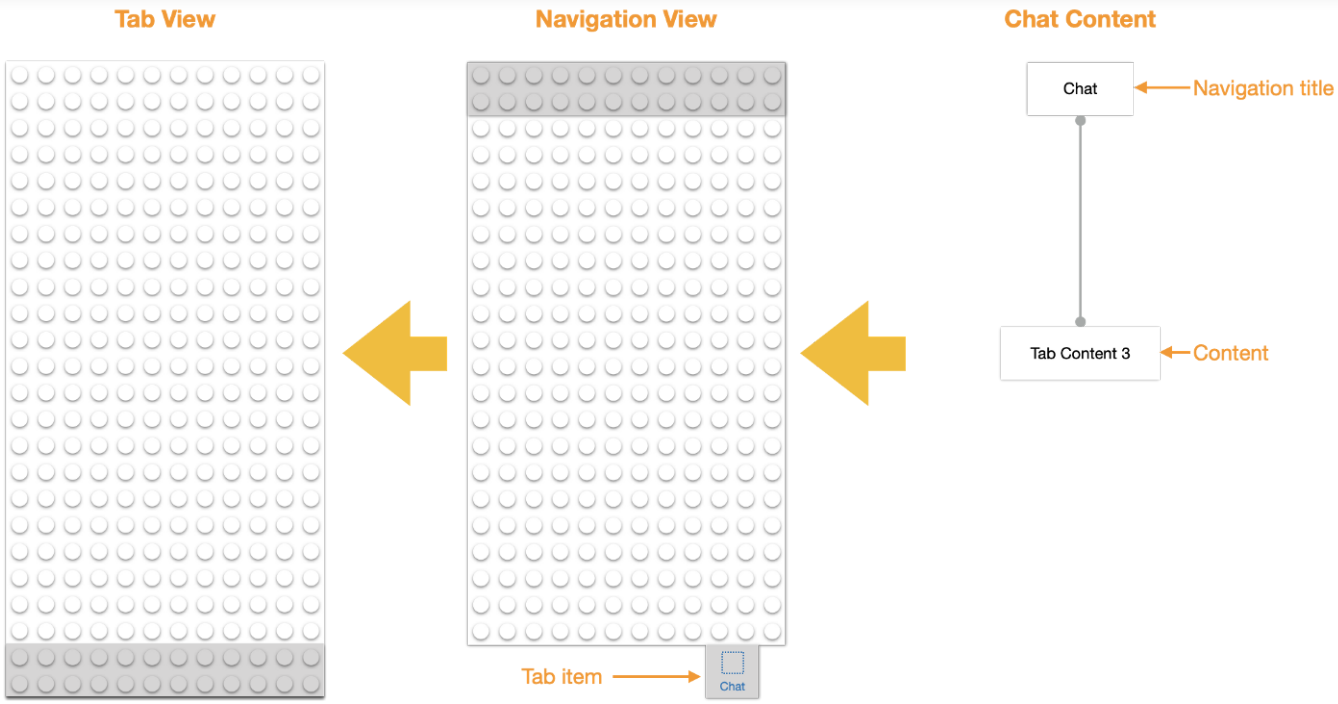
👉 Tap on each tab item and confirm that the selected tab switches to show the correct navigation title.



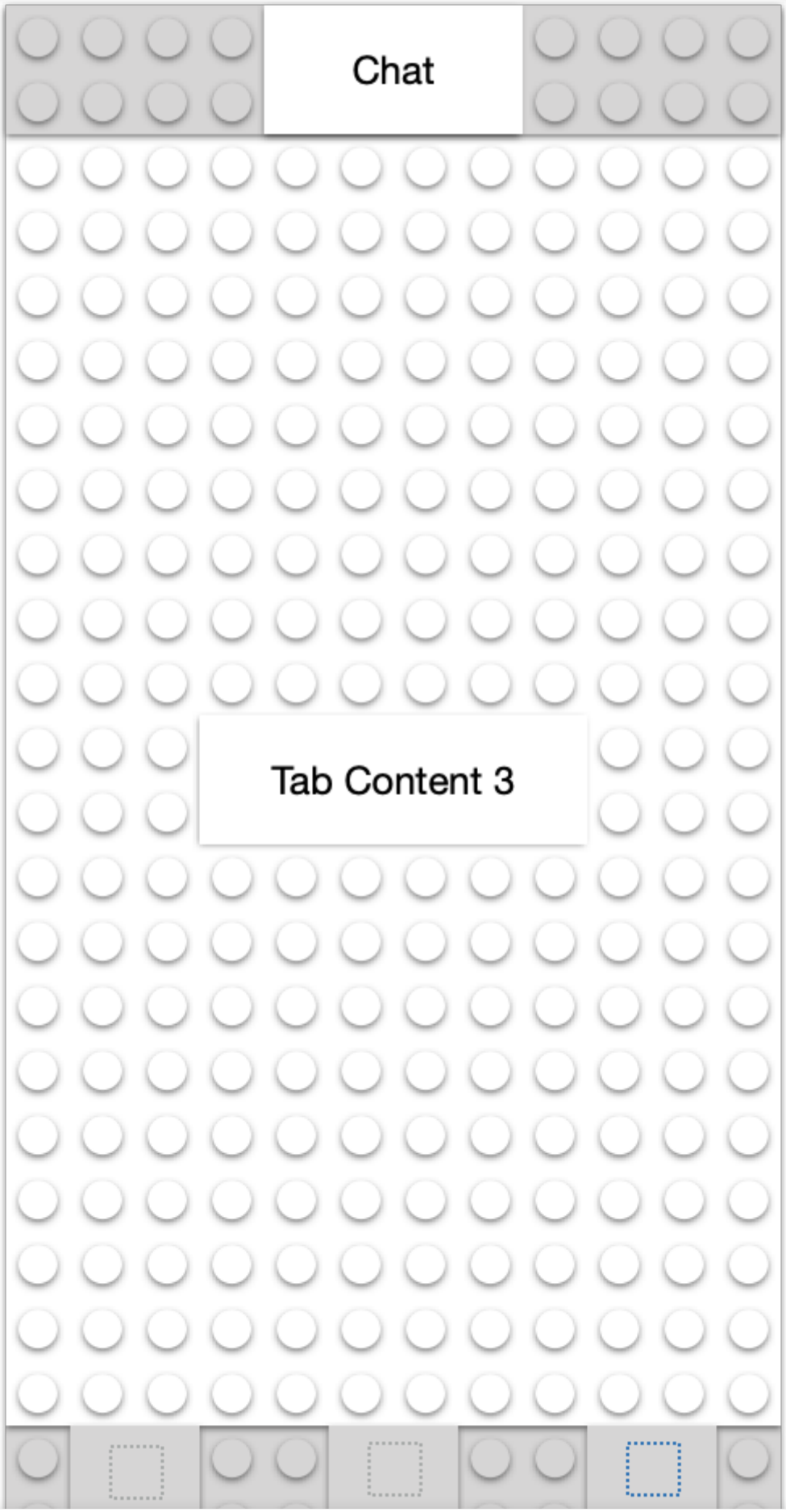
👁 Each scene is showing:

1. The **tab item** label (`News` , `Products` , `Chat`) in the tab bar, at the bottom. They have no icons yet.
2. The **navigation bar**, at the top. Each belongs to a navigation view.
3. A **navigation title** for each scene, which appears in the navigation bar when that scene is active.
4. A text view inside each tab item, showing placeholder “Tab Content” titles. We will soon replace each of those with a vertically scrolling list of content.

Notice that the tab bar and the navigation bar are both displayed. The tab view contains the navigation views, which each contain a navigation bar and one text view. We can picture it as these layers of Lego being added on top of each other. For example, when the Chat tab item is selected, the visible structure is like this:



Added together, with the tab items of the other scenes, we get the composite of all of the scenes as:



Switch back to Xcode.

As we did in Tutorial 1:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Added navigation views and titles`
3. 👉 Click on the `Commit` button.

5. Next...

We've covered a lot in a short time. In this tutorial we have:

1. Created three navigation views, each with a navigation bar.
2. Set the navigation title of each navigation view.
3. Embedded the navigation views in a tab view.
4. Moved each tab item to be connected to a navigation view.

In Tutorial 4, we will introduce the Attributes inspector to modify content and color in the app.

⁉️ If you have any questions or comments, please add a response below.

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Apr 1, 2021 · 6 min read ★

Attributes Inspector and Accent Color

Build an App Like Lego, with SwiftUI — Tutorial 4

1. Introduction

In Tutorial 3, we embedded the News, Products, and Chat scenes inside their own navigation views, as subviews in tab view, each with a tab item. Each scene contained just one view: a text view with the words `Tab Content` and a number.

In this tutorial, we will add “modifiers” to views to change their appearances, such as font and weight. We will also change the whole app’s “accent color”.

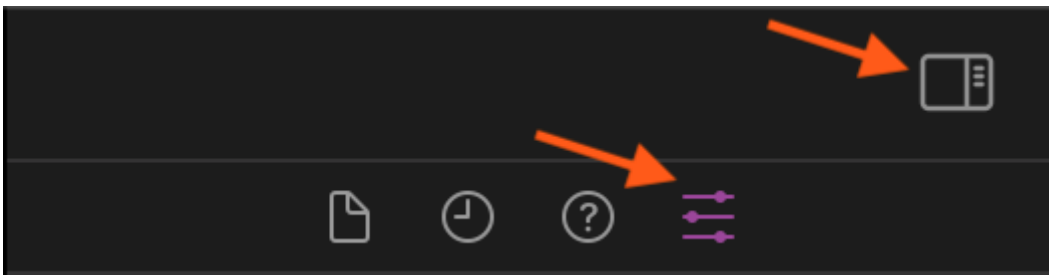
2. Attributes Inspector

In our Xcode project, the code is the source of truth. Every change we make affects the code. The preview and the running app read that code.

But code can be mysterious and tedious for a human to type correctly. So, Xcode provides several visual tools that we can use to write the code for us. For example, in earlier tutorials, we have already dragged some components into our code from the Views Library.

Xcode provides another tool called the “Attributes inspector”, which we can use to modify the content and properties of views. We can type words in a text field or choose from popup menus to make Xcode write the required code for us.

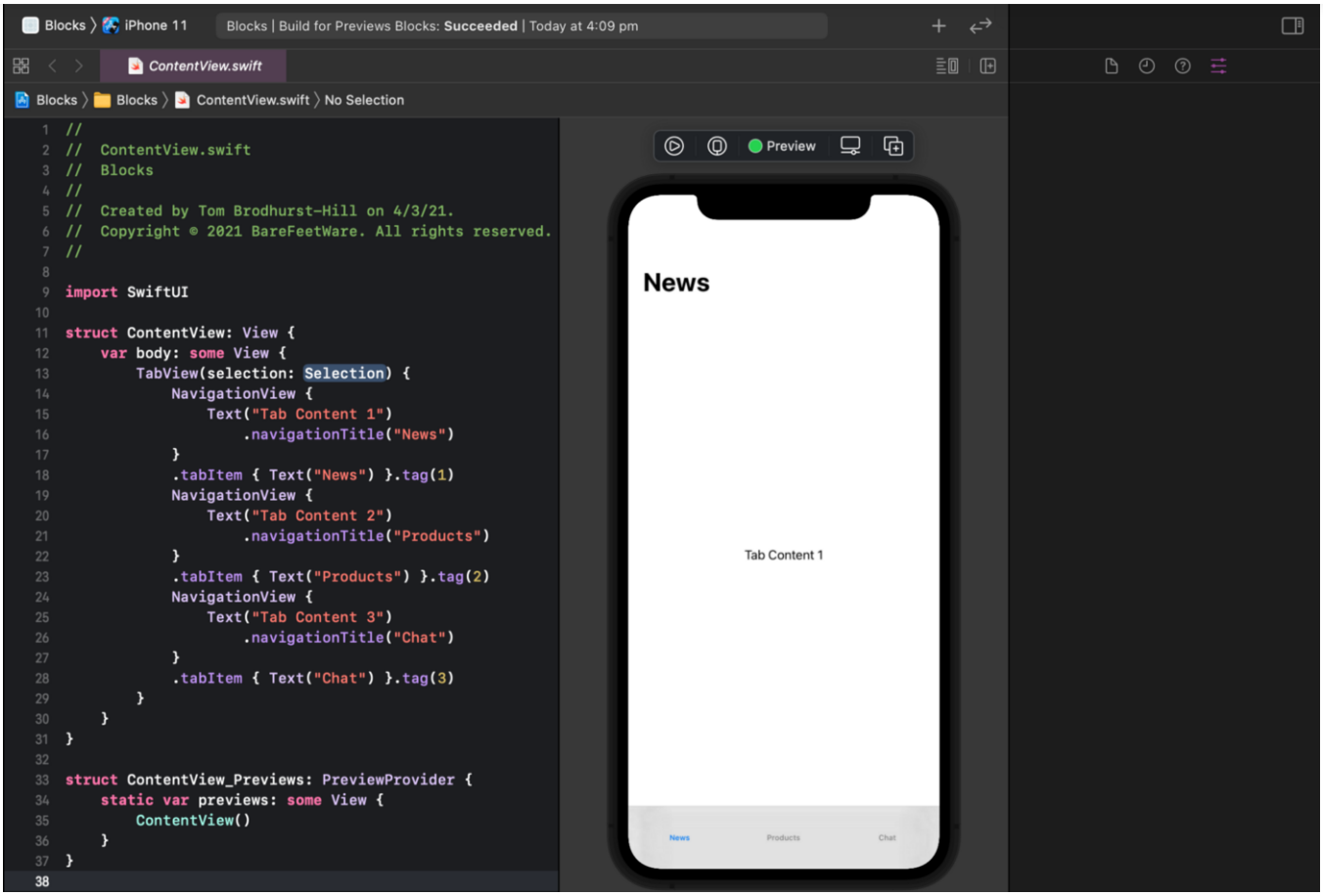
👉 If the Inspector panel (on the right-hand side) is not currently visible, make it appear by clicking on the top-right icon in the Xcode window.



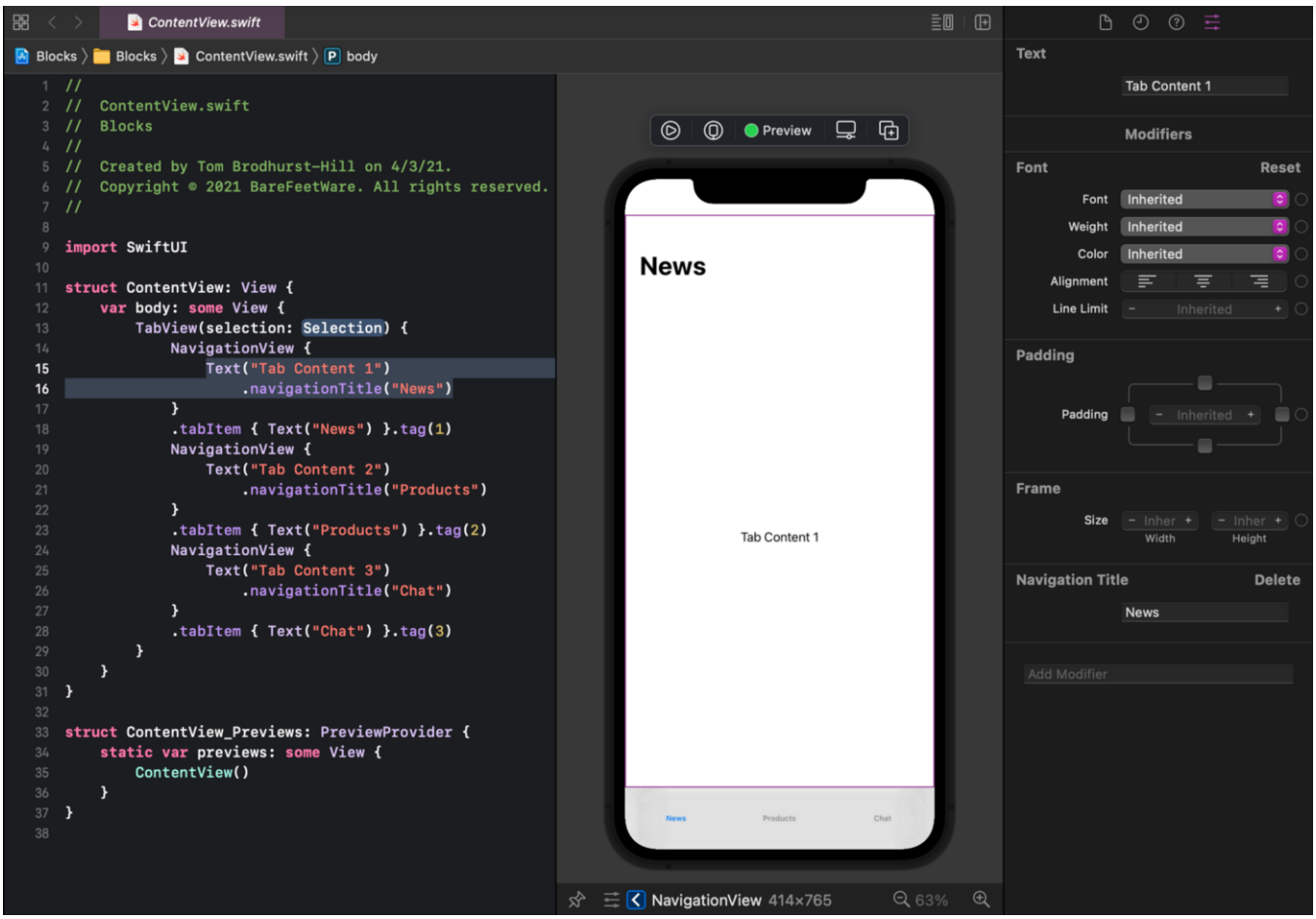
👉 Click on the Attributes icon to show the Attributes inspector.

3. Text and Font

👁 You should see the preview showing the News tab item selected with the contents showing `Tab Content 1`.



👉 Select the content text by double-clicking on the `Tab Content 1` text in the preview. If you only click once, it will only select the navigation view. Double-clicking selects the next inner view.



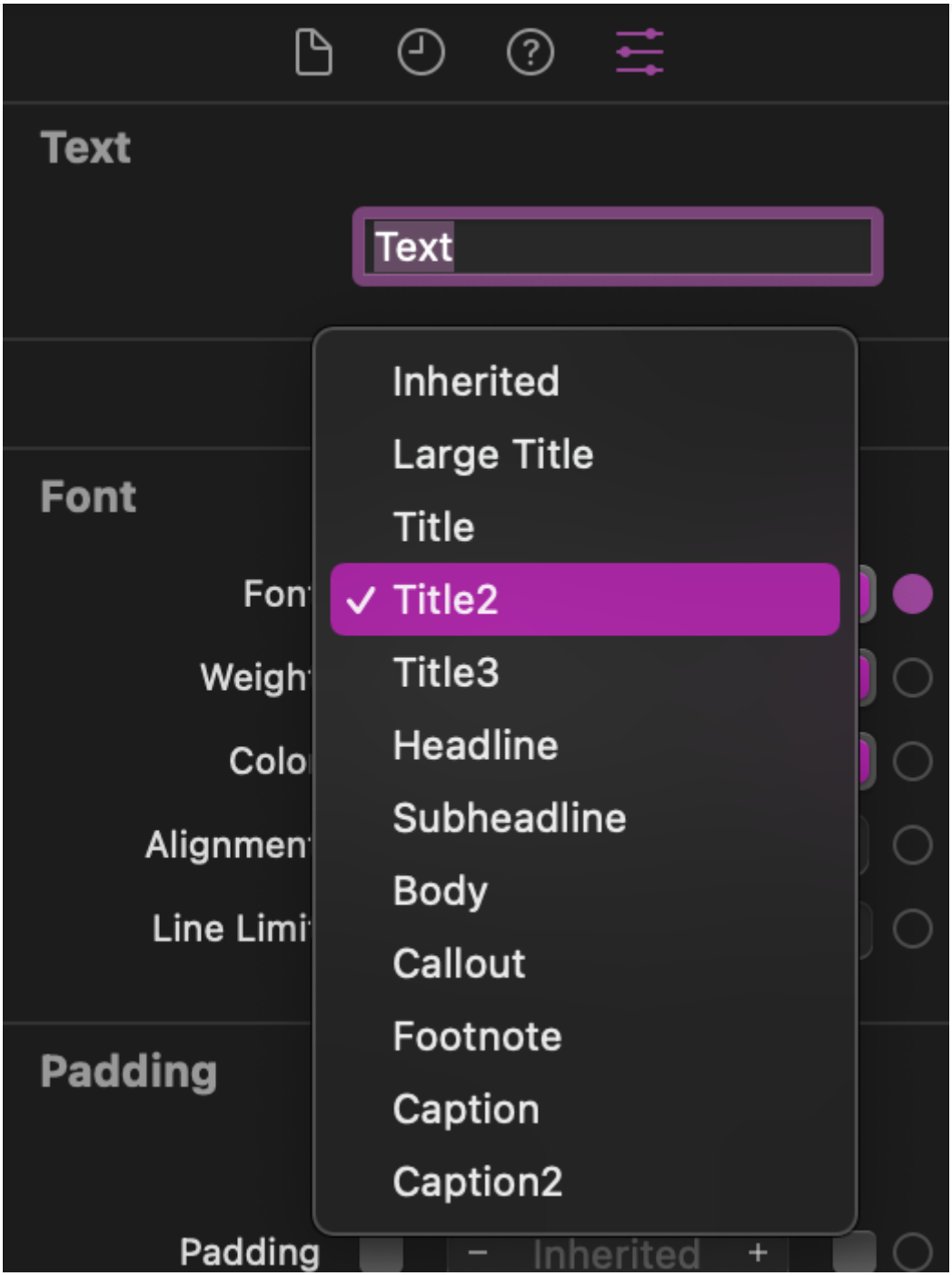
👁 In the code, you should now see the `Text` view and its `navigationTitle` modifier selected. In the Attributes inspector, you should see the `Text` with its attributes (content and modifiers) listed below it.

This text will eventually be the title of each news article in our list. For now, let's change its wording to just be the word "Text".

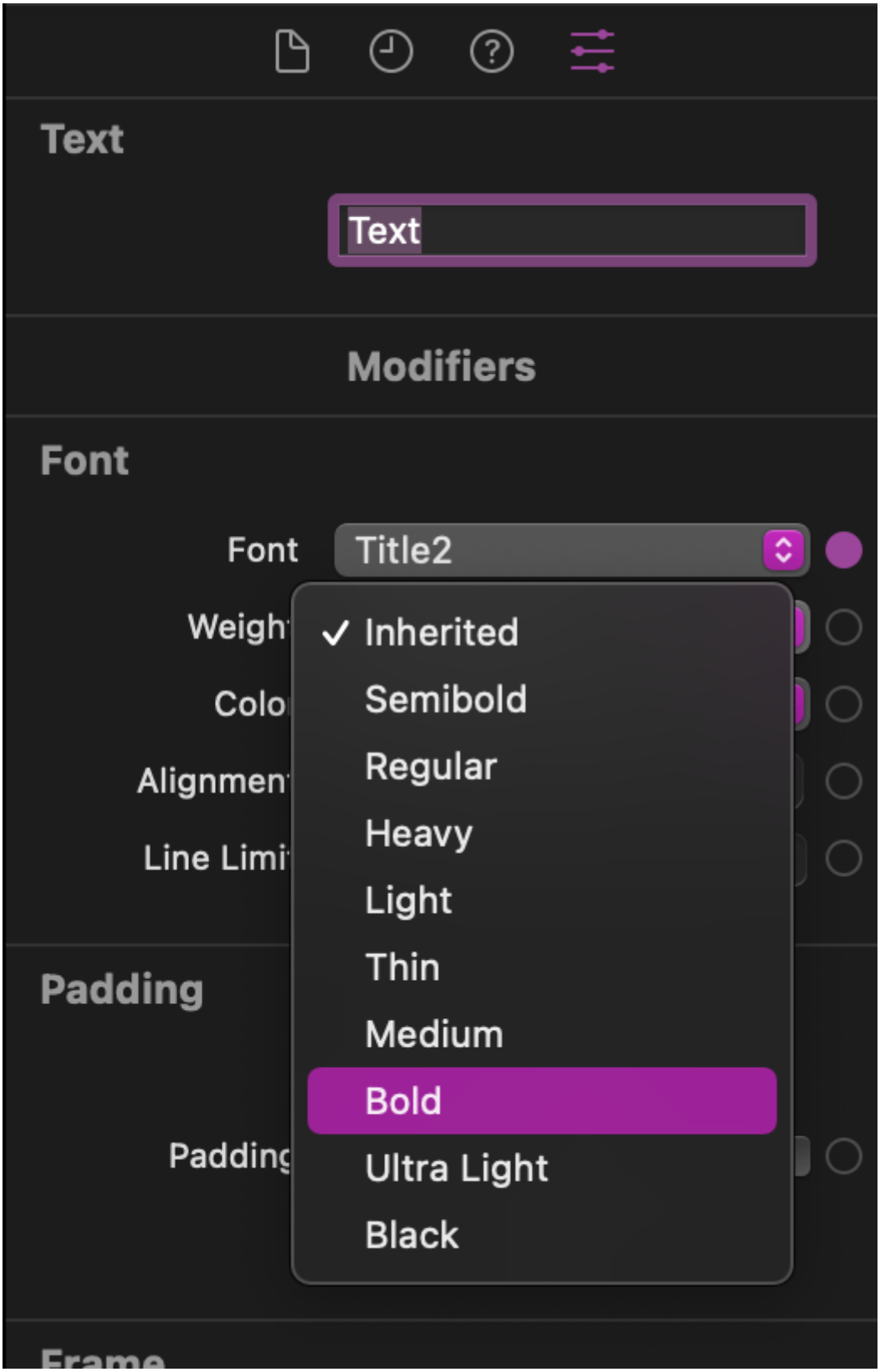
👉 In the Attributes inspector, change the words from `Tab Content 1` to `Text`. Hit the `return` key to trigger the preview to update.

👉 Click on the `Font` popup menu and change it from `Inherited` to `Title2`.

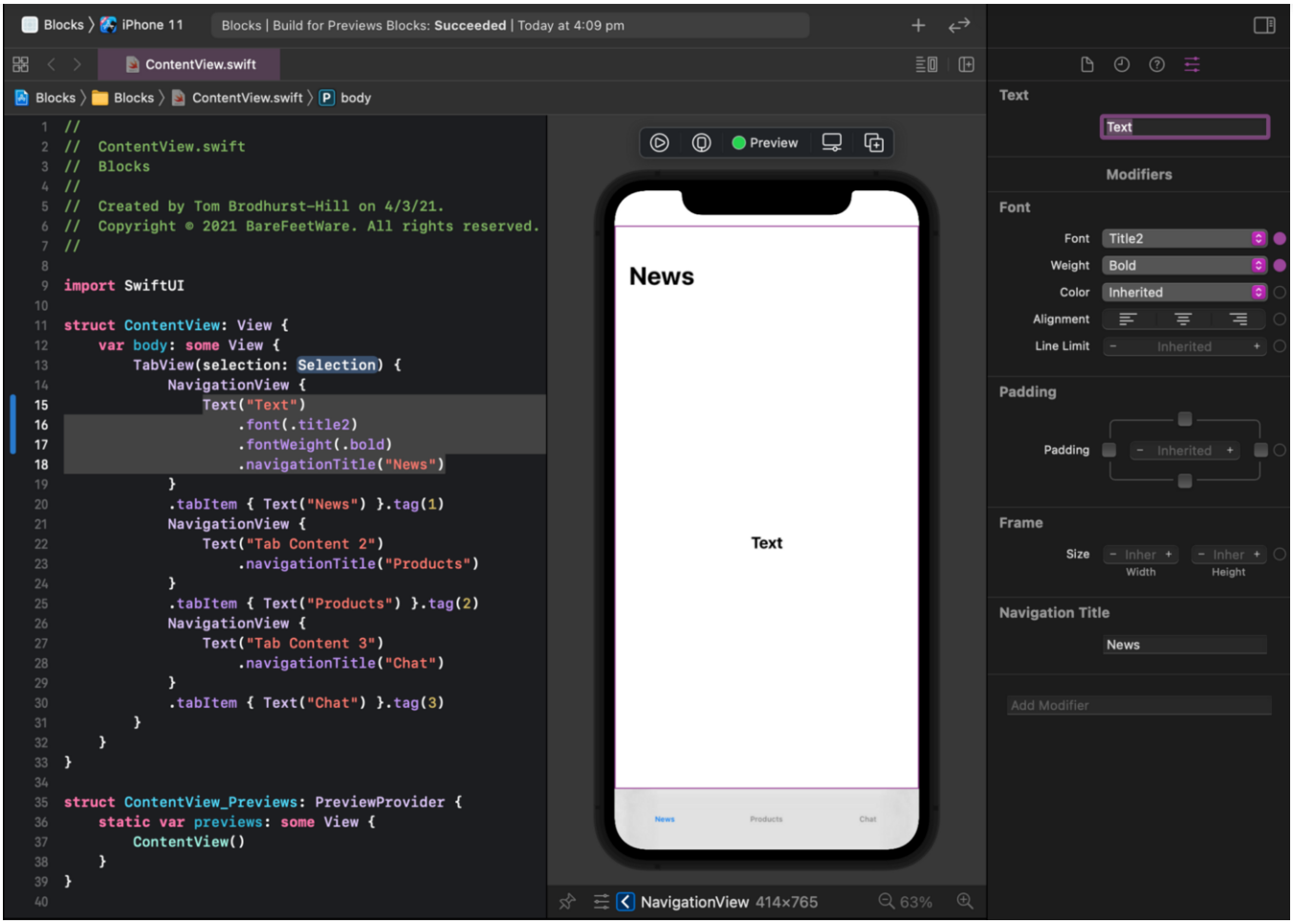
🐞 If `Title2` isn't listed in the popup menu, select `Title`, then try again to select `Title2`.



👉 Similarly, change the `Weight` to `Bold`.



👁 Check that the code, preview, and Attributes inspector appear as shown below.



4. Accent Color and Affordance

The user should be able to tell, just by looking at a scene, which objects they can touch. This visual identification is called “affordance”.

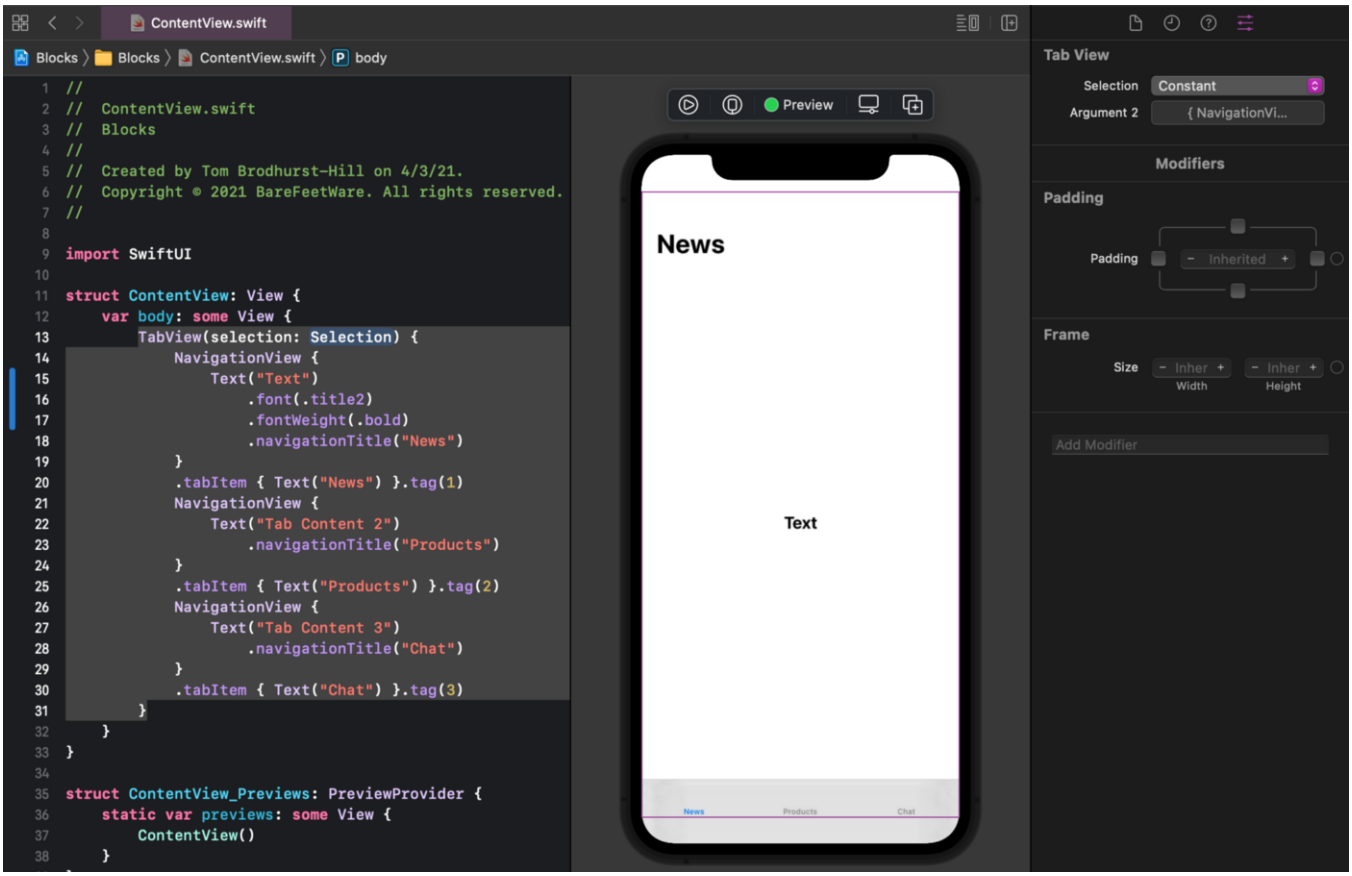
One way that an app can provide affordance is by using a consistent “accent color” for the objects (subviews) that the user can touch. This includes buttons, tab item labels, and popup menus. The accent color is sometimes also called the “tappable color”.

We can change the accent color of individual scenes or views, but the best user interface will consistently use one accent color throughout the whole app. The app should avoid using that accent color for anything that is not tappable, to not confuse the user with “false affordance”.

👁 As you can see in our app so far, the three-tab items at the bottom are all shown in blue.

Previously, we added new modifiers by clicking the `+` Library button and dragging the modifier into our code from the list. Now we'll instead add the accent color modifier via the Attributes inspector.

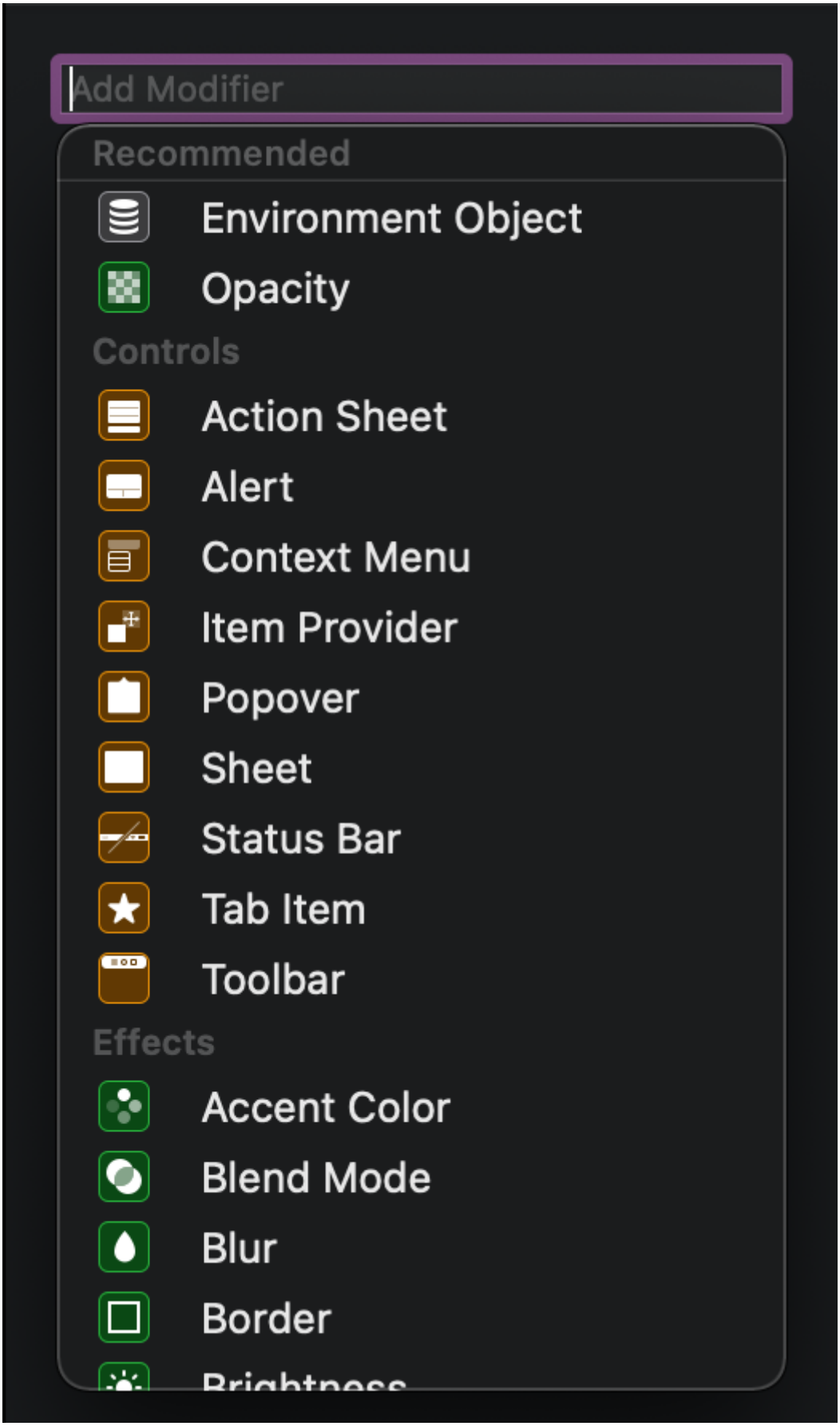
👉 In the preview, click once on the tab bar at the bottom.



🐞 If you mistakenly double click on the tab bar, the `TabView` at the top of the code will change from the `Selection` placeholder to `.constant(1)`. You can just `Undo` to go back to how it was and then try again. But if it changes to `.constant(1)`, that is also OK.

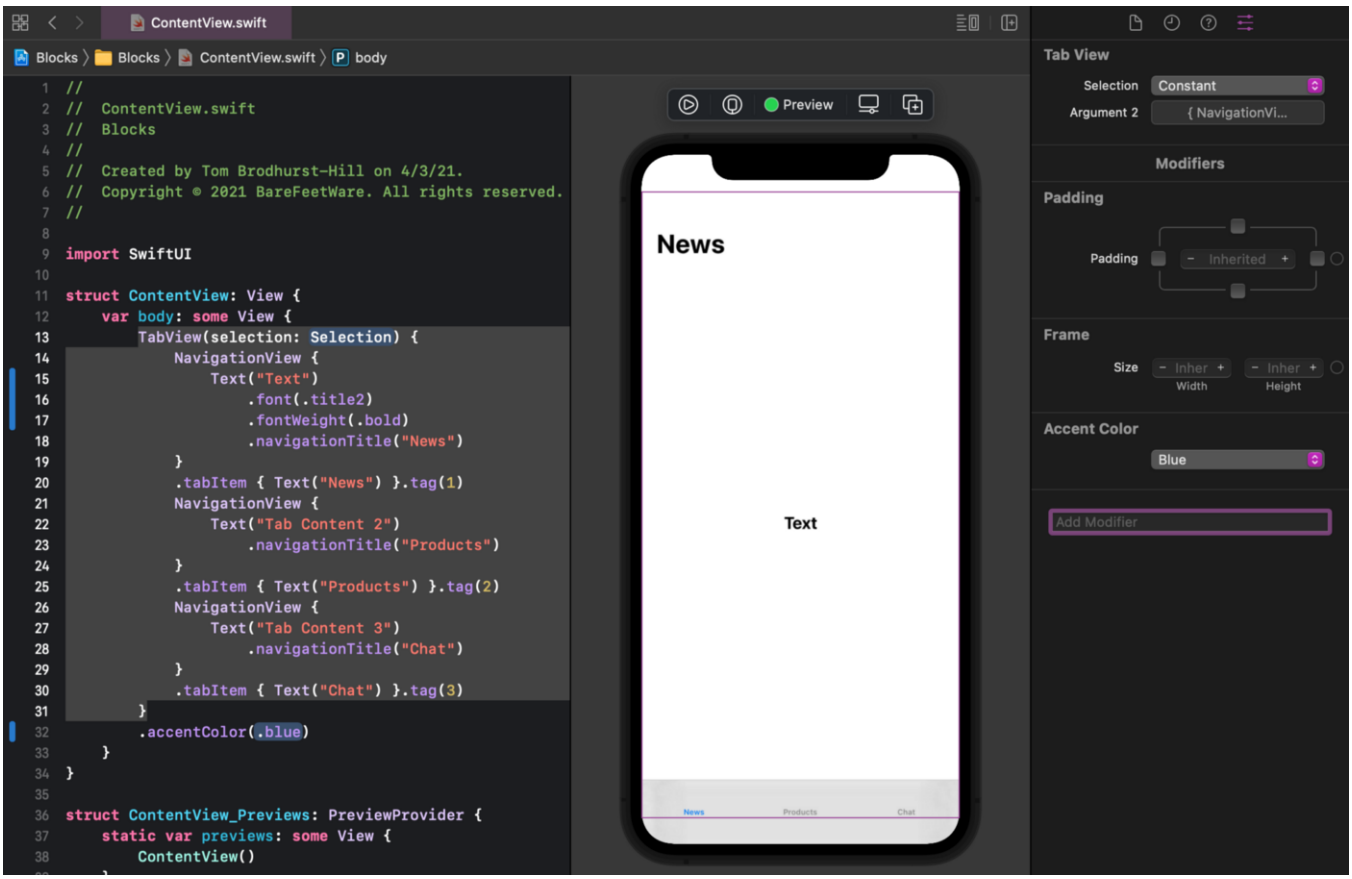
👁 As shown above, you should see the `TabView` highlighted in the code, along with all of its content (subviews).

👉 In the Attributes inspector, click in the bottom field that has the `Add Modifier` placeholder text. You should see a popup menu of all the available modifiers. If the text cursor is flashing in the field but the popup menu doesn't appear, hit the down arrow on the keyboard to make the menu appear.

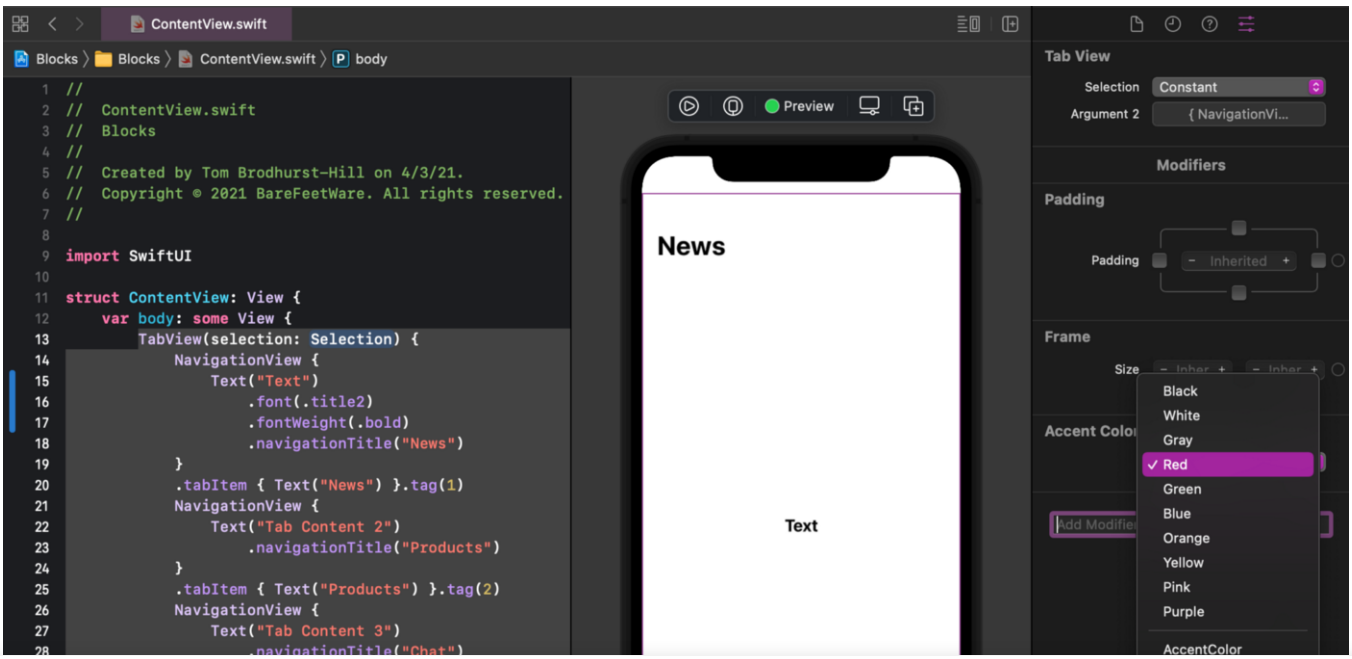


👉 In the list of modifiers, click on `Accent Color` to select it.

`blue`.



👉 In the Attributes inspector, click on the `Accent Color` pop up menu and change it from `blue` to `red`.



👁 As shown above, the code and preview update to show the red accent color.

5. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Modified text attributes and app accent color`
3. 👉 Click on the `Commit` button.

6. Next...

In this Tutorial 4, we used the Attributes inspector to customize some text and the app's accent color.

In Tutorial 5 we will add a list, with cells that navigate to a linked destination scene.

⁉ If you have any questions or comments, please add a response below.

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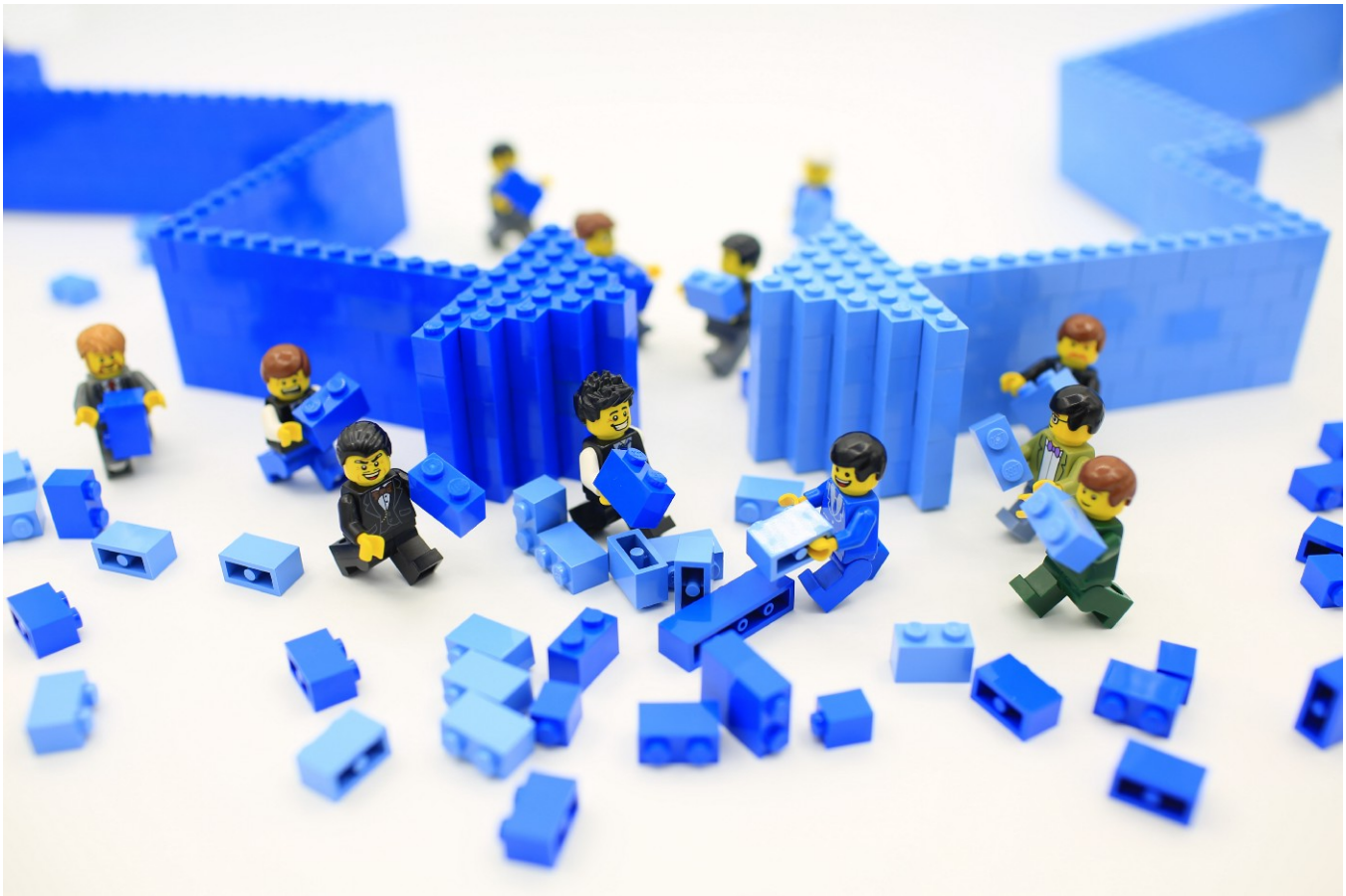
Create a List of Navigation Links

Build an App Like Lego, with SwiftUI — Tutorial 5



1. Introduction

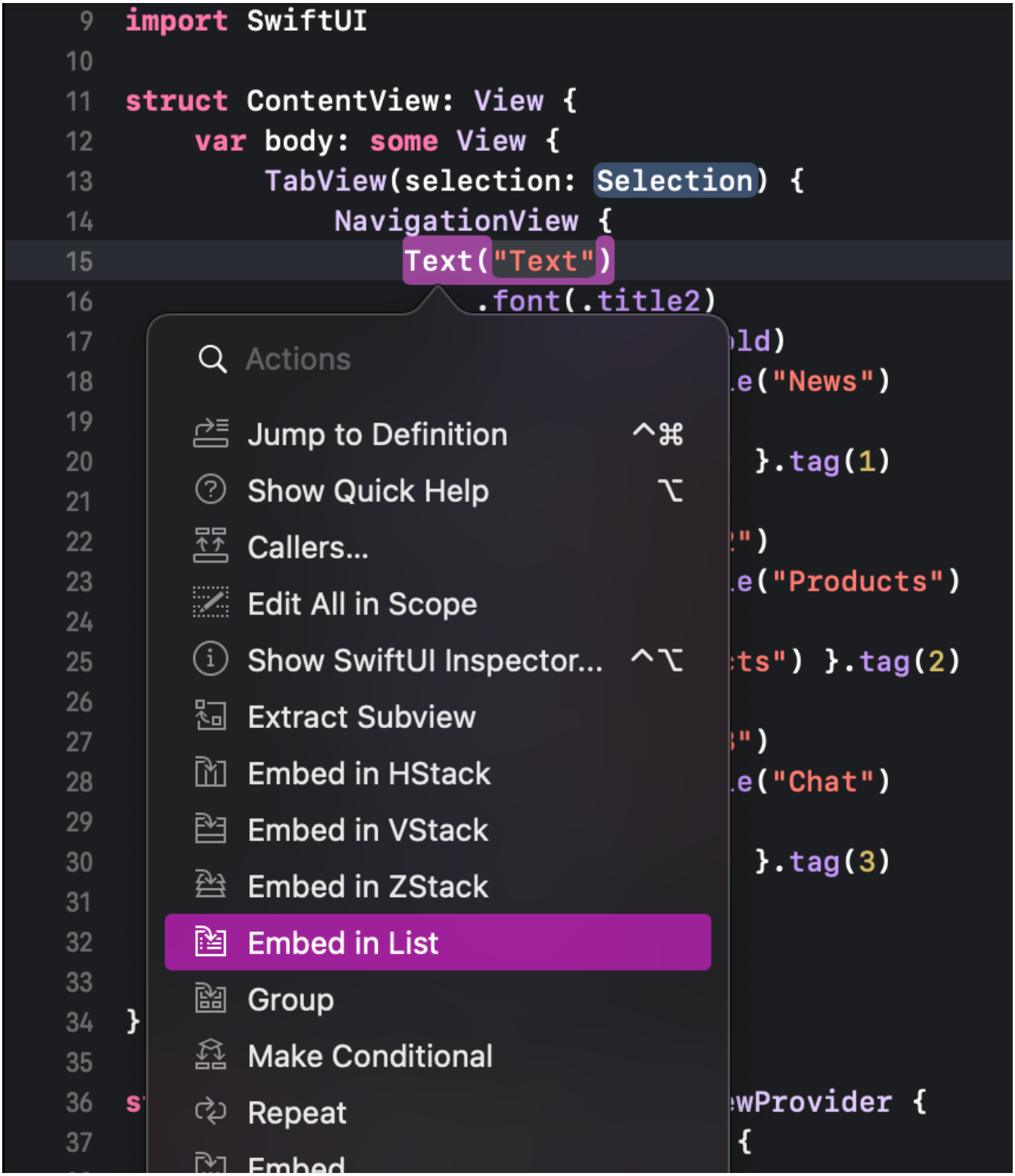
At the end of Tutorial 4, we had navigation views, but they didn't facilitate navigation to anything. In this Tutorial 5, we will add a list of tappable cells that navigate to a destination scene.

2. List

The News scene contains one text view with the word `Text`. That text doesn't require much space, so the navigation view containing it positions the text in its center.

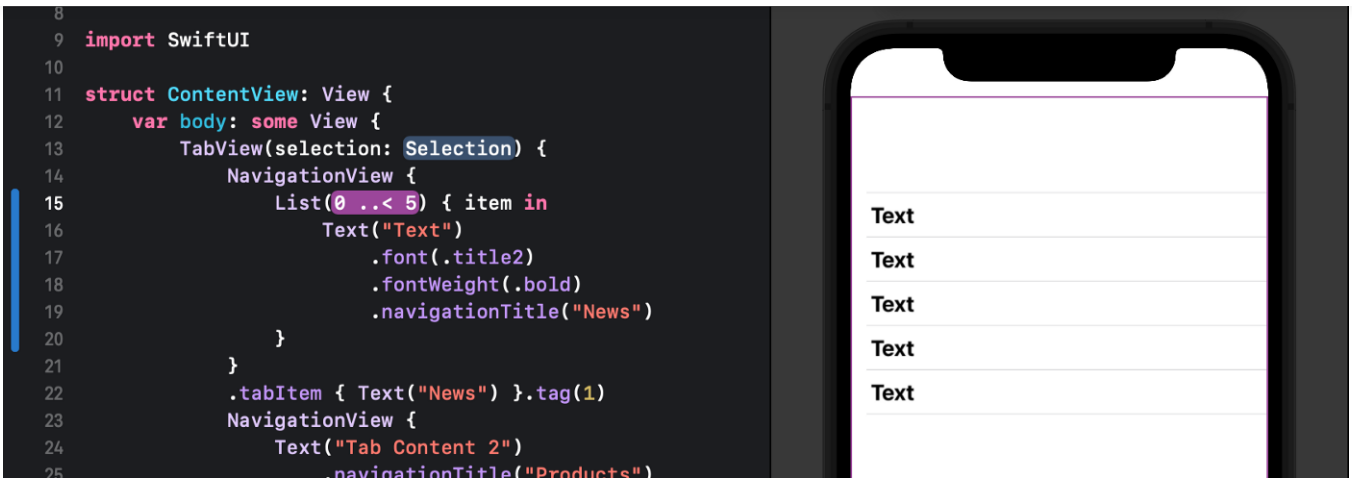
Instead of just one, we want a list of news titles. So, we need to embed the text in a list. We could drag in a list view from the library, then move the text into it. But there's an easier way. We can ask Xcode to embed the text in a list, in one step.

👉 While holding down the `Command` key on the keyboard, click on the `Text("Text")`.



👁️ Xcode shows the Actions popup menu, listing the actions you can perform on the selected code.

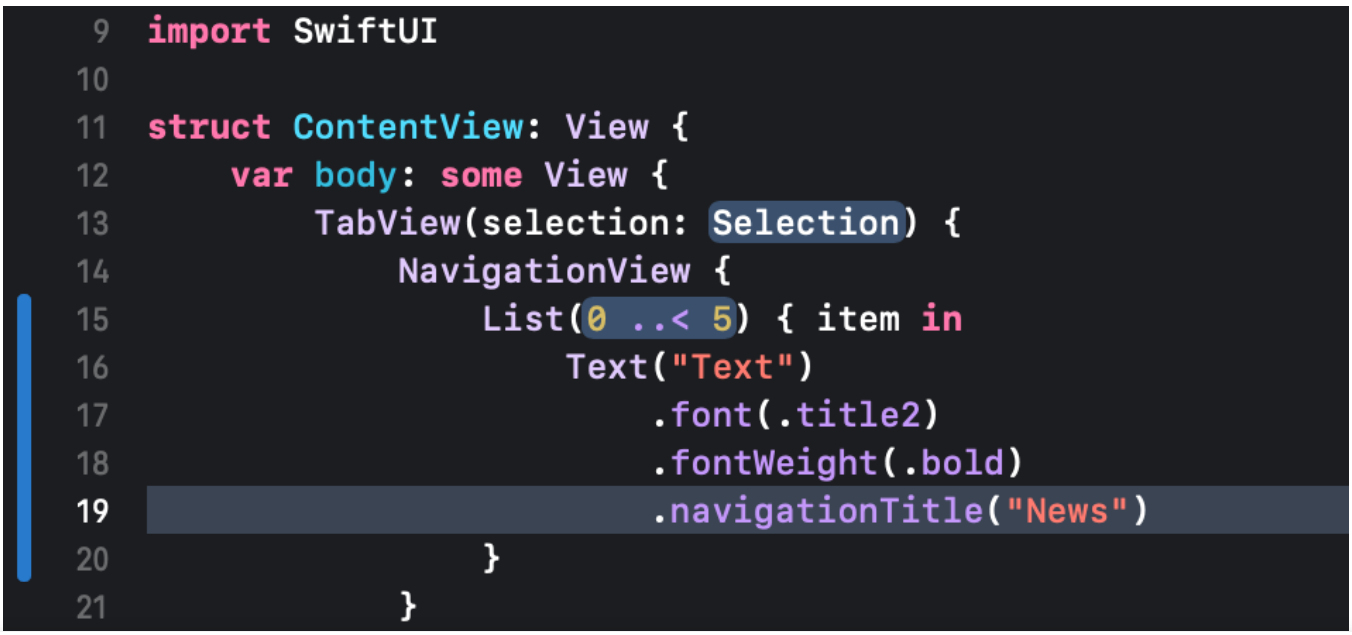
👉 In the Actions menu, select `Embed in List`.



👁 Xcode inserts a new `List` view between the `NavigationView` and the `Text` view. The `Text` is "embedded" in the `List`. The list defaults to showing five rows, currently with each row as a copy of the `Text("Text")`.

👁 All of the modifiers that were attached to the `Text` have stayed with it, and have been embedded in the `List`. For `font` and `fontWeight`, that is what we want. But, notice that the navigation title "News" has disappeared from the preview. We need to move the `.navigationTitle` modifier to again be immediately inside the `NavigationView`, so that it can again display the title in the bar.

👉 Triple-click (click the mouse button three times quickly) on the line of code `.navigationTitle("News")`. That should select the entire line, including empty space.



👉 Drag the selected line down one line, between the closing `}` of the `List` and the `NavigationView`, as shown below.

👁️ The `News` navigation title should now reappear in the preview.

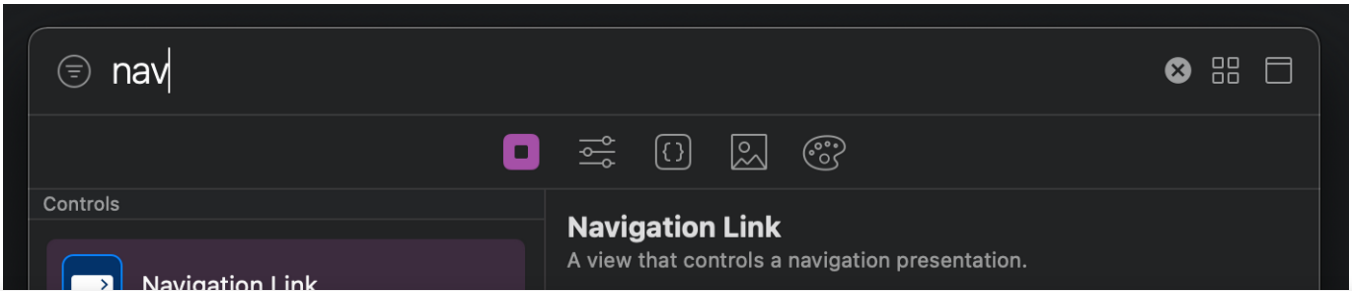
3. Navigation Link

Now we have a list of text views, each of which will eventually show the title of a different news article. The list gives each item a full horizontal row and inserts divider lines between them. Each row in a list is often referred to as a “cell”.

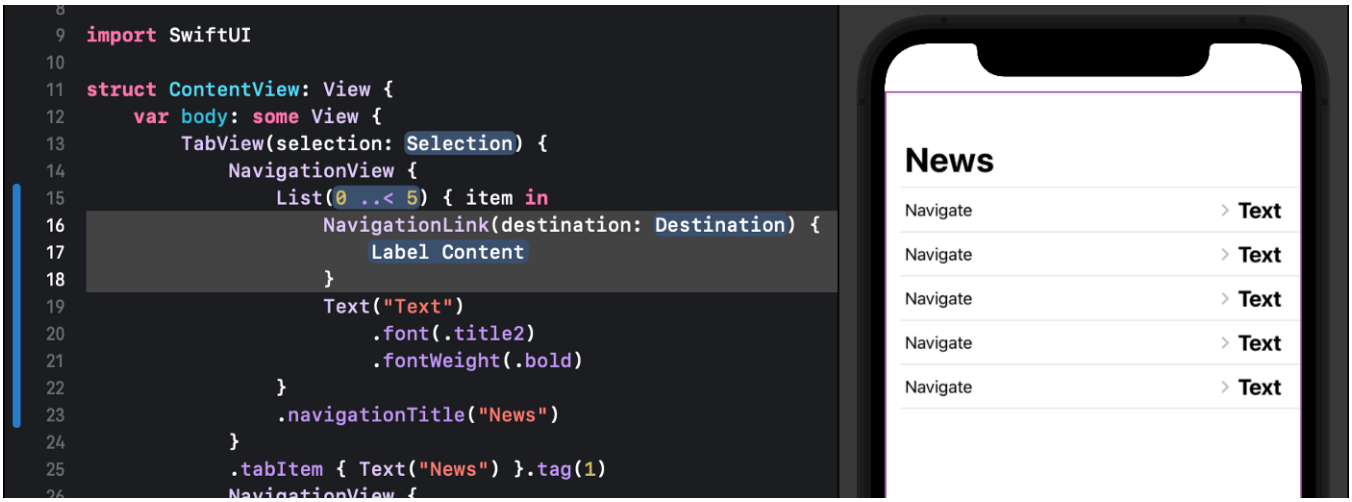
We want each cell in the list to be a link that navigates to a new scene containing the detail of that news item. SwiftUI provides a `NavigationLink` view for this purpose.

We need to embed the `Text` view inside a `NavigationLink`, with a similar end result to how we embedded it in a `List`. Unfortunately, the Action menu doesn’t provide an “Embed in NavigationLink” action. So, we need to grab it from the view library and move the `Text` into it.

👉 Click the `+` button to show the Library. Click the Views icon. Type `nav` in the filter.



👉 Drag the `NavigationLink` from the Library into the code, to insert a new line immediately before the `Text("Text")`.



👁️ As you can see, each cell in the `List` now contains two subviews: the `NavigationLink` and the `Text`. It displays them side by side in the preview.

We instead want the `Text` embedded inside the `NavigationLink`.

👉 Select the `Text("Text")` line of code and the two subsequent lines of modifiers (the `font` and `fontWeight`). Move those three lines of code up one line to before the closing `}` of the `NavigationLink`. Delete the `Label Content` placeholder line.

👁️ In the preview (refresh it if needed), you can see that each row in the list now has a “chevron” (the head of an arrow) on the far right, pointing to the right.

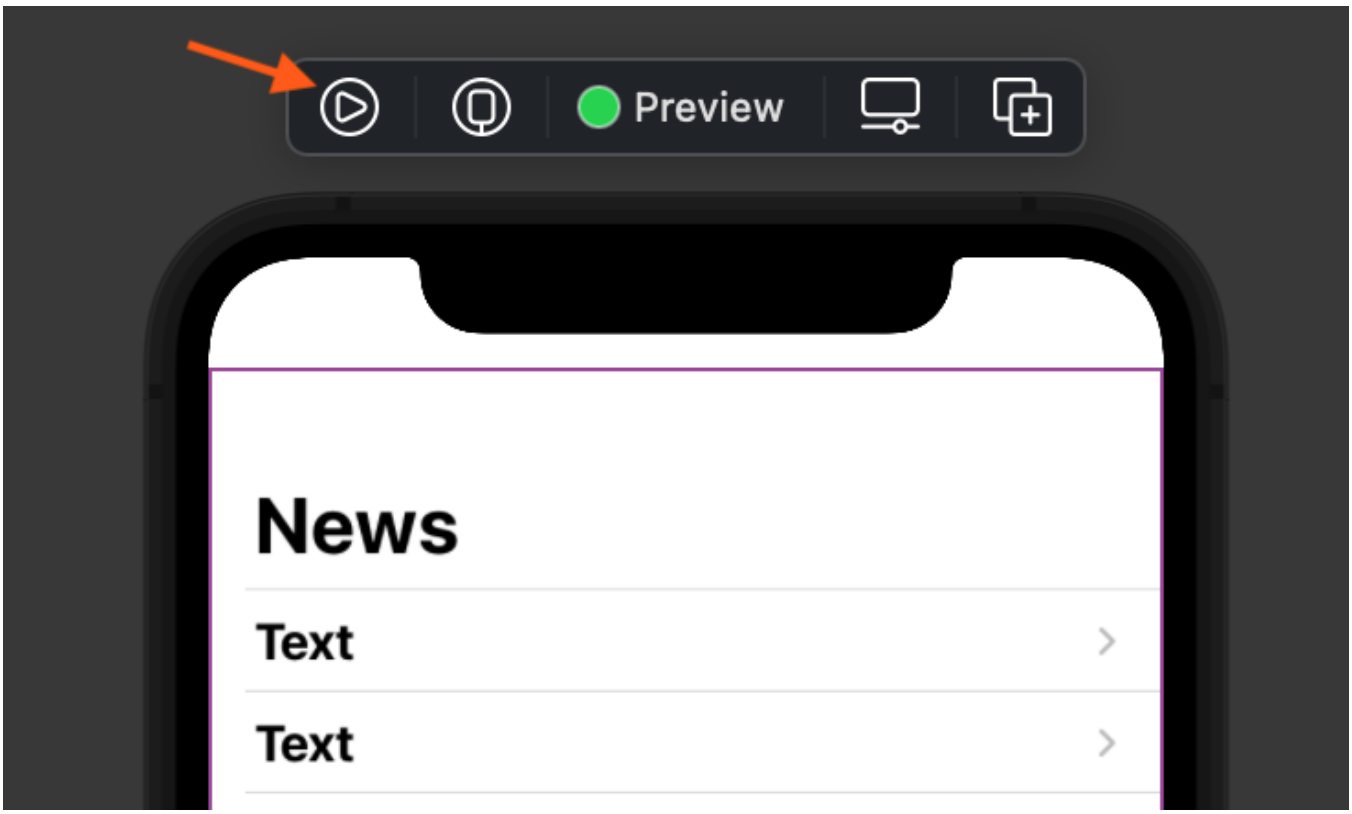
disclosure indicator is gray, not the red accent color because you don't have to tap on it directly — just anywhere in that cell.

The `NavigationLink` code includes a `Destination`. For now, it's just a placeholder. Later, we will replace it with a scene containing detail of each news article.

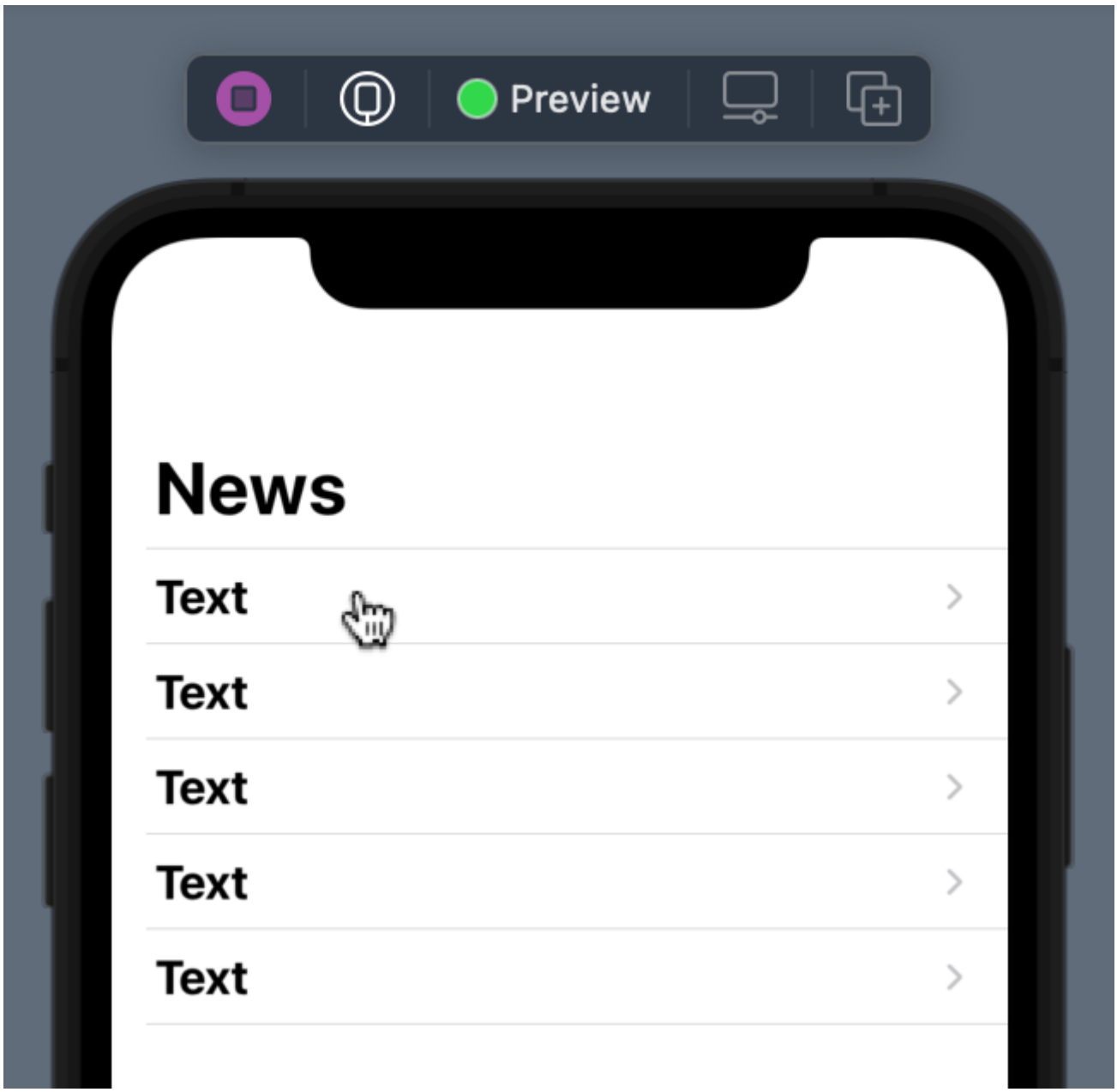
4. Live Preview

Now we have a navigation link that, when tapped, will navigate to a new destination scene. We can't see this dynamic interaction in the static preview. We will need to either run the app or use the "Live Preview" that Xcode provides for this purpose.

👉 In the preview, click on the `Live Preview` button, which looks like a play triangle in a circle.



👁️ After a few seconds, the button changes to a stop icon, and the background of the preview pane changes color. Move the mouse pointer into the iPhone preview and see that it changes from an arrow to a hand and finger. These all indicate that the preview is now live and accepting interaction.



👉 Click on one of the `Text >` cells. You can tap anywhere in a cell, bounded by the divider lines and the left and right edges of the screen. You don't have to tap on the disclosure indicator specifically.

👁️ The app preview accepts the click as a finger tap and navigates to the linked next scene, which is currently just placeholder text that says `Destination`. Note the subtle detail of this transition. The destination scene slides in from the right, pushing the first scene off the screen to the left. The navigation bar and tab bar stay put, but the navigation bar shrinks in height. The large `News` title in the first scene animates to become the title of the back button in the second scene, which is in the app's accent

👁 Note how the animation now runs in reverse, sliding the first scene in from the left.

The navigation link in the navigation view takes care of a lot of UI for us. As another example, instead of tapping the back button, you can swipe from the left edge to the right in the destination scene. If you do it slowly, as you can see in the video above, you can watch the transition in slow motion.

5. Run the app

👉 Run the app.

👉 Switch back to Xcode.

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `News: Added list with navigation links`
3. 👉 Click on the `Commit` button.

7. Next...

Our app now has the basic bones of the navigation flow. It has three scenes (News, Products, and Chat) in a tab view. Each scene has its own navigation view. The News scene now contains a list of news titles, each linked to a destination scene, with a back button. We have a smooth animation between scenes, which follows Apple's Human Interface Guidelines.

The tab bar items could use some custom icons. The cells need images. We'll add those next, starting in Tutorial 6.

⁉️ If you have any questions or comments, please add a response below.

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May 9, 2021 · 8 min read ★

Images and SF Symbol Icons

Build an App Like Lego, with SwiftUI — Tutorial 6

Photo by James Pond on Unsplash

1. Introduction

We can add two different types of images to an app built in Xcode:

1. “SF Symbol” icons.
2. Or image files.

An image file is usually a “bitmap” graphic, such as PNG (from a drawing program) or JPEG (from photos). It just contains a grid of colored pixels that will stretch or shrink if the image is resized. It can look “pixelated” if it doesn’t have enough pixels to fill its assigned area.

In Tutorial 5, we added a list and navigation links to the flow of our app, including sample text. This Tutorial 6 will add images: some symbols for icons and some photos for products and faces.

We’ll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Label

In our Xcode project, the News tab item currently contains only a `Text` view with the word `News`, but no icon.

We want to add an icon in this tab item. The text and the icon will both label the tab item. Then SwiftUI can choose to use the text or icon or both, depending on the circumstance.

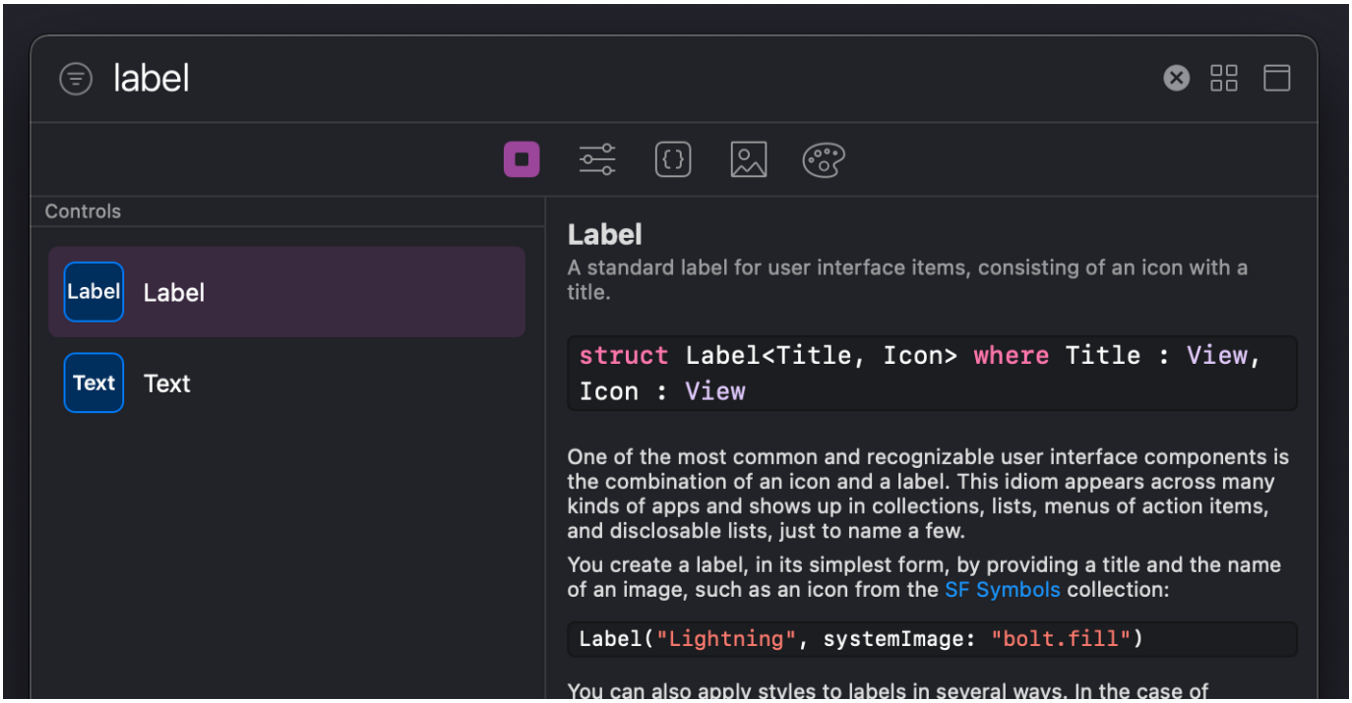
Swift (the programming language that we’re using) is pretty flexible about spacing in the code. We can put a new line or spaces almost anywhere we want. As the code gets more complex, it is beneficial to adopt a strategy for consistent spacing that neatly distinguishes between different sections of code. For example, I tend to start each modifier on a new line.

👉 Click in the code just before the period in `.tag(1)`. Hit return on the keyboard to move it down to a new line.

We need to replace the existing `Text("News")` with a label. The easiest way to do this is to delete the old text, drag in a label, then customize the text in that new label.

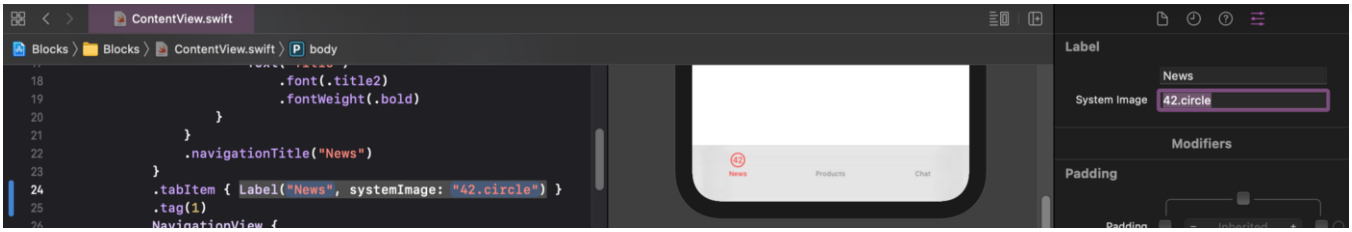
👉 In the `tabItem`, select and delete `Text("News")`.

👉 Click on the `+` Library button, show the Views and filter using the word `Label`.



👉 Drag the `Label` from the library into the empty `tabItem` in the code.

👁 In the preview, you can see the first tab item now has the icon of `42` in a circle, and the word `Label` underneath it. In the Attributes inspector and the code, you can see that the `Label` has the word `"Label"` and a `systemImage` of `42.circle`



We need to change the icon from `42.circle` to something suitable for news. If we type “news” in that field, the icon goes blank since no such system image is available. So, how do we know what system images we can use?

3. Install the SF Symbols App

SwiftUI has thousands of built-in icons or “system images” called “SF Symbols”, which we can use in our apps for tab items and other image labels. We can peruse the available SF Symbols using the SF Symbols app, available for free from Apple’s web page.

👉 Visit Apple’s SF Symbols web page.

👉 Under the `Download the app` heading, click the `Download` link next to the latest version of SF Symbols (version 2.1 at the time of writing this article).

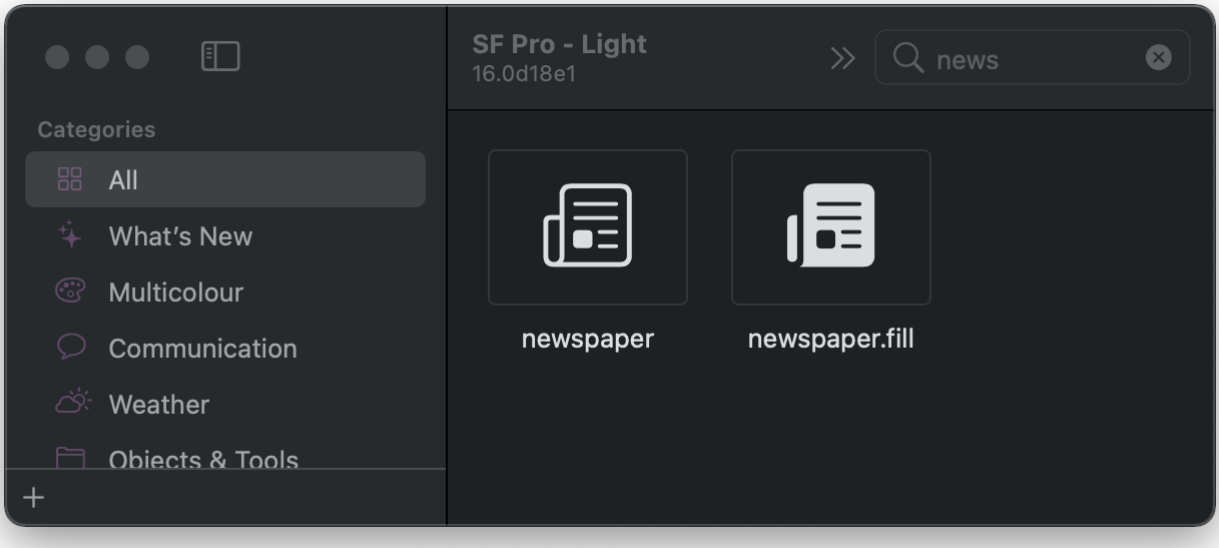
👉 After it finishes downloading, open the installer and install the new app on your Mac.

👉 In your Applications folder, open the new `SF Symbols` app.

4. Add icons to the Tab Items

Let’s find an SF Symbol to use as the icon for our News tab item.

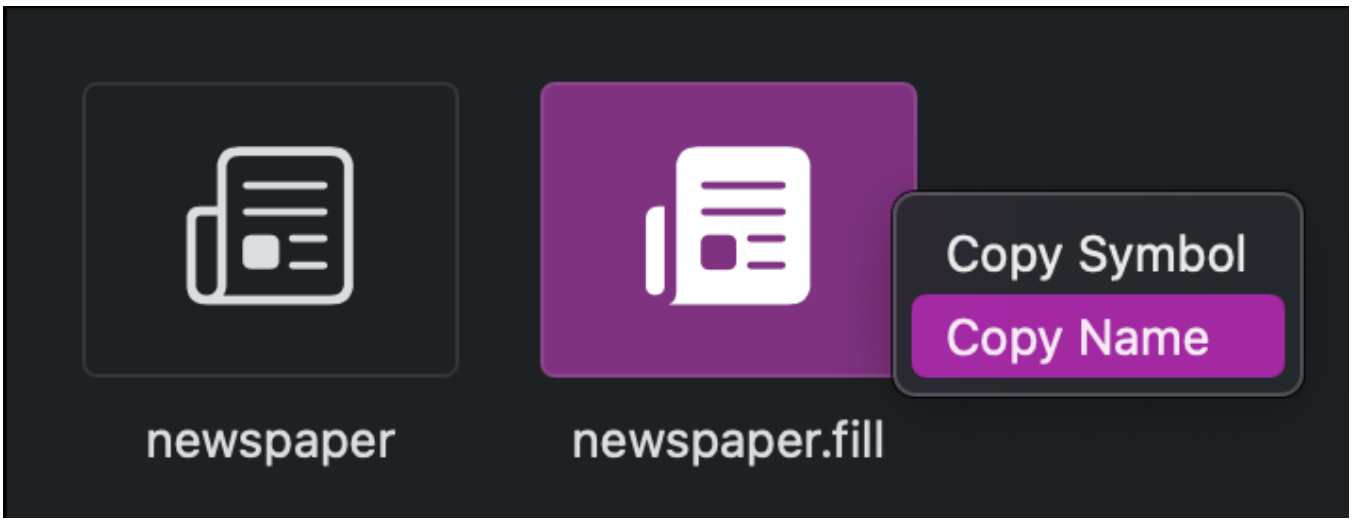
👉 With the SF Symbols app open, type `news` into the search bar.



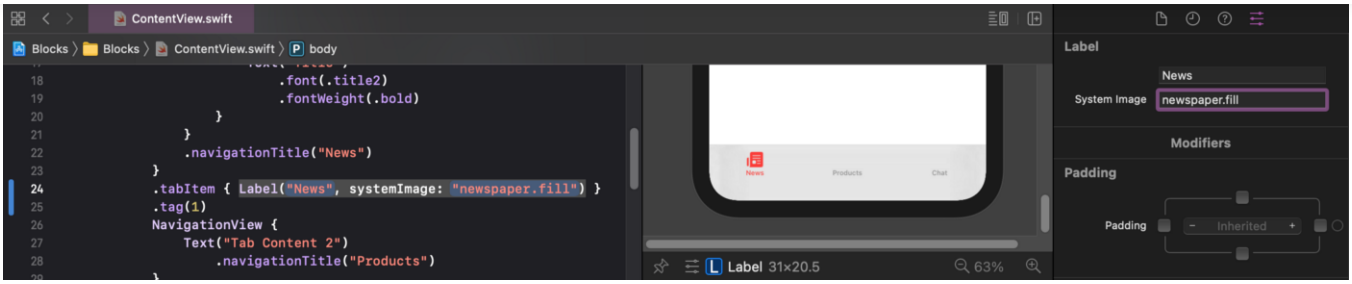
👁 SF Symbols shows the two icons that contain the word `news` in their name.

For tab item icons, filled versions are best because they are more clearly identified when selected.

👉 Right-click (or `Control` click) on the `newspaper.fill` icon and choose `Copy Name` from the popup menu.

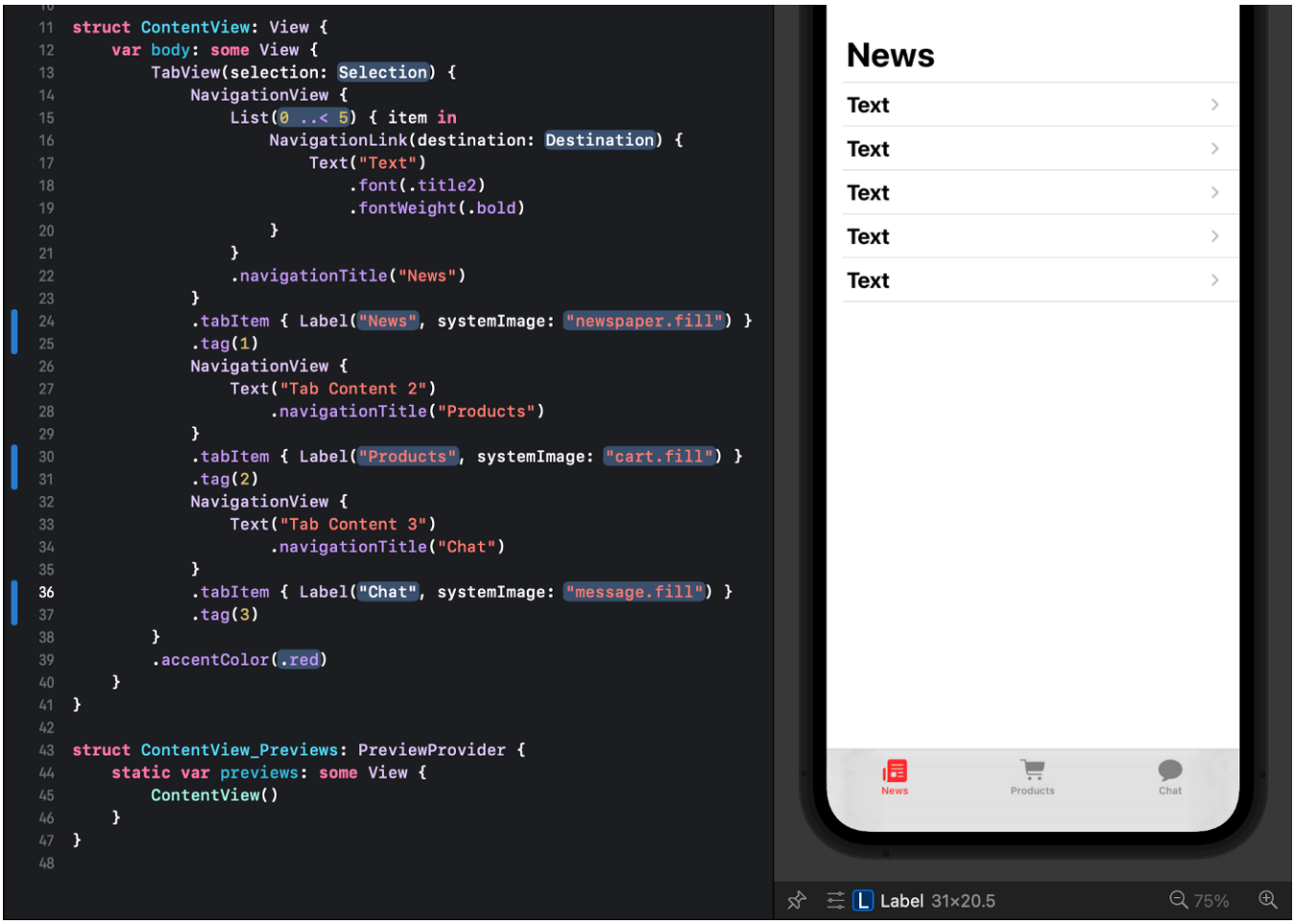


This copies the literal text `newspaper.fill` to the clipboard. But the benefit of using the SF Symbols app is choosing from a known valid symbol name.



👁 The News tab item now shows the `newspaper.fill` icon.

👉 Repeat the process for the other tab items to give them `systemImage`s of `cart.fill` (for Products) and `message.fill` (for Chat). Your code and preview should then appear as shown below.

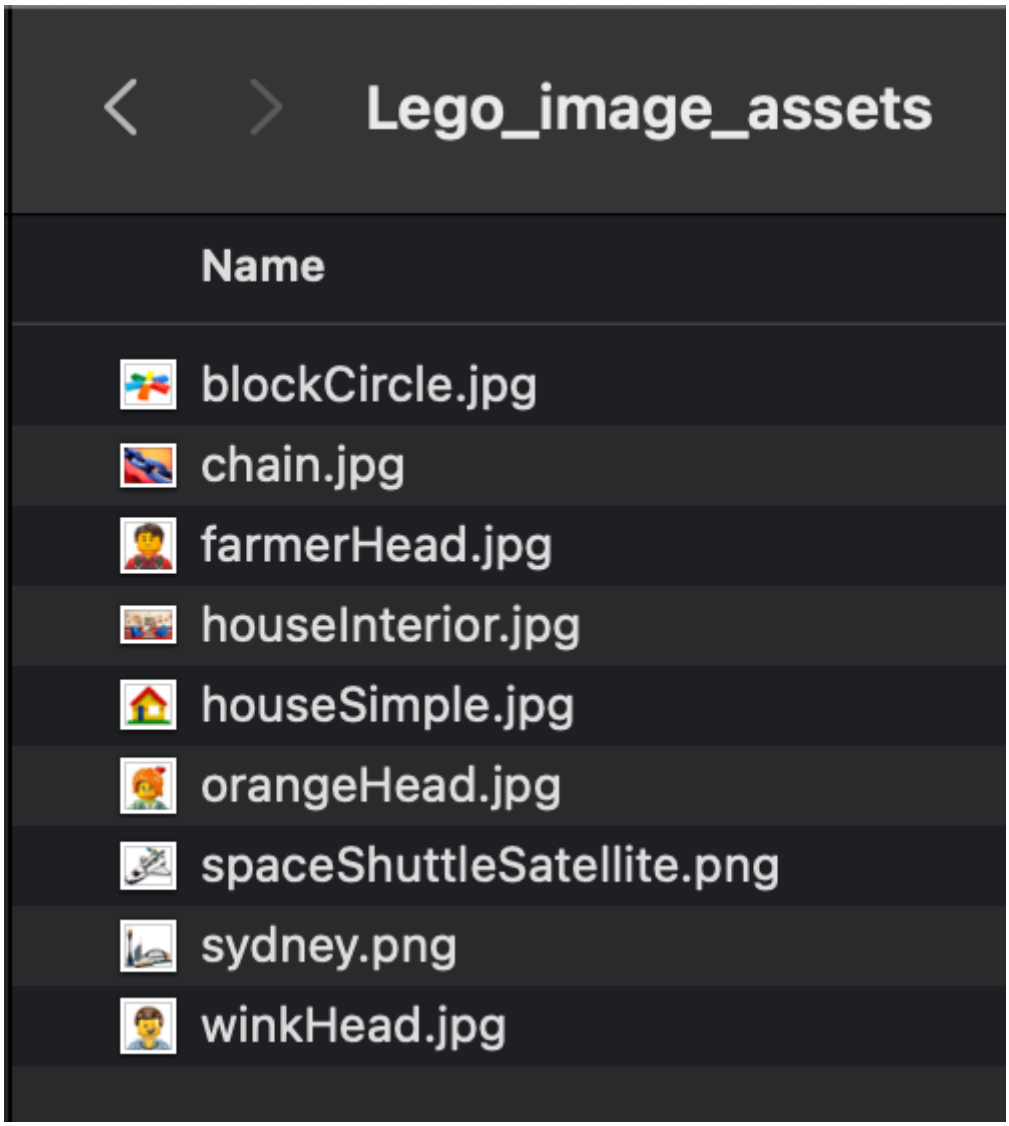


5. Download Image Files

SF Symbols are great for icons. But we sometimes need larger pictures, such as photos of products or people, which aren't system images. For that, we need to add image files

decompress automatically to create a `Lego_image_assets` folder. If not, double click the zip file to decompress it.

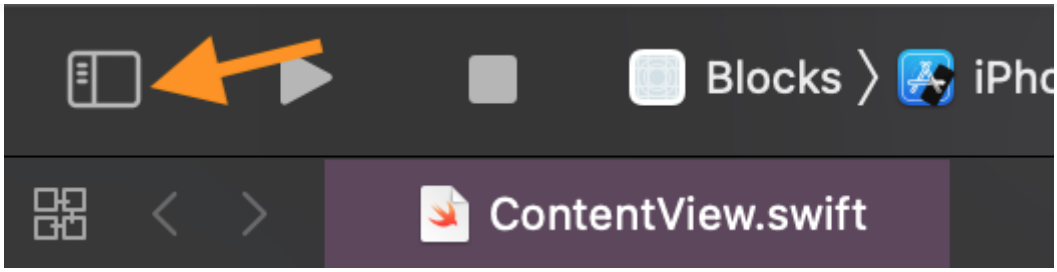
👉 Open the `Lego_image_assets` folder. You should see a list of photos for our app. Some are JPEG format; some are PNG format.



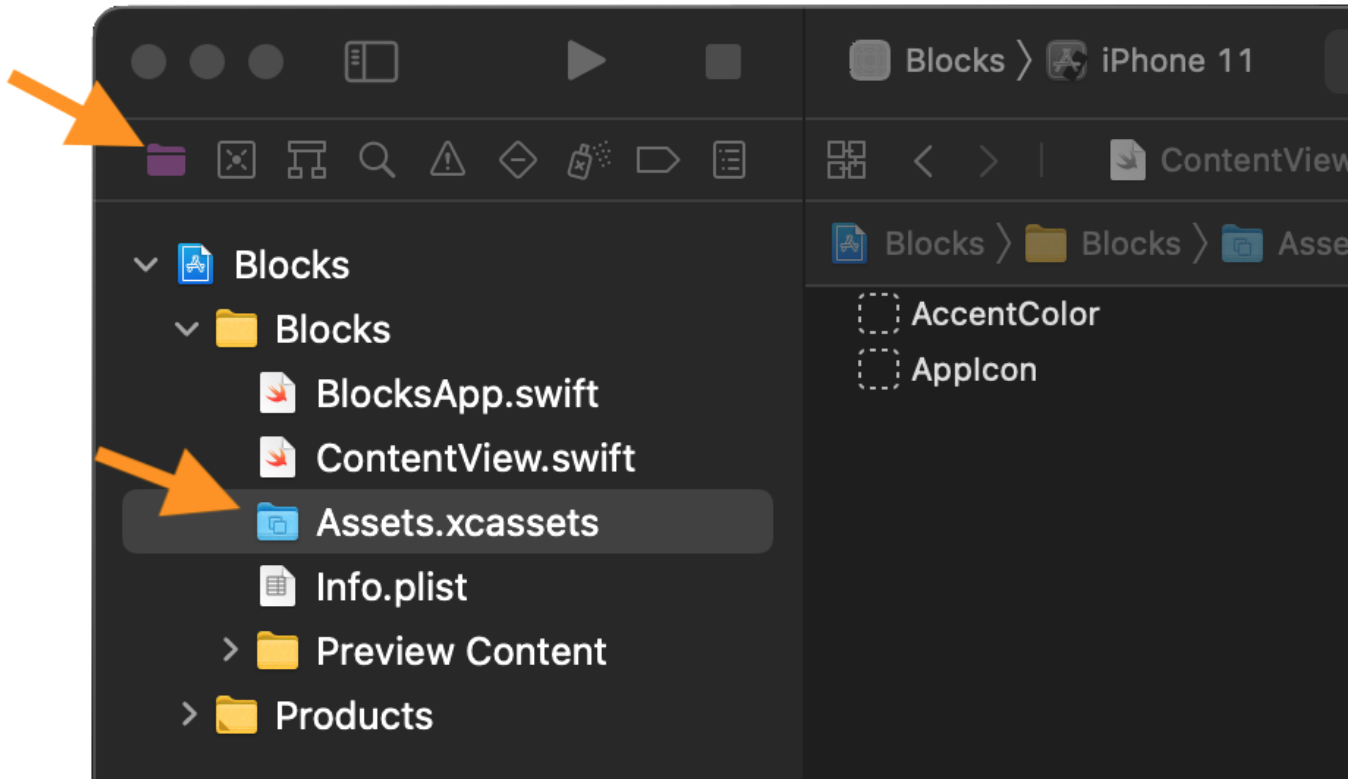
6. Add to the Assets Catalog

Xcode can handle images as individual files, but it is simpler to manage them inside an "assets catalog". You can have several asset catalogs in a project, but for now, we'll use the default "Assets" catalog that Xcode included with the project template.

👉 If Xcode isn't currently showing the Project Navigator, click on the `Hide or Show the Navigator` button near the far left of the toolbar



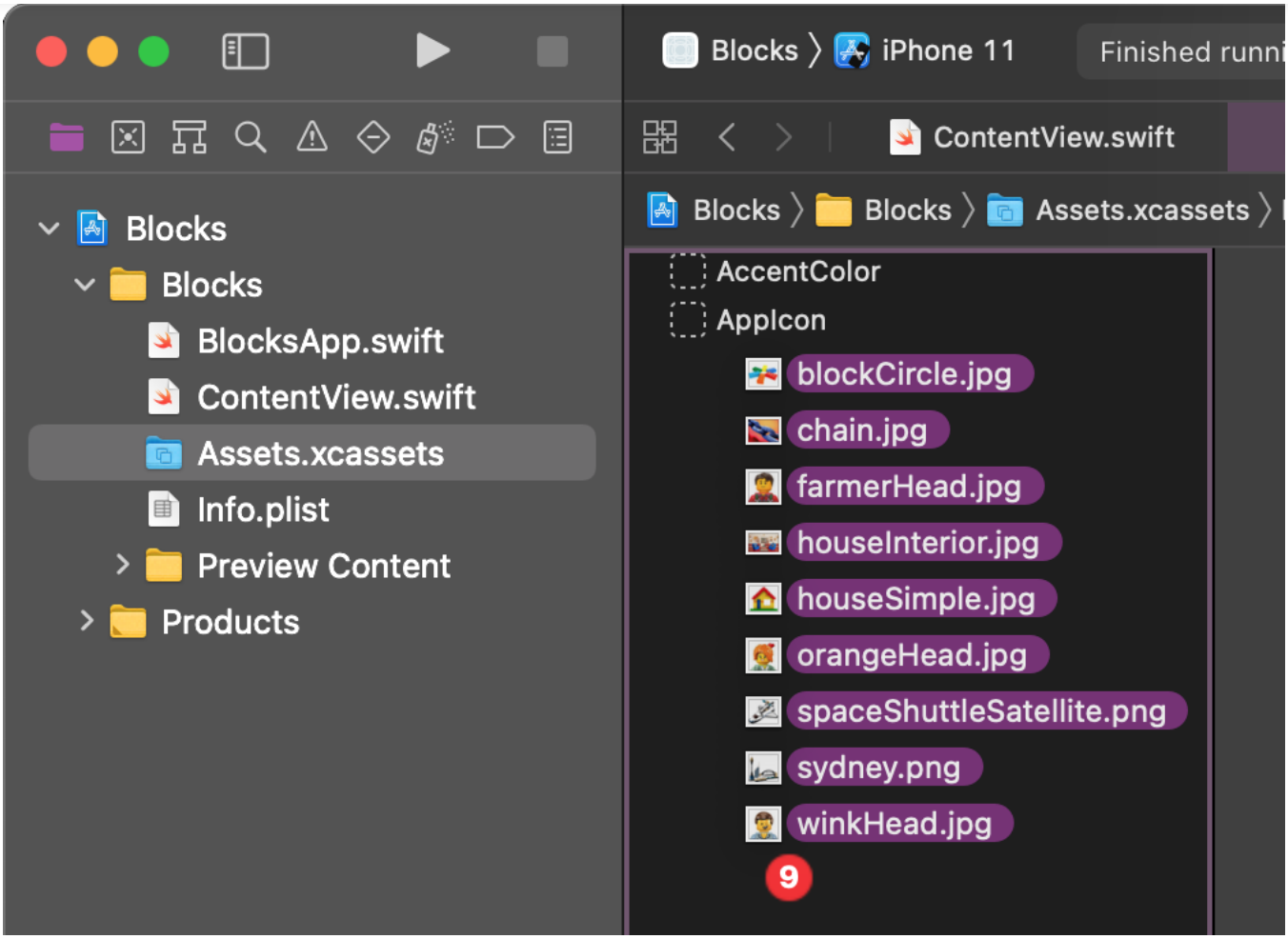
👉 In your Xcode project, select the `Assets.xcassets` item in the Project navigator.



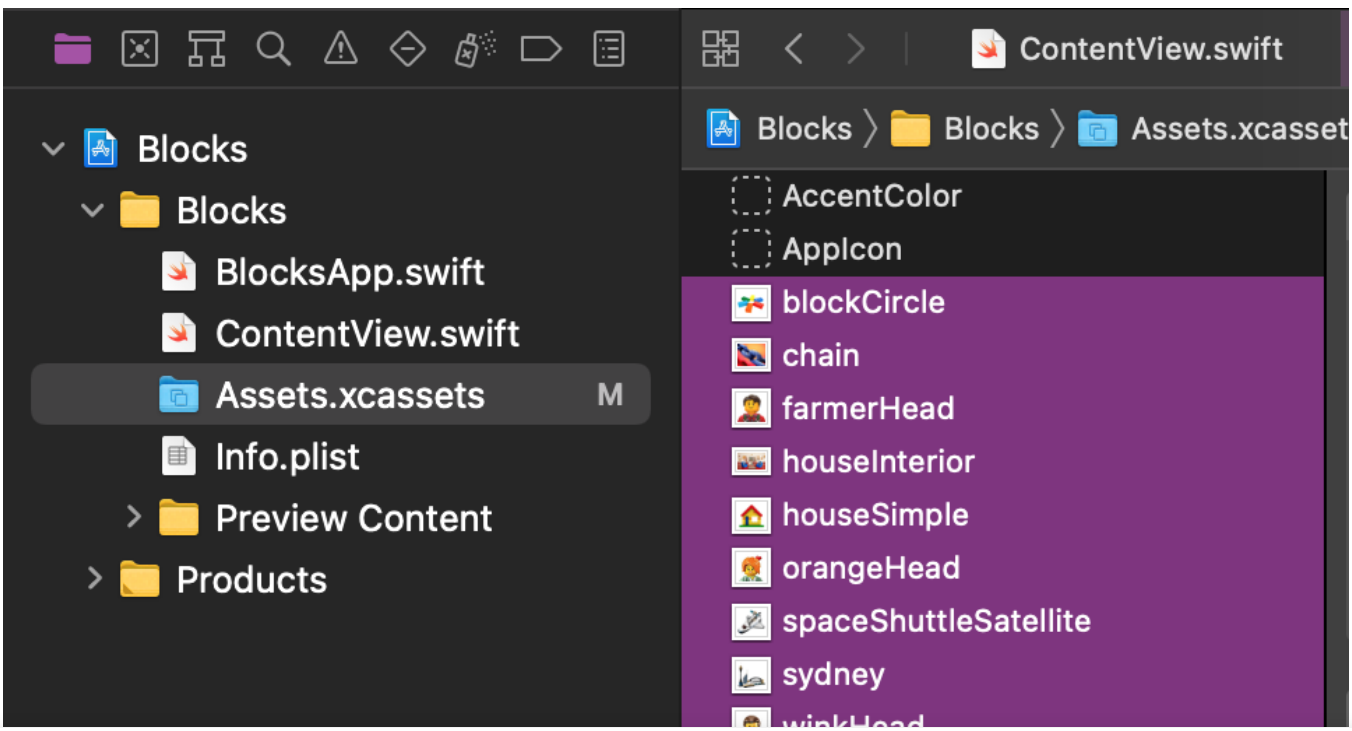
👁️ You can see a placeholder for the `AccentColor` and `AppIcon`. We're not using either of those at this stage.

👉 Back in the Finder, select all of the files inside the `Lego_image_assets` folder. One way to do this is to choose one file and choose `Select All` from the `Edit` menu in the Finder.

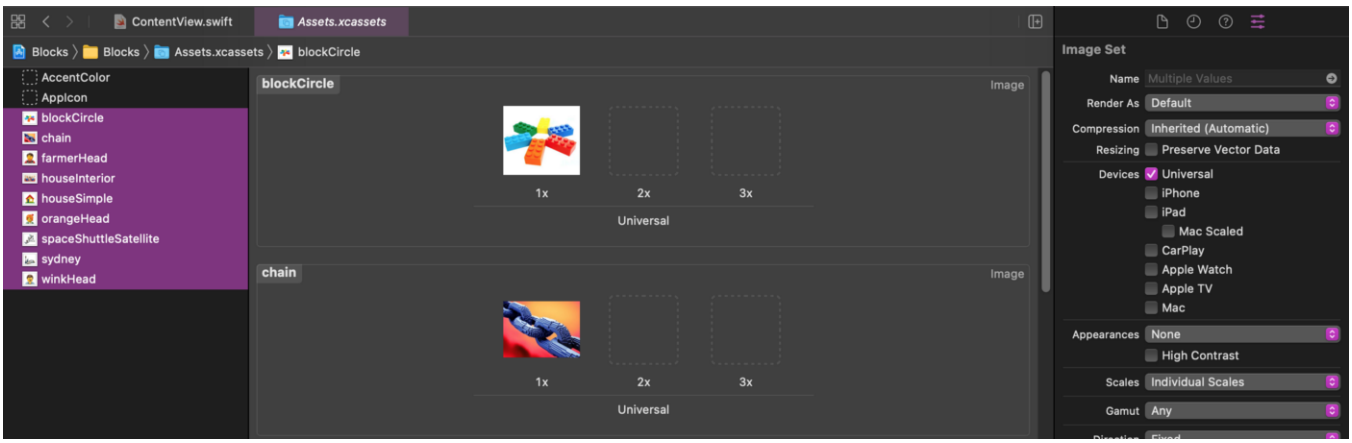
👉 Drag all of the files (by dragging one, with all selected) into Xcode into the middle panel below the `AppIcon` placeholder.



👁 You should see the images listed in the assets catalog.



👁 As you can see, the assets catalog defaults to providing three slots for each image.

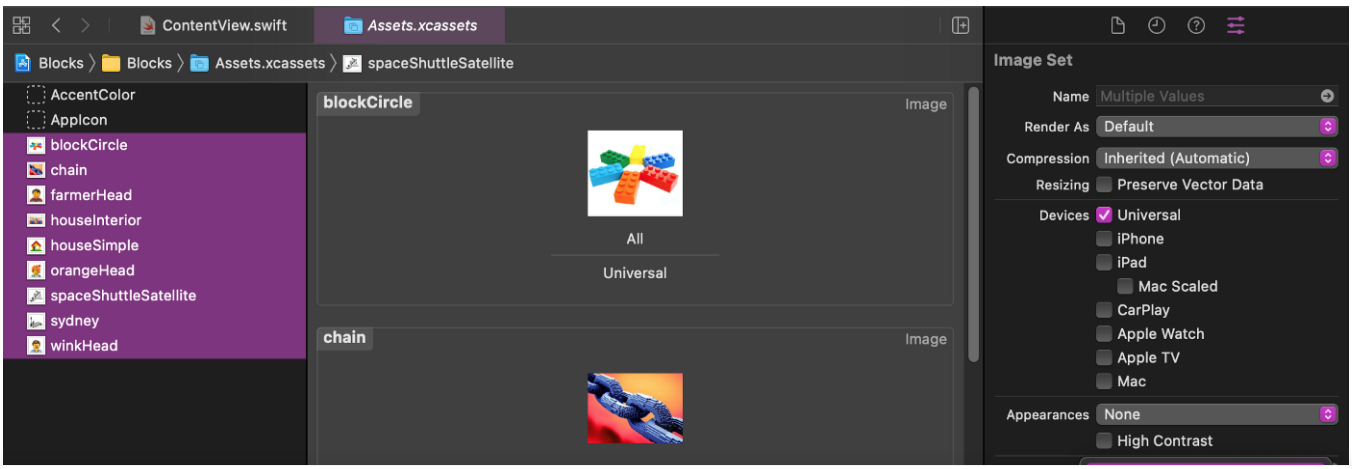


The iPhone, iPad (and Mac) have a screen with one of several resolutions. The original standard screens have one pixel per point. Later devices with “Retina” screens have 2x2=4 pixels per point. Some, such as the iPhone X, have 3x3=9 pixels per point. The asset catalog has placeholders for each of these image resolutions, labeled as `1x`, `2x` and `3x`.

In this case, we only provided one image file for each image asset, which Xcode has placed in the `1x` slot. Since there is no specific version of this image for the other resolutions, Xcode will scale the main image file as needed.

Let’s explicitly tell Xcode to scale each of these images for any needed size.

👉 With all the photos still selected in the assets catalog: in the Attributes inspector, change the `Scales` from `Individual Scales` to `Single Scale`.



As a general guide, for an image that was created as a drawing (such as using Sketch, Figma, or Illustrator apps), it's best to include each resolution (i.e. `1x`, `2x`, `3x`) as its PNG file. For a photo JPEG (such as `farmerHead`), it's usually sufficient to include one version with enough pixel resolution to look good when scaled for different devices.

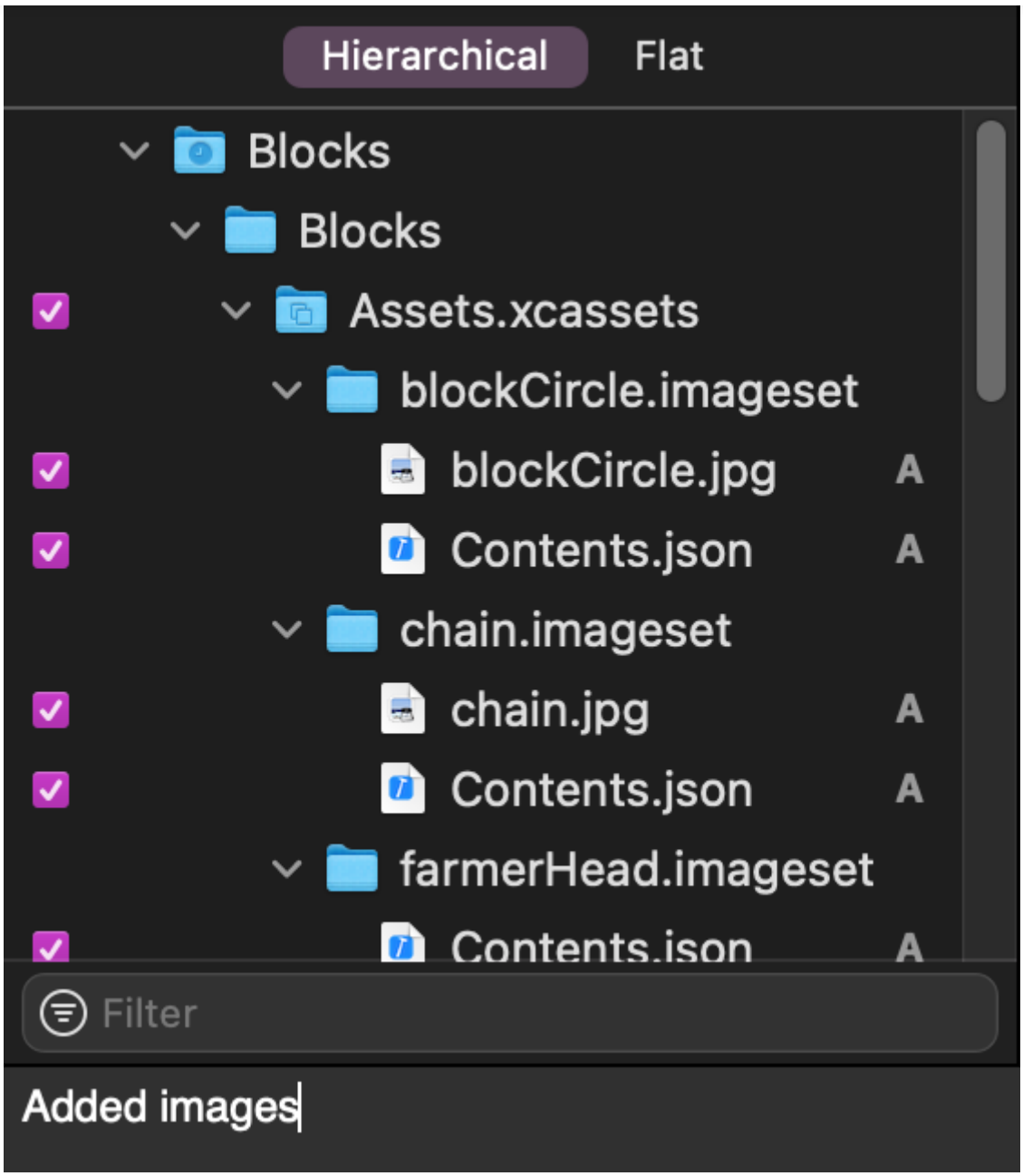
8. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Added images`
3. 👉 Click on the `Commit` button.

👁️ Notice that this time the commit includes many news files: all of the images files and the "JSON" files that Xcode created behind the scenes for the assets catalog.





9. Next...

Our app now has some icons and images. We can see the icons in the tab items, but we haven't yet added the photo images to any of the scenes.

Next, in Tutorial 7, we will start to create our layout for text and images in the cells.

See upcoming tutorials in the table of contents.

⁉ If you have any questions or comments, please add a response below.

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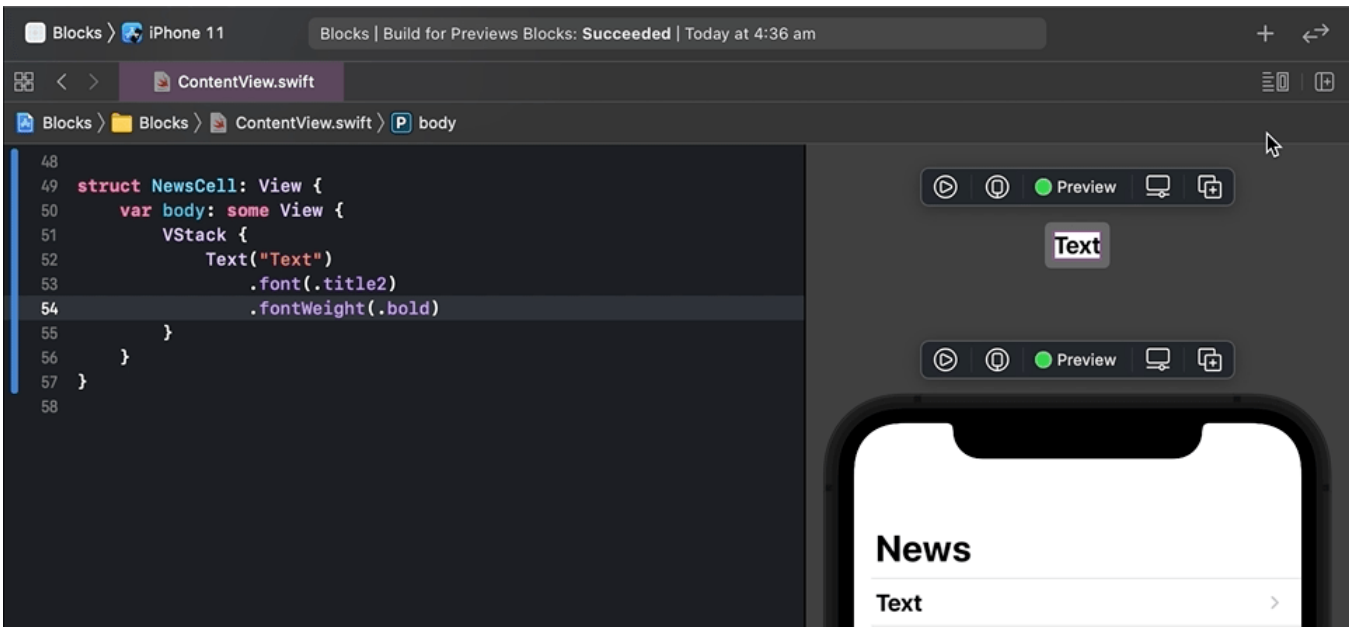
Tom Brodhurst-Hill · Following
May 14, 2021 · 8 min read ★

Extract a Subview and Preview

Build an App Like Lego, with SwiftUI — Tutorial 7



1. Introduction

Good designers break up an app into components, where each scene is made up of several subviews, which stack together like Lego blocks. Those subviews might be further broken down into smaller subviews. Each component can be shared across multiple parent/super views, scenes, and even different apps. This is commonly referred to as a “design system”.

Read more about building a design system, to be shared between designers and developers, in the article “Build an App Like Lego — An Intro for Designers”.

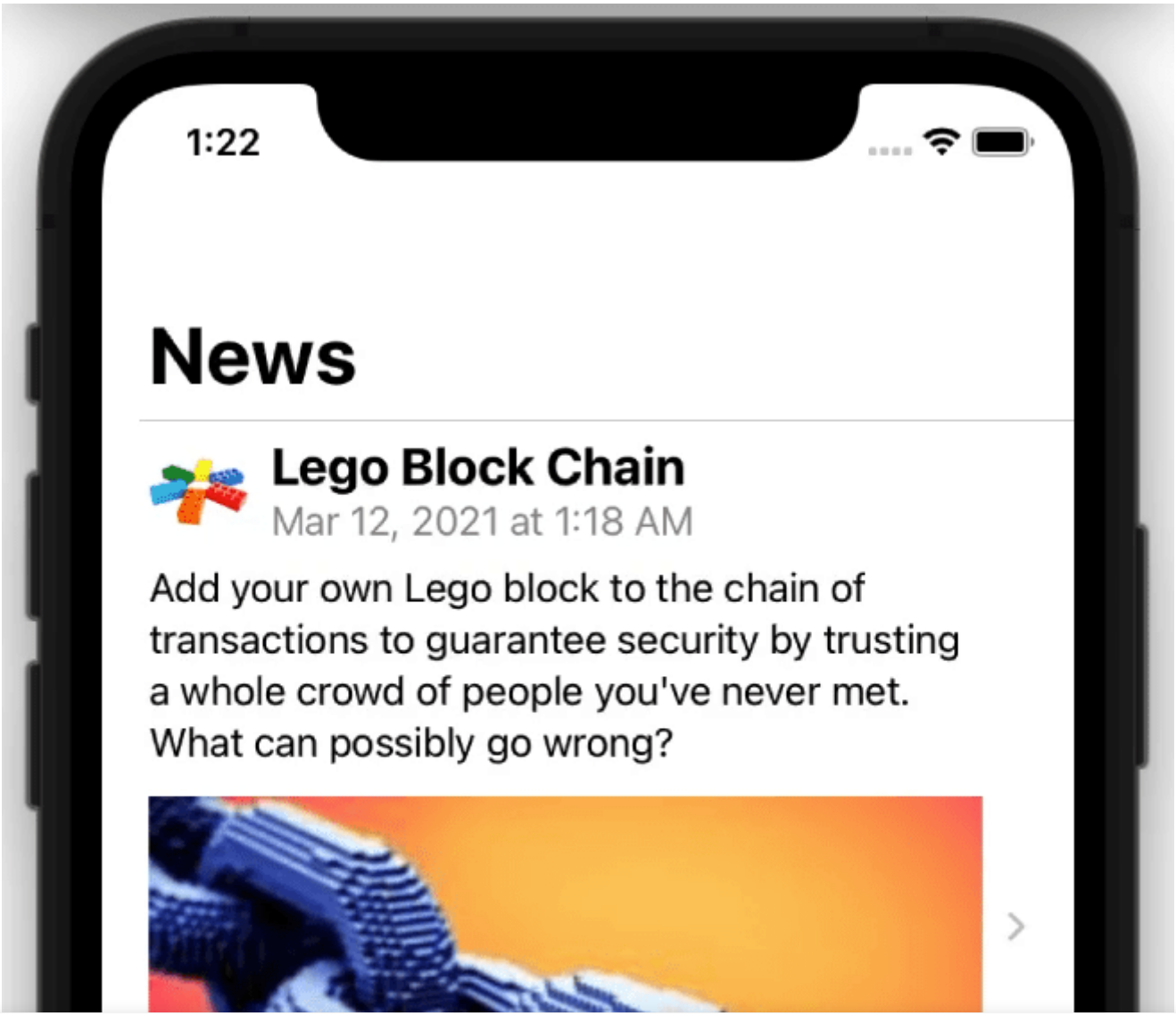
Good developers also break up their app code into reusable components. Instead of building “massive views”, they extract code for each reusable subview into its own file,

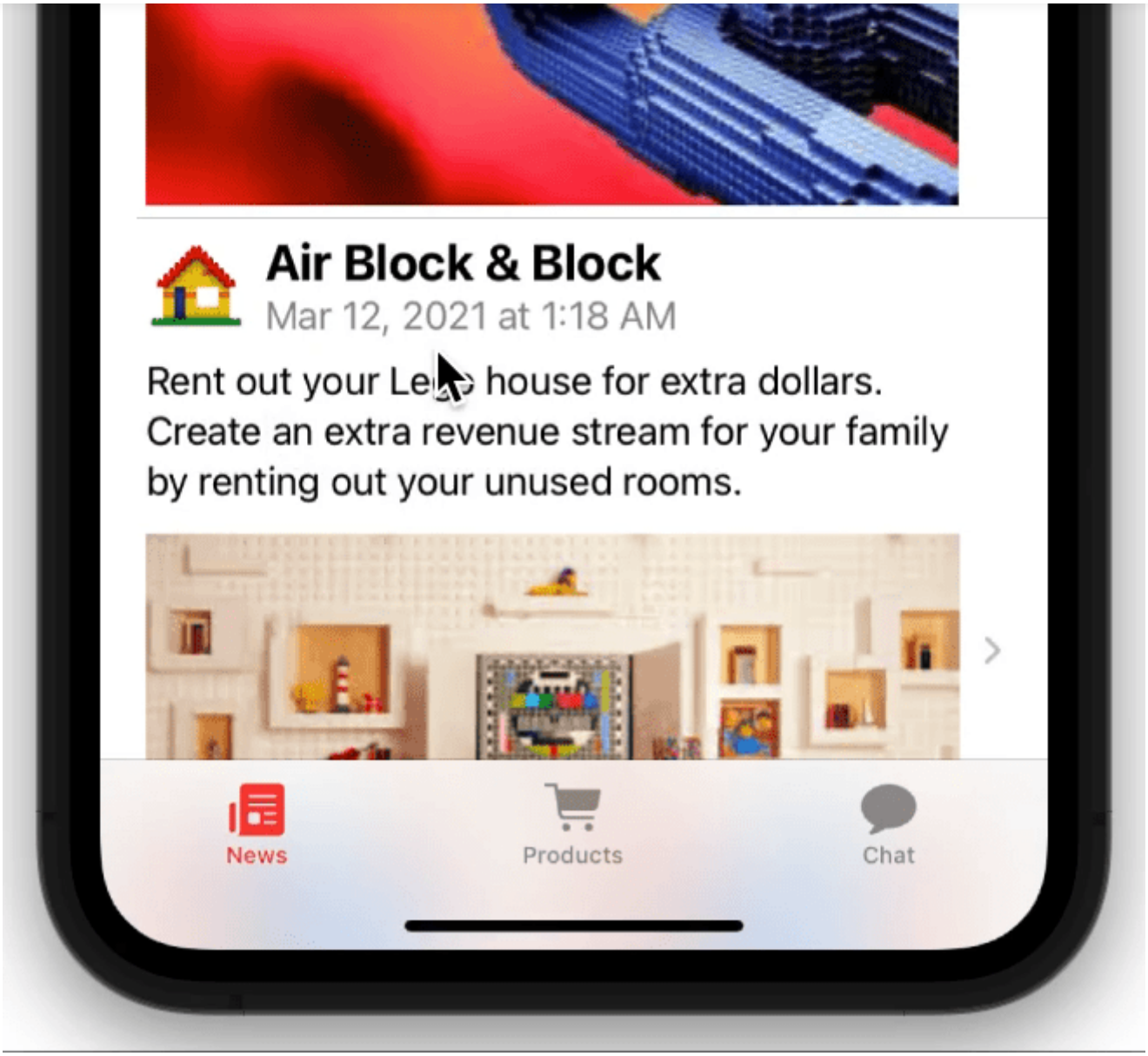
At the end of Tutorial 6 we saw our sample images in the assets catalog. Now we will prepare a cell into which we can add those images (in the next Tutorial 8).

We'll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. News List Cell

We want to ultimately get the cells in the News list to look like those that we previewed as the end goal in Tutorial 1.





As you can see, the desired layout includes a small image, the title, the date (in gray), some detailed text, and a large detail image. At least one text view is allowed to wrap over multiple lines. The fonts show varied styles. The cell height grows to fit its contents.

To achieve this, we need to create our own custom layout, including several subviews.

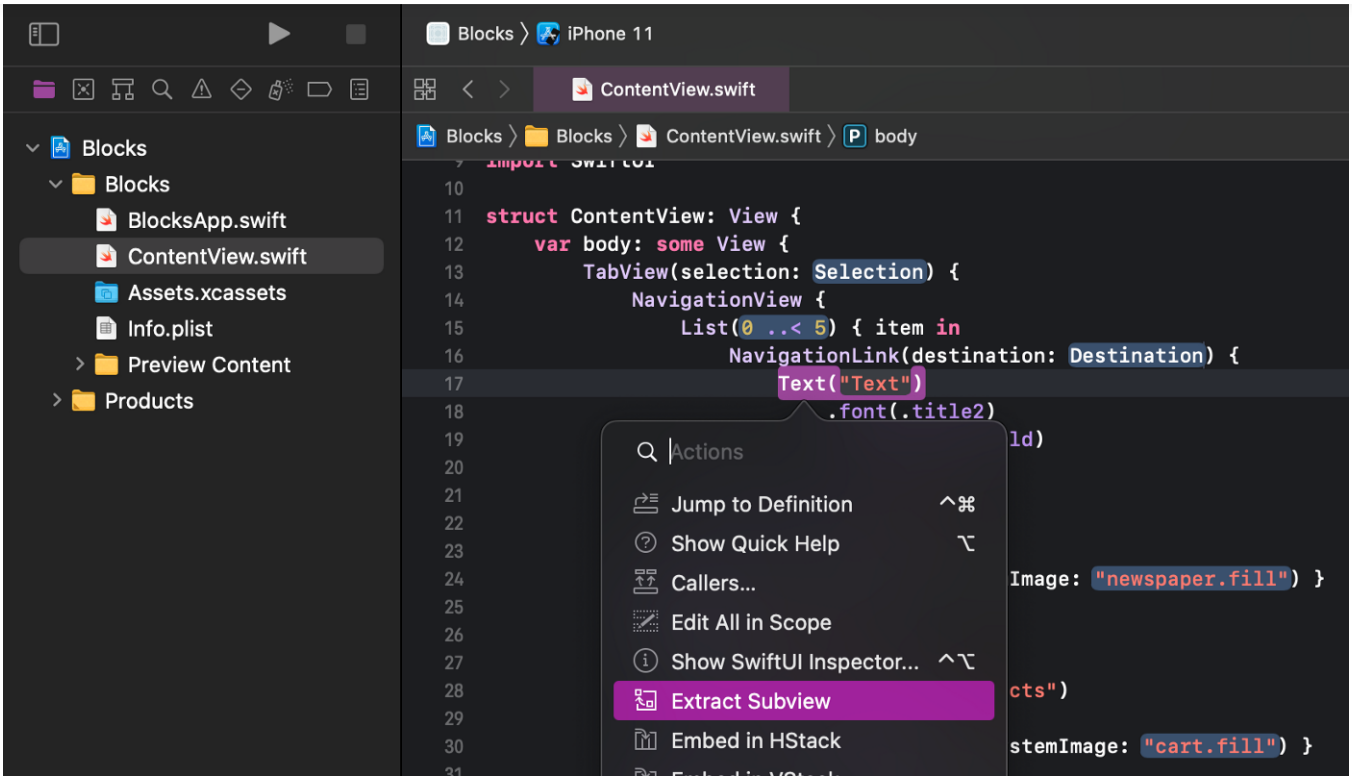
Imagined as Lego blocks, it looks something likes this:

3. Extract a Subview

So far, in this custom cell, we have only created the text title. We need to add several other subviews (text and image views). If we do this in the main `ContentView` code, it will become cluttered. Let's avoid the clutter by first extracting out `Text("Title")` into a new view of its own, where we can add the other subviews.

👉 In the Xcode project's File navigator, select the `ContentView.swift` file, if not already selected.

👉 In the code, `Command` click near the start of `Text("Text")` and choose `Extract Subview` from the menu of actions.



👁 Xcode pulls the `Text` and its modifiers out of the main `struct ContentView` code, into a new `struct ExtractedView` code block at the end of the file.

```
11 struct ContentView: View {
12     var body: some View {
13         TabView(selection: Selection) {
14             NavigationView {
15                 List(0 ..< 5) { item in
16                     NavigationLink(destination: Destination) {
17                         ExtractedView()
18                     }
19                 }
```

```
46
47 struct ExtractedView: View {
48     var body: some View {
49         Text("Text")
50             .font(.title2)
51             .fontWeight(.bold)
52     }
53 }
```

`ExtractedView` is just a placeholder name.

👉 While the `ExtractedView` text is still highlighted, type `NewsCell` to replace that name, and hit `return` (on the keyboard). You should see it renamed in both locations. If not, undo and repeat the previous step to `Extract Subview`.

```
11 struct ContentView: View {
12     var body: some View {
13         TabView(selection: Selection) {
14             NavigationView {
15                 List(0 ..< 5) { item in
16                     NavigationLink(destination: Destination) {
17                         NewsCell()
18                     }
19                 }
```

```
46
47 struct NewsCell: View {
48     var body: some View {
49         Text("Text")
50             .font(.title2)
51             .fontWeight(.bold)
52     }
53 }
```

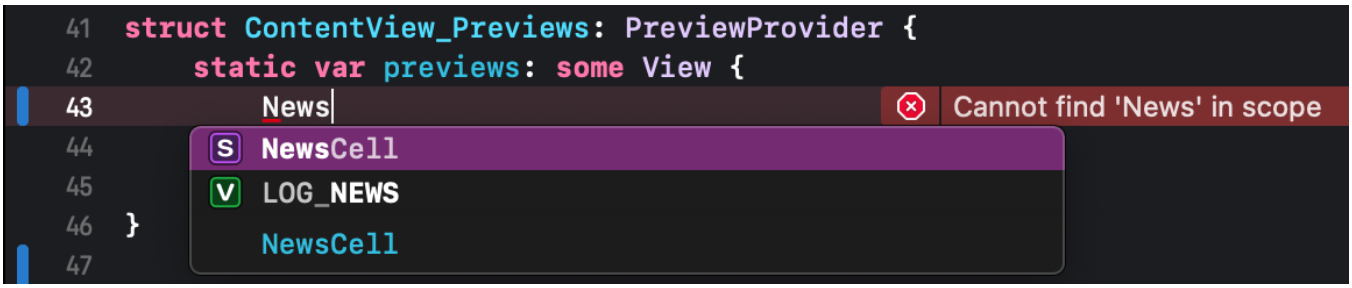
4. Add a Preview

For now, we have both the `ContentView` of our whole app and the `NewsCell` in the same code file. We will eventually create a separate code file for each view. Each SwiftUI view file usually contains its own preview code, which is responsible for generating the preview we've used throughout this tutorial.

The current preview code is fairly simple. It just contains the name of the view that we have been previewing: `ContentView`. The `()` after the name of the view basically just means "make one of these". So, `ContentView()` means "make a `ContentView` here".

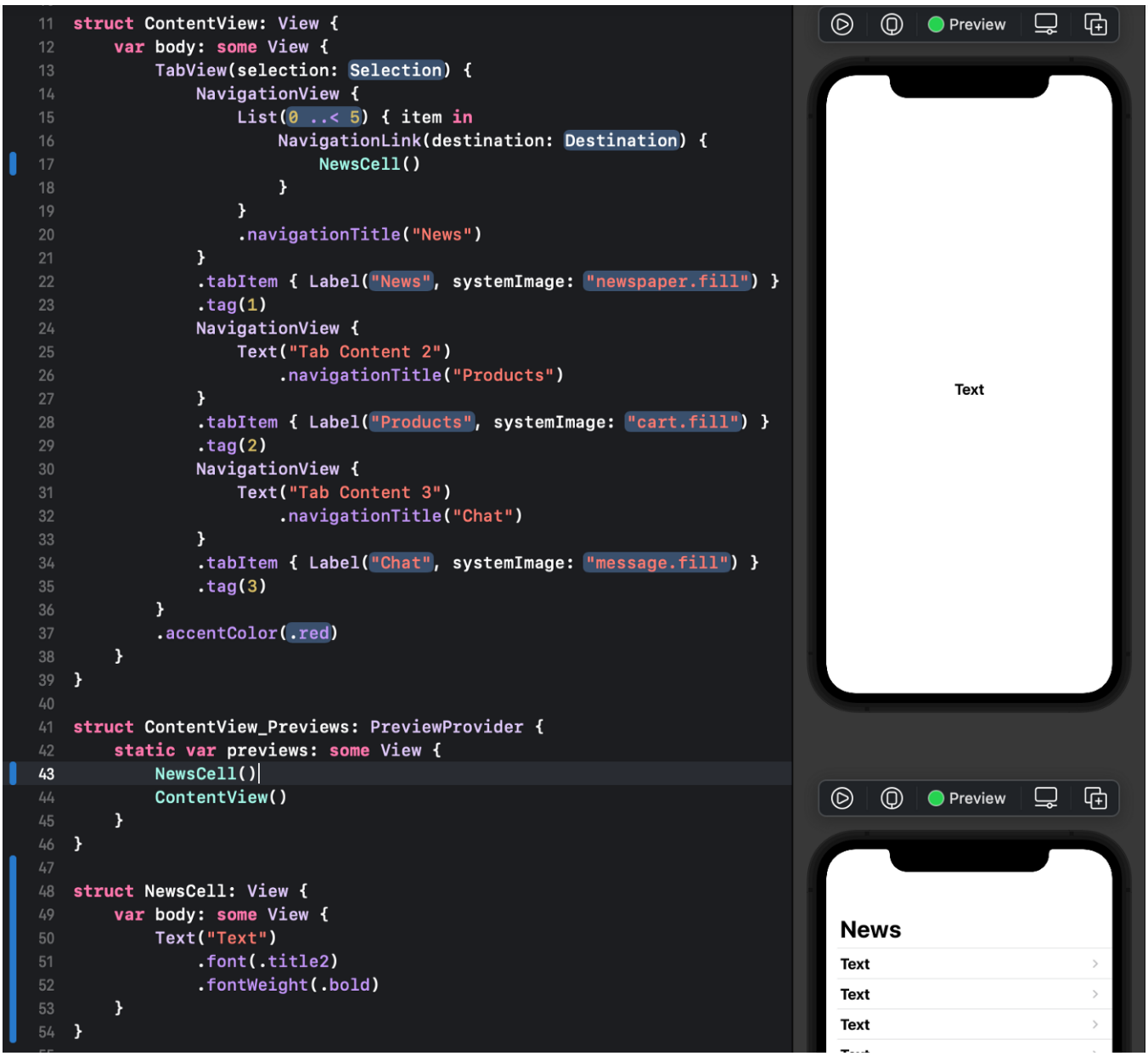
```
41 struct ContentView_Previews: PreviewProvider {
42     static var previews: some View {
43         ContentView()
44     }
45 }
```

👉 In the code, after the `var preview` line, insert a new blank line and start typing `NewsCell`. You should see Xcode autocomplete it and offer `NewsCell` from a popup menu.



👉 Complete entering `NewsCell` by either typing or hit `return` to choose it in the menu. Type `()` at the end.

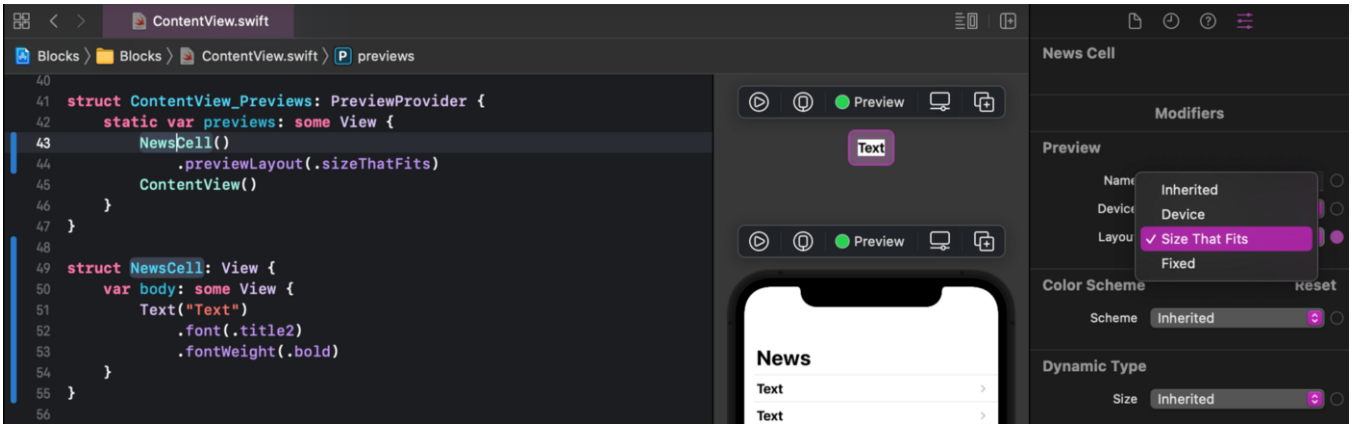
👁️ Check that the preview pane now shows the additional `NewsCell` preview. You may need to click the `Resume` button in the top right of the preview to refresh it.



5. Preview Size That Fits

As you can see, the new preview of the `NewsCell` is taking up an entire iPhone screen. Since it is intended to be a repeating cell row in a list, it would be better for the preview to instead show just the size that fits its content.

👉 In the preview code, click in the `NewsCell()` line (if that line is not already selected). In the Attributes inspector change the `Preview Layout` to `Size That Fits`.



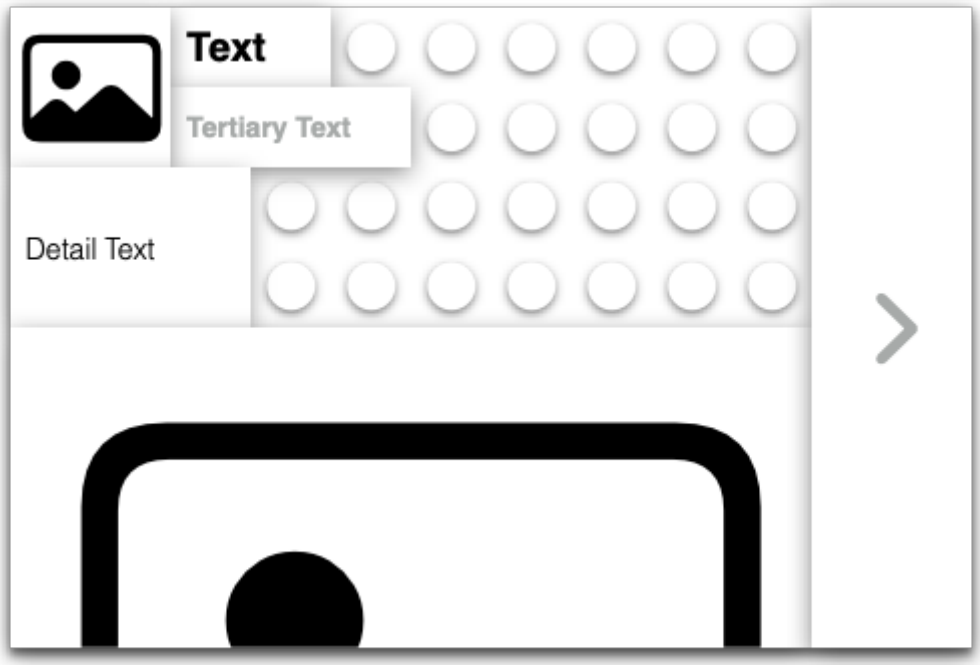
👁 As shown above, you should see that Xcode has added a new `.previewLayout(.sizeThatFits)` to the `NewsCell()`. The preview of the NewsCell is now much smaller — the minimum size needed to fit its content.

6. VStack

Now we start to really build with blocks, like Lego.

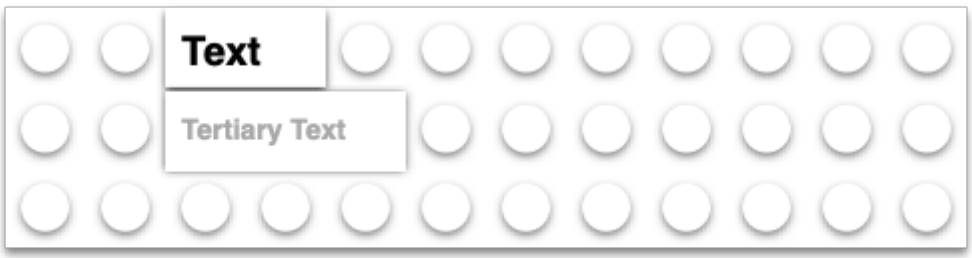
Recall that the aim of this tutorial is to build a custom view (which we've named "NewsCell") that implements a Lego block structure that can display a news article such as:

Our NewsCell needs to eventually display any text and images that we give it. We



So far, our NewsCell only contains one Text view.

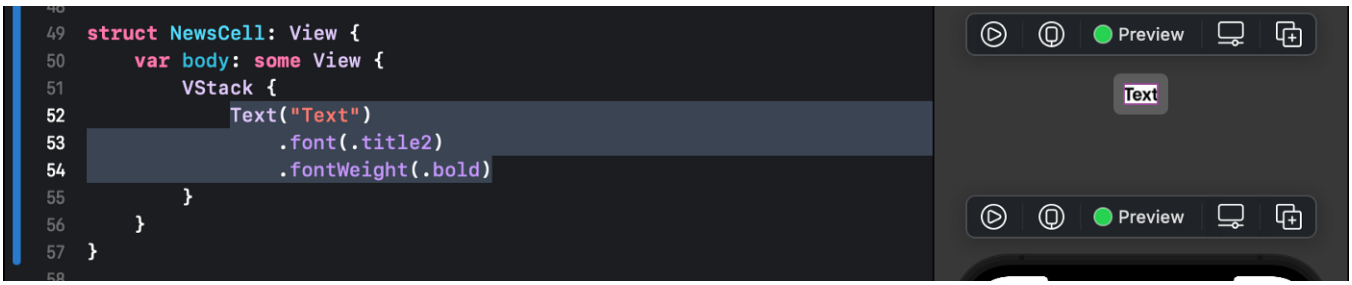
We need to add another text view for the gray wording, under the first `Text` view, which looks like this in Lego blocks:



To add views together, like this, in a vertical stack, we need to embed them in SwiftUI's "VStack".

👉 In the preview, `Command` click on the `Text`. In the popup menu, choose `Embed in VStack`.

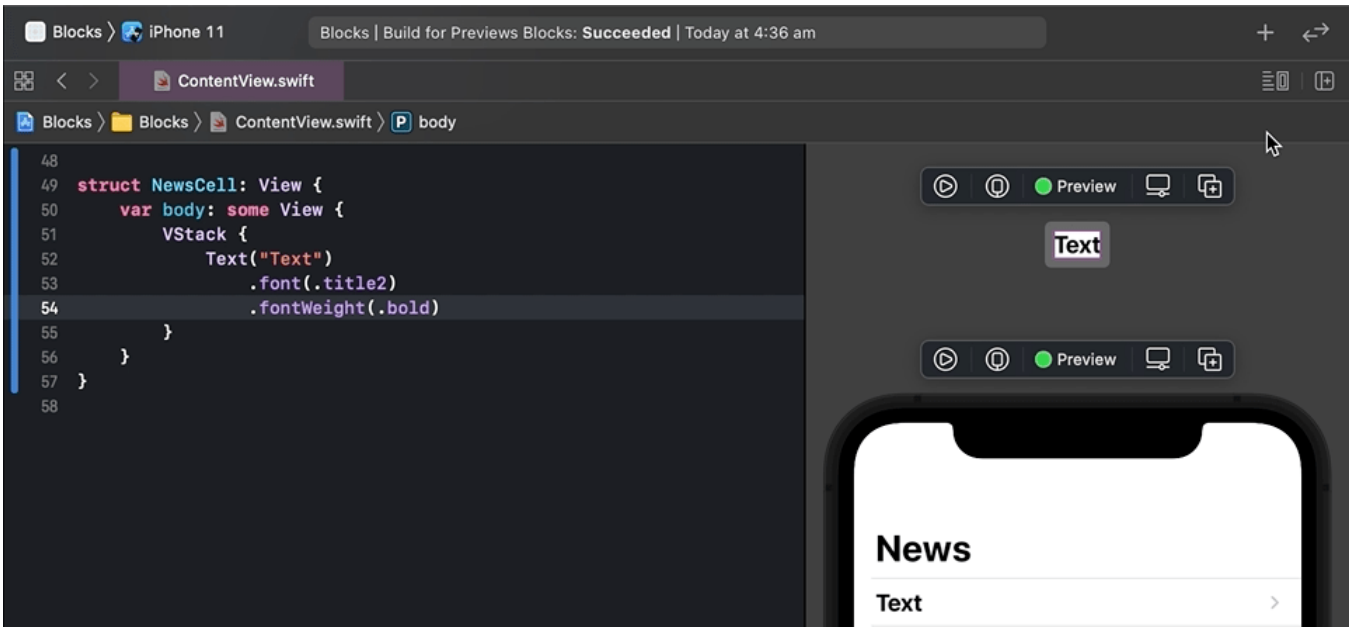
👁️ You can see that the code now has a new `VStack` with the title `Text` inside it.



Nothing changed in the preview, since the `VStack` only contains the same original `Text` view.

Now let's add a second `Text` view (for the gray subtitle) to the `VStack`.

👉 As you've done in earlier tutorials, drag the `Text` view from the Library into the preview, directly below the existing title text view. When it's in the right place to release, you will see a colored line below the title text. If it's hard to see, remember that you can zoom in using the magnifying glass buttons in the bottom right of the preview pane, or use a reverse pinch on a trackpad.

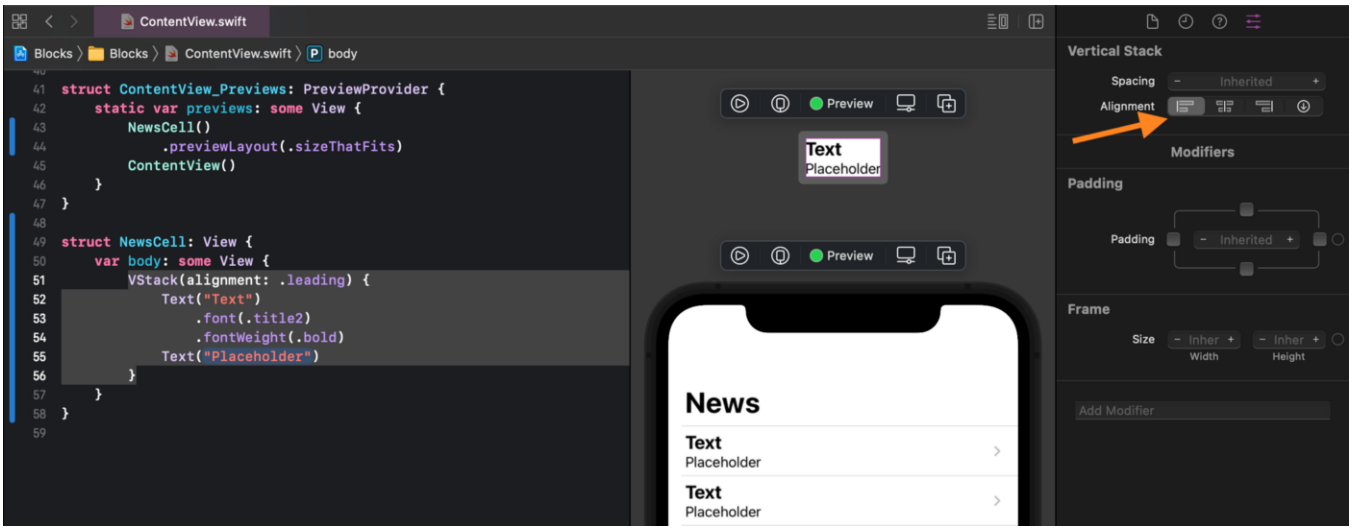


👁️ In the code, the `VStack` now contains two `Text` subviews.

7 VStack Alignment

many other languages, the leading edge is on the right. Fortunately, SwiftUI uses the alignment terms `leading` and `trailing`, so it can adapt to any language orientation.

👉 Check that the `VStack` is still selected in the code. (If not, you can simply click on it.) In the Attributes inspector, under the `Vertical Stack` heading, click on the leading alignment icon.



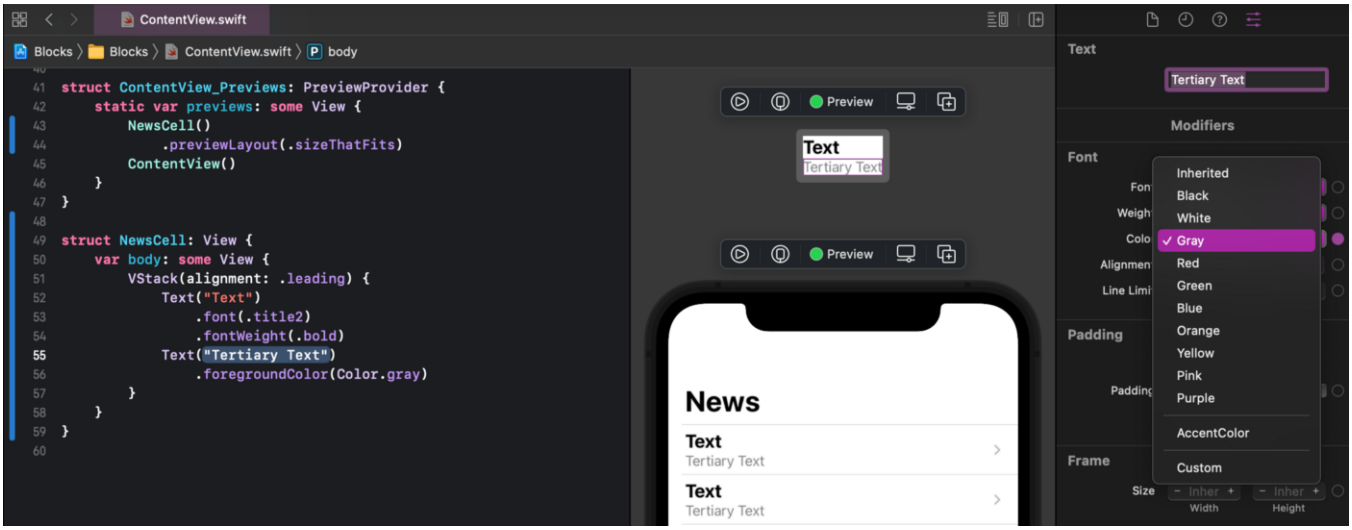
👁️ The two `Text` views are now aligned on the leading edge of the `VStack`. The first preview shows just one news cell. The second preview shows a list of news cells, each with the updated changes.

8. Text Color

Let's replace the `"Placeholder"` text, so we can see how it compares with our desired layout.

👉 Click on the `Placeholder` text, in the preview or the code. You might have to click twice. In the Attributes inspector, change the wording from `Placeholder` to `Tertiary Text`. Hit `return` on the keyboard.

👉 Change the `Font Color` to `Gray`.



9. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Created NewsCell with custom layout`
3. 👉 Click on the `Commit` button.

10. Recap

We created a custom layout for our news cell. We added a vertical stack view, text, and modifiers.

We will complete this layout in Tutorial 8 by adding images and more text.

See upcoming tutorials in the table of contents.

⁉️ If you have any questions or comments, please add a response below.

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Tom Brodhurst-Hill · Following
May 19, 2021 · 8 min read ★

Image Views, Resizing, Aspect Ratio

Build an App Like Lego, with SwiftUI — Tutorial 8

1. Introduction

Images, such as photos and drawings, come in various sizes and resolutions. When showing an image in an app, the available rectangular area is usually quite different from that of the image. So, we need to stipulate how the image should be resized.

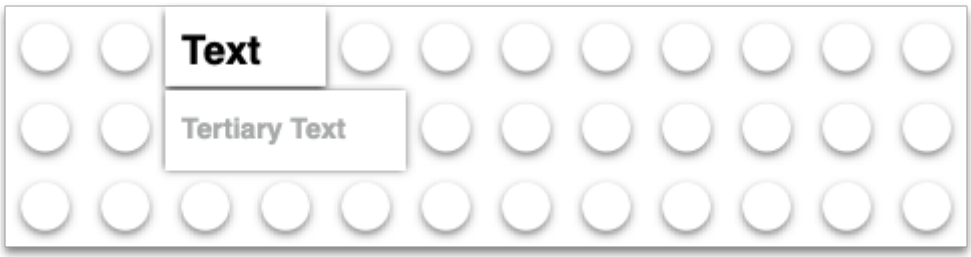
Should the image stretch and shrink? If the aspect ratio of the image differs from the display area, should it fill the area and crop the image, or fit what it can and leave edge gaps?

project. In this Tutorial 8 we will add image views to the news cell, to show those image files. We will also add more text views.

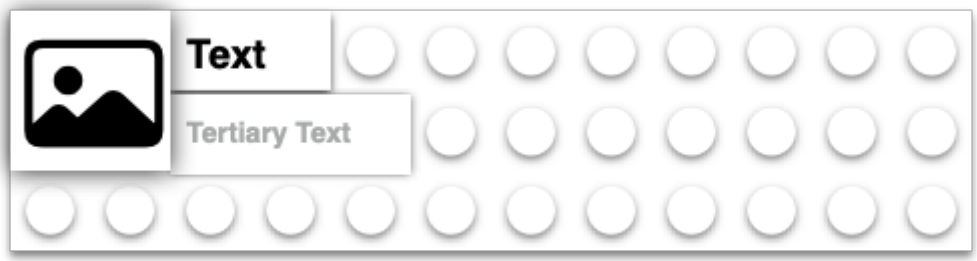
We'll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Add an Image in an HStack

Our NewsCell currently contains two text views.



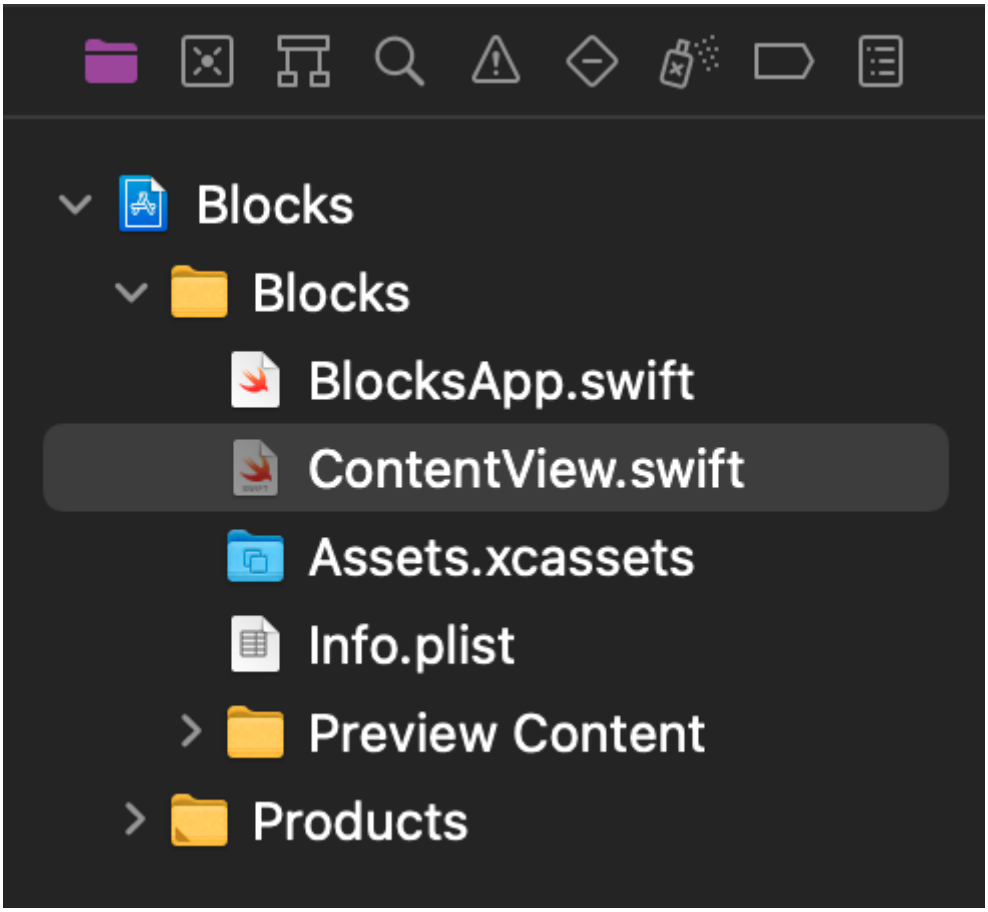
We need to add the small image horizontally next to the existing content.



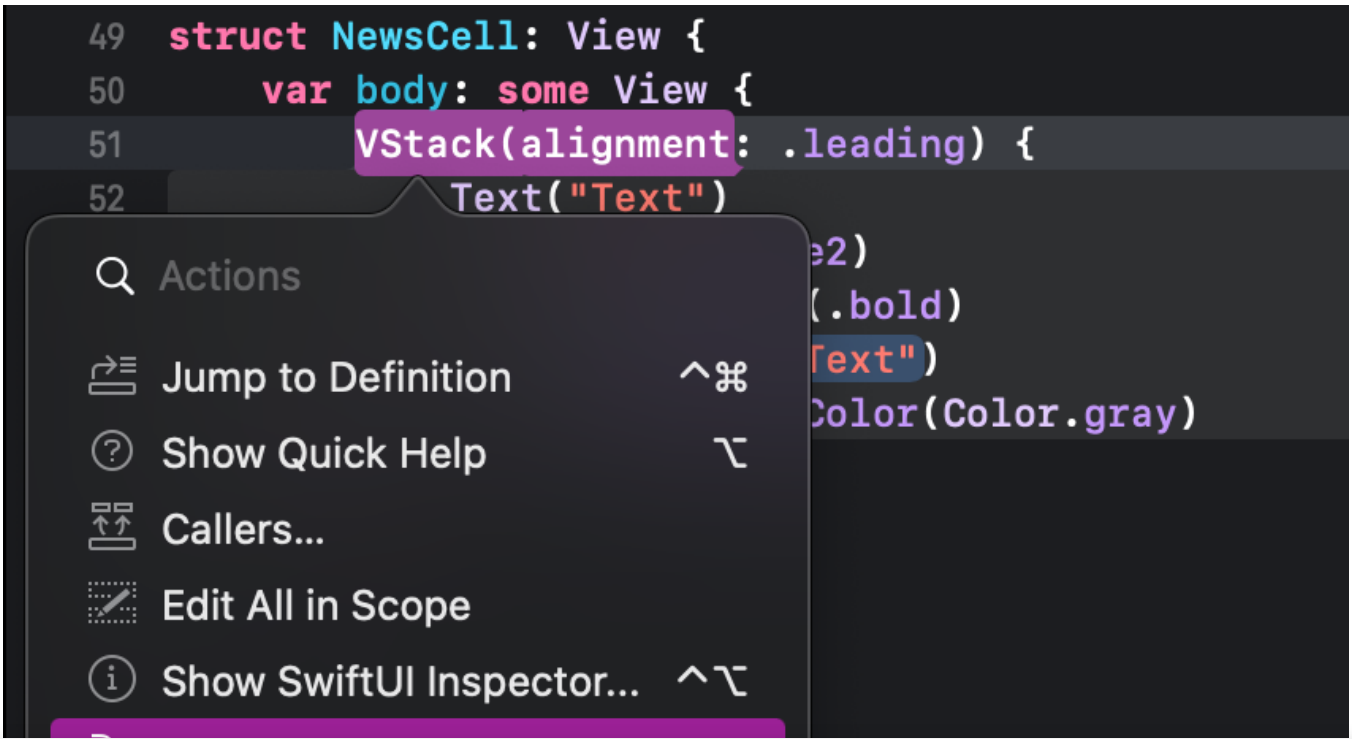
As you might guess, following our use of the VStack in the previous tutorial, SwiftUI provides an "HStack" view to layout subviews horizontally.

We need to embed our `VStack` (which contains the two `Text` views) in a new `HStack`. Then, we'll add the image to that `HStack`.

👉 If not already open, open the "Blocks" Xcode project and select the `ContentView.swift` file in the File navigator.



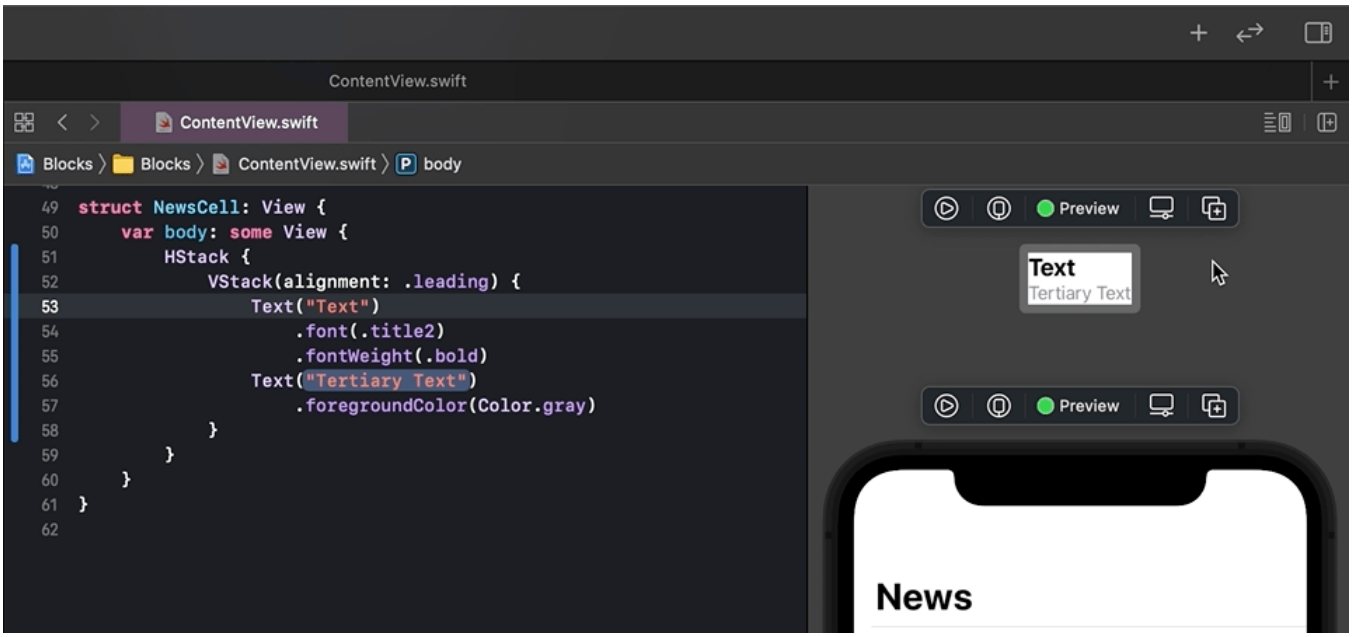
👉 `Command` click on the `VStack` in the code. In the `Actions` popup menu, choose `Embed in HStack`.



```
49  struct NewsCell: View {
50      var body: some View {
51          HStack {
52              VStack(alignment: .leading) {
53                  Text("Text")
54                      .font(.title2)
55                      .fontWeight(.bold)
56                  Text("Tertiary Text")
57                      .foregroundColor(Color.gray)
58              }
59          }
60      }
61  }
62
```

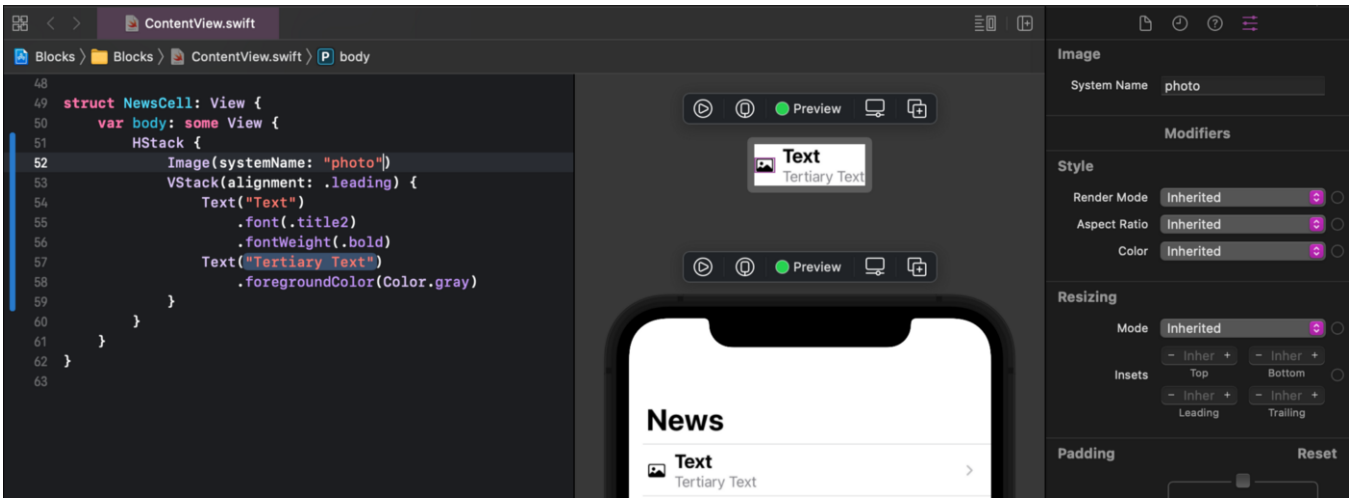
👉 Drag the `Image` view from the Library into the code, to insert a new line after the `HStack`.

🐞 Previously, we dragged a Text view into a VStack in the preview. Unfortunately, if we try to drag the image here into the preview, Xcode doesn't let us position it correctly. So, we're dragging it into the code instead.



For now, we will add the system “photo” image as the placeholder. Later we will make this a property that we can change. We can use an SF Symbol icon for this. You might recall in Tutorial 6 that we displayed an SF Symbol as an image in a `Label` in a tab item.

👉 In the code, click on the `"Image Name"` placeholder and type to replace it with `systemName: "photo"`.



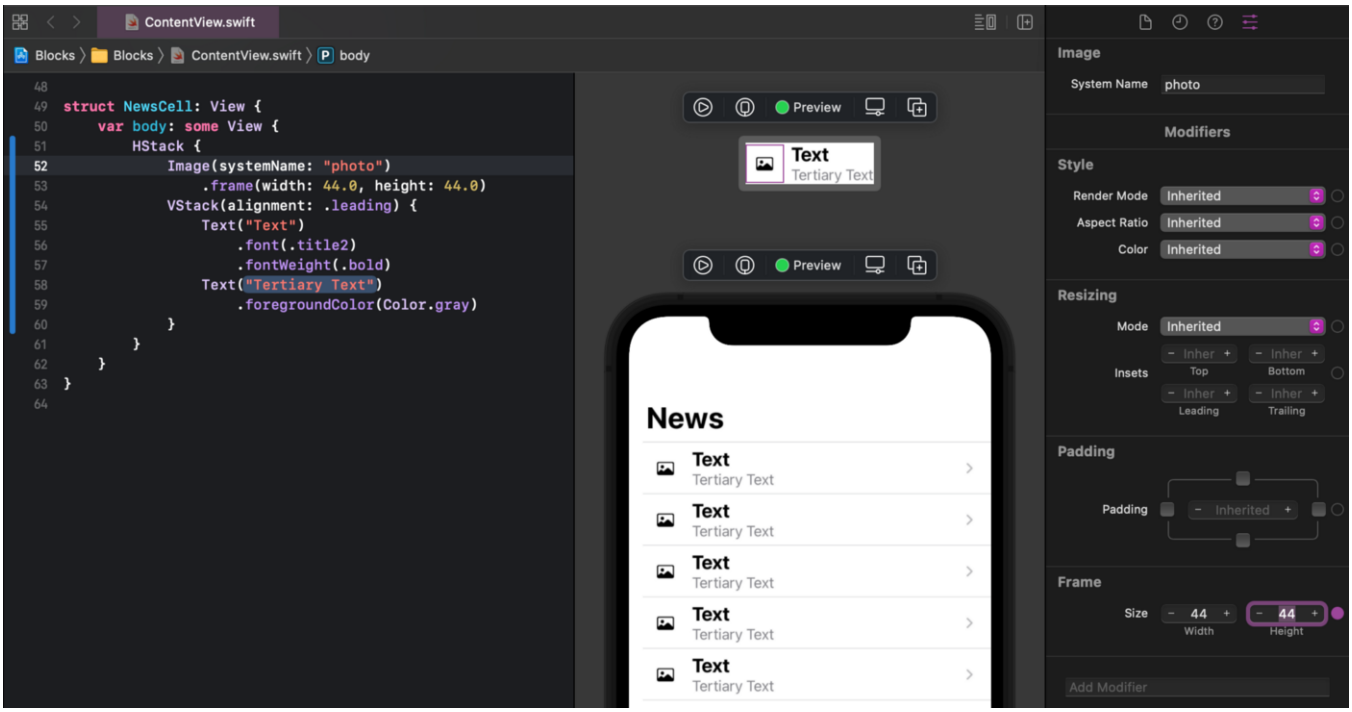
👁 Check that the photo image appears in the preview. If not, check that you have typed the name exactly right, matching lowercase/uppercase.

The image is too small, compared to our intended layout. We will deal with that shortly.

3. Image Modifiers

The image is showing at its original size. But we want to stretch (or shrink) it to fit a defined frame, with a consistent width and height.

👉 With the `Image` still selected in the code, in the Attributes inspector, enter the `Frame Width` and `Height` as `44`. As usual, hit `return` to tell Xcode to update the preview with the new attributes.



👁️ What happened? As you can see by the thin square outline in the left of the NewsCell preview, the image's frame has been correctly set to 44 x 44 points. However, the image content has not resized to fit its frame.

We need to:

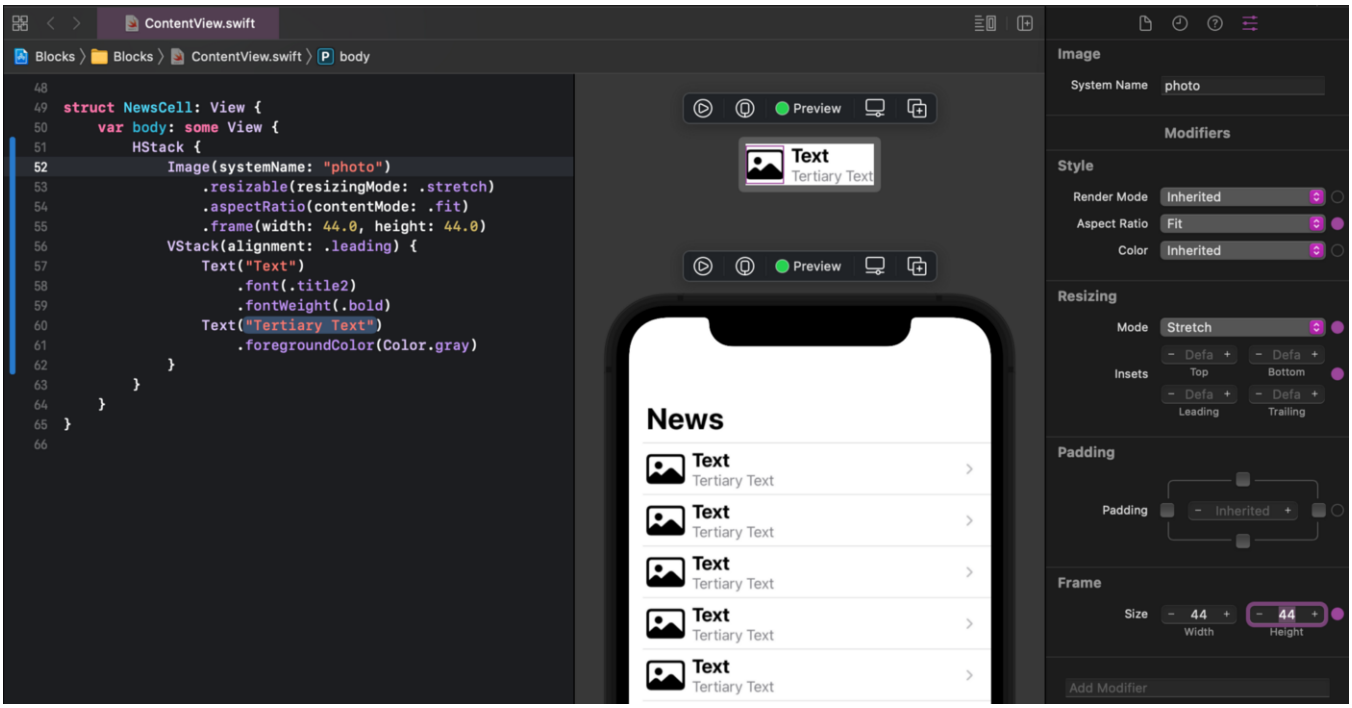
1. Modify the image to be resizable, so it will stretch or shrink to fit its frame.
2. Modify the image to respect its original aspect ratio, so it doesn't distort when it resizes.

SwiftUI provides modifiers for images called `resizable` and `aspectRatio`. They only apply to images and not all view types.

When we add modifiers to a view, the order of those modifiers matters. For example, after adding the `frame` modifier to our image, that modified view is no longer a pure image. We can't add image modifiers after applying a frame. So, we need to add the

update to the latest version. Otherwise, you will need to manually enter the code, without using the Attributes inspector.

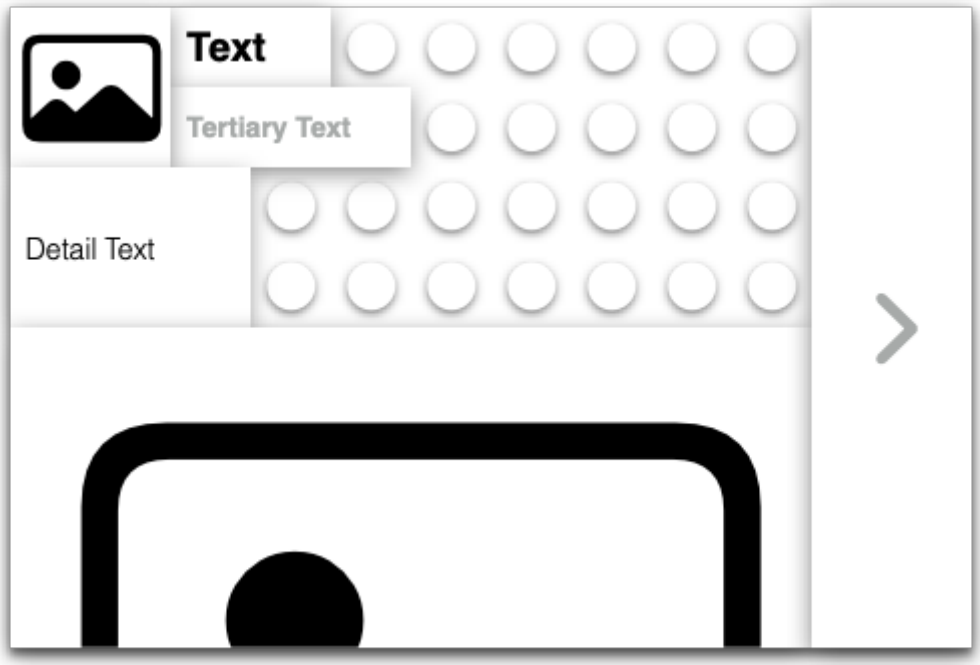
👉 In the Attributes inspector, set the `Aspect Ratio` to `Fit`. Set the `Resizing Mode` to `Stretch`.



👁 The `NewsCell` layout is looking pretty good so far. With the `frame` modifier after the image modifiers (`resizable` and `aspectRatio`), the image is sizing correctly for our layout.

4. Add Another VStack

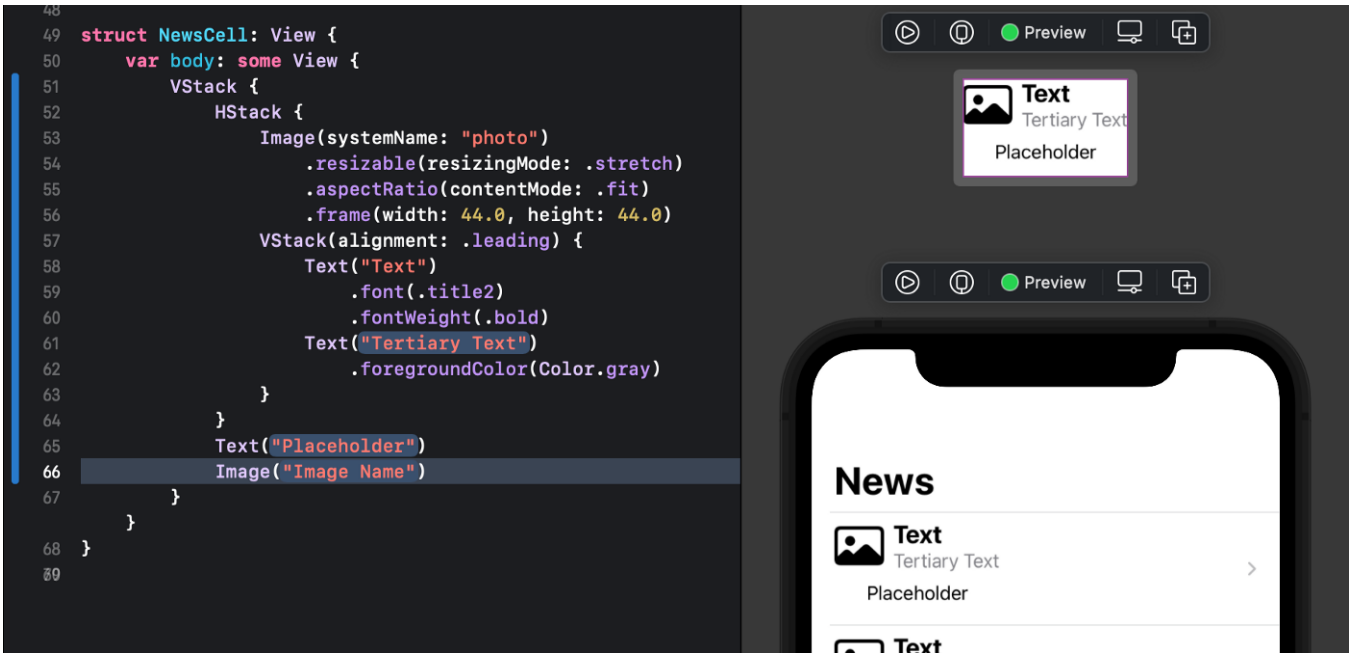
We're nearly there. We just need to add a detailed text view and a large image, vertically below the blocks (views) that we've positioned so far.

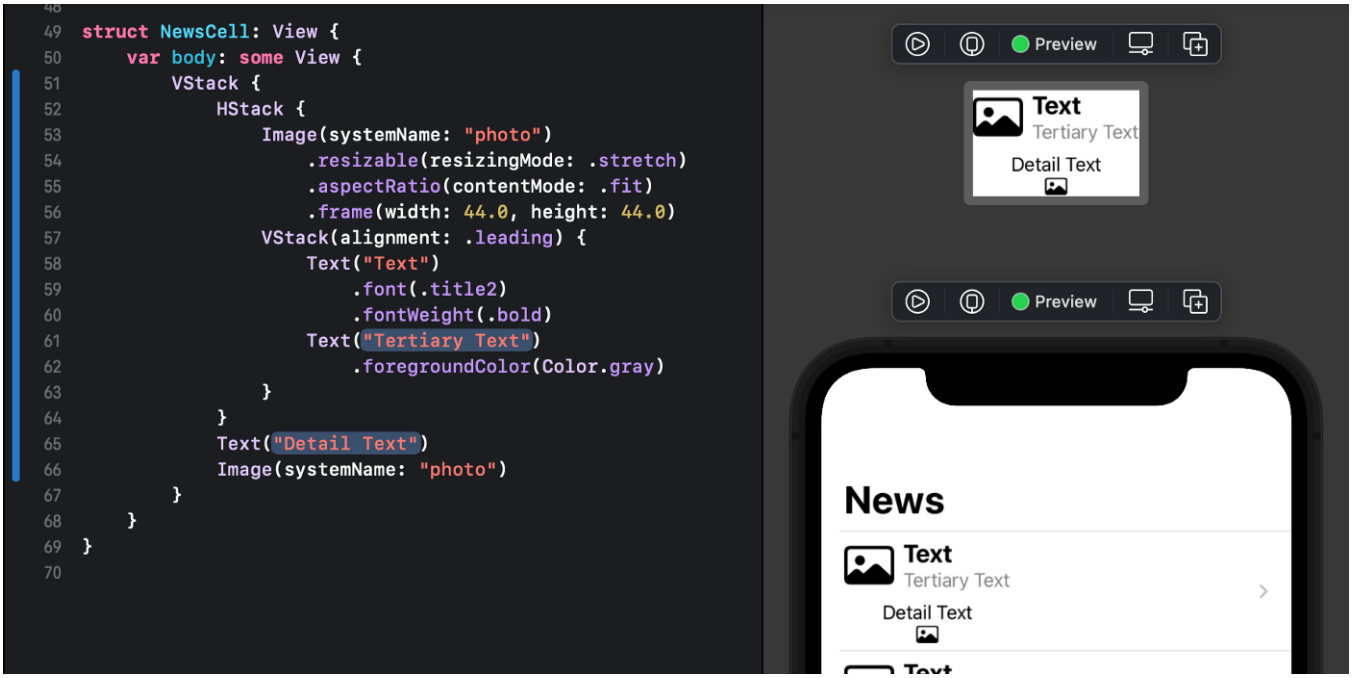


Follow the steps below. They are fairly brief since you have already learned the detail in the previous steps. Refer back if you need to.

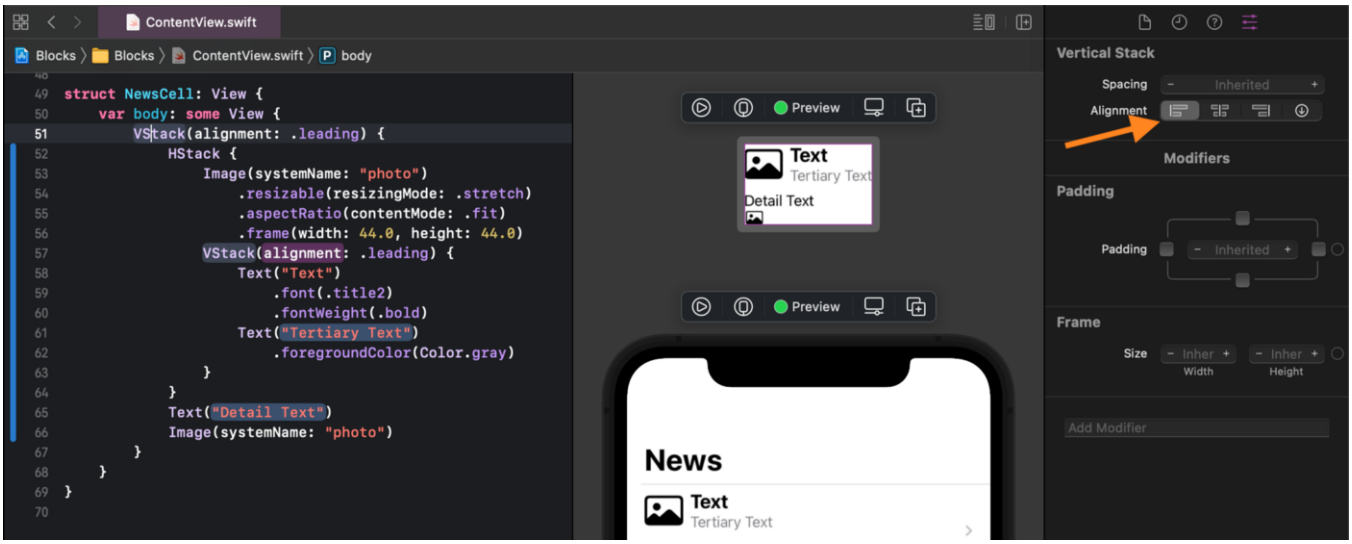
👉 `Command` click on the `HStack` and choose `Embed in VStack`.

👉 From the Library, drag a `Text` view and an `Image` view to insert new lines in the code, just before the closing `}` of the new `VStack`.



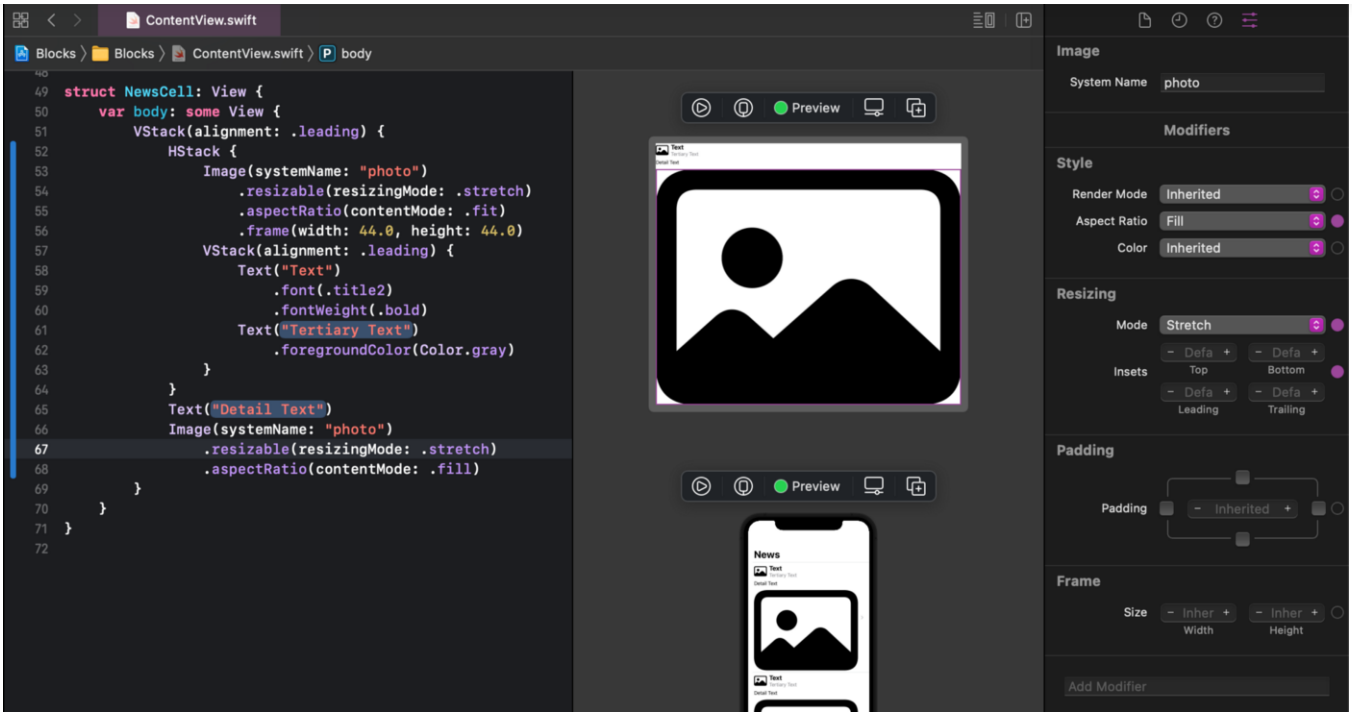


👉 In the code, click on the top `VStack`. In the Attributes inspector, set the `Alignment` to leading.



👉 Click on the new bottom image in the preview (in the top preview of the news cell, not the bottom preview of the list).

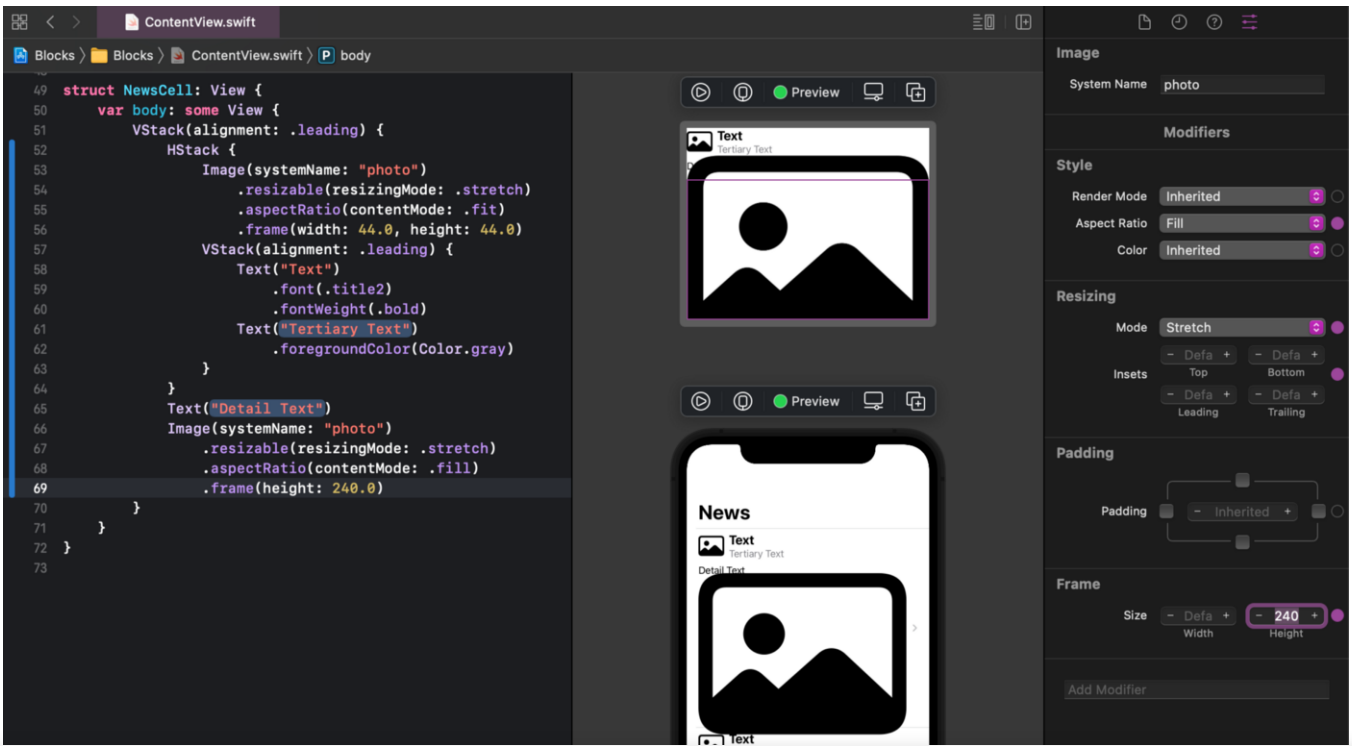
👉 In the Attributes inspector, set the `Aspect Ratio` to `Fill` and the `Resizing Mode` to `Stretch`.



👁️ The image stretches to fill all of the available areas.

Let's limit the image's height, so it won't dwarf the text and the rest of the screen.

👉 Set the image's `Frame Height` to `240` (and hit `return`). Leave the `Width` blank (default).



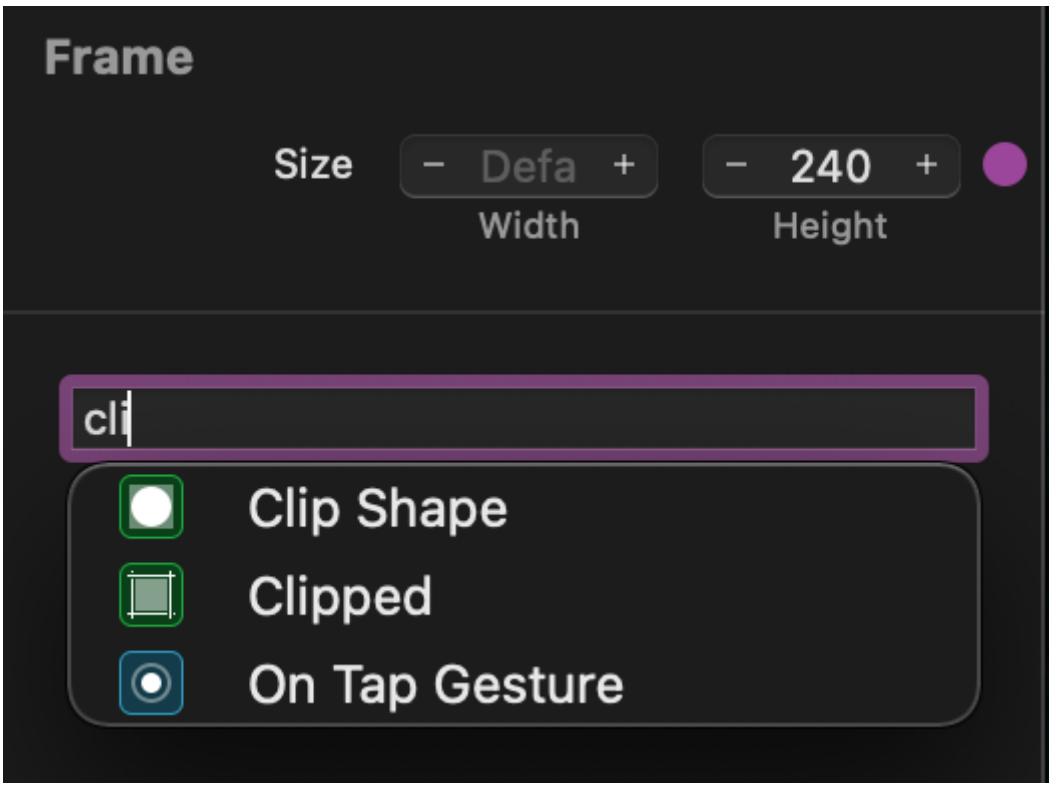
overlapping other views.

We need to clip the image to cut off any part that exceeds its frame. In the Attributes inspector, unfortunately, there is no obvious option to clip the image to its frame.

Fear not — we can add other modifiers just by clicking in the `Add Modifier` field at the bottom of the Attributes inspector.

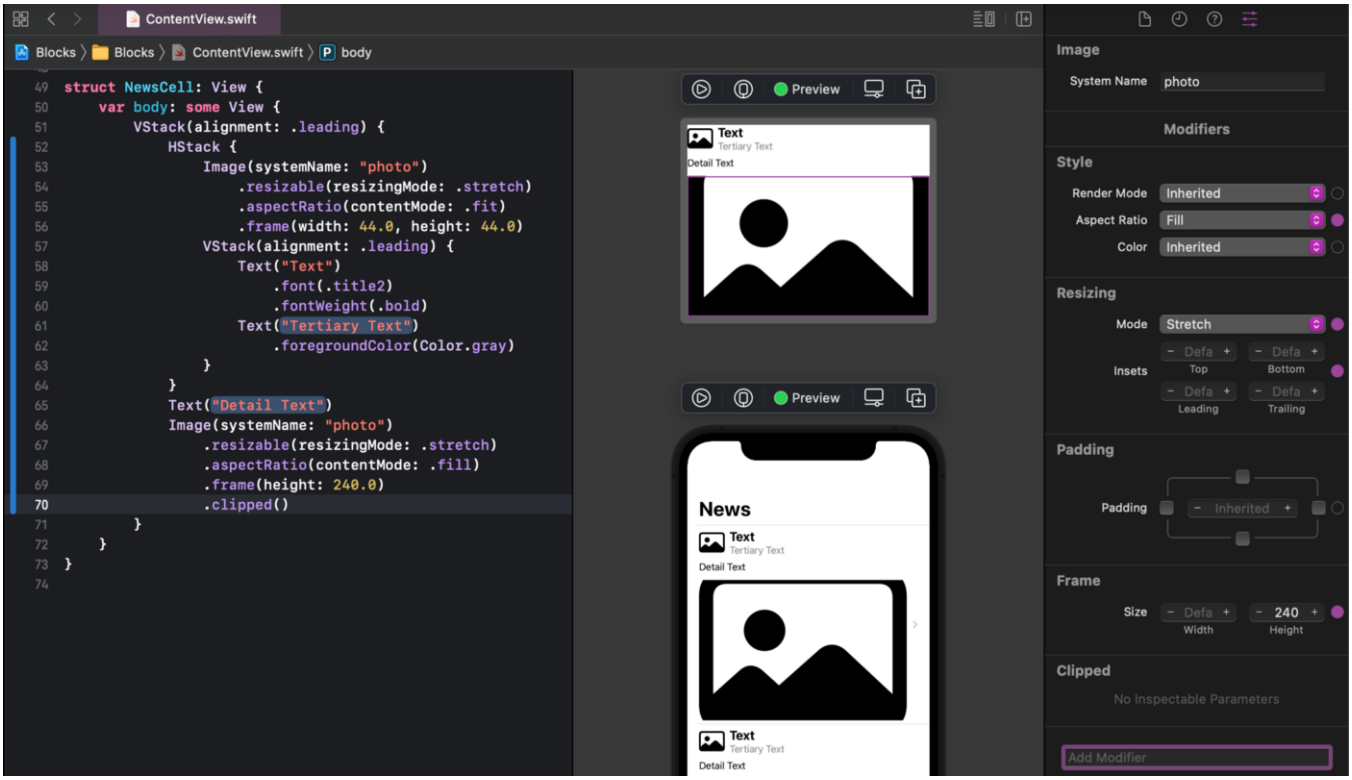
👉 In the `Add Modifier` field, type `cli`.

🐞 If clicking in the `Add Modifier` the field doesn't show the popup menu, try hitting the down arrow on the keyboard.



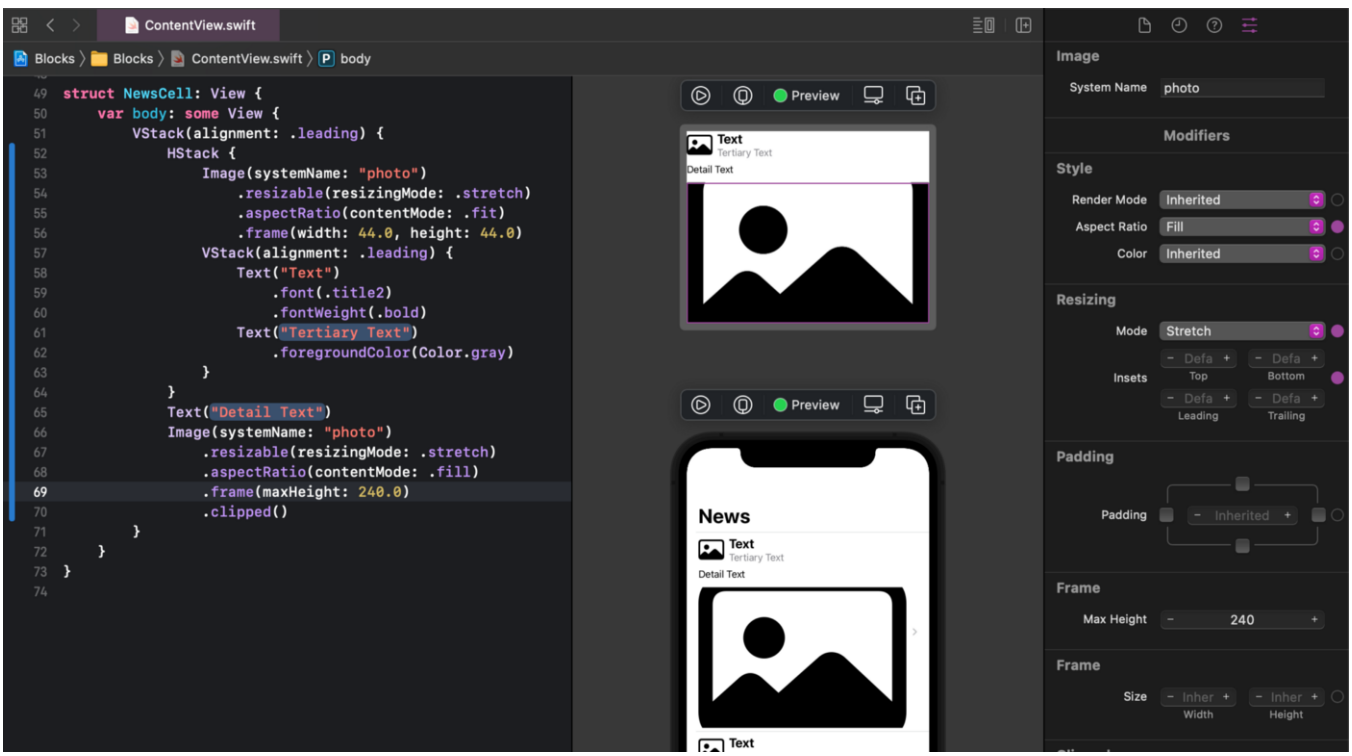
👉 Select the `Clipped` modifier from the popup menu.

👁 The code now has a new `.clipped()` modifier on the second `Image`. In the preview, the image is now clipped to its frame. The Attributes inspector has added a `Clipped` section.



Ideally, we'd like the image to only use the full 240 points as the maximum height, but use less if the image is smaller. Fortunately, `frame` accepts `maxHeight`, for this purpose.

👉 In the code, in the `frame(...)`, change `height` to `maxHeight`.



👁 The final Lego block in our design, the disclosure indicator (right pointing chevron), is automatically added to each of our cells by the List, as you can see in the full scene preview.

5. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `NewsCell: HStack and images`
3. 👉 Click on the `Commit` button.

6. Recap

We created a custom layout for our news cell. We added stack views, images, text and modifiers so that it should layout properly, given any text and image content.

Next, in Tutorial 9, we will move the NewsCell code to its own separate file.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles.

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Community!

Tom Brodhurst-Hill · Following
May 26, 2021 · 4 min read ★

Move a View to its Own File

Build an App Like Lego, with SwiftUI — Tutorial 9

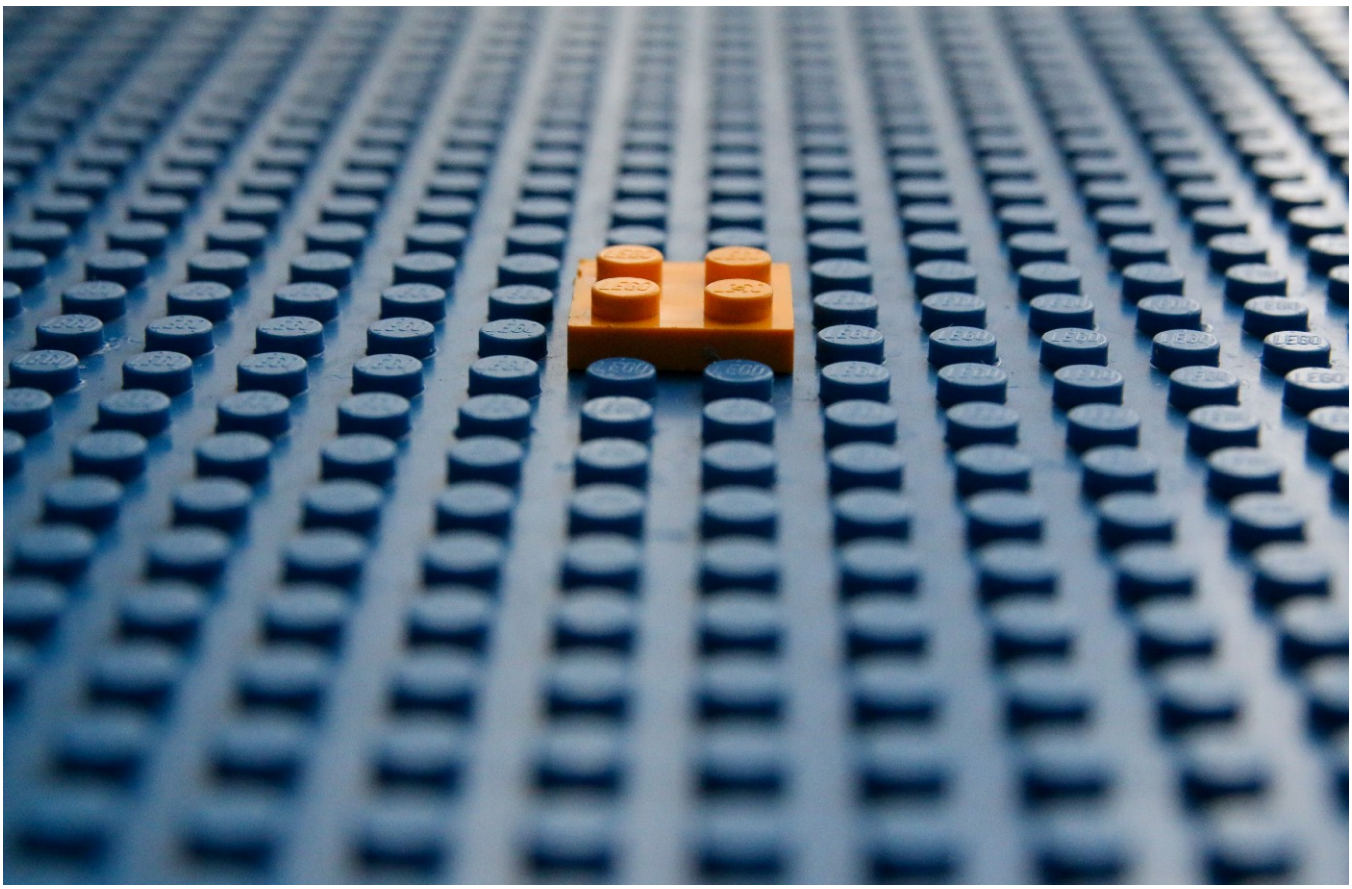


Photo by Glen Carrie on Unsplash

1. Introduction

Xcode provides a menu command to `Extract Subview` from a larger view or scene (which we did in Tutorial 7). But that extracted view still resides in the same file as the original super view. It is best practice to separate each view into its own file.

We need to “refactor” our existing code by “separating the concerns” into separate files.

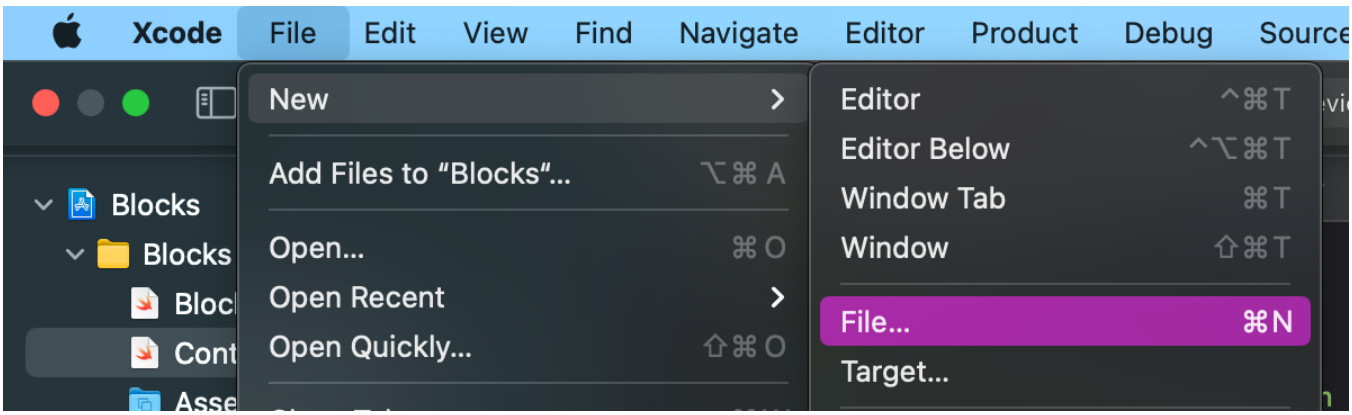
In this short Tutorial 9, we will move the `NewsCell` view into its own `NewsCell.swift` file, out of the parent `ContentView.swift` file.

We'll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

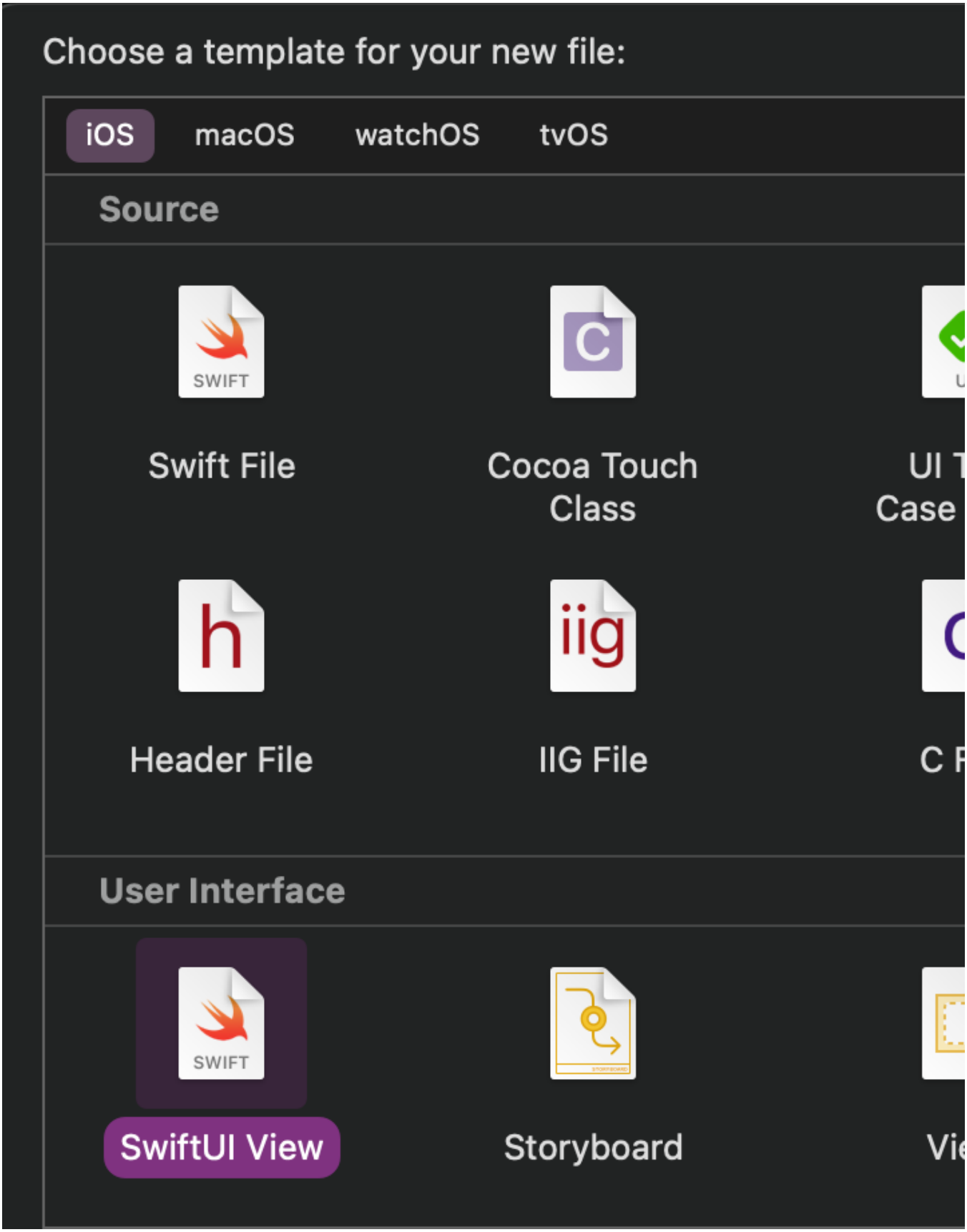
2. Move NewsCell to its own file

At the end of the previous Tutorial 8, we had the `ContentView` and `NewsCell` code structures (or "structs") both in the same `ContentView.swift` file. Let's move `NewsCell` into its file so that we can maintain them separately.

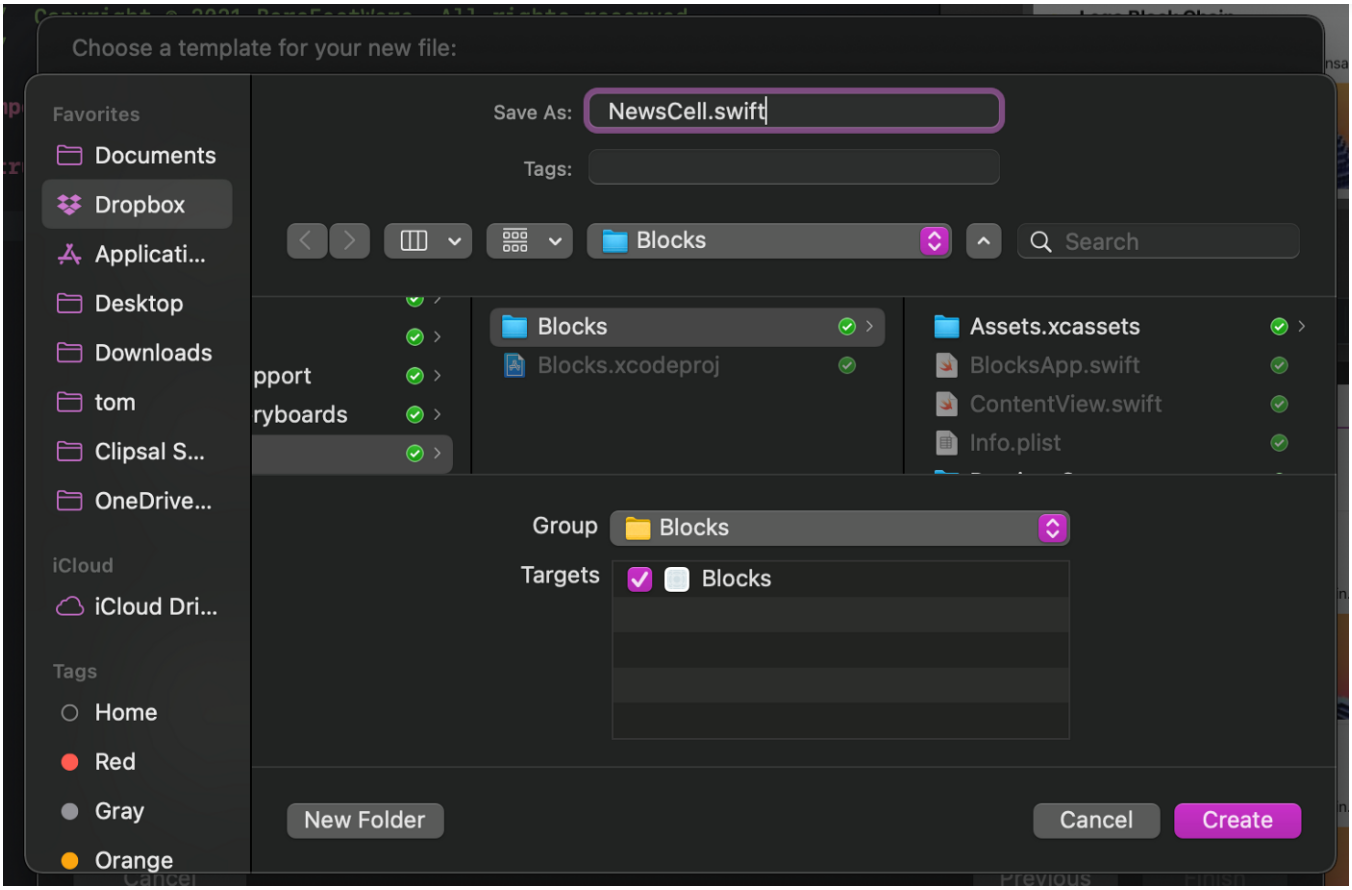
👉 In Xcode, in the File menu, select. `New > File...` .



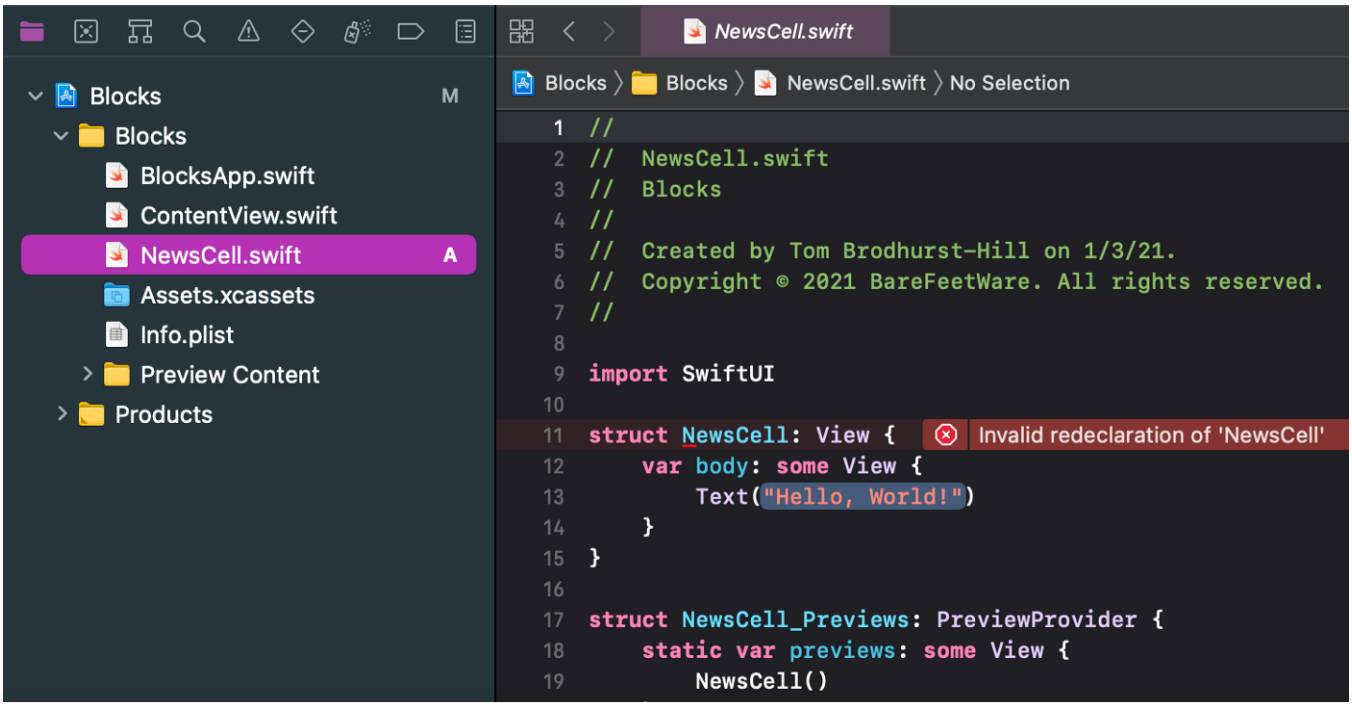
👉 Make sure that `iOS` is selected in the top bar. Choose the `SwiftUI View` option from the template. Click `Next` .



👉 In the Save As dialog, change the name of the new file from `SwiftUIView.swift` to `NewsCell.swift` . Ensure that the file will be saved into the same folder as the

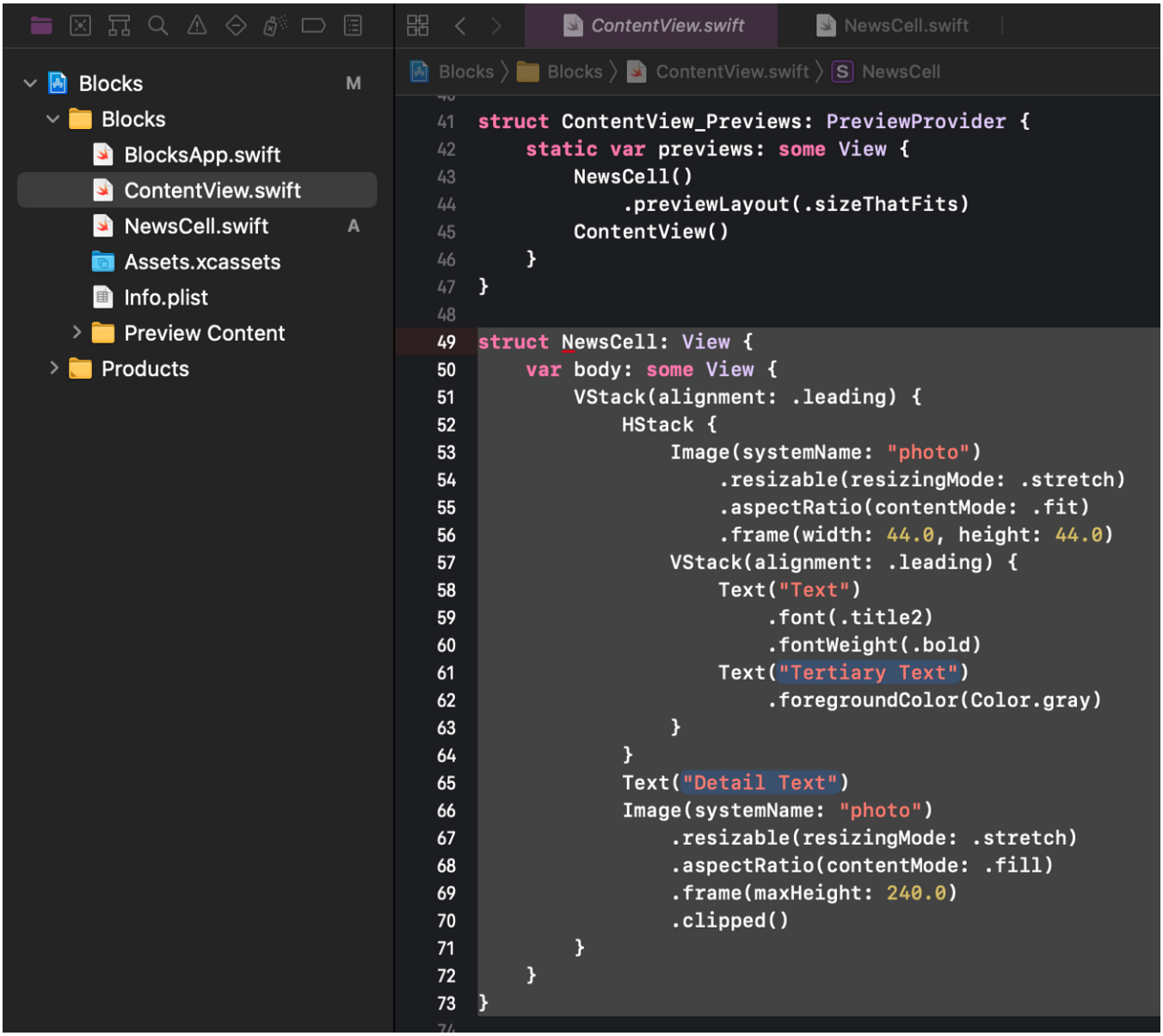


👁 Xcode creates new `struct NewsCell` code, with a placeholder `Text` view. Note that Xcode complains that now there is an `Invalid redeclaration of 'NewsCell'` since we have previously created `struct NewsCell` in the `ContentView.swift` file.



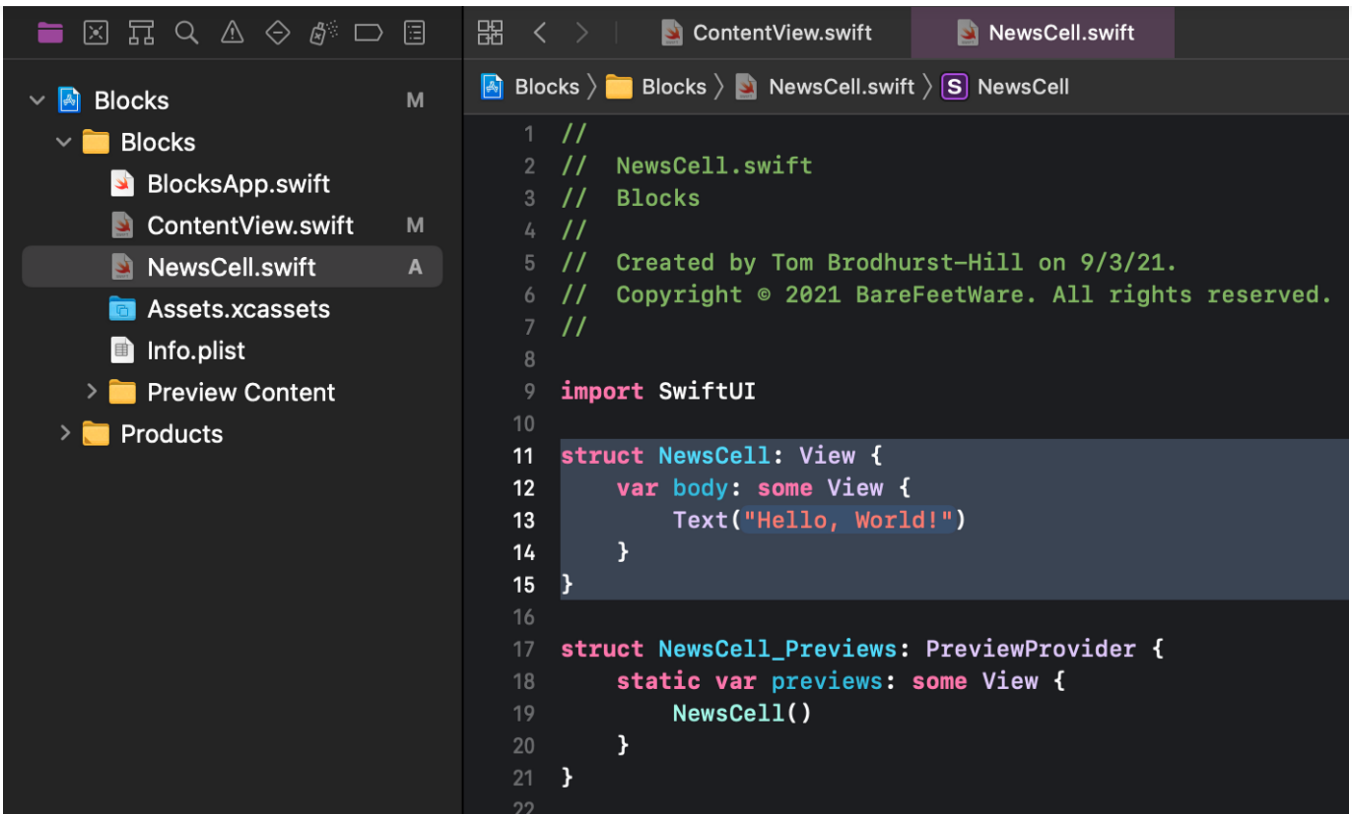
Let's move the `struct NewsCell` code from the `ContentView.swift` file, to this new dedicated `NewsCell.swift` file.

👉 In the Project navigator (on the left), click on the `ContentView.swift` file. Select all of the code in the `struct NewsCell` block of code.

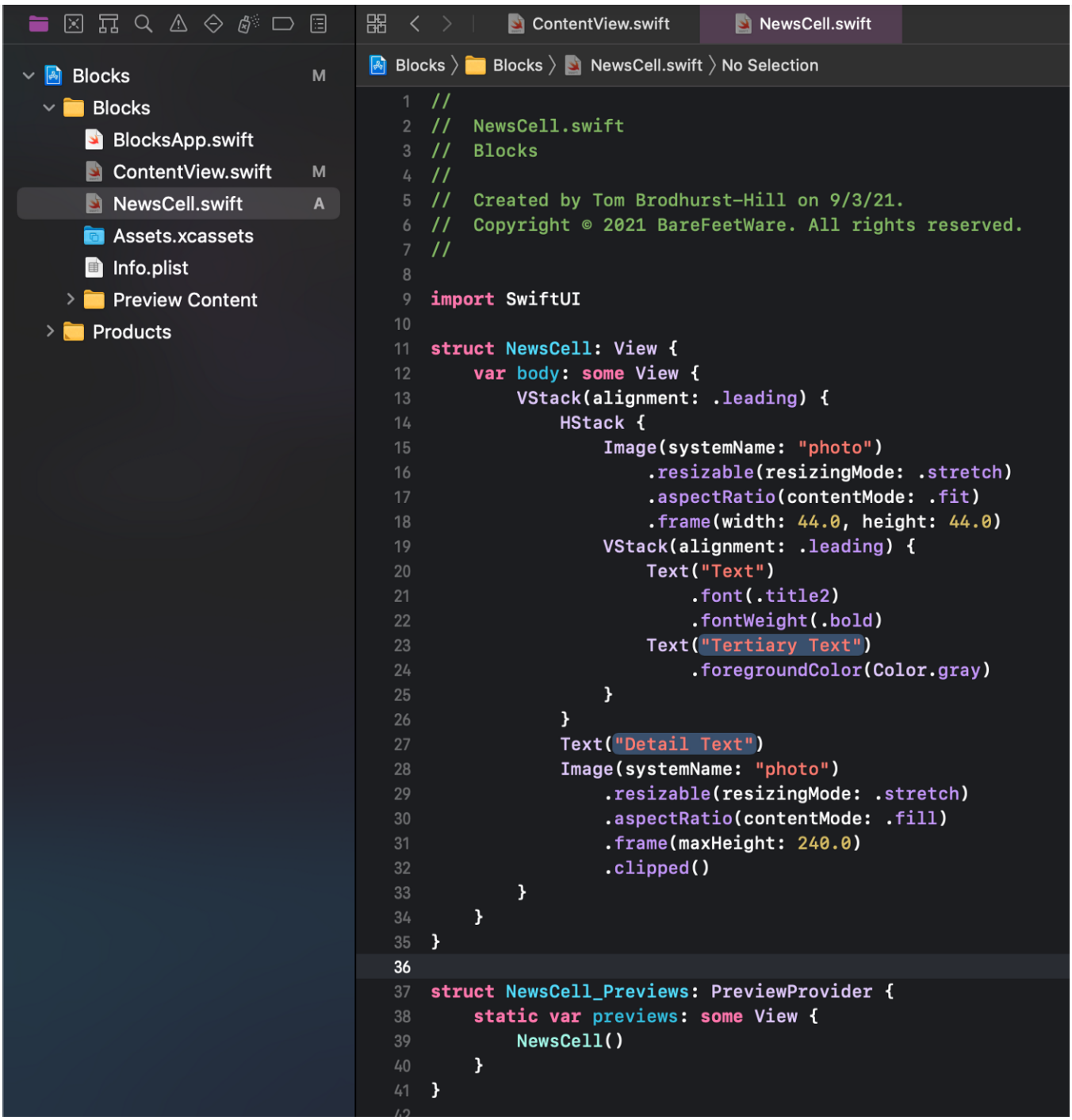


👉 Cut the `struct NewsCell` code (such as by using the `Edit` menu's `Cut` command).

👉 Select the `NewsCell.swift` file (in the Project navigator). Select the placeholder `struct NewsCell` code.



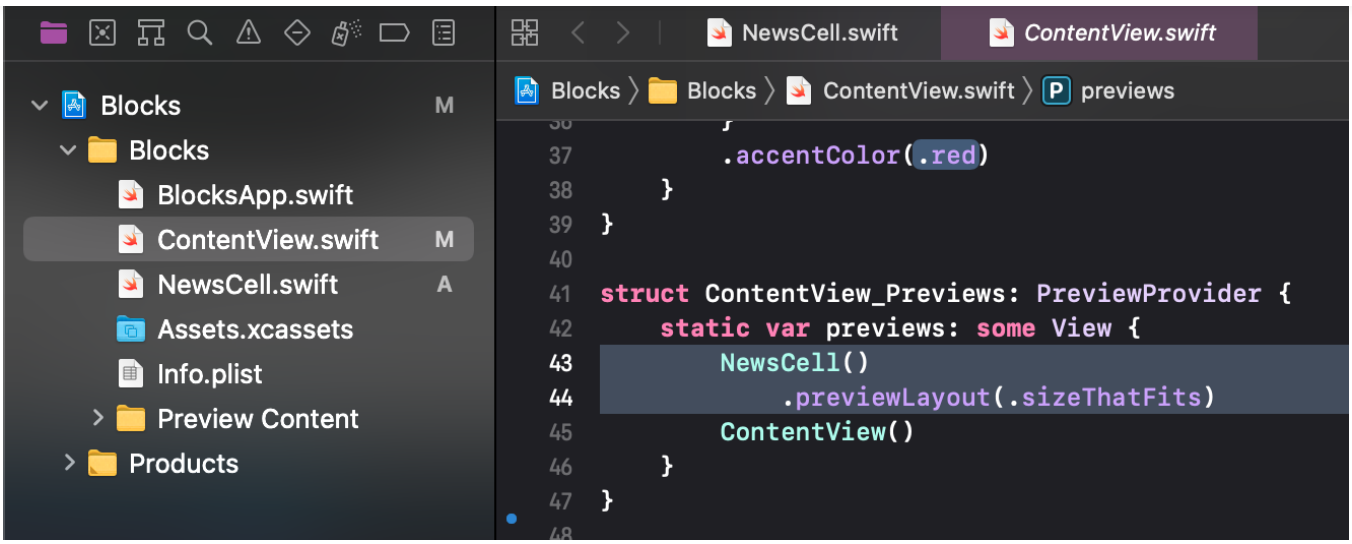
👉 Paste the `struct NewsCell` code over the template code.



3. Move the preview code

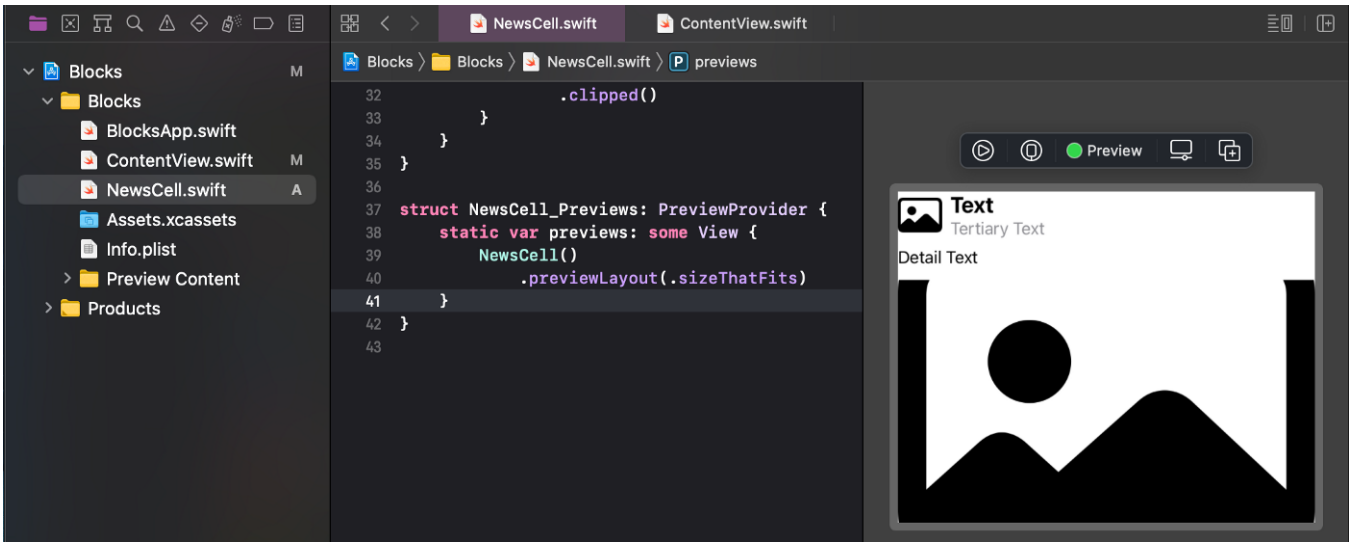
Our original `ContentView.swift` file and the new `NewsCell.swift` file both contain a preview of the `NewsCell`. We should move the preview to only be in the same file as our moved `NewsCell` code.

👉 Back in `ContentView.swift`, select the `NewsCell()` in the preview, including the `.previewLayout(.sizeThatFits)`.



👉 Cut it (such as by choosing `Cut` from the `Edit` menu).

👉 Switch to `NewsCell.swift`. Select the `NewsCell()` in the preview. Paste to replace it.



👁 Xcode shows the preview of the `NewsCell` in the `NewsCell.swift` file and no longer in the `ContentView.swift` file. You might need to refresh using the `Resume` button in the preview.

👉 Run the app to confirm that there are no errors.

4. Commit changes

As you've done before:

3. 👉 Click on the `Commit` button.

5. Next...

Our `NewsCell` code is now in its own `NewsCell.swift` file. We will create a separate file when we start to build each new view instead of exacting it.

Next, in Tutorial 10, we will extract the text and image properties to create different instances of the `NewsCell`.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles.

⁉️ If you have any questions or comments, please add a response below.

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Tom Brodhurst-Hill · Following
Jun 2, 2021 · 8 min read ★

Define Properties for a View

Build an App Like Lego, with SwiftUI — Tutorial 10

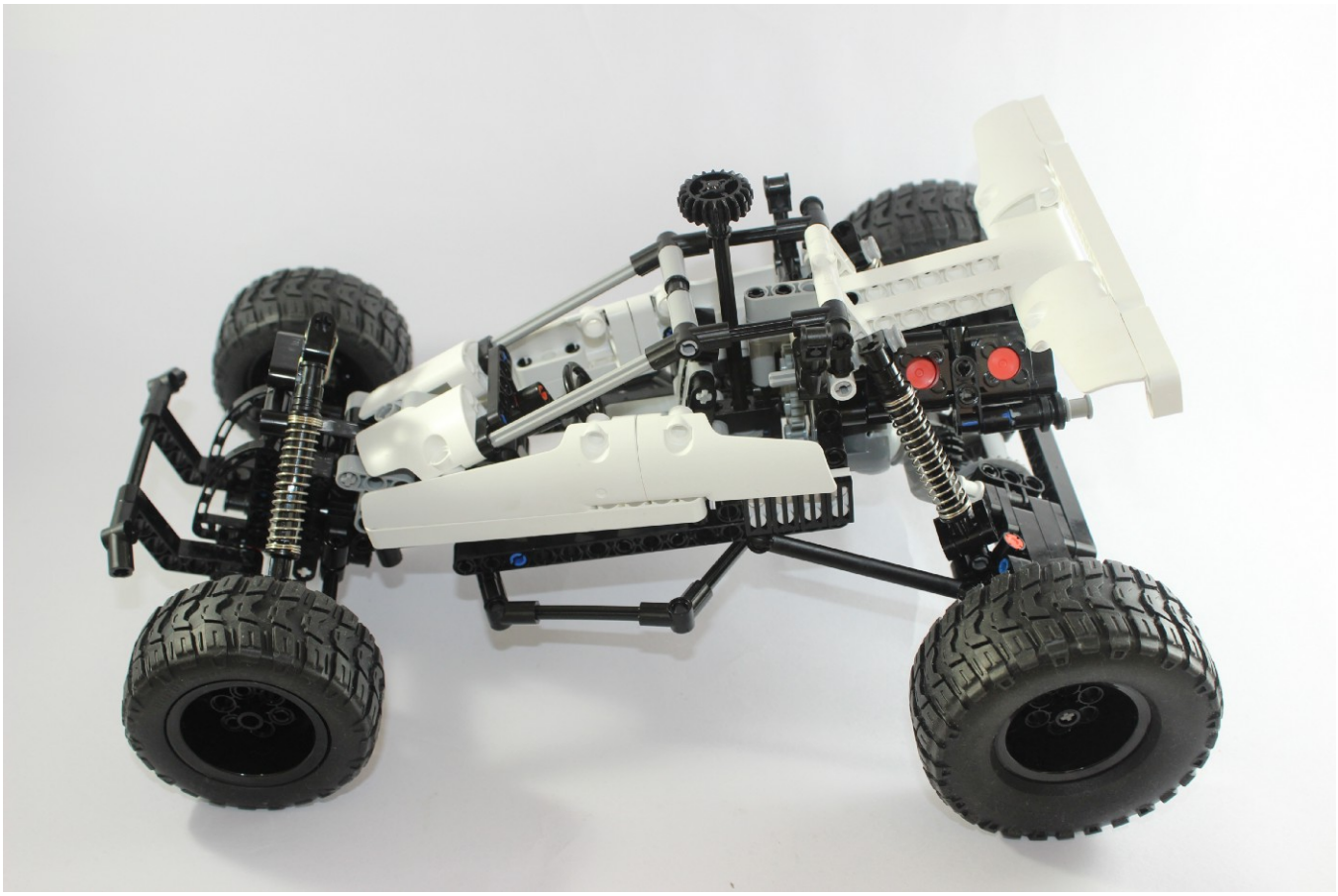


Photo by Adyant Pankaj on Unsplash

1. Introduction

A component is most flexible when we declare “properties” to customize differently for each instance.

For a view component, the properties are best declared as subviews, such as an image or text, or as a view attribute such as color. We usually set a property when the instance

In the previous Tutorial 9, we moved the `NewsCell` code into its own file. It had static text and images, but they were the same for every cell.

In this Tutorial 10, we will add some properties to our code, so that each instance of the news cell can contain different images and text.

We'll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Add properties

In our `struct NewsCell` code we have three `Text` subviews and two `Image` subviews. Currently, they are "hardcoded" with placeholder values like `"Detail Text"` and `systemName: "photo"`. Let's refactor the code to bring out these five subviews as properties of the `NewsCell`.

👉 Select the `NewsCell.swift` file, in the File navigator.

👉 Insert the following `let` lines of code between the `struct NewsCell` line and the `var body`.

👁 It should look like this in Xcode:

You don't need to worry about the mechanics of these lines of code. But here's a crash course on the principles involved here:

1. `let` declares that each property will be assigned once and then not change. Technically, `let` declares this property as a "constant". Alternatively, we would use `var` if we needed to vary (change) a property after it was first created.

2. The word after `let` is the name of the property. We can use any name we like, that

text" is named `detailText`. This is referred to as "camel case" style since it has a hump (or humps) of upper case letters in the middle of the name.

3. The colon (`:`) means "this property (on the left) is that type (on the right)". For example, `detailText: Text` means that the `detailText` property is a `Text` view.

4. In Swift, it is standard practice to use a suffix for the variable name that matches the type. For example, `largeImage` is an `Image`.

5. Since this `NewsCell` is a view, it should only be concerned about the subviews it contains and not the data "model" that populates it. For example, the second line of text, in gray, is currently showing the date. But it could contain any text in the future. That's why we name the text views according to visual prominence (such as `tertiaryText`) rather than the data model (such as `dateText`).

3. Parameters and arguments

👁 Xcode shows an error on the preview, complaining that the `NewsCell()` instance is missing arguments (values) for parameters `image`, `text` etc.

```
44 struct NewsCell_Previews: PreviewProvider {
45     static var previews: some View {
46         NewsCell()   ⊙ Missing arguments for parameters 'image', 'text', 'detailText', 'tertiaryText', 'largeImage' in call
47             .previewLayout(.sizeThatFits)
48     }
49 }
```

Let's pause to explain some buzzword technical terms.

We have created a `NewsCell` "type". Specifically, this one is a `struct` (structure), with properties like `text` and `image`. A type is just the blueprint plan. To create an "instance" (a single occurrence) of that type, we need to provide any required properties in the parentheses of an instance. Each property in the parentheses appears with a name and value. The name is called the "parameter" and the value is called the "argument", but these terms are often interchanged.

For example, consider this `NewsCell` instance:

This `NewsCell` instance has five parameters. The first parameter is `image` with the argument `Image(systemName: "photo")`.

Now, back to our code.

We need to provide values for the properties in the `NewsCell()` instance in the preview.

👉 Delete the `()` after `NewsCell`. Re-type the opening `(`. Xcode should offer to autocomplete with all the new parameters and placeholders for the arguments (values).

👉 Choose that autocompletion option, by hitting `Return` or double-clicking in the popup menu.

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(image: Image, text: Text, detailText: Text, tertiaryText: Text, largeImage: Image)
            .previewLayout(.sizeThatFits)
    }
}
```

👉 Replace the first `Image` argument placeholder with `Image(systemName: "photo")`.

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(image: Image(systemName: "photo"), text: Text, detailText: Text, tertiaryText: Text, largeImage: Image)
            .previewLayout(.sizeThatFits)
    }
}
```

👁️ As you can see, the `NewsCell(...)` line of code containing the arguments is getting long and will get longer as we fill in each argument.

Let's wrap each parameter and argument on its own line to make it more readable. Remember that Swift allows us to format code spacing how we like, without affecting the execution of the code.

👉 Click just before the first parameter `image` (just after the opening `(`) and hit `Return`. Click just before the `text` parameter and hit `Return`. Repeat for all the parameters.

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(
            image: Image(systemName: "photo"),
            text: Text,
            detailText: Text,
            tertiaryText: Text,
            largeImage: Image)
            .previewLayout(.sizeThatFits)
    }
}
```

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(
            image: Image(systemName: "photo"),
            text: Text("Text"),
            detailText: Text("Detail Text"),
            tertiaryText: Text("Tertiary Text"),
            largeImage: Image(systemName: "photo"))
            .previewLayout(.sizeThatFits)
    }
}
```

👉 After the last `Image(...)`, click between the two closing parentheses: `))`. Hit `return` to move the second `)` to a new line.

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(
            image: Image(systemName: "photo"),
            text: Text("Text"),
            detailText: Text("Detail Text"),
            tertiaryText: Text("Tertiary Text"),
            largeImage: Image(systemName: "photo")
        )
            .previewLayout(.sizeThatFits)
    }
}
```

👉 Let's ensure that the code is neatly indented. Select all the code in this file (such as by choosing `Select All` in the `Edit` menu). Hit `Control` — `i` to re-indent the code (or, in the `Editor` menu, select `Structure > Re-Indent`).

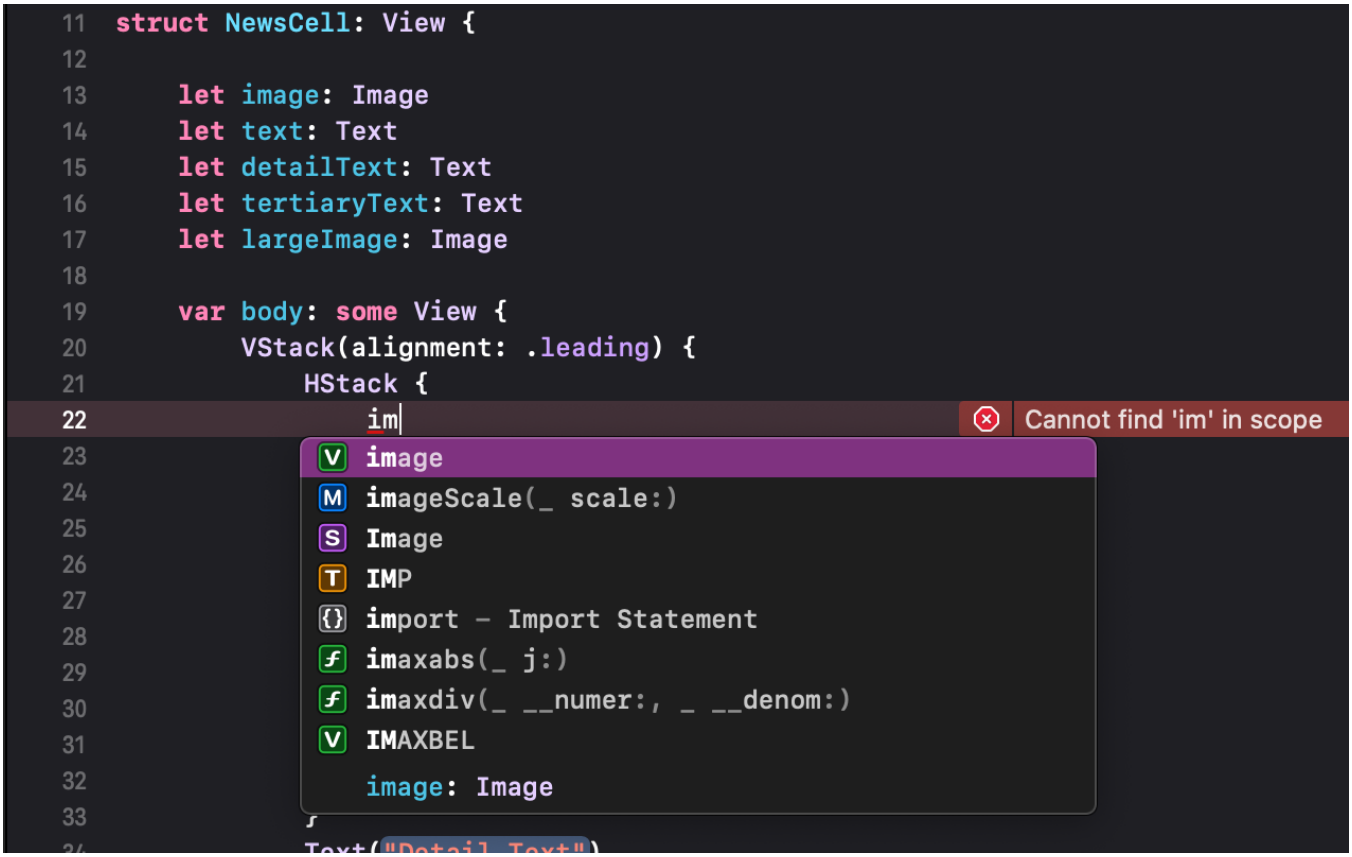
👁 Xcode moves the `.previewLayout` modifier to line up with the closing `)` in the preview code.

```
struct NewsCell_Previews: PreviewProvider {
    static var previews: some View {
        NewsCell(
            image: Image(systemName: "photo"),
            text: Text("Text"),
            detailText: Text("Detail Text"),
            tertiaryText: Text("Tertiary Text"),
            largeImage: Image(systemName: "photo")
        )
```

4. Implement the properties

We have defined the properties of our `NewsCell`, but the code inside `var body` doesn't yet actually use them. We need to replace the occurrences of the `Text` and `Image` views in the code with those property names.

👉 In the `var body` code, select the first `Image(systemName: "photo")` code. Type `image` to replace it.



👁 As you type, Xcode offers to autocomplete with various options. You can choose the desired property (marked with a `V` for "variable" in the popup menu) — in this case: `image`.

👉 Similarly, select `Text("Text")`. Replace it with `text`.

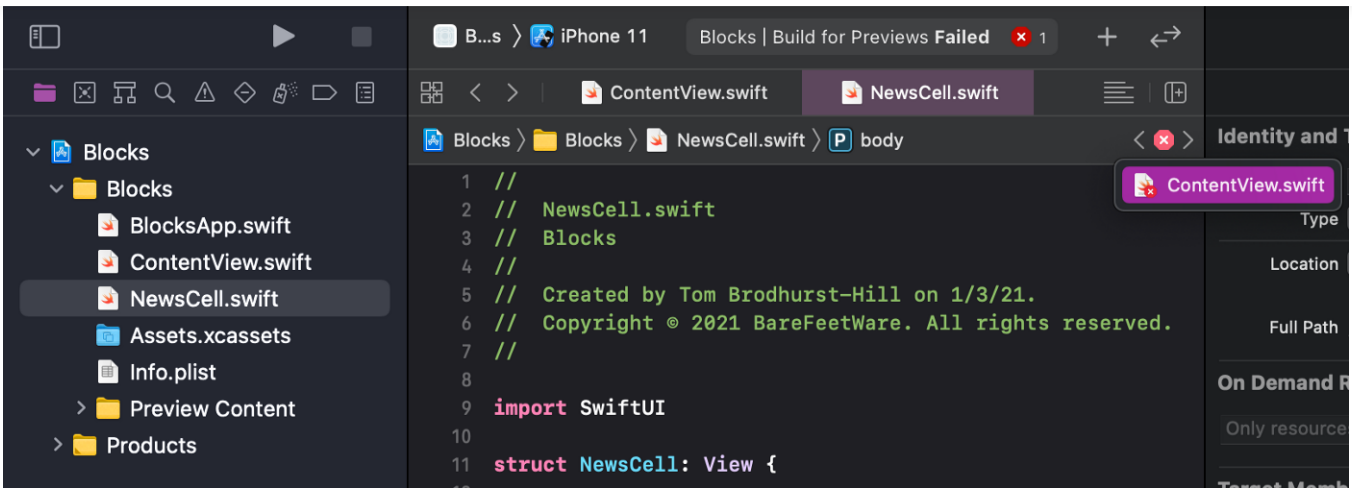
👉 Repeat for all of the properties, by replacing the other two `Text` views and one `Image` view with the corresponding property names, as shown below:

```
11  struct NewsCell: View {
12
13      let image: Image
14      let text: Text
15      let detailText: Text
16      let tertiaryText: Text
17      let largeImage: Image
18
19      var body: some View {
20          VStack(alignment: .leading) {
21              HStack {
22                  image
23                      .resizable(resizingMode: .stretch)
24                      .aspectRatio(contentMode: .fit)
25                      .frame(width: 44.0, height: 44.0)
26                  VStack(alignment: .leading) {
27                      text
28                          .font(.title2)
29                          .fontWeight(.bold)
30                      tertiaryText
31                          .foregroundColor(Color.gray)
32                  }
33              }
34              detailText
35              largeImage
36                  .resizable(resizingMode: .stretch)
37                  .aspectRatio(contentMode: .fill)
38                  .frame(maxHeight: 240.0)
39                  .clipped()
40          }
41      }
42  }
```

`NewsCell` now requires that all five properties are given a value when we create an instance, using `NewsCell()`.

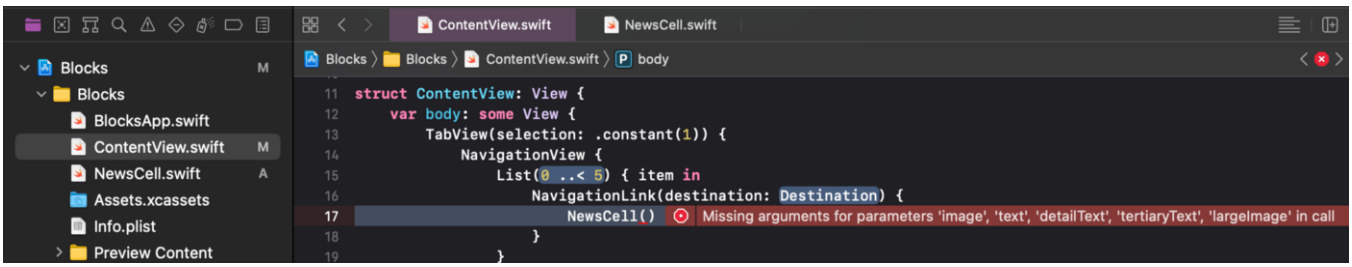
5. Add properties to the instance in ContentView

👉 In the `Product` menu, choose `Build`.



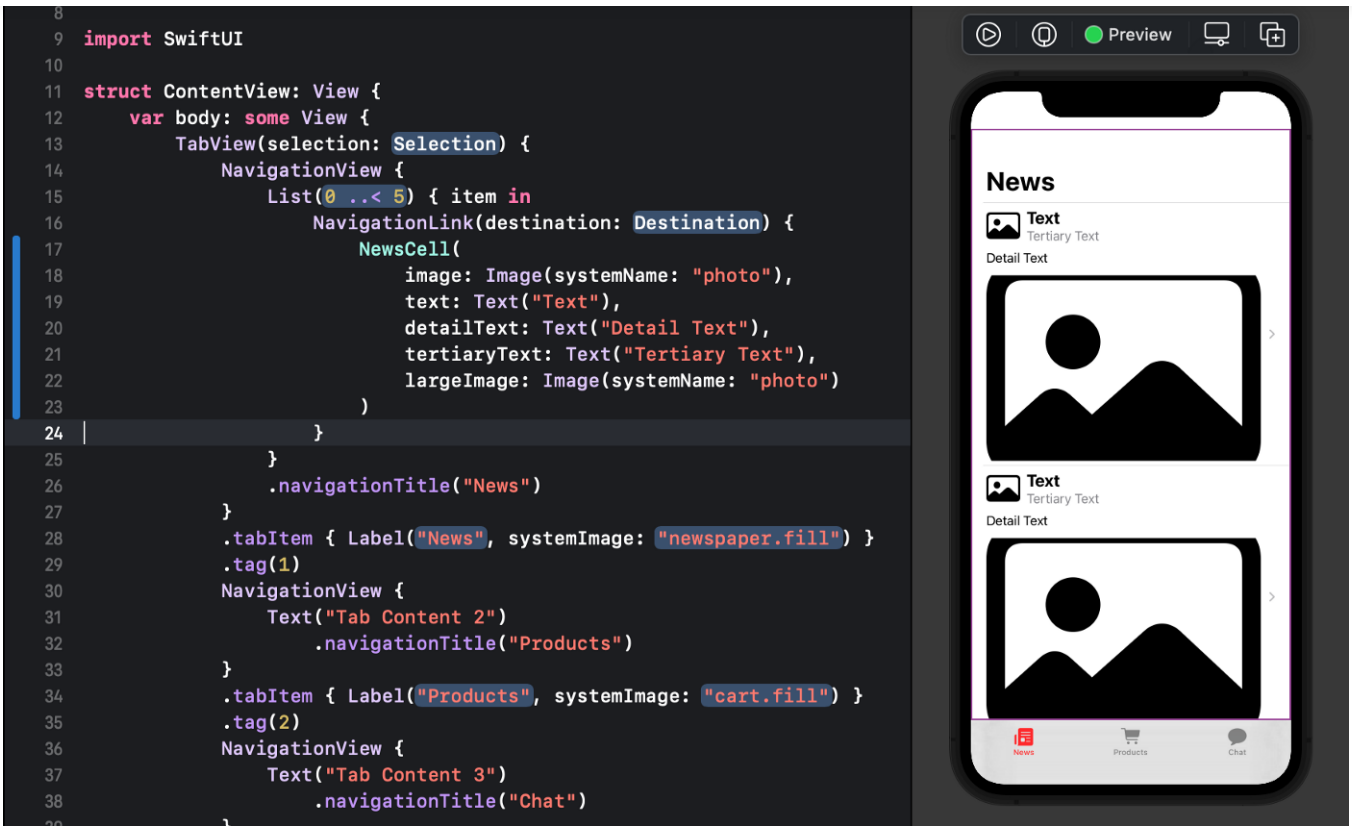
👉 Click on the error (stop sign) in the path bar. Xcode shows the file containing the error. Click on `ContentView.swift` in the popup menu.

👁️ As you can see, the `NewsCell()` instance in the `ContentView` now has the error `Missing arguments for parameters`, the same error that we fixed earlier in the `NewsCell` preview.



For now, we'll just fill this `NewsCell()` with the same placeholder data as we had in the preview. In the next tutorial, we will connect it to a data model.

👉 Copy the populated `NewsCell(...)` instance from the preview in `NewsCell.swift` to replace the empty `NewsCell()` instance in `ContentView`.



👁️ Check that the preview shows the new placeholder text and images. You will probably need to refresh the preview using the `Try Again` or `Resume` button.

6. Commit changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `NewsCell: refactored with properties`
3. 👉 Click on the `Commit` button.

7. Next...

Our `NewsCell` now has properties, so we can give each instance different property values. Currently, however, each instance in our News scene is exactly the same.

Next, in Tutorial 11, we will add a data model with multiple news articles, which we will use in different instances of a `NewsCell`.

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Tom Brodhurst-Hill · Following
Jun 9, 2021 · 6 min read ★

Create a Model and Mock Instances

Build an App Like Lego, with SwiftUI — Tutorial 11

Photo by Apolo Photographer on Unsplash

1. Introduction

Broadly speaking, an app has two facets: model and view. A view is something you see or touch or otherwise interact with directly as a human. A model is something behind the scenes that stores data or calculates results.

A view's job is to show visual layout, color, text, images, buttons, tab bar, and other

In this tutorial, we will build a model and mock data.

So far in our app, we have created only views, like `NewsCell`. At the end of the previous Tutorial 10 we refactored the `NewsCell` to expose properties that we can customize to create different `NewsCell` instances.

In this Tutorial 11, we will add a model called `Article` to contain the raw news article information. In the next tutorial, we will display those articles in news cells.

We'll pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Model Types

Swift stores words and names in a type called a `String`. A `String` is a model, which stores a "string" of characters, such as letters, numbers, spaces, and punctuation, to make a word, sentence, paragraph or longer. In contrast to a `Text` view, a `String` only stores the "string" of characters, not the visual characteristics like font, color, and size.

Swift stores dates and times in the `Date` type.

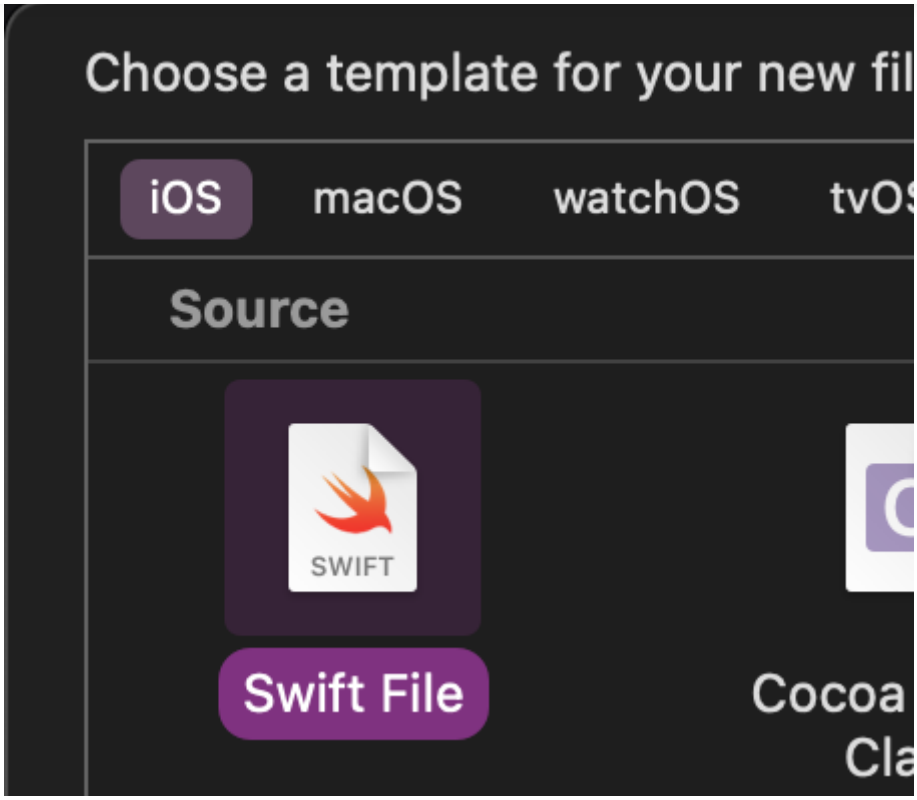
Numbers are usually stored as an `Int` if they are integers (whole numbers like `0`, `1`, `234`, `-78`) or as `Double` if they can have a fractional component (like `0.78`, `1.23` or `-45.6`).

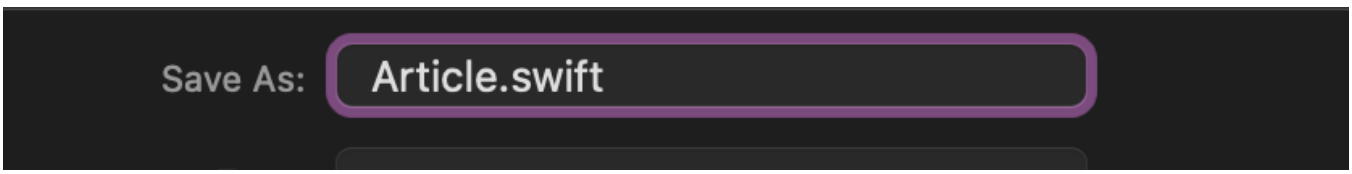
3. Create the Model Code

Each news article will consist of a title, date, detail, and the name of two images. Let's create an `Article` type to store this information for each article.

👉 In Xcode, use the `File` menu's `New File…` command to create a new file called

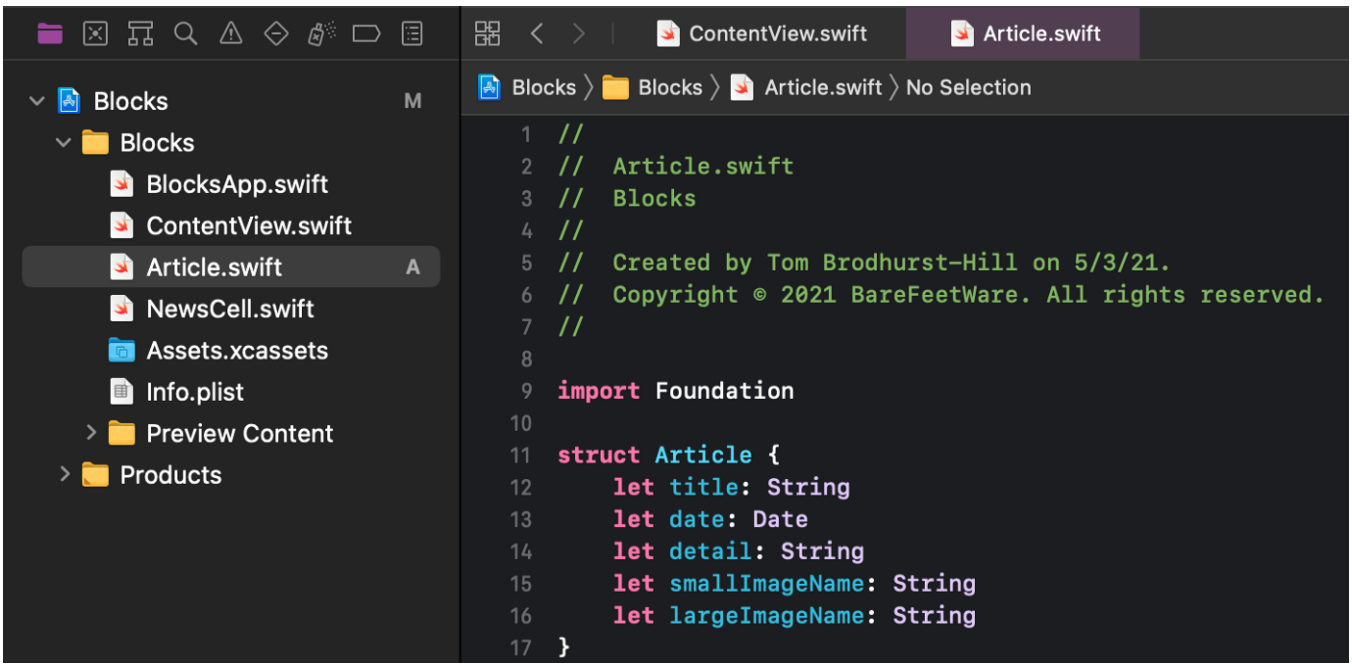






👉 Type or paste the code below. It's good practice to type in the code to familiarise yourself with Xcode's editing and autocompletion features.

👁️ Your `Article` code should look like this:



That's it! We have created our first model.

ℹ️ For the curious, here's a breakdown explanation of the code above:

1. `import Foundation` imports (into the app project) all of the foundation (fundamental) Swift types, such as dates. If we didn't do this, Xcode's compiler would complain that it *Cannot find type 'Date' in scope*.

2. `struct Article` declares that we are creating a new type (specifically a "structure")

4. The word following `let` sets the name of each property, such as `title`, `date`, `detail`. We can use any wording we like, but we should follow the guidelines for naming Swift variables.

5. The colon (`:`) tells Swift that the property name on the left is of the type on the right. For example, the `title` is a `String`, which means it will be a string of letters, numbers, spaces, whereas `date` will be the special `Date` type that stores the time and day in a year.

4. Create Mock Articles

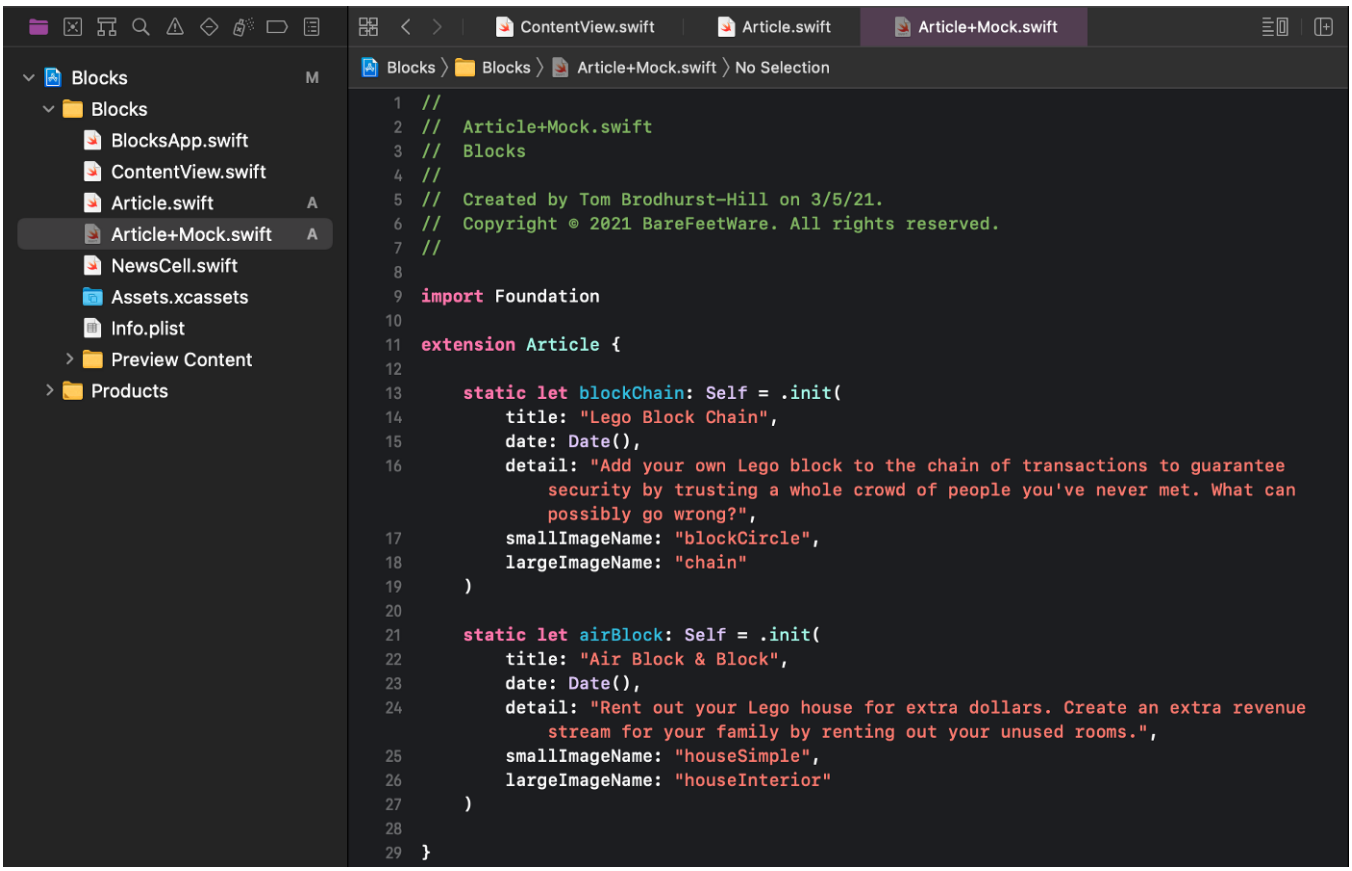
In a completed app, we would source the news articles from the internet, by requesting them from a news server. Since we don't have any network fetching functionality yet, we need to "mock" some model data that we can use to test our models. Mock data gives examples of what we expect in our finished app.

👉 Create another file, using the `Swift File` template. Call it `Article+Mock.swift`.

👉 Type in the code below. You might want to copy and paste the long quoted strings.



👁️ When done, the code should look like this:



ℹ️ Don't worry about understanding the code, but here is an explanation:

1. The file is named `Article+Mock.swift` because it extends (or adds to) the functionality of the `struct Article` type that we already have. The `+Mock` in the name indicates the **purpose** of the extension in this file. We can have multiple files that extend the same type, each with a different `+Purpose`.

2. `extension Article` adds extra functionality to the `struct Article` that we already created. In other words, it "extends" `Article` with more features. We could have just added this code in the `struct Article` code, but keeping the mock values in a

3. Using `static` and `: Self` declares the variable as an "instance of this type". That just means that anywhere in the code that expects an `Article`, we can just provide `.blockChain` or `.airBlock`. This makes it really easy to use these mock articles wherever we need them.

4. This code is all inside the `extension Article`, which gives it the same context as if it was all inside `struct Article`. This means that, in this context, Swift understands that `Self` means `Article` and that `.init(...)` means `Article(...)`. For example, we could have written `static let blockChain: Article = Article(` instead of `static let blockChain: Self = .init(`, since they mean the same thing in this context. But the latter is more generic and reusable.

5. Each pair of parameters and argument provides a value for that property. For example, `title: "Lego Block Chain"` sets the title property to the string `"Lego Block Chain"`.

6. Recall from our earlier Tutorial 6 that we added a bunch of image files, including those named `houseSimple` and `houseInterior`. If you like, you can have another look by selecting the `Assets.catalog` in the Project navigator. We are quoting those asset names here for the image names.

7. `Date()` creates a new instance of a date. Since we have provided no properties in this instance of `Date`, it will use its default value, which happens to be "right now" — that is, today, right this second, when the code runs.

👉 After entering all the code, test that it compiles by selecting `Build` from the `Product` menu. If there are any errors, fix them by checking that your code matches the above code.

5. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.

2. 👉 Enter a description such as: `Created Article model and mock instances`



We have created a new `Article` model and a couple of mock instances.

Next, in Tutorial 12, we will extend the `NewsCell` view so it can display the data from the `Article` model.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles.

💬 If you have any questions or comments, please add a response below.

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Jun 15, 2021 · 7 min read ★

Connect Model and View

Build an App Like Lego, with SwiftUI — Tutorial 12

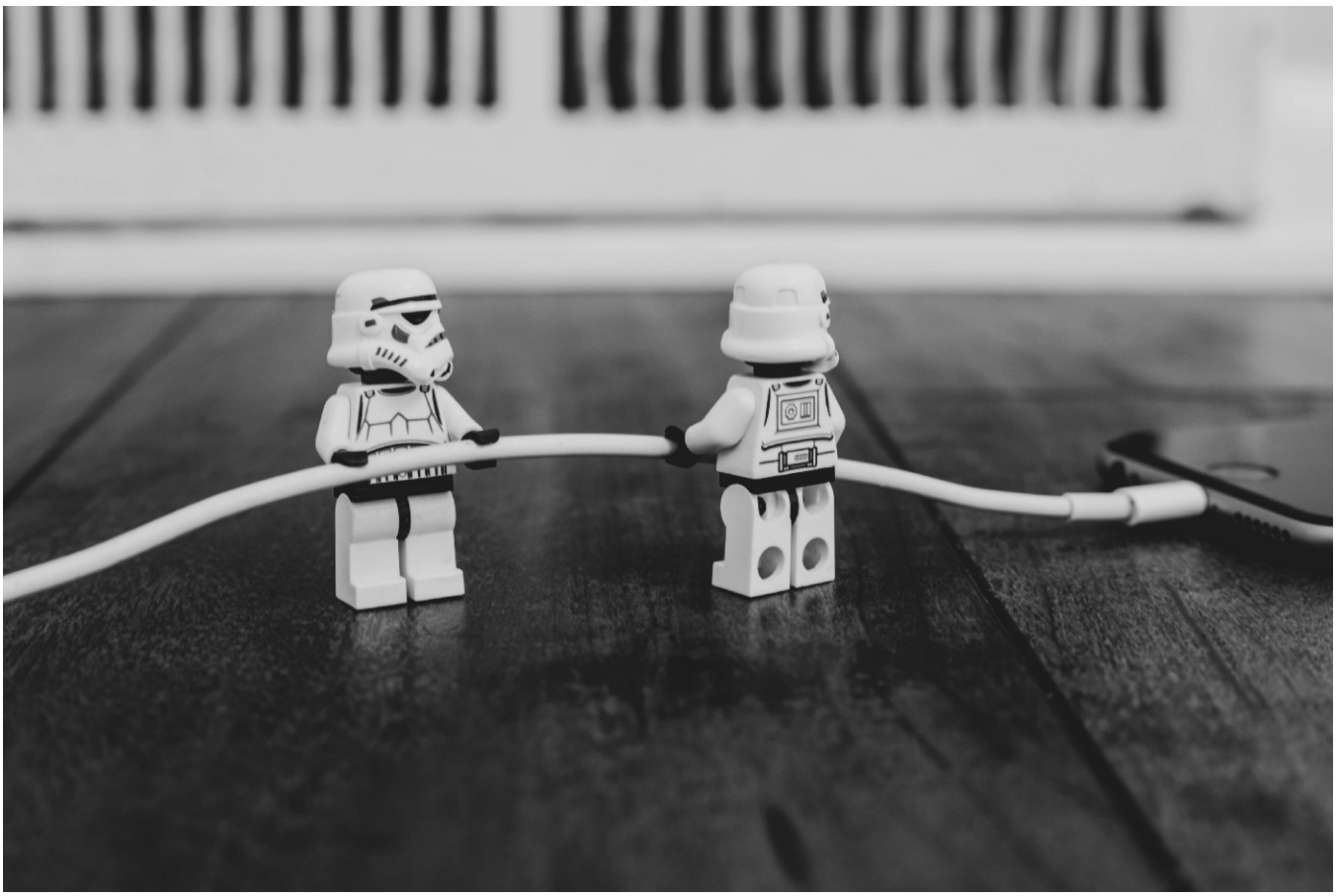


Photo by Will Porada on Unsplash

1. Introduction

A properly architected app separates the view components (what you see and touch) from the model components (what you can't see, such as data and calculations). At some point, we need to display some model data in a view. We need some code that dictates how to "present" it or "control" it, which is why it is sometimes described as a "presenter" or a "controller".

present it in the view.

In this tutorial, we will create an extension of a view to display data from a model. We will also use the Attributes inspector to select which mock model to use for each view.

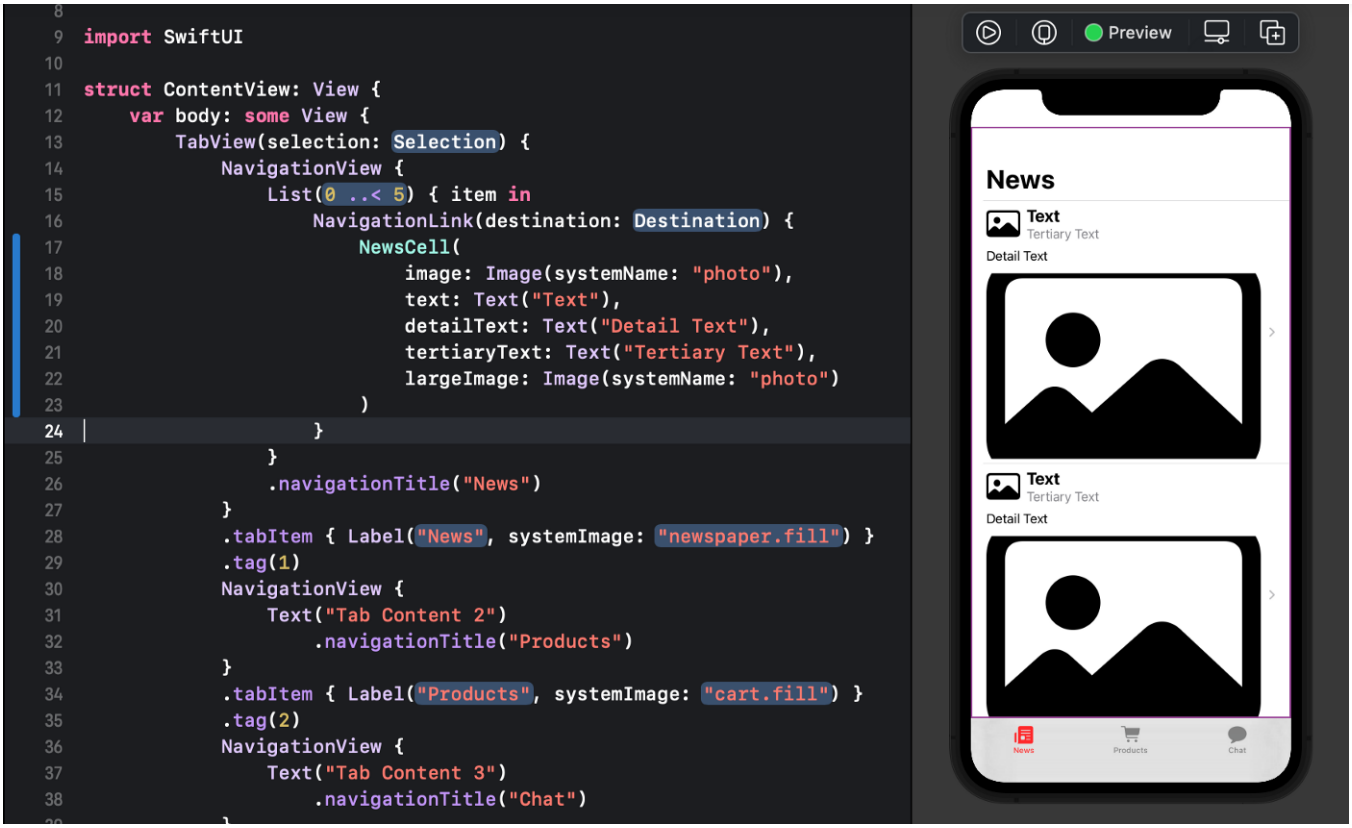
In the previous Tutorial 11, we created an `Article` model and a couple of mock instances. In this Tutorial 12, we will display those articles in news cells.

We will pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Extend NewsCell to Accept an Article

Now we have an `Article` model and a `NewsCell` view. We need a way to show the data from an `Article` in a `NewsCell`. There are several ways to do this, but the neatest and most extendable way I've found is to create an extension of the view (`NewsCell`) that expects a model (`Article`) as the only parameter.

👁 Look at `ContentView.swift`. Recall that in Tutorial 10 we temporarily created a `NewsCell` instance by providing all of the expected view properties: `image`, `text`, etc.



This `NewsCell` instance is currently just a placeholder.

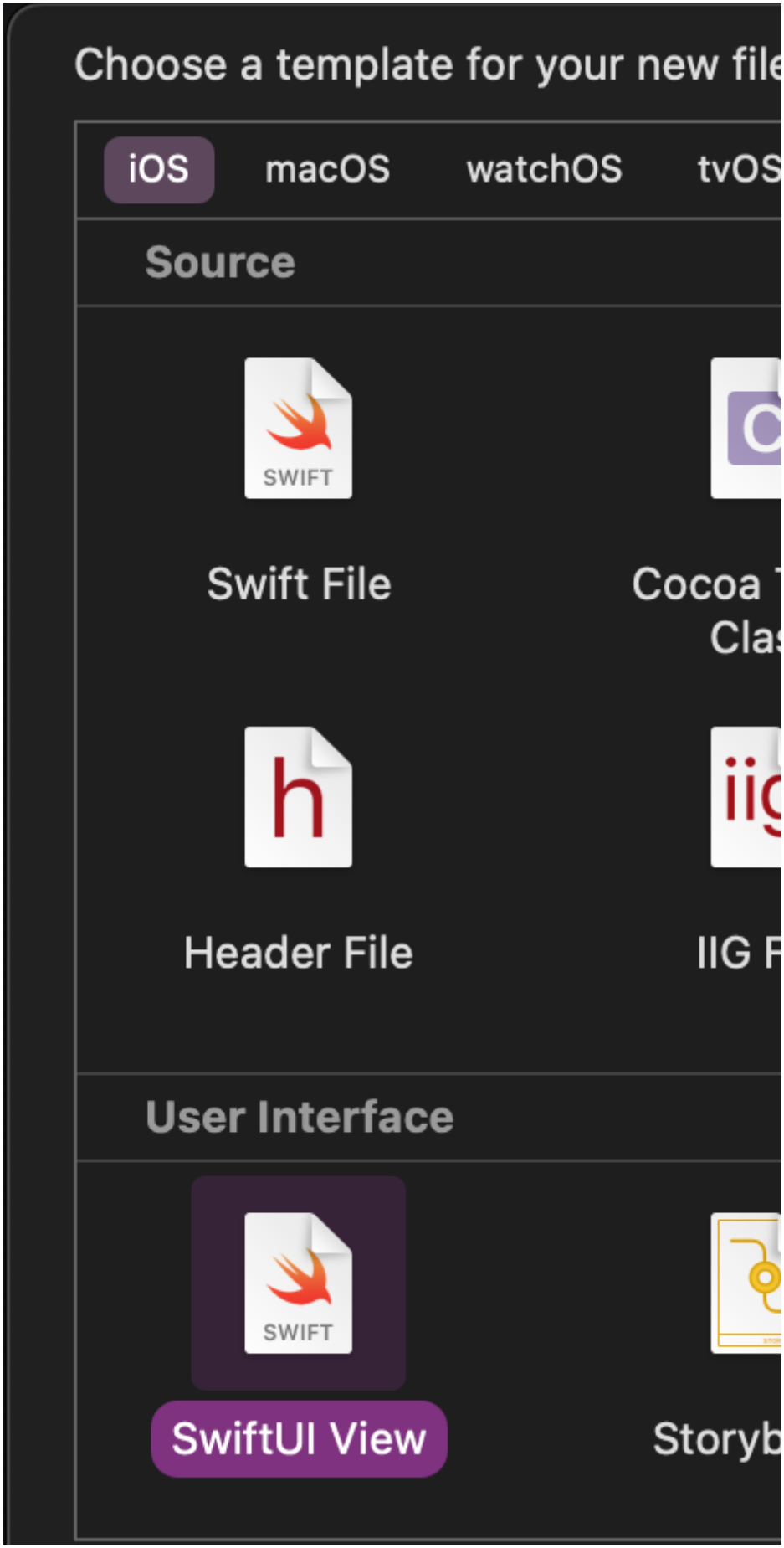
Now that we have an `Article` model, we would like to replace this `NewsCell` placeholder with the data from `Article` (model) instances.

For example:

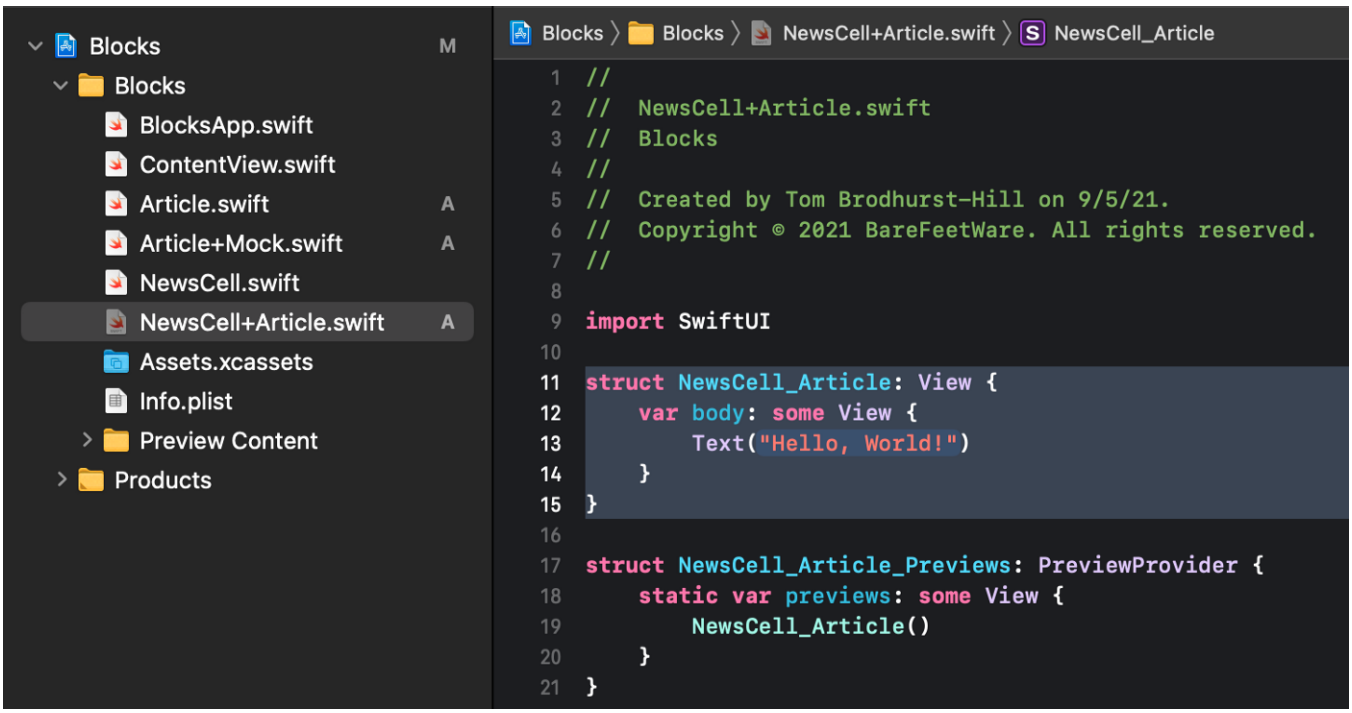
To facilitate this, we need to define an alternative `init` (initialization) for `NewsCell` that will take an `Article`.

In other words, we already have an `init` (a way to create) for `NewsCell` where we specify each `Text` and `Image` subview. It would be convenient for us to have another `init` which would instead just need an `Article`. The code will extract each part of the `Article` to make the required `Text` and `Image` subviews.

Let's do that now.


Choose a template for your new file
iOS
macOS
watchOS
tvOS
Source
SWIFT
Swift File
Cocoa
Cla
h
Header File
IIG F
User Interface
SWIFT
SwiftUI View
Storyb

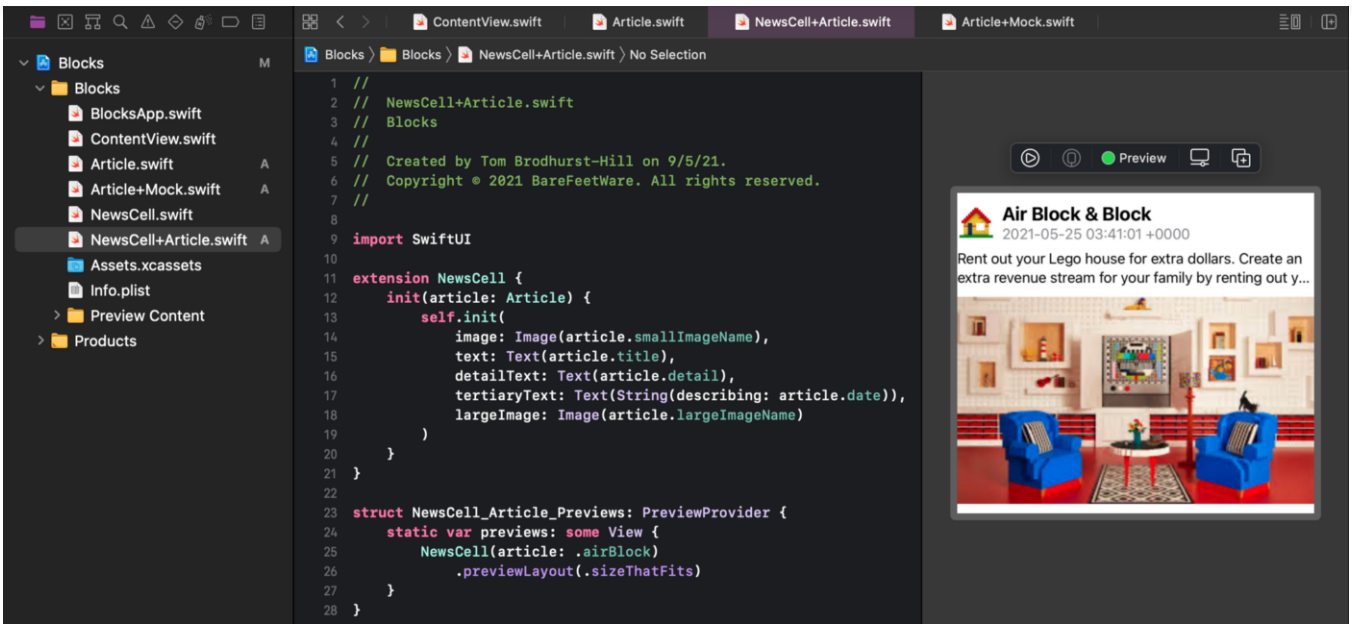
👉 In the new file, select the default `struct NewsCell_Article` code.



👉 Delete it and replace it with the following code:

In the preview, replace the template `NewsCell_Article()` instance with:

👁 Your code should look like this:



👉 Check that your code compiles, by selecting `Build` from the `Product` menu. Fix any errors in the code.

ℹ️ Let's walk through what's happening here, in the code. Again, you don't need to worry about these inner workings — this is just for those who want to understand the code:

1. `extension NewsCell` just means: Add this new code to the existing functionality of `NewsCell`.
2. `init(article: Article)` means: Define a new way of initializing/instantiating a `NewsCell`, that just requires a parameter named `article` with an argument (value) that is an `Article`.
3. `self.init(image...)` means: Create a `NewsCell` using the existing properties/parameters of `image`, `text` etc, with the arguments/values listed below for each.
4. `article.smallImageName` means: the article's `smallImageName`. Getting the property of an instance like this is referred to as "dot notation".
5. `image: Image(article.smallImageName)` means: For the expected `image` parameter/property, create an `Image` using the `smallImageName` of the provided

`detailText`.

7. For the `tertiaryText`, we want to show the `article`'s `date`. `Text()` expects a `String` argument but the `article`'s `date` is a `Date`, not a `String`. To create a `String` from a `Date`, we can use the `String(describing:)` initialiser function. This will give a basic `String` description of the `Date`. It won't be pretty, but it will do for now, and we'll fix it later.

👉 If the preview hasn't updated, click on the `Resume` button in the top right of the preview pane.

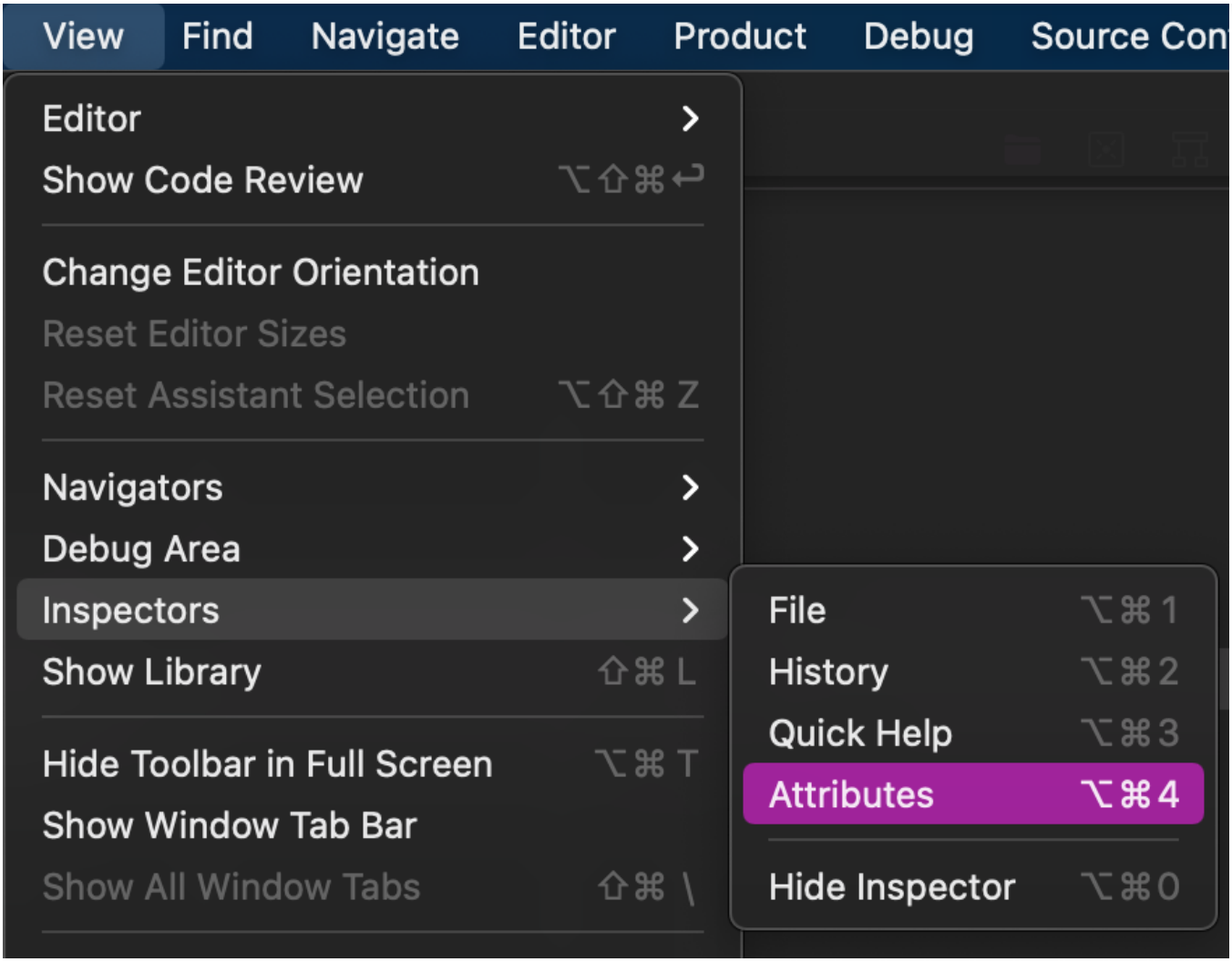
👁 Confirm that the preview shows the "Air Block & Block" article data, as shown above. Of course, the date will show as your current local date.

3. Select a Mock Instance from the Attributes Inspector

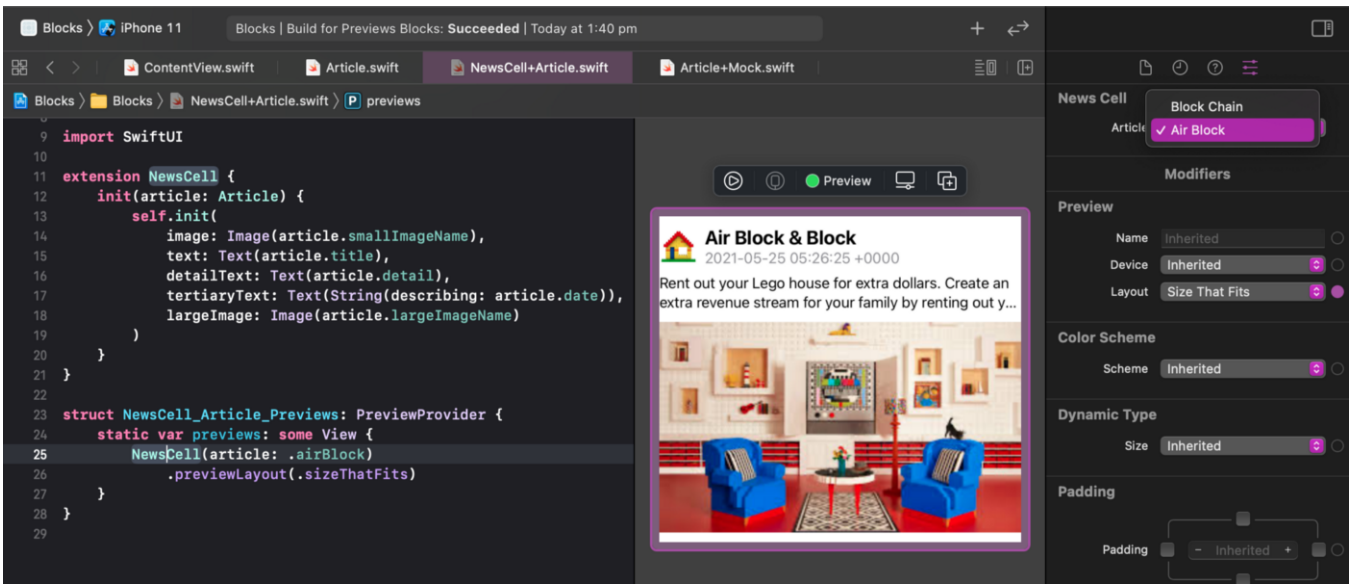
👉 Click on the `NewsCell(...)` instance in the preview code.

Make sure that the Attributes inspector (right panel) is showing. If not, you can display it through the `View` menu.



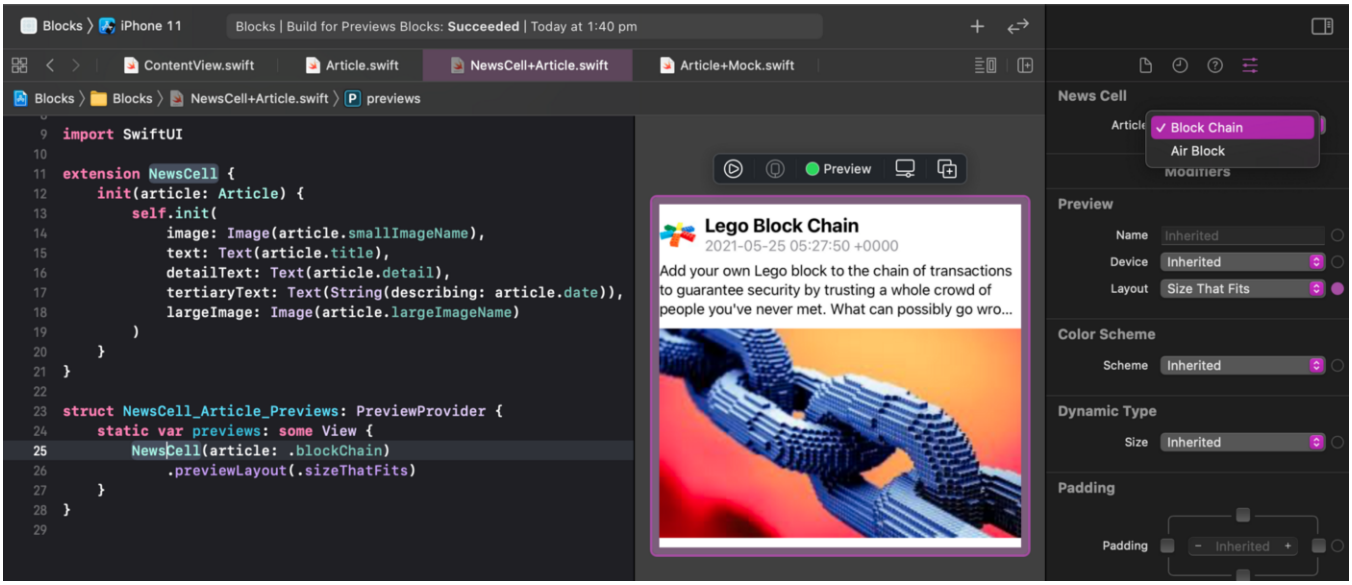


👉 At the top of the Attributes inspector, click on the `Article` popup menu.



the camel case of our variable names (like `airBlock`) to more human-readable separate words in title case (like `Air Block`).

👉 In the Attributes inspector, change the `Article` popup menu from `Air Block` to `Block Chain`. Confirm that the preview updates to show the different `Article`.



Then change it back to `Air Block`.

4. Show Articles in the List

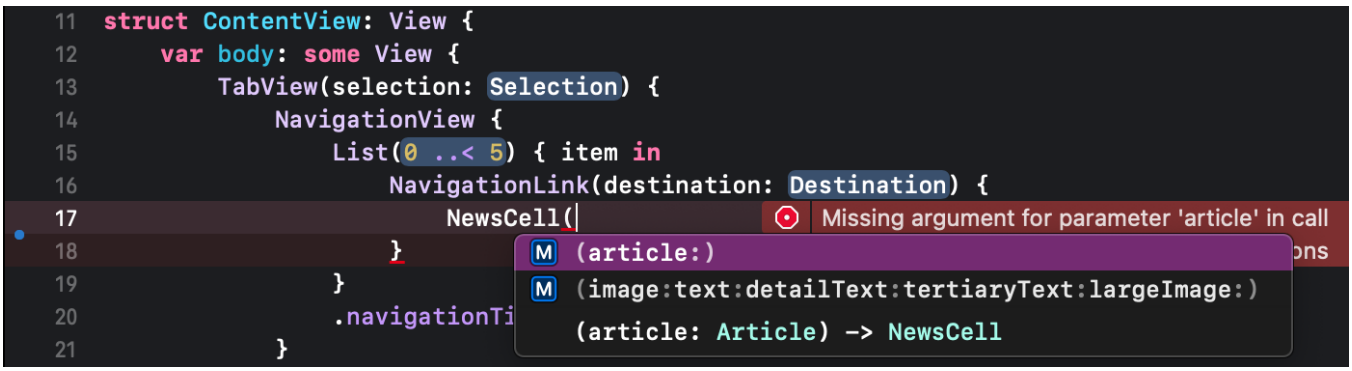
Now that we have created the `NewsCell`'s `init(article: Article)` initializer, let's use an article in the list display in `ContentView`.

👉 In `ContentView.swift`, locate the `NewsCell(` line of code. Double click on the opening parenthesis `(`, which will select the entire multiline contents between the opening and closing parentheses.

```
11  struct ContentView: View {
12      var body: some View {
13          TabView(selection: Selection) {
14              NavigationView {
15                  List(0 ..< 5) { item in
16                      NavigationLink(destination: Destination) {
17                          NewsCell(
18                              image: Image(systemName: "photo"),
19                              text: Text("Text"),
20                              detailText: Text("Detail Text"),
21                              tertiaryText: Text("Tertiary Text"),
22                              largeImage: Image(systemName: "photo")
23                          )
24                      }
```

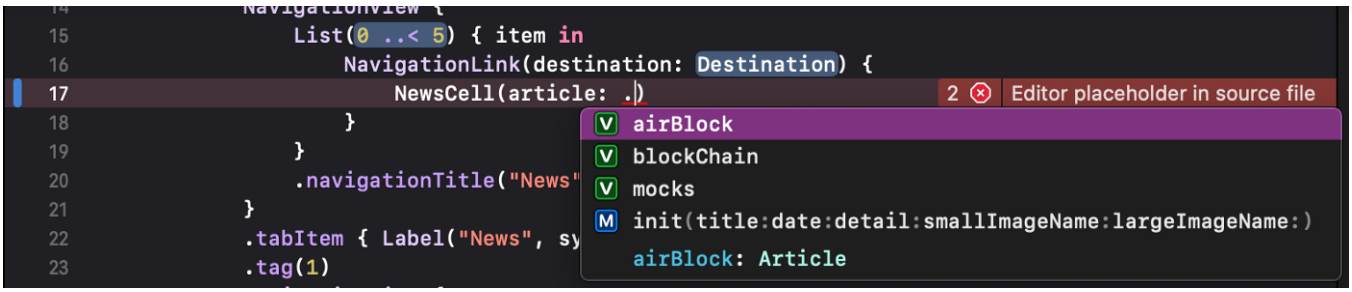
👉 Hit `delete` on the keyboard.

👉 Type the opening `(` again. This time, in the auto-completion popup menu, you should see the additional option of the `NewsCell(article:)` initializer. Select it.



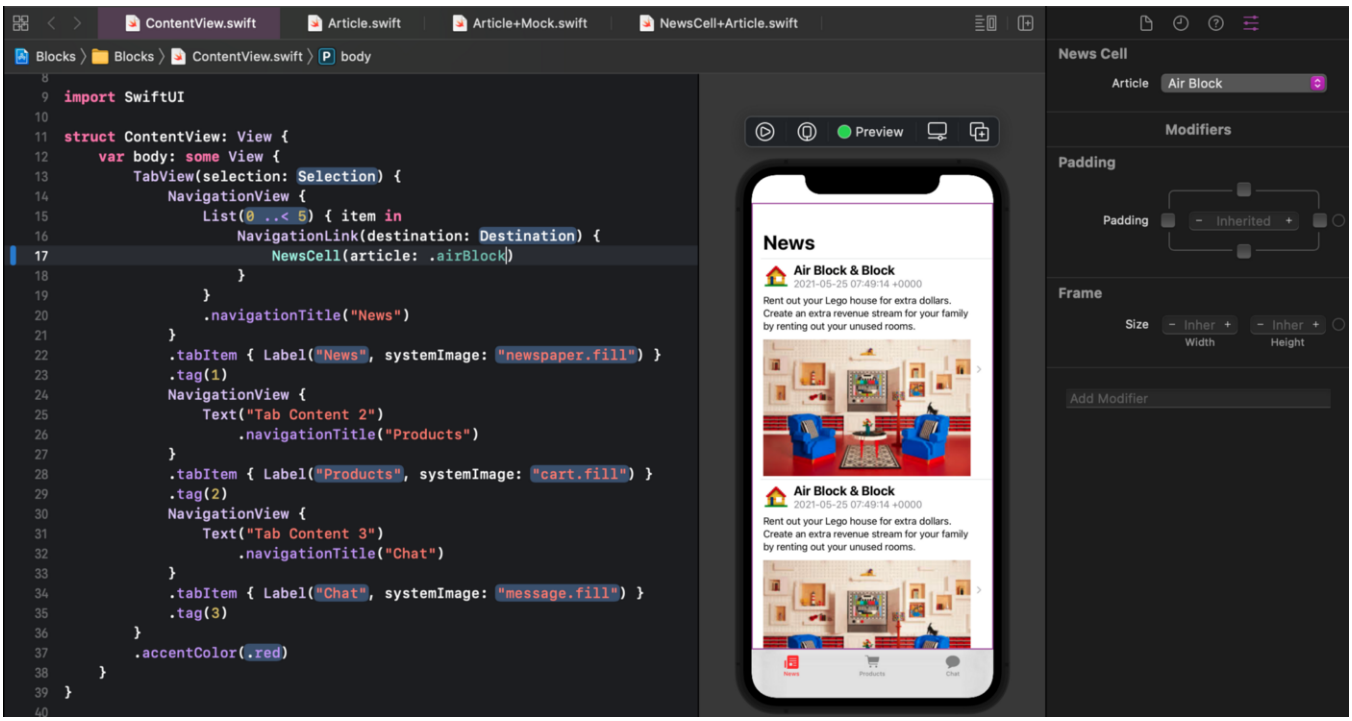
👁 Xcode places an `Article` placeholder where it expects an instance of an `Article`.

👉 With the `Article` placeholder selected, type a period (`.`). Xcode should offer a popup menu of the available instances of `Article` (which we created in an earlier tutorial).



👉 Select `airBlock` from the popup menu.

👉 Check that the list of news cells in the preview all show the `airBlock` article. If necessary, build the app (select `Build` from the `Product` menu) and refresh the preview.



5. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `NewsCell can display an Article`
3. 👉 Click on the `Commit` button.

Next, in Tutorial 13, we will loop through the Article instances to show them all in the list.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles.

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Tom Brodhurst-Hill · Following
Jun 23, 2021 · 7 min read ★

Show an Array of Identifiable Items in a List

Build an App Like Lego, with SwiftUI — Tutorial 13

Photo by Eric & Niklas on Unsplash

1. Introduction

In Swift and most programming languages, an ordered sequence of items is called an `Array`. In SwiftUI, we often want to display an array of items in a `List`. An `Array` is a model structure. A `List` is a view structure.

A `List` needs to uniquely identify each item. In other words, it needs the items in an `Array` to be `Identifiable`. For example, we could identify each item by a unique name or a unique number. Then the `List` can control the items' positions and perform

In the previous Tutorial 12, we displayed an article in each news cell in our list. But each cell showed the same article.

In this Tutorial 13, we will show one `NewsCell` for each unique `Article` in an `Array`. We will make the articles `Identifiable` so we can display then in a `List`.

We will pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Create an Array

First, let's create an array of articles, using the mock articles that we created earlier.

👉 Open the `Article+Mock.swift` file that we created in an earlier tutorial. At the end of that file, add a blank line and then this code:

Your code should then look like this:

```swift
extension Article {

    static let blockChain: Self = .init(
        title: "Lego Block Chain",
        date: Date(),
        detail: "Add your own Lego block to the chain of transactions to guarantee security by trusting a whole crowd of people you've never met. What can possibly go wrong?",
        smallImageName: "blockCircle",
        largeImageName: "chain"
    )

    static let airBlock: Self = .init(
        title: "Air Block & Block",
        date: Date(),
        detail: "Rent out your Lego house for extra dollars. Create an extra revenue stream for your family by renting out your unused rooms.",
        smallImageName: "houseSimple",
        largeImageName: "houseInterior"
    )

}

extension Article {
    static let mocks: [Self] = [.blockChain, .airBlock]
}

```

ℹ️ Here's a quick overview of this new code:

1. The second extension is separated just for visual clarity. We could have combined all of the code in this file into one extension.

2. `Self` inside `extension Article` is the same as explicitly writing `Article`

means an array of that type. An array is just a sequence of items, in order. For example, an array of fruits could be `let fruits: [Fruit] = [.apple, .orange, .banana]`.

4. We've chosen the variable name `mocks` for the array of mock articles. Arrays are usually named as a plural.
5. We wrap the items in the array in square brackets, with the items separated by commas.
6. We've assigned `mocks` to be the array of `[.blockChain, .airBlock]`, which contains the two instances already defined above.

3. Show an Array in a List

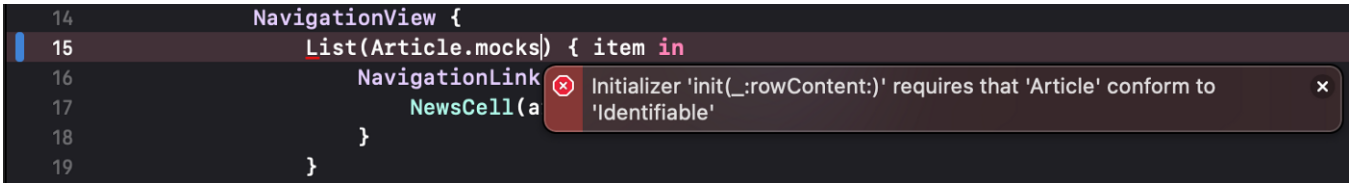
Now we will show the information from our `mocks` array of articles in a `List`.

👉 In `ContentView.swift`, in the `List(...)`, click on the template `0...<5` to select it.

```
11  struct ContentView: View {
12      var body: some View {
13          TabView(selection: Selection) {
14              NavigationView {
15                  List(0 ..< 5) { item in
16                      NavigationLink(destination: Destination) {
17                          NewsCell(article: .airBlock)
18                      }
19                  }
```

👉 Replace it with `Article.mocks`. As you type, Xcode will prompt to autocomplete, so you don't have to type the whole thing.

```
14              NavigationView {
15                  List(A) { item in
16                      S Article
17                      Pr App
18                      E Axis
```



4. Identifiable

👁 As you can see, Xcode shows an error popover.

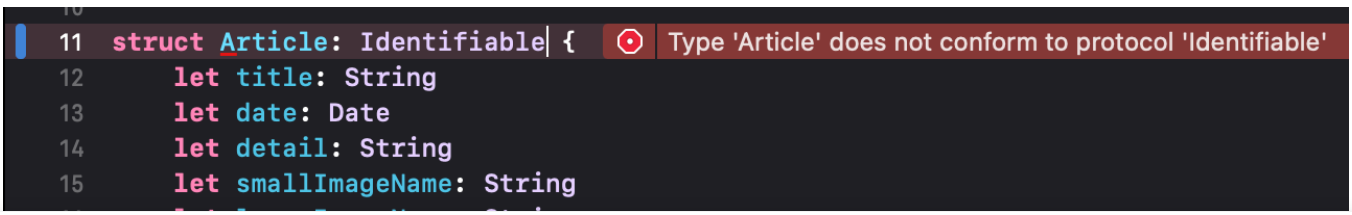
👉 Click on the red stop sign icon in the error popover to reveal all of the words in the error description.

Xcode is saying that the `List` won't accept an array of articles, because `Article` does not "conform to Identifiable". But what does that mean?

It means that `List` needs a way to identify each article as distinct from the other articles in the `mocks` array. The simplest way to do that is to just add a unique identifier to each article. It could be a unique name string, but we will just number them.

👉 Open the `Article.swift` file (by selecting it in the File navigator in the left pane(.

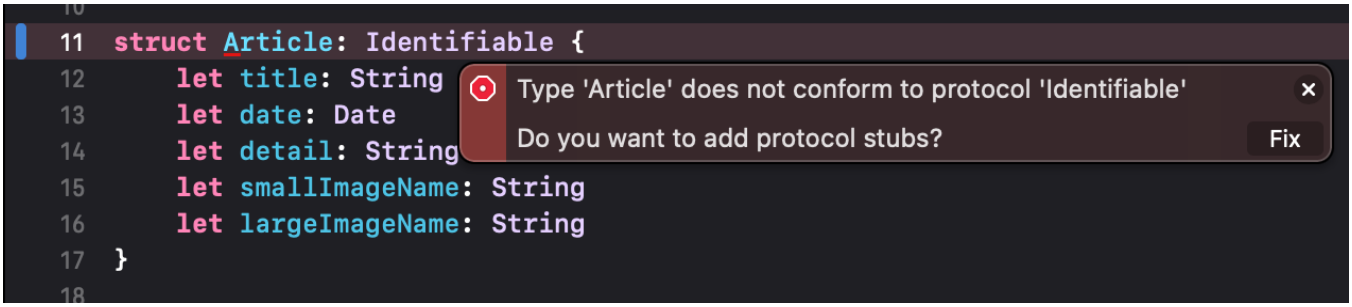
👉 After `struct Article`, add `: Identifiable`. This tells Xcode that we promise to make `Article` "conform" to the `Identifiable` protocol.



👁️ Xcode keeps us to our promise, by complaining that `Type 'Article' does not conform to protocol 'Identifiable'`. Note that this stop sign contains a dot, not a cross like previous errors.

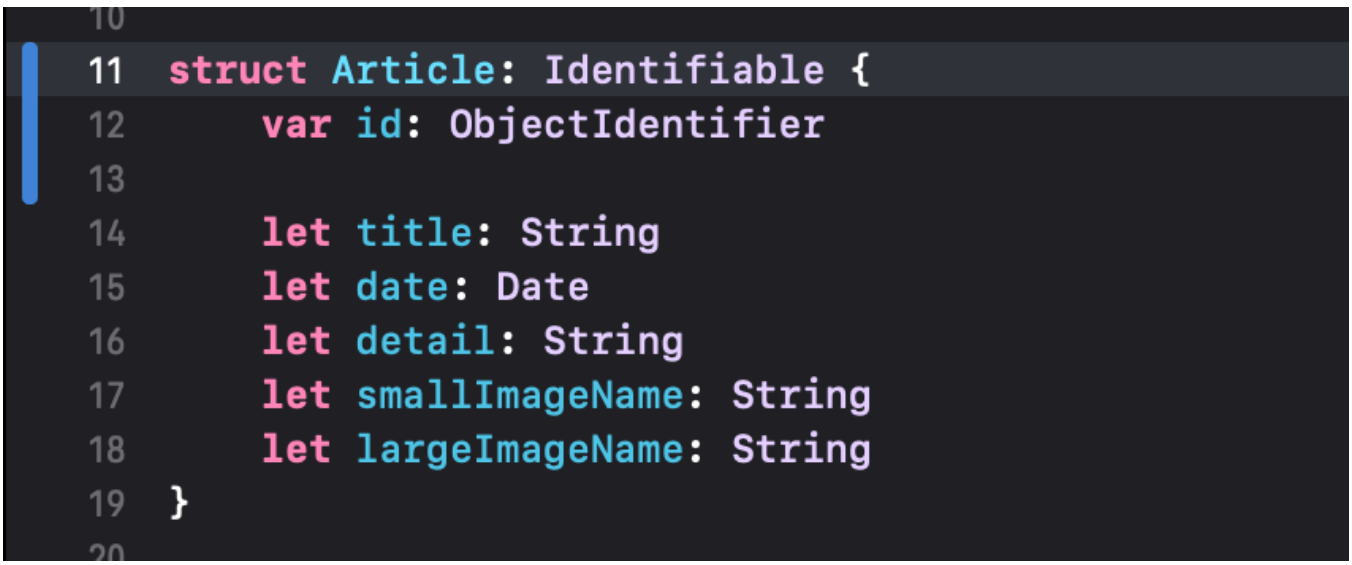
👉 Click on the stop sign containing the dot.

👁️ The error popover expands and offers to `Fix` the error by adding `protocol stubs`.



👉 Click on the `Fix` button in the popover.

👁️ Xcode adds placeholder code to fix the error.



👉 Since we will use simple integers (whole numbers) for the id, replace `ObjectIdentifier` with `Int`.

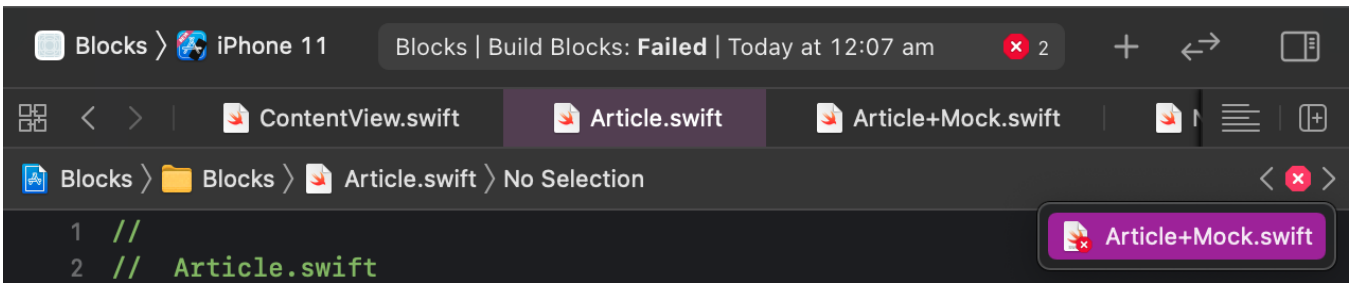
👉 Since we will not change (vary) the `id` of each article, once assigned, change `var` to `let`.

```
11  struct Article: Identifiable {
12      let id: Int
13      let title: String
14      let date: Date
15      let detail: String
16      let smallImageName: String
17      let largeImageName: String
18  }
19
```

👉 Build the app (in the `Products` menu).

5. Add missing arguments

👁️ Now Xcode complains about errors in the `Article+Mock.swift` file.



👉 Switch to the `Article+Mock.swift` file by selecting it in the error popup menu.

👁️ Xcode shows two occurrences of the same error: Each mock article is missing an argument (value) for the new `id` parameter (property) that we added.

```
11  extension Article {
12
13      static let blockChain: Self = .init(
14          title: "Lego Block Chain",          Missing argument for parameter 'id' in call
15          date: Date(),
16          detail: "Add your own Lego block to the chain of transactions to
                guarantee security by trusting a whole crowd of people you've
                never met. What can possibly go wrong?",
17          smallImageName: "blockCircle",
18          largeImageName: "chain"
19      )
20
21      static let airBlock: Self = .init(
22          title: "Air Block & Block",         Missing argument for parameter 'id' in call
23          date: Date(),
24          detail: "Rent out your Lego house for extra dollars. Create an extra
                revenue stream for your family by renting out your unused rooms.",
25          smallImageName: "houseSimple",
26          largeImageName: "houseInterior"
27      )
28
29  }
30
31  extension Article {
32      static let mocks: [Self] = [.blockChain, .airBlock]
33  }
34
```

👉 Tap on the stop sign containing the dot. In the popover error detail, click on the `Fix` button.

```
11  extension Article {
12
13      static let blockChain: Self = .init(
14          title: "Lego Block Chain",
15          date: Date(),                       Missing argument for parameter 'id' in call
16          detail: "Add your own L             Insert 'id: <#Int#>, '          Fix
                guarantee security
                never met. What can possibly go wrong?",
17          smallImageName: "blockCircle",
18          largeImageName: "chain"
19      )
```

👁 Xcode adds the missing `id` parameter with a placeholder for the expected `Int` value.

👉 Replace the `Int` placeholder with the value `1`. Click after the comma and hit `Return` to separate the parameters onto their own lines.

```
13      static let blockChain: Self = .init(
14          id: 1,
15          title: "Lego Block Chain",
16          date: Date(),
```

👉 Similarly, in the second instance, add `id: 2`.

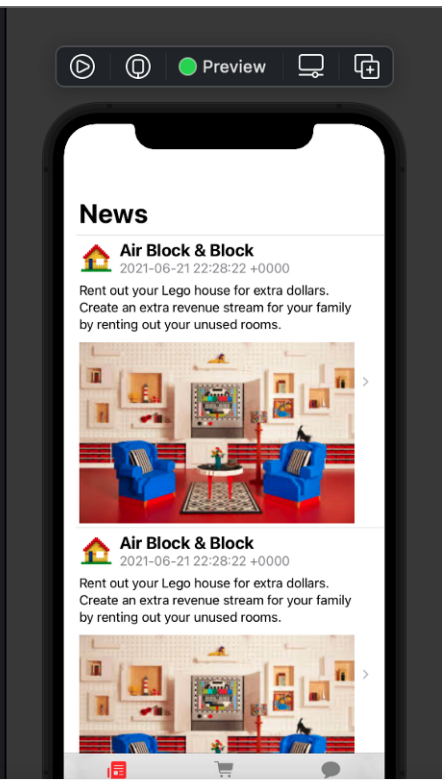
```
22      static let airBlock: Self = .init(
23          id: 2,
24          title: "Air Block & Block",
25          date: Date(),
```

👉 Build the app again and check that there are now no errors.

6. Array in a List

👉 Switch to the `ContentView.swift` file, which contains our `List`. If necessary, `Resume` the preview.

```
1  //
2  //  ContentView.swift
3  //  Blocks
4  //
5  //  Created by Tom Brodhurst-Hill on 4/3/21.
6  //  Copyright © 2021 BareFeetWare. All rights reserved.
7  //
8
9  import SwiftUI
10
11 struct ContentView: View {
12     var body: some View {
13         TabView(selection: Selection) {
14             NavigationView {
15                 List(Article.mocks) { item in
16                     NavigationLink(destination: Destination) {
17                         NewsCell(article: .airBlock)
18                     }
19                 }
20                 .navigationTitle("News")
21             }
22             .tabItem { Label("News", systemImage: "newspaper.fill") }
23             .tag(1)
24             NavigationView {
25                 Text("Tab Content 2")
26                     .navigationTitle("Products")
27             }
28             .tabItem { Label("Products", systemImage: "cart.fill") }
29             .tag(2)
```



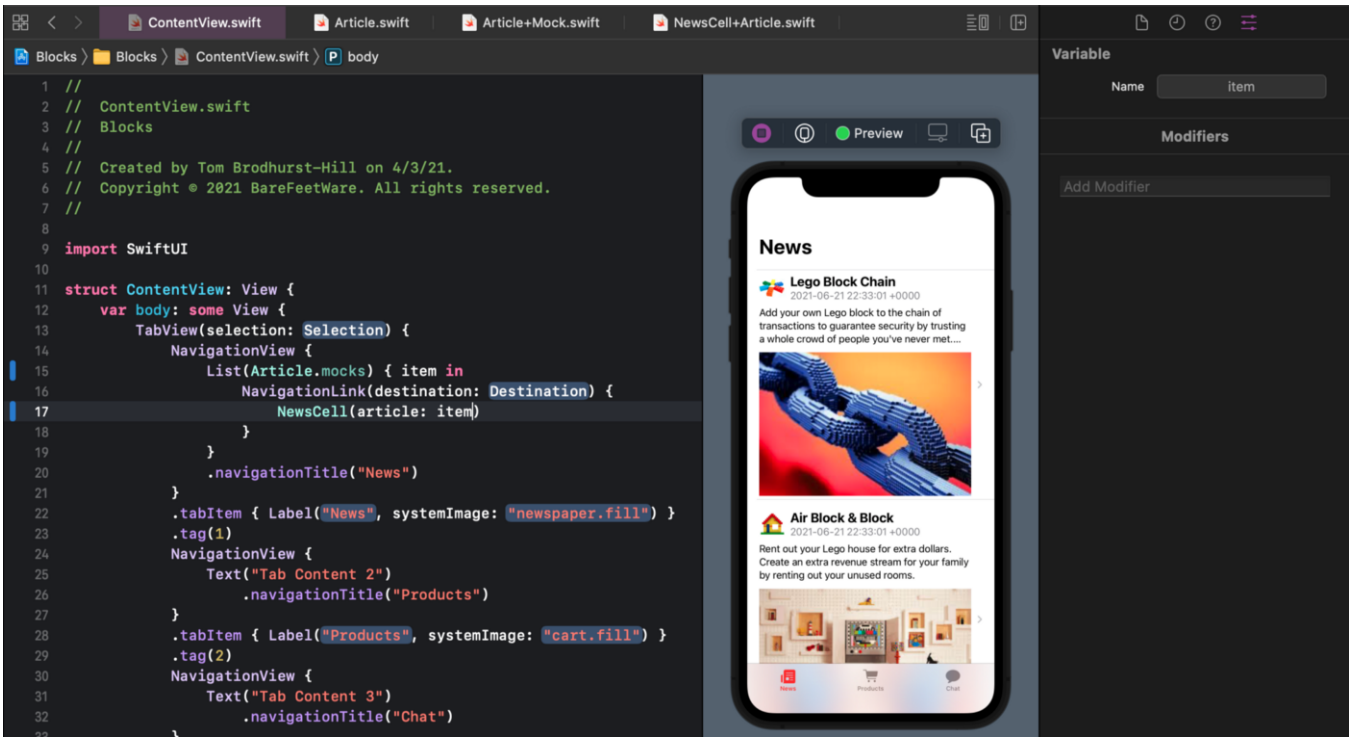
👉 When the preview is running, scroll the News scene by dragging it up and down.

👁️ You should see that there are now just two news cells displayed in the list. Recall that the previous template code showed six cells.

The `List(Article.mocks)` tells SwiftUI to make a list containing one cell/row for each item in the `Article`'s `mocks` array, which is just two.

But the preview is still displaying all news cells with only the `.airBlock` article. That makes sense, since the `NewsCell` code inside the `List` has the argument `.airBlock`). We need to replace that static (unchanging) instance with each `item` that the `List` provides.

👉 In the `NewsCell(…)`, replace the `.airBlock` with `item`.



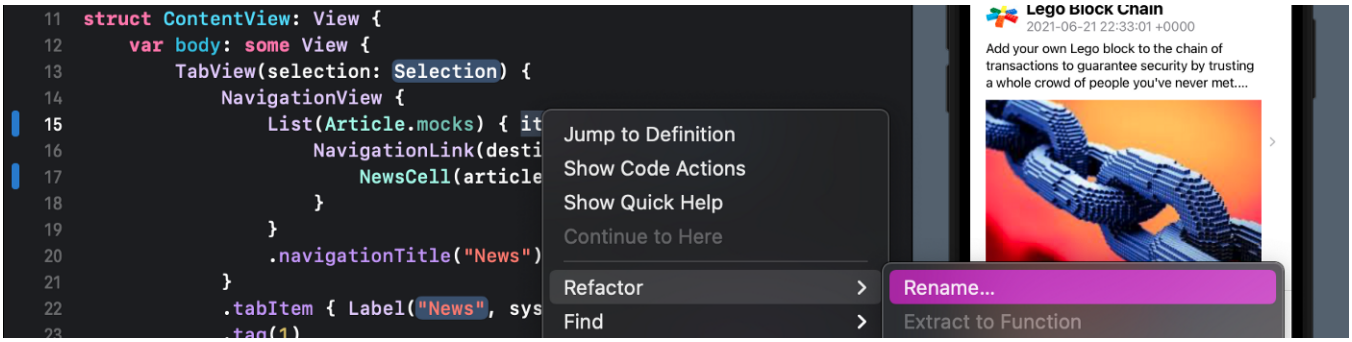
👁️ The preview now shows two news cells populated with different articles. You can scroll up and down to check.

7. Rename a Variable

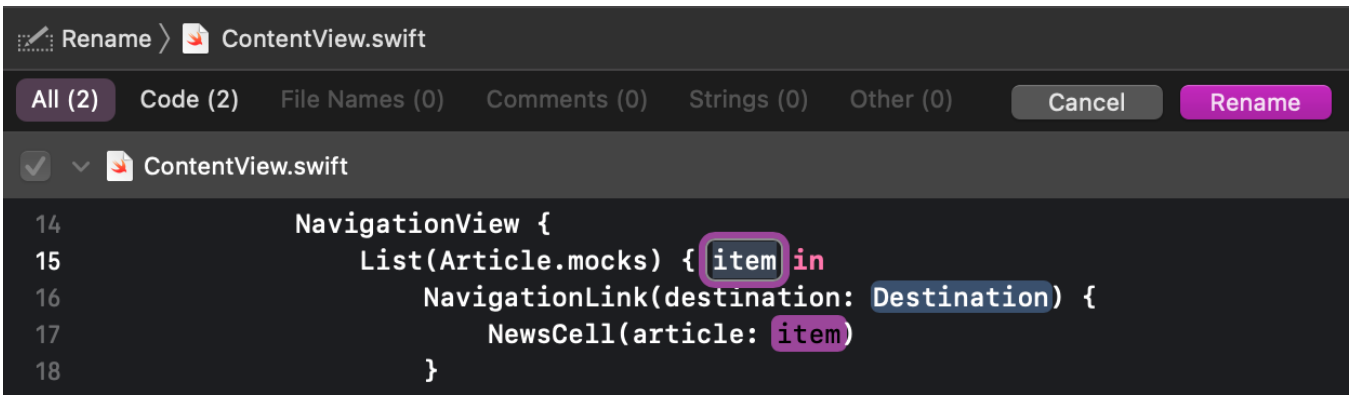
The variable name `item` is pretty generic. As our code gets more complex, naming

👉 Control click on either of the `item` occurrences in the `List` code.

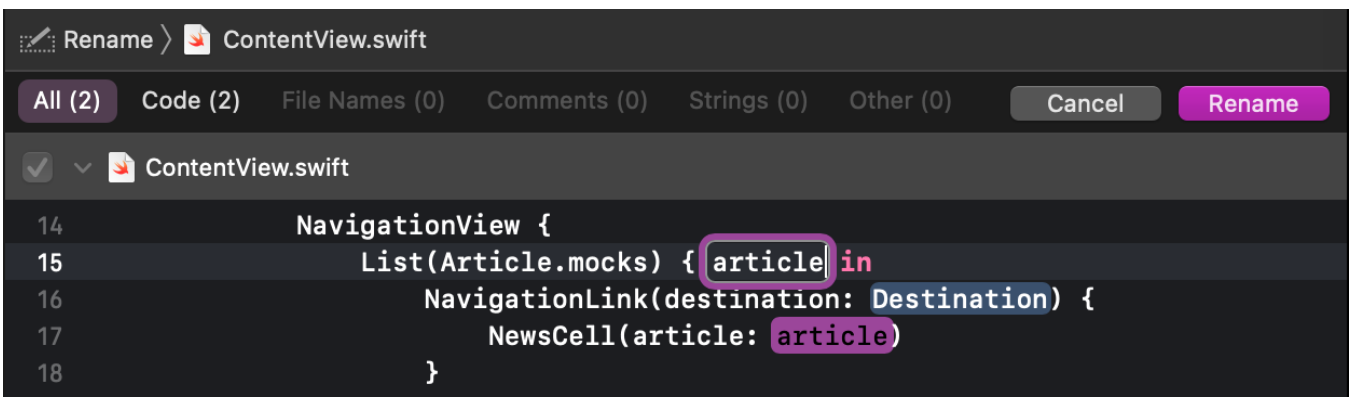
👉 In the popup menu, select `Refactor > Rename...`.



👁️ Xcode focuses on the code that will be affected and selects both occurrences of `item`.



👉 With the `item` text still selected, type to replace it with `article`. You should see both instances change as you type.



👉 Click on the Rename button

8. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Article: Identifiable and mocks`
3. 👉 Click on the `Commit` button.

9. Next...

Congratulations! The list of news articles is now visually complete. It is showing all the currently available articles.

Next, in Tutorial 14, we will build a `ProductCell`, using all the tools you've learned so far.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles. If you liked this article, clap for it (up to 50 times).

💬 If you have any questions or comments, please add a response below.

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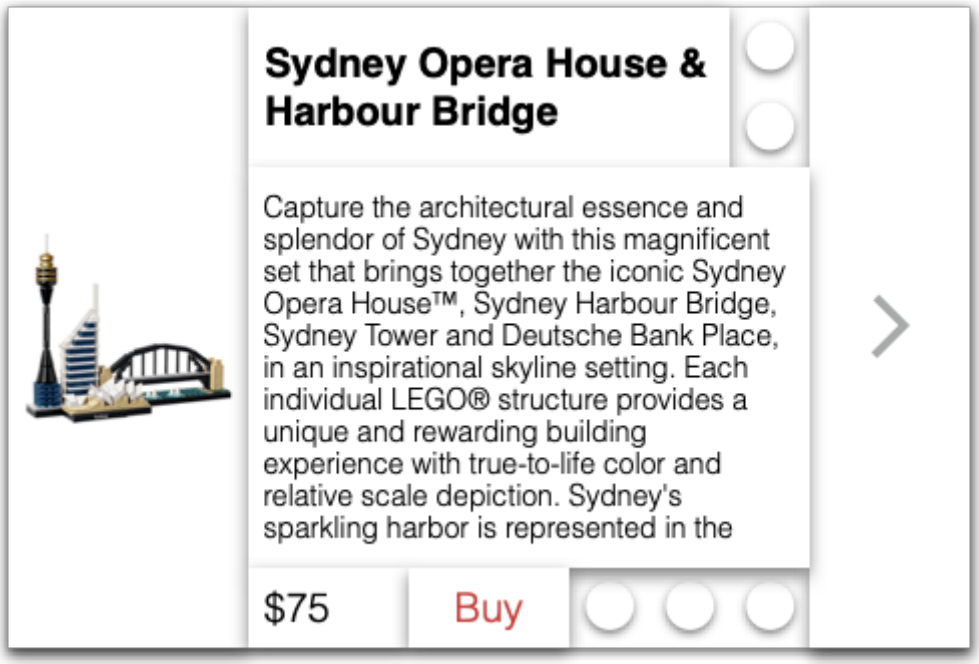
Jun 29, 2021 · 9 min read ★

Create a Cell by Stacking Subviews

Build an App Like Lego, with SwiftUI — Tutorial 14



In SwiftUI, we can build a view from subview components by dragging them from a library, so that they click into place vertically and horizontally, like Lego® blocks.

In this Tutorial 14, we will add text subviews, a button, and a resizing image.

In the previous Tutorial 13, we finished connecting the news `Article` model instances with the `NewsCell`s in the News scene. Now we will build a `ProductCell` for our Products scene.

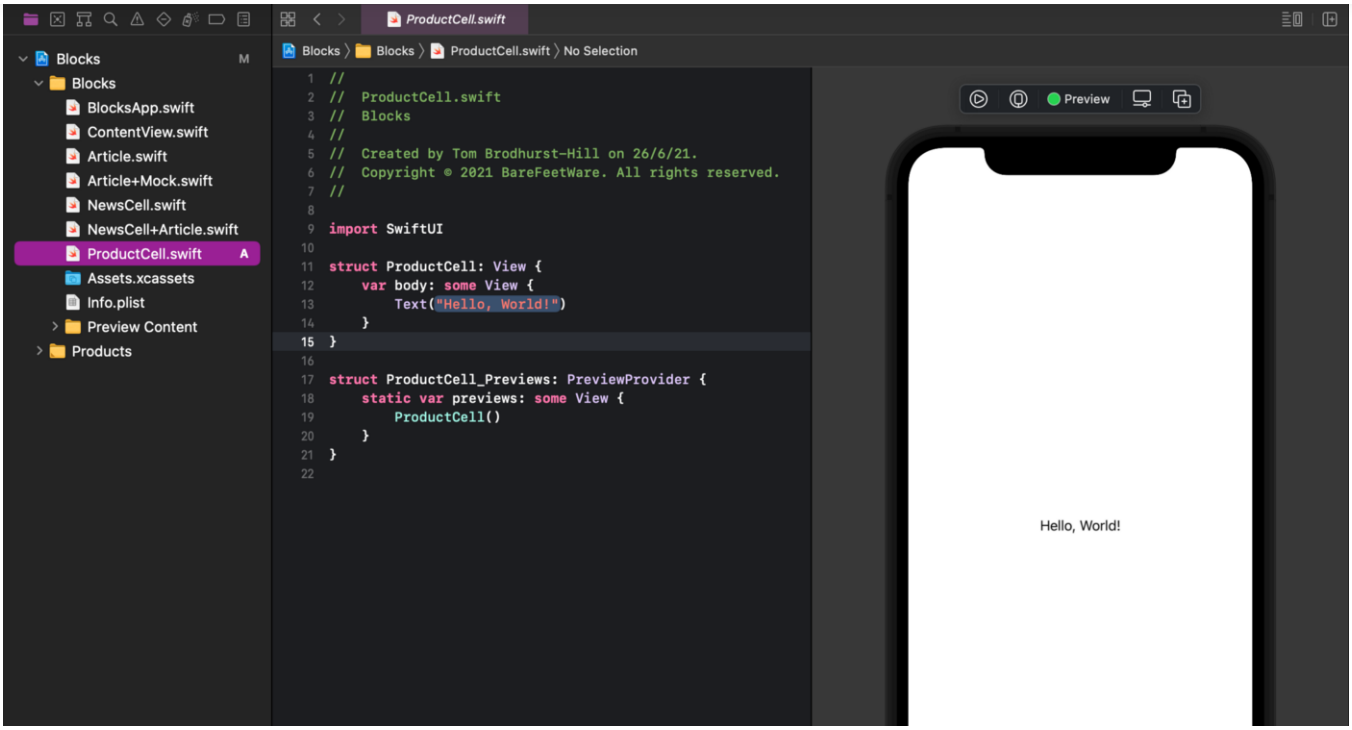
We will pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Product Cell

We're going to create a product cell to show the image, name description, and price of a product, along with a button to buy it. We will assemble the Lego® blocks like this:

The layout above shows placeholders for the image and text blocks, which we will be able to replace for each different instance. For example, to sell the Sydney Harbour Bridge, we could substitute the image and text blocks as shown below.

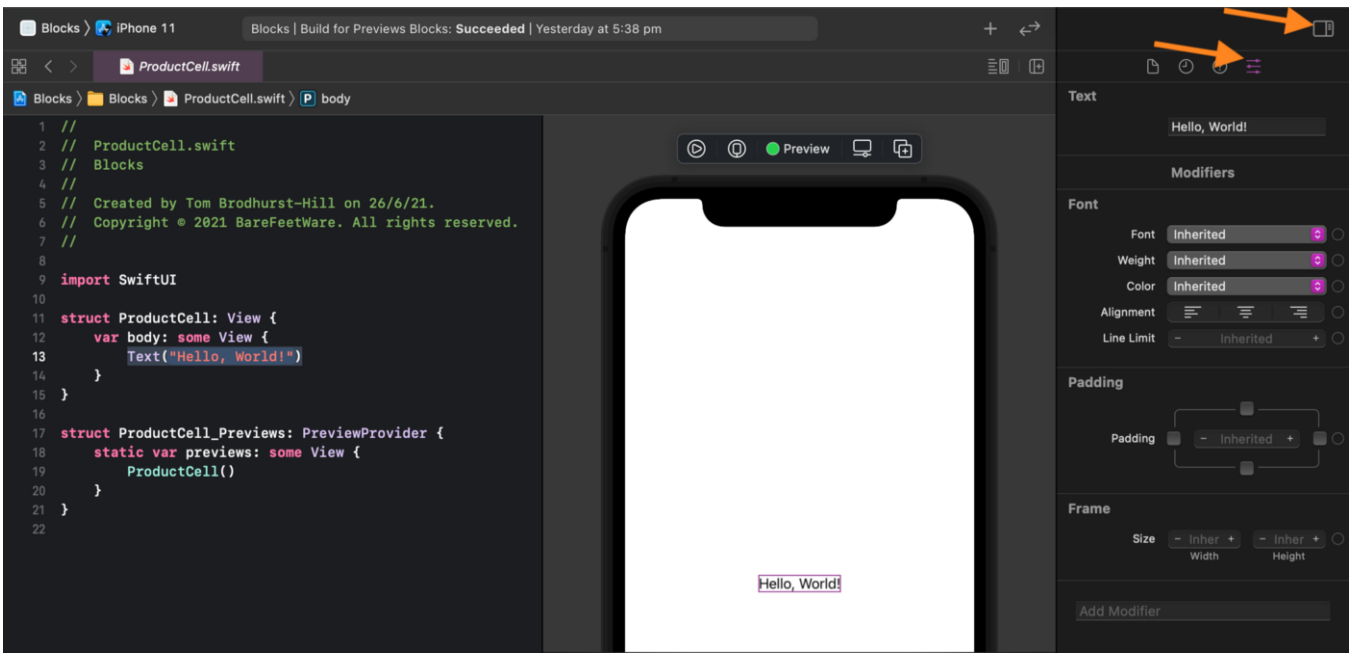
👉 In Xcode's File menu, select `New > File`. Choose the `SwiftUI View` template, and name it `ProductCell.swift`.



3. Text Attributes

Now we will style the text subview using the Attributes inspector.

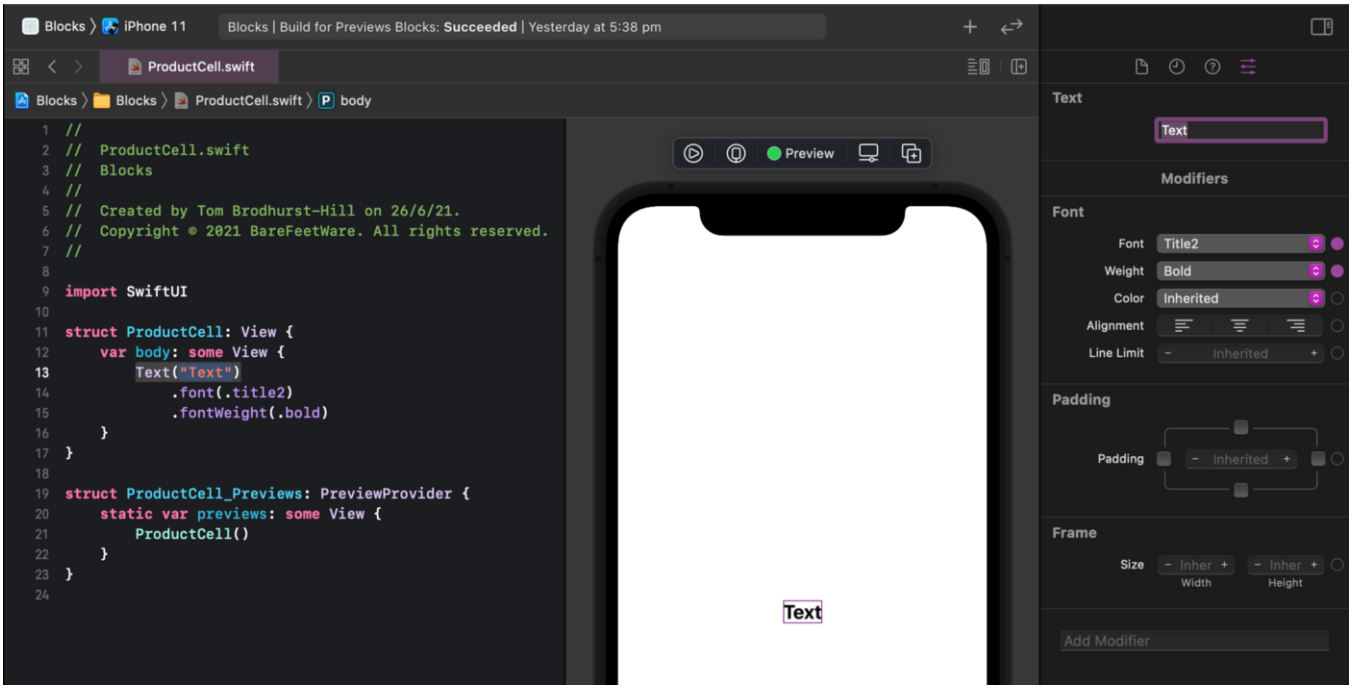
👉 Ensure that the Attributes inspector panel is visible on the right. If not, click on the `Show Inspectors` and the `Show Attributes inspector` buttons in the top right (as shown below).



👉 In the Attributes inspector, change the text to be just the word `Text`. Hit `return`. Set the `Font` to `Title 2`. Set the `Font Weight` to `Bold`.

🐞 You might need to first select `Title`, to prompt Xcode to also list `Title 2`.

👁 Check that your code, preview, and Attributes inspector appear as below.

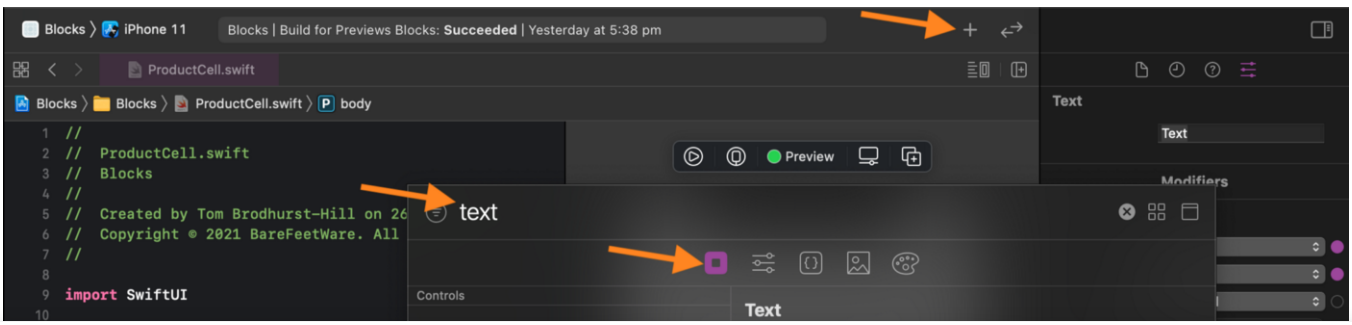


4. Add Subviews in a Vertical Stack

Let's add the other Lego blocks (subviews) to our view.

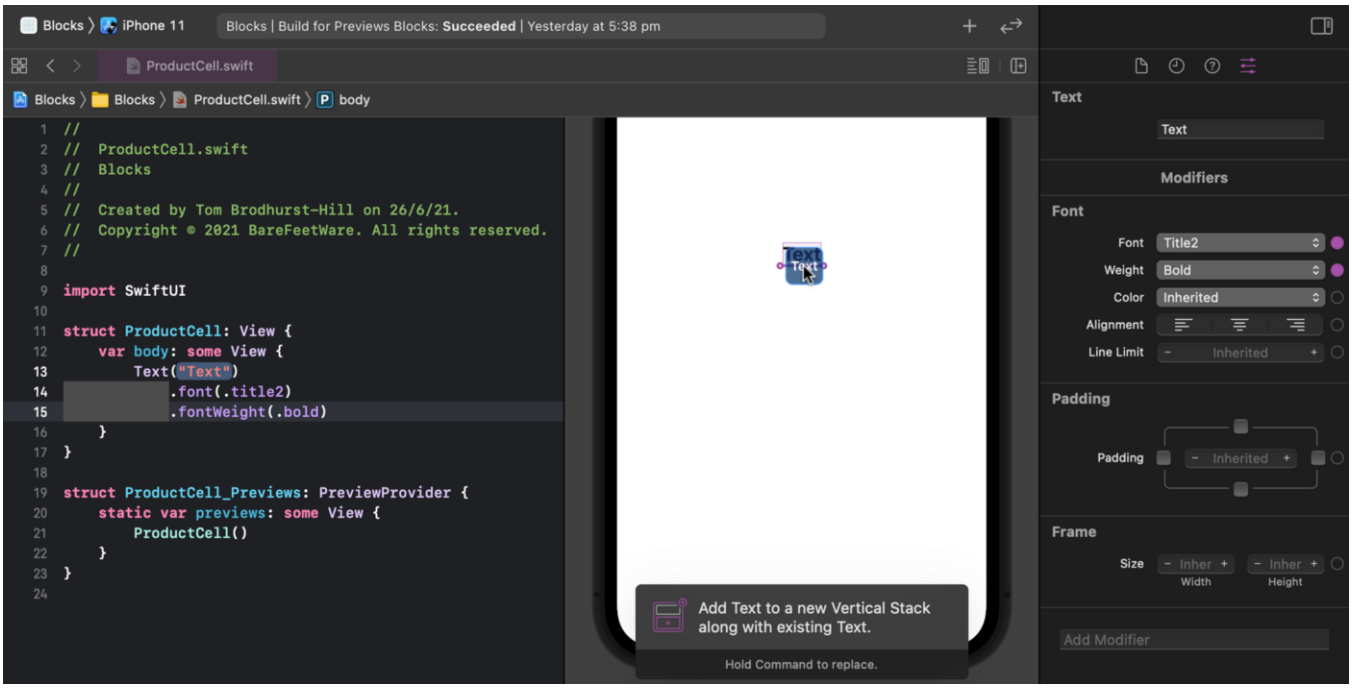
👉 Click on the Library button (the `+` symbol) above the top right of the preview pane.

👉 The Library appears. Ensure that the Views tab is selected. Type the word `text` into the search bar. Select the `Text` item in the list, as shown below.

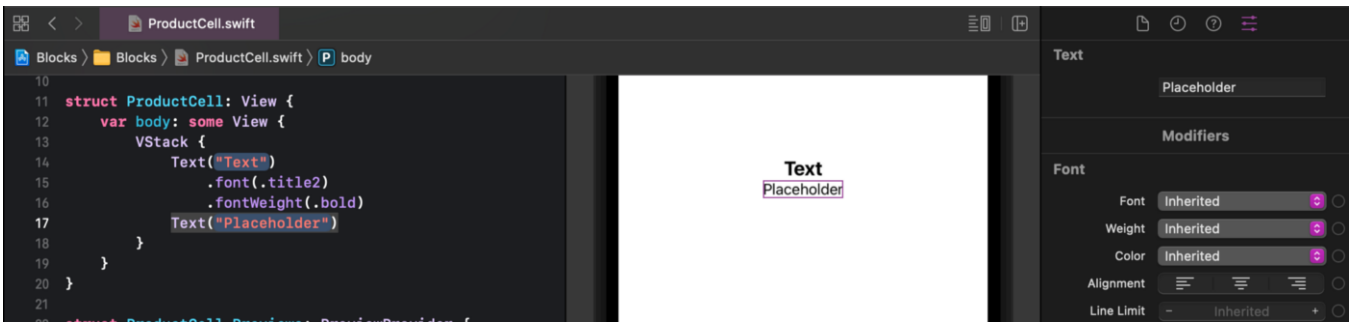


👉 Drag the `Text` item from the Library into the preview, just below the existing `Text` subview (Lego block).

👁️ As shown below, Xcode shows where the new subview will be positioned, like one Lego block below the other.

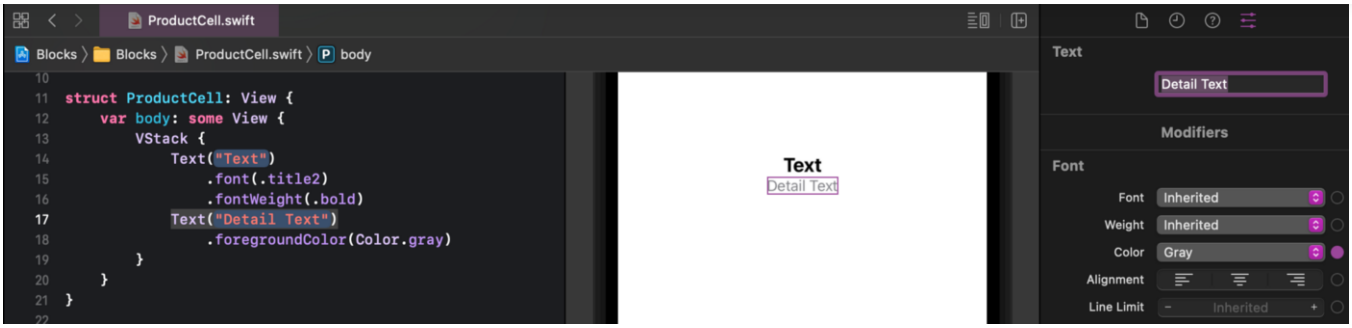


👁️ In the code, Xcode adds a `VStack` (vertical stack) containing the original `Text` and the new `Placeholder` text.

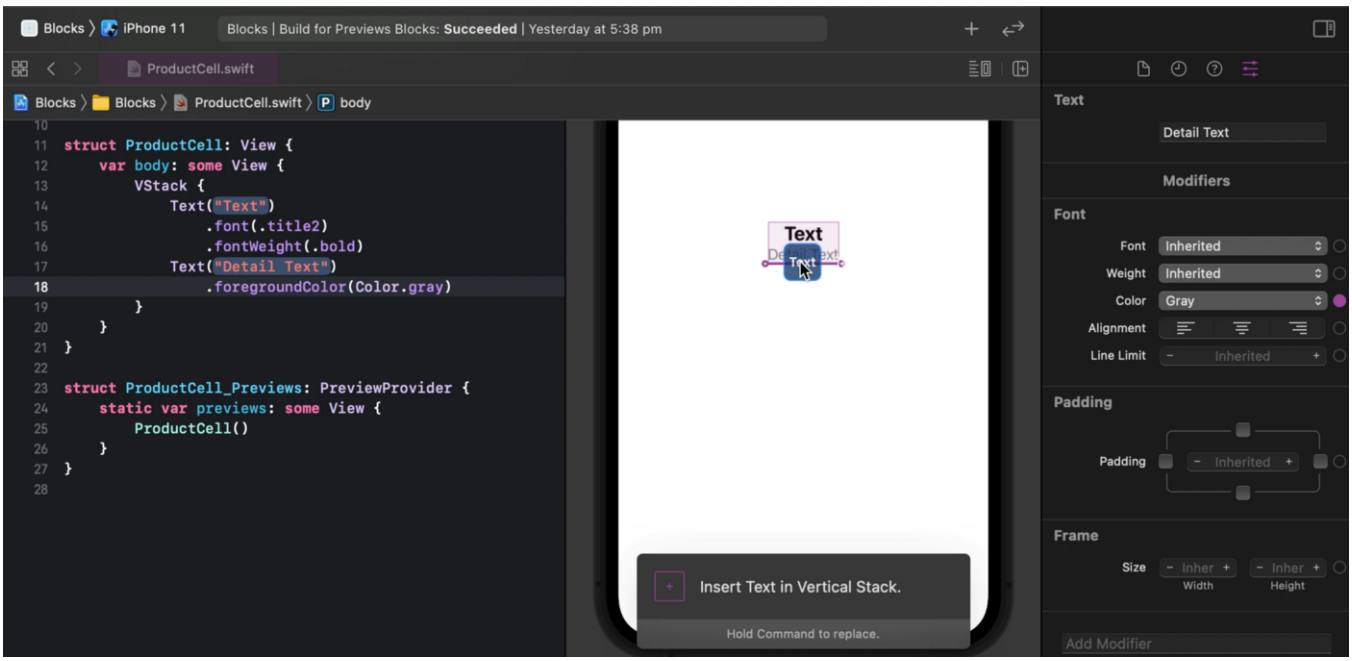


👉 In the preview, click on the new `Placeholder` text subview, so that you can see its attributes.

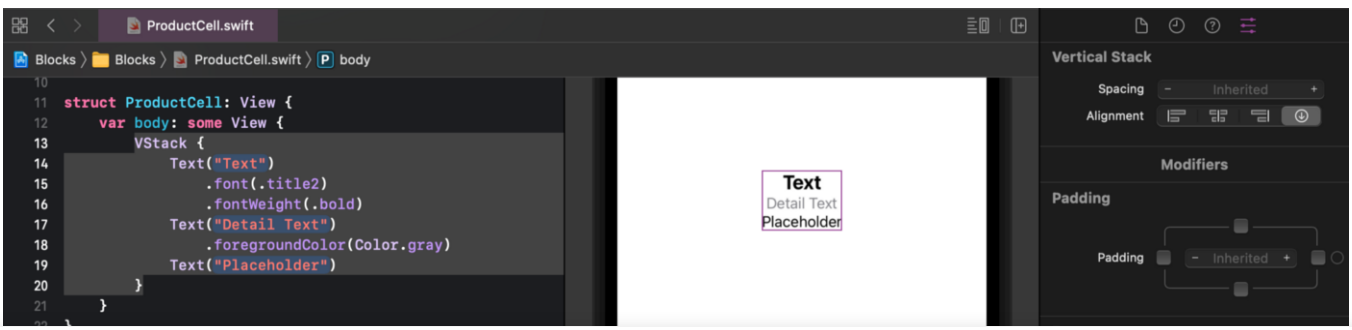
👉 In the Attributes inspector, change the new text subview to contain the words `Detail Text`. Hit `return` so Xcode applies the change. Change the `Color` to `Gray`.

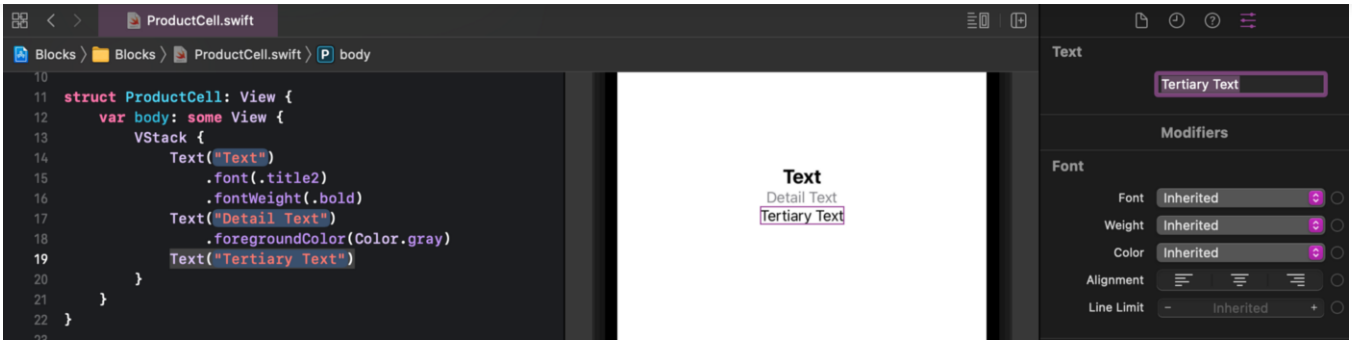


👉 Again from the Views Library, drag in a third text subview, just below the `Detail Text`. Before you release the dragged object, ensure that the caption at the bottom says `Insert Text in Vertical Stack`. If it instead says `Add Text to a new Vertical Stack...` then you need to move the pointer up a few pixels until the caption changes.



👁️ Check that your code appears as shown below, with all three `Text` subviews in just one `VStack`. Otherwise, undo and try again.



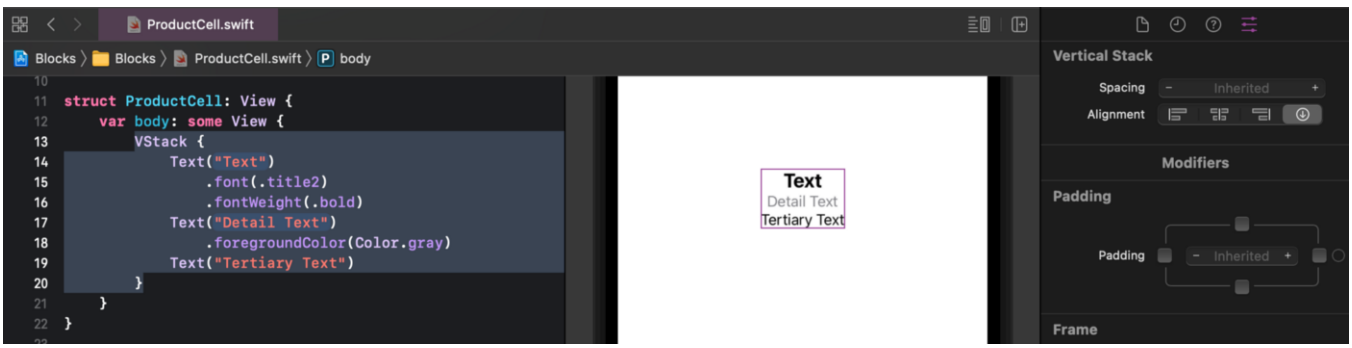


5. Vertical Stack Alignment

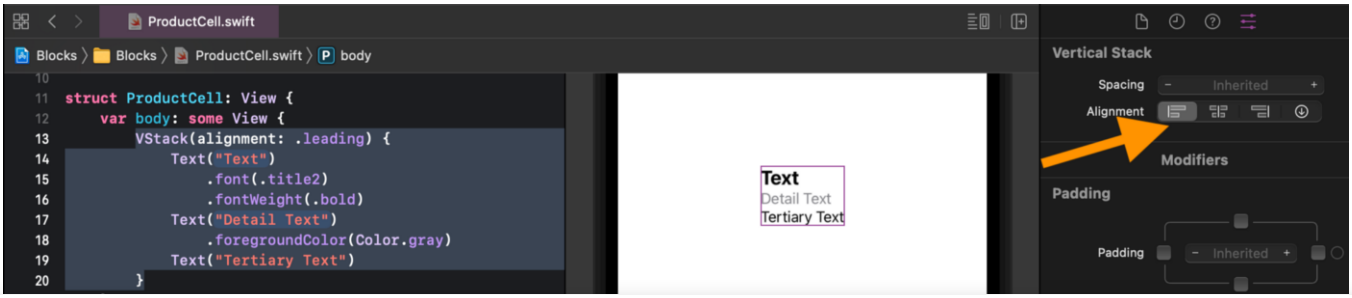
Our vertical stack contains the three text subviews, stacked like Lego® blocks. A `VStack` defaults to center aligning its subviews, but we want this `VStack` to align them against the leading edge (the left edge in English systems).

👉 In the preview, select the `VStack`, by clicking just to the left or right of the `Text` subview. Alternatively, click in the white space away from the text subviews, then once anywhere on the text subviews.

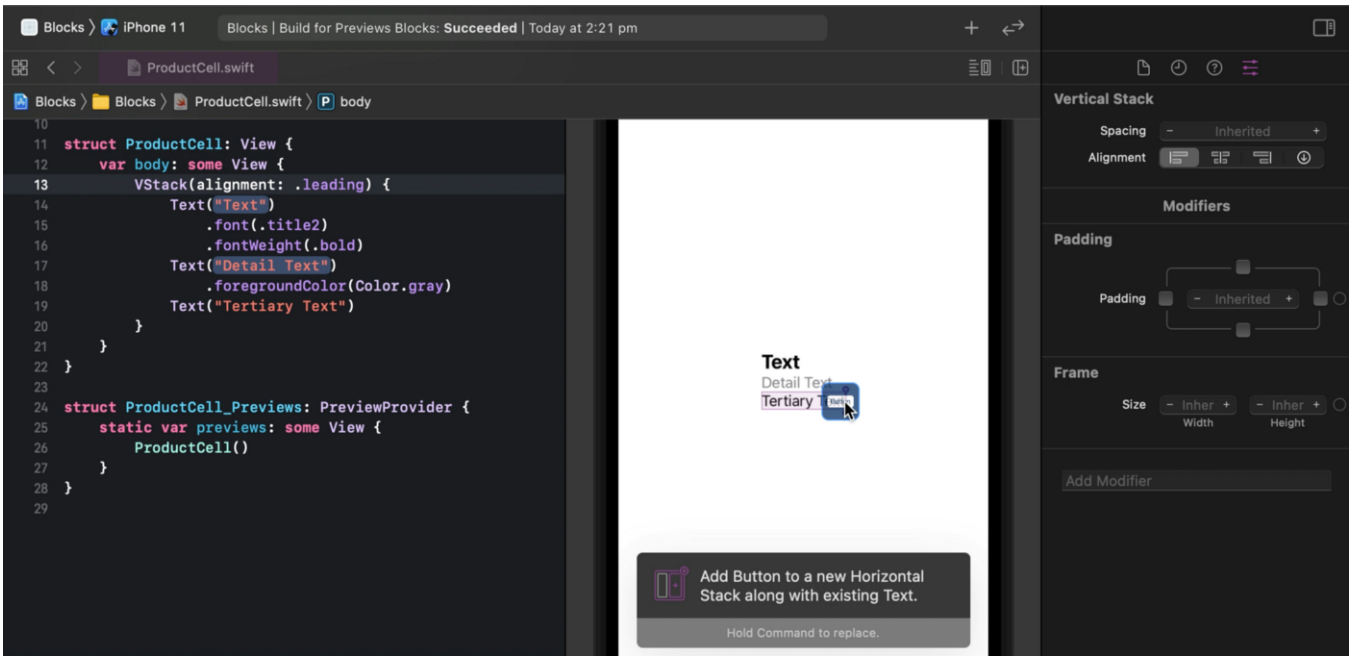
👁 Confirm that Xcode shows the `VStack` selected in the code, preview and Attributes inspector, as shown below.



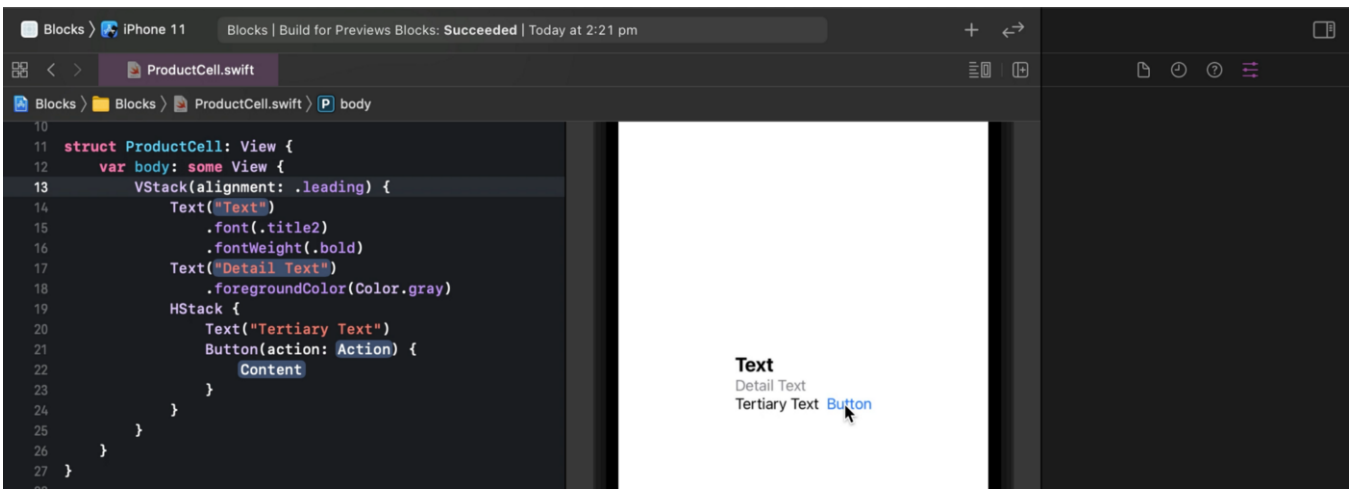
👉 In the Attributes inspector, next to `Alignment`, click on the leading (first) icon.



👉 Show the Views Library again, but this time locate the `Button` item (at the top of the list). Drag `Button` into the preview to the right of the `Tertiary Text`. Ensure that the insertion bar shows only to the right of the `Tertiary Text` and not all of the text subviews.

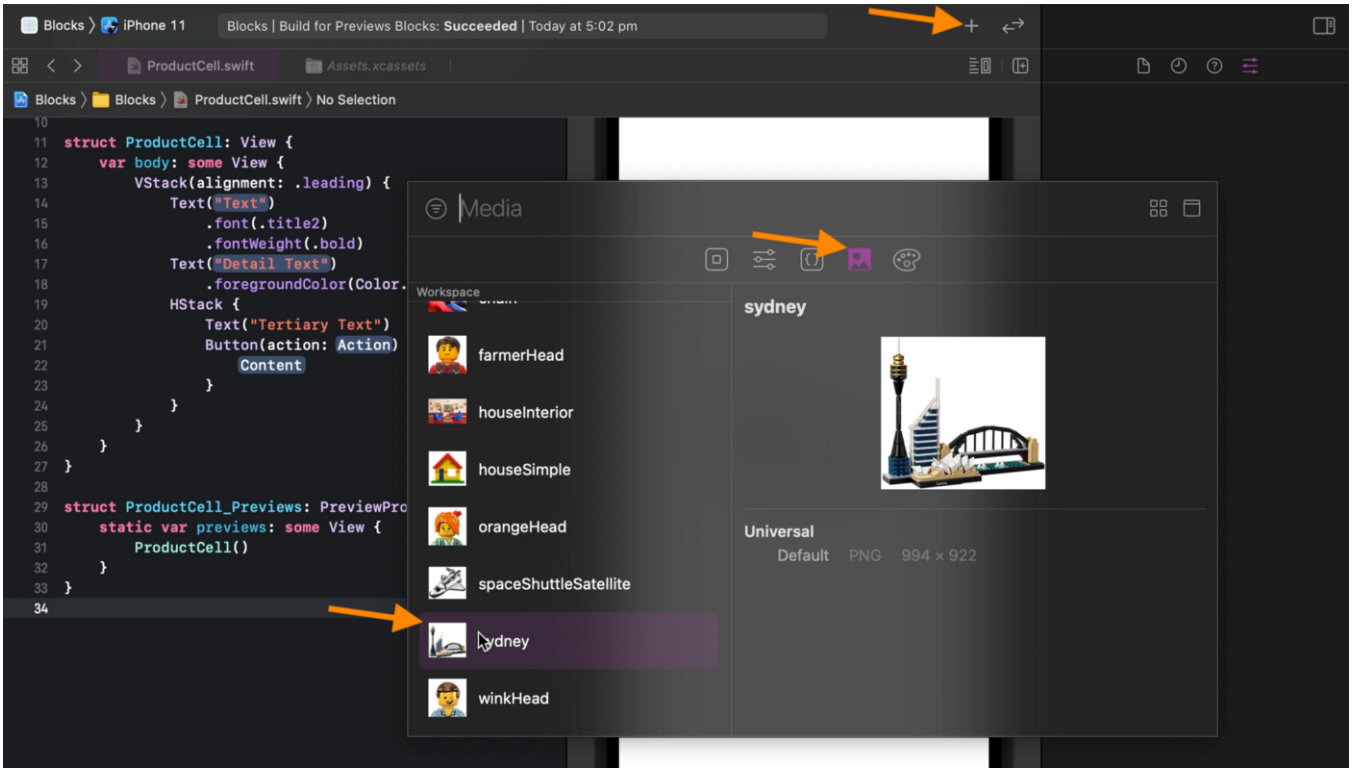


👁️ Xcode creates an `HStack` (horizontal stack), containing the `Tertiary Text` and the `Button` side by side.

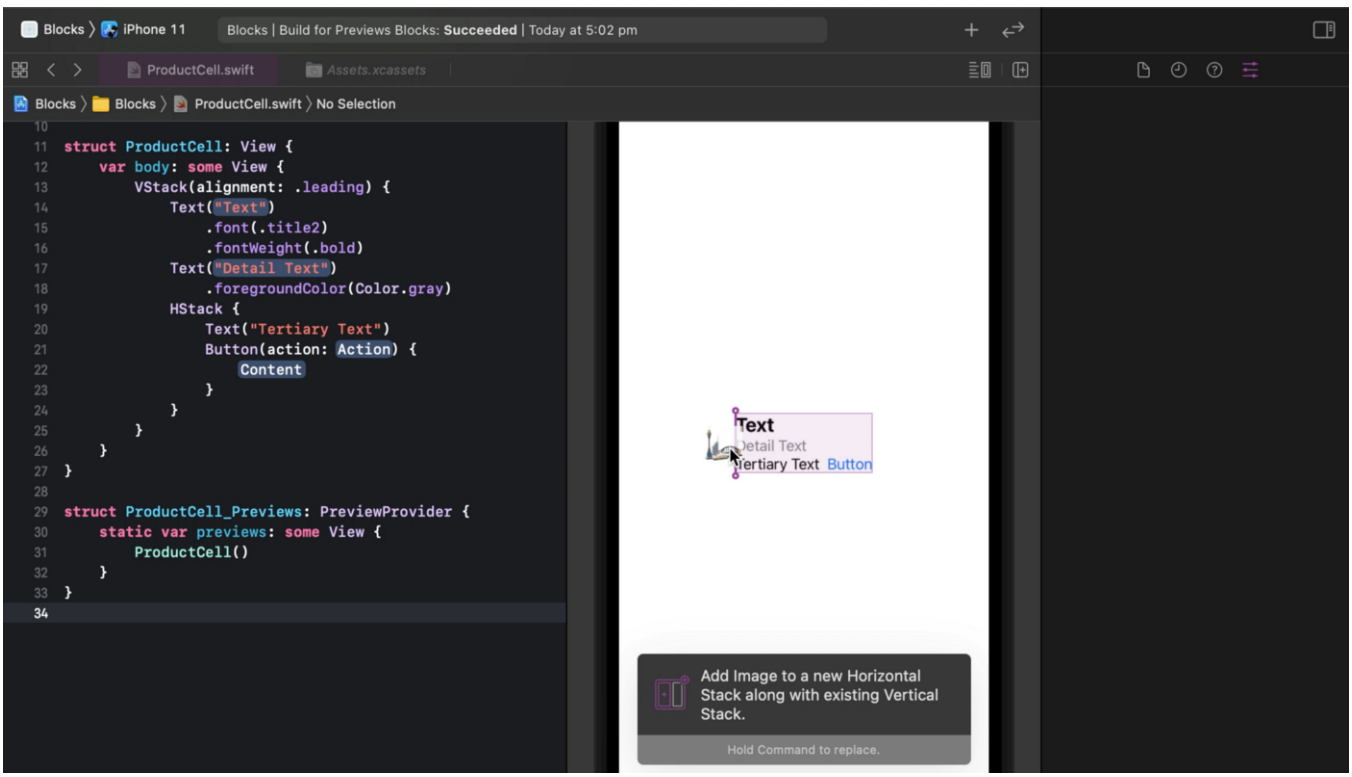


7. Add a Stretching Image in a Horizontal Stack

👉 Click the `+` button again to show the Library. Click on the `Media Library` tab to

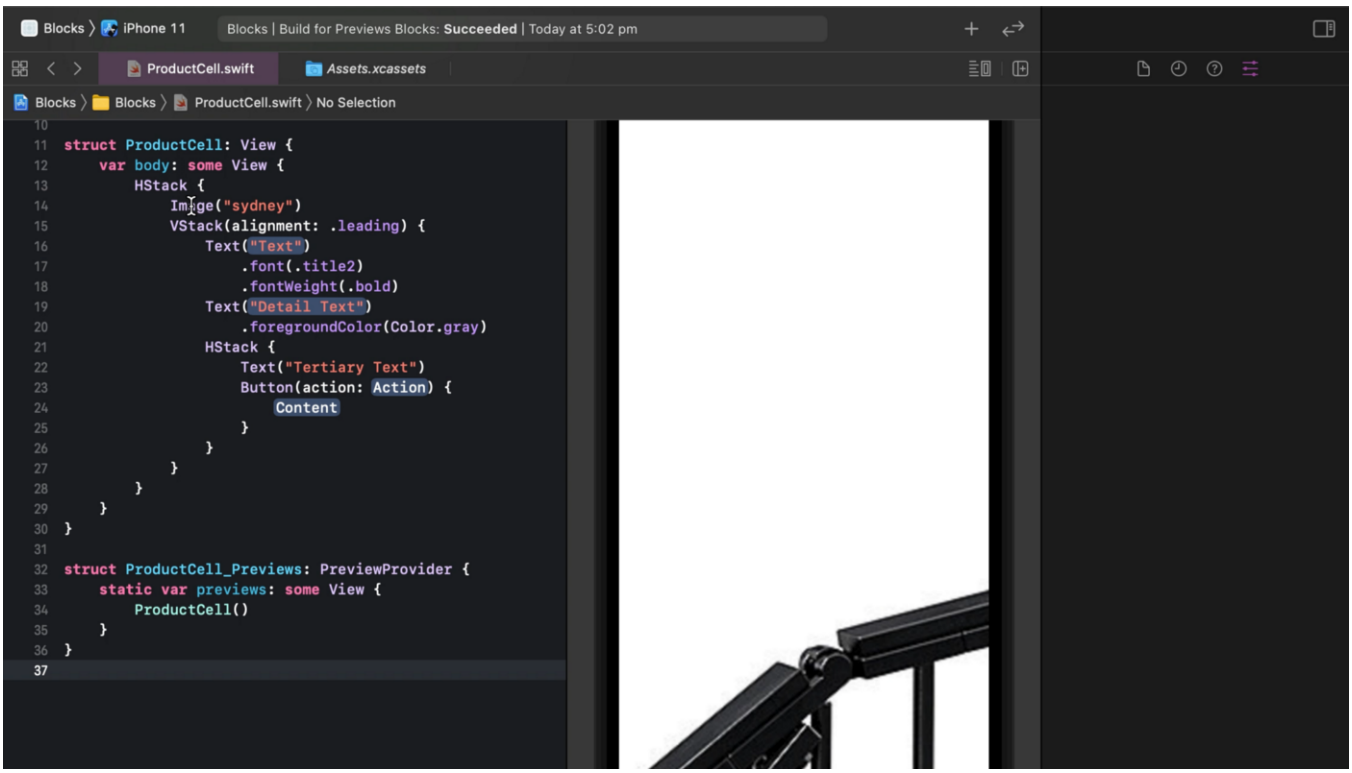


👉 Drag the `Sydney` image to the left of the text subviews. This time, ensure that the insertion bar appears next to **all** the text subviews, as shown below.



🐞 We could have instead dragged `Image` from the Views Library, but it defaults to

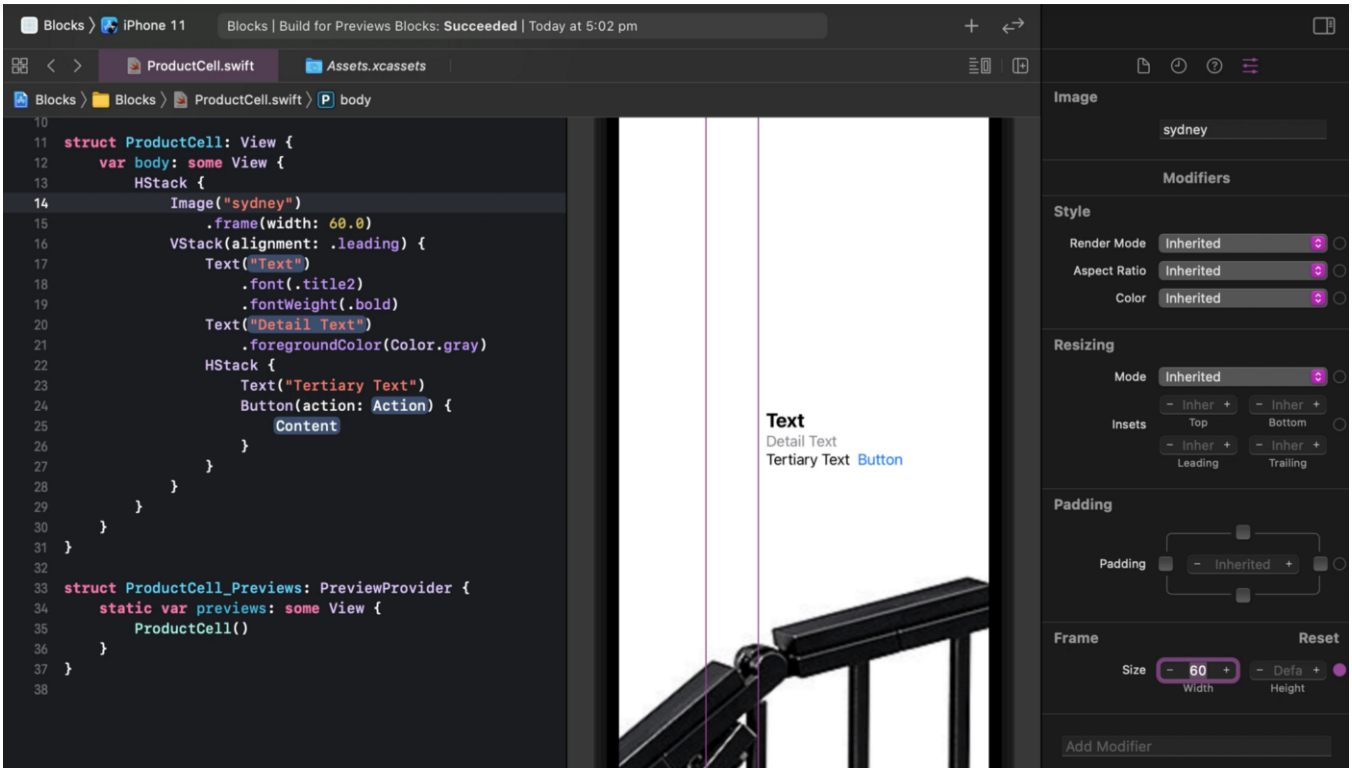
👁 The image loads but is so huge that we can barely see it on the iPhone screen. It also pushes all of the other content off-screen.



We need to restrict the image to be 60 points wide, make it stretch/shrink to fit, and keep its aspect ratio.

👉 In the code, click on the `Image("Sydney")` line of code. We can't easily click to select it in the preview itself since it is out of bounds.

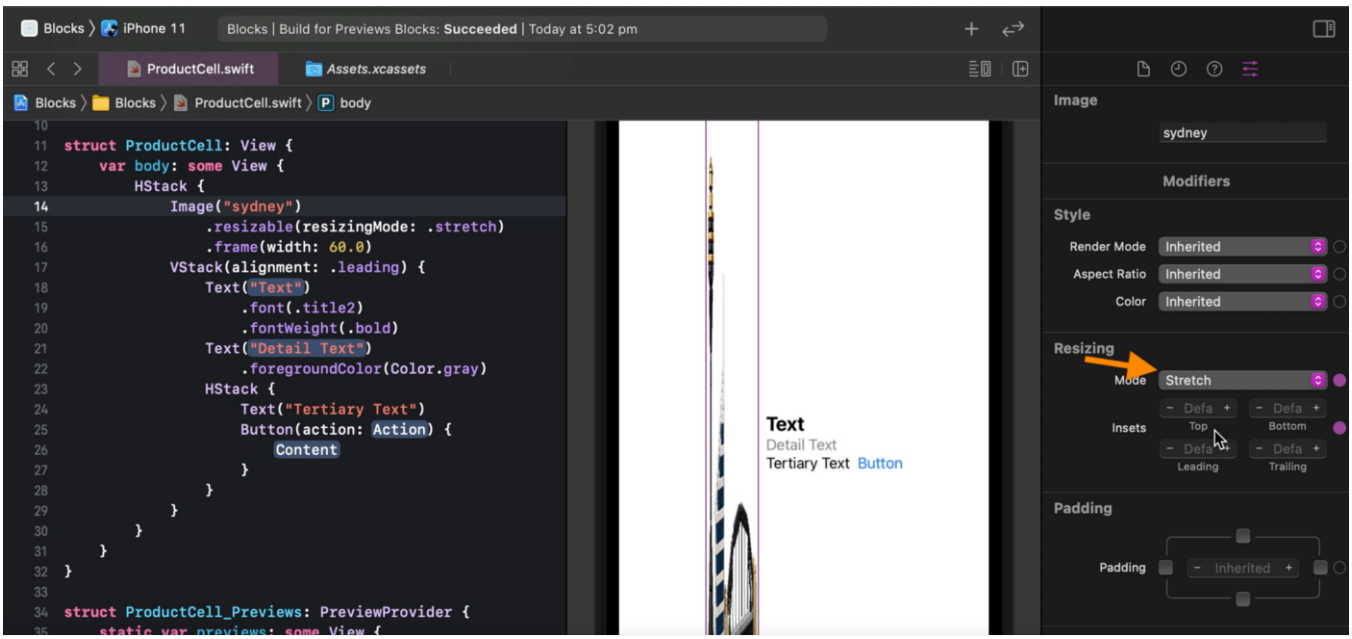
👉 In the Attributes inspector, set the `Frame Width` to `60`, and hit `return`.



👁 As you can see by the tall rectangular outline, the image is now restricted to a width of 60 points, allowing room for the rest of the content to appear again. However, the image content is drawing beyond its frame.

We need to restrict the image to shrink/stretch to only fill its frame.

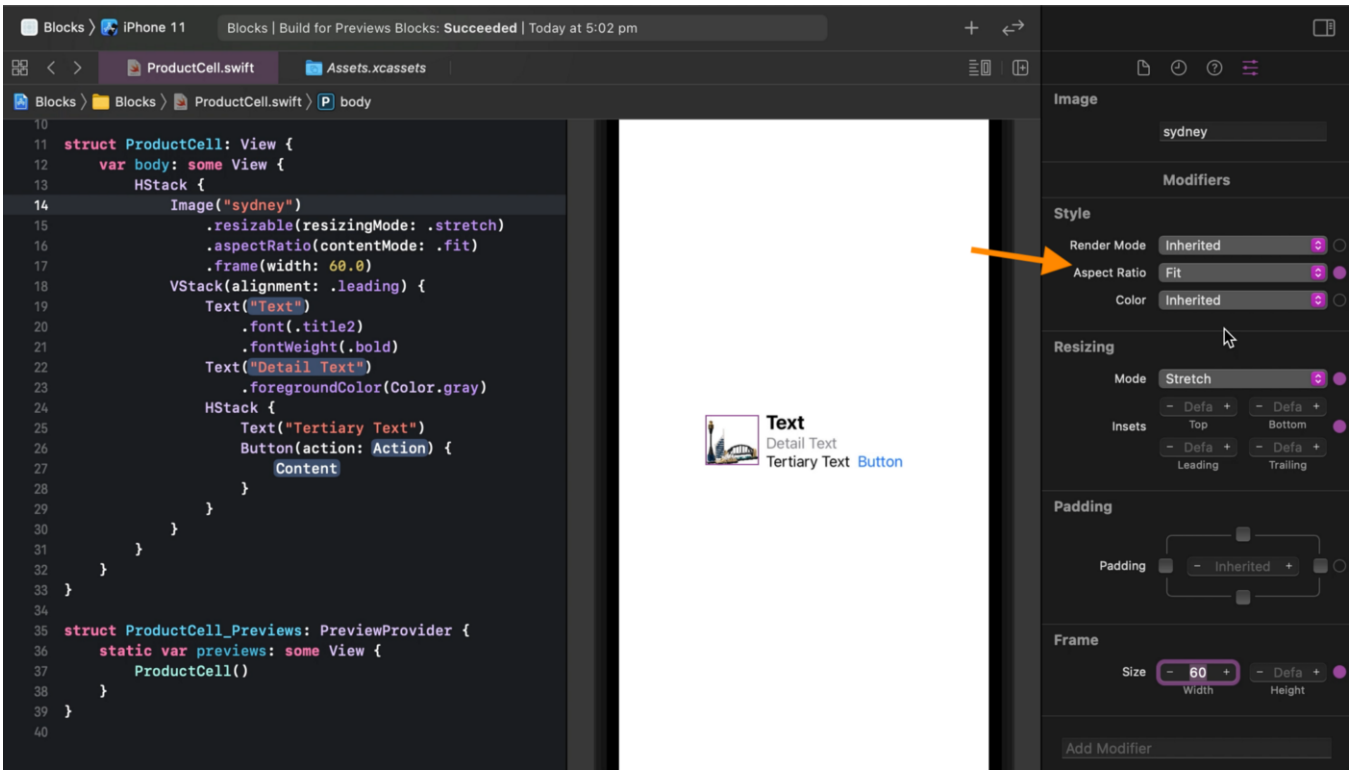
👉 In the Attributes inspector, set the `Resizing Mode` to `Stretch`



👁 The image is now stretching to fit its frame, but it is distorted — not stretching vertically by the same proportion as horizontally.

We can fix the vertical/horizontal distortion by setting the aspect ratio to fit.

👉 In the Attributes inspector, set the `Aspect Ratio` to `Fit`.



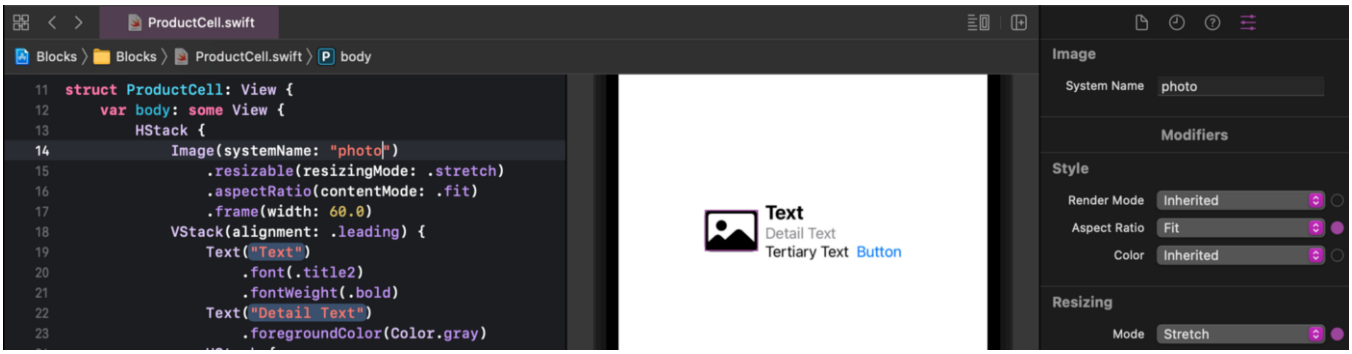
8. Image Symbol

Since the Library only facilitates adding an `Image` that uses an asset file, we used the `Sydney` image as a placeholder. However, it would be better to show something more general, like the "photo" system image. As we discussed earlier in Tutorial 6, SwiftUI provides thousands of "SF Symbol" icons, including one called "photo".

👉 In the code, after `Image`, select `("Sydney")`. Delete it and type an opening parenthesis again. Xcode shows a popup list of autocomplete options. Scroll down to the `Image(systemName:)` option and select it.

👁 Xcode enters `Image(systemName: String)`, with the `String` placeholder selected.

👉 Replace `String` with `"photo"`.



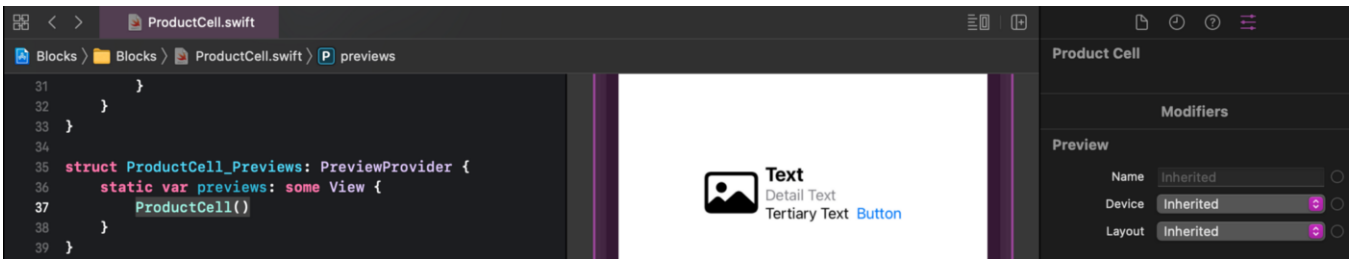
👁 Xcode shows the photo icon, as the placeholder image in our cell.

9. Preview Size That Fits

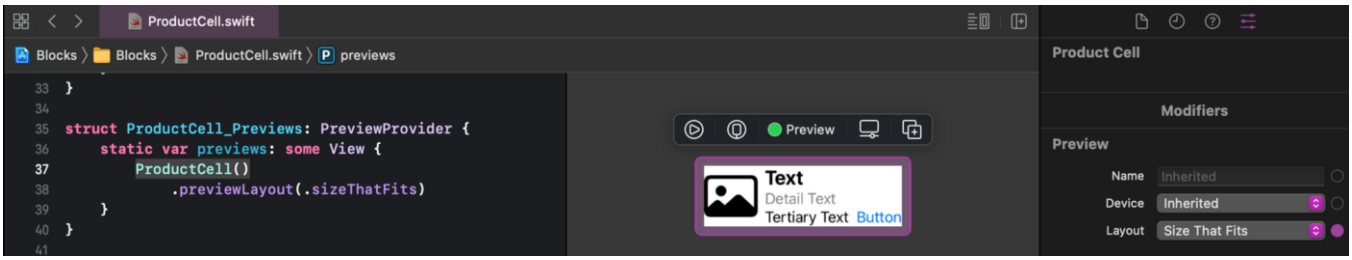
The `ProductCell` layout is looking pretty good now.

The preview is showing on a full-screen iPhone. This view is intended to be just part of

👉 Click anywhere in the white space of the preview, outside of the subviews that we've added.



👉 In the Attributes inspector, set the `Preview Layout` to `Size That Fits`.

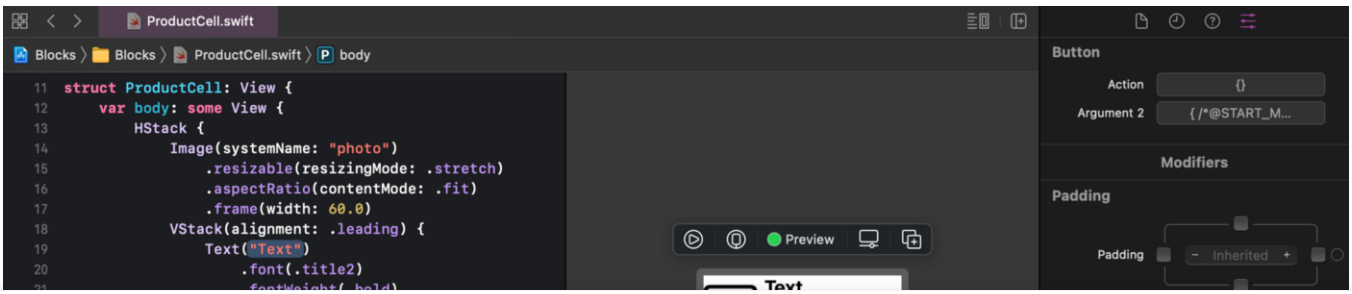


🐞 We could have set the preview layout to `Size That Fits` at the very beginning, before adding the subviews. This would have made it a bit easier to manage. Unfortunately, Xcode (up to at least version 12.5) doesn't allow us to drag subviews in to add an outer `VStack` or `HStack`, without the extra space on the outside. So, we deferred resizing the preview until after that was done.

10. Change the Button Title

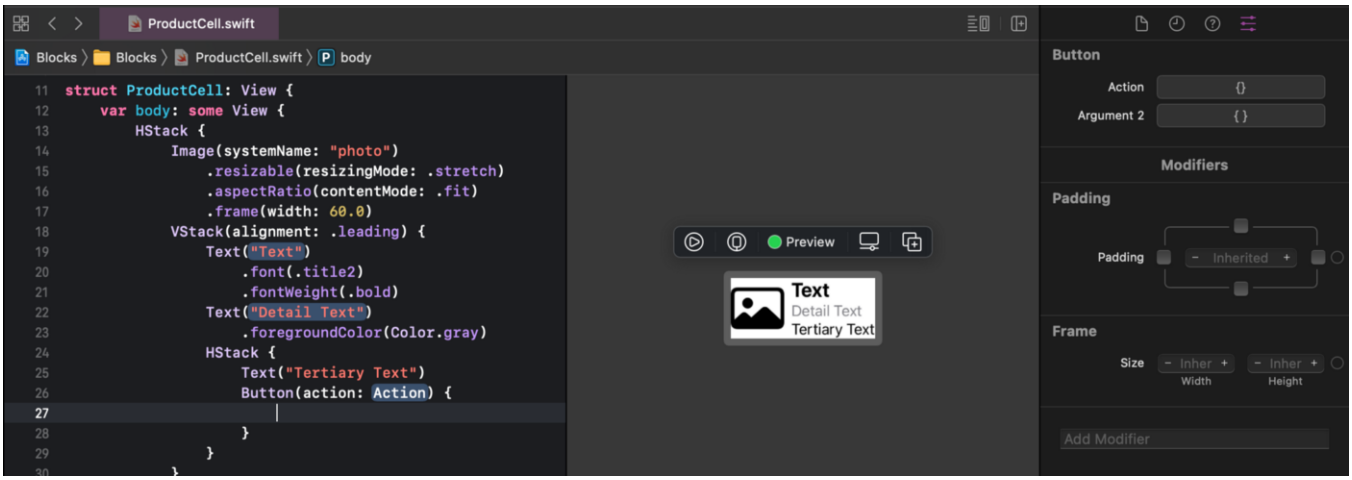
The button is currently displaying the default title `Button`. Let's change it to `Buy` to match our design.

👉 In the preview, click once in the `Button`.

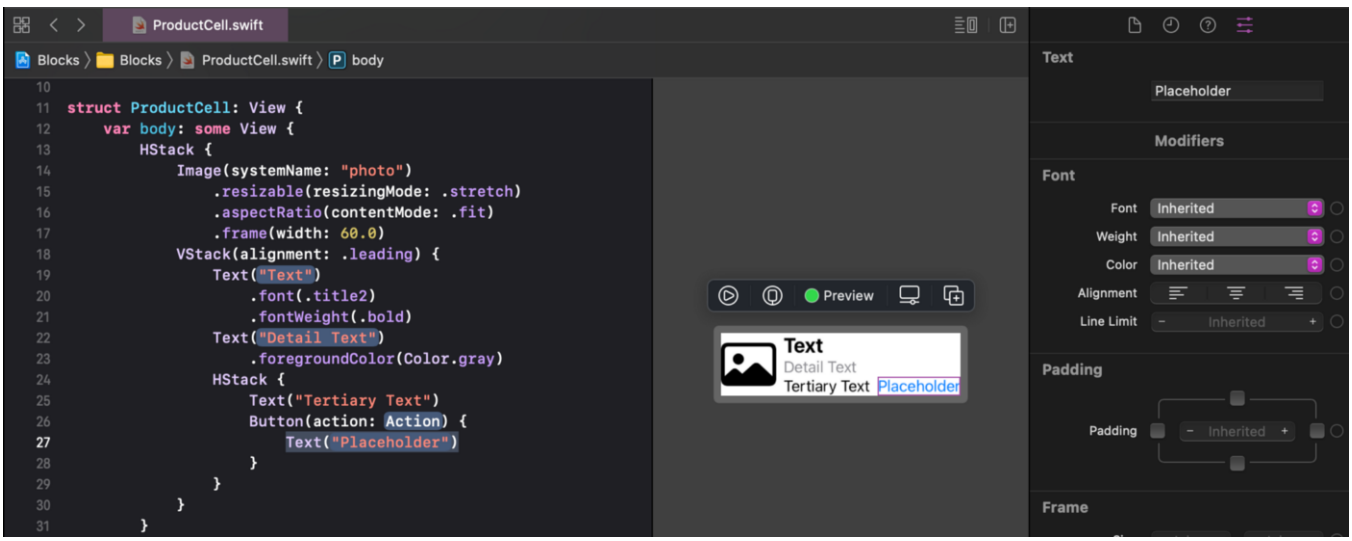


🐞 As you can see, the Attributes inspector doesn't provide any way to change the title of the button. It just shows `Argument 2` with a disabled button.

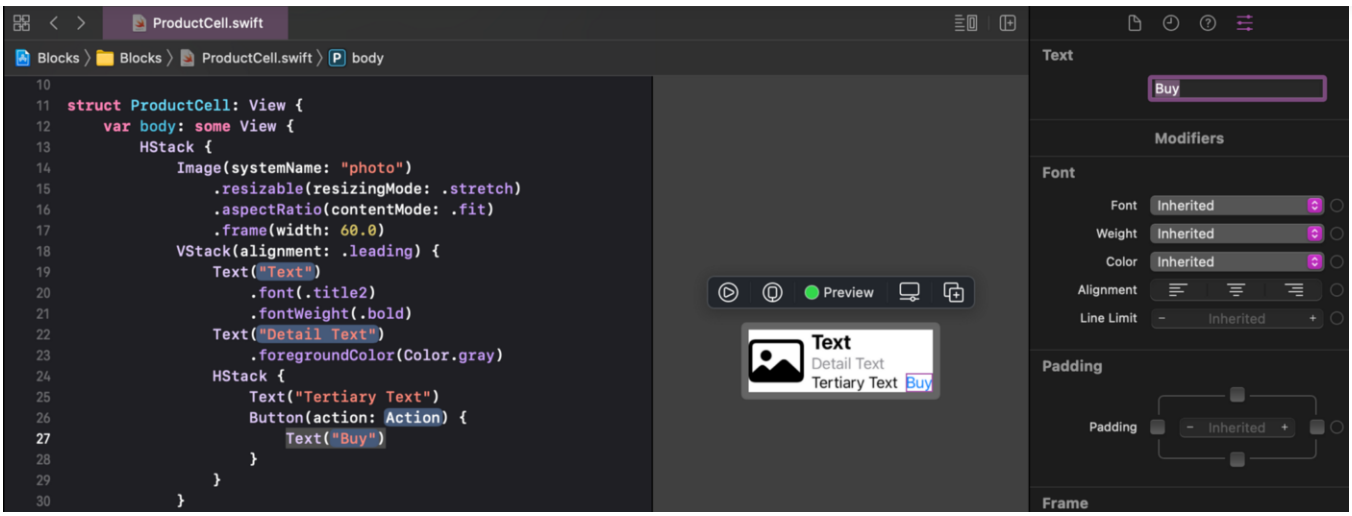
👉 In the code, click on the `Content` below the `Button` line of code. Hit `delete` on the keyboard to remove it.



👉 Click the `+` button to show the Library. From the Views Library, drag a `Text` subview into the code, where the `Content` used to be in the `Button`.



👉 In the Attributes inspector, change the `Text` word from `Placeholder` to `Buy` and hit `return`.



👁️ Check that your code and preview appear as shown above.

11. Commit Changes

As you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `ProductCell`
3. 👉 Click on the `Commit` button.

12. Next...

We have created a `ProductCell`, including subviews for text, an image and a button.

In Tutorial 15 we will create a `Product` model, some mock products and show them in a list in the app.

See upcoming tutorials in the table of contents. Follow the author to be notified of more articles. If you liked this article, clap for it (up to 50 times).

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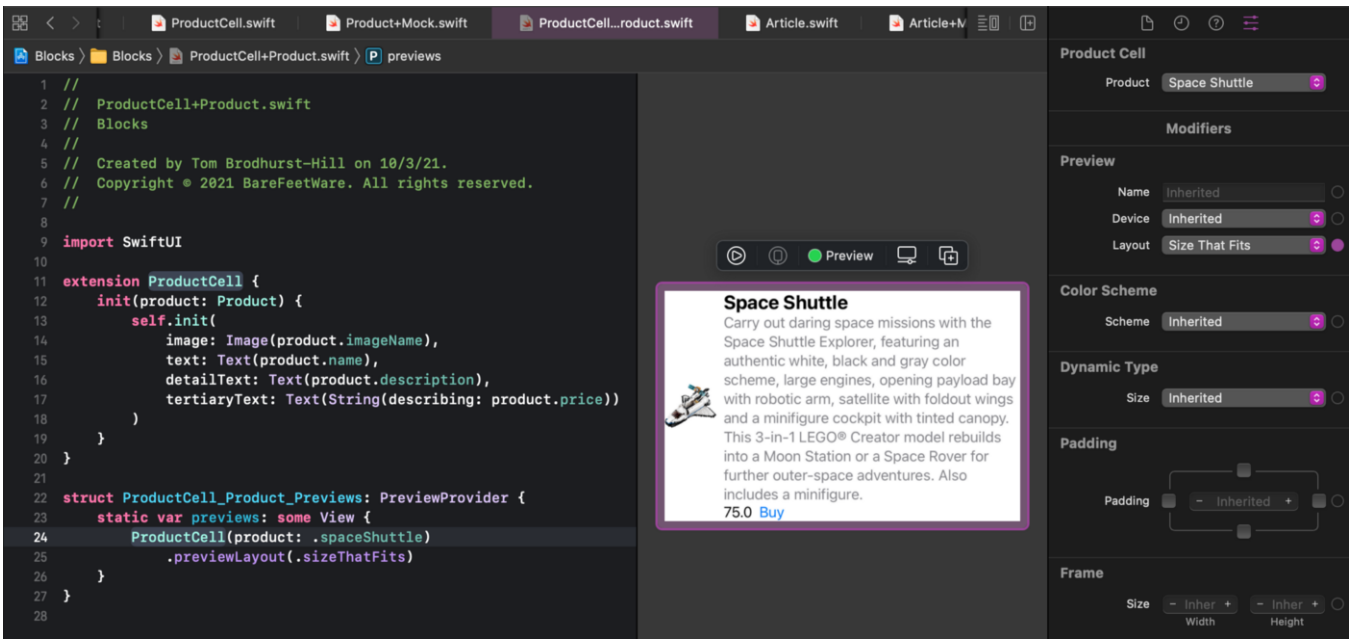
Tom Brodhurst-Hill · Following
Jul 7, 2021 · 6 min read ★

Create a Model, Mock, and List of Cells

Build an App Like Lego, with SwiftUI — Tutorial 15



1. Introduction

A properly architected app is built from the blocks of a view, a model, and some kind of controller or presenter to inject the model into the view. Keeping the responsibilities separated makes the blocks reusable and more easily understood.

SwiftUI marks the end of the need for a “view controller”, which was a hallmark of the previous UIKit way of building apps. That is thankfully true. However, we still logically need some small piece of code to inject the model properties into a view, so I will refer to it here as the “controller” or “presenter”. In reality, this controller is just a simple small extension of the view that maps each model property into a view property.

In a later tutorial, we will also introduce the “view model”.

In the previous Tutorial 14, we created a `ProductCell` view. In this Tutorial 15, we will create a `Product` model and mock values to be shown in that view.

This is similar to when we created the `Article` model for the `NewsCell`. Refer back to the earlier tutorials if anything here seems unfamiliar.

We will pick up here where the last tutorial left off. Ideally, you have completed the previous tutorials in this series. Or, you can download the prepared project, ready to start this tutorial.

2. Extract Properties of a View

In Xcode, select the `ProductCell.swift` file that we created in the previous Tutorial 14.

👉 Insert the following properties before the `var body:`

👁 Your code should look like this:

```
11  struct ProductCell: View {
12
13      let image: Image
14      let text: Text
15      let detailText: Text
16      let tertiaryText: Text
17
18      var body: some View {
19          HStack {
20              Image(systemName: "photo")
21                  .resizable(resizingMode: .stretch)
```

👁 Xcode now complains in the `PreviewProvider` code (at the bottom of the file) that the `ProductCell()` instance is `missing arguments`.

```
41  struct ProductCell_Previews: PreviewProvider {
42      static var previews: some View {
43          ProductCell()  Missing arguments for parameters 'image', 'text', 'detailText', 'tertiaryText' in call
44              .previewLayout(.sizeThatFits)
45      }
46  }
```

👉 Click on the stop icon in the error pop over to expand the detail. Click the `Fix` button.

```
41  struct ProductCell_Previews: PreviewProvider {
42      static var previews: some View {
43          ProductCell()
44              .previewLayout
45      }
46  }
47
```

Missing arguments for parameters 'image', 'text', 'detailText', 'tertiaryText' in call

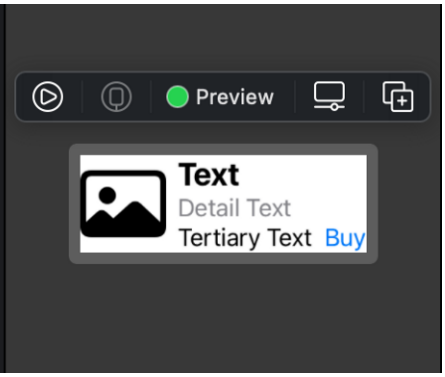
Insert 'image: <#Image#>, text: <#Text#>, detailText: <#Text#>, tertiaryText: <#Text#>' Fix

`Structure > Re-Indent` to tidy up the indenting, if needed.

```
41 struct ProductCell_Previews: PreviewProvider {
42     static var previews: some View {
43         ProductCell(
44             image: Image,      Cannot convert value of type 'Text' to expected argument type 'Image'
45             text: Text,
46             detailText: Text,
47             tertiaryText: Text
48         )
49         .previewLayout(.sizeThatFits)
50     }
51 }
```

👉 Replace each of the placeholders (`Image` and `Text`) in the `PreviewProvider` code with the copied placeholders from the `var body` . For example, replace `Image` with `Image(systemName: "photo")` .

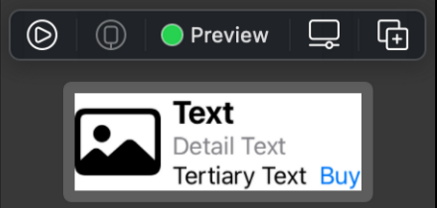
```
41 struct ProductCell_Previews: PreviewProvider {
42     static var previews: some View {
43         ProductCell(
44             image: Image(systemName: "photo"),
45             text: Text("Text"),
46             detailText: Text("Detail Text"),
47             tertiaryText: Text("Tertiary Text")
48         )
49         .previewLayout(.sizeThatFits)
50     }
51 }
```



👁 Check that the code compiles without error and that the preview displays correctly.

👉 Replace each of the placeholder `Image` and `Text` views in the `var body` with the corresponding new property names. For example, replace `Image(systemName: "photo")` with `image` .

```swift
//
//  ProductCell.swift
//  Blocks
//
//  Created by Tom Brodhurst-Hill on 10/3/21.
//  Copyright © 2021 BareFeetWare. All rights reserved.
//

import SwiftUI

struct ProductCell: View {

    let image: Image
    let text: Text
    let detailText: Text
    let tertiaryText: Text

    var body: some View {
        HStack {
            image
                .resizable(resizingMode: .stretch)
                .aspectRatio(contentMode: .fit)
                .frame(width: 60.0)
            VStack(alignment: .leading) {
                text
                    .font(.title2)
                    .fontWeight(.bold)
                detailText
                    .foregroundColor(Color.gray)
                HStack {
                    tertiaryText
                    Button(action: Action) {
                        Text("Buy")
                    }
                }
            }
        }
    }
}

struct ProductCell_Previews: PreviewProvider {
    static var previews: some View {
        ProductCell(
            image: Image(systemName: "photo"),
            text: Text("Text"),
            detailText: Text("Detail Text"),
            tertiaryText: Text("Tertiary Text")
        )
        .previewLayout(.sizeThatFits)
    }
}
```



3. Product Model

👉 Create a new file, using the `Swift File` template. Name it `Product.swift`.

👉 Add the `Product` structure code below:

👁️ Confirm that your code looks like this, with no errors:

Blocks 〉 Blocks 〉 Product.swift 〉 No Selection

```swift
//
//  Product.swift
//  Blocks
//
//  Created by Tom Brodhurst-Hill on 10/3/21.
//  Copyright © 2021 BareFeetWare. All rights reserved.
//

import Foundation

struct Product: Identifiable {
    let id: Int
    let name: String
    let description: String
    let price: Double
    let imageName: String
}

```

4. Product Mocks

👉 Create a new `Swift File` named `Product+Mock.swift`.

👉 Add the extension code from the following:

👁 Check that the code compiles without any errors, and looks like this:

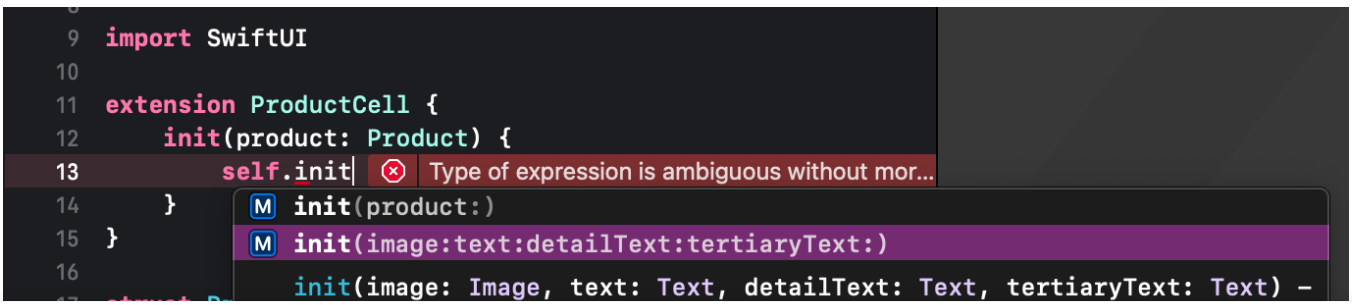
Blocks 〉 Blocks 〉 Product+Mock.swift 〉 No Selection

```swift
//
//  Product+Mock.swift
//  Blocks
//
//  Created by Tom Brodhurst-Hill on 10/3/21.
//  Copyright © 2021 BareFeetWare. All rights reserved.
//

import Foundation

extension Product {

    static let sydney: Self = .init(
        id: 1,
        name: "Sydney Opera House & Harbour Bridge",
        description: "Capture the architectural essence and splendor of Sydney with this magnificent set that brings together the iconic Sydney Opera House™, Sydney Harbour Bridge, Sydney Tower and Deutsche Bank Place, in an inspirational skyline setting. Each individual LEGO® structure provides a unique and rewarding building experience with true-to-life color and relative scale depiction. Sydney's sparkling harbor is represented in the tiled baseplate, adding an extra dimension and feel of authenticity to this detailed recreation of one of the world's most glamorous cities.",
        price: 98.0,
        imageName: "sydney"
    )

    static let spaceShuttle: Self = .init(
        id: 2,
        name: "Space Shuttle",
        description: "Carry out daring space missions with the Space Shuttle Explorer, featuring an authentic white, black and gray color scheme, large engines, opening payload bay with robotic arm, satellite with foldout wings and a minifigure cockpit with tinted canopy. This 3-in-1 LEGO® Creator model rebuilds into a Moon Station or a Space Rover for further outer-space adventures. Also includes a minifigure.",
        price: 75.0,
        imageName: "spaceShuttleSatellite"
    )

}

extension Product {
    static let mocks: [Self] = [.sydney, .spaceShuttle]
}

```

5. Product Presenter

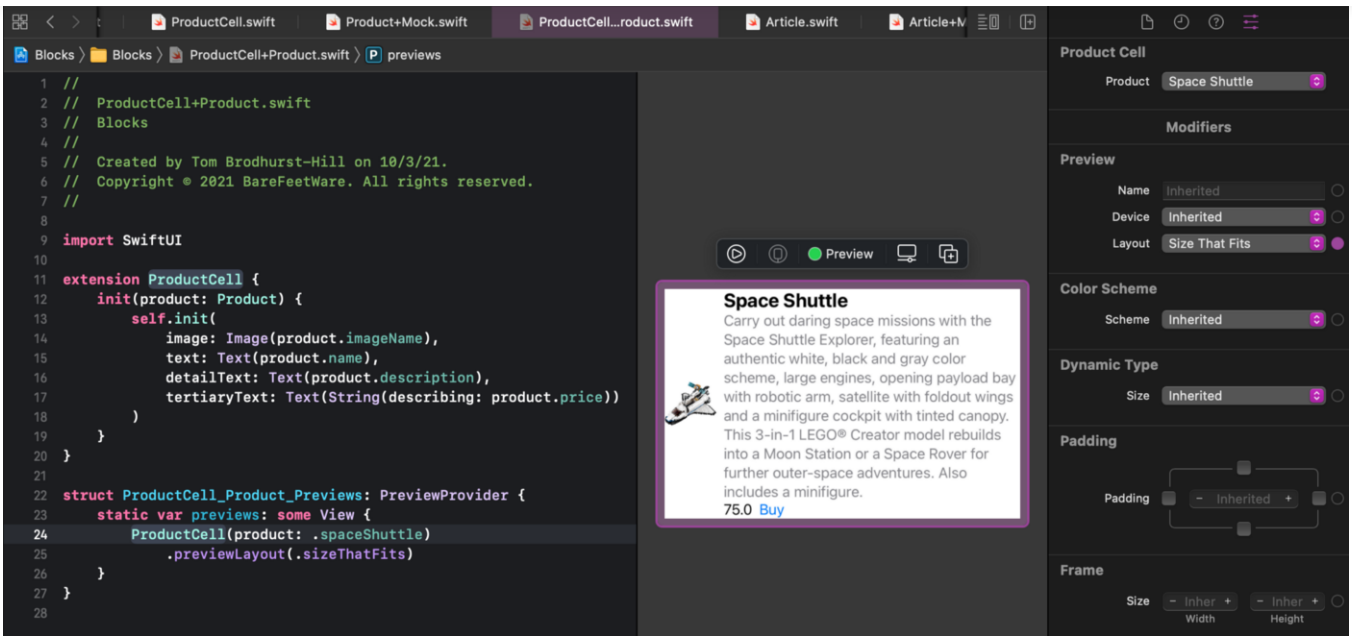
Now we have a `Product` model and a `ProductCell` view. We need to define how a `Product`'s properties are presented in a `ProductCell`.

👁 As you're typing, Xcode should offer autocompletions to make it easier, such as this one after typing `init(` :



👉 In the `var previews`, replace the `ProductCell_Product()` template code with:

👁️ Confirm that the code compiles and the preview shows as below:



6. List of ProductCells

We're nearly there. We have a `Product` model, with a `mocks` array of sample data. We have a `ProductCell` view and a way to present a `Product` model in the cell.

Now we just need a scene to display the products in a list.

In the `ContentView.swift` file, we already have a placeholder scene for the products, complete with a navigation view. We just need to replace the placeholder `Text("Tab Content 2")` with a list of products.

👉 Switch to the `ContentView.swift` file.

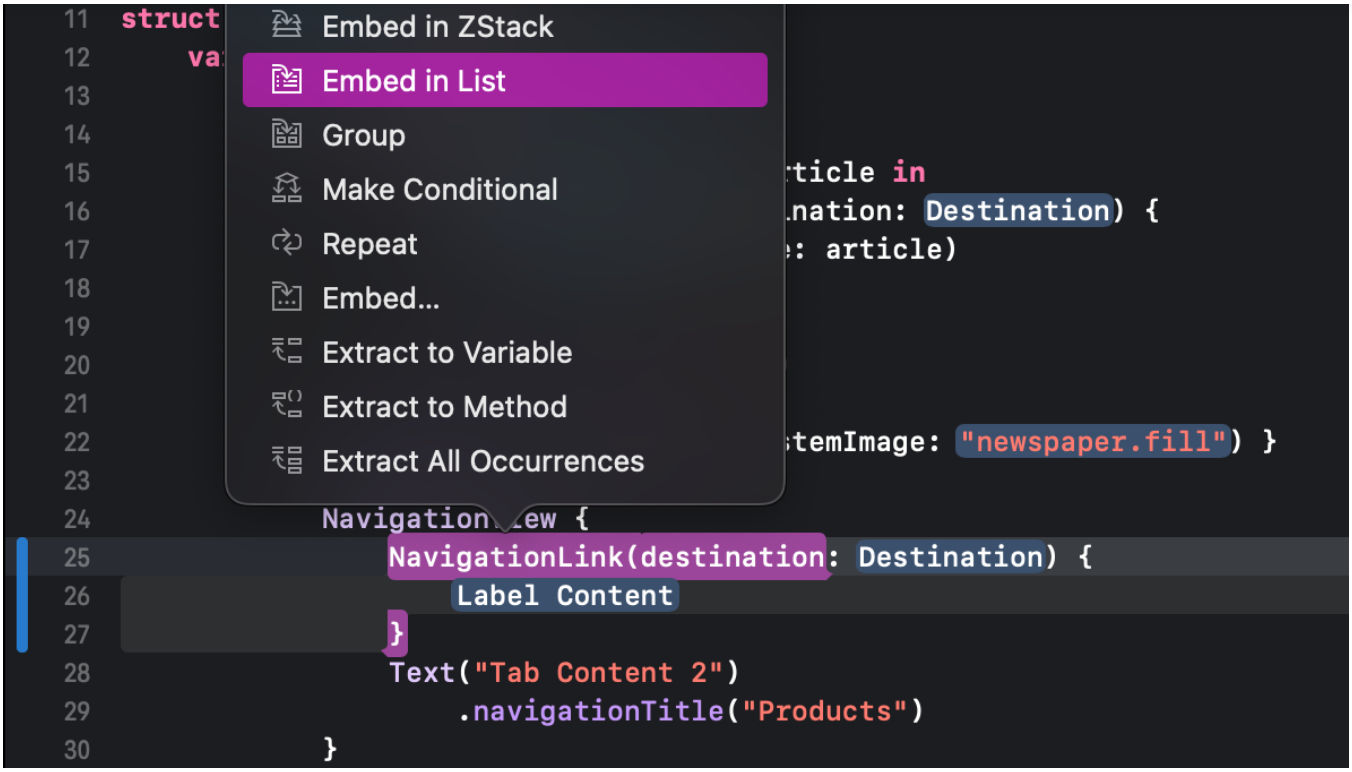
👉 From the Views Library, drag a `Navigation Link` to insert a line above the `Text("Tab Content 2")` line of code.

```
11  struct ContentView: View {
12      var body: some View {
13          TabView(selection: Selection) {
14              NavigationView {
15                  List(Article.mocks) { article in
16                      NavigationLink(destination: Destination) {
17                          NewsCell(article: article)
18                      }
19                  }
20                  .navigationTitle("News")
21              }
22              .tabItem { Label("News", systemImage: "newspaper.fill") }
23              .tag(1)
24              NavigationView {
25                  NavigationLink(destination: Destination) {
26                      Label Content
27                  }
28                  Text("Tab Content 2")
29                      .navigationTitle("Products")
30              }
31              .tabItem { Label("Products", systemImage: "cart.fill") }
32              .tag(2)
```

👉 Delete the `Text("Tab Content 2")` line of code.

```
24              NavigationView {
25                  NavigationLink(destination: Destination) {
26                      Label Content
27                  }
28                      .navigationTitle("Products")
29              }
30              .tabItem { Label("Products", systemImage: "cart.fill") }
31              .tag(2)
```

👉 Command click on the `NavigationLink` code. In the Actions popup menu, select `Embed in List`.



👁 Xcode wraps the `NavigationLink` in a `List`, as shown below.

```
NavigationView {
    List(0 ..< 5) { item in
        NavigationLink(destination: Destination) {
            Label Content
        }
        .navigationTitle("Products")
    }
}
```

👉 Move the `navigationTitle` line of code down one line, so it is again just inside the `NavigationView`'s closing `}`.

```
NavigationView {
    List(0 ..< 5) { item in
        NavigationLink(destination: Destination) {
            Label Content
        }
    }
    .navigationTitle("Products")
}
```

```
24              NavigationView {
25                  List(Product.mocks) { product in
26                      NavigationLink(destination: Destination) {
27                          Label Content
28                      }
29                  }
30                  .navigationTitle("Products")
31              }
```

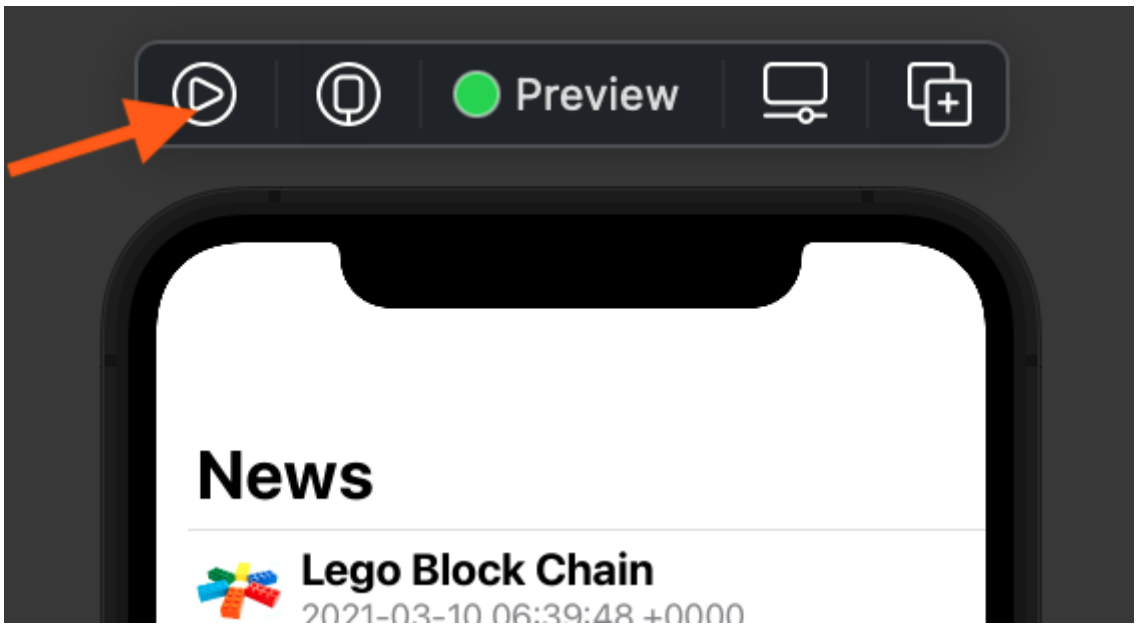
👉 Replace the placeholder `Label Content` with the code below. Use Xcode's autocompletion to reduce the need to type on the keyboard.

```
24          NavigationView {
25              List(Product.mocks) { product in
26                  NavigationLink(destination: Destination) {
27                      ProductCell(product: product)
28                  }
29              }
30              .navigationTitle("Products")
31          }
```

👉 Build and ensure there are no errors.

7. Live Preview

👉 In the preview, click the live preview button in the top left.

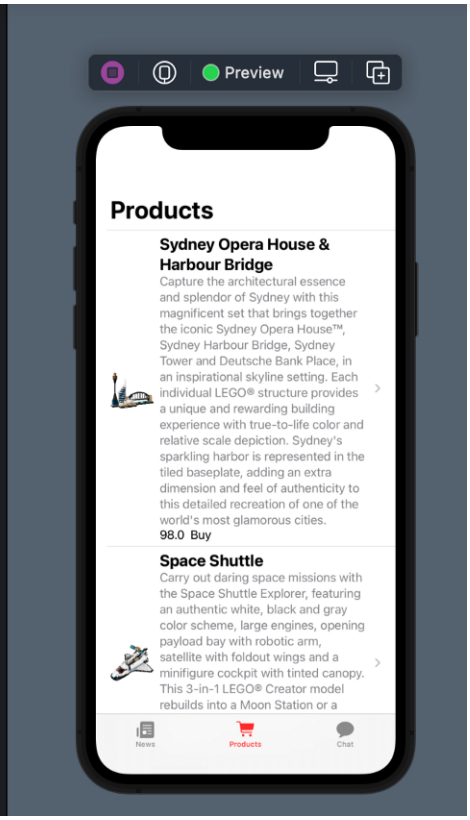


👁️ After a few seconds, the preview is live, so we can test it.

👉 Click on the `Products` tab item in the tab bar at the bottom.

👁️ The preview shows the two products from the mocks array, in product cells.

```swift
//
//  ContentView.swift
//  Blocks
//
//  Created by Tom Brodhurst-Hill on 4/3/21.
//  Copyright © 2021 BareFeetWare. All rights reserved.
//

import SwiftUI

struct ContentView: View {
    var body: some View {
        TabView(selection: Selection) {
            NavigationView {
                List(Article.mocks) { article in
                    NavigationLink(destination: Destination) {
                        NewsCell(article: article)
                    }
                }
                .navigationTitle("News")
            }
            .tabItem { Label("News", systemImage: "newspaper.fill") }
            .tag(1)
            NavigationView {
                List(Product.mocks) { product in
                    NavigationLink(destination: Destination) {
                        ProductCell(product: product)
                    }
                }
                .navigationTitle("Products")
            }
            .tabItem { Label("Products", systemImage: "cart.fill") }
            .tag(2)
```



👉 Run the app to double check that it's all working correctly in the Simulator.

8. Commit Changes

When it's all done and working, as you've done before:

1. 👉 Choose `Commit` from the `Source Control` menu.
2. 👉 Enter a description such as: `Product cells show product mock data`
3. 👉 Click on the `Commit` button.

9. Next...

Congratulations! The products list layout is complete. It is showing all the currently available products.

Next, in Tutorial 16, we will tidy up our file structure and introduce a view model to format the dollars and dates.

If you've been through the tutorial series to this point and would like to us to publish

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