Contents

Basic layouts in Compose

1. Introduction

Being a UI toolkit, Compose makes it easy to implement your app's designs. You describe how you want your UI to look, and Compose takes care of drawing it on screen. This codelab teaches you how to write Compose UIs. It assumes you understand the concepts taught in the basics codelab, so make sure that you complete that codelab first. In the Basics codelab, you learned how to implement simple layouts using `Surfaces`, `Rows` and `Columns`. You also augmented these layouts with modifiers like `padding`, `fillMaxWidth`, and `size`.

In this codelab you implement a more **realistic and complex layout**, learning about various **out of the box composables** and **modifiers** along the way. After finishing this codelab, you should be able to transform a basic app's design into working code.

This codelab does not add any actual behavior to the app. To learn about state and interaction instead, complete the State in Compose codelab instead.

For more support as you're walking through this codelab, check out the following code-along:

1.1. What you'll learn

In this codelab, you will learn:

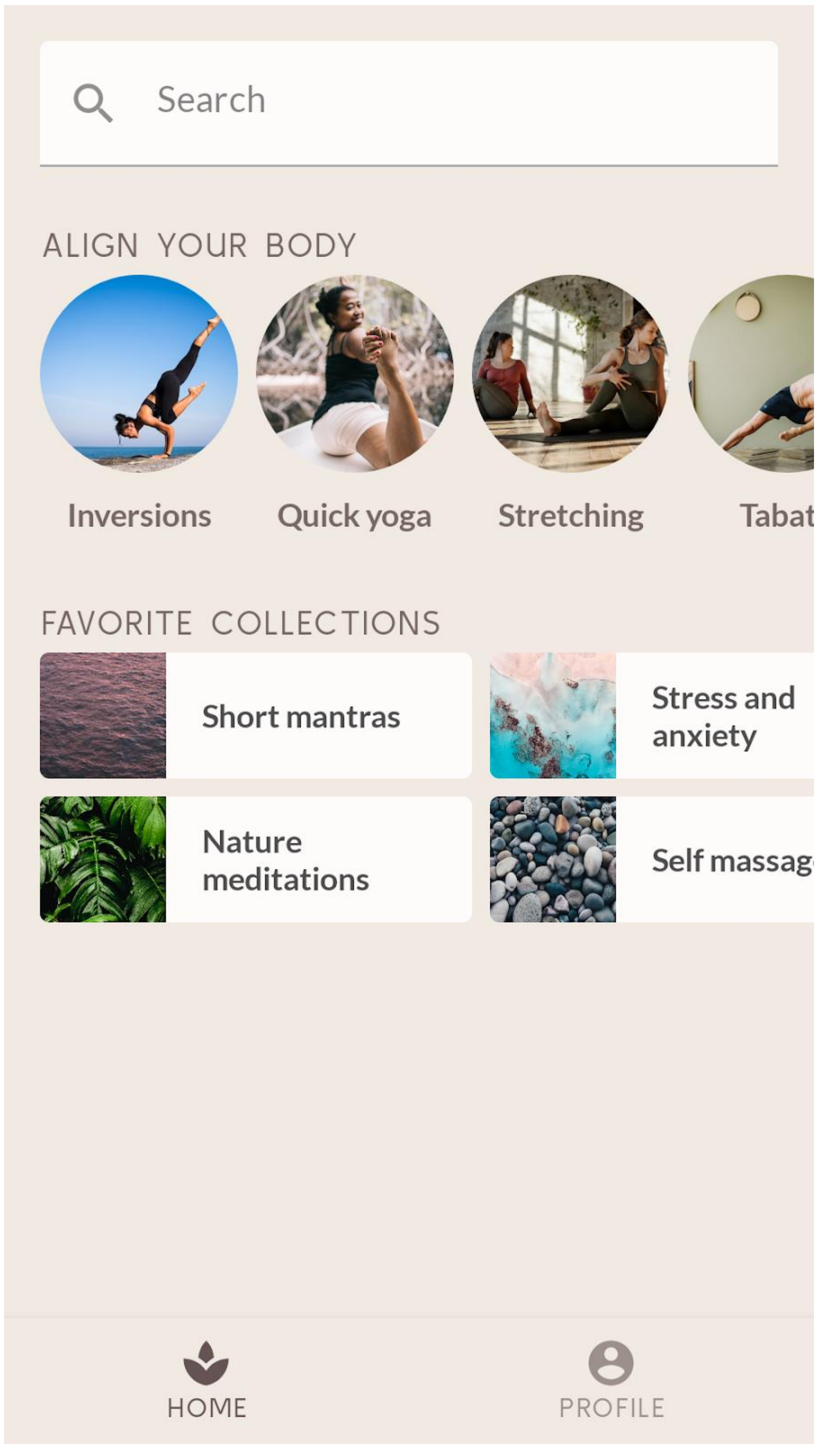
- How modifiers help you augment your composables.
- How standard layout components like Column and LazyRow position child composables.
- How alignments and arrangements change the position of child composables in their parent.
- How Material composables like Scaffold and Bottom Navigation help you create comprehensive layouts.
- How to build flexible composables using slot APIs.

1.2. What you'll need

- Have Android Studio Chipmunk or later installed.
- Experience with Kotlin syntax, including lambdas.
- Basic experience with Compose. If you haven't already, complete the Jetpack Compose basics codelab before starting this codelab.
- Basic knowledge of what a composable is, and what modifiers are.

1.3. What you'll build

In this codelab, you implement a realistic app design based on mocks provided by a designer. MySoothe is a well-being app that lists various ways to improve your body and mind. It contains a section that lists your favorite collections, and a section with physical exercises. This is what the app looks like:



2. Getting set up

In this step, you download code that contains theming and some basic setup.

2.1. Get the code

The code for this codelab can be found in the android-compose-codelabs Github repository. To clone it, run:

```
$ git clone https://github.com/googlecodelabs/android-compose-codelabs
```

Alternatively, you can download two zip files:

- Starting point
- Solution

2.2. Check out the code

The downloaded code contains code for all available Compose codelabs. To complete this codelab, open the `BasicLayoutsCodelab` project inside Android Studio.

The compose-codelabs repo contains starter code for all codelabs in the pathway.

For this codelab, use the **BasicLayoutsCodelab** project.

- **BasicLayoutsCodelab** — Project that contains the starter and finished code for this codelab.

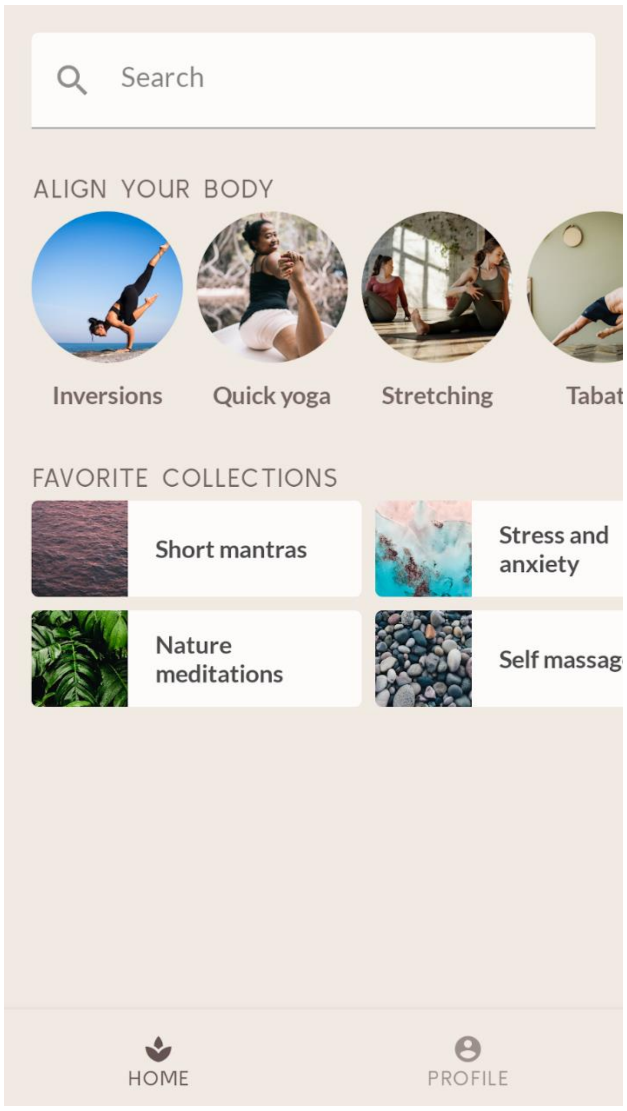
The project is built in multiple git branches:

- **main** – Contains the starter code for this project. Make your changes here to complete the codelab.
- **end** – Contains the solution to this codelab.

We recommend that you start with the code in the `main` branch and follow the codelab step by step at your own pace.

3. Start with a plan

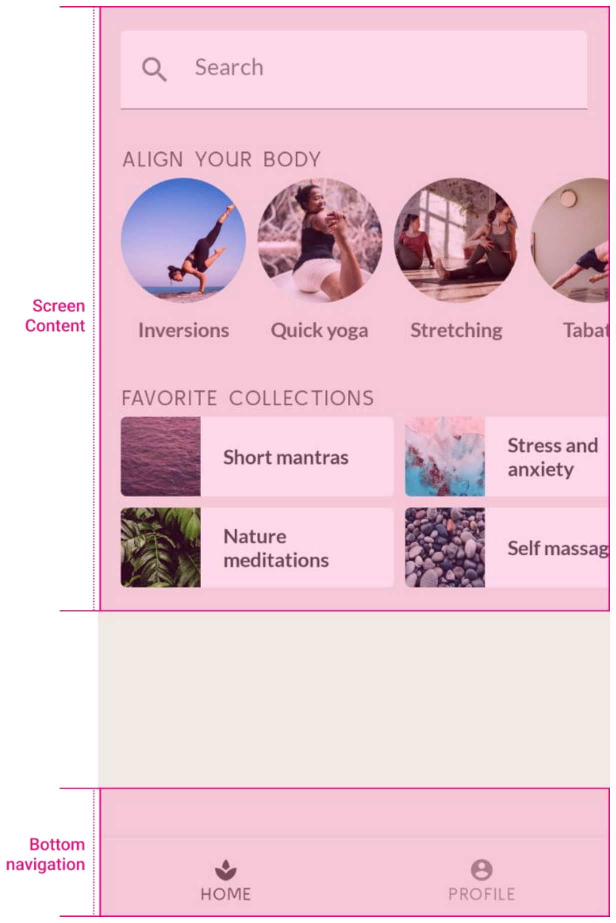
Let's take a closer look at the design:



When you're asked to implement a design, a good way to start is by getting a clear understanding of its structure. Don't start coding straight away, but instead **analyze the design itself**. How can you **split this UI into multiple reusable parts**?

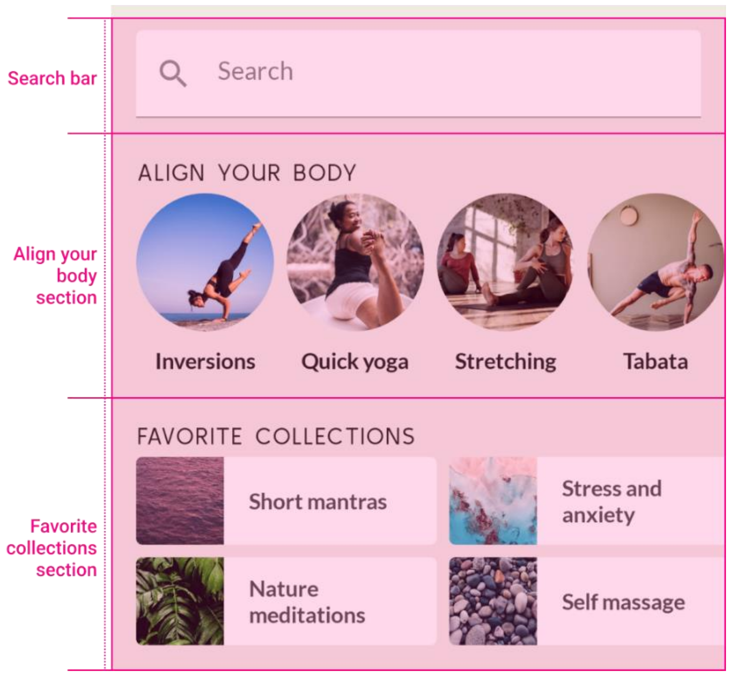
So let's give this a go with our design. At the highest abstraction level, we can break this design down into two pieces:

- The screen's content.
- The bottom navigation.



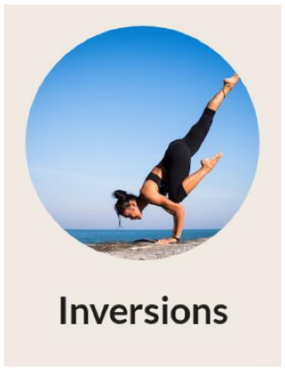
Drilling down, the screen content contains three sub-parts:

- The Search bar.
- A section called "Align your body".
- A section called "Favorite collections".

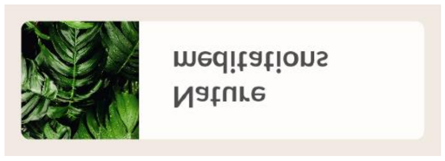


Inside each section, you can also see some lower level components that are re-used:

- The "align your body" element that's shown in a horizontally scrollable row.



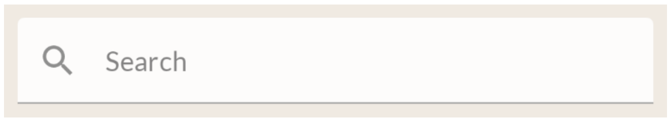
- The "favorite collection" card that's shown in a horizontally scrollable grid.



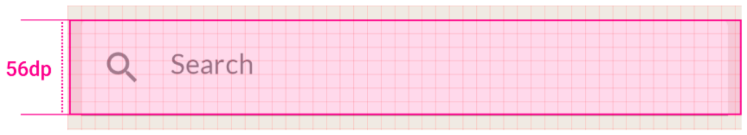
Now that you've analyzed the design, you can start implementing composables for every identified piece of the UI. Start with the lowest level composables and continue to combine these into more complex ones. By the end of the codelab, your new app will look like the provided design.

4. Search bar - Modifiers

The first element to transform into a composable is the Search bar. Let's take another look at the design:



Based on this screenshot alone, it would be quite difficult to implement this design in a pixel-perfect way. Generally, a designer conveys more information about the design. They can give you access to their design tool, or share so-called redlining designs. In this case, our designer handed off the redlining designs, which you can use to read off any sizing values. The design is shown with an 8dp grid overlay, so you can easily see how much space is between and around elements. Additionally, some spacings are added explicitly to clarify certain sizes.



You can see that the search bar should have a height of 56 density-independent pixels. It should also fill the full width of its parent.

To implement the search bar, use a Material component called Text field. The Compose Material library contains a composable called `TextField`, which is the implementation of this Material component.

Start with a basic `TextField` implementation. In your code base, open `MainActivity.kt` and search for the `SearchBar` composable.

Inside the composable called `SearchBar`, write the basic `TextField` implementation:

```
import androidx.compose.material.TextField

@Composable
fun SearchBar(
  modifier: Modifier = Modifier
) {
  TextField(
     value = "",
     onValueChange = {},
     modifier = modifier
  )
}
```

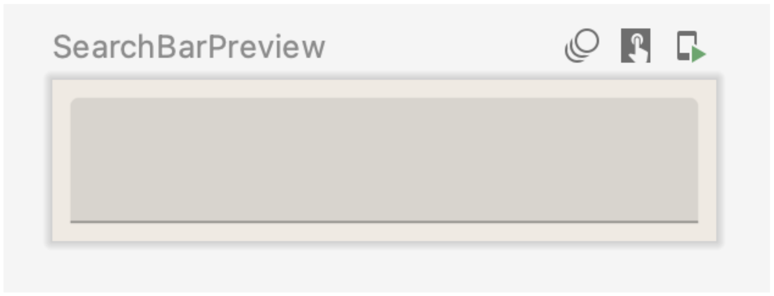
Some points to notice:

- You hardcoded the text field's value, and the `onValueChange` callback doesn't do anything. Since this is a layout-focused codelab, you ignore anything that has to do with state.

If you'd like to learn more about state in composables, check out the State in Compose codelab.

- The `SearchBar` composable function accepts a `modifier` parameter and passes this on to the `TextField`. This is a best practice as per Compose guidelines. This allows the method's caller to modify the composable's look & feel, which makes it more flexible and reusable. You'll continue this best practice for all composables in this codelab.

Let's look at the preview of this composable. Remember that you can use the Preview functionality in Android Studio to quickly iterate on your individual composables. `MainActivity.kt` contains previews for all the composables you'll build in this codelab. In this case, the method `SearchBarPreview` renders our `SearchBar` composable, with some background and padding to give it a bit more context. With the implementation you just added, it should look like this:



There are some things missing. First, let's fix the size of the composable using modifiers.

When writing composables, you use **modifiers** to:

- Change the composable's size, layout, behavior, and appearance.
- Add information, like accessibility labels.
- Process user input.
- Add high-level interactions, like making an element clickable, scrollable, draggable, or zoomable.

Each composable that you call has a `modifier` parameter that you can set to adapt that composable's look, feel and behavior. When you set the modifier, you can chain multiple modifier methods to create a more complex adaptation.

If you want to learn more about the behavior of modifiers, check out the modifiers documentation. You can also look at the full list of available modifiers.

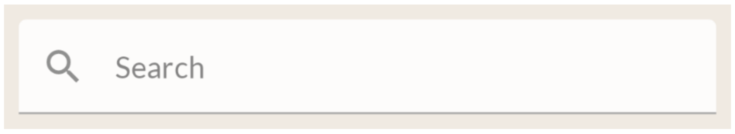
In this case, the search bar should be at least 56dp high, and fill its parent's width. To find the right modifiers for this, you can go through the list of modifiers and look at the Size section. For the height, you can use the `heightIn` modifier. This makes sure that the composable has a specific minimum height. It can, however, become larger when, for example, the user enlarges their system font size. For the width you can use the fillMaxWidth modifier. This modifier makes sure that the search bar uses up all the horizontal space of its parent.

Update the modifier to match the code below:

```
import androidx.compose.material.TextField


@Composable
fun SearchBar(
  modifier: Modifier = Modifier
) {
  TextField(
     value = "",
     onValueChange = {},
     modifier = modifier
        .fillMaxWidth()
        .heightIn(min = 56.dp)
  )
}
```

In this case, because one modifier influences the width, and the other the height, the order of these modifiers doesn't matter.

You also have to set some parameters of the `TextField`. Try to make the composable look like the design by setting the parameter values. Here's the design again as a reference:



These are the steps that you should take to update your implementation:

- Add the search icon. `TextField` contains a parameter `leadingIcon` that accepts another composable. Inside, you can set an `Icon`, which in our case should be the `Search` icon. Make sure to use the right Compose `Icon` import.
- Set the background color of the text field to MaterialTheme's `surface` color. You can use the `TextFieldDefaults.textFieldColors` to override specific colors.
- Add a placeholder text "Search" (you can find this as string resource `R.string.placeholder_search`).

When you're done, your composable should look similar to this:

```
import androidx.compose.foundation.layout.fillMaxWidth
import androidx.compose.foundation.layout.heightIn
import androidx.compose.ui.res.stringResource
import androidx.compose.material.Icon
import androidx.compose.material.MaterialTheme
import androidx.compose.material.Text
import androidx.compose.material.TextField
import androidx.compose.material.TextFieldDefaults
import androidx.compose.material.icons.Icons
import androidx.compose.material.icons.filled.Search


@Composable
fun SearchBar(
  modifier: Modifier = Modifier
) {
  TextField(
     value = "",
     onValueChange = {},
     leadingIcon = {
        Icon(
           imageVector = Icons.Default.Search,
           contentDescription = null
        )
     },
     colors = TextFieldDefaults.textFieldColors(
        backgroundColor = MaterialTheme.colors.surface
     ),
     placeholder = {
        Text(stringResource(R.string.placeholder_search))
     },
     modifier = modifier
        .fillMaxWidth()
        .heightIn(min = 56.dp)
  )
}
```

Notice that:

- You added a `leadingIcon` showing the search icon. This icon does not need a content description, as the text field's placeholder already describes the meaning of the text field. Remember that a content description is normally used for accessibility purposes and gives the user of your app a textual representation of an image or icon.

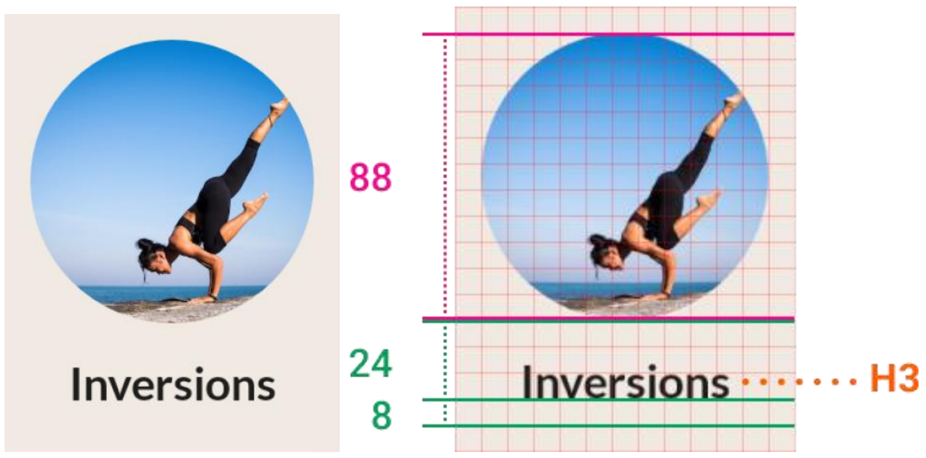
To learn more about accessibility, check out the Accessibility codelab or read the Accessibility documentation.

- To adapt the background color of the text field, you set the `colors` property. Instead of a separate parameter for each color, the composable contains one combined parameter. Here you pass in a copy of the `TextFieldDefaults` data class, where you update only the colors that are different. In this case, that's only the background color.
- You set a minimum height, not a fixed height. This is the recommended approach, so that the text field can still grow in size when the user, for example, increases their font sizes in the system settings.

In this step you saw how you can use composable parameters and modifiers to change a composable's look and feel. This applies to both composables provided by the Compose and Material libraries, and to the ones you write yourself. You should always think about providing parameters to customize the composable you're writing. You should also add a `modifier` property so the composable's look and feel can be adapted from the outside.

5. Align your body - Alignment

The next composable you'll implement is the "Align your body" element. Let's take a look at its design, including the redlines design next to it:



The redlines design now also contains baseline-oriented spacings. Here's the information we get from it:

- The image should be 88dp high.
- The spacing between the baseline of the text and the image should be 24dp.
- The spacing between the baseline and the bottom of the element should be 8dp.
- The text should have a typography style of H3.

The **baseline** of a text is the line on which the letters "sit". It's considered a best practice among designers to align text elements based on their baseline, instead of their top or bottom.

To implement this composable, you need an [Image](https://developer.android.com) and a [Text](https://developer.android.com) composable. They need to be included in a [Column](https://developer.android.com), so they are positioned underneath each other.

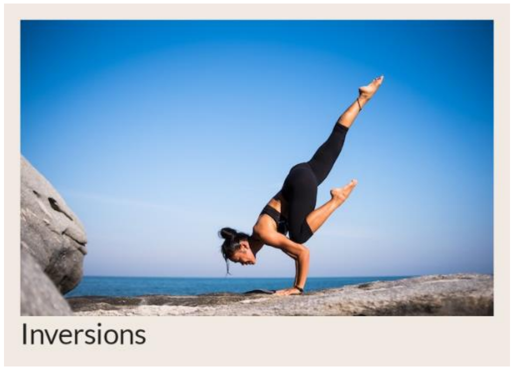
Find the `AlignYourBodyElement` composable in your code and update its content with this basic implementation:

```
import androidx.compose.foundation.Image
import androidx.compose.foundation.layout.Column
import androidx.compose.ui.res.painterResource

@Composable
fun AlignYourBodyElement(
  modifier: Modifier = Modifier
) {
  Column(
    modifier = modifier
  ) {
    Image(
      painter = painterResource(R.drawable.ab1_inversions),
      contentDescription = null
    )
    Text(
      text = stringResource(R.string.ab1_inversions)
    )
  }
}
```

Notice that:

- You set the `contentDescription` of the image to null, as this image is purely decorative. The text below the image describes enough of the meaning, so the image does not need an extra description.
- You are using a hard-coded image and text. In the next step, you'll move these to use parameters provided in the `AlightYourBodyElement` composable to make them dynamic.

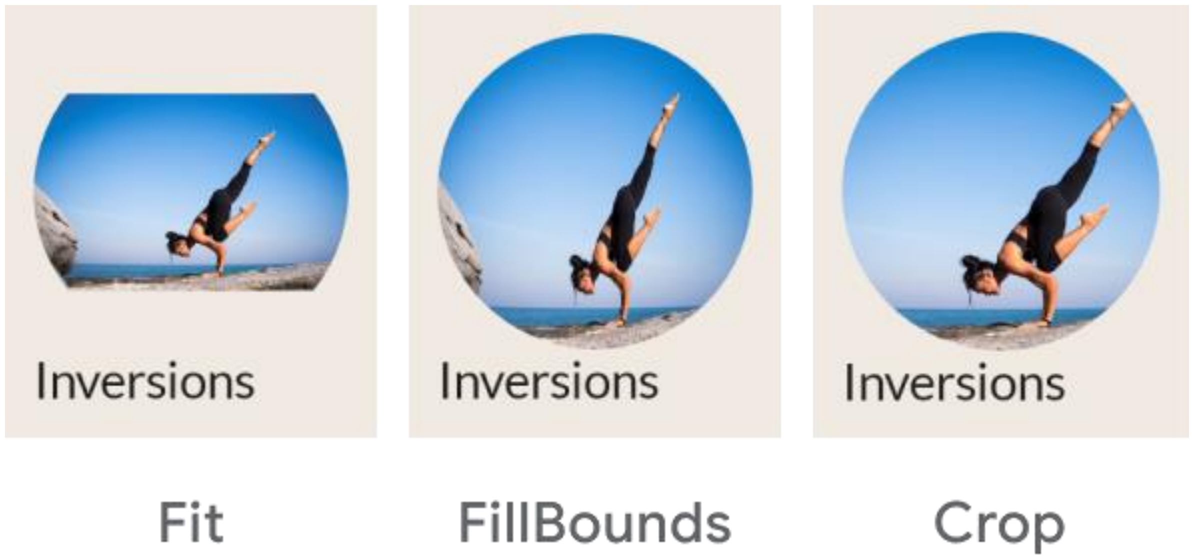
Take a look at the preview of this composable:



There are some improvements to be made. Most noticeably, the image is too large and not shaped as a circle. You can adapt the `Image` composable with the size and clip modifiers and the `contentScale` parameter.

The size modifier adapts the composable to fit a certain size, similar to the fillMaxWidth and heightIn modifiers that you saw in the previous step. The clip modifier works differently and **adapts the composable's appearance**. You can set it to any Shape and it clips the composable's content to that shape.

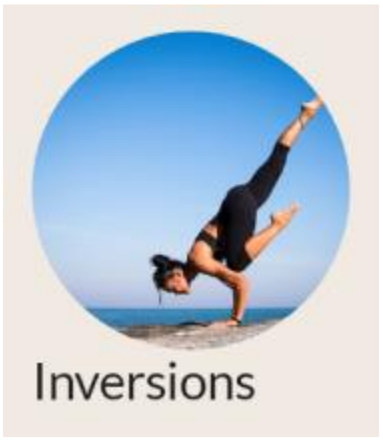
The image also needs to be scaled correctly. To do so, we can use the Image's contentScale parameter. There are several options, most notably:



In this case, the crop type is the correct one to use. After applying the modifiers and the parameter, your code should look like this:

```
import androidx.compose.foundation.layout.size
import androidx.compose.foundation.shape.CircleShape
import androidx.compose.ui.draw.clip
import androidx.compose.ui.layout.ContentScale
@Composable
fun AlignYourBodyElement(
  modifier: Modifier = Modifier
) {
  Column(
    modifier = modifier
  ) {
    Image(
      painter = painterResource(R.drawable.ab1_inversions),
      contentDescription = null,
      contentScale = ContentScale.Crop,
      modifier = Modifier
        .size(88.dp)
        .clip(CircleShape)
    )
    Text(
      text = stringResource(R.string.ab1_inversions)
    )
  }
}
```

Your design should now look like this:



As a next step, align the text horizontally by setting the alignment of the `Column`.

In general, to align composables inside a parent container, you set the **alignment** of that parent container. So instead of telling the child to position itself in its parent, you tell the parent how to align its children.

For a `Column`, you decide how its children should be aligned horizontally. The options are:

- Start
- CenterHorizontally
- End

For a `Row`, you set the vertical alignment. The options are similar to those of the `Column`:

- Top
- CenterVertically
- Bottom

For a `Box`, you combine both horizontal and vertical alignment. The options are:

- TopStart
- TopCenter
- TopEnd
- CenterStart

- Center
- CenterEnd
- BottomStart
- BottomCenter
- BottomEnd

All of the container's children will follow this same alignment pattern. You can override the behavior of a single child by adding an align modifier to it.

For this design, the text should be centered horizontally. To do that, set the `Column`'s `horizontalAlignment` to center horizontally:

```
import androidx.compose.ui.Alignment
@Composable
fun AlignYourBodyElement(
  modifier: Modifier = Modifier
) {
  Column(
     horizontalAlignment = Alignment.CenterHorizontally,
     modifier = modifier
  ) {
     Image(
        //..
     )
     Text(
        //..
     )
  }
}
```

With these parts implemented, there are only some minor changes that you need to make to make the composable identical to the design. Try to implement these by yourself or reference the final code if you get stuck. Think of the following steps:

- Make the image and text dynamic. Pass them as arguments to the composable function. Don't forget to update the corresponding Preview and pass in some hard-coded data.
- Update the text to use the right typography style.
- Update the baseline spacings of the text element.

When you're done implementing these steps, your code should look similar to this:

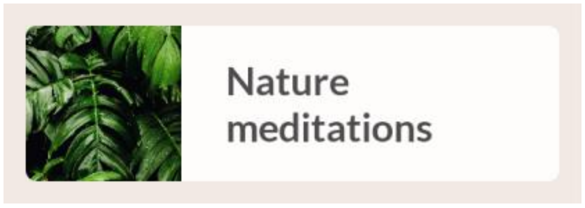
```
import androidx.compose.foundation.layout.paddingFromBaseline
```

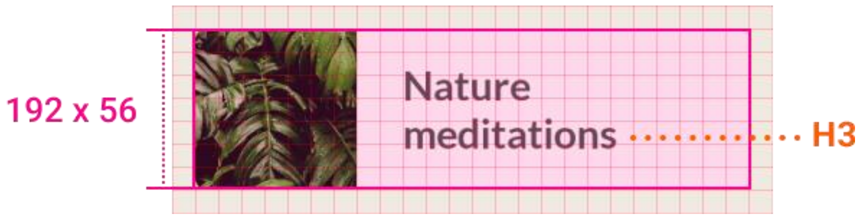
```
@Composable
fun AlignYourBodyElement(
  @DrawableRes drawable: Int,
  @StringRes text: Int,
  modifier: Modifier = Modifier
) {
  Column(
    modifier = modifier,
    horizontalAlignment = Alignment.CenterHorizontally
  ) {
    Image(
      painter = painterResource(drawable),
      contentDescription = null,
      contentScale = ContentScale.Crop,
      modifier = Modifier
        .size(88.dp)
        .clip(CircleShape)
    )
    Text(
      text = stringResource(text),
      style = MaterialTheme.typography.h3,
      modifier = Modifier.paddingFromBaseline(
        top = 24.dp, bottom = 8.dp
      )
    )
  }
}

@Preview(showBackground = true, backgroundColor = 0xFFF0EAE2)
@Composable
fun AlignYourBodyElementPreview() {
  MySootheTheme {
    AlignYourBodyElement(
      text = R.string.ab1_inversions,
      drawable = R.drawable.ab1_inversions,
      modifier = Modifier.padding(8.dp)
    )
  }
}
```

There are often various ways to get to the same result, so your implementation might be slightly different from this proposed solution. For example, you can often use a Spacer or set a padding, and both will have the same visual result. The most important part is that your implementation follows the design and Compose guidelines.

6. Favorite collection card - Material Surface

The next composable to implement is in a way similar to the "Align the body" element. Here's the design, including the redlines:





In this case, the full size of the composable is provided. You can see that the text once again should be H3.

This container has some sort of background color, different from the background of the whole screen. It also has rounded corners. Since the designer didn't specify a color, we can assume that the color will be defined by the theme. For such a container, we use Material's Surface composable.

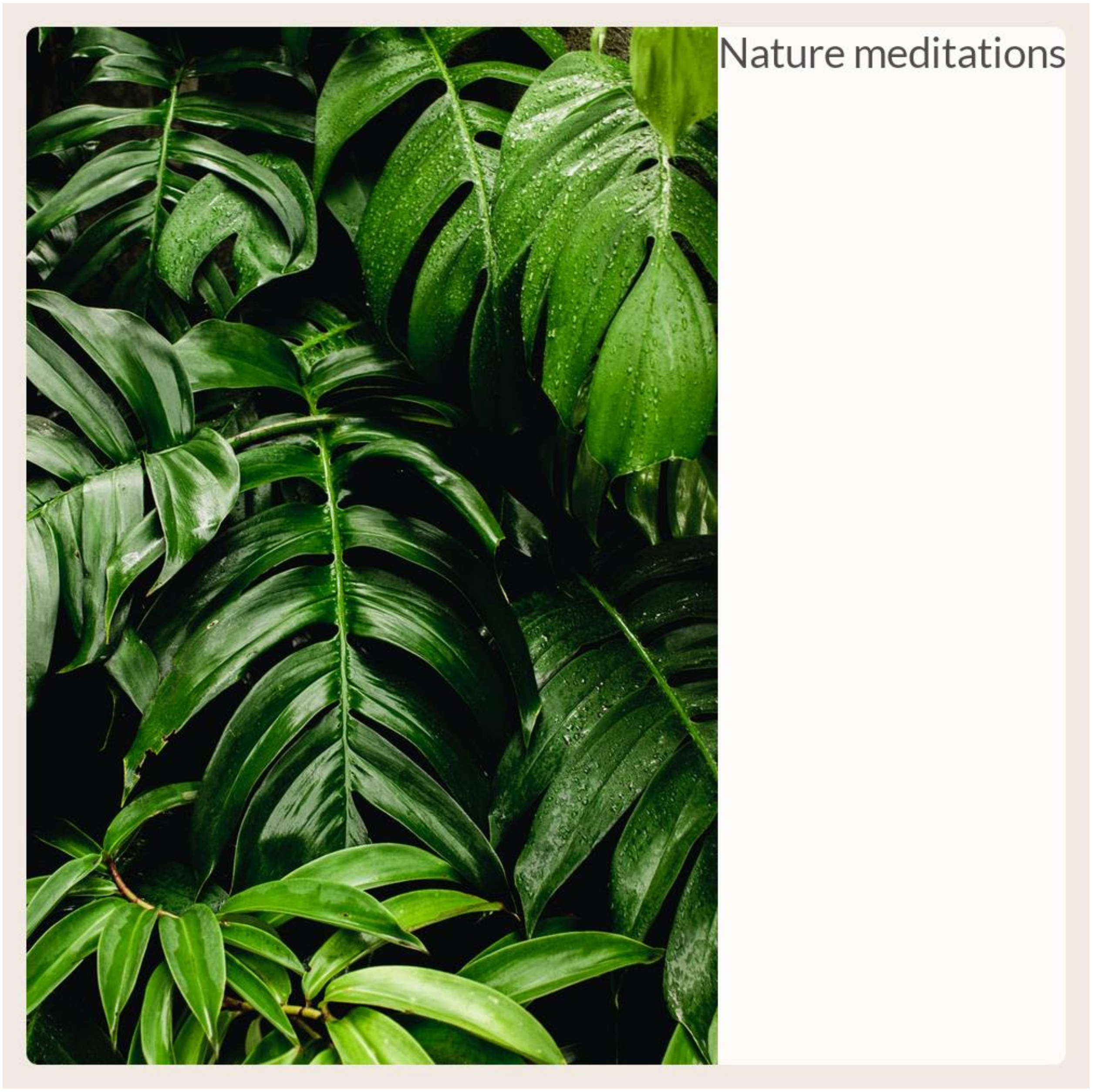
Surface is a component in the Compose Material library. It follows general Material Design patterns and you can adapt it by changing your app's theme. You can learn more about theming in the Theming in Compose codelab or in the Theming documentation.

You can adapt the `Surface` to your needs by setting its parameters and modifier. In this case, the surface should have rounded corners. You can use the `shape` parameter for this. Instead of setting the shape to a `Shape` as for the Image in the previous step, you'll use a value coming from our Material theme.

Let's see what this would look like:

```
import androidx.compose.foundation.layout.Row
import androidx.compose.material.Surface

@Composable
fun FavoriteCollectionCard(
  modifier: Modifier = Modifier
) {
  Surface(
        shape = MaterialTheme.shapes.small,
        modifier = modifier
    ) {
        Row {
            Image(
                painter = painterResource(R.drawable.fc2_nature_meditations),
                contentDescription = null
            )
            Text(
                text = stringResource(R.string.fc2_nature_meditations)
            )
        }
    }
}
```

And let's see the Preview of this implementation:

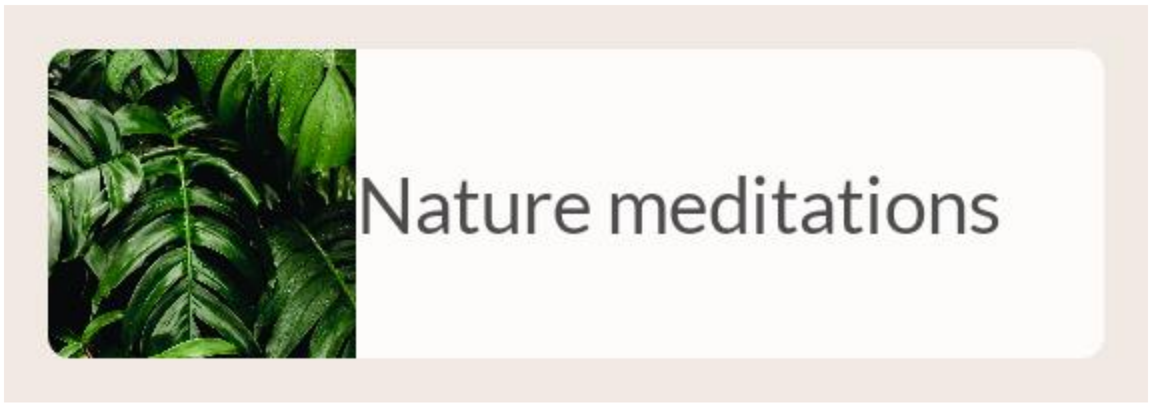


Next, apply the lessons learned in the previous step. Set the size of the image and crop it in its container. Set the width of the `Row`, and align its children vertically. Try to implement these changes yourself before looking at the solution code!

Your code would now look something like this:

```
import androidx.compose.foundation.layout.width


@Composable
fun FavoriteCollectionCard(
  modifier: Modifier = Modifier
) {
  Surface(
    shape = MaterialTheme.shapes.small,
    modifier = modifier
  ) {
    Row(
      verticalAlignment = Alignment.CenterVertically,
      modifier = Modifier.width(192.dp)
    ) {
      Image(
        painter = painterResource(R.drawable.fc2_nature_meditations),
        contentDescription = null,
        contentScale = ContentScale.Crop,
        modifier = Modifier.size(56.dp)
      )
      Text(
        text = stringResource(R.string.fc2_nature_meditations)
      )
    }
  }
}
```

The preview should now look like this:



To finish up this composable, implement the following steps:

- Make the image and text dynamic. Pass them in as arguments to the composable function.
- Update the text to use the right typography style.
- Update the spacing between the image and the text.

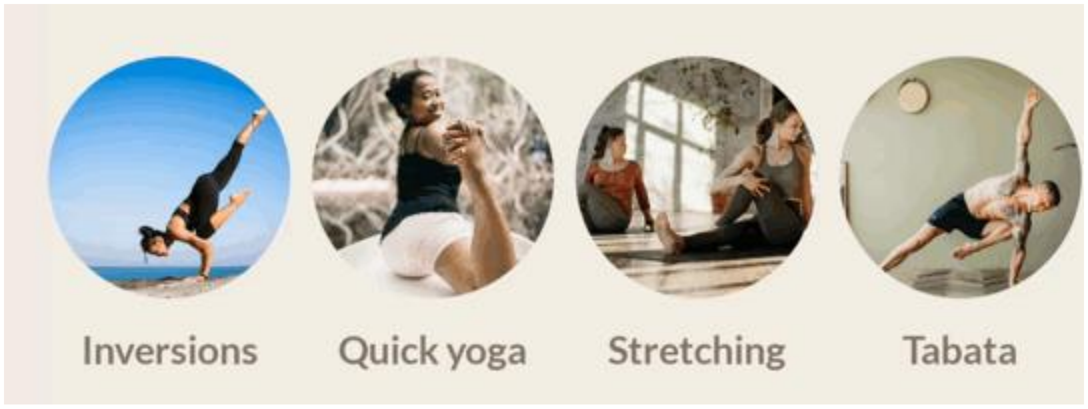
Your end result should look similar to this:

```
@Composable
fun FavoriteCollectionCard(
  @DrawableRes drawable: Int,
  @StringRes text: Int,
  modifier: Modifier = Modifier
) {
  Surface(
     shape = MaterialTheme.shapes.small,
     modifier = modifier
  ) {
     Row(
        verticalAlignment = Alignment.CenterVertically,
        modifier = Modifier.width(192.dp)
     ) {
        Image(
           painter = painterResource(drawable),
           contentDescription = null,
           contentScale = ContentScale.Crop,
           modifier = Modifier.size(56.dp)
        )
        Text(
           text = stringResource(text),
           style = MaterialTheme.typography.h3,
           modifier = Modifier.padding(horizontal = 16.dp)
        )
     }
  }
}

//..


@Preview(showBackground = true, backgroundColor = 0xFFF0EAE2)
@Composable
fun FavoriteCollectionCardPreview() {
  MySootheTheme {
     FavoriteCollectionCard(
        text = R.string.fc2_nature_meditations,
        drawable = R.drawable.fc2_nature_meditations,
        modifier = Modifier.padding(8.dp)
     )
  }
}
```

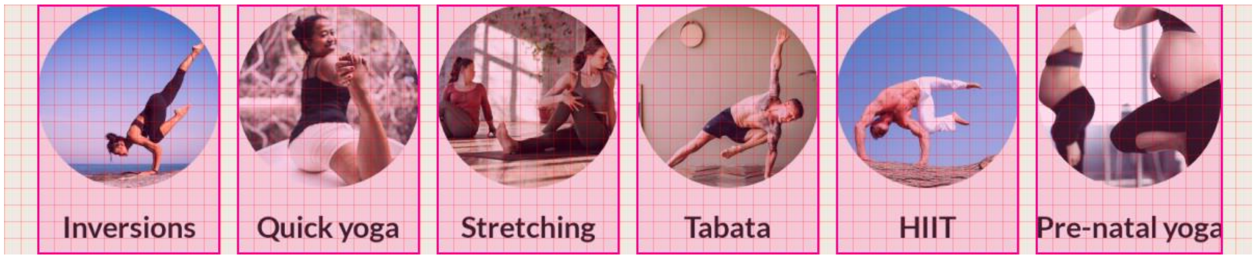
7. Align your body row - Arrangements

Now that you've created the basic composables that are shown on the screen, you can start creating the different sections of the screen.

Start with the "Align your body" scrollable row.



Here's the redline design for this component:



Remember that one block of the grid represents 8dp. So in this design there's 16dp space before the first item, and after the last item in the row. There's 8dp of spacing between each item.

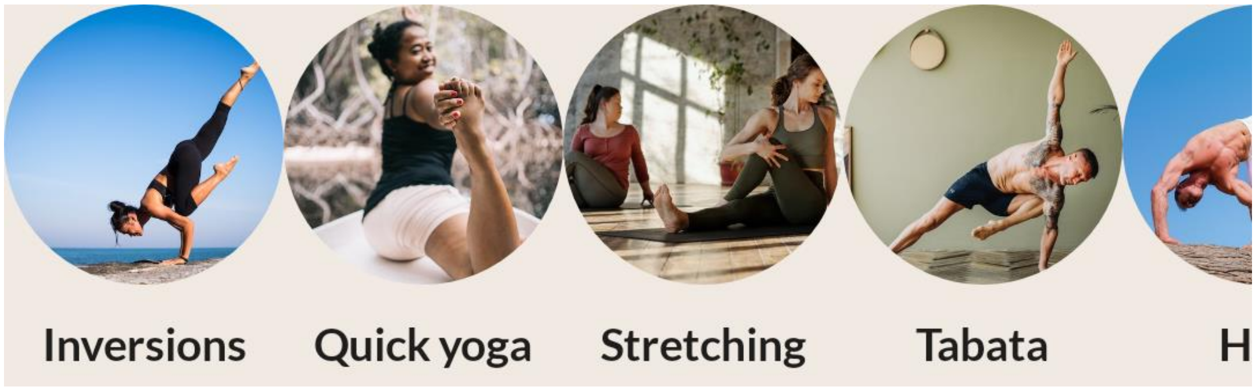
In Compose, you can implement a scrollable row like this using the `LazyRow` composable. The documentation on lists contains much more information about Lazy lists like `LazyRow` and `LazyColumn`. For this codelab, it's enough to know that the `LazyRow` only renders the elements that are shown on screen instead of all elements at the same time, which helps keep your app performant.

Start with a basic implementation of this `LazyRow`:

```
import androidx.compose.foundation.lazy.LazyRow
import androidx.compose.foundation.lazy.items

@Composable
fun AlignYourBodyRow(
  modifier: Modifier = Modifier
) {
  LazyRow(
        modifier = modifier
    ) {
        items(alignYourBodyData) { item ->
            AlignYourBodyElement(item.drawable, item.text)
        }
    }
}
```

As you can see, the children of a `LazyRow` aren't composables. Instead, you use the Lazy list DSL that provides methods like [item]() and [items]() that emit composables as list items. For each item in the provided `alignYourBodyData`, you emit a `AlignYourBodyElement` composable that you implemented earlier.

Notice how this is displayed:

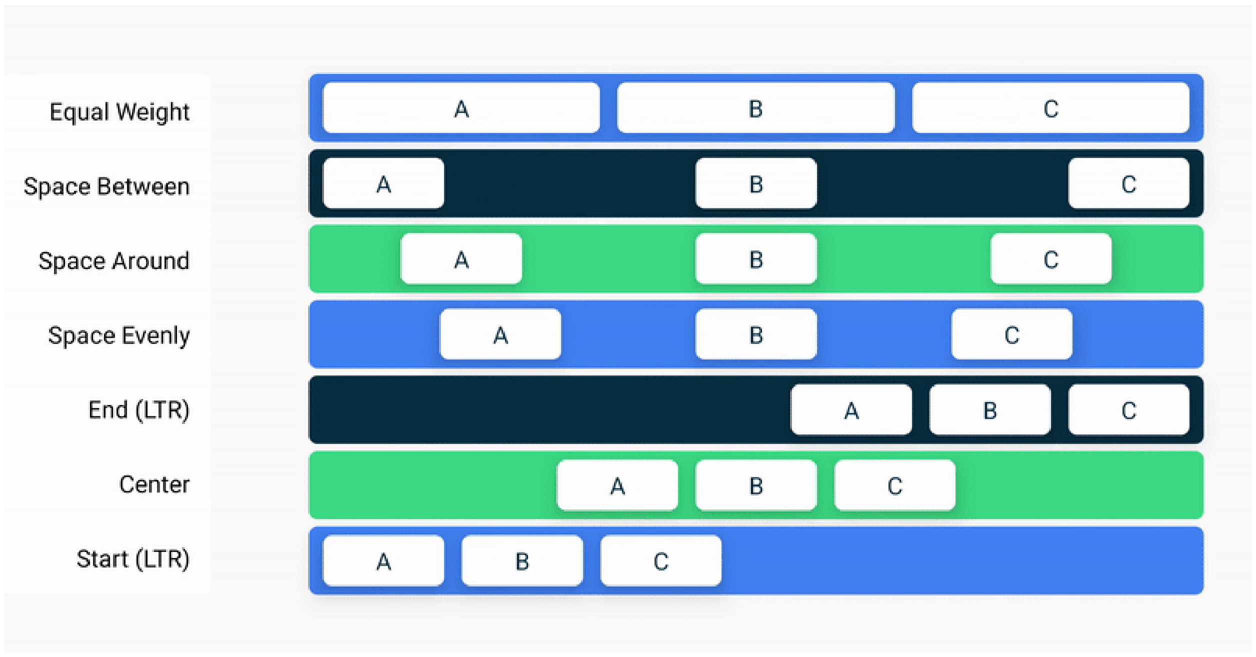


The spacings that we saw in the redlines design are still missing. To implement these, you'll have to learn about **arrangements**.

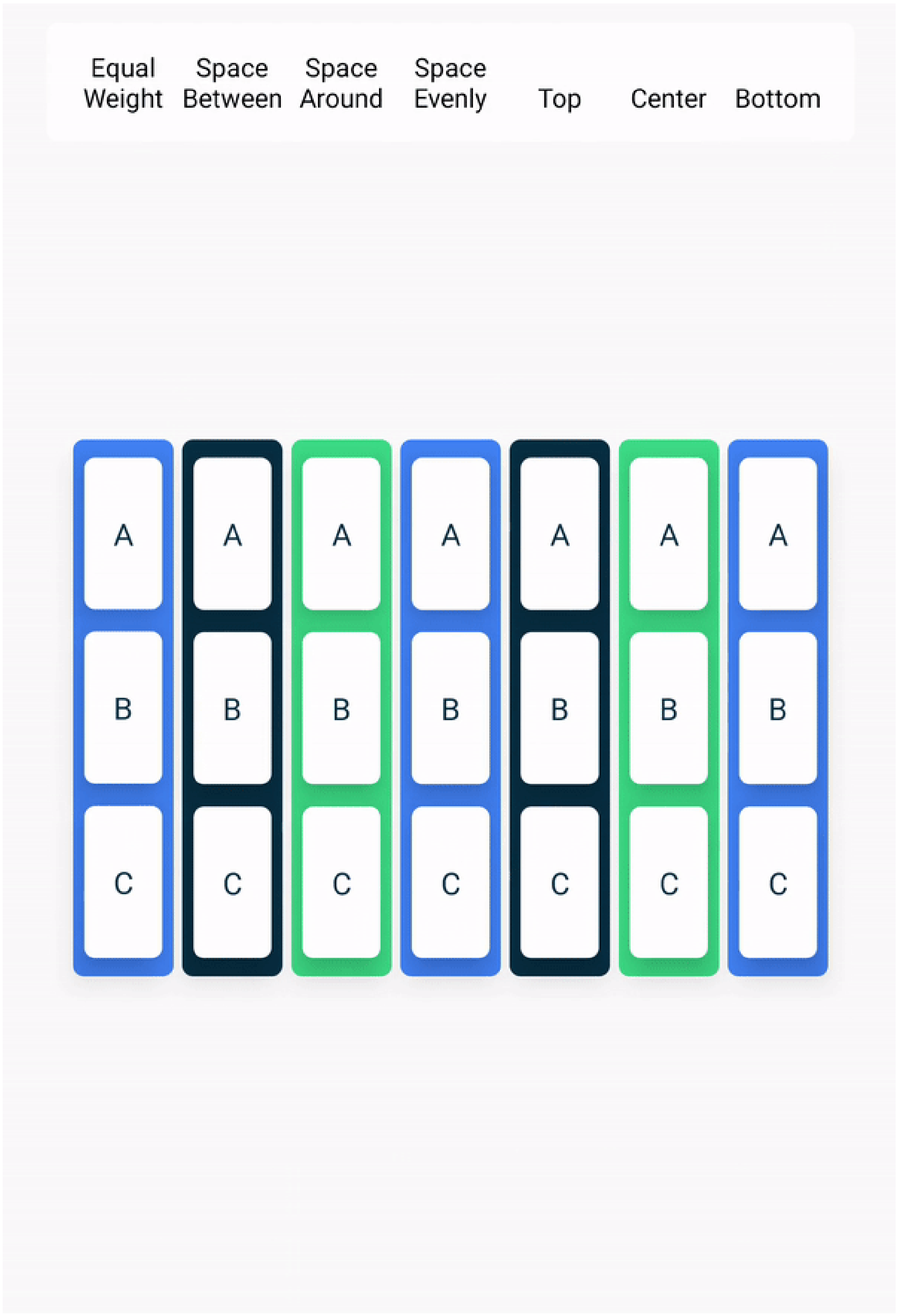
In the previous step you learned about alignments, which are used to align a container's children on the **cross-axis**. For a `Column`, the cross-axis is the horizontal axis, while for a `Row`, the cross-axis is the vertical axis.

However, we can also make a decision on how to place child composables on a container's **main axis** (horizontal for `Row`, vertical for `Column`).

For a `Row`, you can choose the following arrangements:



And for a `Column`:

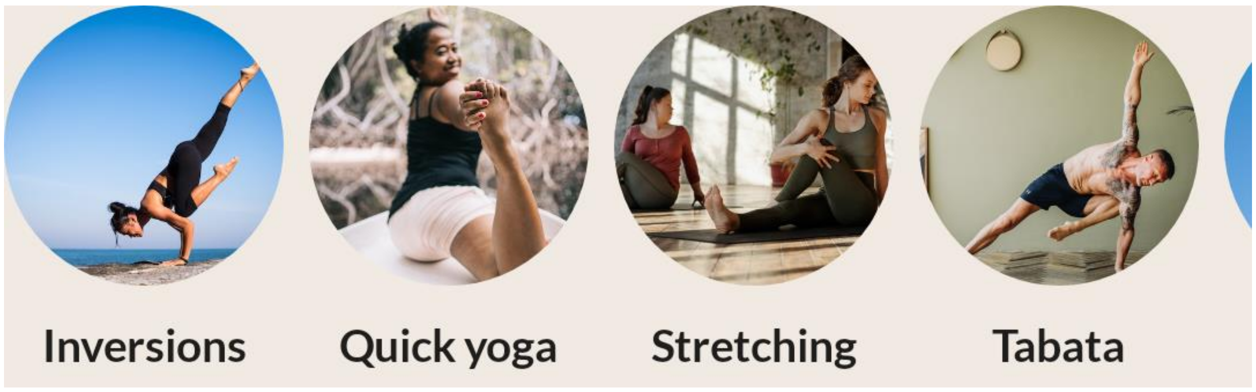

Equal Weight
Space Between
Space Around
Space Evenly
Top
Center
Bottom
A
B
C

In addition to these arrangements, you can also use the `Arrangement.spacedBy()` method to add a fixed space in between each child composable.

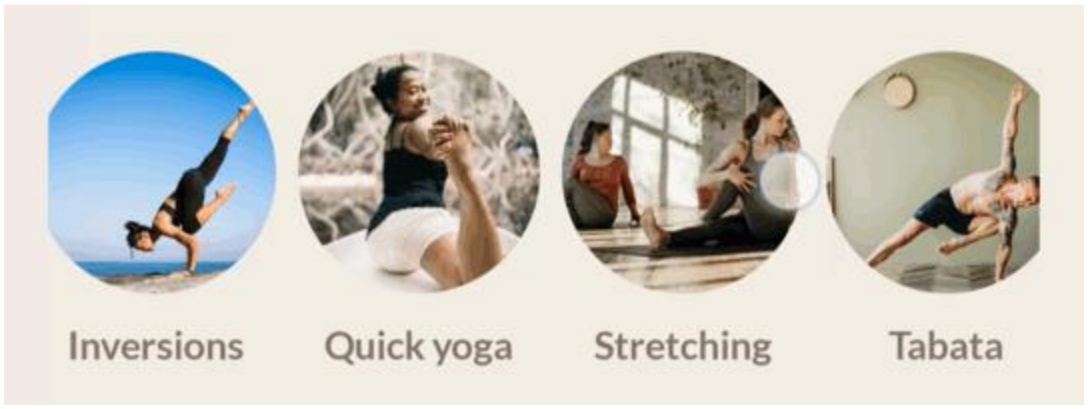
In the example, the `spacedBy` method is the one you need to use, as you want to place 8dp of spacing between each item in the `LazyRow`.

```
import androidx.compose.foundation.layout.Arrangement

@Composable
fun AlignYourBodyRow(
  modifier: Modifier = Modifier
) {
  LazyRow(
    horizontalArrangement = Arrangement.spacedBy(8.dp),
    modifier = modifier
  ) {
    items(alignYourBodyData) { item ->
      AlignYourBodyElement(item.drawable, item.text)
    }
  }
}
```

Now the design looks like this:



You need to add some padding on the sides of the `LazyRow` as well. Adding a simple padding modifier will not do the trick in this case. Try adding padding to the `LazyRow` and see how it behaves:



As you can see, when scrolling, the first and last visible item are cut off on both sides of the screen.

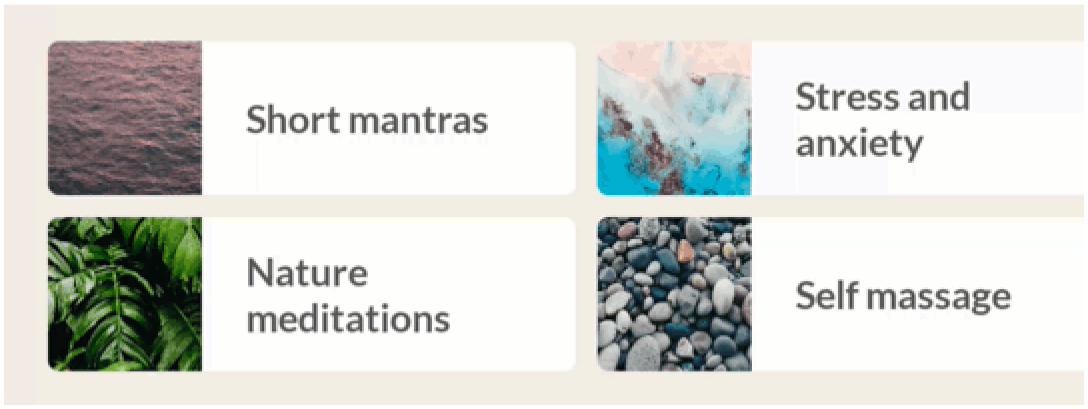
To maintain the same padding, but still scroll your content within the bounds of your parent list without clipping it, all lists provide a parameter called `contentPadding`.

Make sure that your composable behaves correctly when you swipe through the list. You can use [interactive Preview] to interact with your composable's Preview.

```
@Composable
fun AlignYourBodyRow(
  modifier: Modifier = Modifier
) {
  LazyRow(
     horizontalArrangement = Arrangement.spacedBy(8.dp),
     contentPadding = PaddingValues(horizontal = 16.dp),
     modifier = modifier
  ) {
     items(alignYourBodyData) { item ->
        AlignYourBodyElement(item.drawable, item.text)
     }
  }
}
```

8. Favorite collections grid - Lazy grids

The next section to implement is the "Favorite collections" part of the screen. Instead of a single row, this composable needs a grid:



You could implement this section similarly to the previous section, by creating a `LazyRow` and let each item hold a `Column` with two `FavoriteCollectionCard` instances. However, in this step you'll use the [`LazyHorizontalGrid`](), which provides a nicer mapping from items to grid elements.

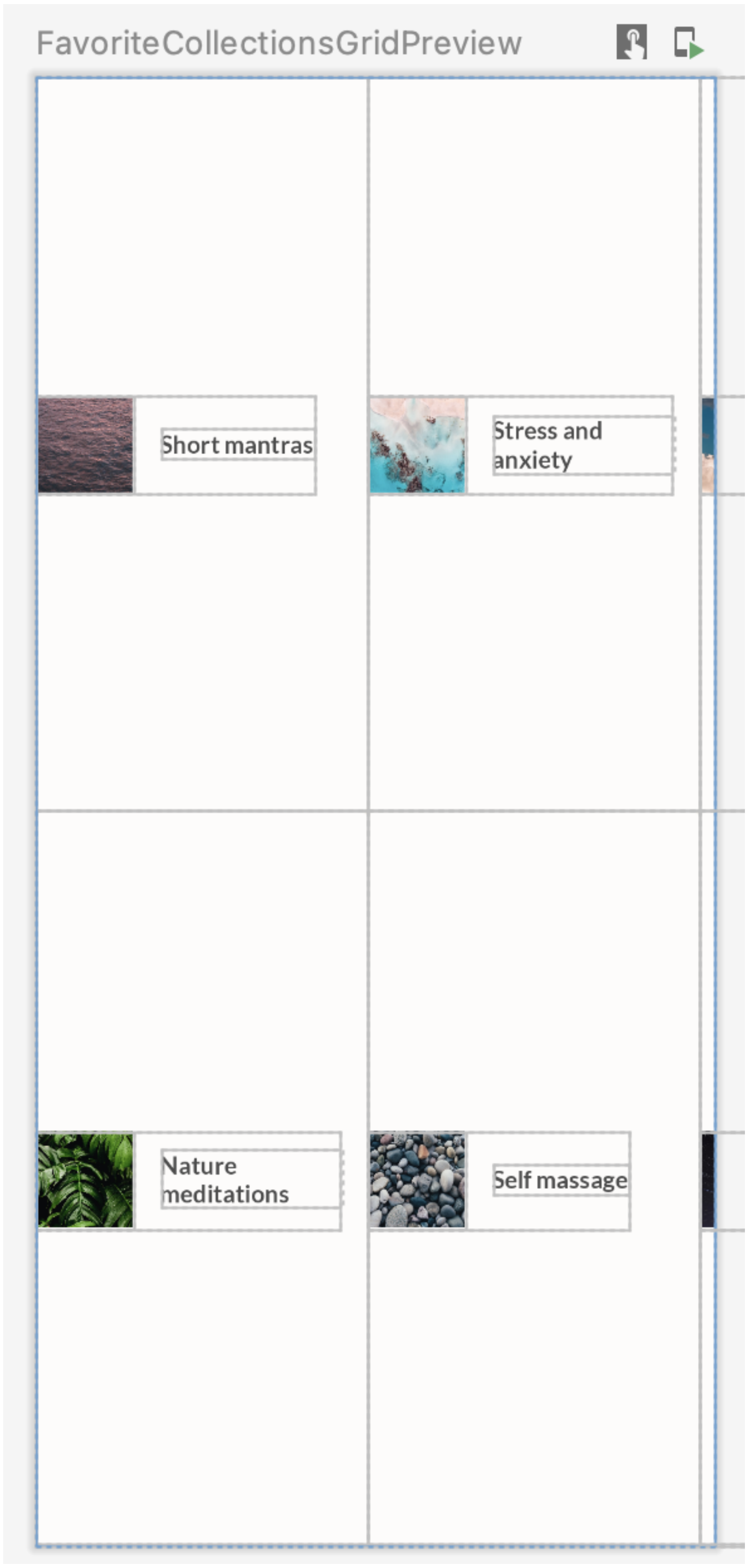
Start with a simple implementation of the grid with two fixed rows:

```
import androidx.compose.foundation.lazy.grid.GridCells
import androidx.compose.foundation.lazy.grid.LazyHorizontalGrid
import androidx.compose.foundation.lazy.grid.items

@Composable
fun FavoriteCollectionsGrid(
  modifier: Modifier = Modifier
) {
  LazyHorizontalGrid(
     rows = GridCells.Fixed(2),
     modifier = modifier
  ) {
     items(favoriteCollectionsData) { item ->
        FavoriteCollectionCard(item.drawable, item.text)
     }
  }
}
```

As you can see, you simply replaced the `LazyRow` from the previous step with a `LazyHorizontalGrid`.

`LazyHorizontalGrid` is part of the Lazy layouts API that was released in Jetpack Compose 1.2.0-alpha05. You'll need to use at least this version when you want to use this grid. For more information, check the [release notes]().

However, this won't give you the correct result just yet:


FavoriteCollectionsGridPreview

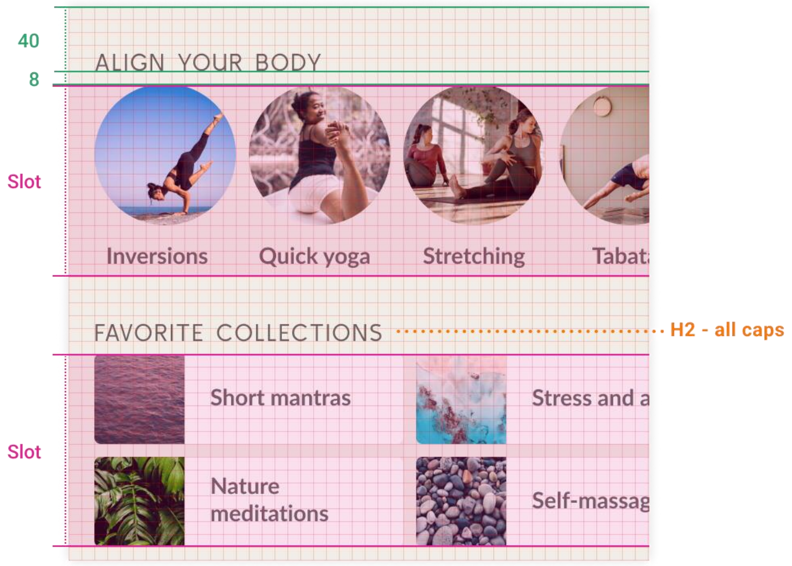
The grid takes up as much space as its parent, which means the favorite collection cards are stretched way too much vertically. Adapt the composable, so that the grid cells have the correct size and spacing between them.

Your result should look something like this:

```
@Composable
fun FavoriteCollectionsGrid(
  modifier: Modifier = Modifier
) {
  LazyHorizontalGrid(
      rows = GridCells.Fixed(2),
      contentPadding = PaddingValues(horizontal = 16.dp),
      horizontalArrangement = Arrangement.spacedBy(8.dp),
      verticalArrangement = Arrangement.spacedBy(8.dp),
      modifier = modifier.height(120.dp)
  ) {
      items(favoriteCollectionsData) { item ->
          FavoriteCollectionCard(
              drawable = item.drawable,
              text = item.text,
              modifier = Modifier.height(56.dp)
          )
      }
  }
}
```

10. Home section - Slot APIs

In the MySoothe home screen, there are multiple **sections** that follow the same pattern. They each have a title, with some content varying depending on the section. Here's the design we want to implement:



As you can see, each section has a **title** and a **slot**. The title has some spacing and style information associated with it. The slot can be filled in dynamically with different content, depending on the section.

To implement this flexible section container, you use so-called *slot APIs*. Before you implement this, read the section on the documentation page about [slot-based layouts](). This will help you understand what a slot-based layout is and how you can use slot APIs to build such a layout.

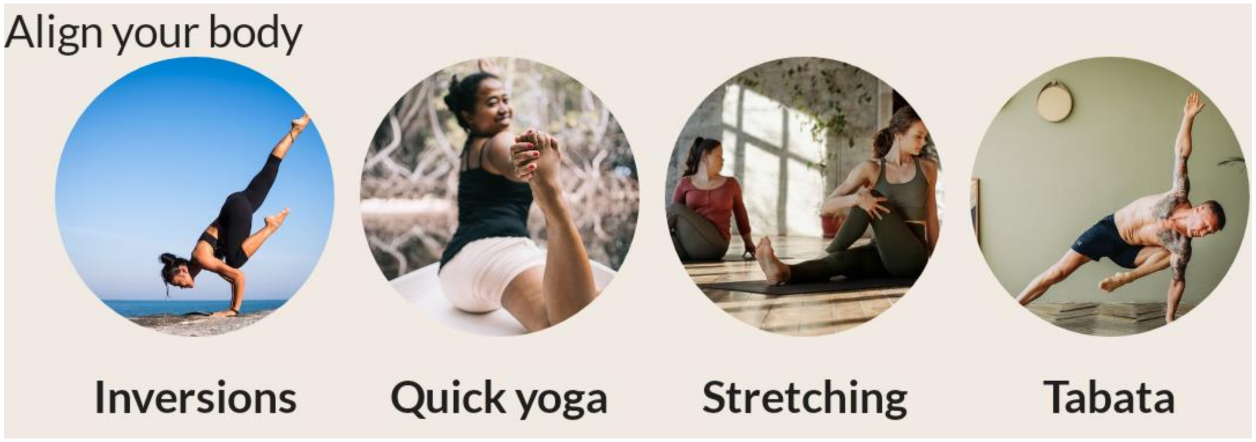
Slot-based layouts leave an empty space in the UI for the developer to fill as they wish. You can use them to create more flexible layouts.

Adapt the `HomeSection` composable to receive the title and slot content. You should also adapt the associated Preview to call this `HomeSection` with the "Align your body" title and content:

```
@Composable
fun HomeSection(
  @StringRes title: Int,
  modifier: Modifier = Modifier,
  content: @Composable () -> Unit
) {
  Column(modifier) {
    Text(stringResource(title))
    content()
  }
}

@Preview(showBackground = true, backgroundColor = 0xFFF0EAE2)
@Composable
fun HomeSectionPreview() {
  MySootheTheme {
    HomeSection(R.string.align_your_body) {
      AlignYourBodyRow()
    }
  }
}
```

You can use the `content` parameter for the composable's slot. This way, when you use the `HomeSection` composable, you can use a trailing lambda to fill the content slot. When a composable provides multiple slots to fill in, you can give them meaningful names that represent their function in the bigger composable container. For example, Material's [TopAppBar] provides the slots for `title`, `navigationIcon`, and `actions`.

Let's see how the section looks with this implementation:



The Text composable needs some more information to make it align with the design. Update it so that:

- It shows in all caps (hint: you can use the `String`'s `uppercase()` method for this).
- It uses the H2 typography.
- It has paddings that fit the redlines design.

Your final solution should look something like this:

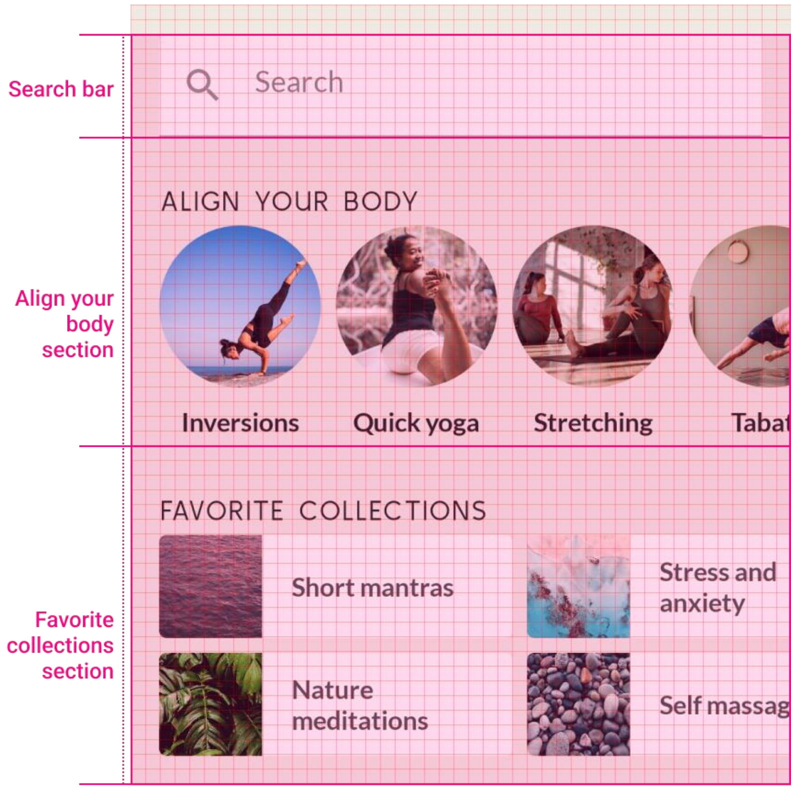
```
import java.util.*

@Composable
```

```
fun HomeSection(
  @StringRes title: Int,
  modifier: Modifier = Modifier,
  content: @Composable () -> Unit
) {
  Column(modifier) {
    Text(
      text = stringResource(title).uppercase(Locale.getDefault()),
      style = MaterialTheme.typography.h2,
      modifier = Modifier
        .paddingFromBaseline(top = 40.dp, bottom = 8.dp)
        .padding(horizontal = 16.dp)
    )
    content()
  }
}
```

11. Home screen - Scrolling

Now that you have created all the separate building blocks, you can combine them into a full screen implementation.

Here's the design you're trying to implement:



We're simply placing the search bar and the two sections below one another. There's some spacing that you need to add to make everything fit the design. One composable that we haven't used before is the `Spacer`, which helps us to put extra room inside our `Column`. If you would instead set the `Column`'s padding, you'd get the same cut-off behavior that we saw before in the Favorite Collections grid.

```
@Composable
fun HomeScreen(modifier: Modifier = Modifier) {
  Column(modifier) {
     Spacer(Modifier.height(16.dp))
     SearchBar(Modifier.padding(horizontal = 16.dp))
     HomeSection(title = R.string.align_your_body) {
        AlignYourBodyRow()
     }
     HomeSection(title = R.string.favorite_collections) {
        FavoriteCollectionsGrid()
     }
     Spacer(Modifier.height(16.dp))
  }
}
```

Although the design fits well on most device sizes, it needs to be scrollable vertically in case the device is not high enough - for example in landscape mode. This requires that you add scrolling behavior.

As we saw earlier, Lazy layouts such as `LazyRow` and `LazyHorizontalGrid` automatically add scrolling behavior. However, you don't always need a Lazy layout. In general, **you use a Lazy layout when you have many elements in a list or large data sets to load**, so emitting all items at once would come at a performance cost and would slow down your app. When a list has only a limited number of elements, you can instead choose to use a simple `Column` or `Row` and **add the scroll behavior manually**. To do so, you use the `verticalScroll` or `horizontalScroll` modifiers. These require a `ScrollState`, which contains the current state of the scroll, used to modify the scroll state from outside. In this case, you're not looking to modify the scroll state, so you simply create a persistent `ScrollState` instance using `rememberScrollState`.

To learn more about `remember` and its role in Compose state, follow the State in Compose codelab

Your final result should look like this:

```
import androidx.compose.foundation.rememberScrollState
import androidx.compose.foundation.verticalScroll

@Composable
fun HomeScreen(modifier: Modifier = Modifier) {
  Column(
        modifier
          .verticalScroll(rememberScrollState())
          .padding(vertical = 16.dp)
  ) {
        SearchBar(Modifier.padding(horizontal = 16.dp))
        HomeSection(title = R.string.align_your_body) {
          AlignYourBodyRow()
        }
        HomeSection(title = R.string.favorite_collections) {
          FavoriteCollectionsGrid()
        }
  }
}
```

To verify the composable's scrolling behavior, limit the Preview's height and run it in [interactive preview]:

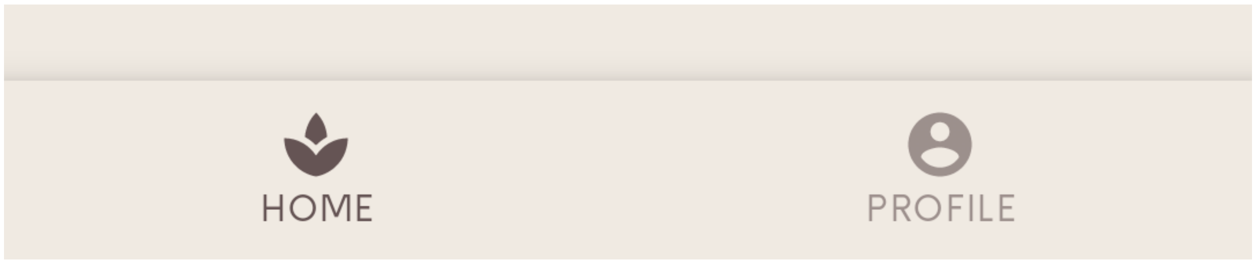
```
@Preview(showBackground = true, backgroundColor = 0xFFF0EAE2, heightDp = 180)
@Composable
fun ScreenContentPreview() {
  MySootheTheme { HomeScreen() }
}
```

12. Bottom navigation - Material

Now that you've implemented the content of the screen, you're ready to add the window decoration. In the case of MySoothe, there's a bottom navigation that lets the user switch between different screens.

First, implement this bottom navigation composable itself, and then include it in your app.

Let's take a look at the design:



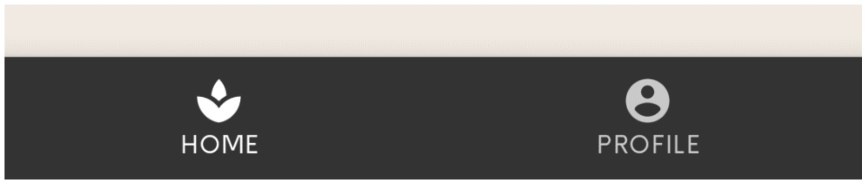
Thankfully, you don't have to implement this entire composable from scratch by yourself. You can use the `BottomNavigation` composable that's a part of the Compose Material library. Inside the `BottomNavigation` composable, you can add one or more `BottomNavigationItem` elements, that will then get styled automatically by the Material library.

If you're interested in **Material Design** and would like to learn more about how to implement a design system using Jetpack Compose, you can follow the Theming in Compose codelab or read the Theming documentation.

Start with a basic implementation of this bottom navigation:

```
import androidx.compose.material.BottomNavigation
import androidx.compose.material.BottomNavigationItem
import androidx.compose.material.icons.filled.AccountCircle
import androidx.compose.material.icons.filled.Spa

@Composable
private fun SootheBottomNavigation(modifier: Modifier = Modifier) {
  BottomNavigation(modifier) {
    BottomNavigationItem(
      icon = {
        Icon(
          imageVector = Icons.Default.Spa,
          contentDescription = null
        )
      },
      label = {
        Text(stringResource(R.string.bottom_navigation_home))
      },
      selected = true,
      onClick = {}
    )
    BottomNavigationItem(
      icon = {
        Icon(
          imageVector = Icons.Default.AccountCircle,
          contentDescription = null
        )
      },
      label = {
        Text(stringResource(R.string.bottom_navigation_profile))
      },
      selected = false,
      onClick = {}
    )
  }
}
```

What this basic implementation looks like:



There are some style adaptations you should make. First of all, you can update the background color of the bottom navigation by setting its `backgroundColor` parameter. You can use the background color from the Material theme for this. By setting the background color, the color of the icons and texts automatically adapts to the `onBackground` color of the theme. You final solution should look something like this:

```
@Composable
private fun SootheBottomNavigation(modifier: Modifier = Modifier) {
  BottomNavigation(
    backgroundColor = MaterialTheme.colors.background,
    modifier = modifier
  ) {
    BottomNavigationItem(
      icon = {
        Icon(
          imageVector = Icons.Default.Spa,
          contentDescription = null
        )
      },
      label = {
        Text(stringResource(R.string.bottom_navigation_home))
      },
      selected = true,
      onClick = {}
    )
    BottomNavigationItem(
      icon = {
        Icon(
          imageVector = Icons.Default.AccountCircle,
          contentDescription = null
        )
      },
      label = {
        Text(stringResource(R.string.bottom_navigation_profile))
      },
      selected = false,
      onClick = {}
    )
  }
}
```

13. MySoothe App - Scaffold

For this final step, create the full screen implementation, including the bottom navigation. Use Material's Scaffold composable. Scaffold gives you a **top-level configurable composable** for apps that implement Material design. It contains slots for various Material concepts, one of which is the bottom bar. In this bottom bar, you can place the bottom navigation composable that you created in the previous step.

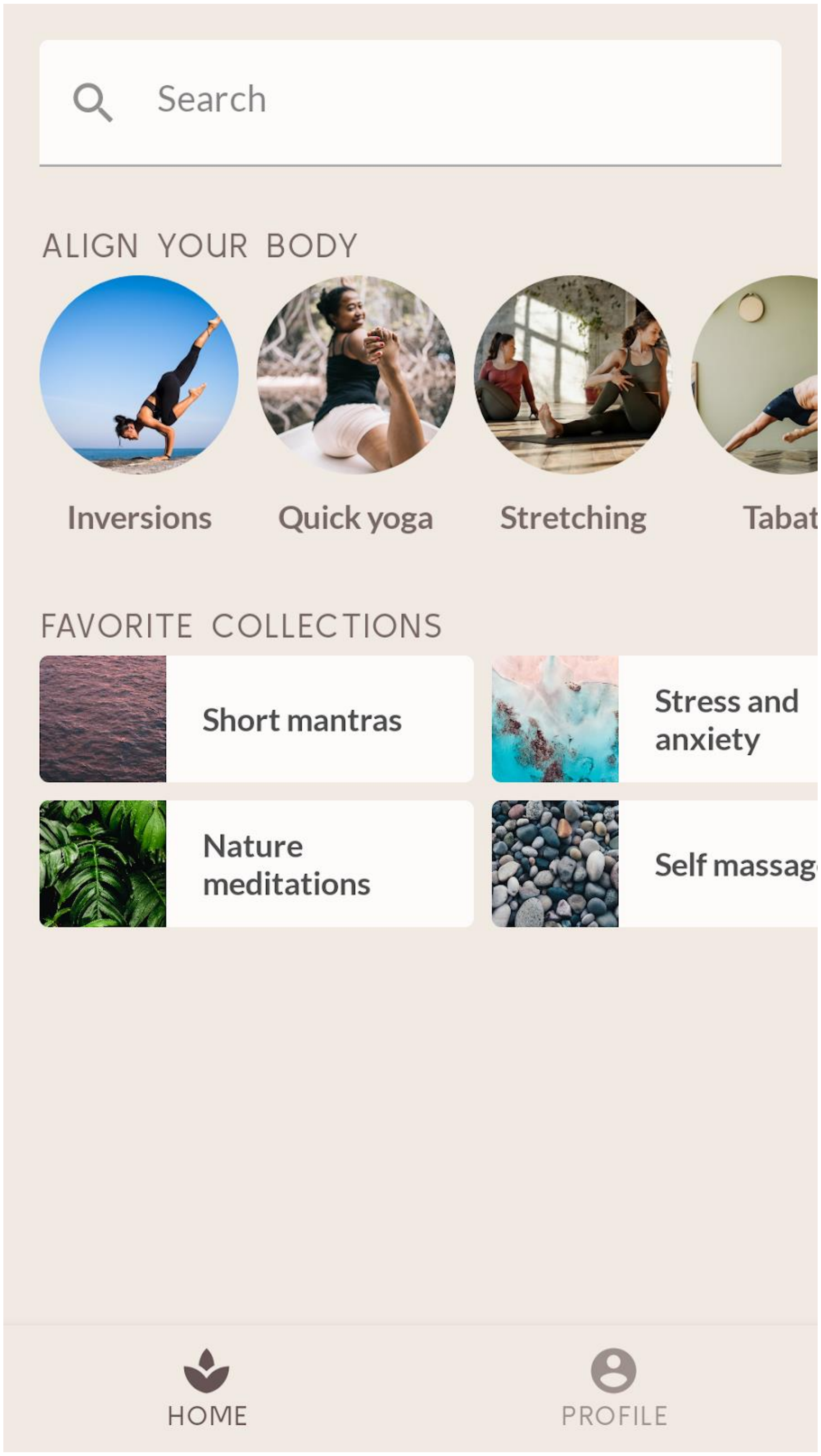
Implement the MySootheApp composable. This is the top level composable for your app, so you should:

- Apply the `MySootheTheme` Material theme.
- Add the `Scaffold`.
- Set the bottom bar to be your `SootheBottomNavigation` composable.
- Set the content to be your `HomeScreen` composable.

Your final result should be:

```
import androidx.compose.material.Scaffold

@Composable
fun MySootheApp() {
  MySootheTheme {
    Scaffold(
      bottomBar = { SootheBottomNavigation() }
    ) { padding ->
      HomeScreen(Modifier.padding(padding))
    }
  }
}
```

Your implementation is now complete! If you want to check if your version is implemented in a pixel-perfect way, you can download the following image, and compare it to your own Preview implementation.


Search
ALIGN YOUR BODY
Inversions
Quick yoga
Stretching
Tabat
FAVORITE COLLECTIONS
Short mantras
Stress and anxiety
Nature meditations
Self massag
HOME
PROFILE

14. Congratulations

Congratulations, you've successfully completed this codelab and learned more about layouts in Compose. Through implementing a real-world design, you learned about modifiers, alignments, arrangements, Lazy layouts, slot APIs, scrolling, and Material components.

Check out the other codelabs on the Compose pathway. And check out the code samples.

15. Documentation

For more information and guidance about these topics, check out the following documentation:

- Layouts in Compose
- Modifiers