

# Building iOS User Interfaces with SwiftUI

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Designing Interfaces with SwiftUI



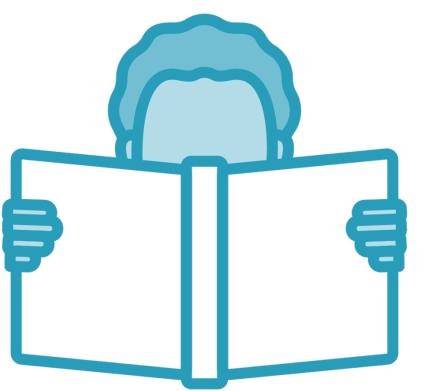
**Andrew Bancroft**

@andrewcbancroft [www.andrewcbancroft.com](http://www.andrewcbancroft.com)

# In order to be successful...



What do I need to **have**?

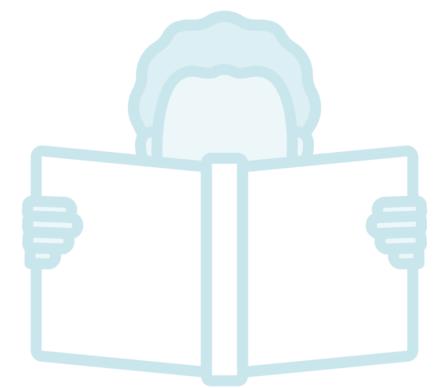


What do I need to **know**?

# In order to be successful...



What do I need to **have**?

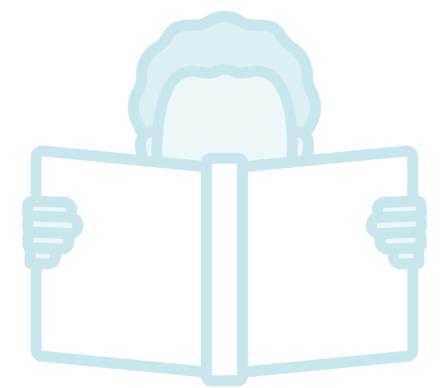


What do I need to **know**?

# In order to be successful...



What do I need to **have**?

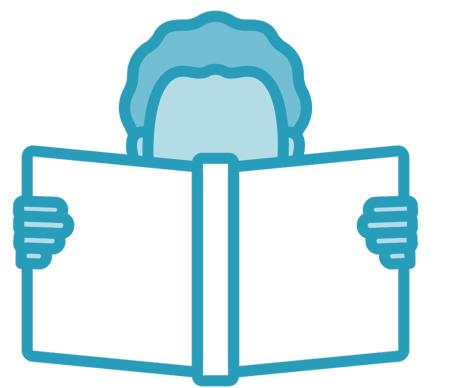


What do I need to **know**?

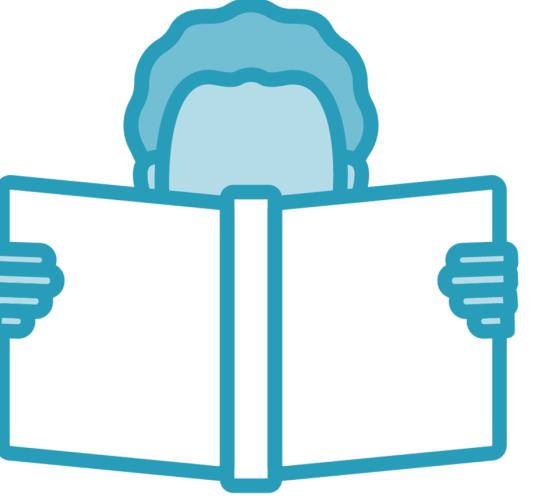
# In order to be successful...



What do I need to **have**?



What do I need to **know**?



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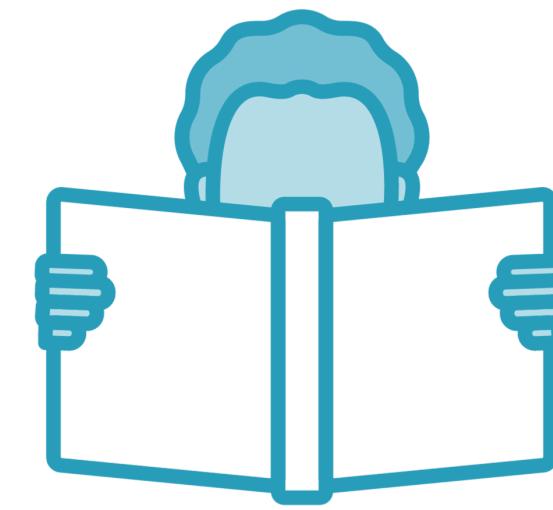
# What do I need to know?

✓ Swift

No Swift ?

No **Swift** ?

Need to brush up on core Swift concepts?

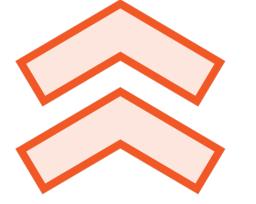


# What do I need to know?

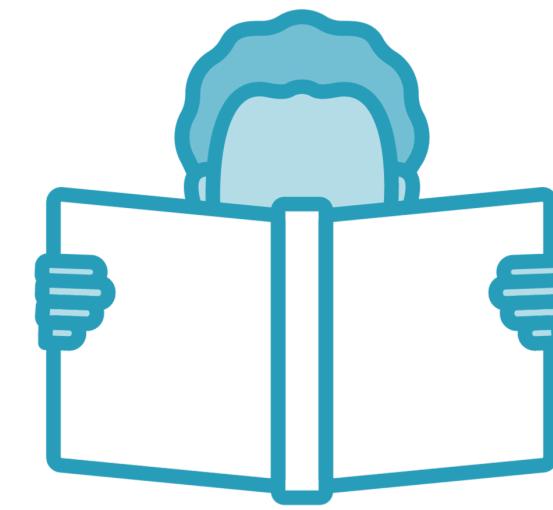
- ✓ Swift
- ✓ Basics of iOS Development with SwiftUI



**Basics**

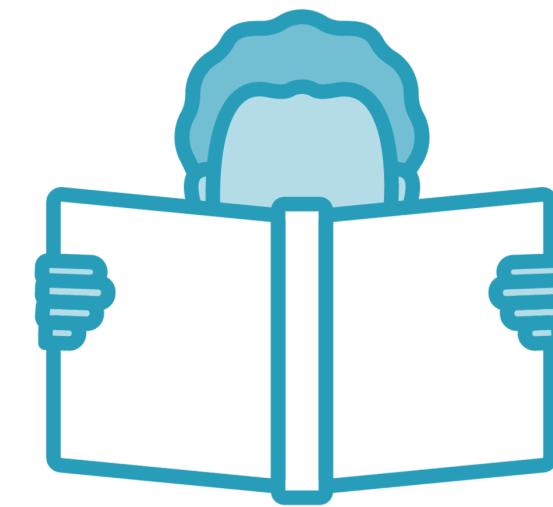


**Intermediate**



- # What do I need to know?
- ✓ Swift
  - ✓ Basics of iOS Development with SwiftUI

*Do not need to be an expert*

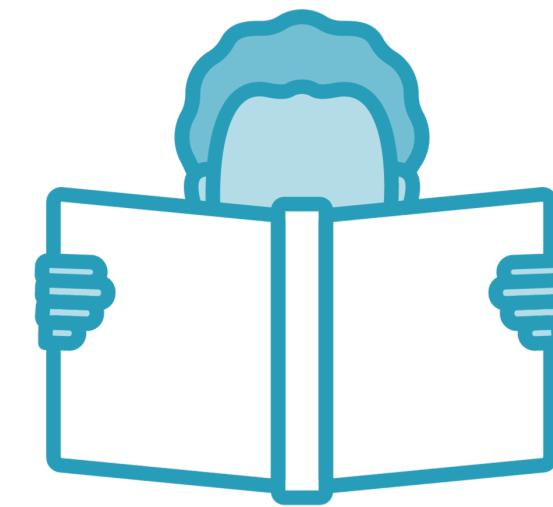


# What do I need to know?

- ✓ Swift
- ✓ Basics of iOS Development with SwiftUI

*Do not need to be an expert*

Will mix in review of the most important concepts  
in order to reinforce



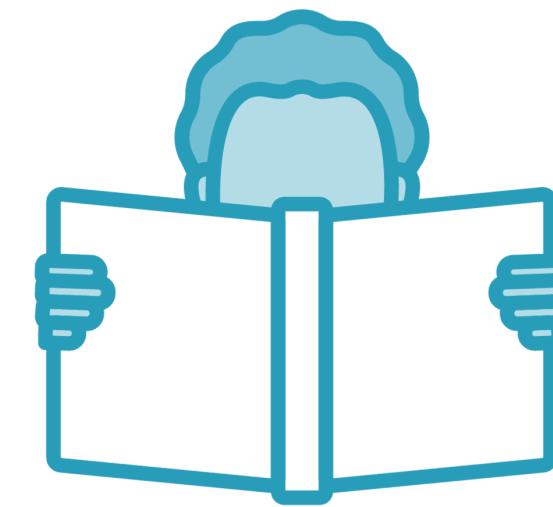
# What do I need to know?

- ✓ Swift
- ✓ Basics of iOS Development with SwiftUI

*Do not need to be an expert*

Will mix in review of the most important concepts  
in order to reinforce

- ✓ Accustomed to Mac and Xcode



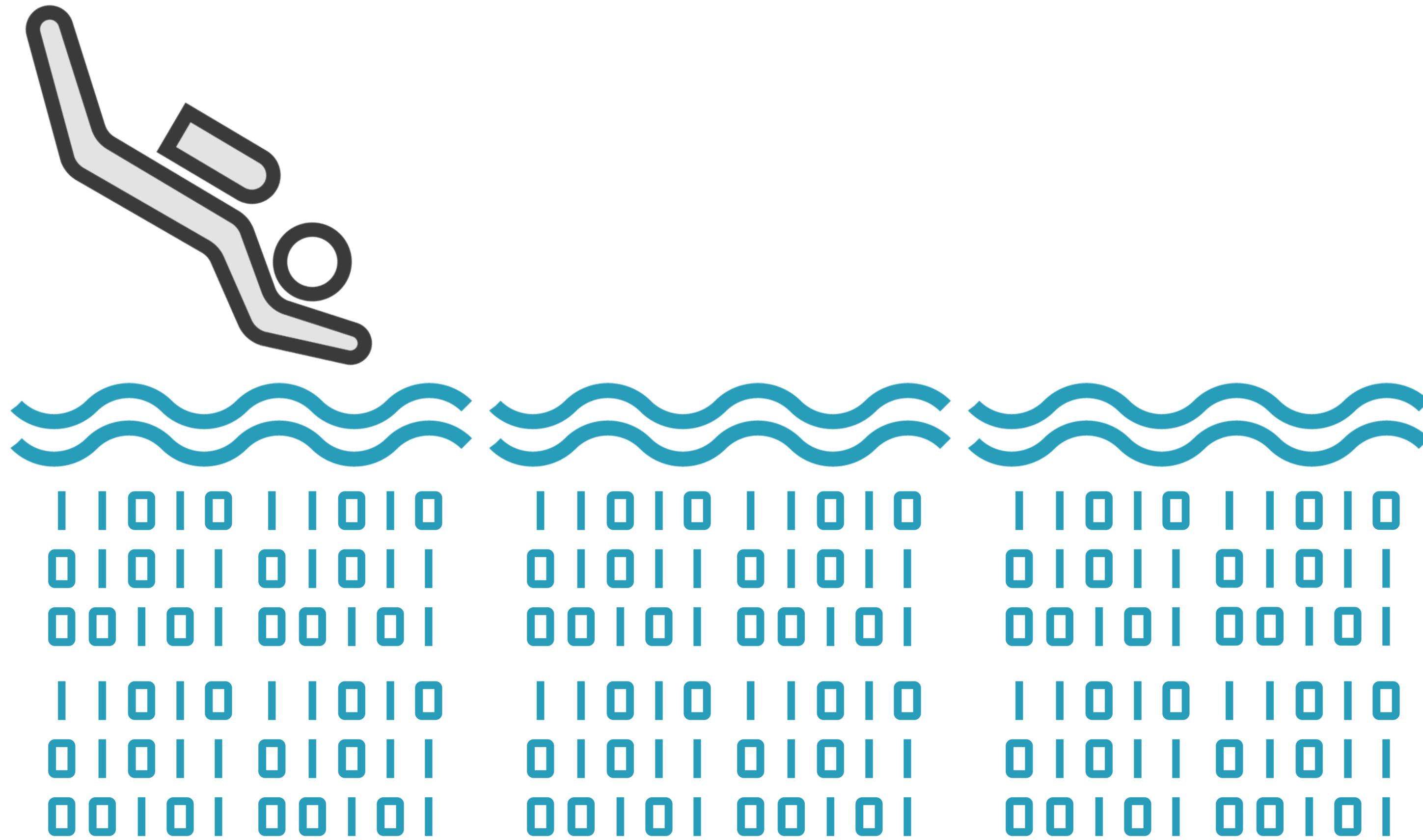
# What do I need to know?

- ✓ Swift
- ✓ Basics of iOS Development with SwiftUI

*Do not need to be an expert*

Will mix in review of the most important concepts  
in order to reinforce

- ✓ Accustomed to Mac and Xcode



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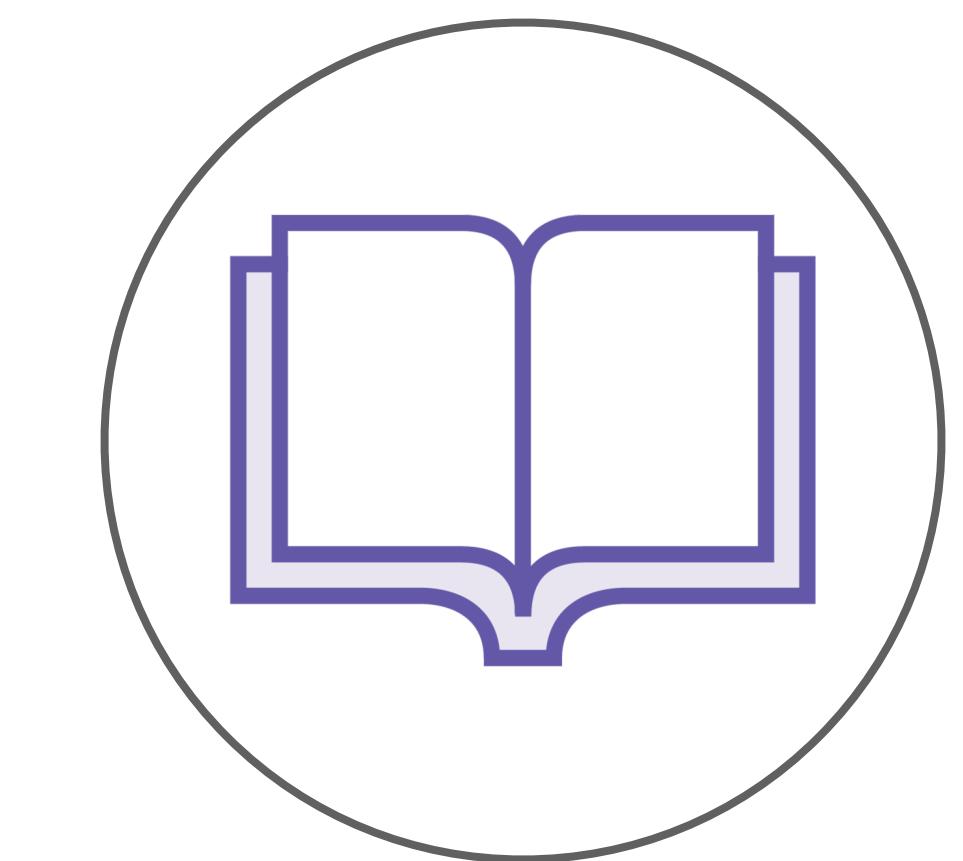


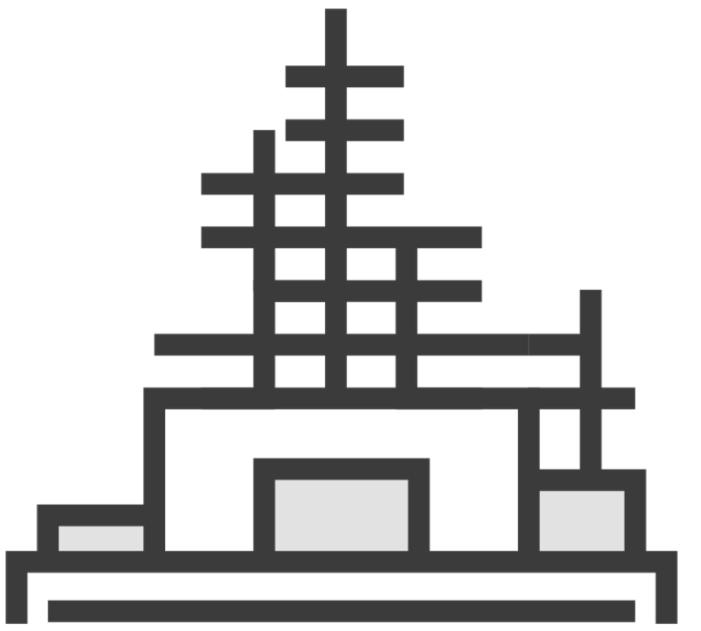
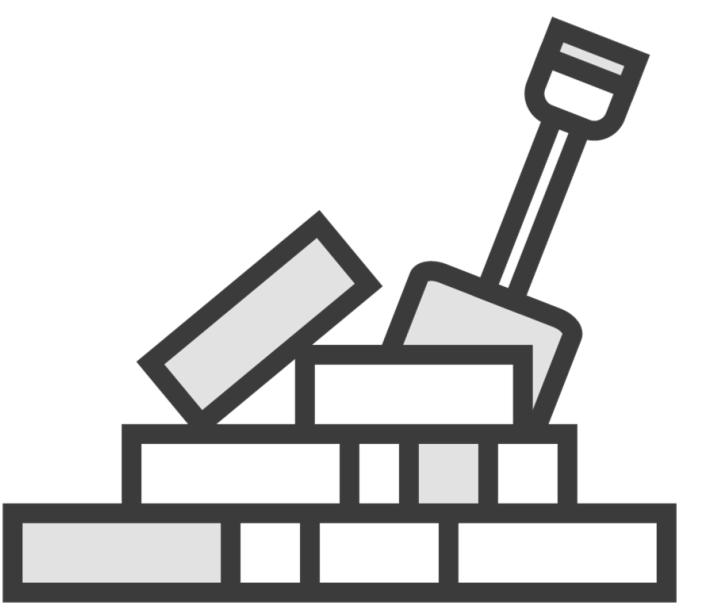
# The Snowhaven Renovation Scenario

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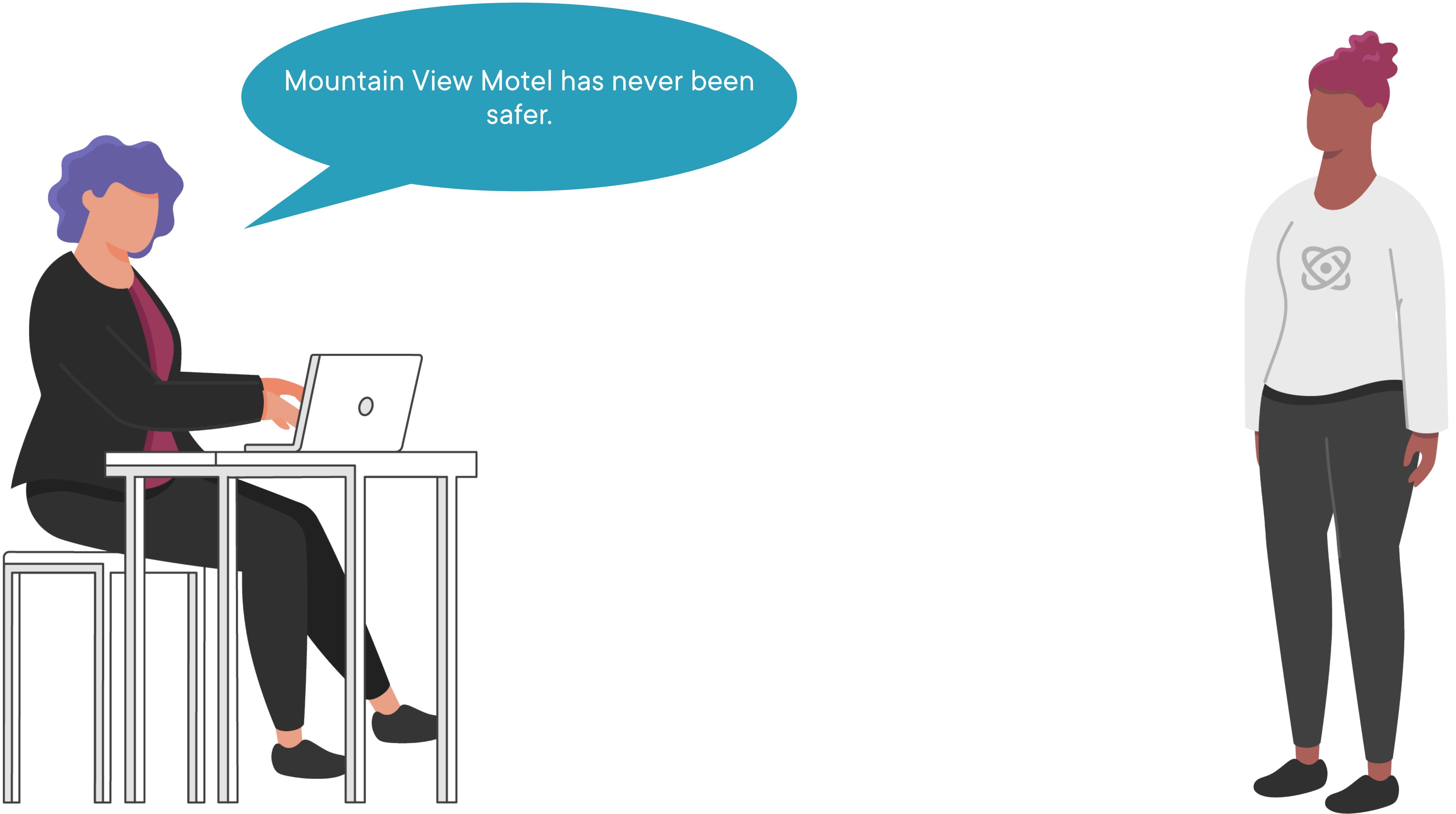
A dark, atmospheric night scene of a motel building. The building is a long, single-story structure with a dark roof and light-colored walls. Several windows are lit from within, casting a warm glow. A prominent sign on the right side of the building reads "Mountain View Motel" in white letters. The sky is filled with heavy, dark clouds. In the background, a dense forest of tall trees is visible. On the far left, a portion of another building is visible, featuring a red and yellow patterned facade.

**Mountain View  
Motel**

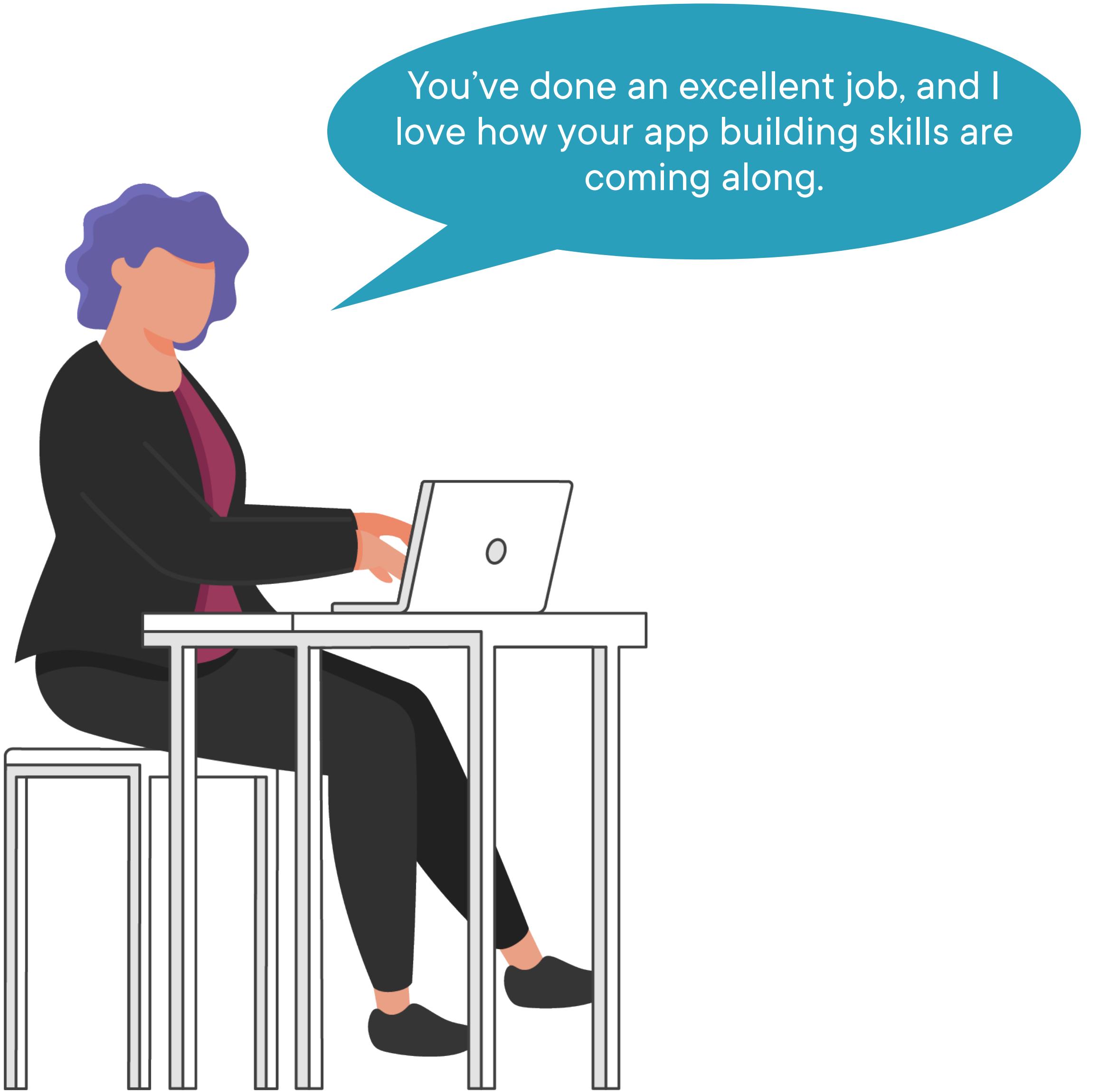




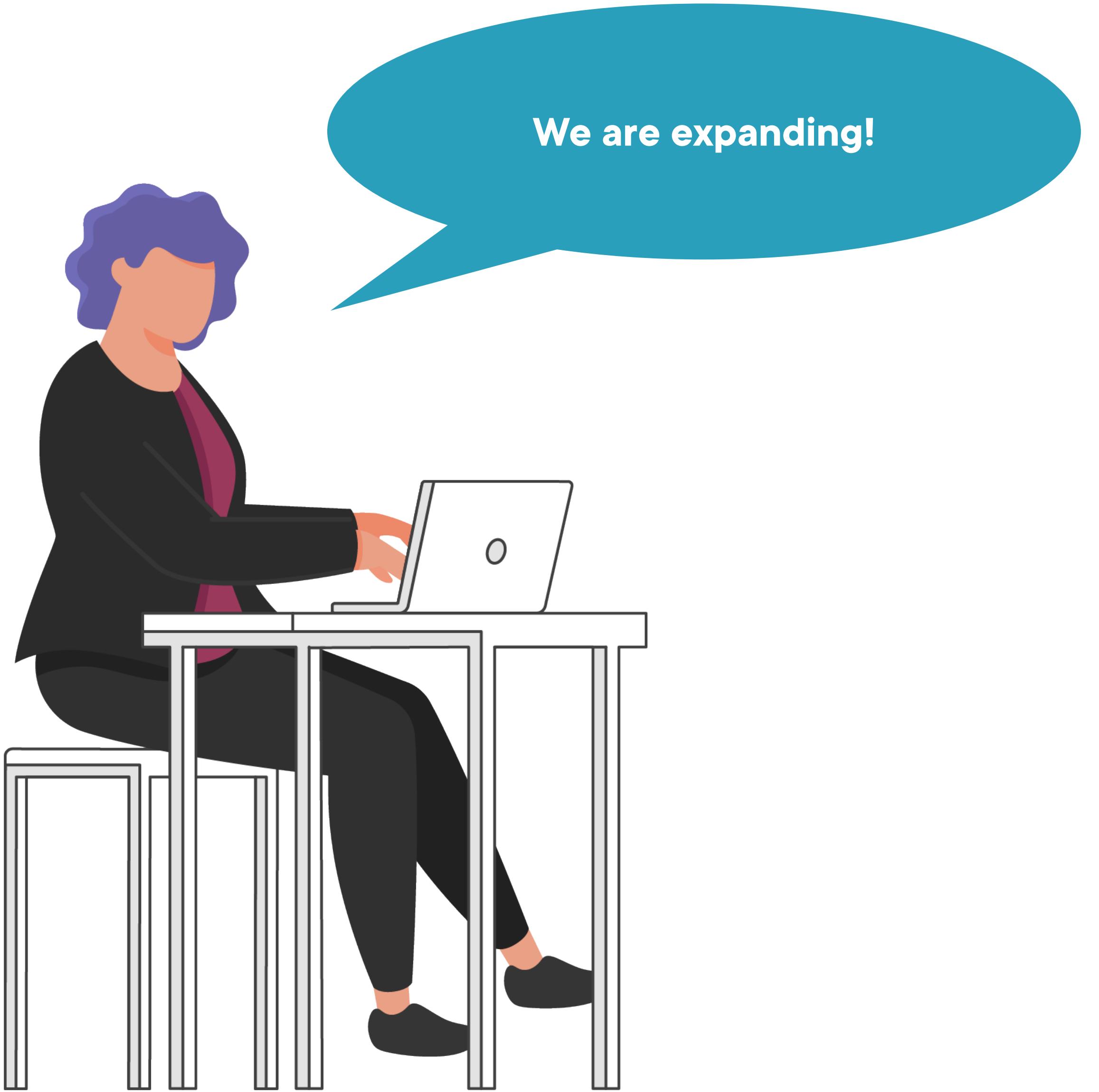
I'd like to make you an offer that I hope  
you can't refuse...



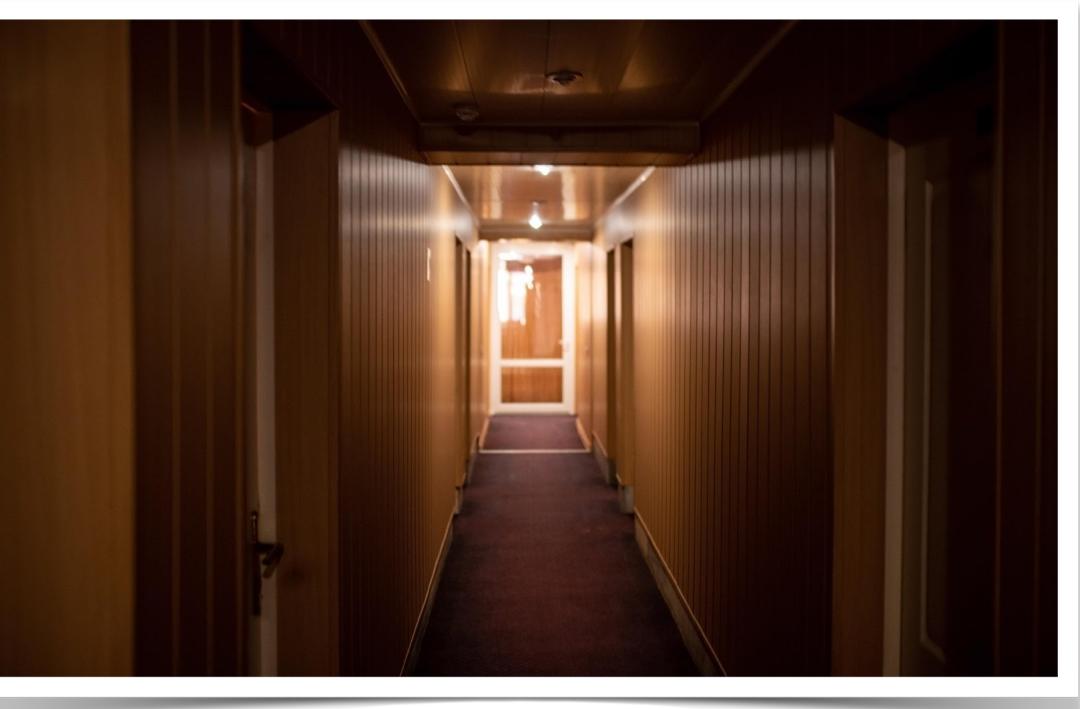
Mountain View Motel has never been  
safer.

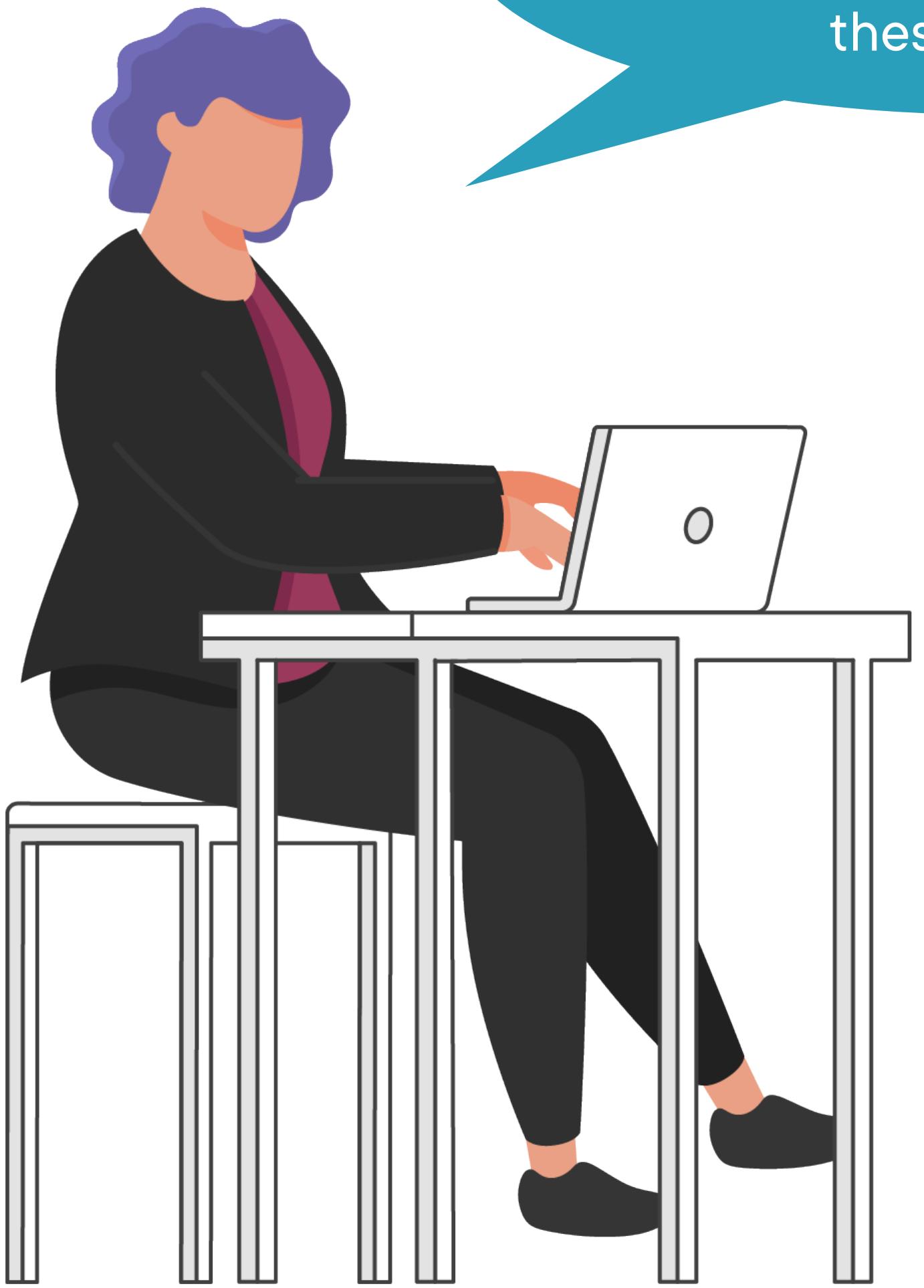








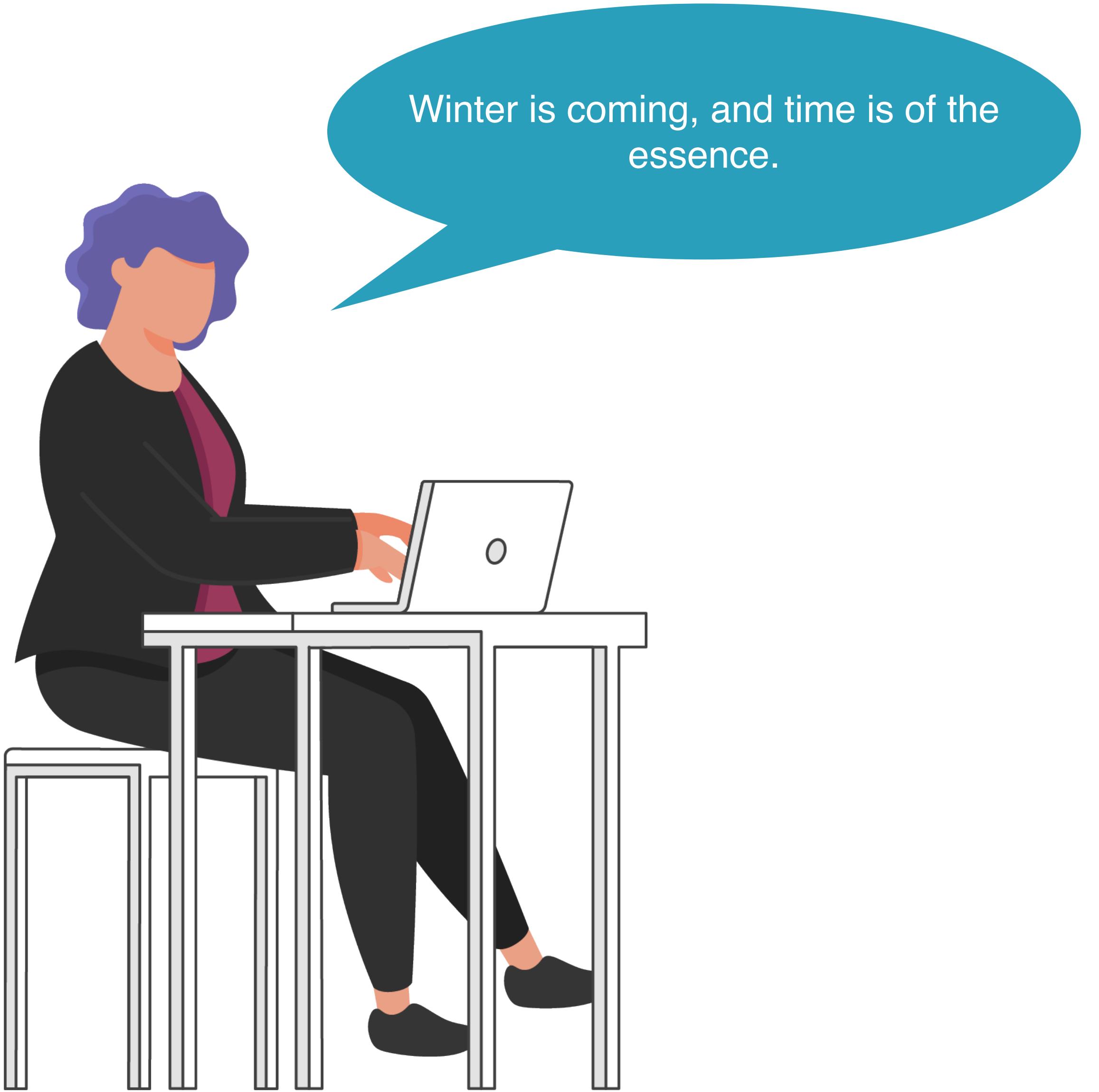


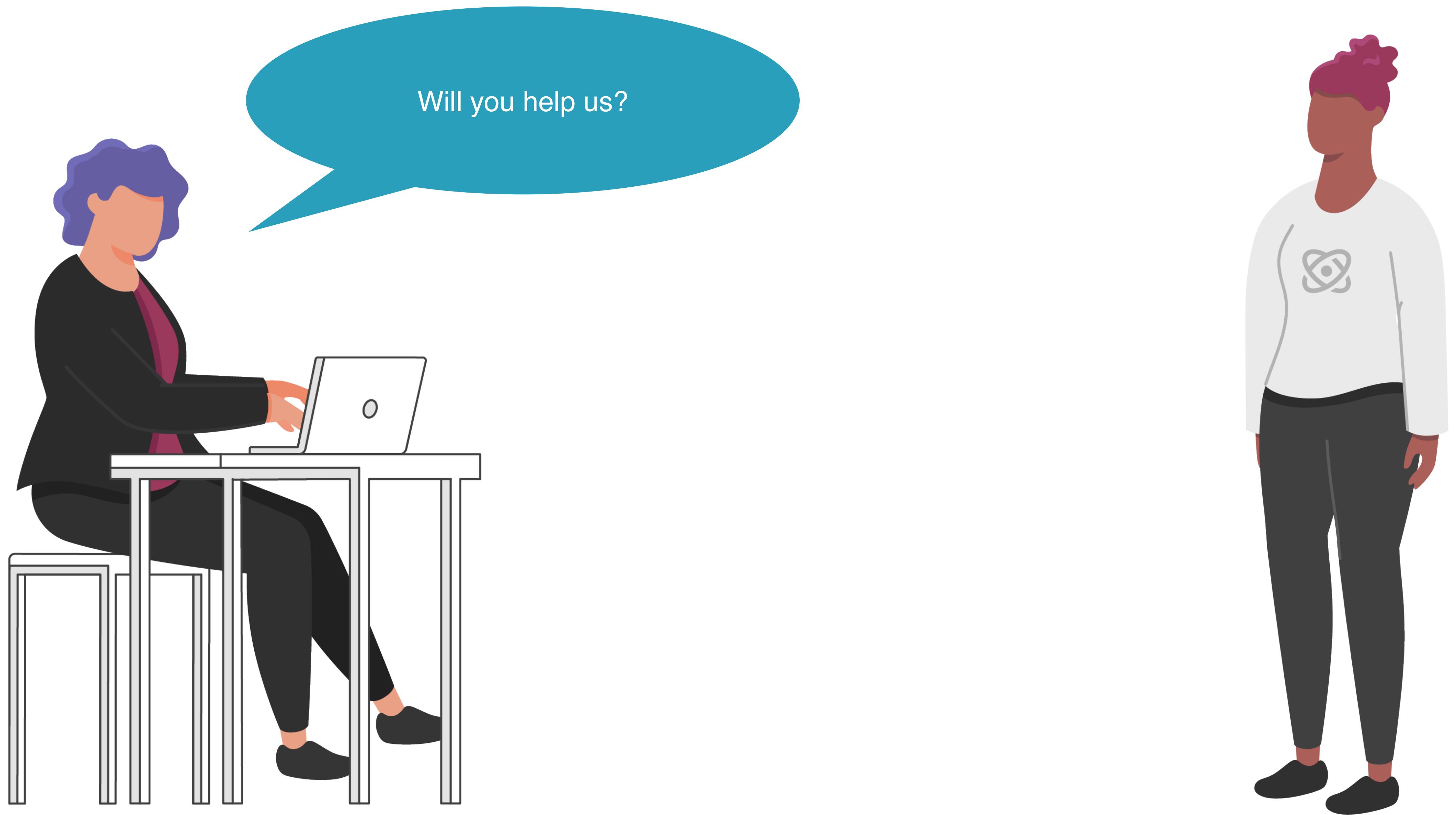


I need an iOS developer.  
Someone who can build an app for  
checking in on the progress of all of  
these repairs.



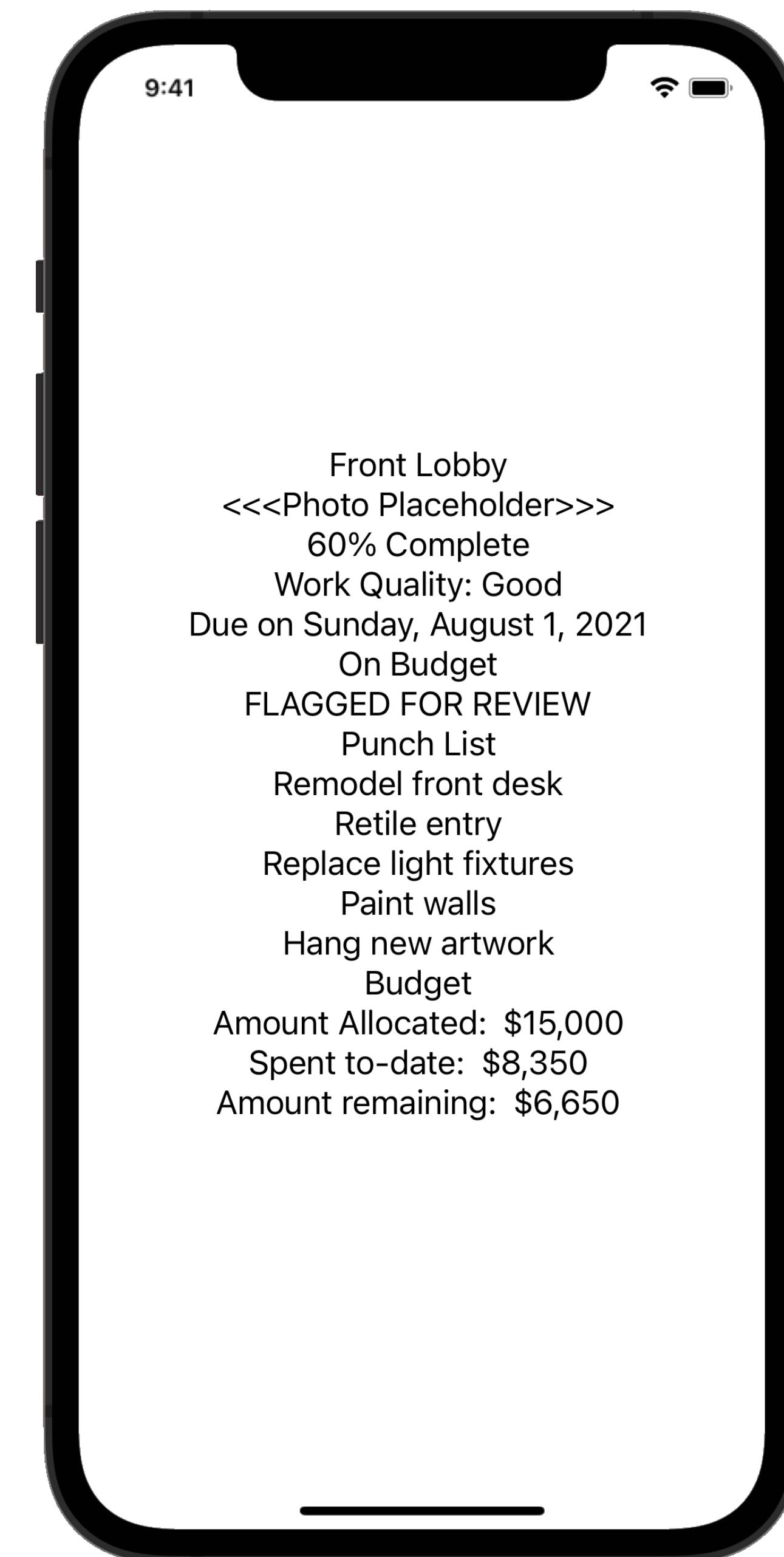








RenoTracker





9:41

Front Lobby

Due on Sunday, August 1, 2021

Work Quality: Good  
★ ★ ★ ☆

FLAGGED FOR REVIEW

Punch List

- Remodel front desk
- Retile entry
- Replace light fixtures
- Paint walls
- Hang new artwork

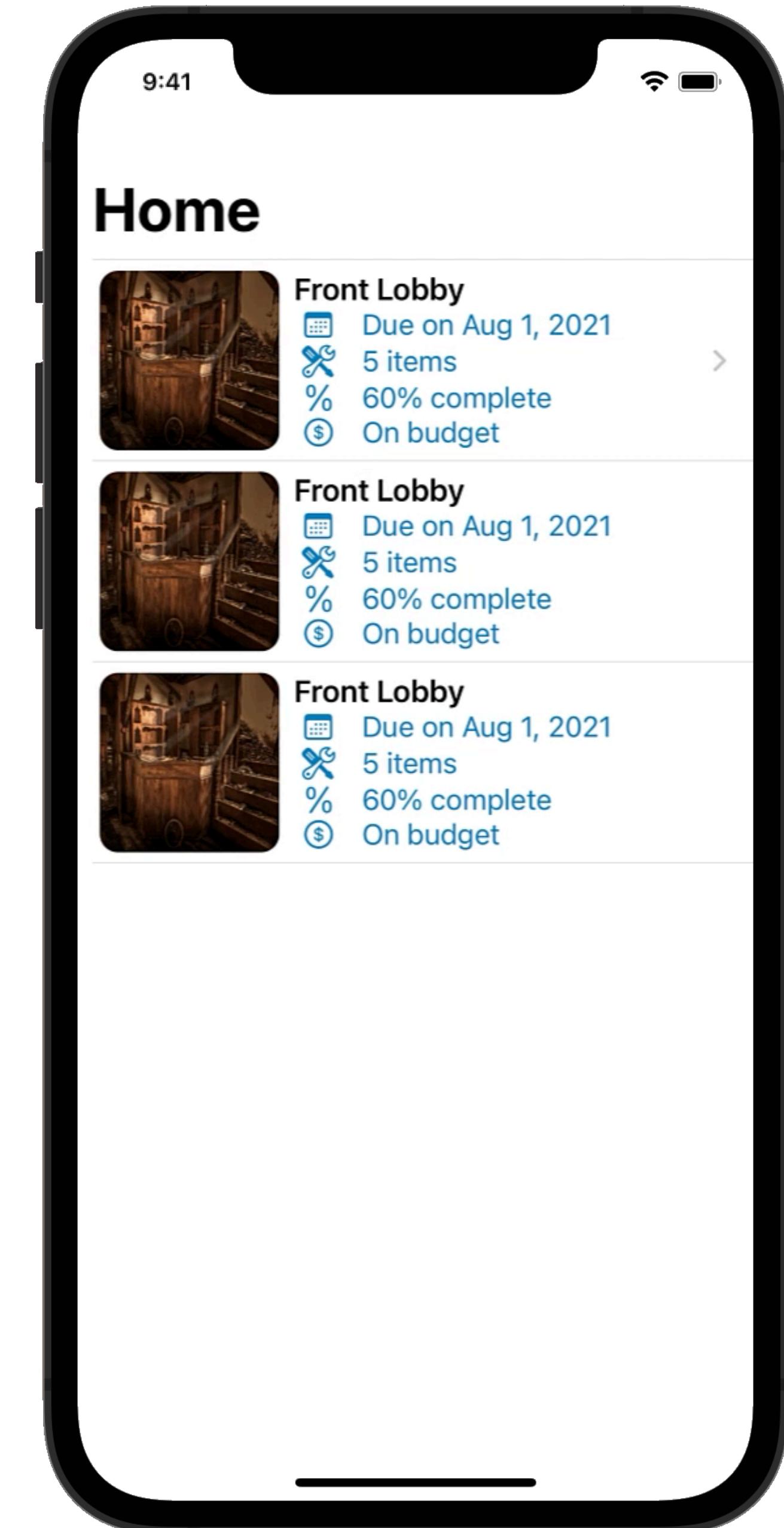
Budget

- On Budget

Amount Allocated: \$15,000

Spent to-date: \$8,350

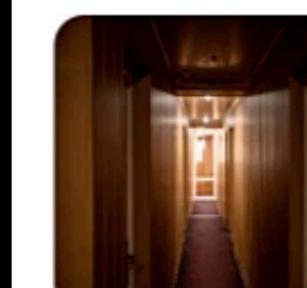
Amount remaining: \$6,650





11:19

## Home

-  **Front Lobby**  
📅 Due on Aug 1, 2021  
🛠 5 items  
%
-  **Main Entrance**  
📅 Due on May 30, 2021  
🛠 2 items  
%
-  **1st Floor Hallway**  
📅 Due on Jul 31, 2021  
🛠 4 items  
%
-  **2nd Floor Hallway**  
📅 Due on Jul 31, 2021  
🛠 4 items  
%
-  **1st Floor Guest Rooms**  
📅 Due on Nov 1, 2021  
🛠 7 items  
%
-  **2nd Floor Guest Rooms**  
📅 Due on Nov 1, 2021  
🛠 7 items  
%



11:37

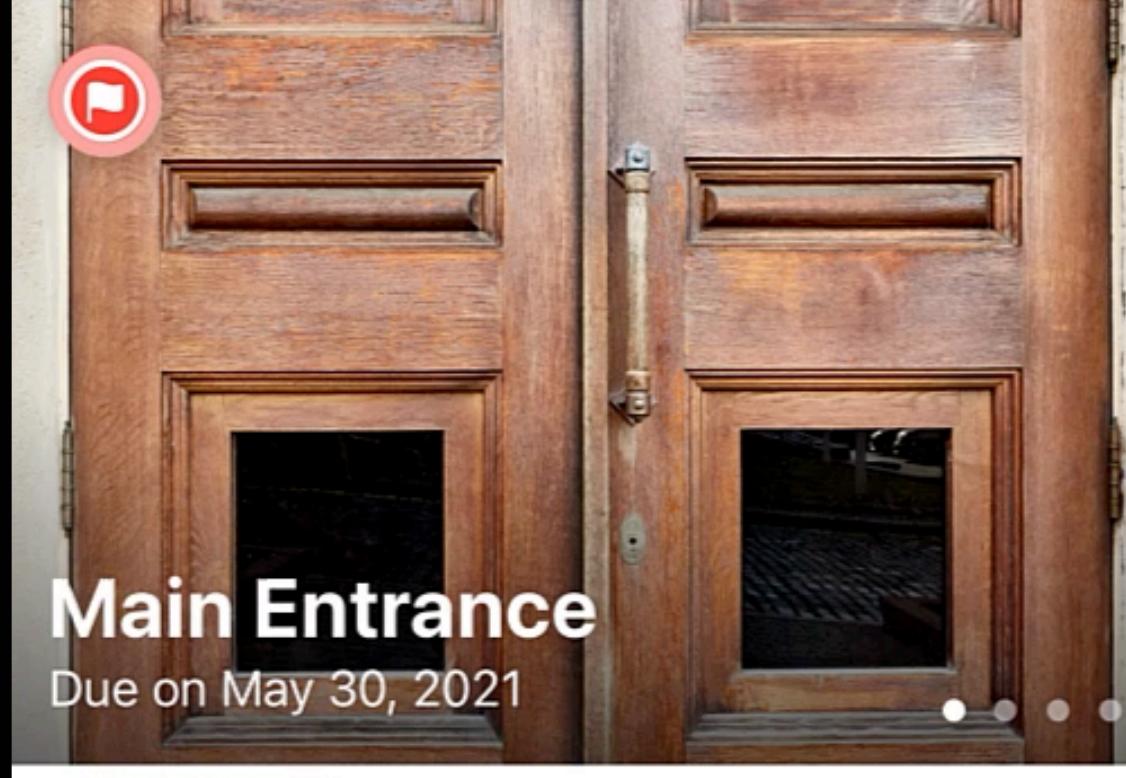
## Home

- Front Lobby**  
📅 Due on Aug 1, 2021  
🛠 5 items  
%
- Main Entrance**  
📅 Due on May 30, 2021  
🛠 2 items  
%
- 1st Floor Hallway**  
📅 Due on Jul 31, 2021  
🛠 4 items  
%
- 2nd Floor Hallway**  
📅 Due on Jul 31, 2021  
🛠 4 items  
%
- 1st Floor Guest Rooms**  
📅 Due on Nov 1, 2021  
🛠 7 items  
%
- 2nd Floor Guest Rooms**  
📅 Due on Nov 1, 2021  
🛠 7 items  
%



11:41

# Home



Main Entrance  
Due on May 30, 2021

Front Lobby  
Due on Aug 1, 2021  
5 items  
60% complete  
On budget

Main Entrance  
Due on May 30, 2021  
2 items  
0% complete  
On budget

1st Floor Hallway  
Due on Jul 31, 2021  
4 items  
25% complete  
On budget

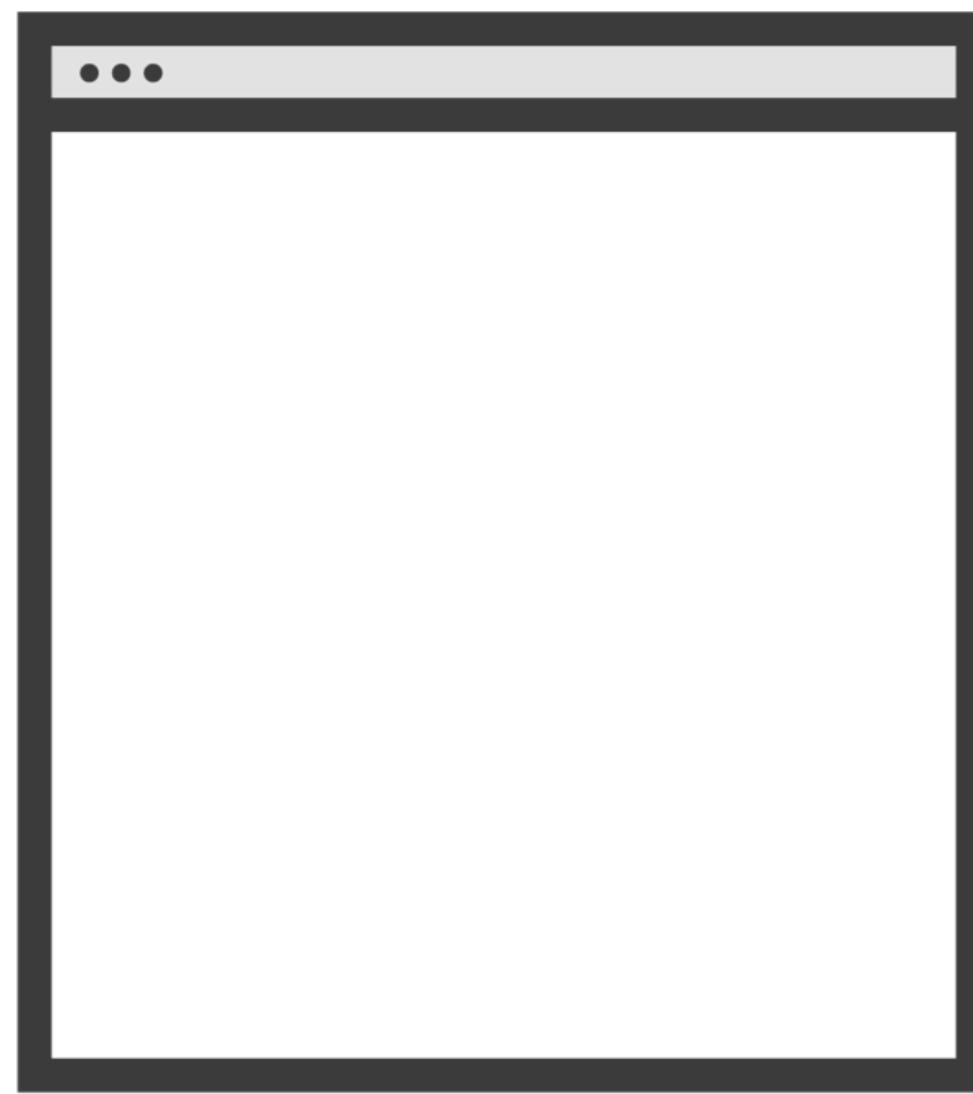
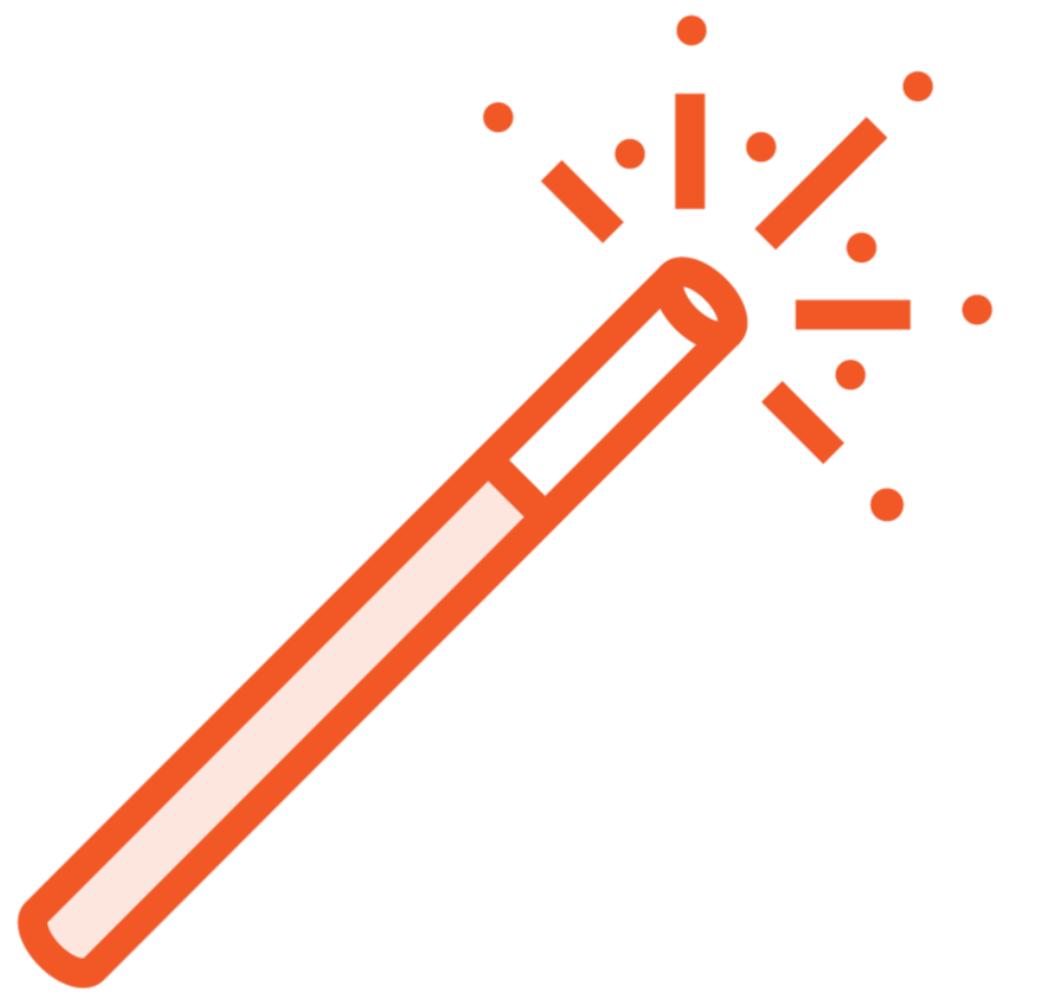
2nd Floor Hallway  
Due on Jul 31, 2021  
4 items  
0% complete

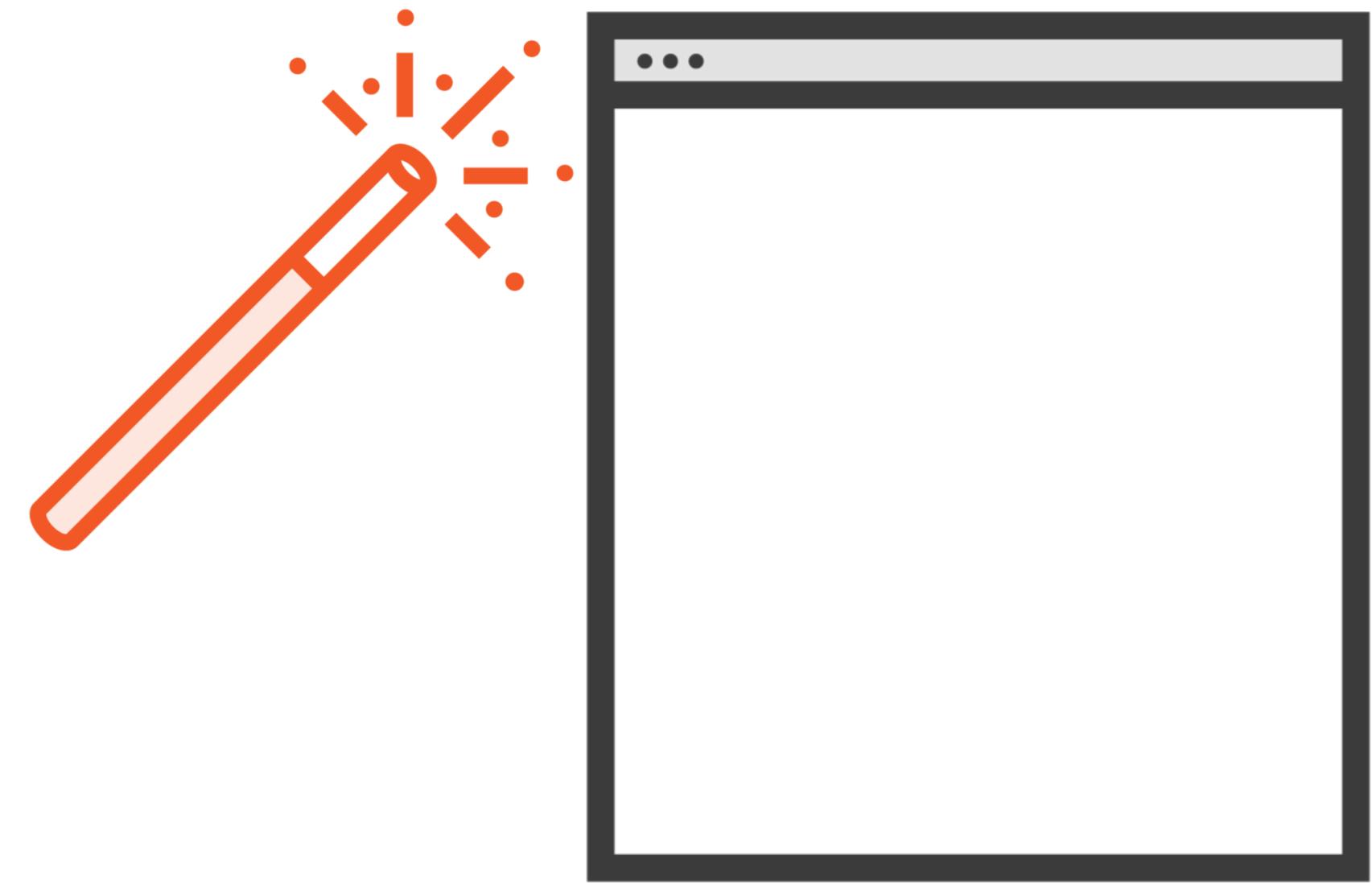
A screenshot of a mobile application showing a home improvement project list. The screen is titled "Home". At the top, there is a thumbnail of a wooden double door labeled "Main Entrance" with a due date of "May 30, 2021". Below it is a section for "Front Lobby" with a due date of "Aug 1, 2021", 5 items, 60% complete, and on budget. Another section for "Main Entrance" shows 2 items, 0% complete, and on budget. The third section is "1st Floor Hallway" with a due date of "Jul 31, 2021", 4 items, 25% complete, and on budget. The fourth section is "2nd Floor Hallway" with a due date of "Jul 31, 2021", 4 items, and 0% complete.

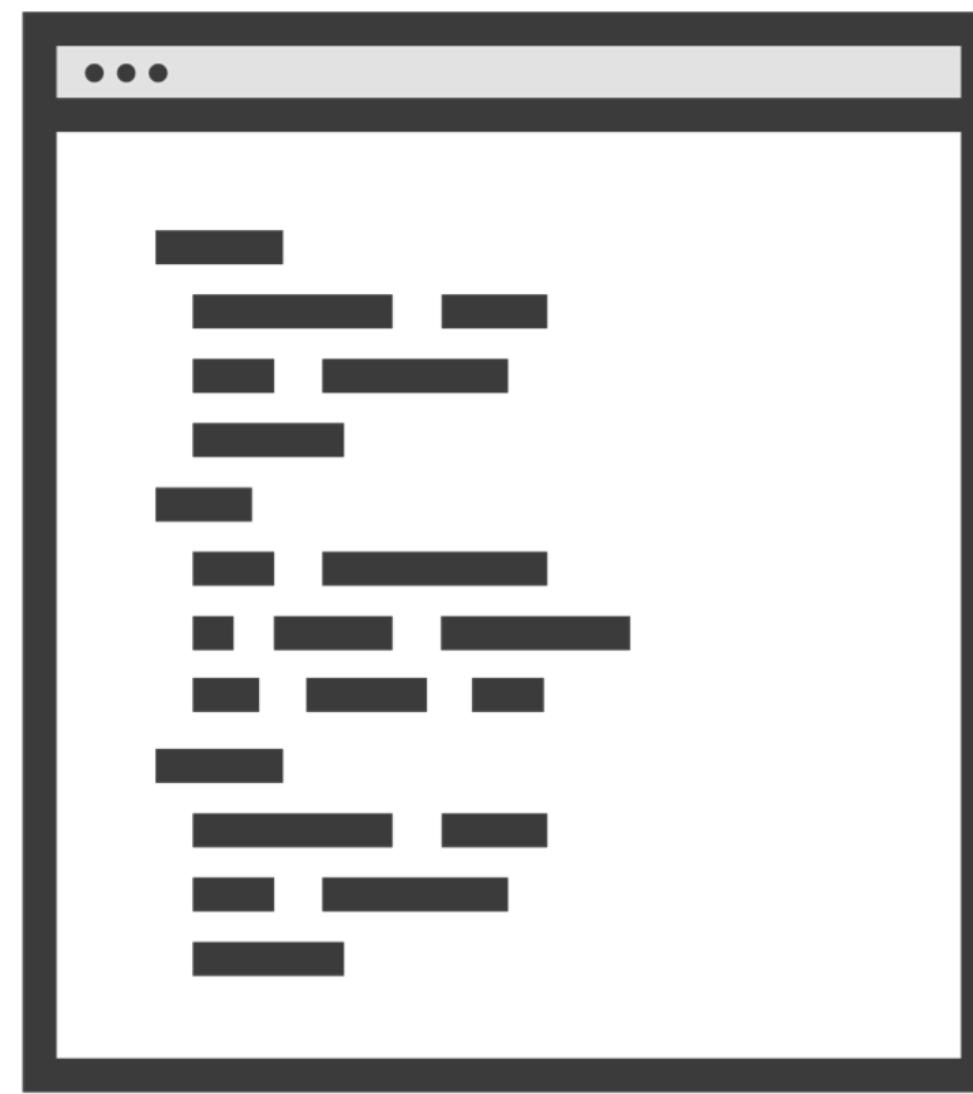


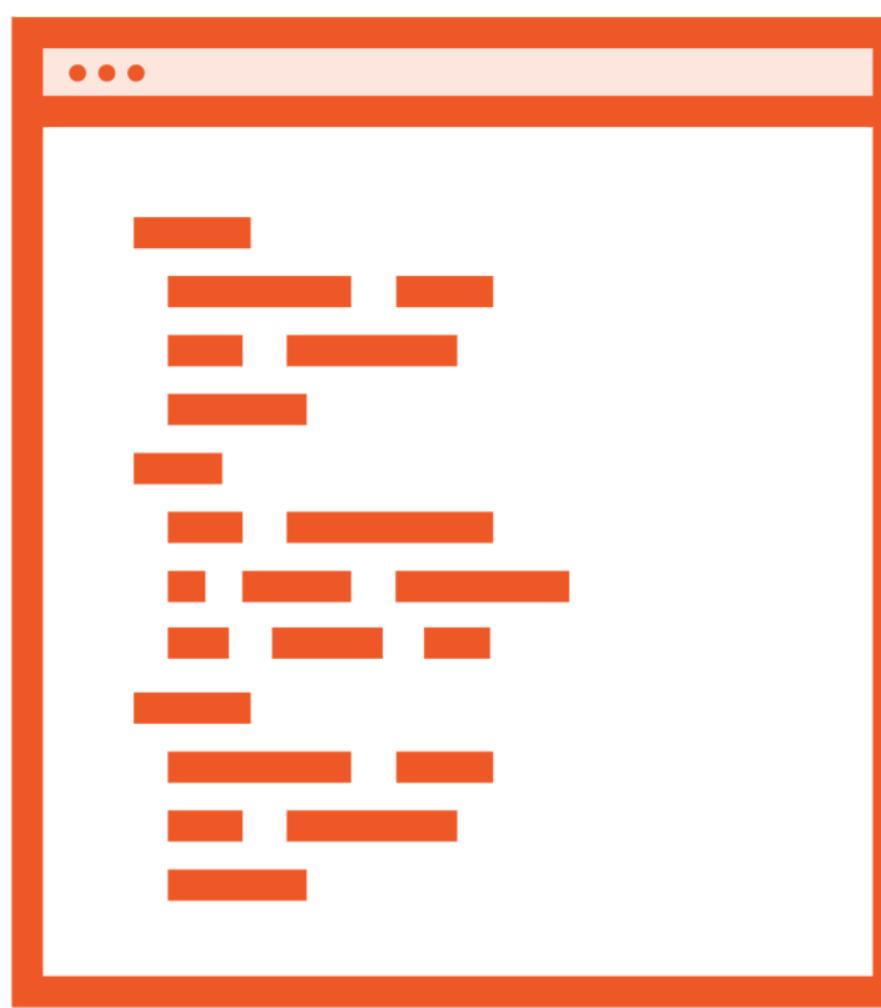
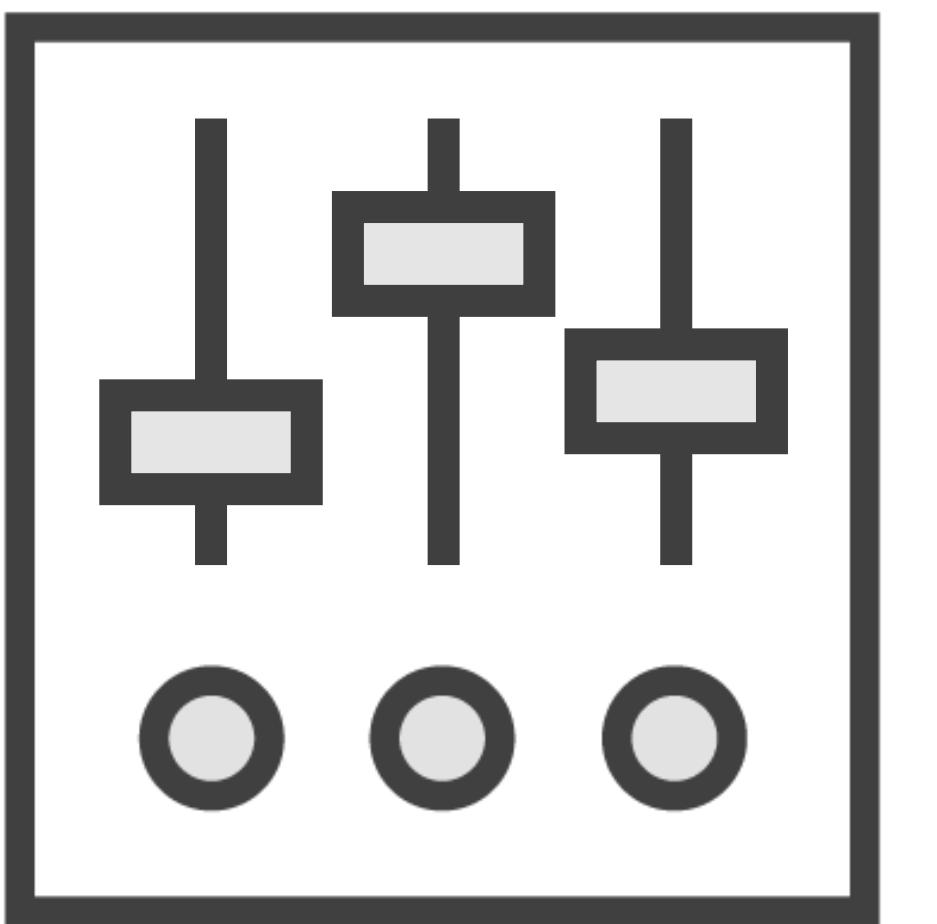
# Defining SwiftUI Views

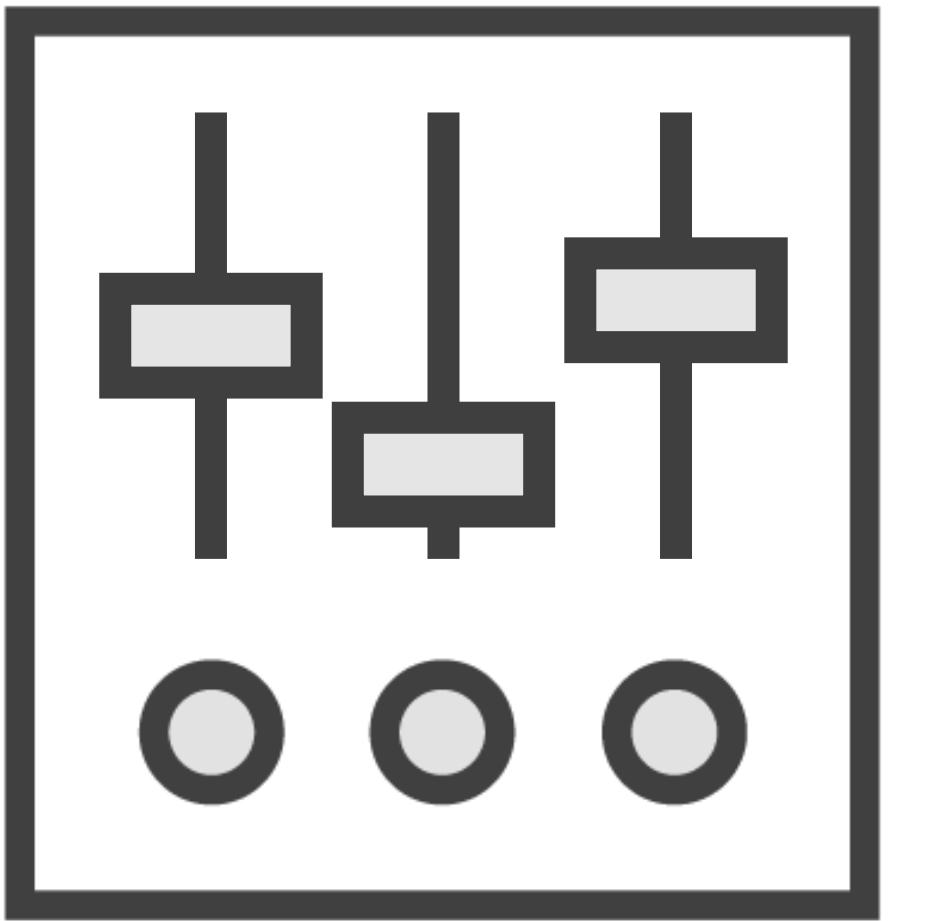
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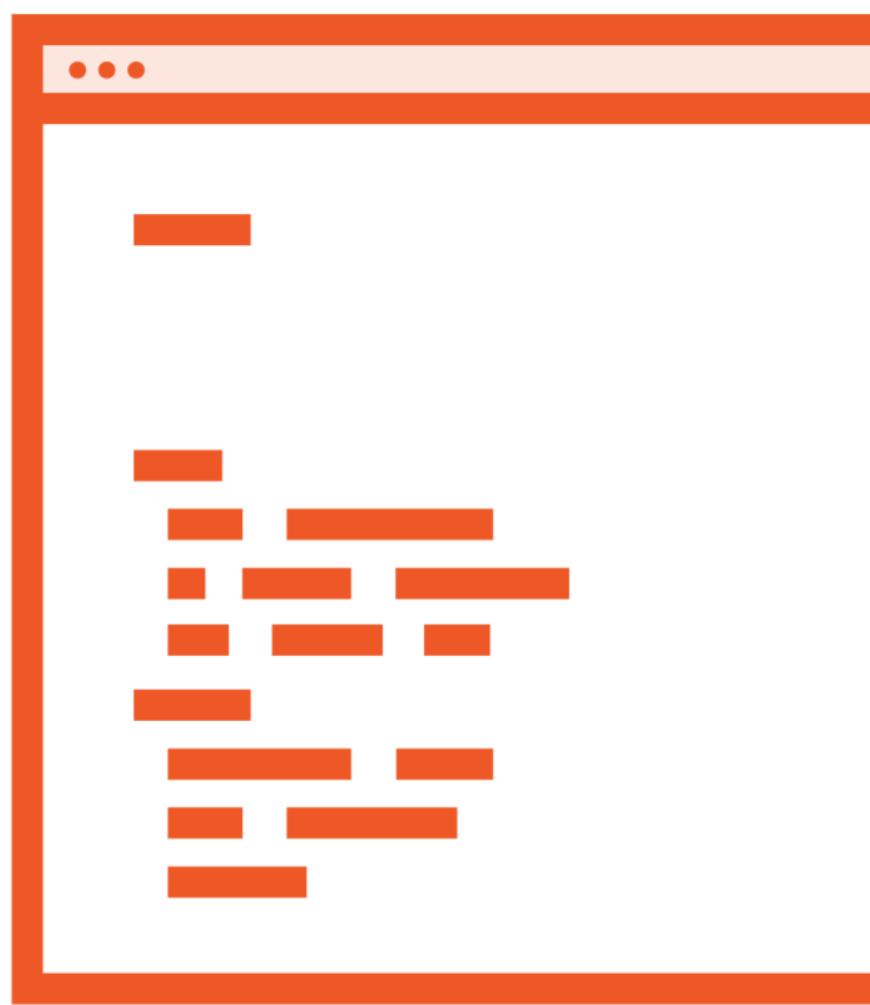


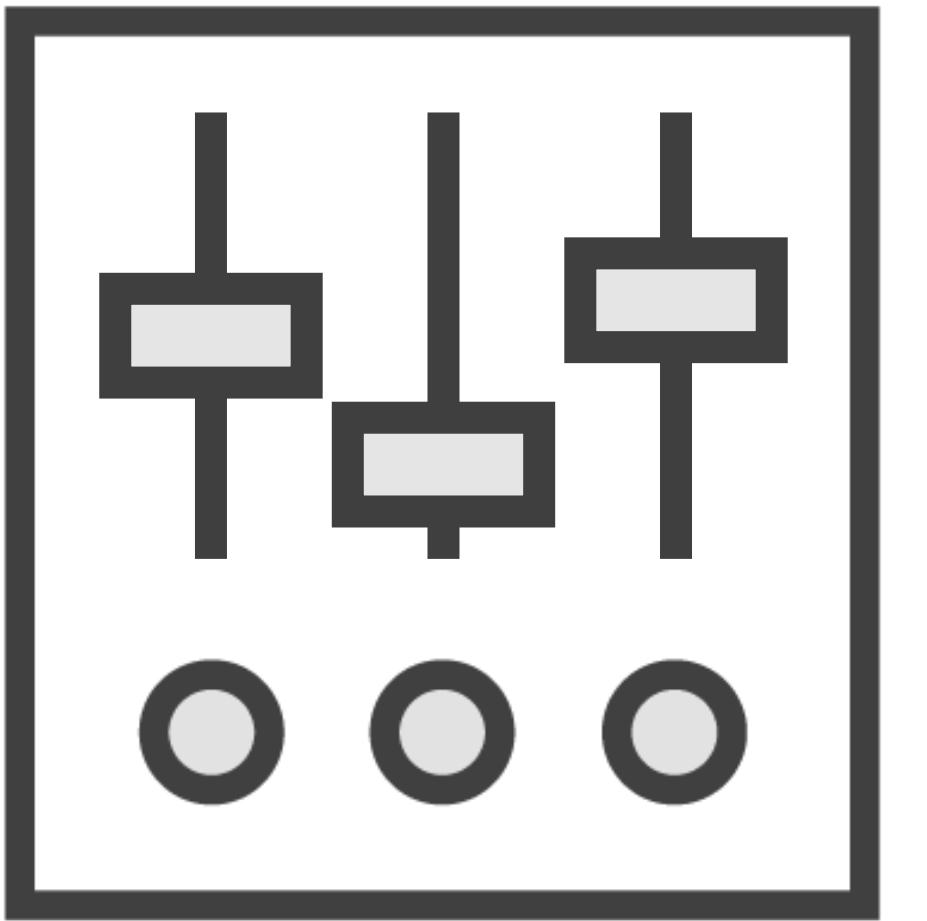




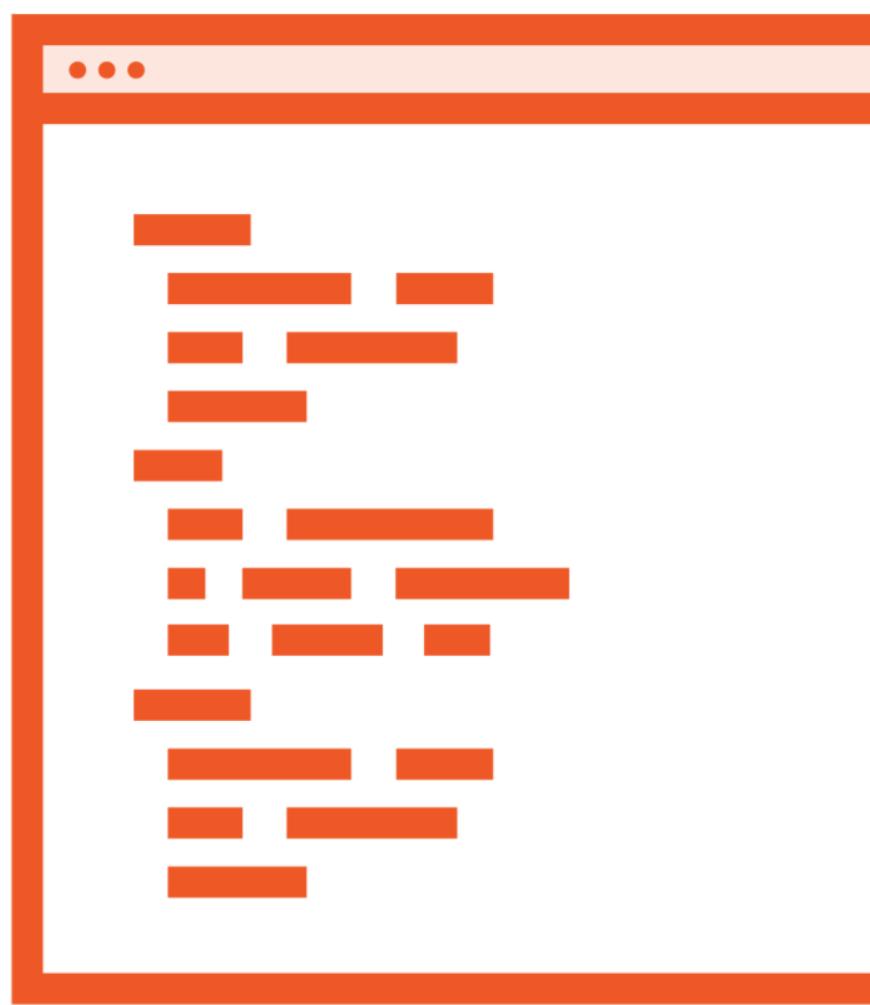


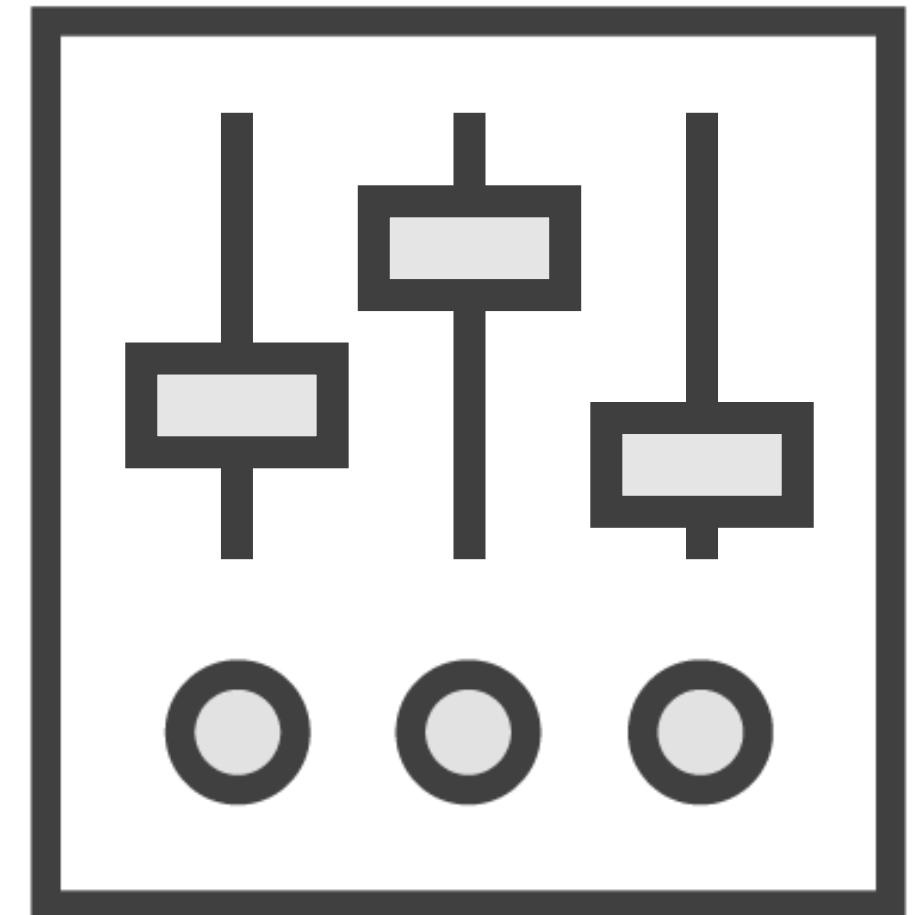
Modify a few lines





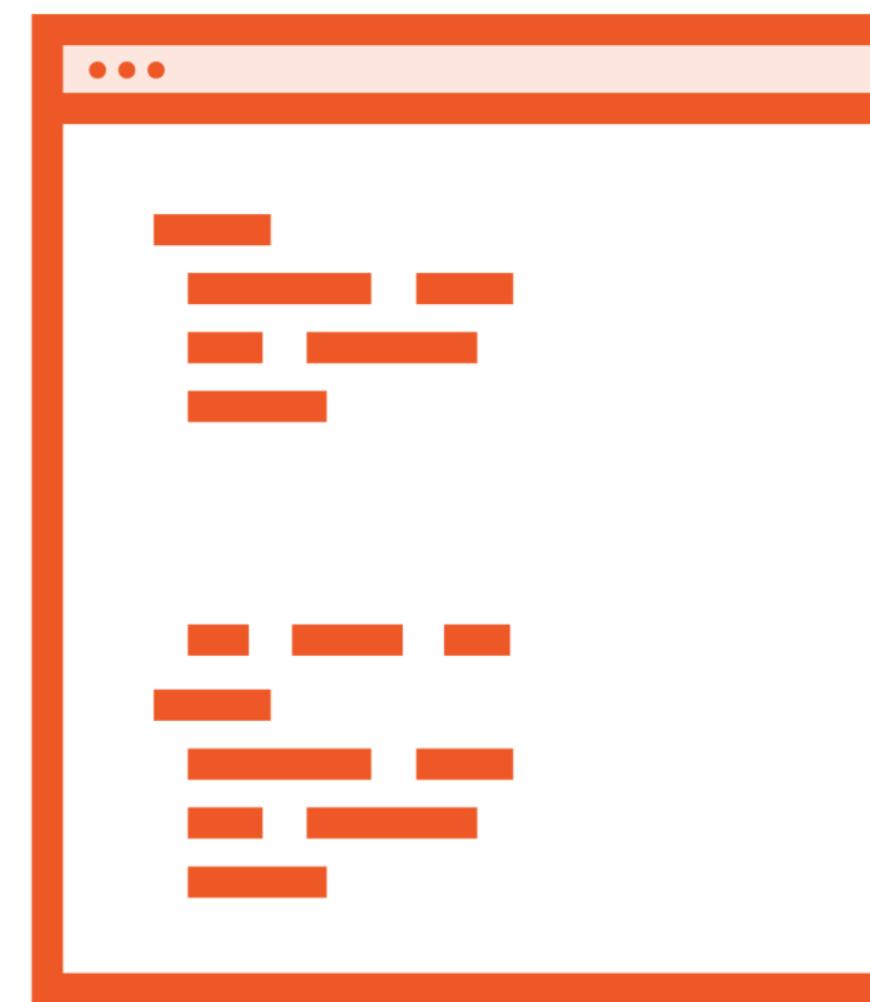
Modify a few lines

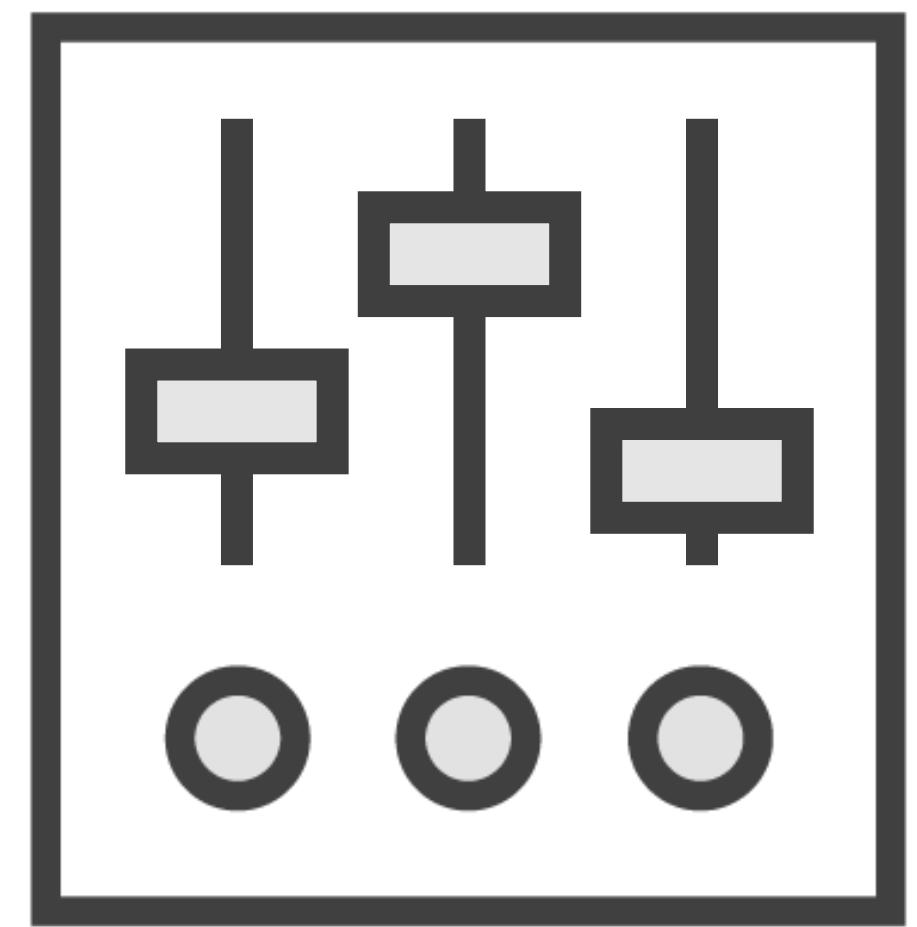




Modify a few lines

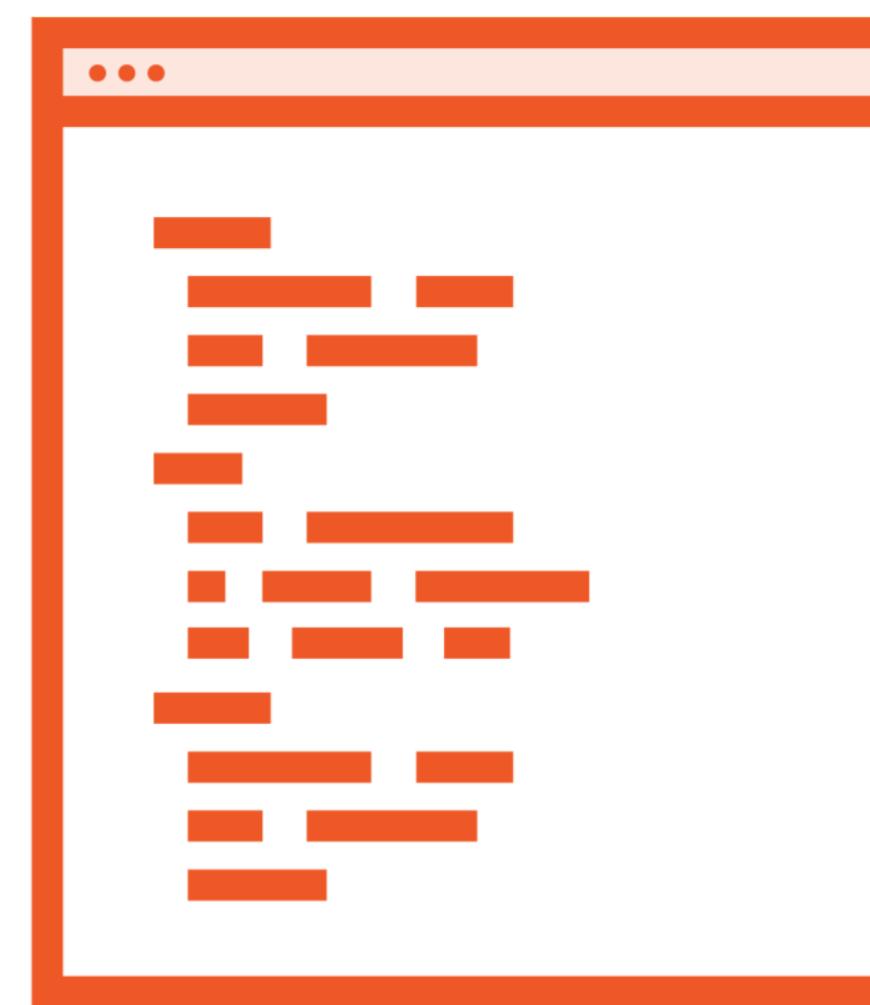
Change parameter values

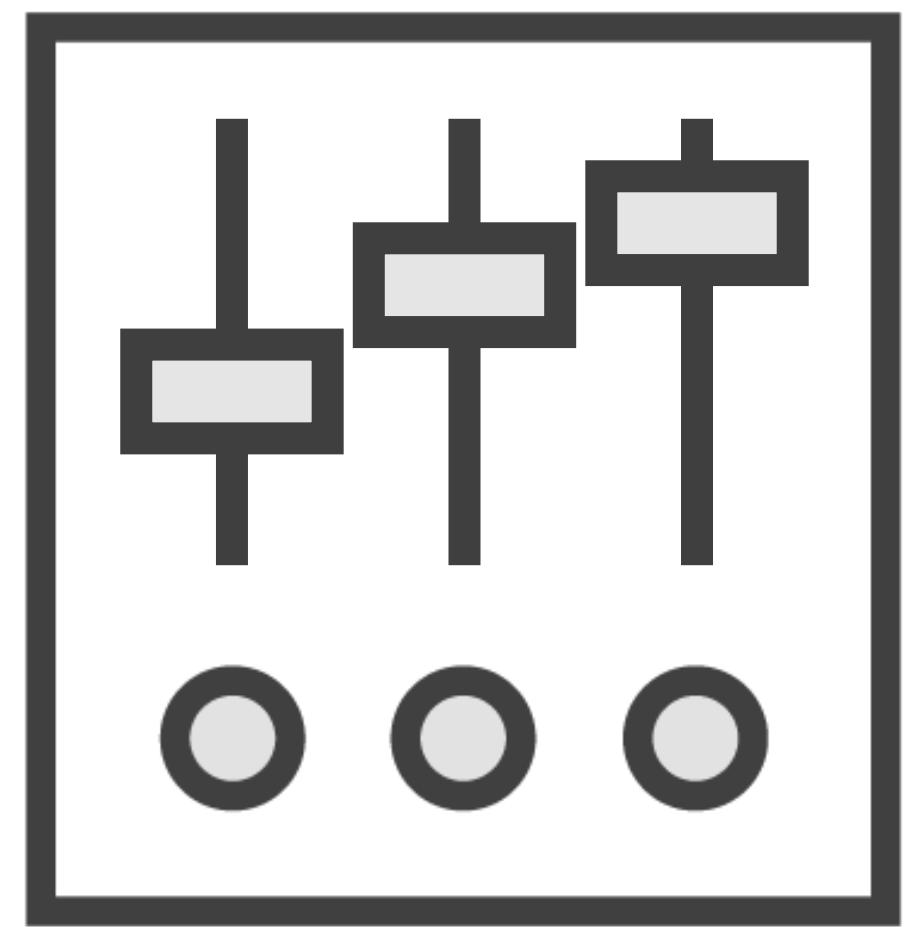




Modify a few lines

Change parameter values

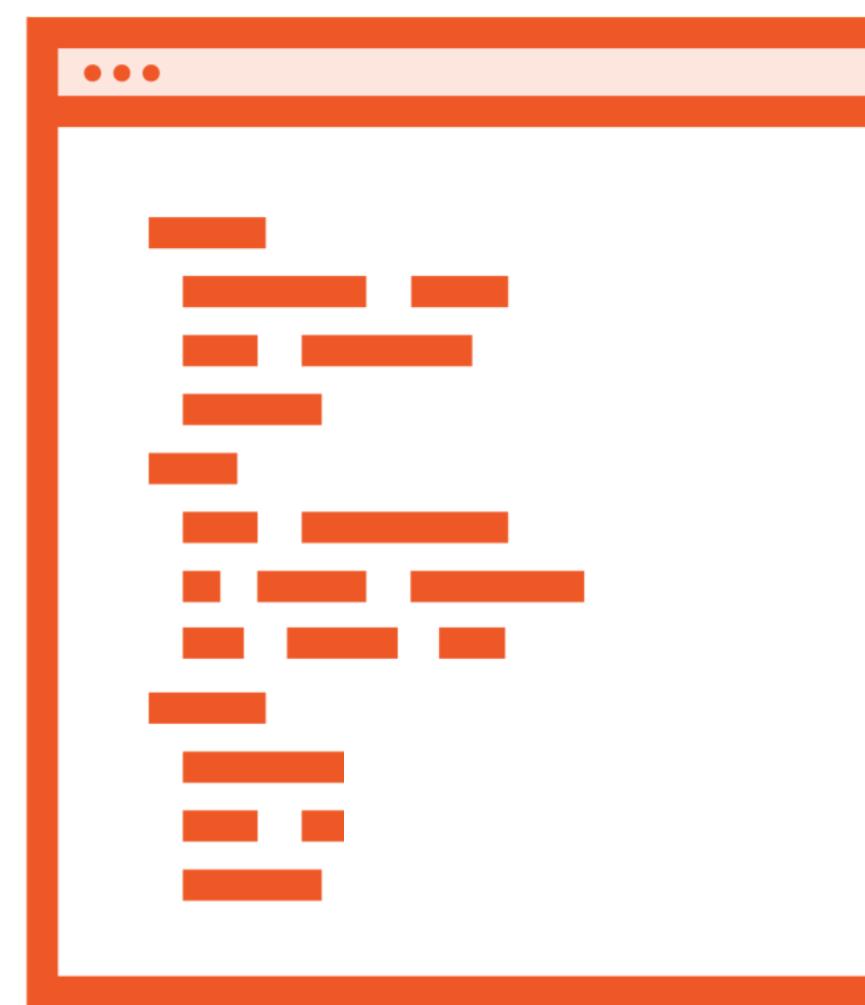


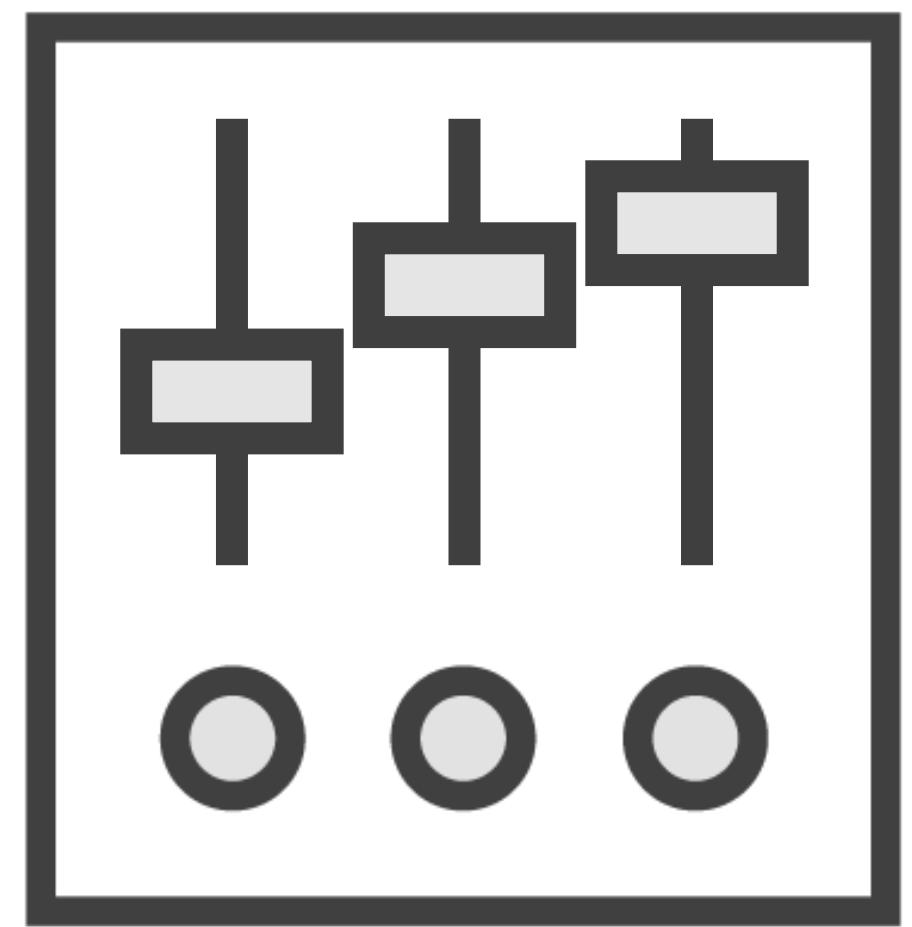


**Modify a few lines**

**Change parameter values**

**Experiment**

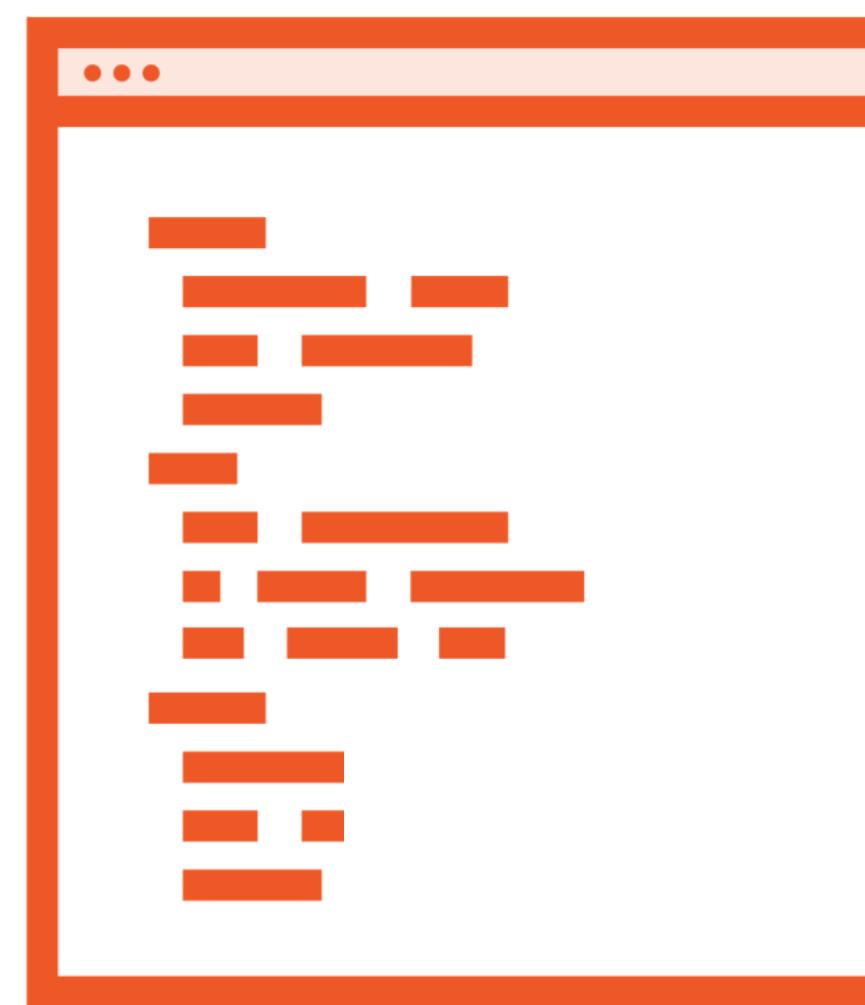




**Modify a few lines**

**Change parameter values**

**Experiment**





What does it take to define a SwiftUI View?



How did she know that these were  
the four views she needed to add?



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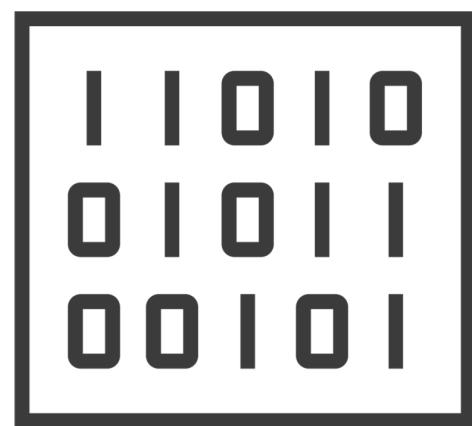
How did she know that these were  
the four views she needed to add?

1	1	0	1	0
0	1	0	1	1
0	0	1	0	1



How did she know that these were  
the four views she needed to add?

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How did she know that these were  
the four views she needed to add?





Renovation Progress Report

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021



## Front Lobby

Project Number 2021001

### Status

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget

FLAGGED FOR REVIEW

### Punch List

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

### Budget

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	<b>\$6,650</b>

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

### Inspection Log

Saturday, May 1, 2021 Front desk needs another coat of stain.

Thursday, May 6, 2021 Tile work is excellent.

Friday, May 7, 2021 Second coat of stain is sufficient.

**SNOWHAVEN SKI LODGE**

Renovation Progress Report

Friday, May 28, 2021



## Front Lobby

Project Number 2021001

**Status**

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

**Punch List**

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

**Budget**

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	<b>\$6,650</b>

9:41

Home Edit

# Front Lobby

SNOWHAVEN SKI LODGE Friday, May 28, 2021  
Renovation Progress Report



## Front Lobby

Project Number 2021001

Status

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

Punch List

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

Budget

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	\$6,650

On Budget

Amount Allocated: \$25,000.00  
Spent to-date: \$18,350.00  
Amount remaining: \$6,650.00

11:19

# Home



## Front Lobby

- 📅 Due on Aug 1, 2021
- ✖ 5 items
- % 60% complete
- 💲 On budget



## Main Entrance

- 📅 Due on May 30, 2021
- ✖ 2 items
- % 0% complete
- 💲 On budget



## 1st Floor Hallway

- 📅 Due on Jul 31, 2021
- ✖ 4 items
- % 25% complete
- 💲 On budget



## 2nd Floor Hallway

- 📅 Due on Jul 31, 2021
- ✖ 4 items
- % 0% complete
- 💲 On budget



## 1st Floor Guest Rooms

- 📅 Due on Nov 1, 2021
- ✖ 7 items
- % 29% complete
- 💲 Over budget



## 2nd Floor Guest Rooms

- 📅 Due on Nov 1, 2021
- ✖ 7 items
- % 0% complete
- 💲 On budget

11:19

# Home

- Front Lobby**  
Due on Aug 1, 2021  
5 items  
60% complete  
On budget
- Main Entrance**  
Due on May 30, 2021  
2 items  
0% complete  
On budget
- 1st Floor Hallway**  
Due on Jul 31, 2021  
4 items  
25% complete  
On budget
- 2nd Floor Hallway**  
Due on Jul 31, 2021  
4 items  
0% complete  
On budget
- 1st Floor Guest Rooms**  
Due on Nov 1, 2021  
7 items  
29% complete  
Over budget
- 2nd Floor Guest Rooms**  
Due on Nov 1, 2021  
7 items  
0% complete  
On budget

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021

2021

2021



## Front Lobby

Project Number 2021001

Status

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget

FLAGGED FOR REVIEW

Punch List

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

Budget

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	\$6,650

ining  
0,000

ining  
3,400

11:19

### Home

Project	Status
Home	20% complete On budget
2nd Floor Hallway	Due on Jul 31, 2021 4 items 0% complete On budget
1st Floor Guest Rooms	Due on Nov 1, 2021 7 items 29% complete Over budget
2nd Floor Guest Rooms	Due on Nov 1, 2021 7 items 0% complete On budget
Restaurant	Due on Aug 30, 2021 6 items 33% complete On budget
Lounge	Due on Aug 15, 2021 5 items 0% complete On budget
Ski Lift 1	Due on Nov 15, 2021 4 items 25% complete On budget

SKILLZ

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

**Main Entry**  
Project Number 2021002

Status: Work Quality: Good | 0% Complete | FLAGGED FOR REVIEW

Punch List:

- TBD

Budget:

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	\$6,650

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

**Front Lobby**  
Project Number 2021001

Status: Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget | FLAGGED FOR REVIEW

Punch List:

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

Budget:

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	\$6,650

Friday, May 28, 2021

11:19

Home

70% complete  
On budget

2nd Floor Hallway  
Due on Jul 31, 2021  
4 items  
0% complete  
On budget

1st Floor Guest Rooms  
Due on Nov 1, 2021  
7 items  
29% complete  
Over budget

2nd Floor Guest Rooms  
Due on Nov 1, 2021  
7 items  
0% complete  
On budget

Restaurant  
Due on Aug 30, 2021  
6 items  
33% complete  
On budget

Lounge  
Due on Aug 15, 2021  
5 items  
0% complete  
On budget

Ski Lift 1  
Due on Nov 15, 2021  
4 items  
25% complete  
On budget

SKILLZ

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021

2021

2021



## Main Entrance

Project Number 2021002

Status

Work Quality: Good | 0% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

Punch List

- TBD

Budget

Amount Allocated	Spent To-date	Amount Remaining
\$25,000	\$5,000	\$20,000

3,400

6,650

11:19

Home Edit

# Restaurant

33%

Due on Aug 30, 2021

### Work Quality

★★★☆

### Punch List

- Remove old carpet
- Install tile
- Replace light fixtures
- Paint walls
- Hang new artwork
- Replace furniture

### Budget

On Budget

Amount Allocated:	\$10,500.00
Spent to-date:	\$2,100.00
Amount remaining:	\$8,400.00

SNOWHAVEN SKI LODGE  
Renovation Progress Report

Friday, May 28, 2021

2021

2021

## Main Entrance

Project Number 2021002

Status

Work Quality: Good | 0% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

Punch List

- TBD

Budget

Amount Allocated	Spent To-date	Amount Remaining
\$25,000	\$5,000	\$20,000

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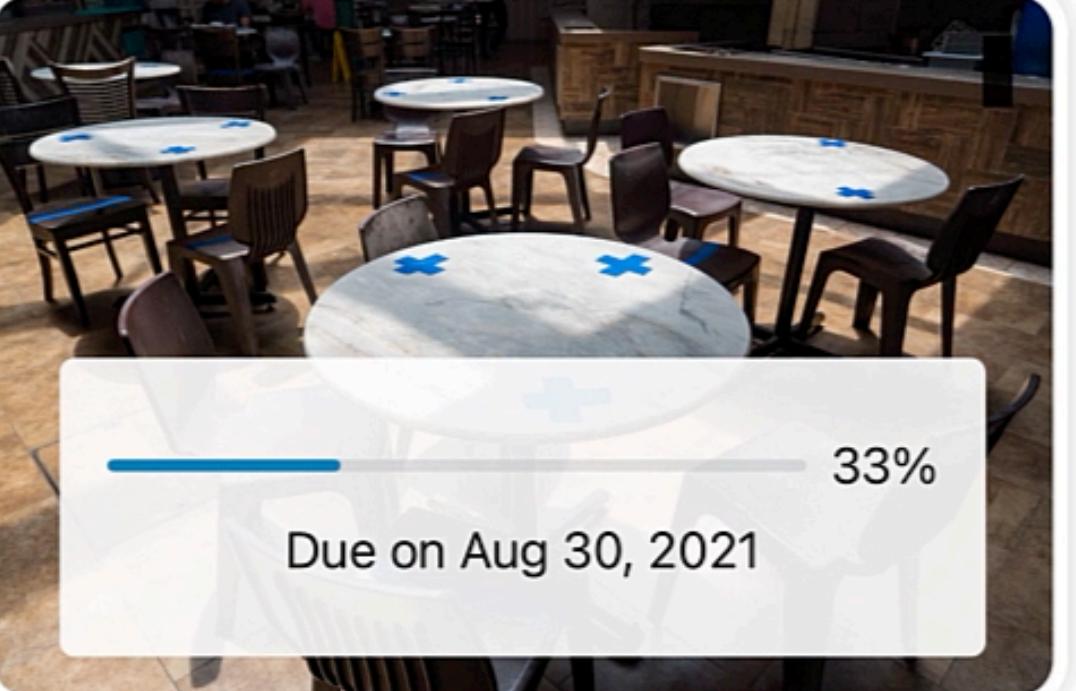
ining

ining

11:19

Home Edit

# Restaurant



33%

Due on Aug 30, 2021

### Work Quality

★★★☆

### Punch List

- Remove old carpet
- Install tile
- Replace light fixtures
- Paint walls
- Hang new artwork
- Replace furniture

### Budget

On Budget

Amount Allocated:	\$10,500.00
Spent to-date:	\$2,100.00
Amount remaining:	\$8,400.00

SNOWHAVEN SKI LODGE  
Renovation Progress Report

Friday, May 28, 2021



# Restaurant

Project Number 2021007

### Status

Work Quality: Good | 33% Complete | Due on Monday, August 30, 2021 | On Budget

### Punch List

- ✓ Remove old carpet
- ✓ Install tile
- Replace light fixtures
- Paint walls
- Hang new artwork
- Replace furniture

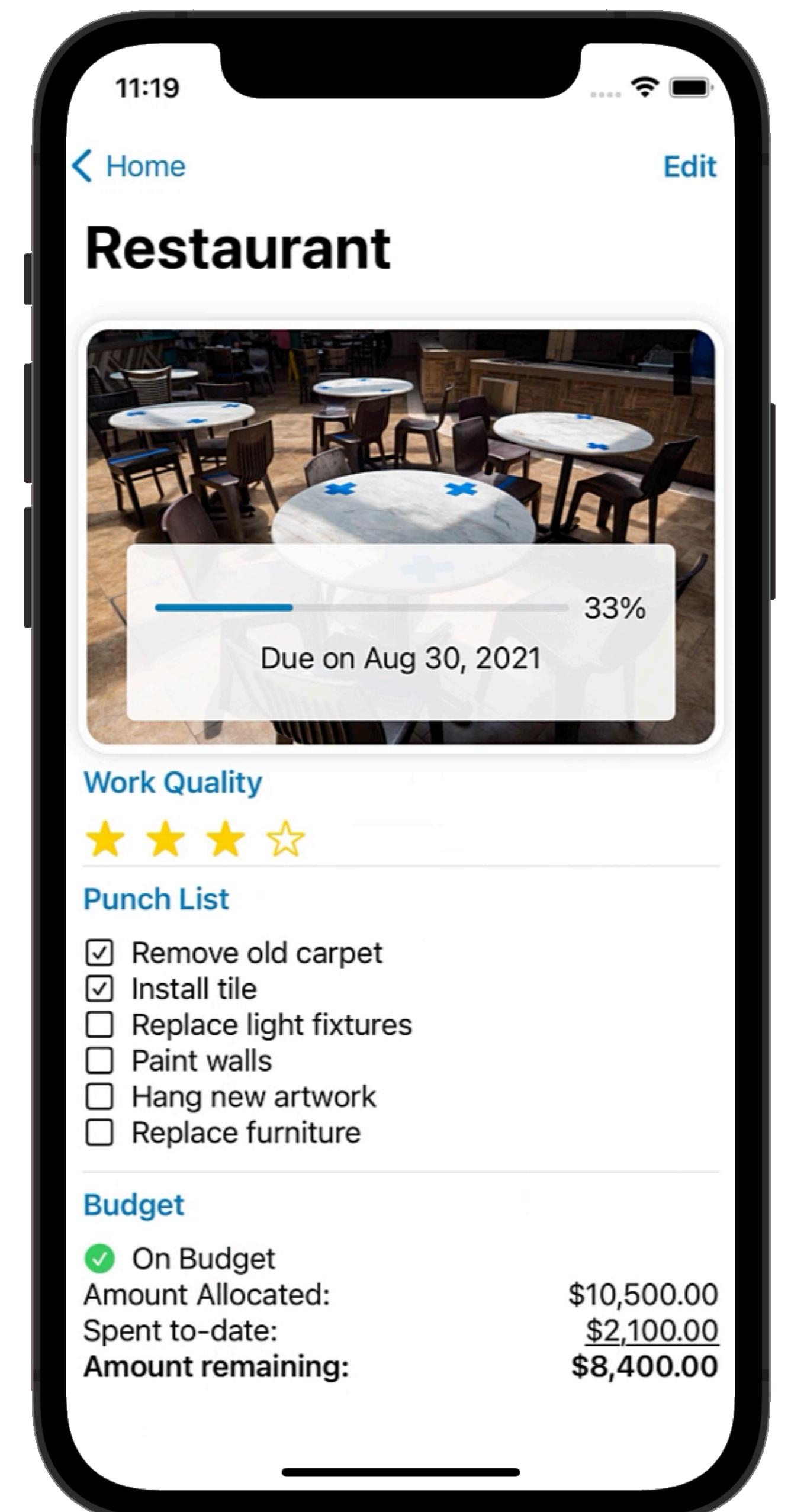
### Budget

Amount Allocated	Spent To-date	Amount Remaining
\$10,500	\$2,100	\$8,400

11:19

Home Edit

# Restaurant



33%

Due on Aug 30, 2021

Work Quality

★★★★

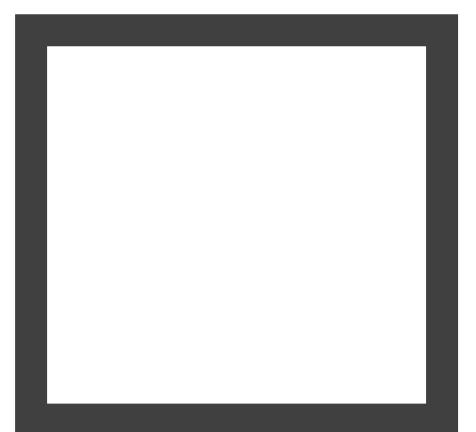
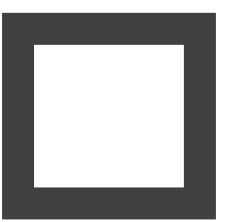
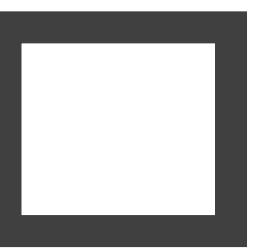
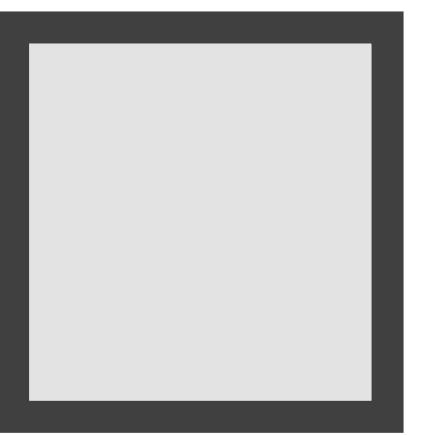
Punch List

- Remove old carpet
- Install tile
- Replace light fixtures
- Paint walls
- Hang new artwork
- Replace furniture

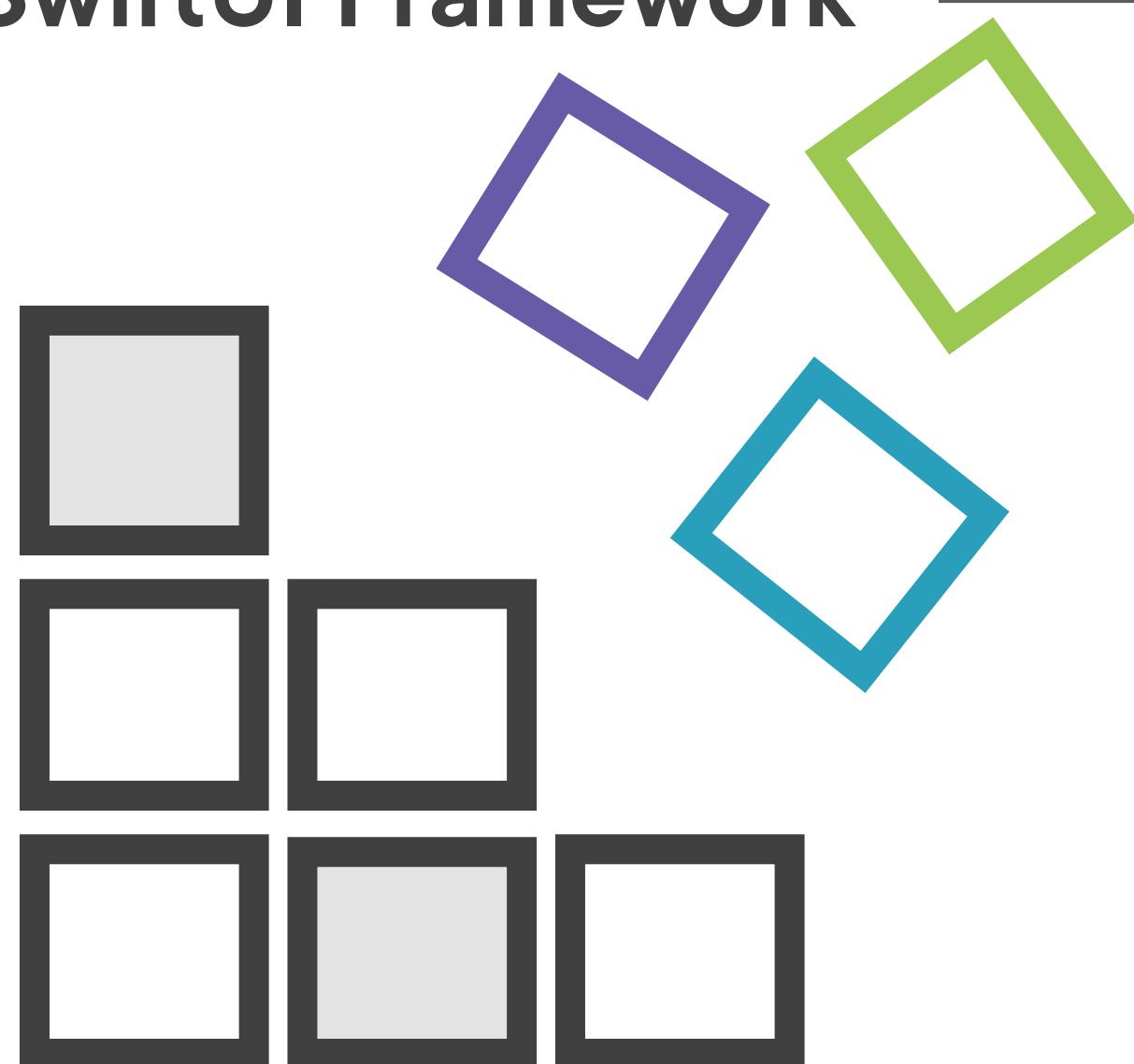
Budget

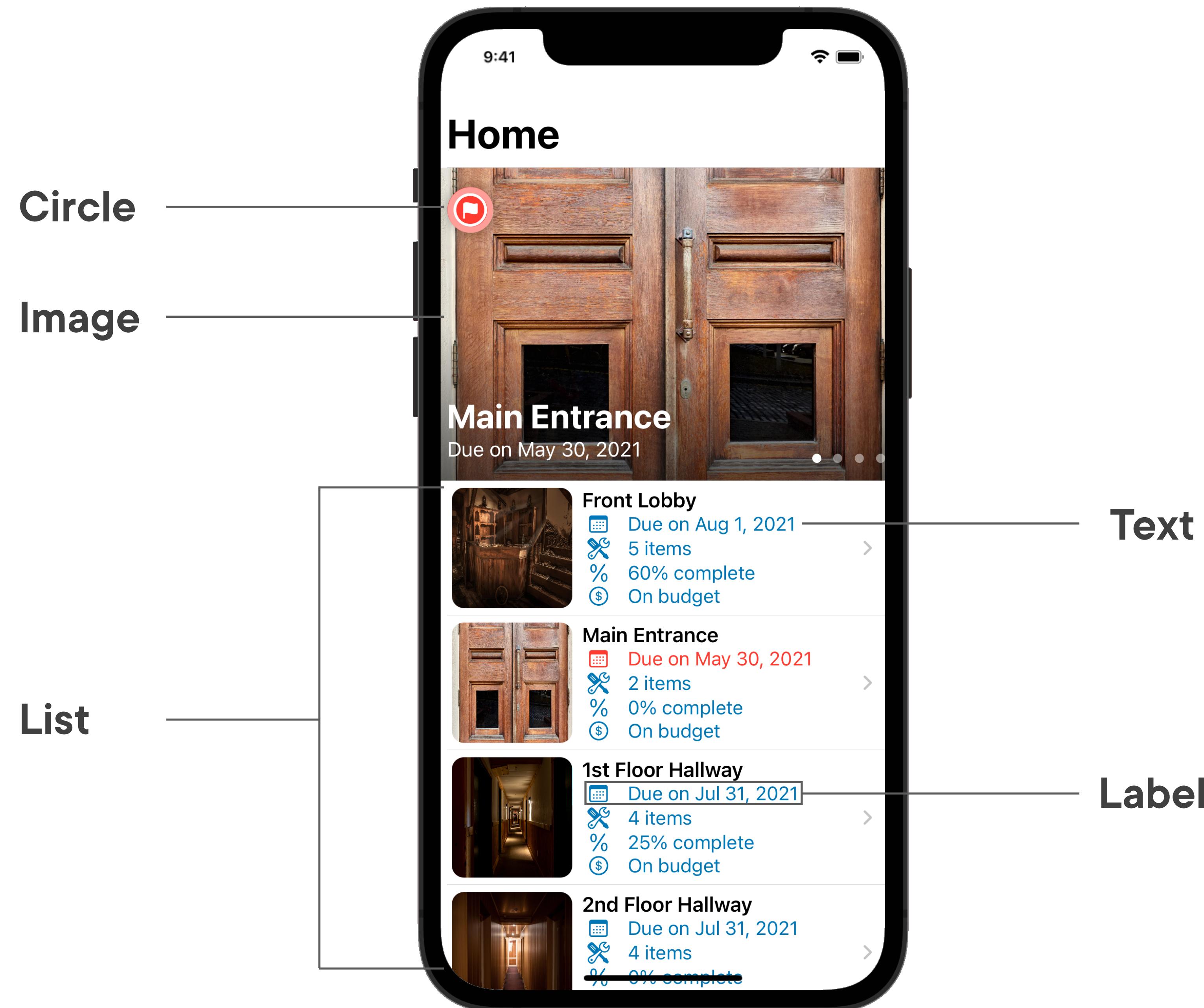
On Budget

Amount Allocated:	\$10,500.00
Spent to-date:	\$2,100.00
Amount remaining:	\$8,400.00



## SwiftUI Framework





Circle

Image

List

Home

Main Entrance

Due on May 30, 2021

Front Lobby

Due on Aug 1, 2021  
 5 items  
% 60% complete  
\$ On budget

Main Entrance

Due on May 30, 2021  
 2 items  
% 0% complete  
\$ On budget

1st Floor Hallway

Due on Jul 31, 2021  
 4 items  
% 25% complete  
\$ On budget

2nd Floor Hallway

Due on Jul 31, 2021  
 4 items  
% 0% complete

Text

Label

**“I, a compliant Apple Developer, hereby promise to implement...”**



**View Protocol**

- ✓ A **computed property...**
- ✓ **named body...**
- ✓ **that returns some View**

# Creating Basic Designs and Layouts

**SwiftUI  
Layout Containers**

**Other  
Primitive Views**

**View Modifiers**

# Creating Basic Designs and Layouts

---

# Challenges With Building User Interfaces



Envision the entire layout and all the styles to create for an app's look and feel  
**all up front**

# Advantages of SwiftUI



**Intuitive** to pick a starting point and begin experimenting with how to lay out and design our user interfaces



Where should you and I begin?

Why not start with laying out the  
**Detail View?**

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021



## Front Lobby

Project Number 2021001

**Status**

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

**Punch List**

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

**Budget**

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	<b>\$6,650</b>



**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021



## Front Lobby

Project Number 2021001

**Status**

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget  
FLAGGED FOR REVIEW

**Punch List**

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

**Budget**

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	\$6,650

9:41

< Home Edit

## Front Lobby



**Work Quality**

★★★☆ [View Inspection Log](#)

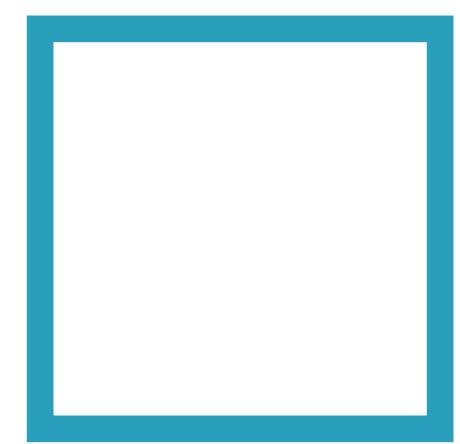
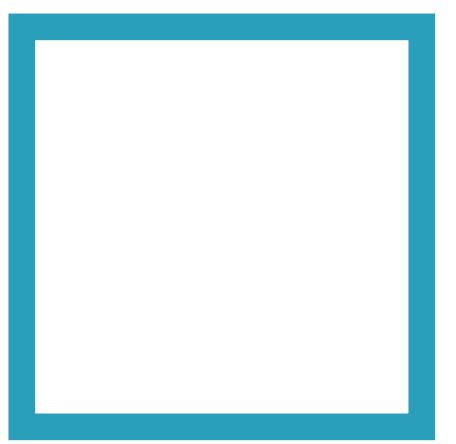
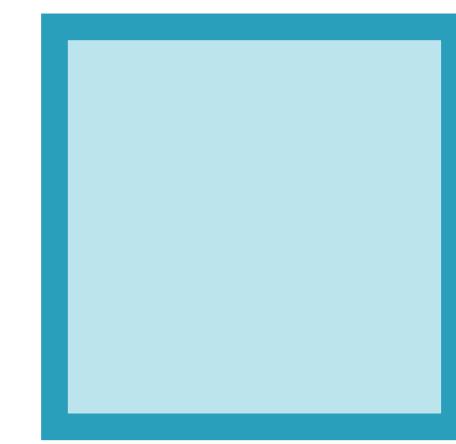
**Punch List**

- Remodel front desk
- Retile entry
- Replace light fixtures
- Paint walls
- Hang new artwork

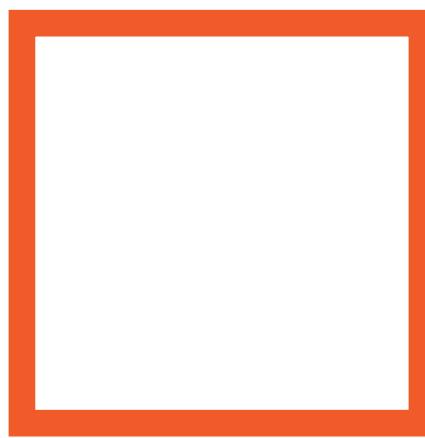
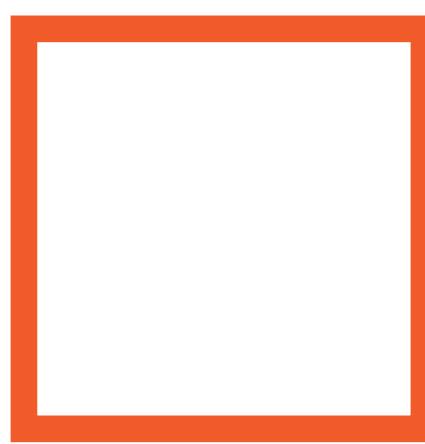
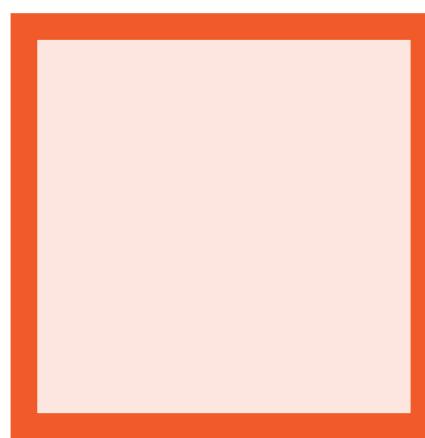
**Budget**

✓ On Budget

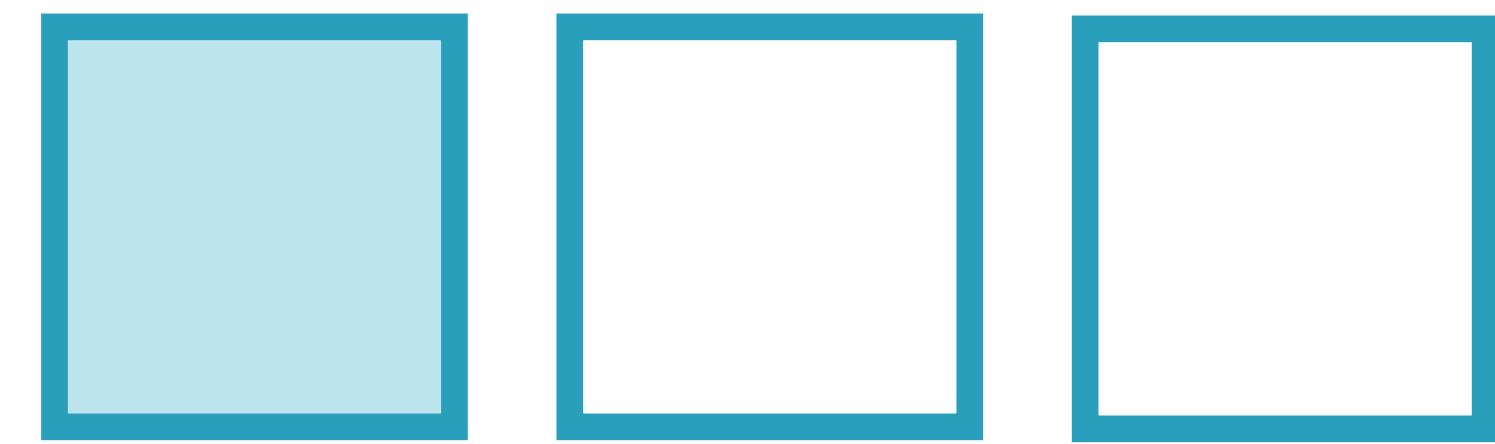
Amount Allocated:	\$25,000.00
Spent to-date:	\$18,350.00
Amount remaining:	\$6,650.00



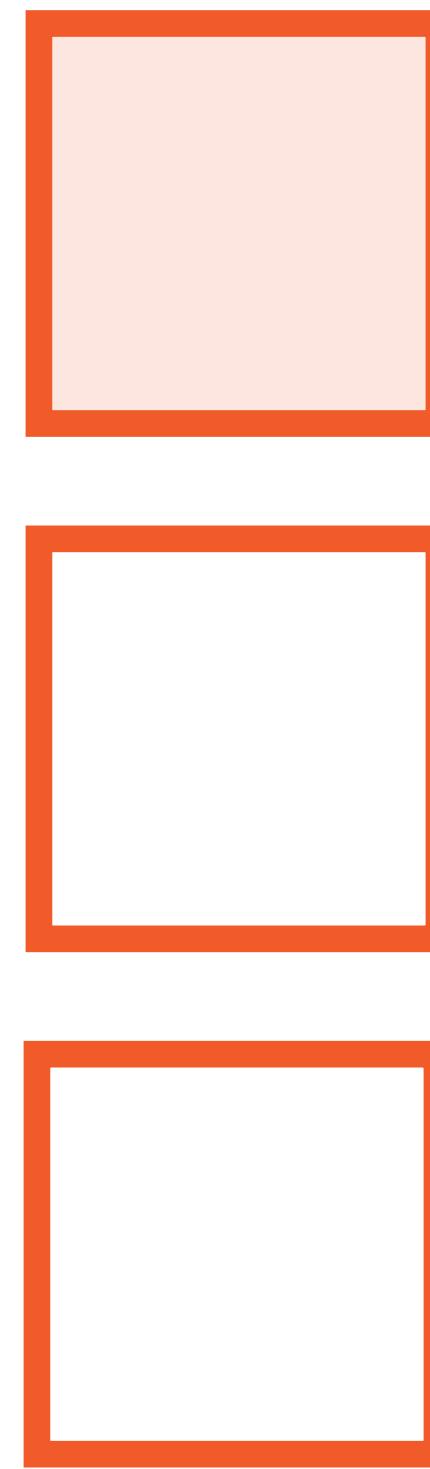
**Horizontal**



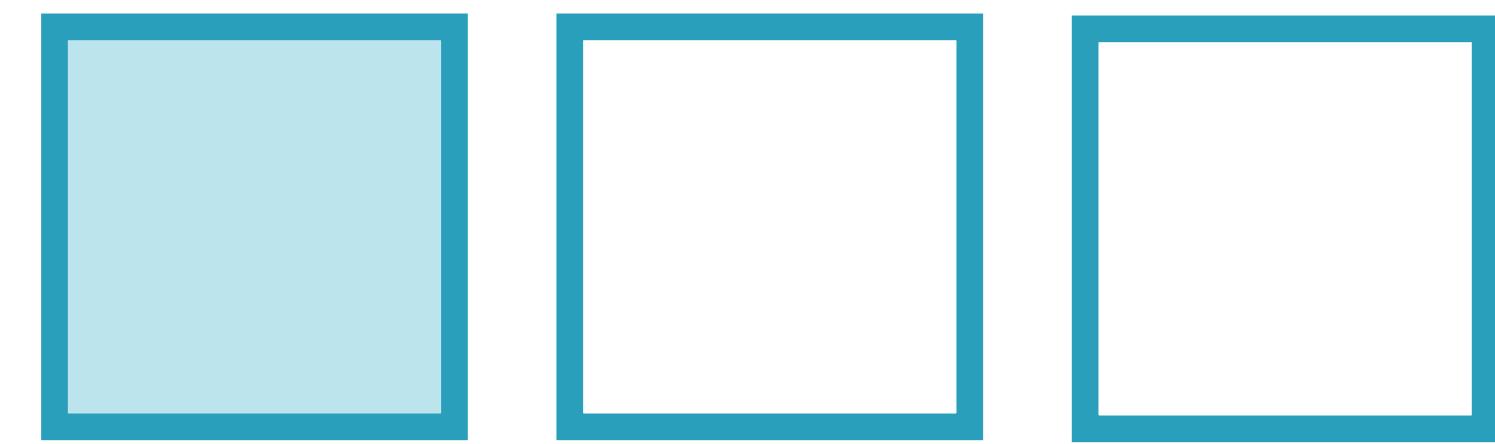
**Vertical**



Horizontal Stack



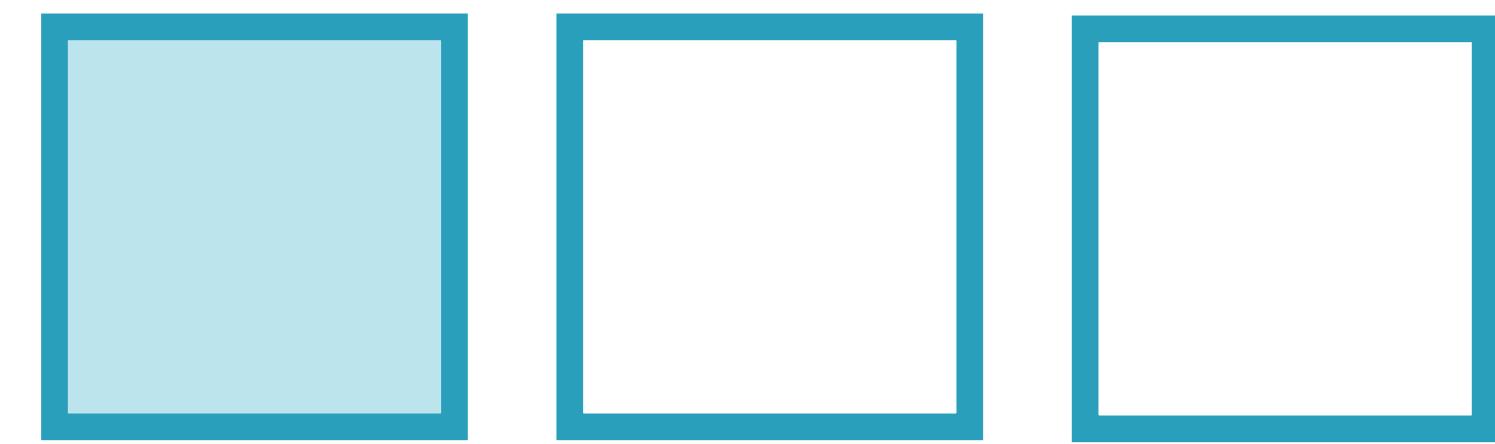
Vertical Stack



Horizontal Stack



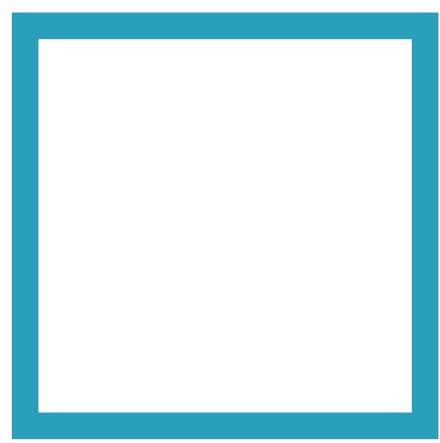
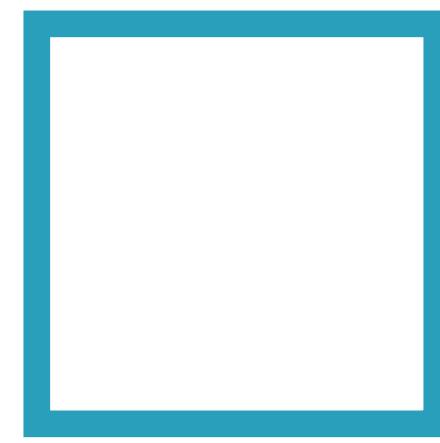
Vertical Stack



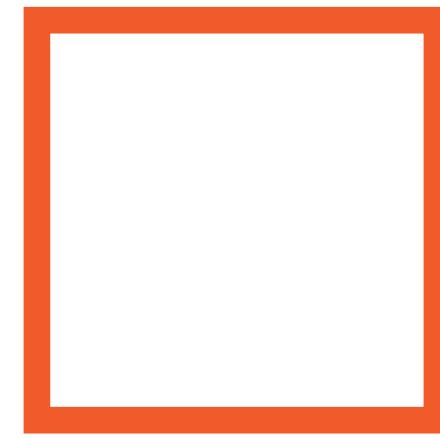
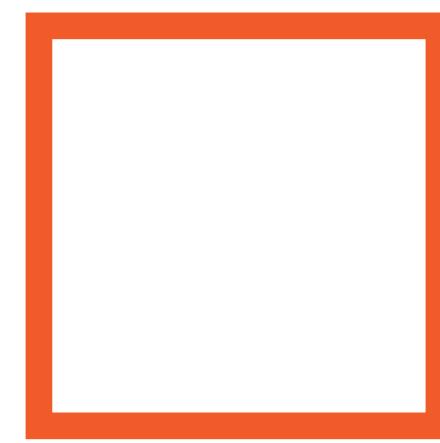
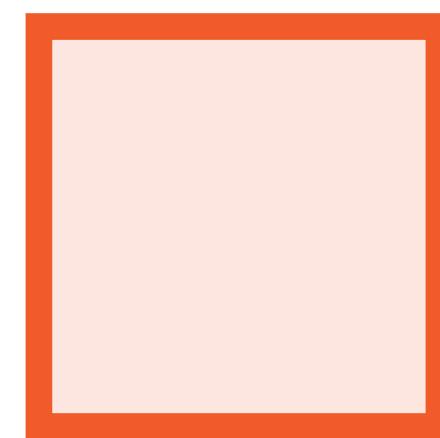
Horizontal Stack



Vertical Stack



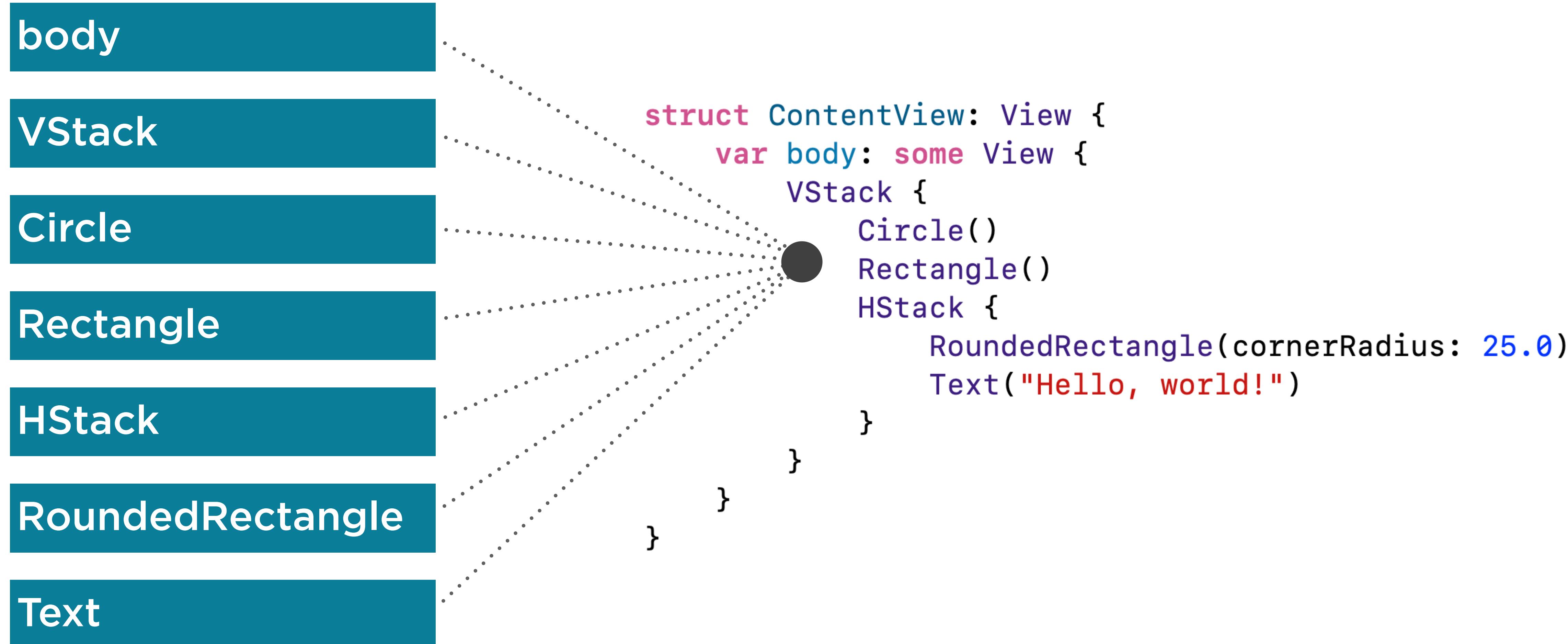
HStack



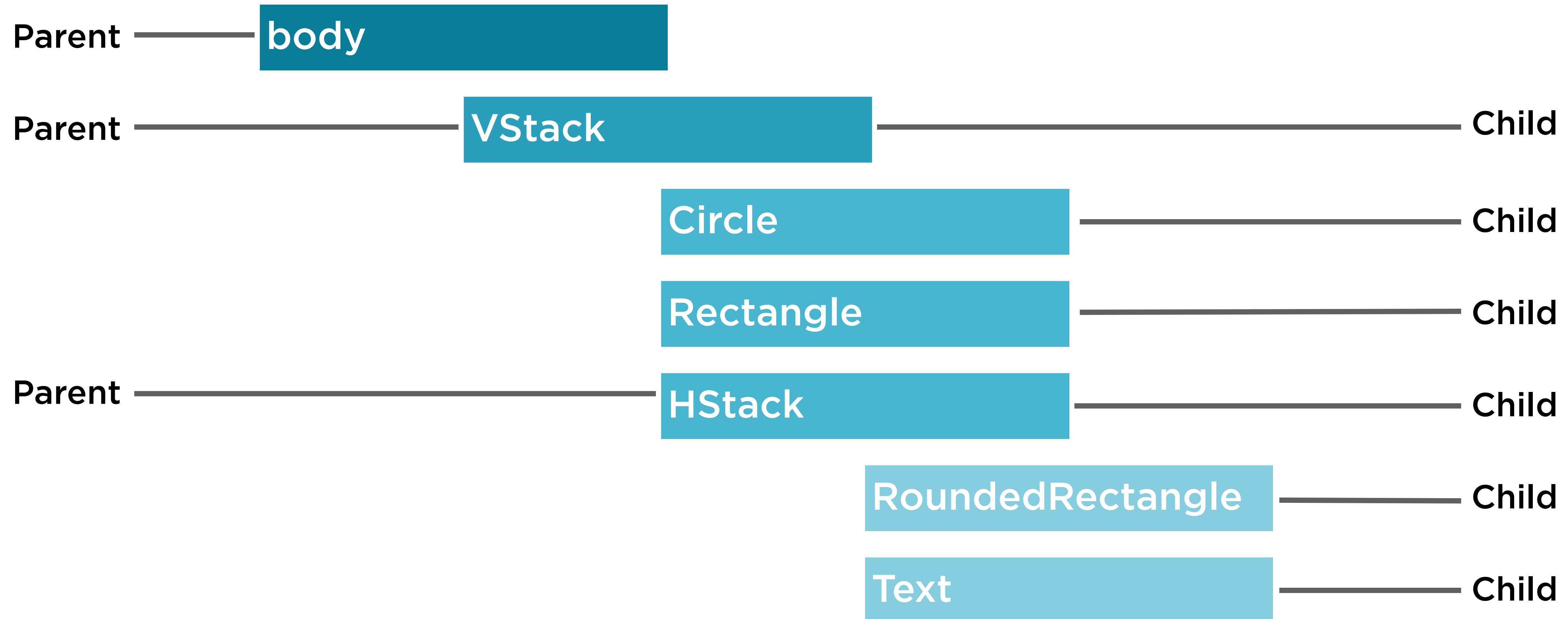
VStack

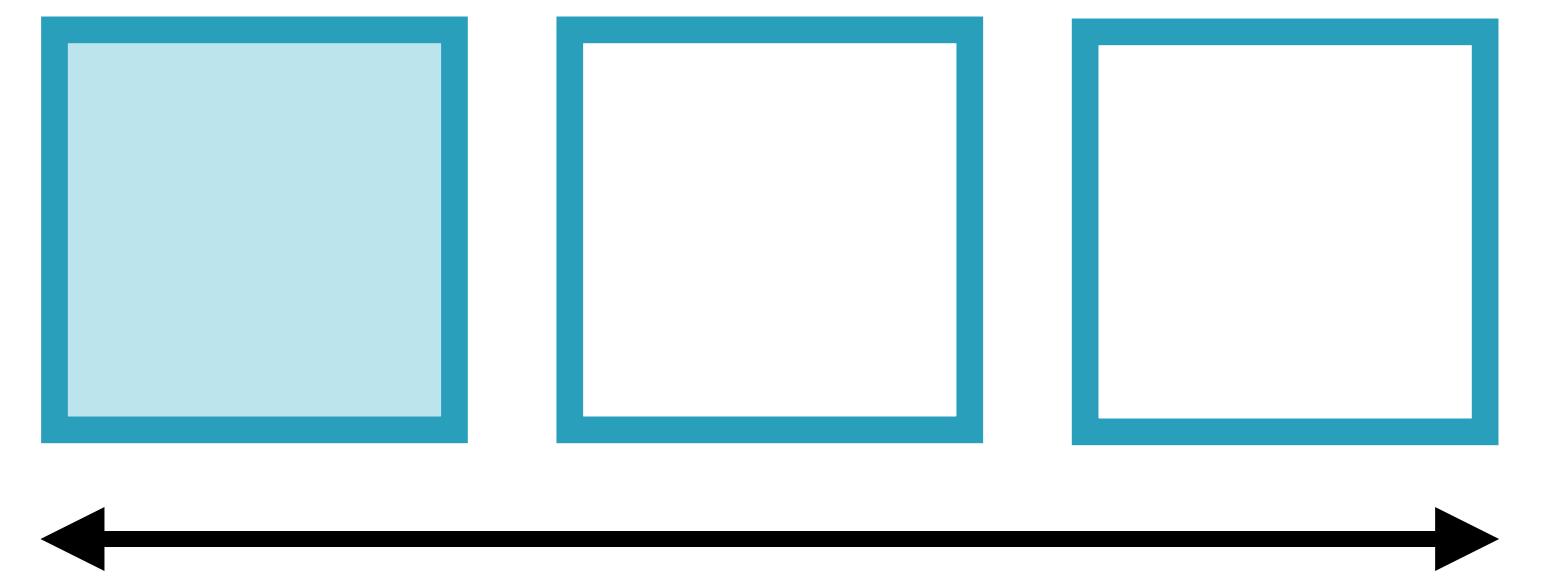
Foundational to getting Views to appear where you want them on a screen.

# View Hierarchy

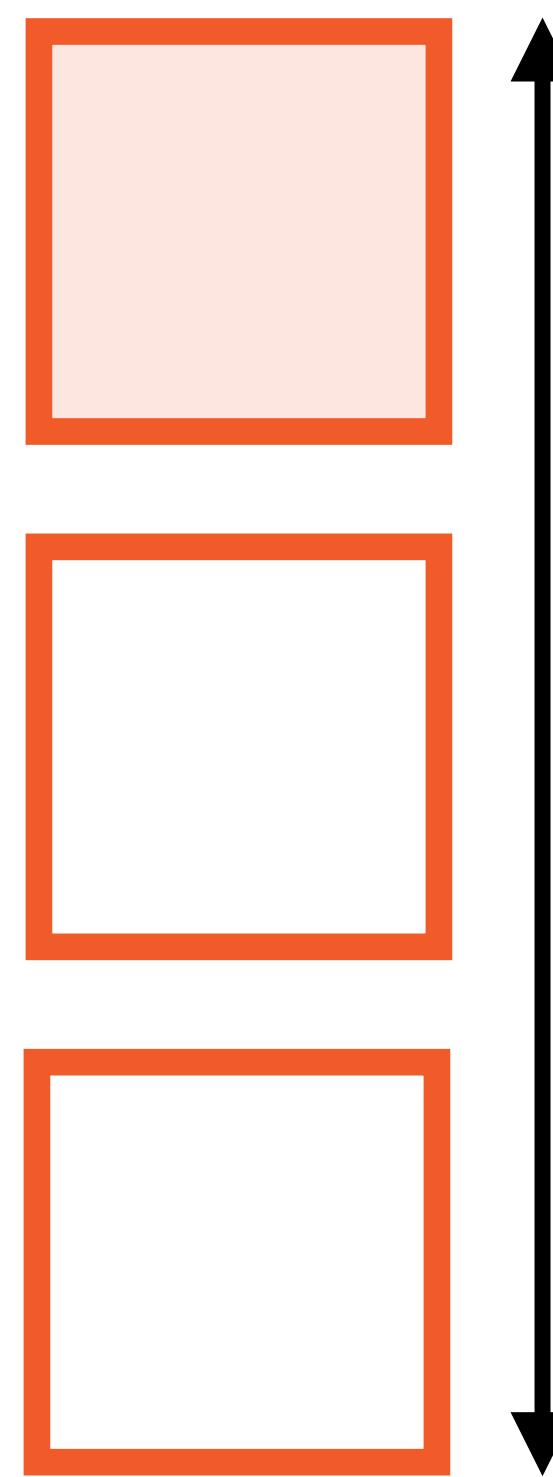


# View Hierarchy





HStack



VStack

**SNOWHAVEN SKI LODGE**  
Renovation Progress Report

Friday, May 28, 2021



## Front Lobby

Project Number 2021001

### Status

Work Quality: Good | 60% Complete | Due on Sunday, August 1, 2021 | On Budget

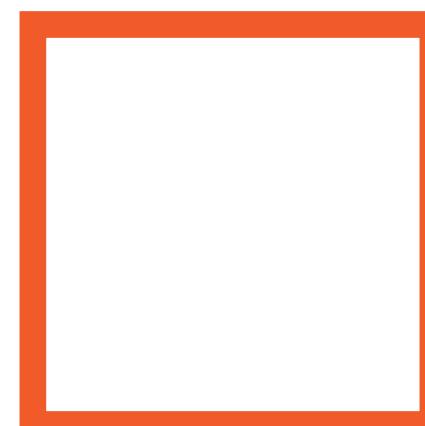
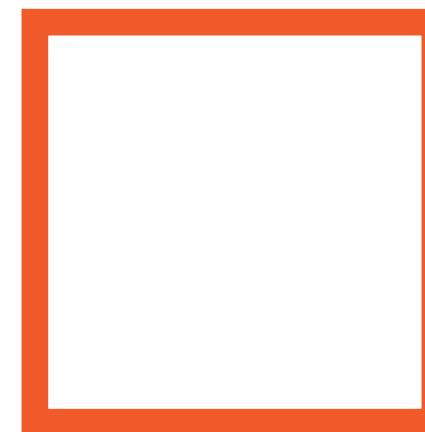
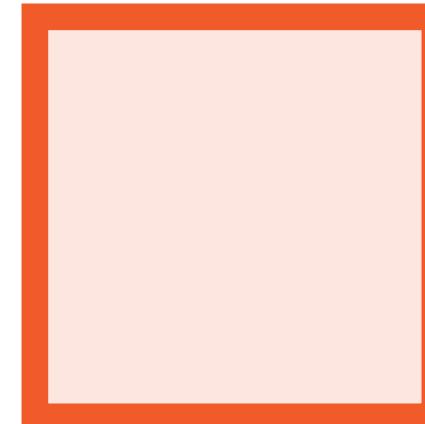
FLAGGED FOR REVIEW

### Punch List

- ✓ Remodel front desk
- ✓ Retile entry
- ✓ Replace light fixtures
- \* Paint walls
- Hang new artwork

### Budget

Amount Allocated	Spent To-date	Amount Remaining
\$15,000	\$8,350	<b>\$6,650</b>



V Stack

**Representing data**  
is foundational to building  
effective user interfaces.

# A View has one critical job:



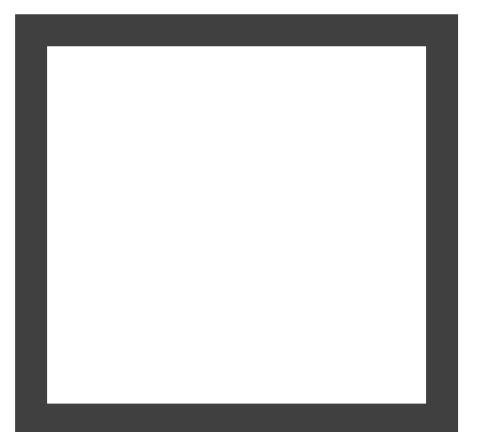
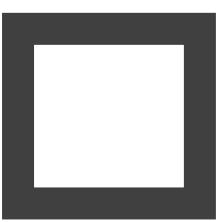
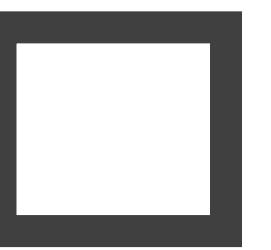
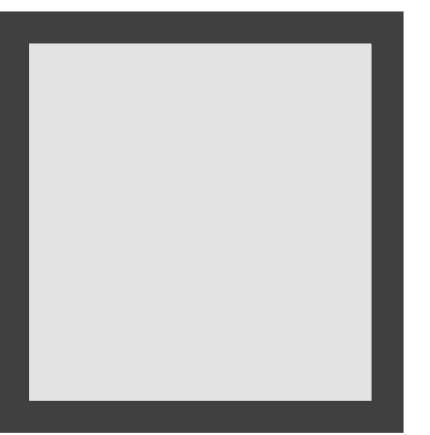
Accurately **represent** the **data** of an application at all times in what gets displayed on the screen.



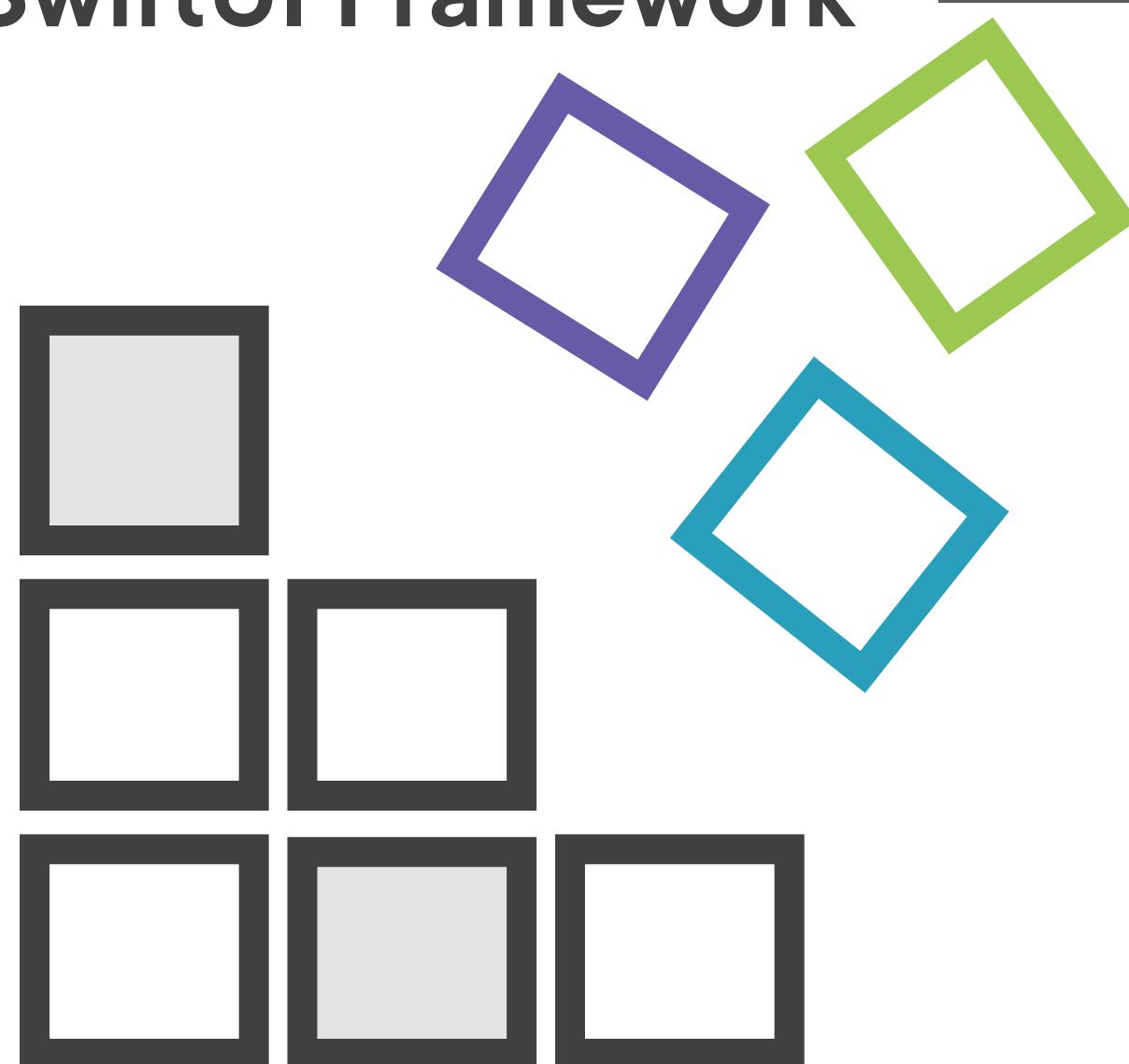
What are some other ways to represent data  
in SwiftUI?

# Representing Data in User Interfaces

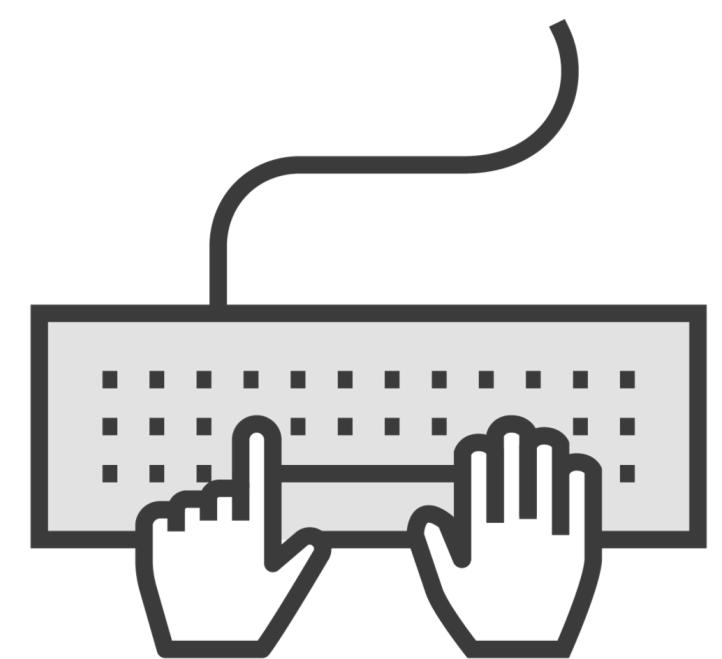
---



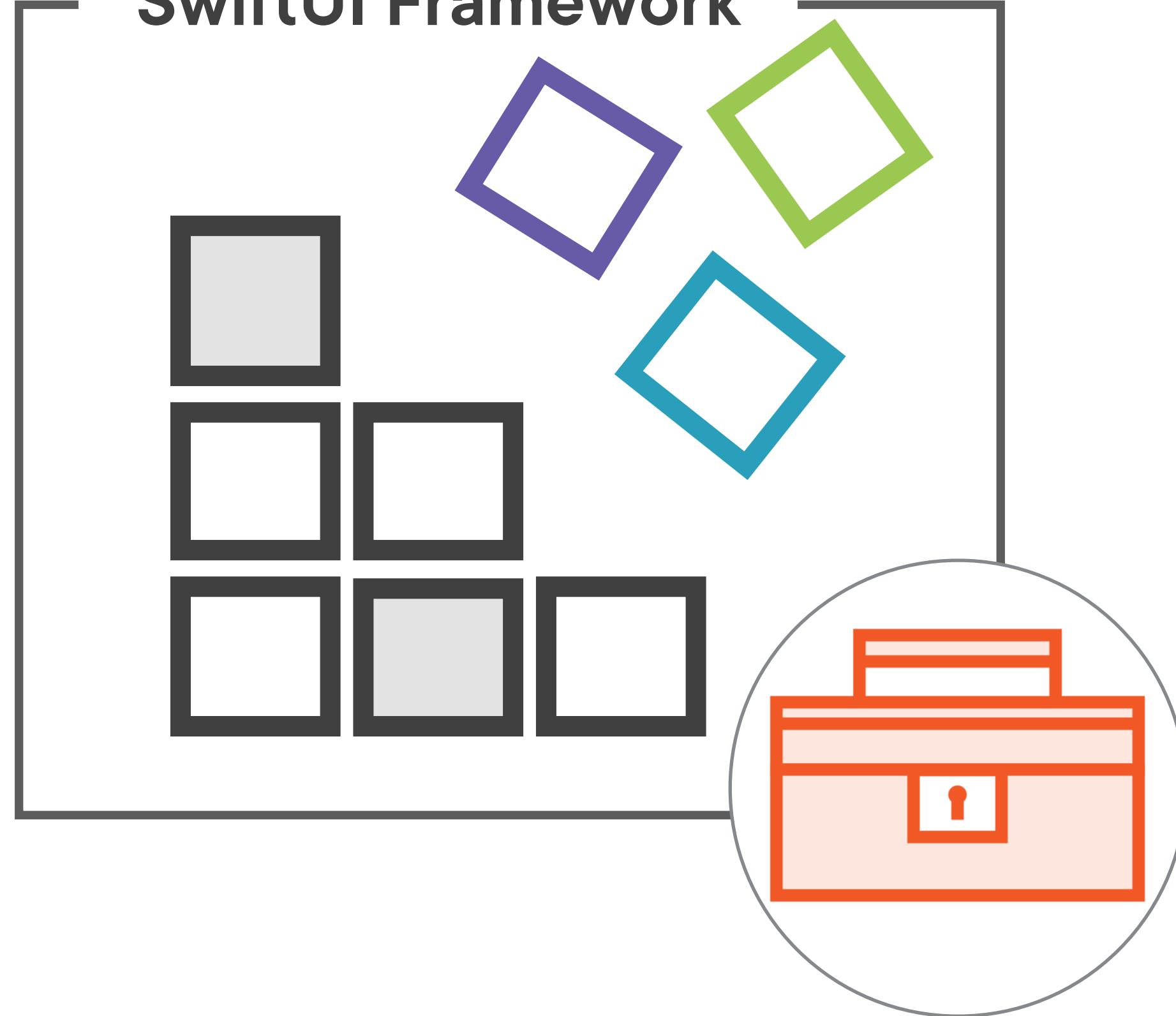
## SwiftUI Framework



$$\boxed{\bullet} = \boxed{\bullet}$$



## SwiftUI Framework





# Image

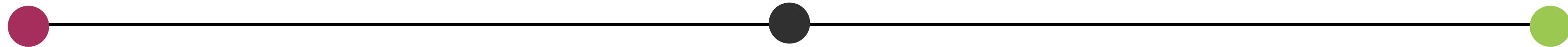
Represents photos and other graphical content.

**HEIF**

**PNG**

**JPG**

**PDF**



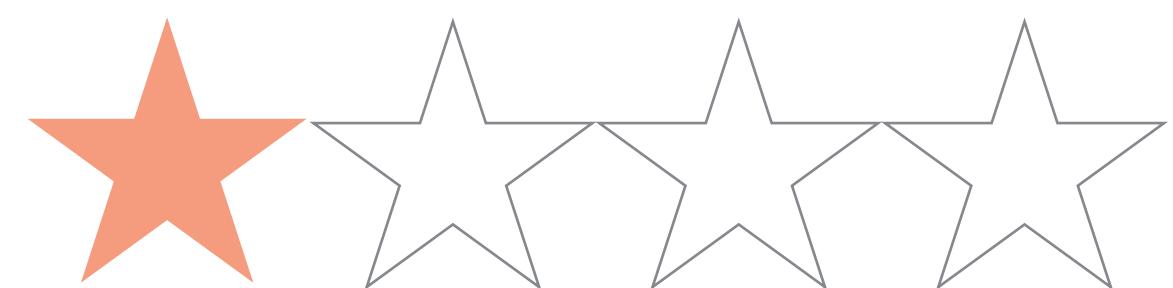
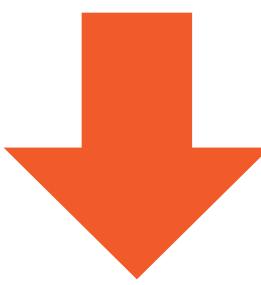
**Worse than good**

**Good**

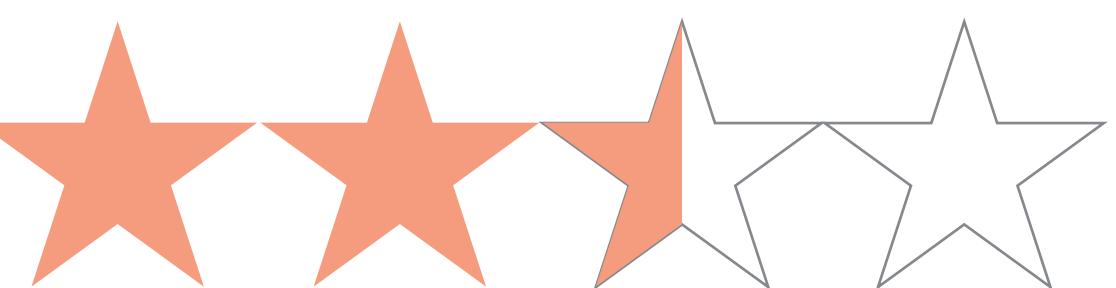
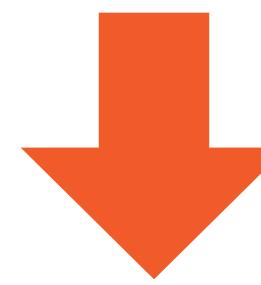
**Better than good**



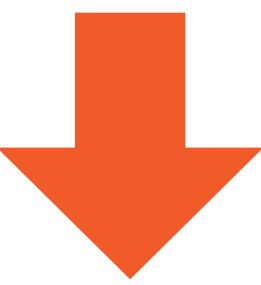
**Worse than good**



**Good**



**Better than good**





**SF Symbols 3**

**iOS 15**

**SF Symbols 2**

**iOS 14+**



## Label

Represents a combination of an icon and a string of text.

# Settings



Sign in to your iPhone

Set up iCloud, the App Store, and more.



General



Accessibility



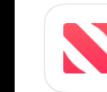
Privacy



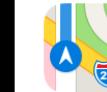
Passwords



Safari



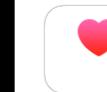
News



Maps



Shortcuts



Health



Siri & Search



Photos



SwiftUI is Apple's declarative framework  
for building user interfaces  
across all of its platforms.

iOS

iPadOS

macOS

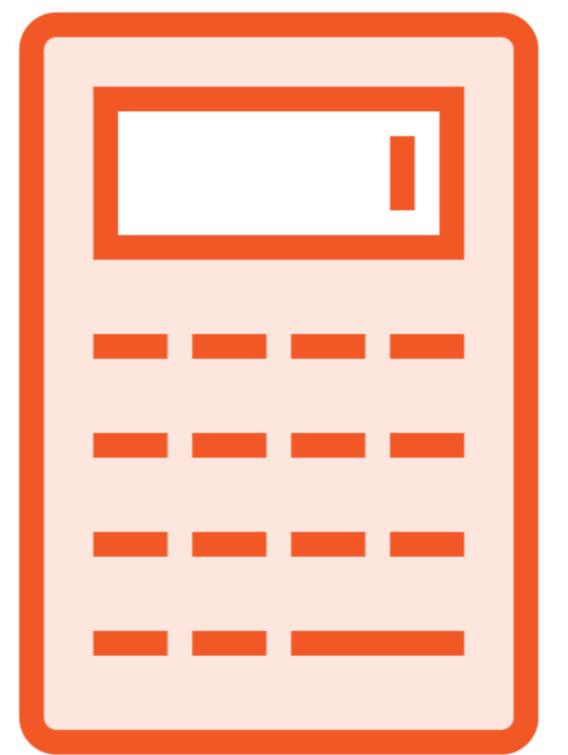
watchOS

tvOS

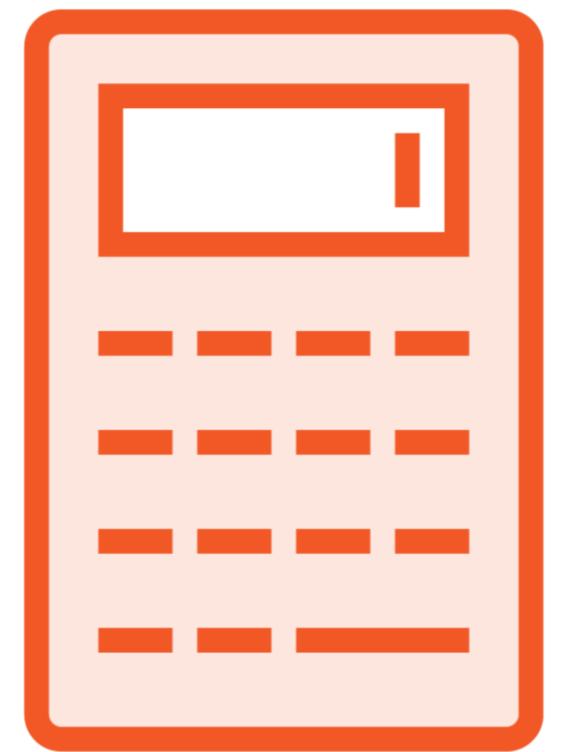


# ProgressView

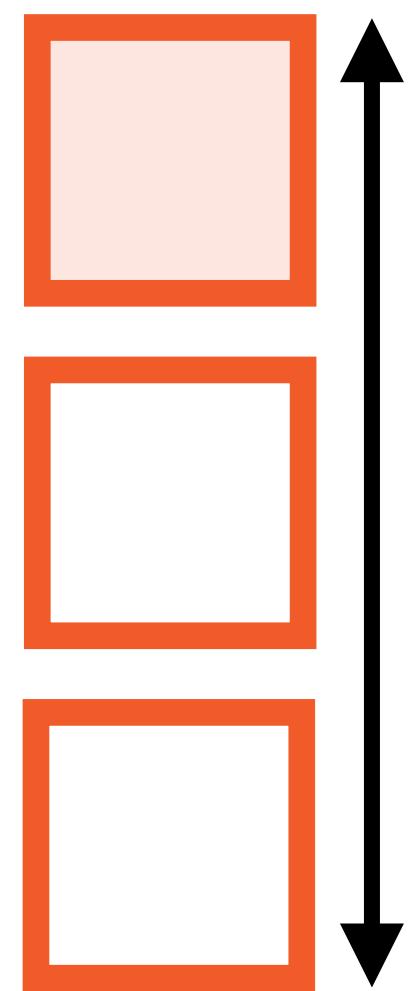
Represents progress towards completion of a task.



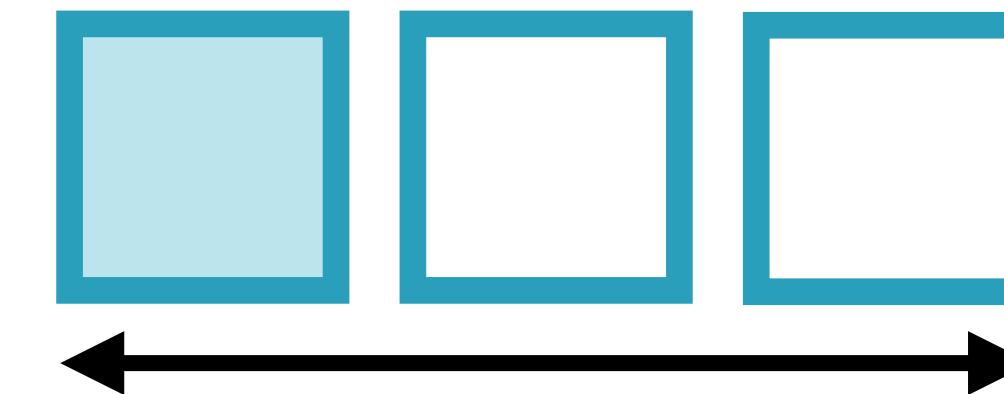
**5 Total Items**



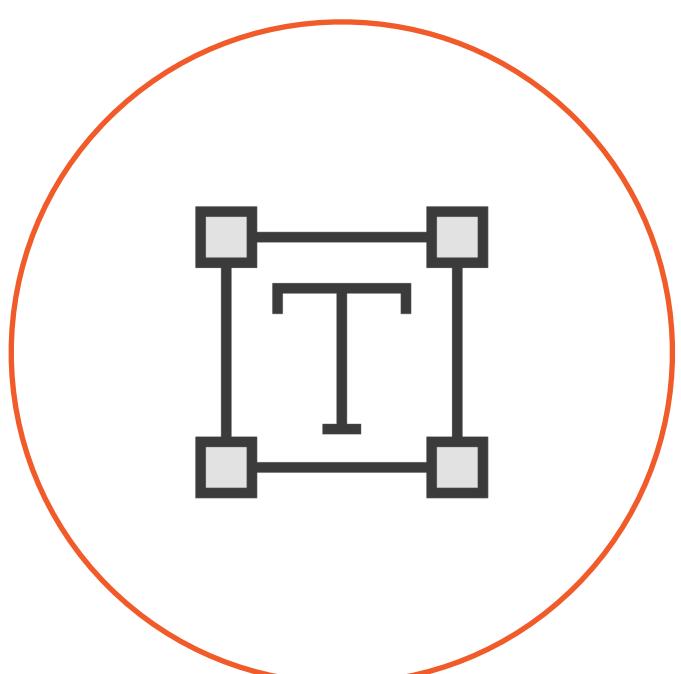
**3 Complete**  $\div$  **5 Total Items**  $=$  0.6



**V Stack**



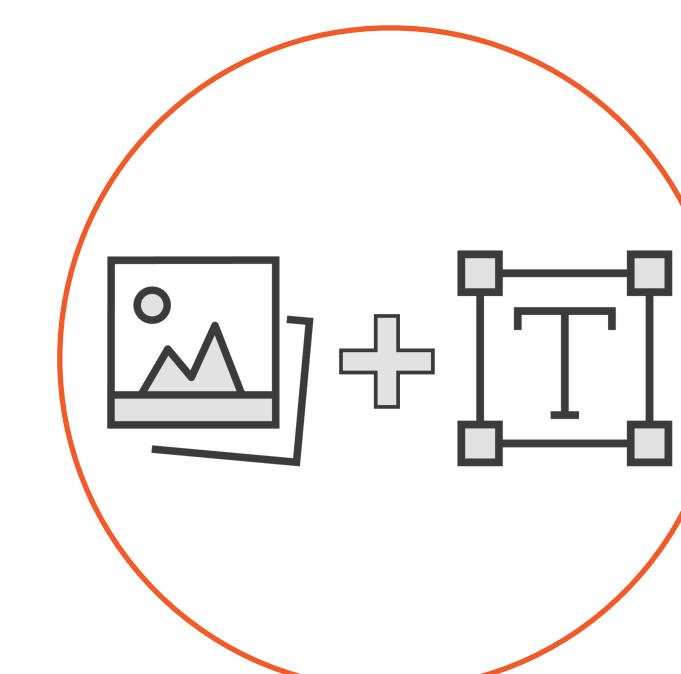
**H Stack**



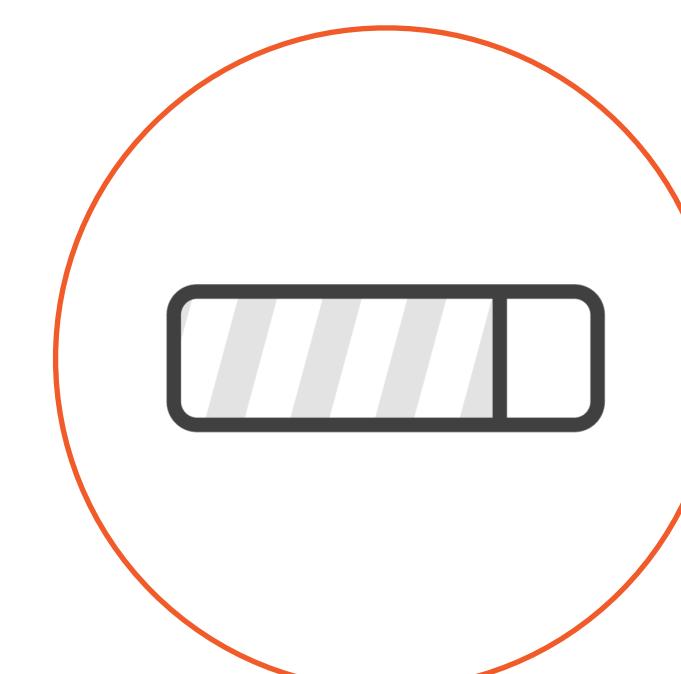
**Text**



**Image**



**Label**



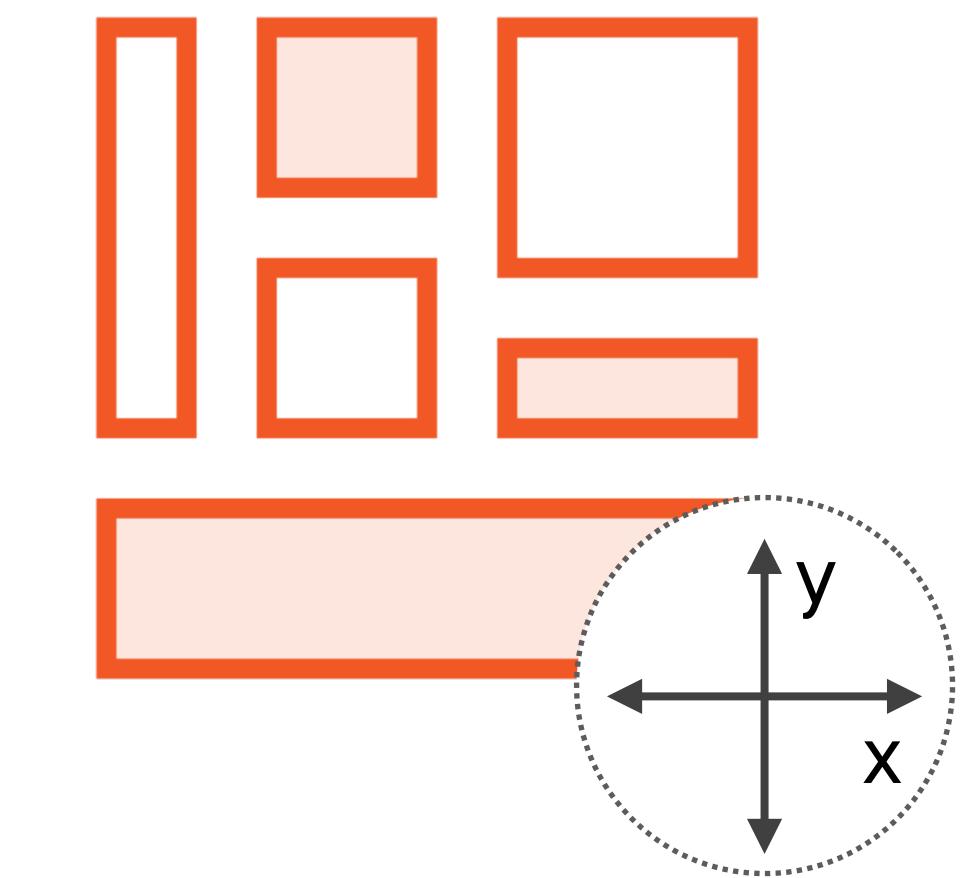
**ProgressView**

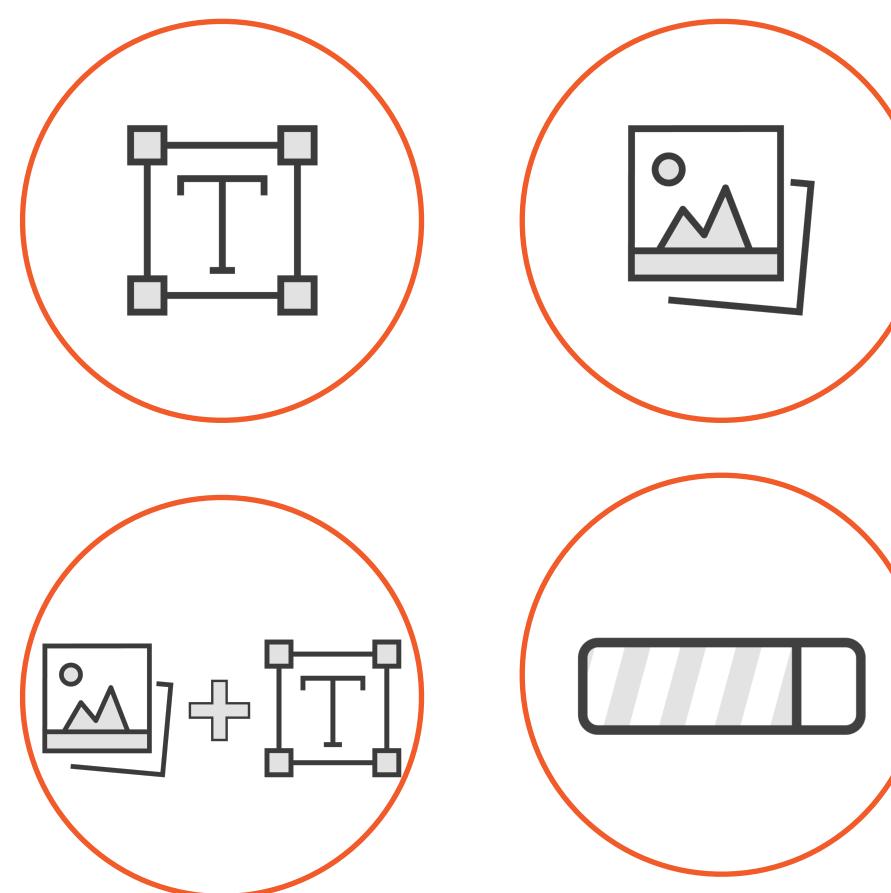
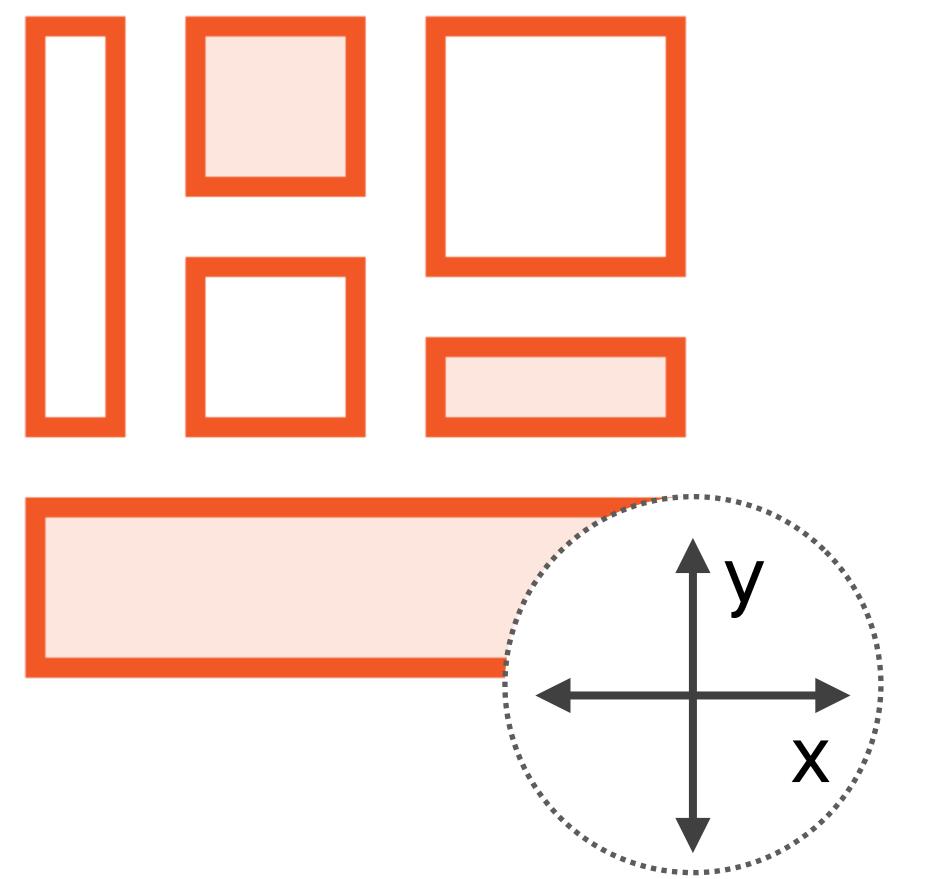


How do we customize the appearance  
of SwiftUI Views?

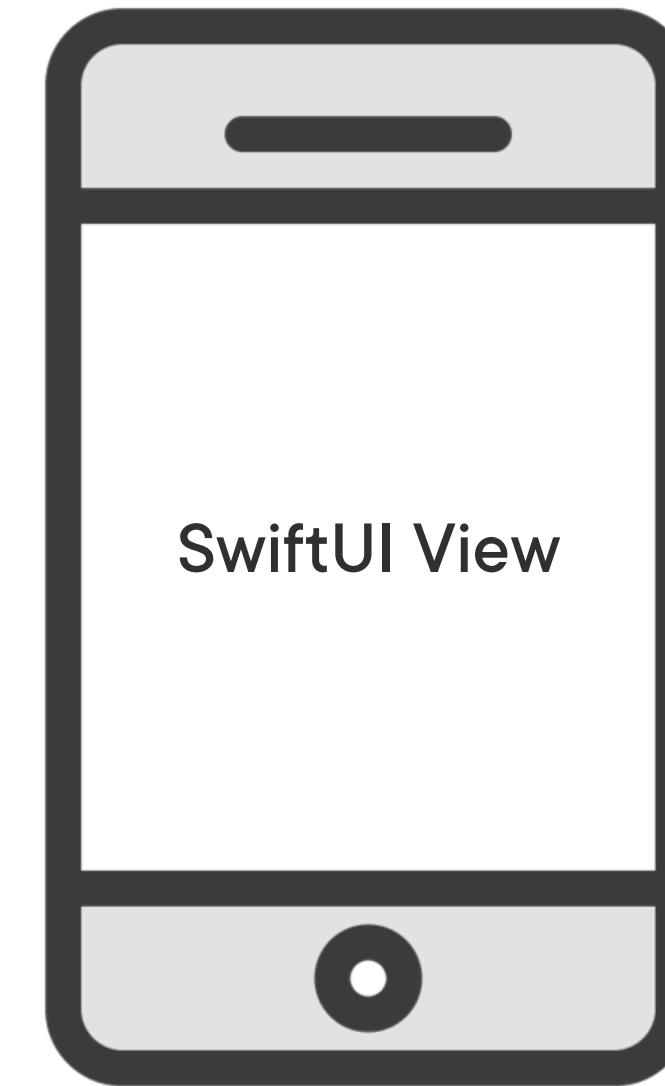
# Customizing the Appearance of Views

---

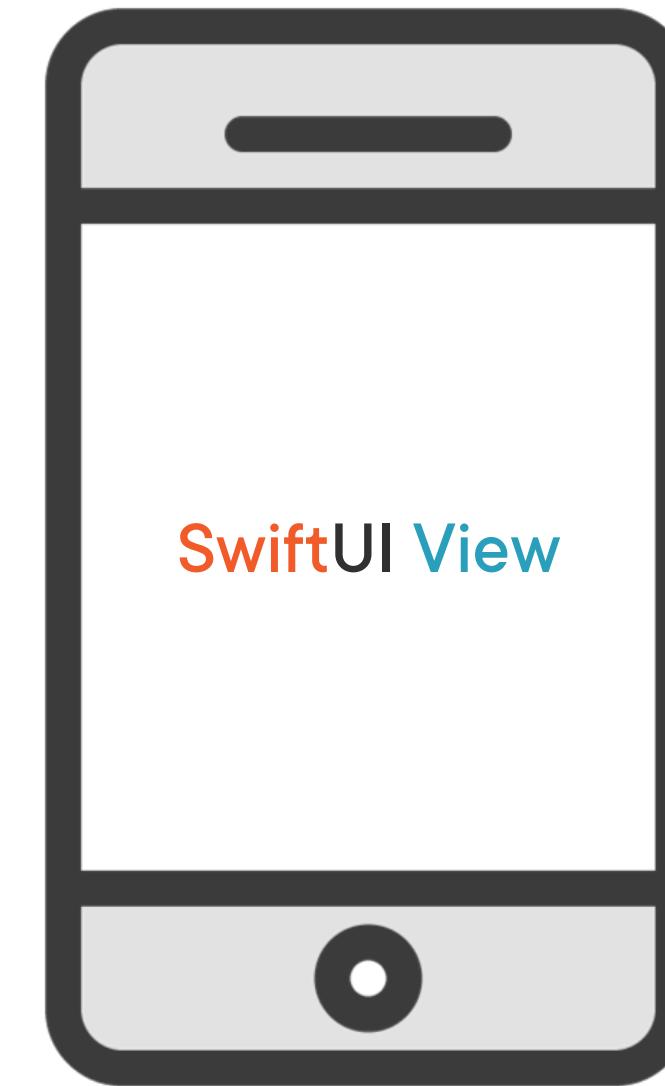




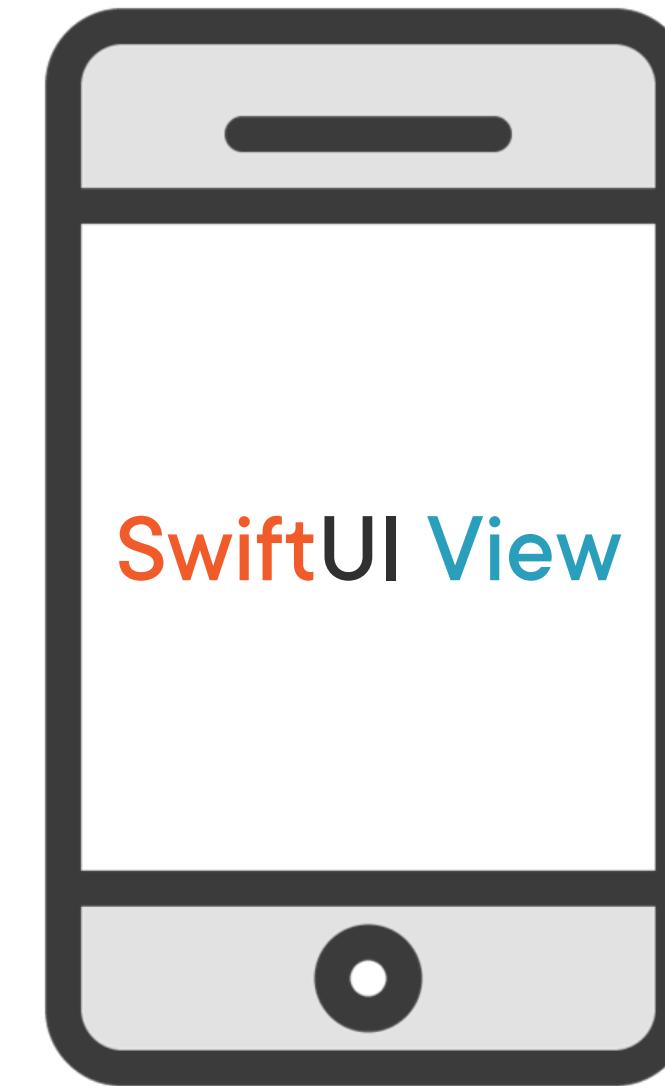
# Customize a View's Appearance



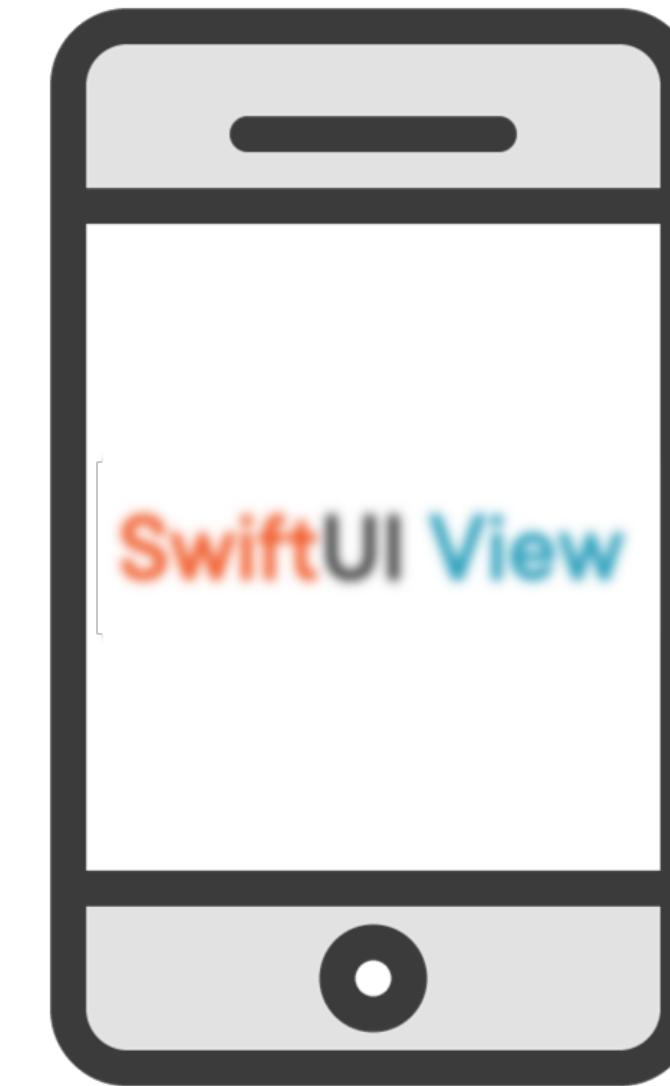
# Customize a View's Appearance



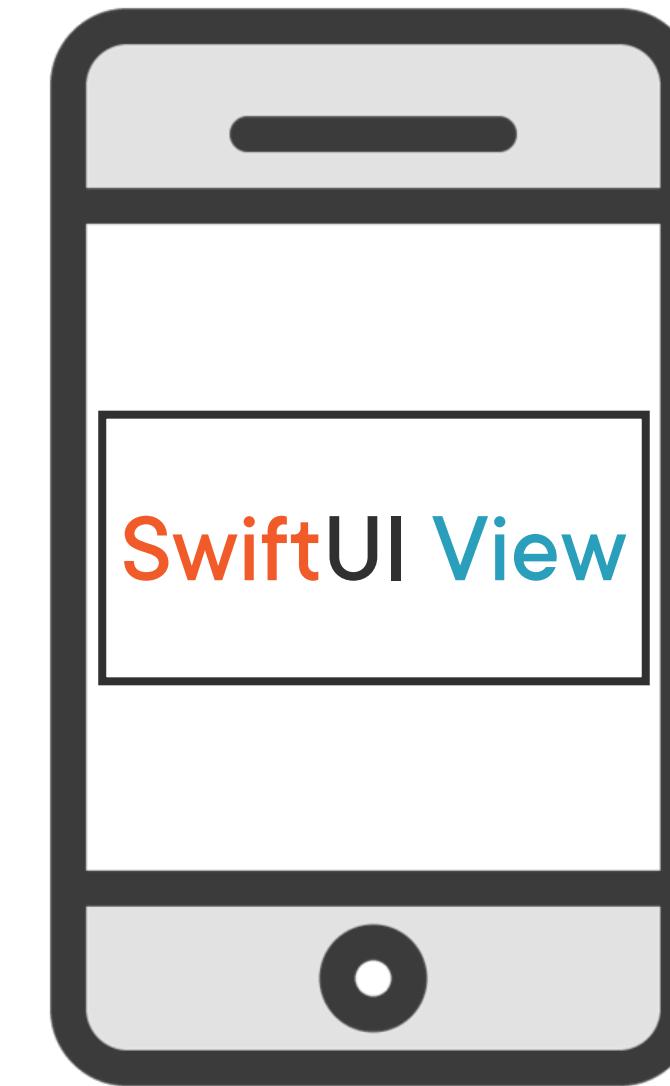
# Customize a View's Appearance



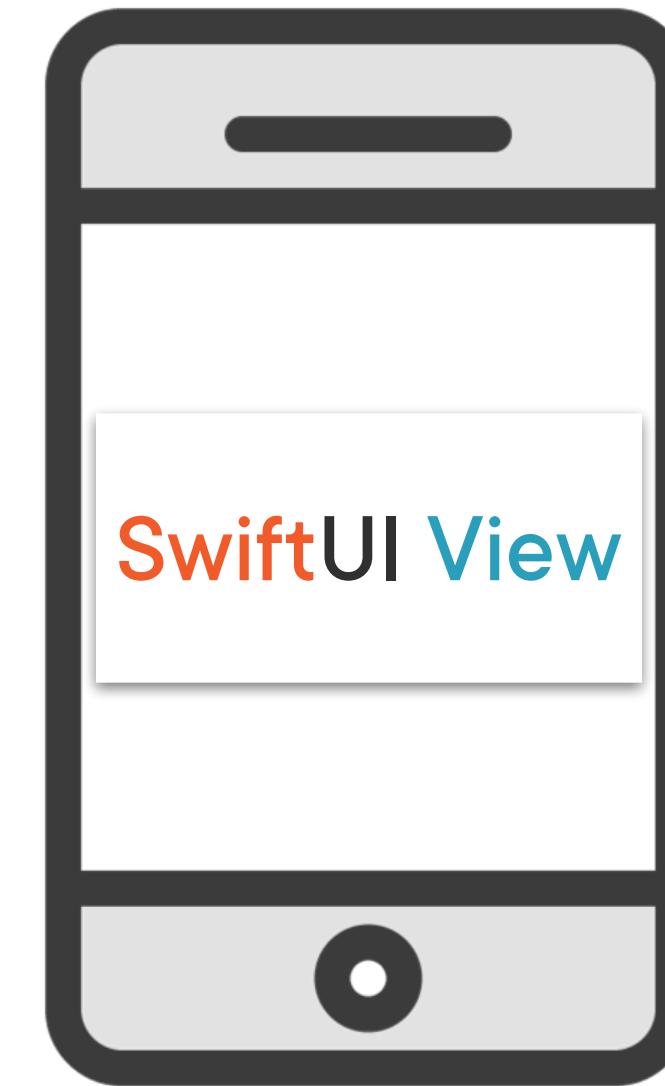
# Customize a View's Appearance



# Customize a View's Appearance



# Customize a View's Appearance





How do we modify the appearance of  
SwiftUI Views?



How do we **modify** the appearance of  
SwiftUI Views?

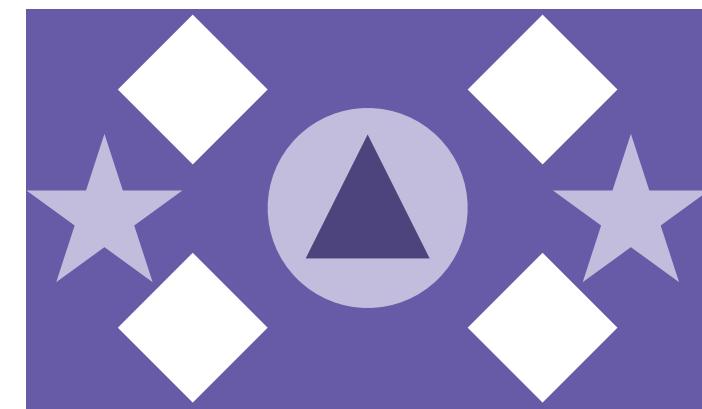


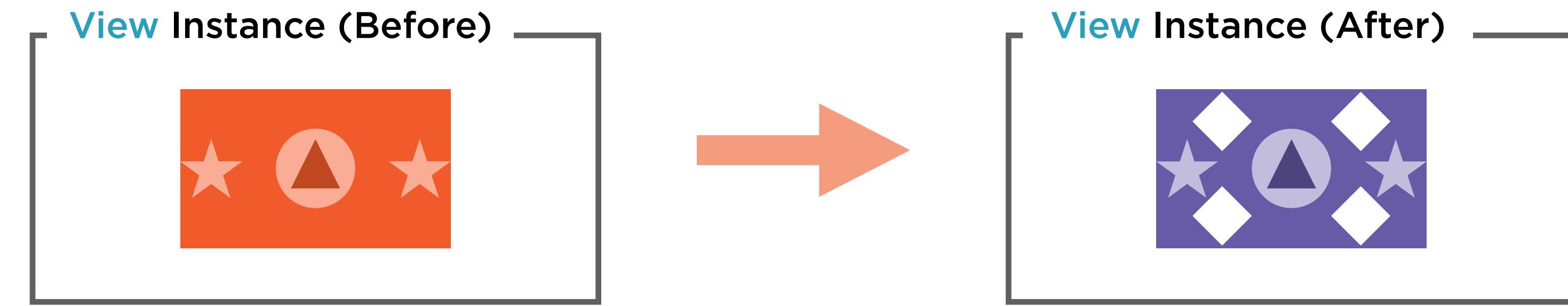
Since Views are structs, they adhere to  
“value type semantics” when we “modify” them.

**View Instance (Before)**



**View Instance (After)**

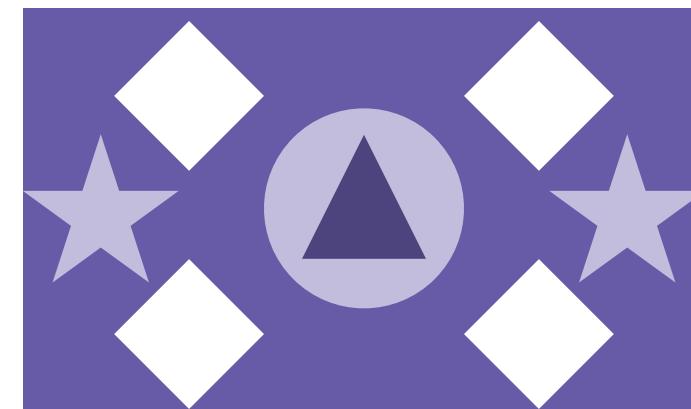
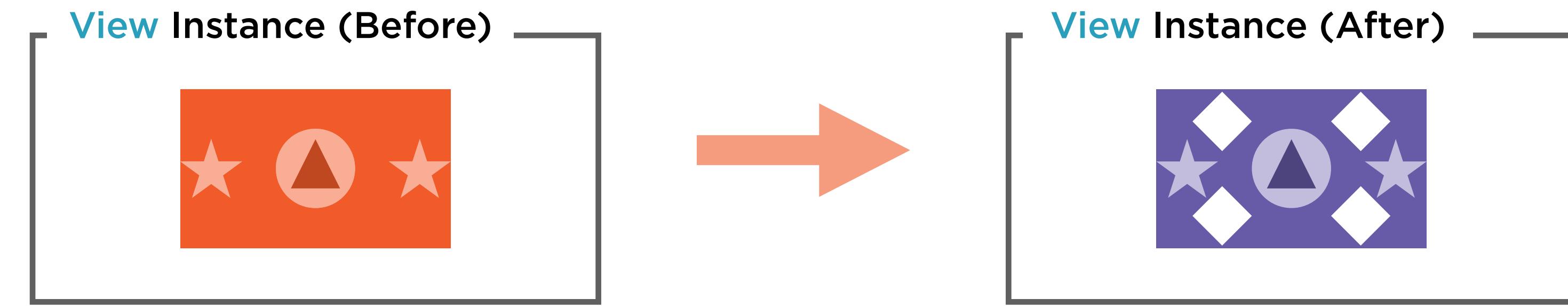




**Update existing instance of a `View` directly by setting new values to its stored properties.**

```
existingView.background = Color.purple
```

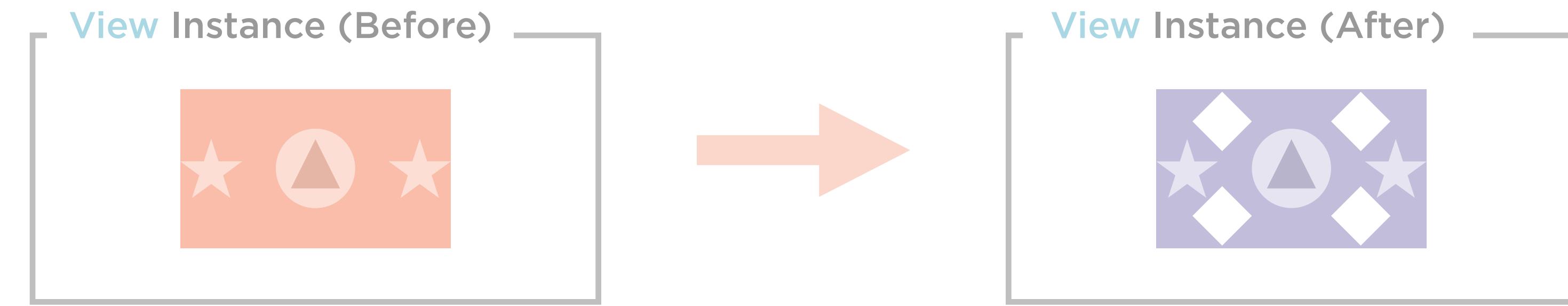
```
existingView.accessoryViews = [Diamond(), Diamond(), Diamond(), Diamond()]
```



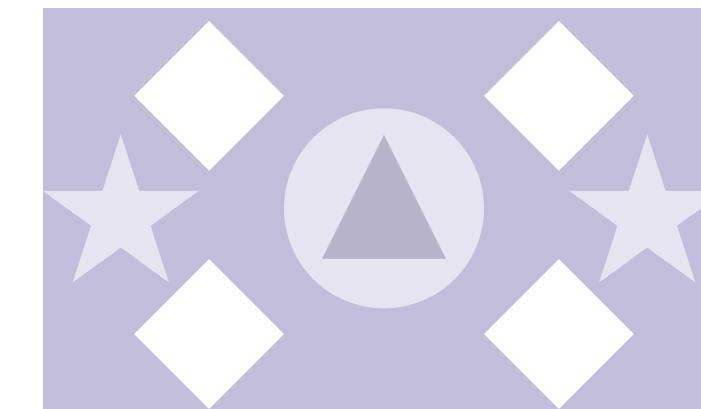
**Update existing instance of a `View` directly by setting new values to its stored properties.**

```
existingView.background = Color.purple
```

```
existingView.accessoryViews = [Diamond(), Diamond(), Diamond(), Diamond()]
```



**WRONG WAY**



**Update existing instance of a View directly by setting new values to its stored properties.**

```
existingView.background = Color.purple
```

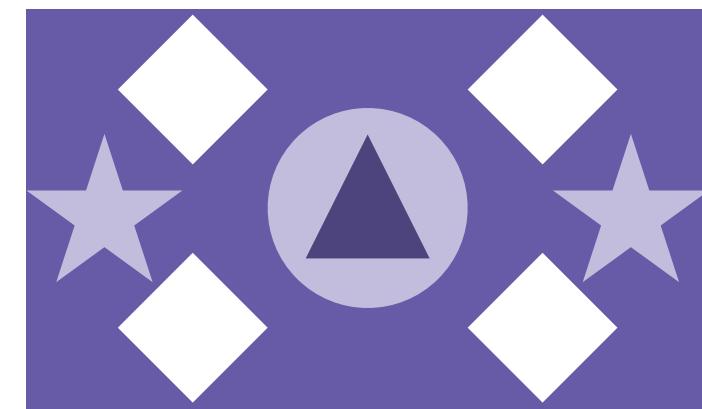
```
existingView.accessoryViews = [Diamond(), Diamond(), Diamond(), Diamond()]
```

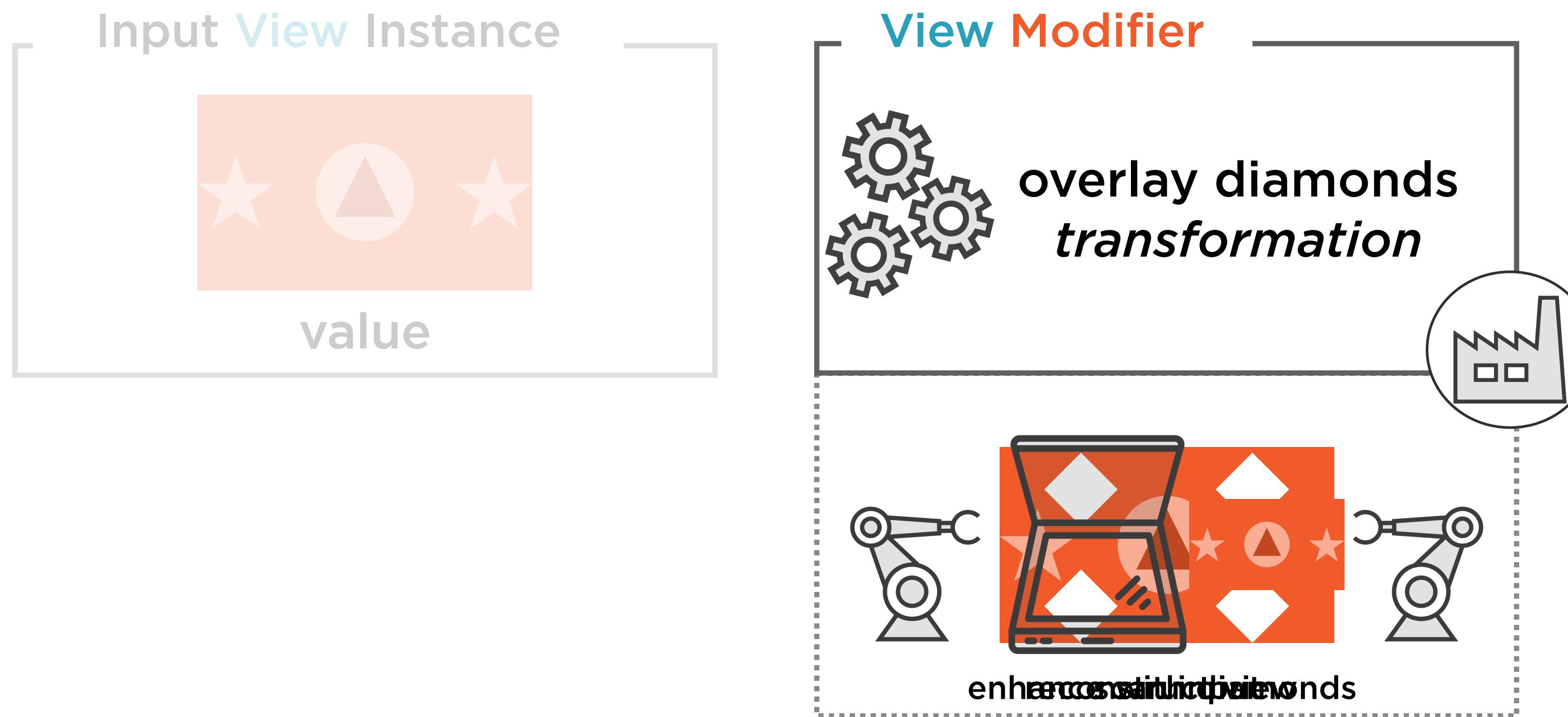
View modifiers should be thought of as  
**View transformation factories.**

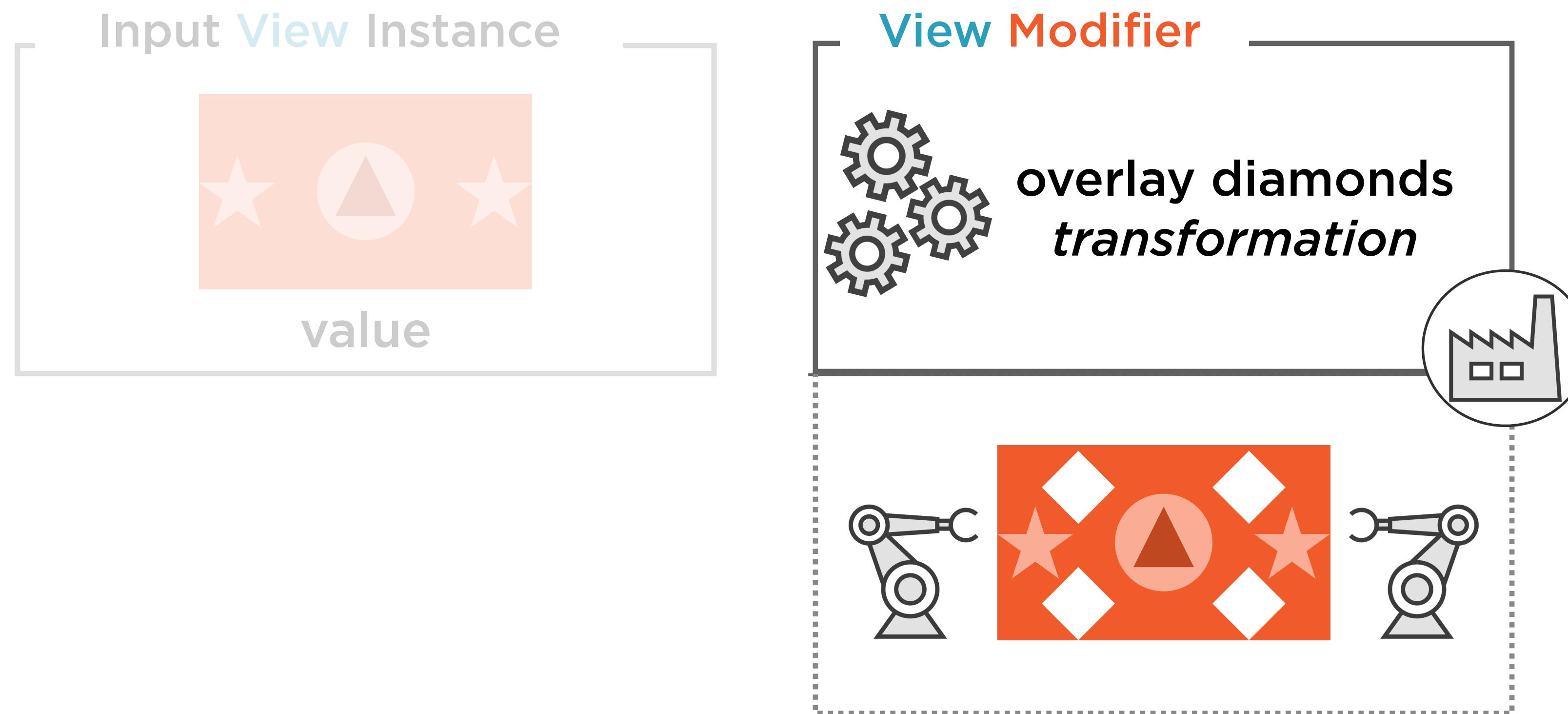
**View Instance (Before)**



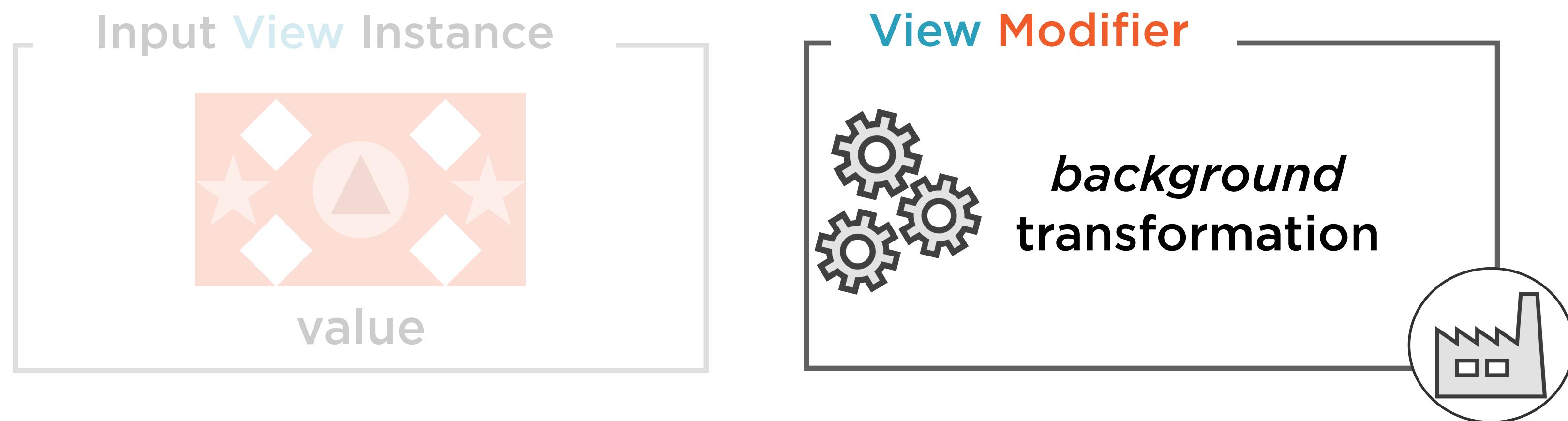
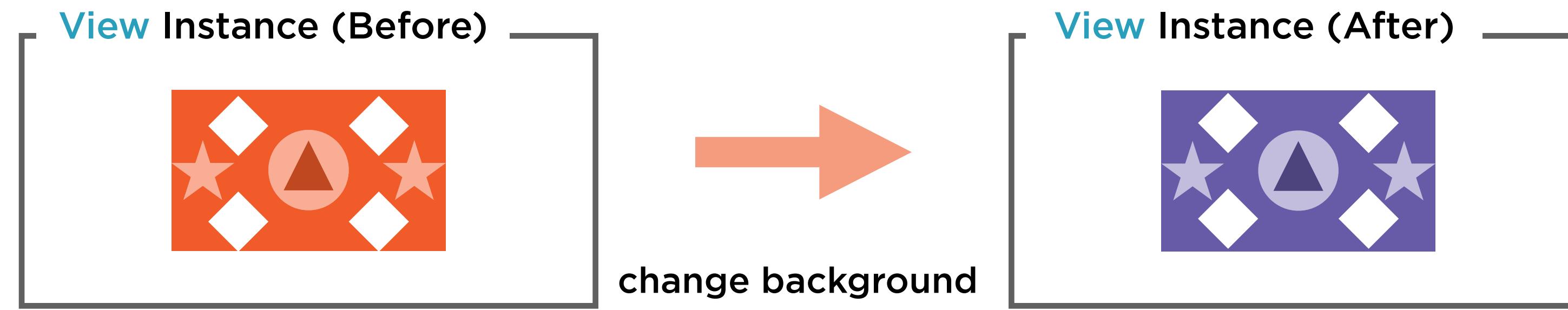
**View Instance (After)**











**View Instance (Before)**



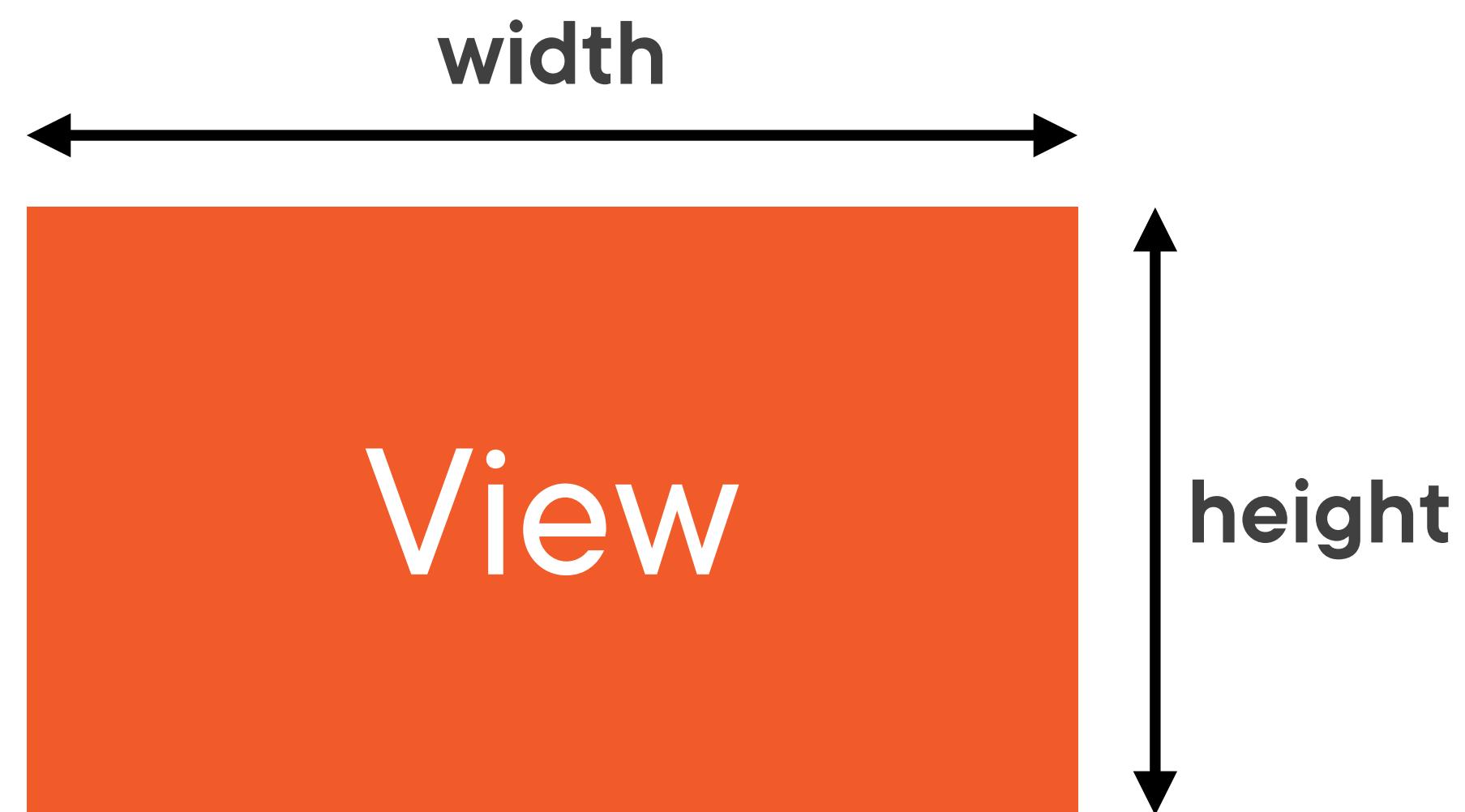


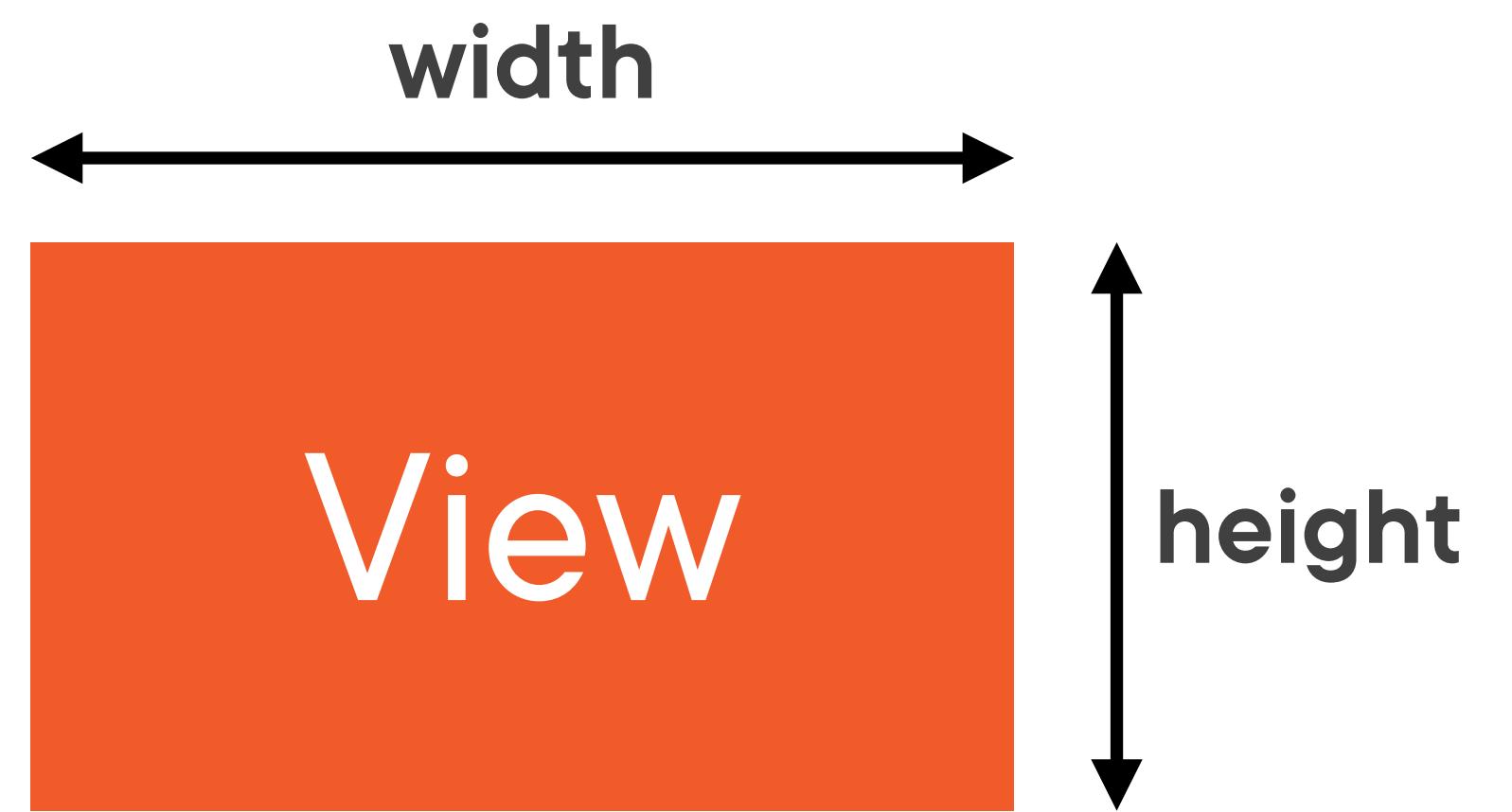
**View modifiers**

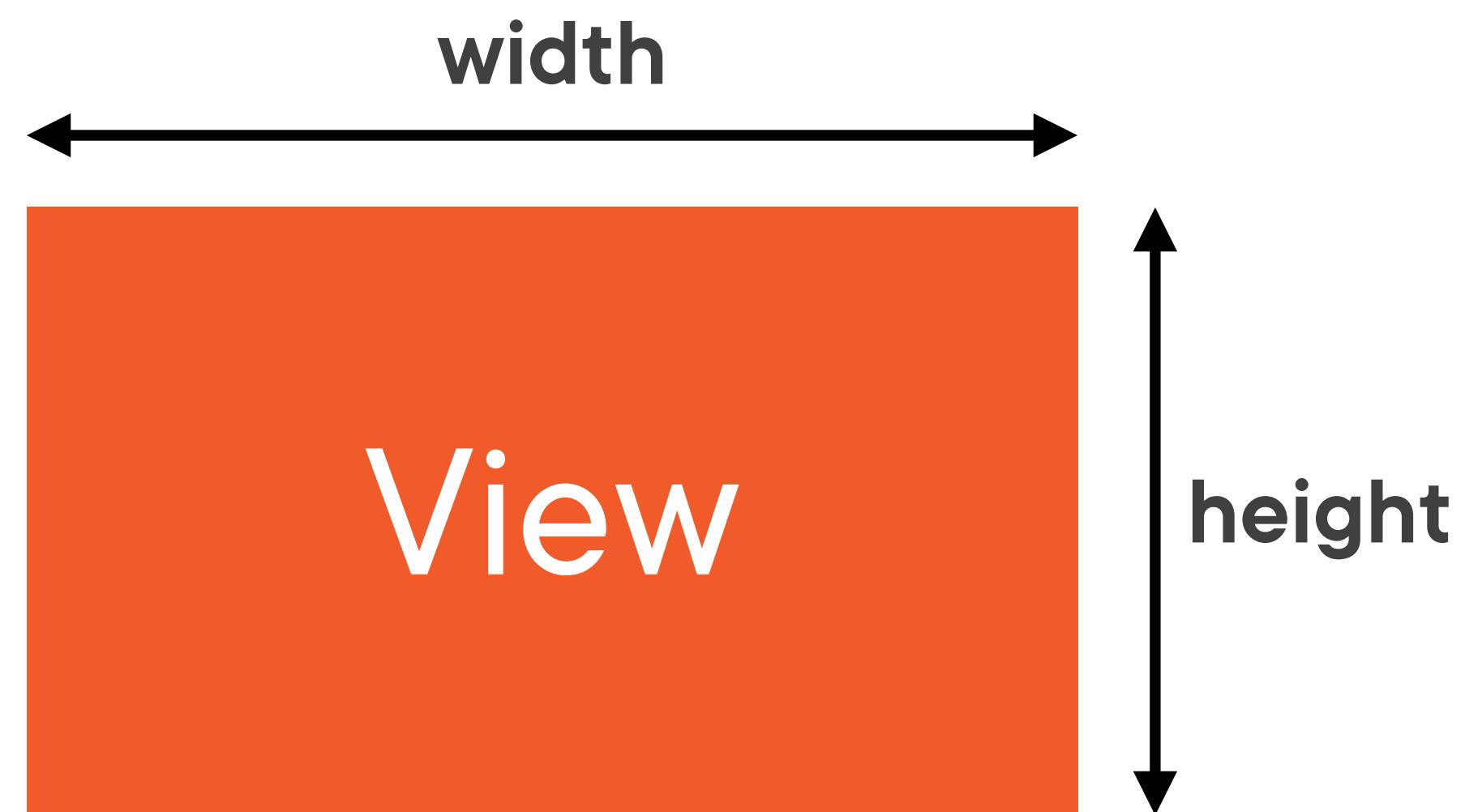
**Reinforce your existing knowledge of how View modifiers work.**

# Changing the Size and Scale of Views

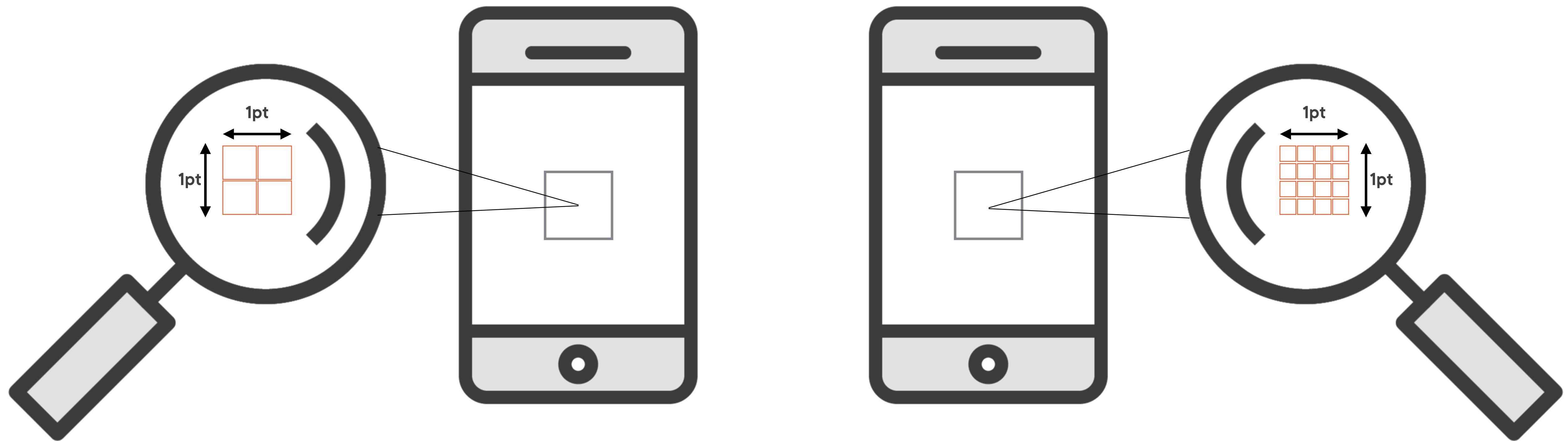
---

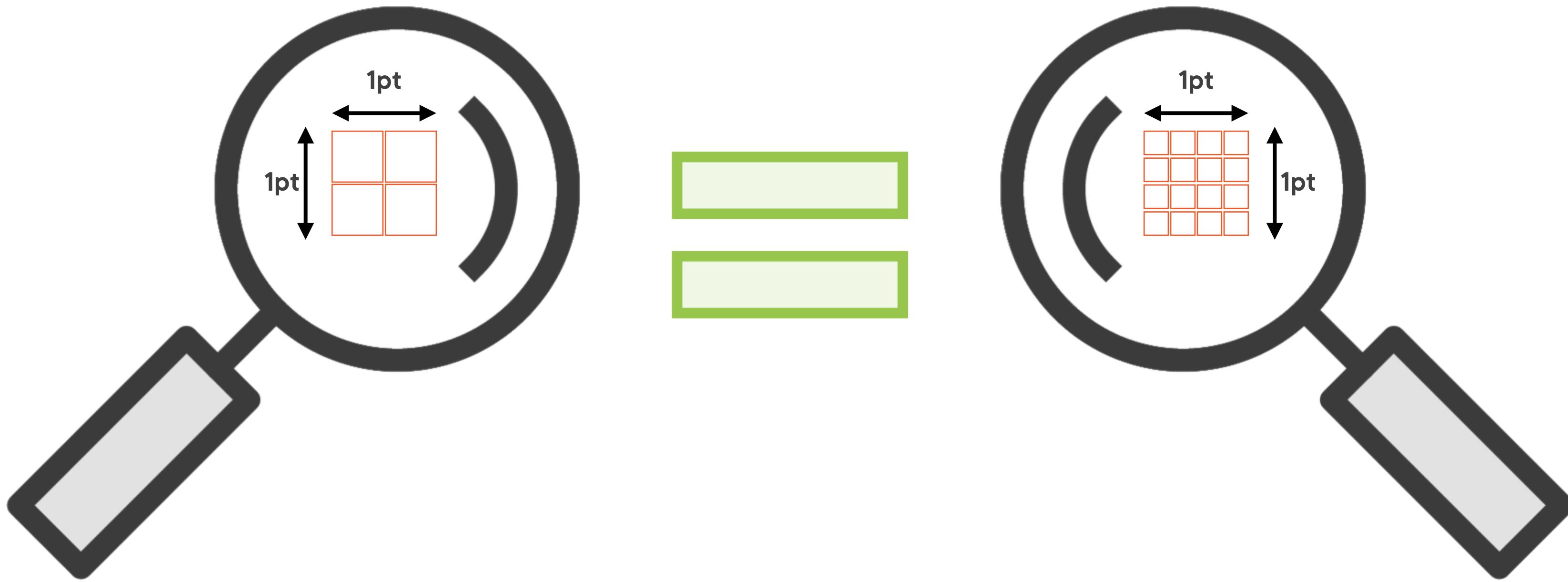






The dimensions of images and any other SwiftUI View have widths and heights that are expressed in points,  
**not pixels.**



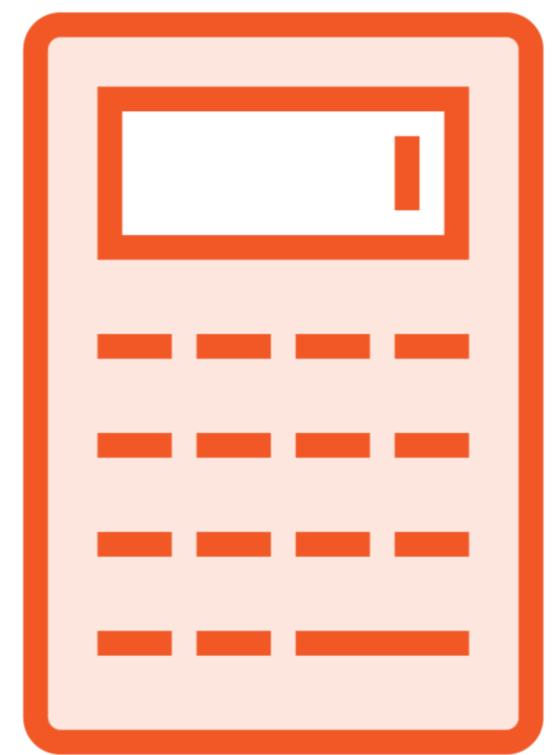


**533.3 pt**



**355.7 pt**





533.3 pt

÷

355.7 pt

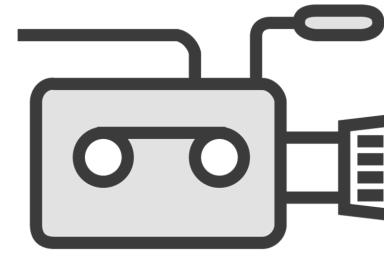
=

1.5

# Aspect Ratio

1.5

3:2

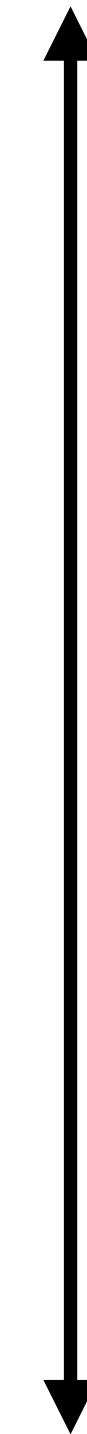


Sketch

**533.3 pt**

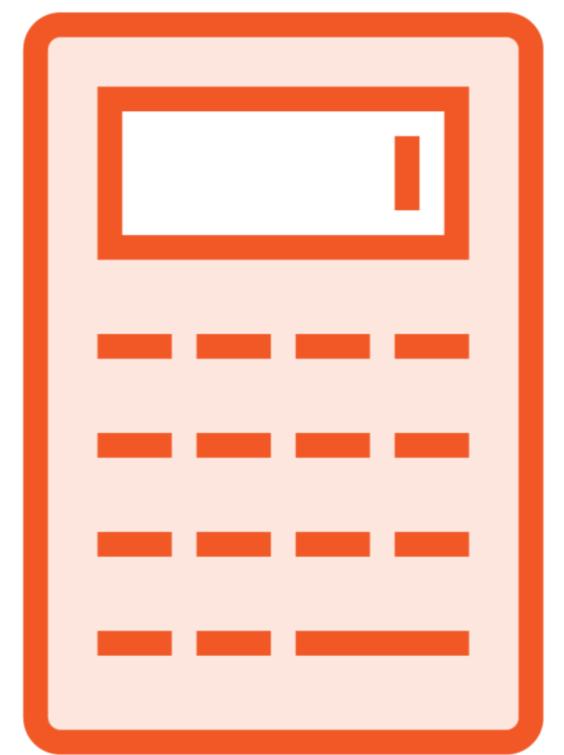


**355.7 pt**



**Frame**

SwiftUI always renders images  
according to their actual size.



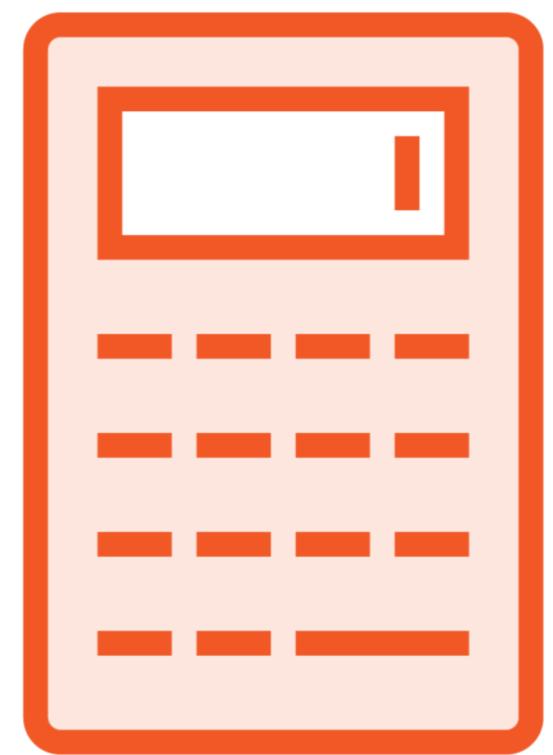
360 pt

÷

258.7 pt

=

1.39



360 pt

÷

240 pt

=

1.5



How do we add effects like borders and shadows  
to SwiftUI Views?

# Adding Effects to Views

---

9:41



## Front Lobby



60% Complete

Due on Sunday, August 1, 2021

### Work Quality



### Punch List

- Remodel front desk
- Retile entry
- Replace light fixtures
- Paint walls
- Hang new artwork

### Budget

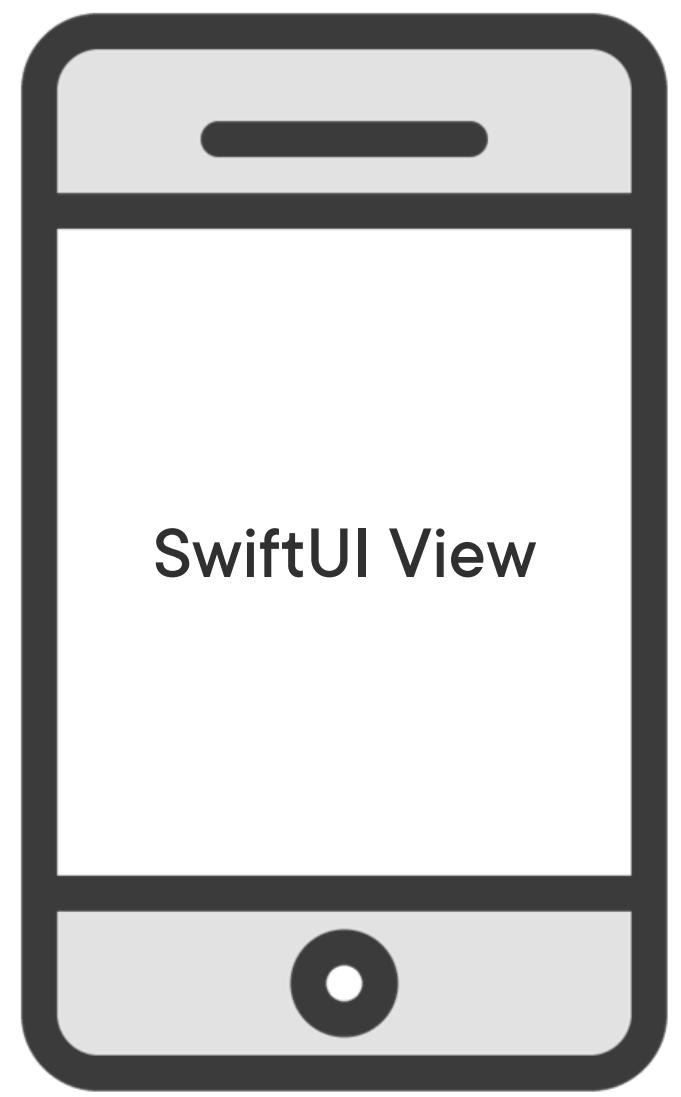
On Budget

Amount Allocated: \$15,000

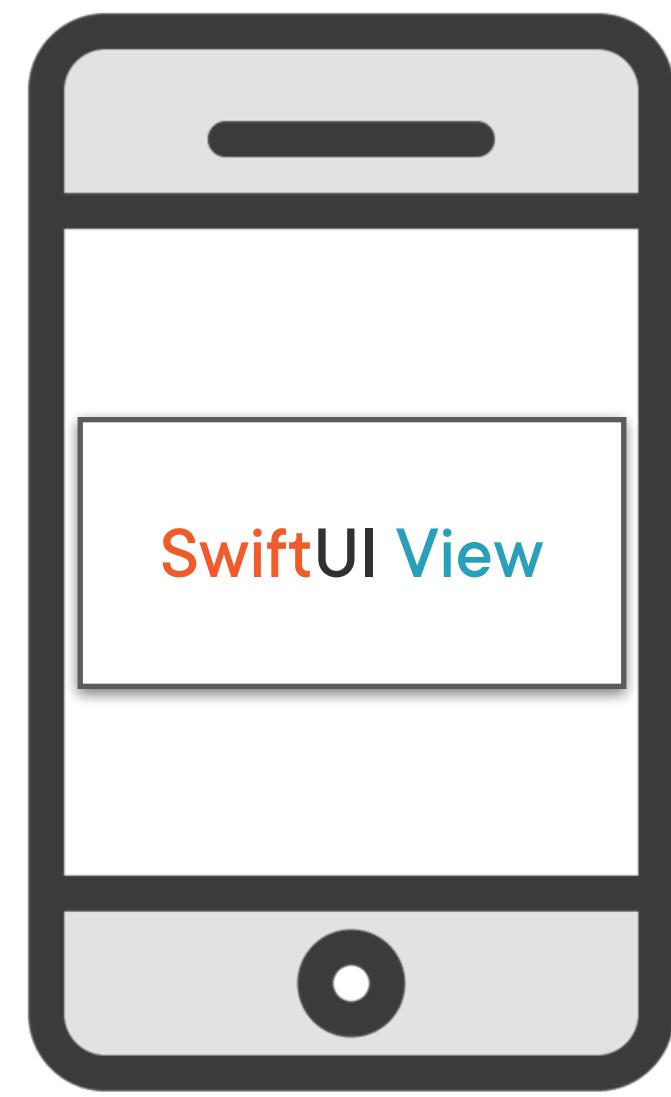
Spent to-date: \$8,350

Amount remaining: \$6,650

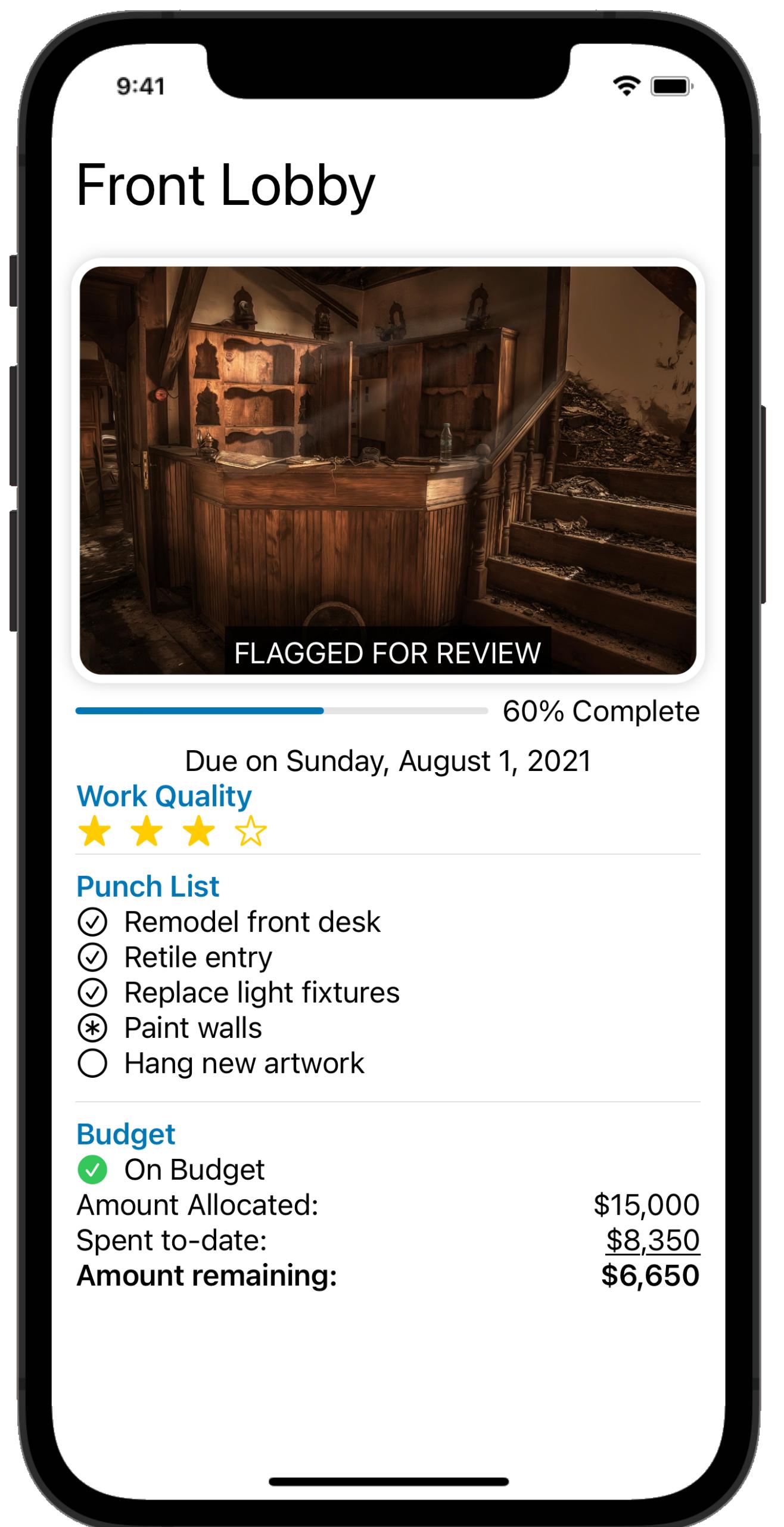
Everything in a SwiftUI user  
interface is either a View...  
or a modified View.



**Primitive View**

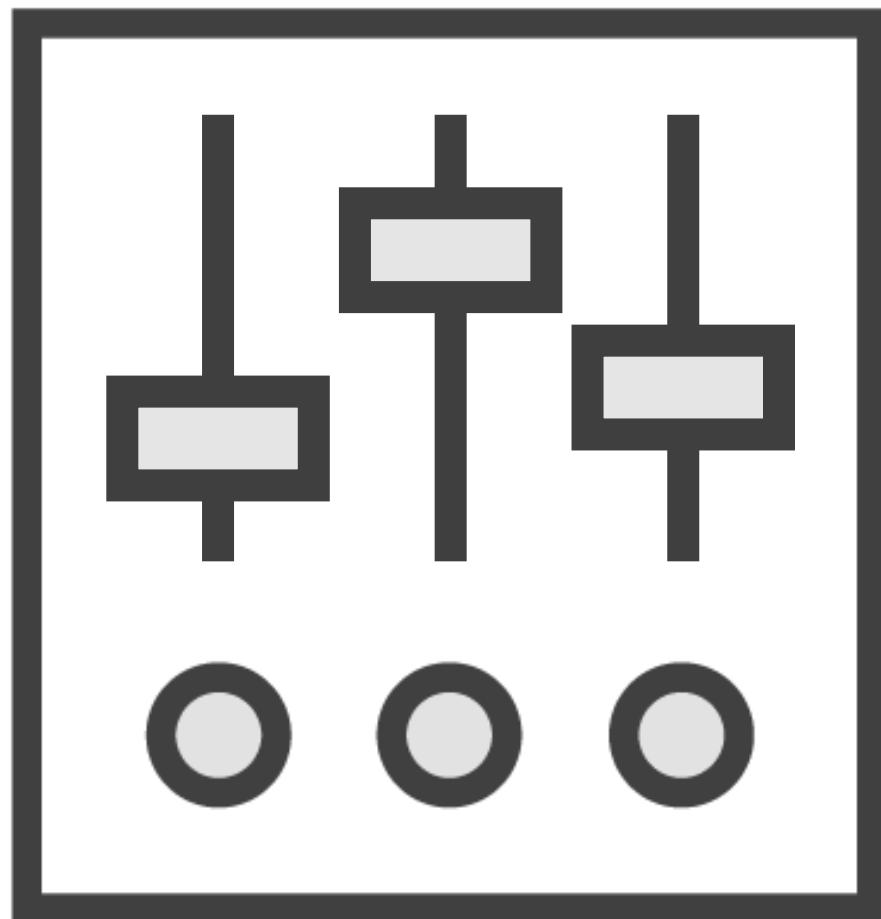


**Modified View**

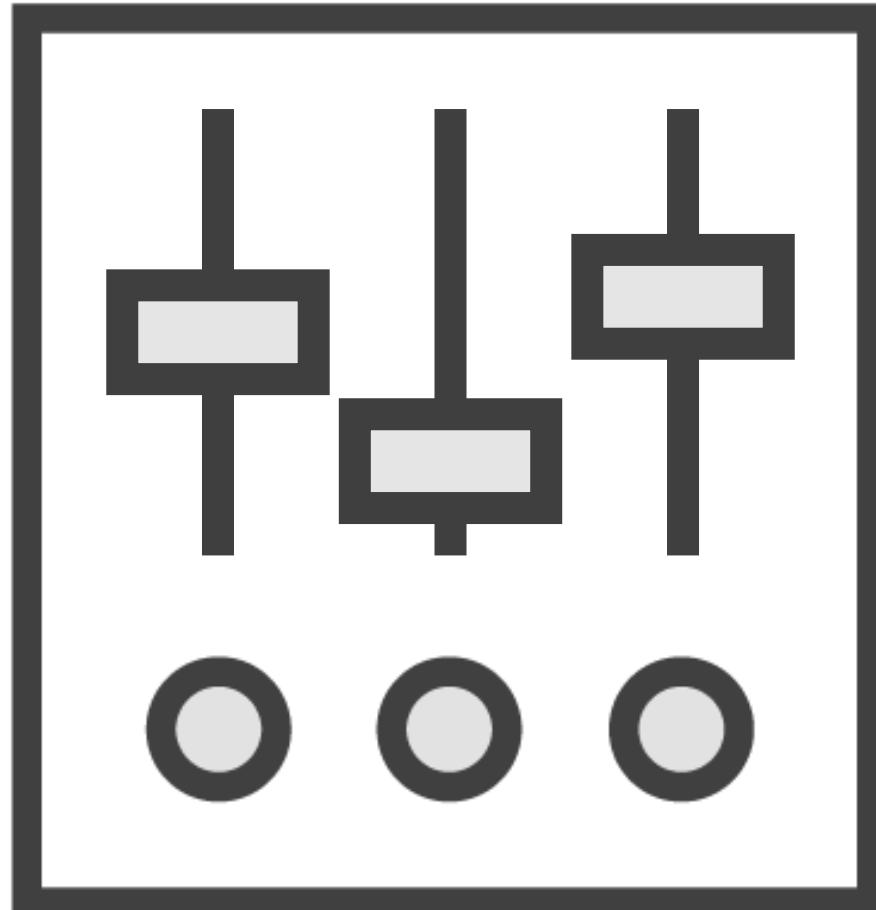


# Layering Views with ZStacks

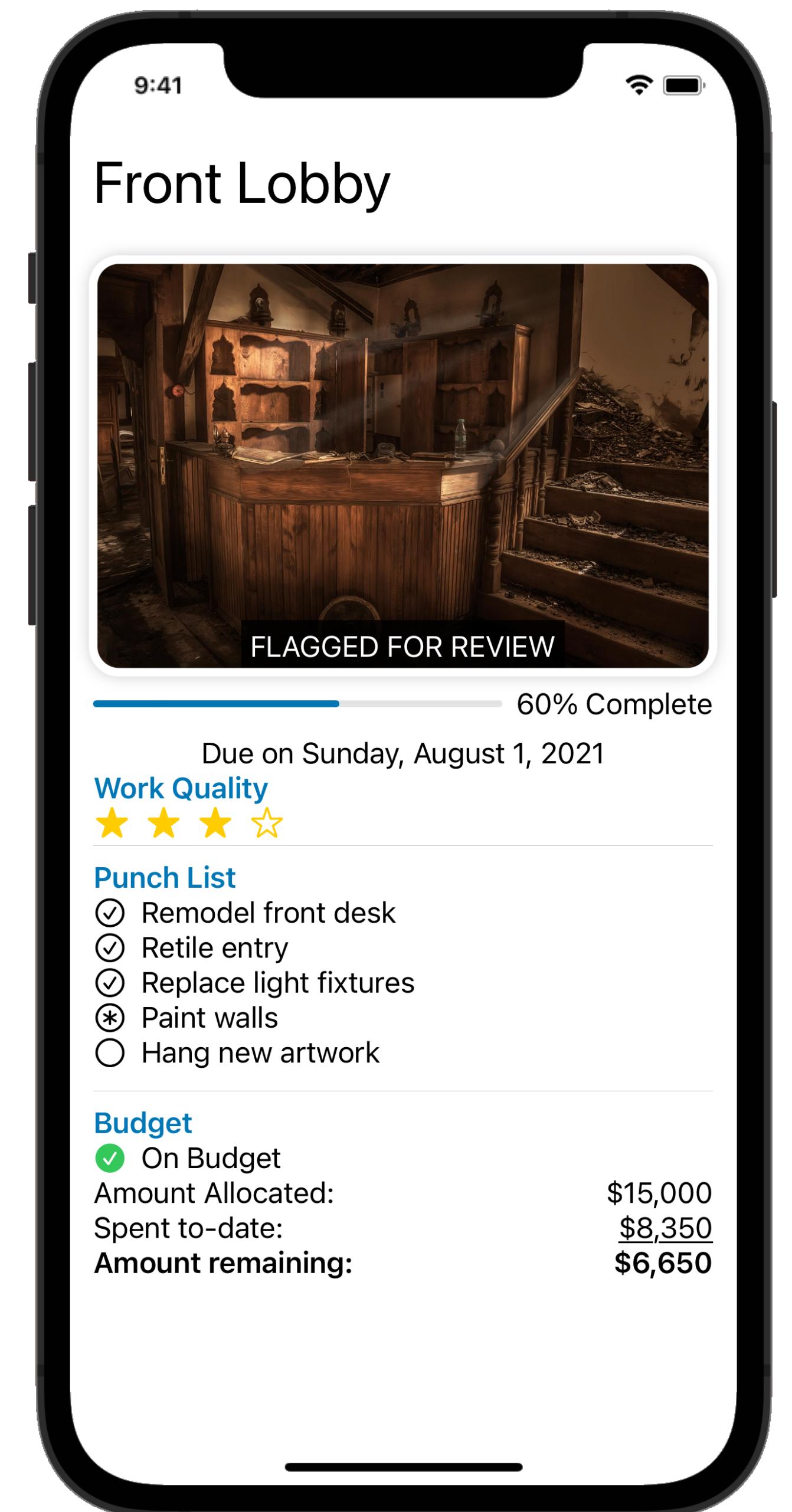
---



Sometimes layouts require a little more control over how Views stack on top of or beneath one another...

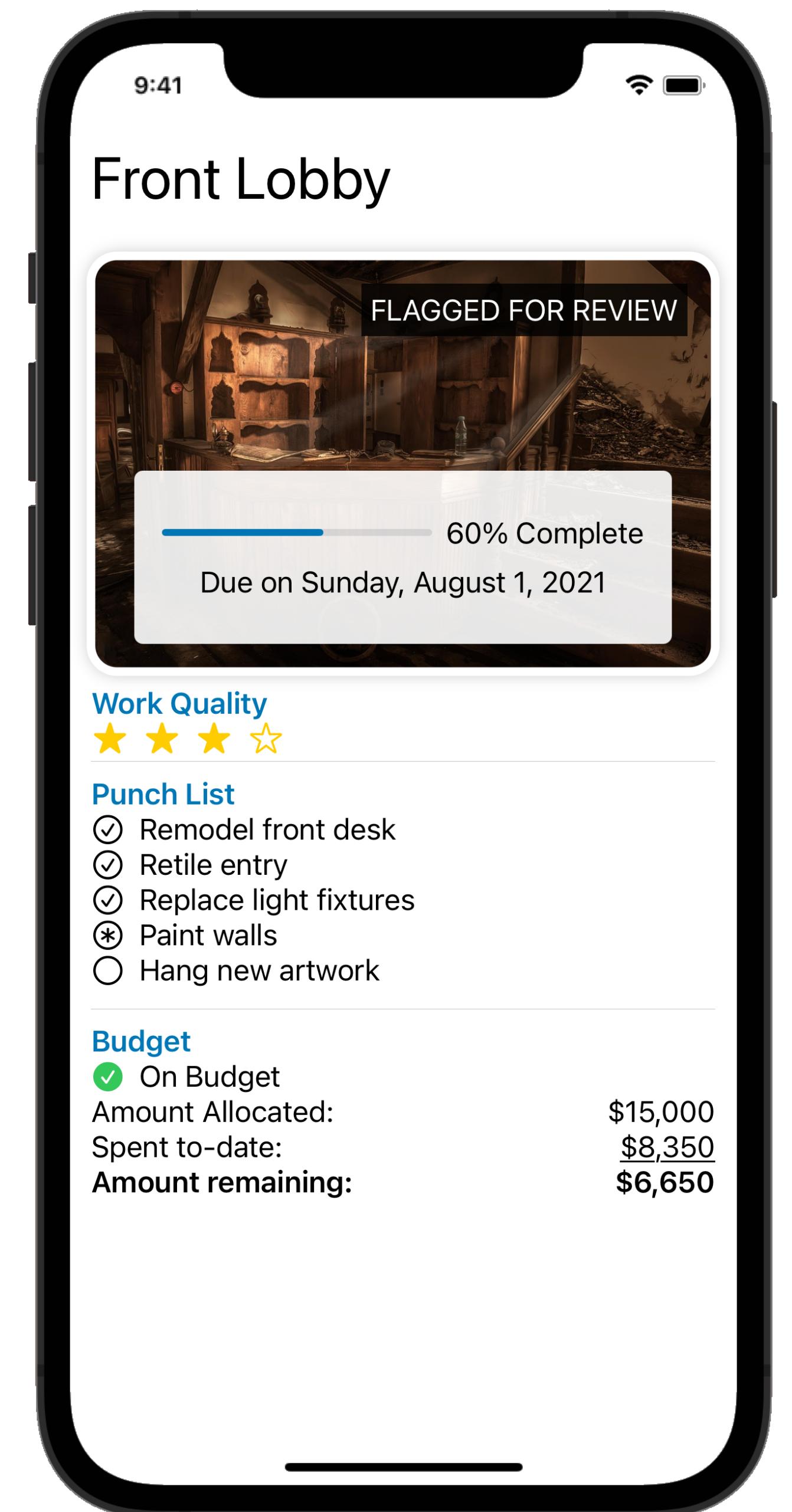


Sometimes layouts require a little more control over how Views stack on top of or beneath one another...



What if we could build a  
progress card...

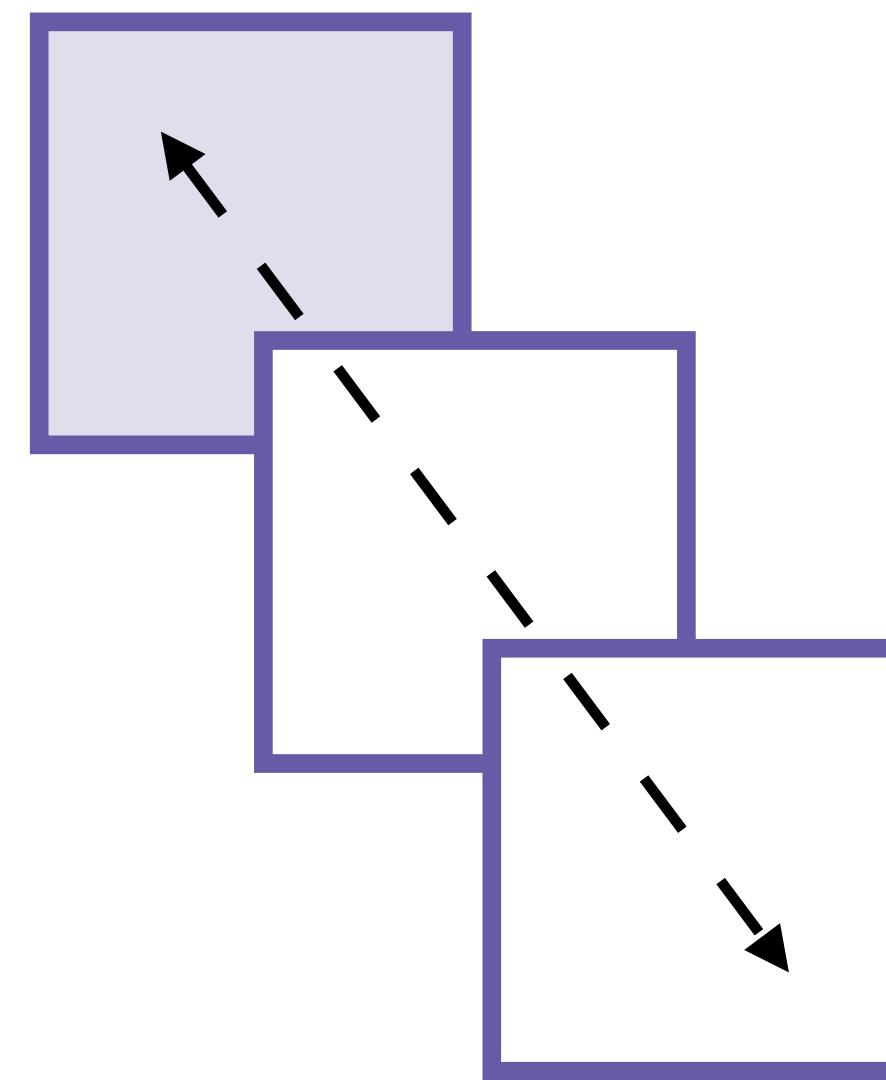




What if we could build a  
progress card...

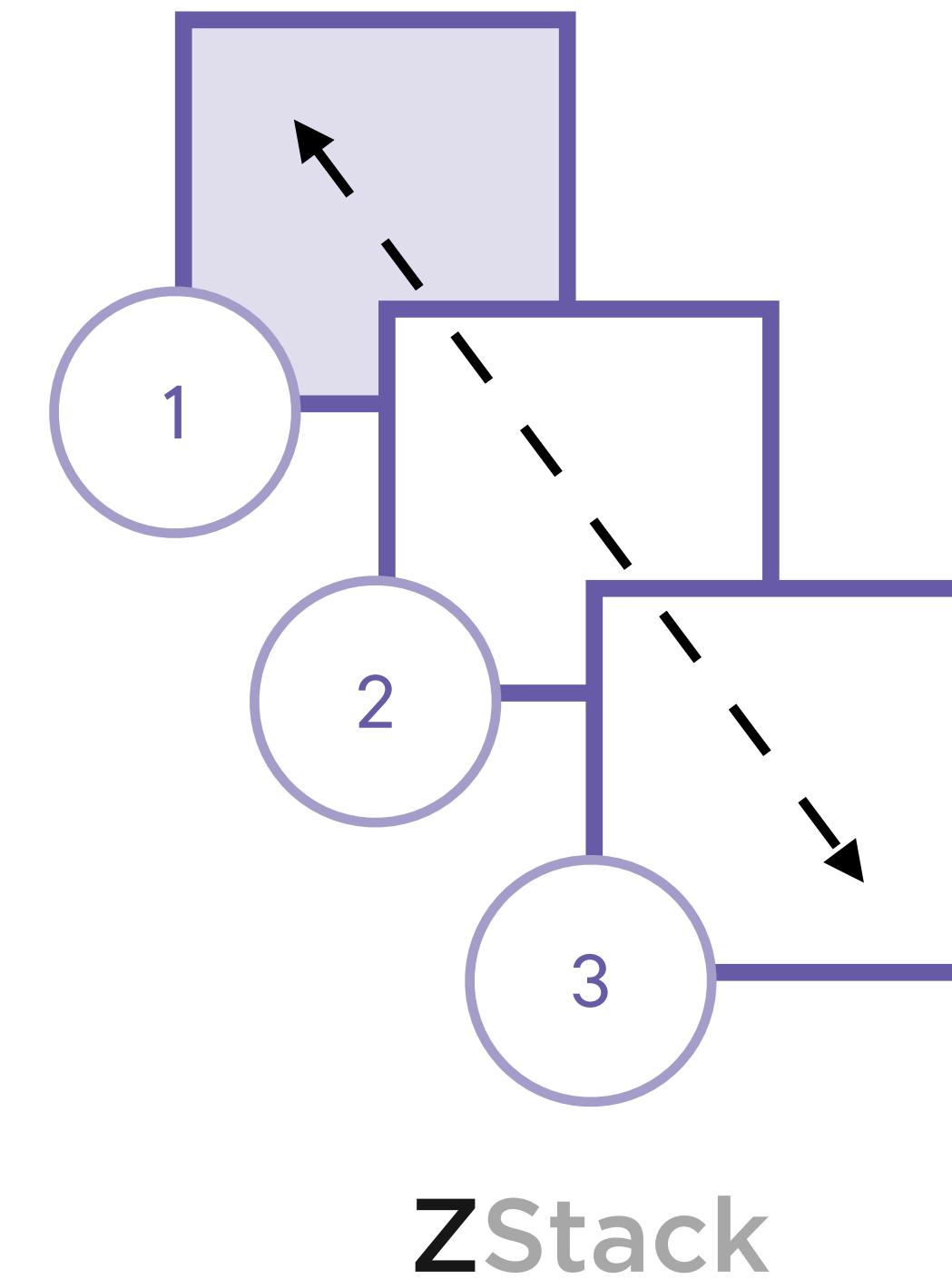


# Lay Out Overlapping Content



**ZStack**

# Lay Out Overlapping Content



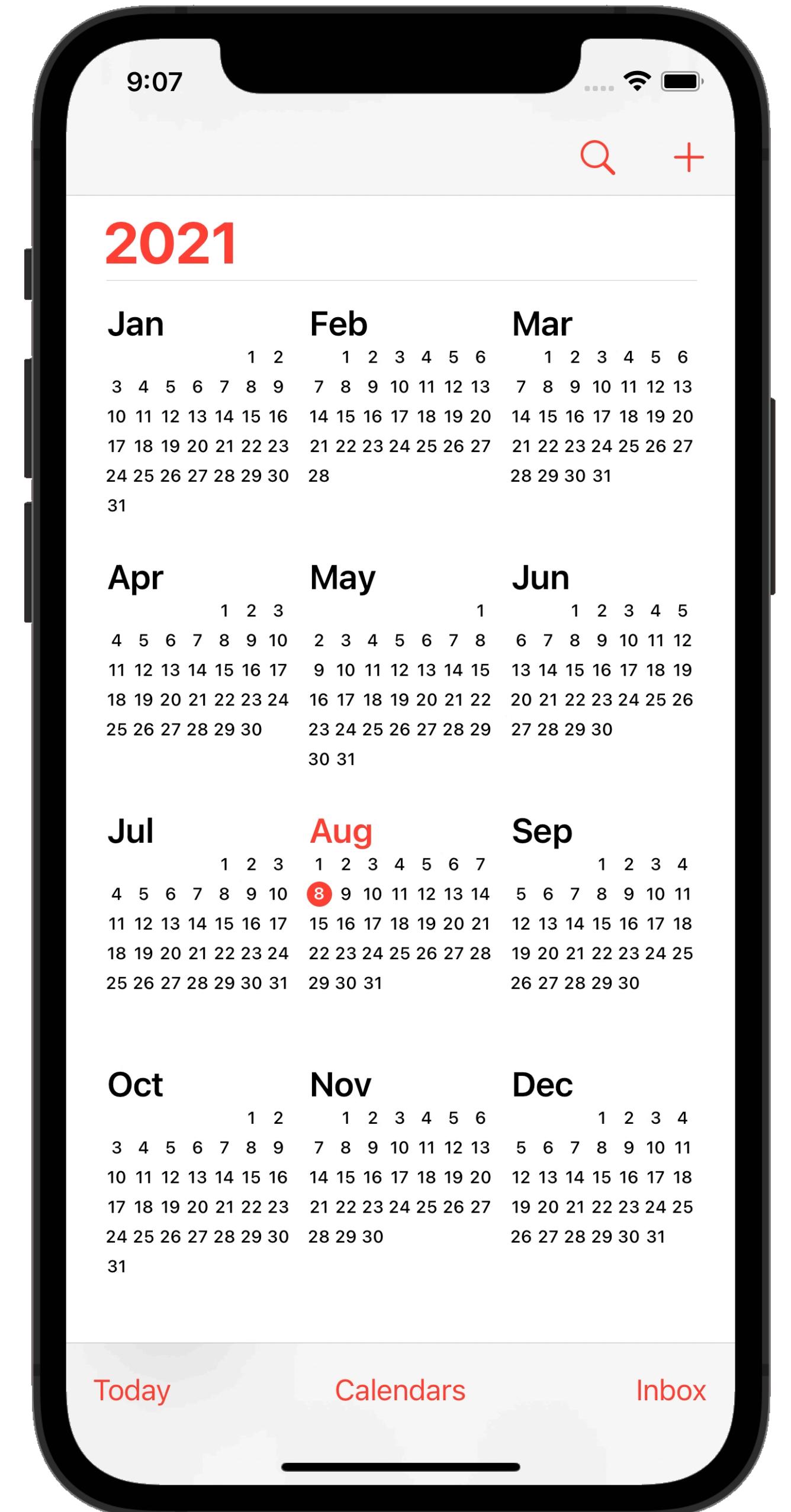
Child Views in a ZStack that are initialized later (further down) in code get placed **on top** of the ones that were initialized first in code.

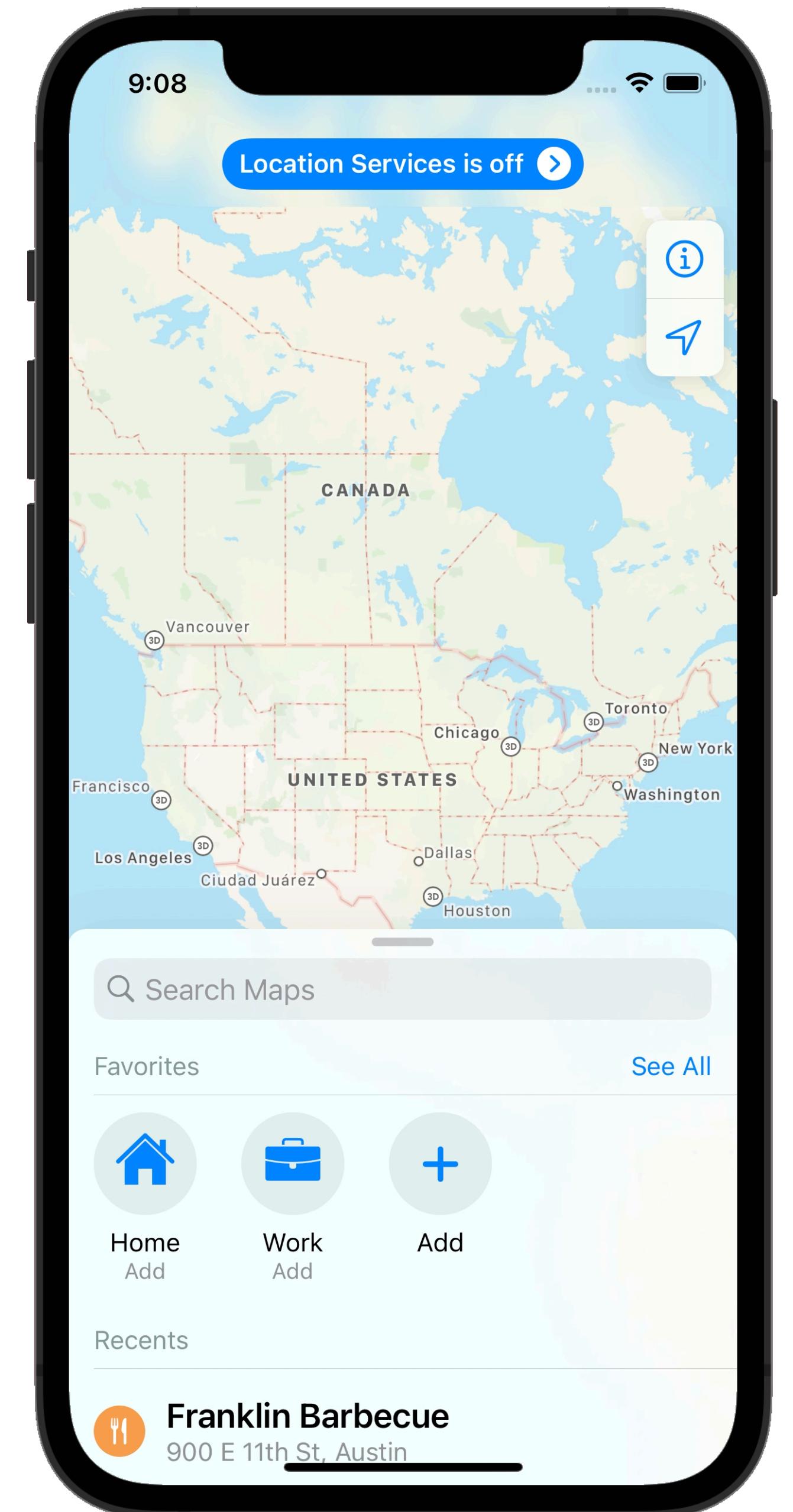
# Implementing Drill-through and Modal Navigation

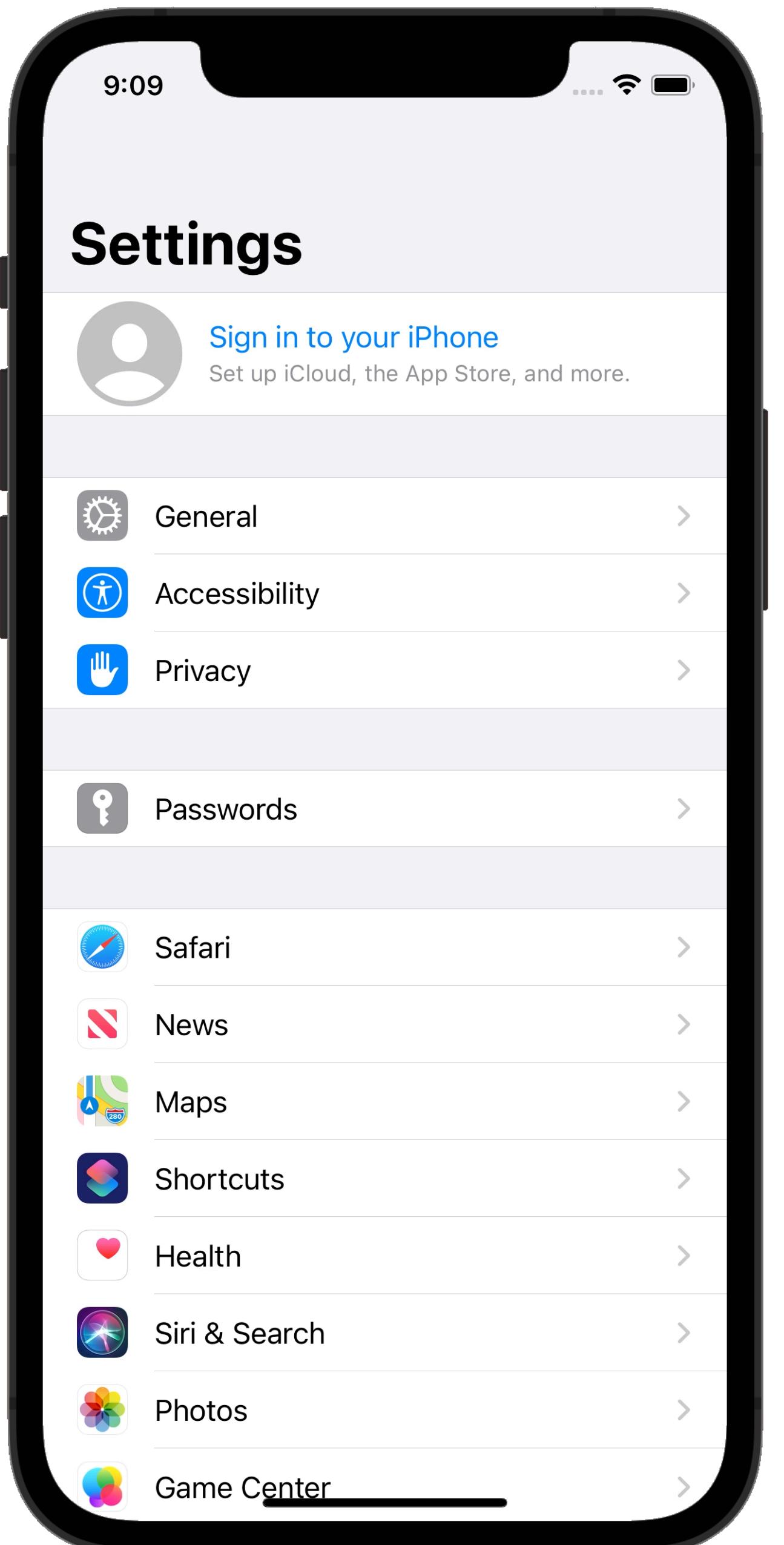
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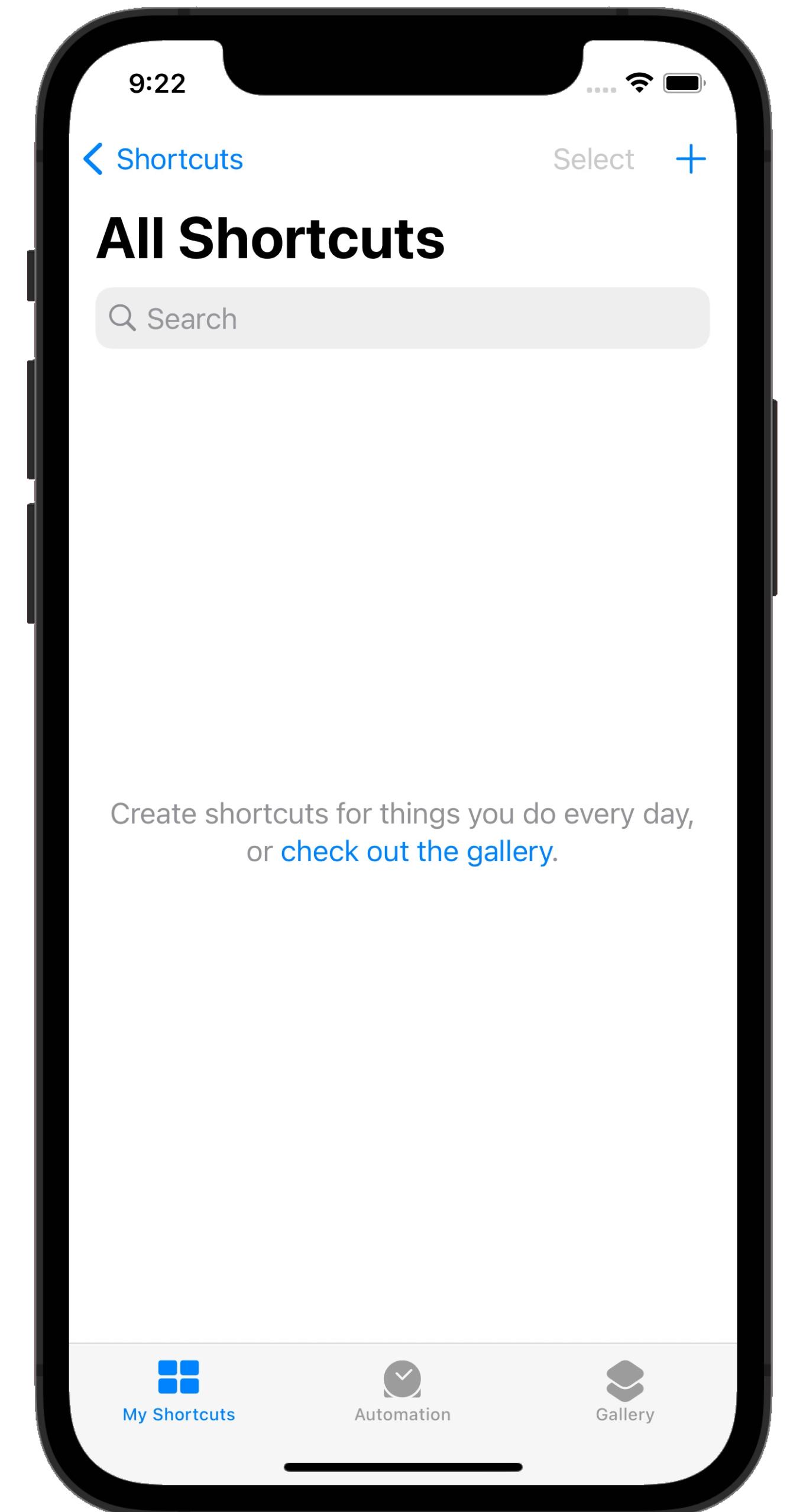


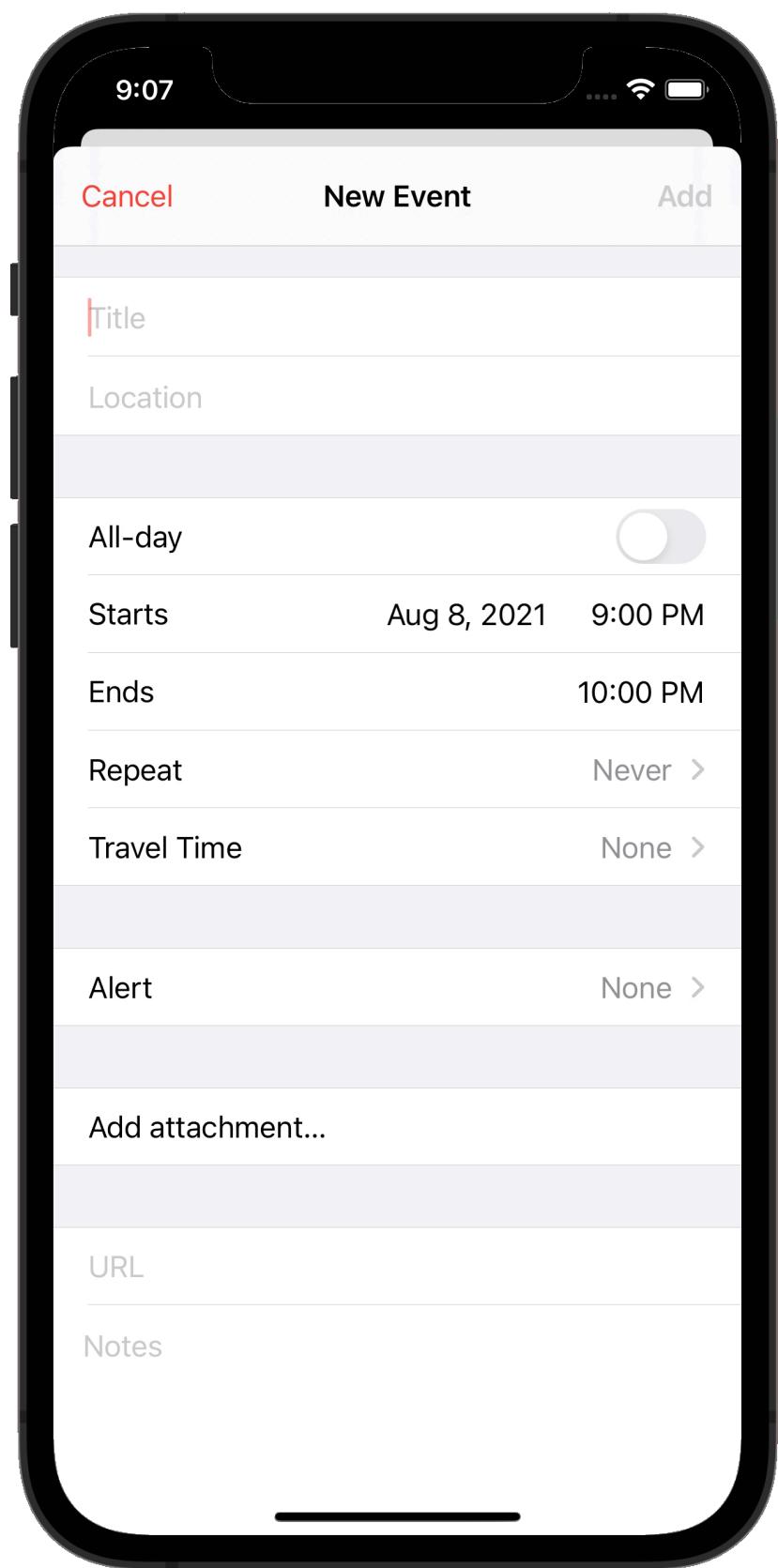
How can we show the Edit screen, not as another  
drill-down transition... but rather as a [modal view](#)?



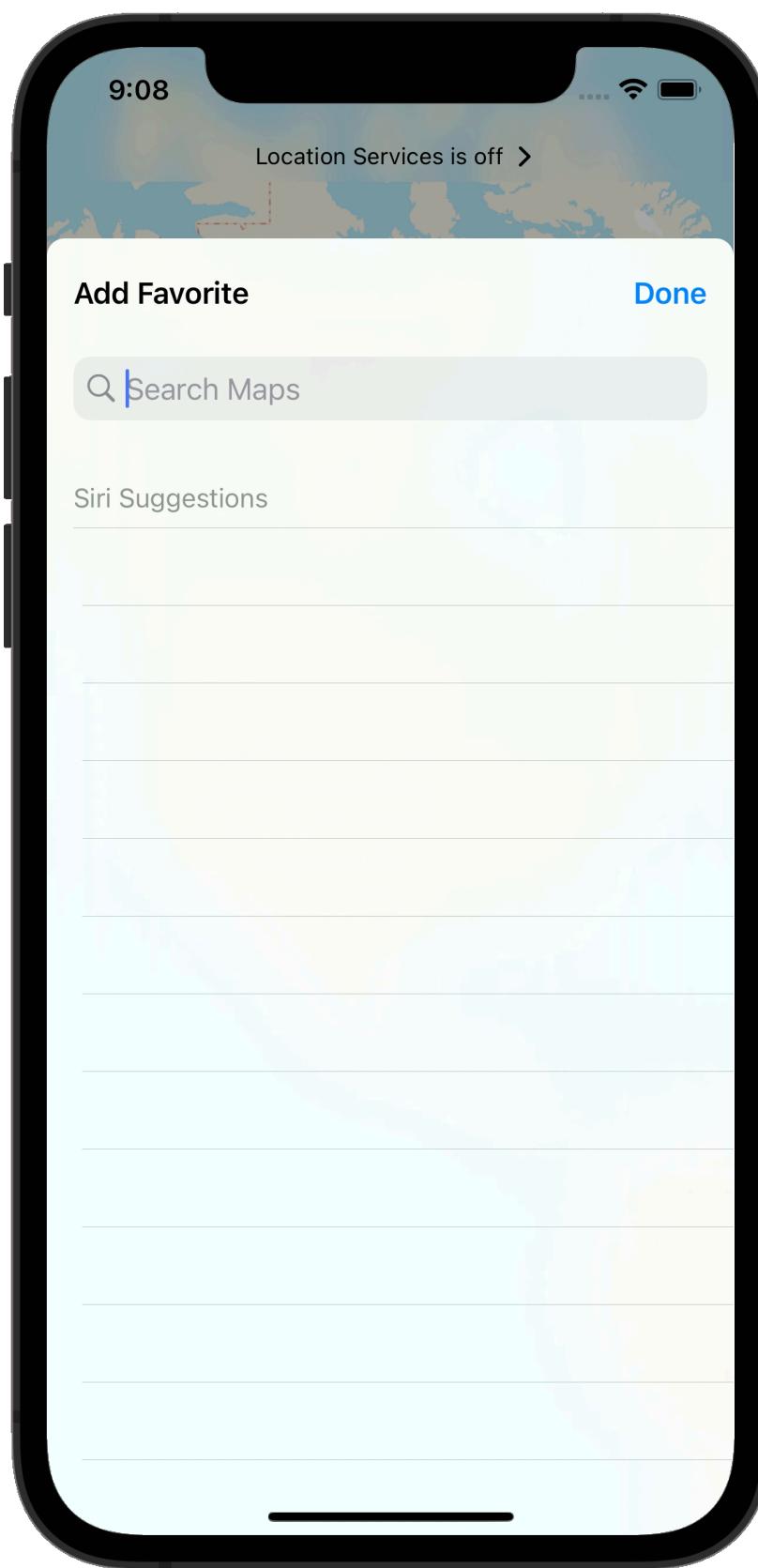




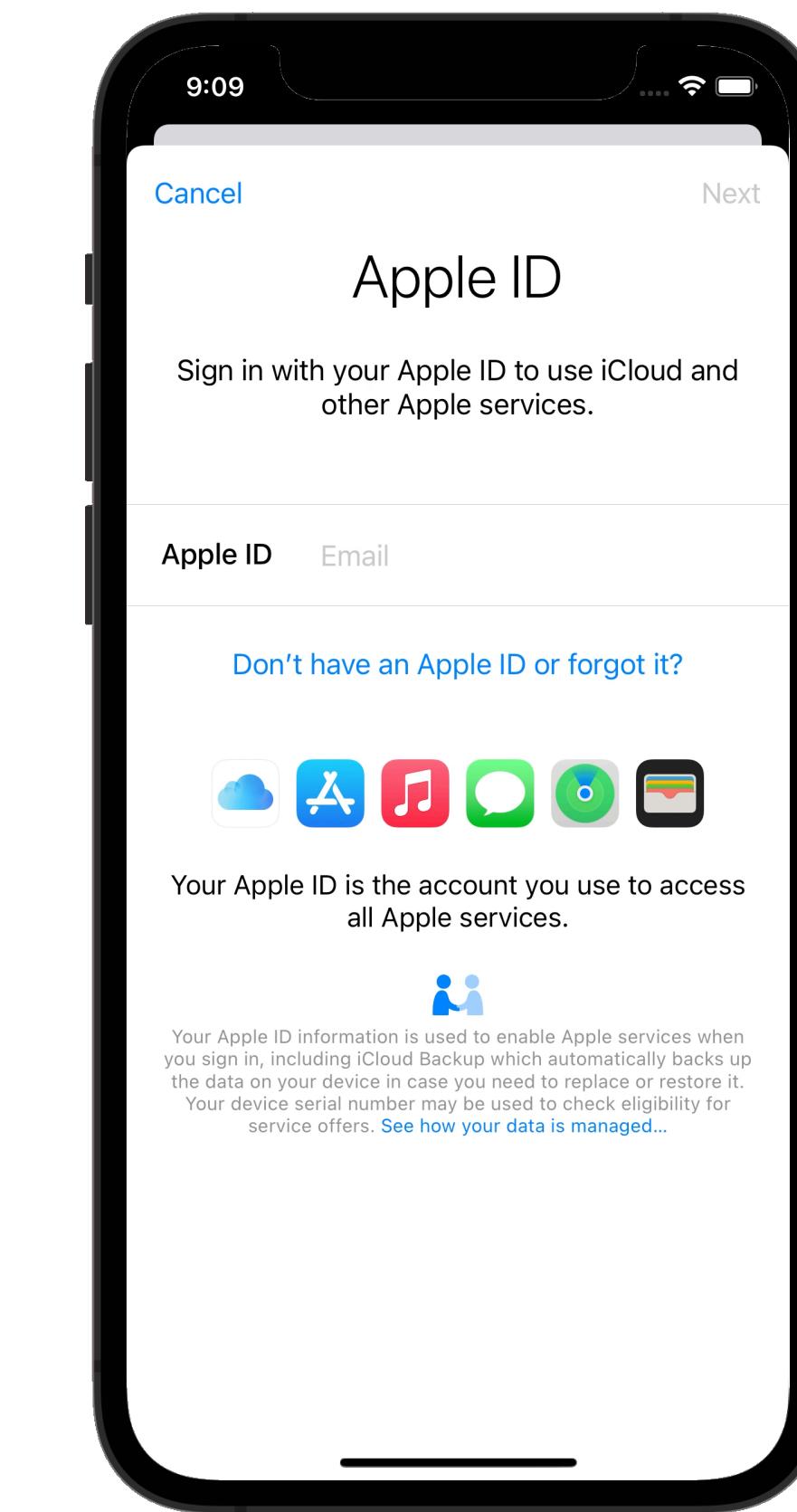




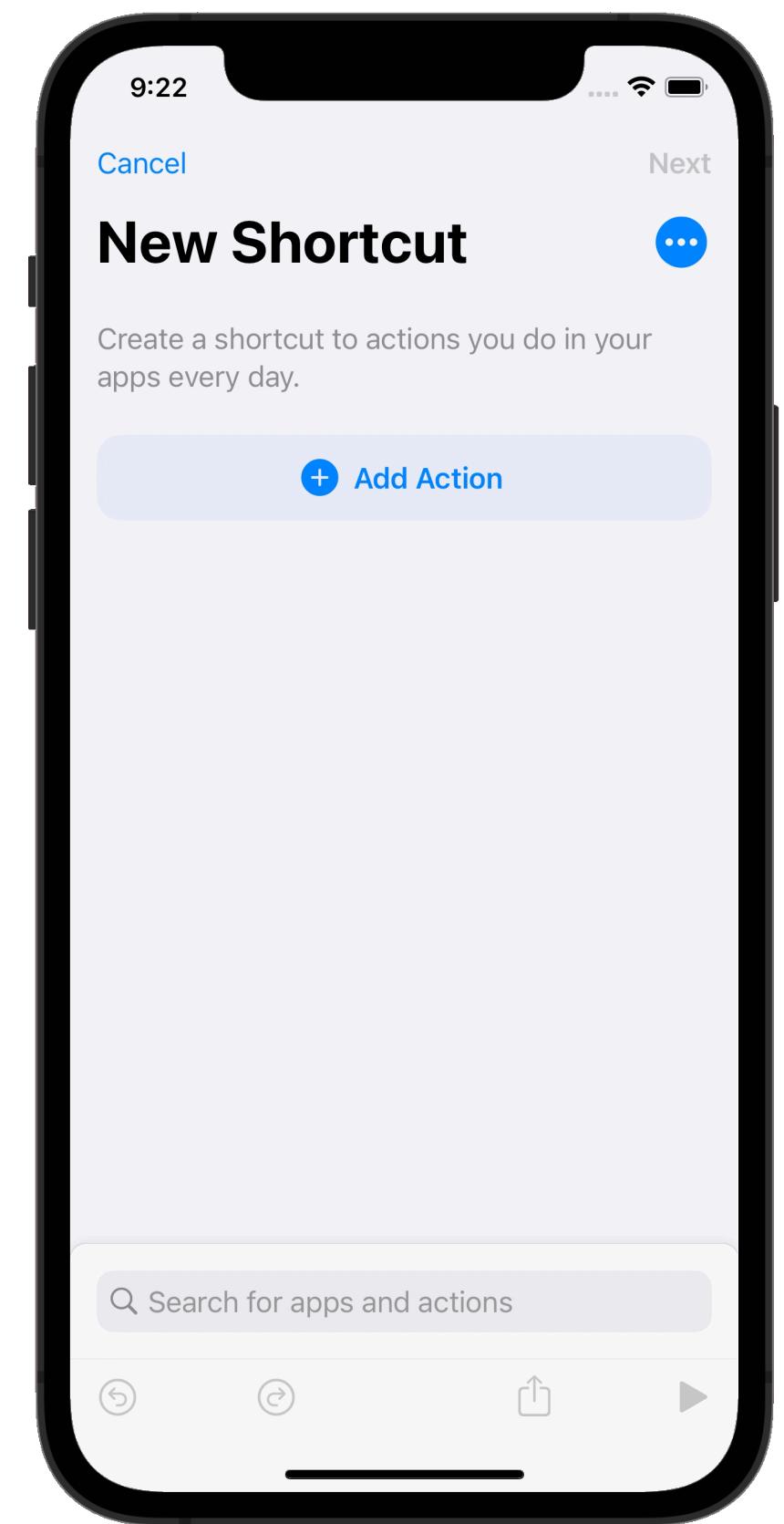
Calendar



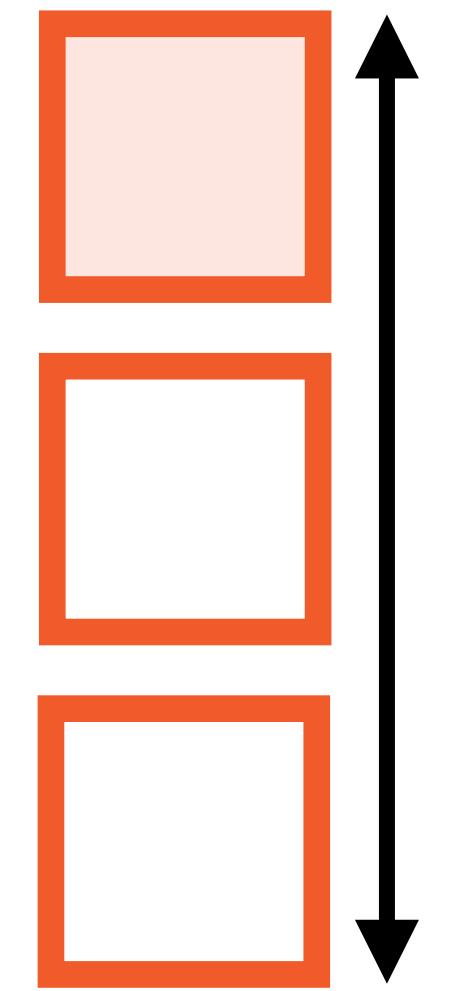
Maps



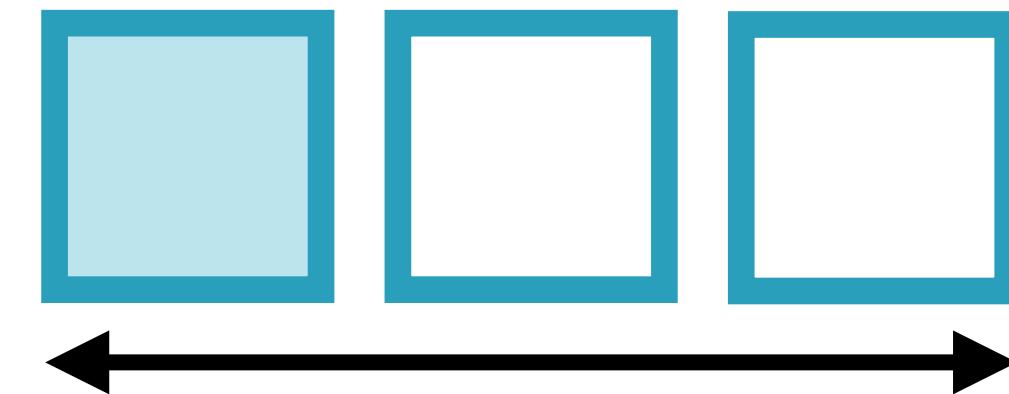
Settings



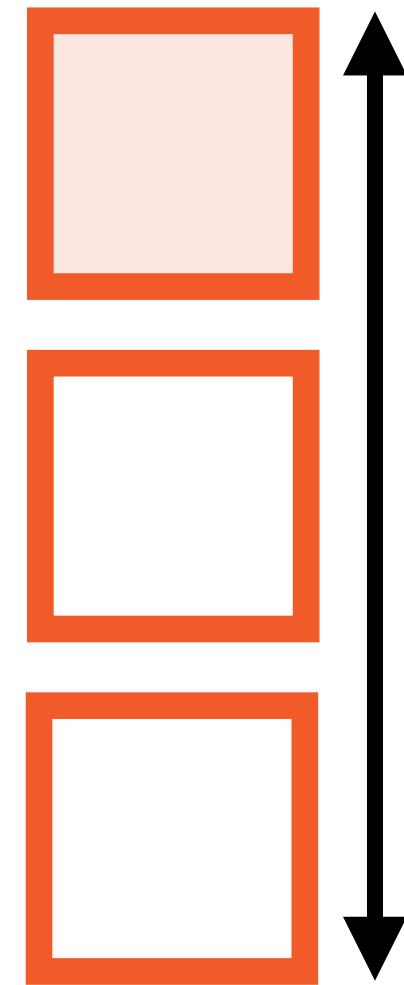
Shortcuts



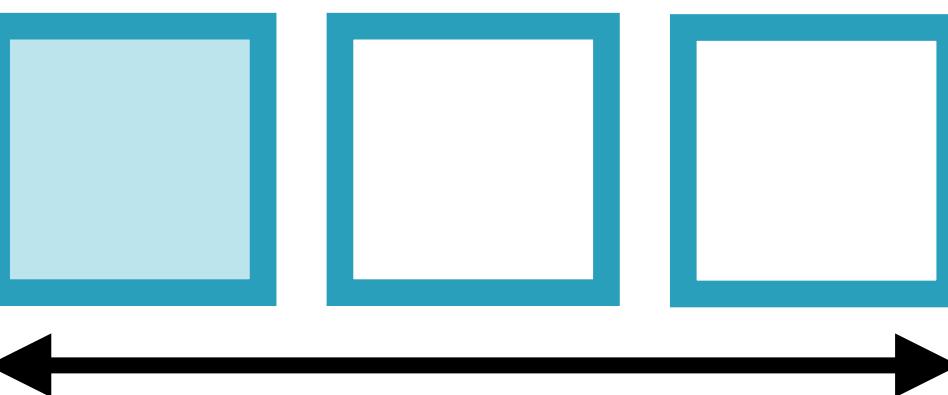
**V Stack**



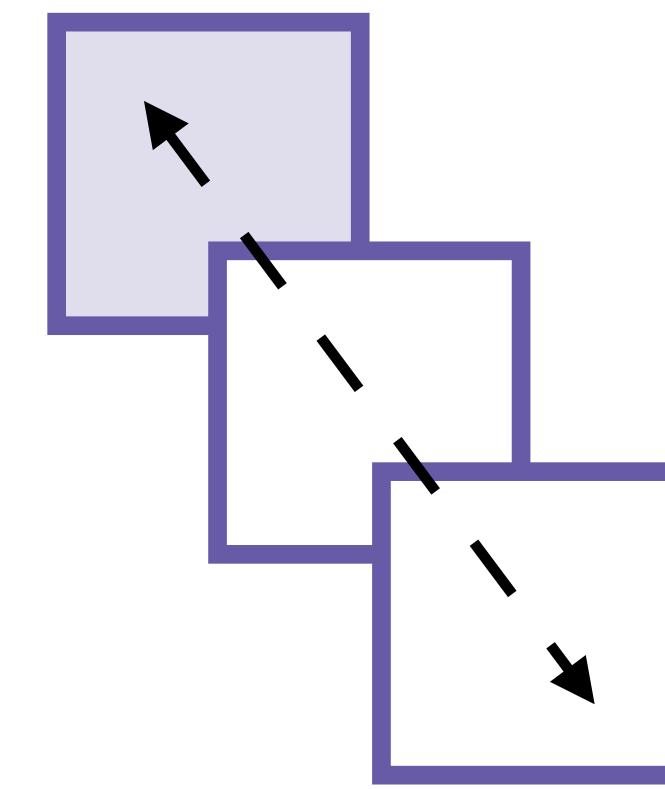
**H Stack**



**VStack**



**HStack**



**ZStack**

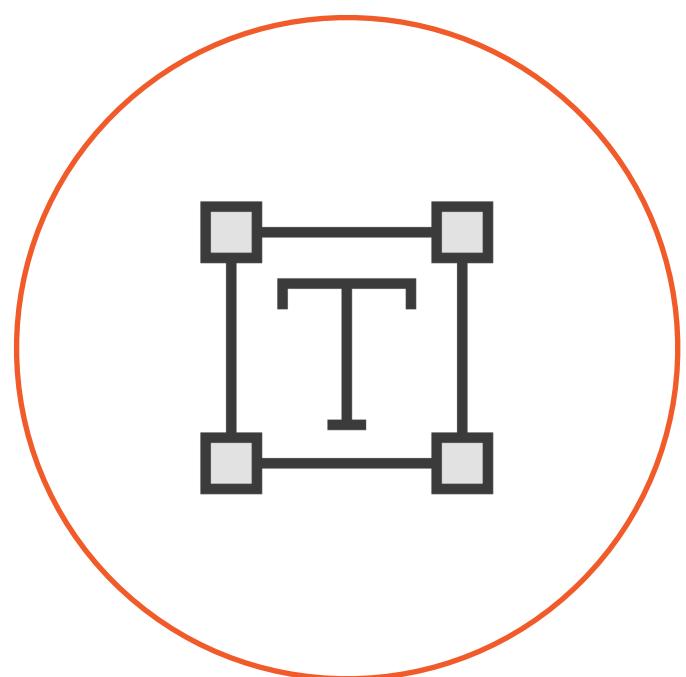


500 pt

350 pt

.frame(width: 500, height: 350)

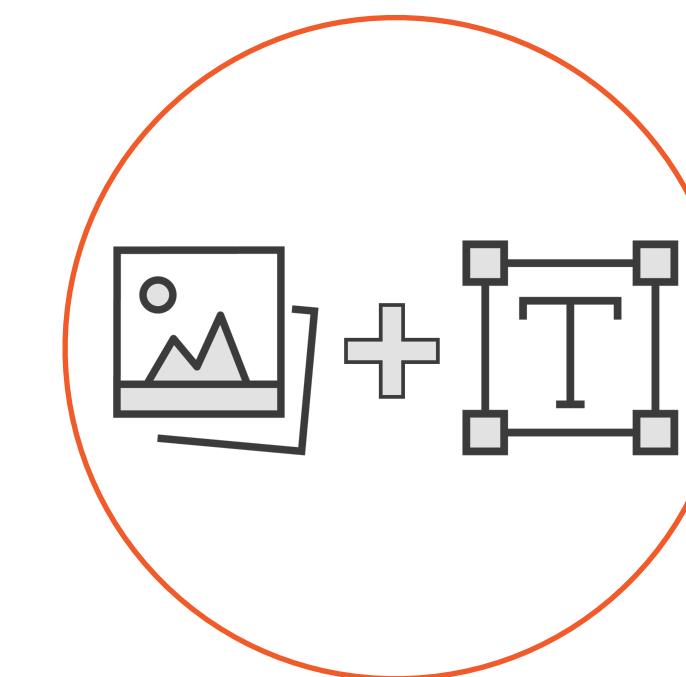
# Representing Data



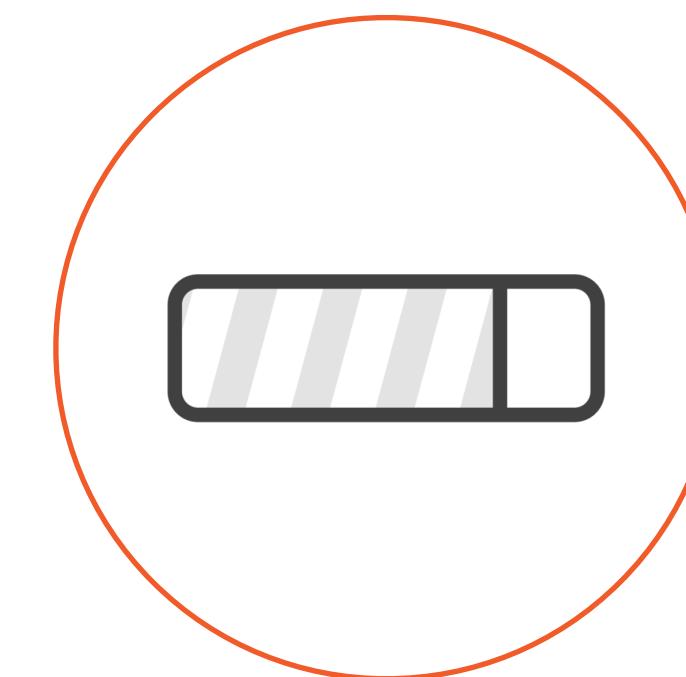
**Text**



**Image**



**Label**



**ProgressView**



**Toggle the presentation of the modal**

**Review the mechanics of how changeable data works in SwiftUI**

Up Next:  
Handling User Input

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