



ĐẠI HỌC ĐÀ NẴNG
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Vietnam - Korea University of Information and Communication Technology

Lesson 13: App UI design



About this lesson

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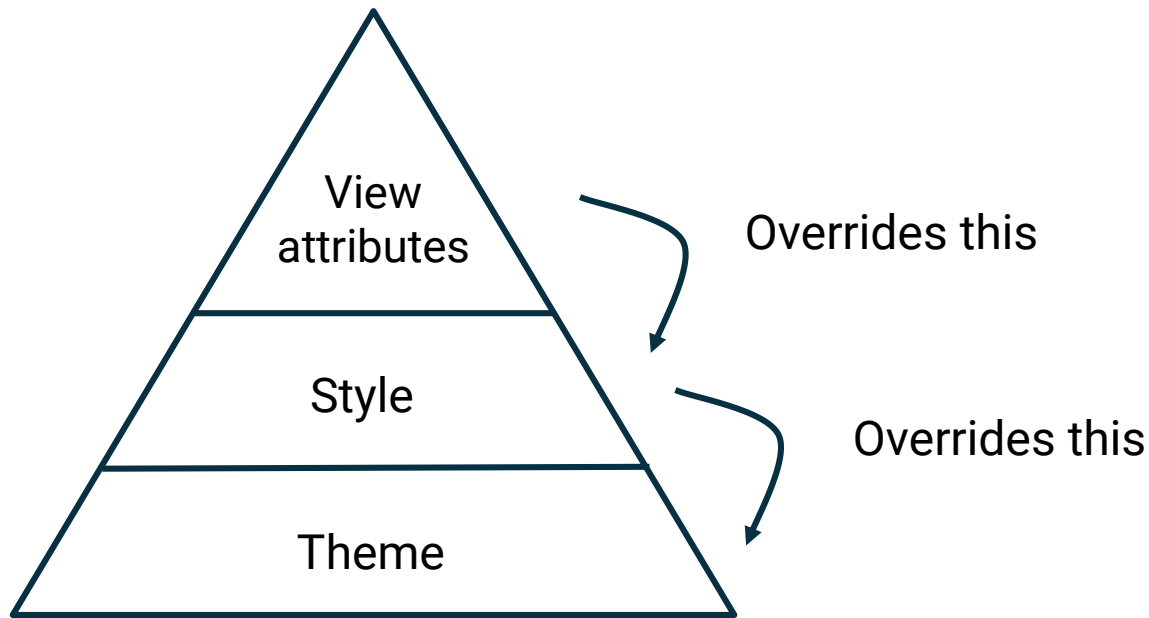
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Android styling

Android styling system

- Used to specify the visual design of your app
- Helps you maintain a consistent look across your app
- Hierarchical (you can inherit from parent styles and override specific attributes)

Precedence of each method of styling



Themes

- Collection of named resources, useful broadly across the app
- Named resources are known as theme attributes
- Examples:
 - Use a theme to define primary & secondary colors in the app
 - Use a theme to set the default font for all text within an activity

Declare a theme

In `res/values/themes.xml`:

```
<style name="Theme.MyApp" parent="Theme.MaterialComponents.Light">
    <item name="colorPrimary">@color/orange_500</item>
    <item name="colorPrimaryVariant">@color/orange_700</item>
    <item name="colorSecondary">@color/pink_200</item>
    <item name="colorSecondaryVariant">@color/pink_700</item>
    ...
</style>
```

Apply a theme

In `AndroidManifest.xml`:

```
<manifest ... >
    <application ... >
        <activity android:theme="@style/Theme.MyApp" ... >
            </activity>
        </application>
    </manifest>
```

In layout file:

```
<ConstraintLayout ...
    android:theme="@style/Theme.MyApp">
```


Refer to theme attribute in a layout

In layout file:

```
<LinearLayout ...  
    android:background="?attr/colorSurface">
```

Use `?attr/themeAttributeName` syntax.

Examples: `?attr/colorPrimary`
`?attr/colorPrimaryVariant`

Styles

- A style is a collection of view attributes, specific to a type of view
- Use a style to create a collection of reusable styling information, such as font size or colors
- Good for declaring small sets of common designs used throughout your app

Declare a style

In `res/values/styles.xml`:

```
<style name="DescriptionStyle">
    <item name="android:textColor">#00FF00</item>
    <item name="android:textSize">16sp</item>
    ...
</style>
```

Apply a style

On a view in a layout file:

```
<TextView
    style="@style/DescriptionStyle"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/description_text" />
```

Refer to theme attribute in a style

In `res/values/styles.xml`:

```
<style name="DescriptionStyle">
    <item name="android:textColor">?attr/colorOnSurface</item>
    <item name="android:textSize">16sp</item>
    ...
</style>
```

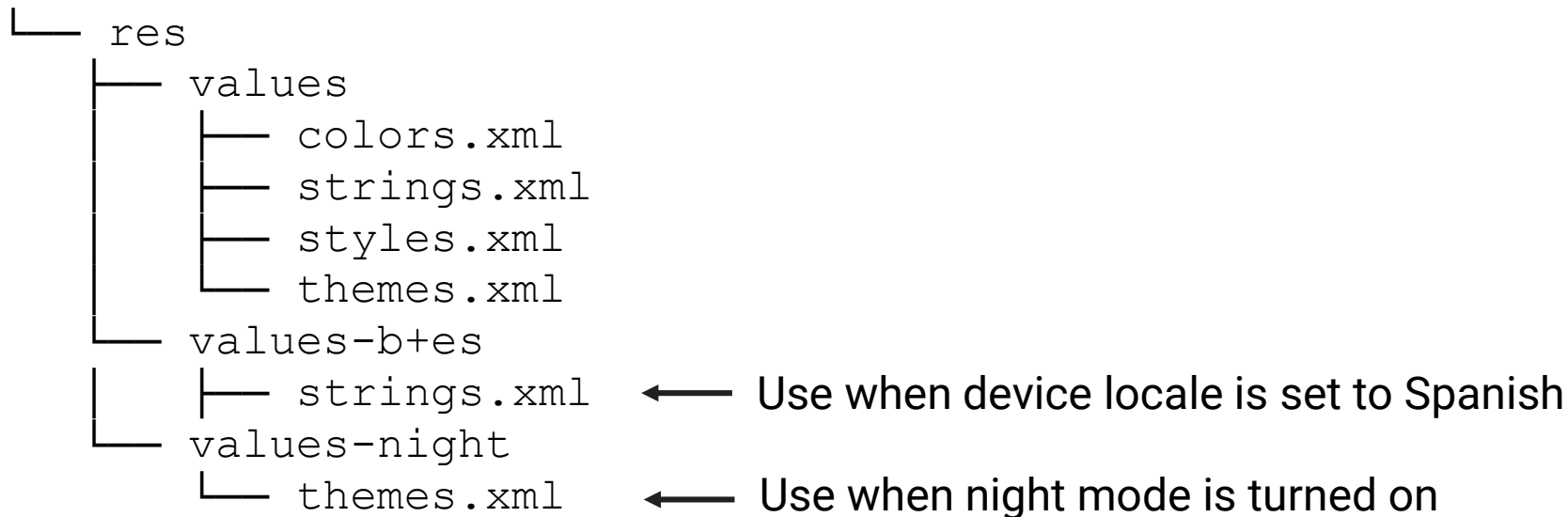
View attributes

- Use view attributes to set attributes explicitly for each view
- You can use every property that can be set via styles or themes
- Use for custom or one-off designs such as margins, paddings, or constraints

Resources directory

```
└─ res
    ├── drawable
    ├── drawable-*
    ├── layout
    ├── menu
    ├── mipmap-*
    ├── navigation
    ├── values
    │   ├── colors.xml
    │   ├── dims.xml
    │   ├── strings.xml
    │   ├── styles.xml
    │   └── themes.xml
    └── values-*
```

Provide alternative resources



Color resources

A way to name and standardize colors throughout your app

In `res/values/colors.xml`:

```
<resources>
    <color name="purple_200">#FFBB86FC</color>
    <color name="purple_500">#FF6200EE</color>
    <color name="purple_700">#FF3700B3</color>
    <color name="teal_200">#FF03DAC5</color>
    <color name="teal_700">#FF018786</color>
    ...
</resources>
```

Specified as hexadecimal colors in form of #AARRGGBB



Dimension resources

A way to name and standardize dimension values in your layouts

- Declare your dimension values in `res/values/dimens.xml`:

```
<resources>
    <dimen name="top_margin">16dp</dimen>
</resources>
```

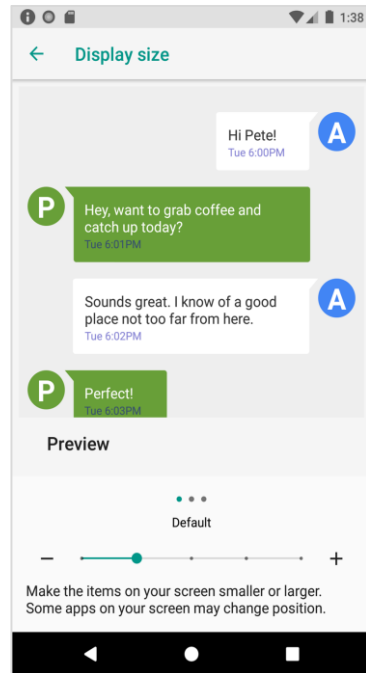
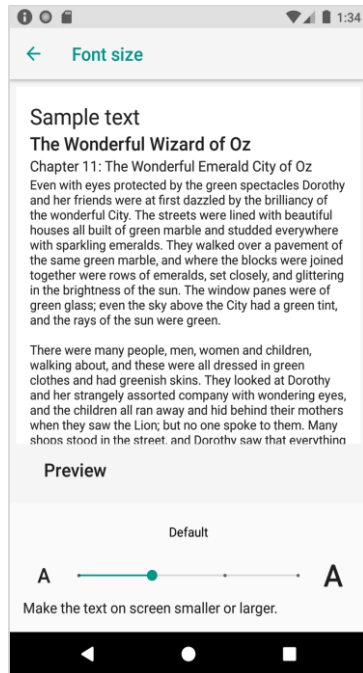
- Refer to them as `@dimen/<name>` in layouts or `R.dimen.<name>` in code:

```
<TextView ...
    android:layout_marginTop="@dimen/top_margin" />
```

Typography

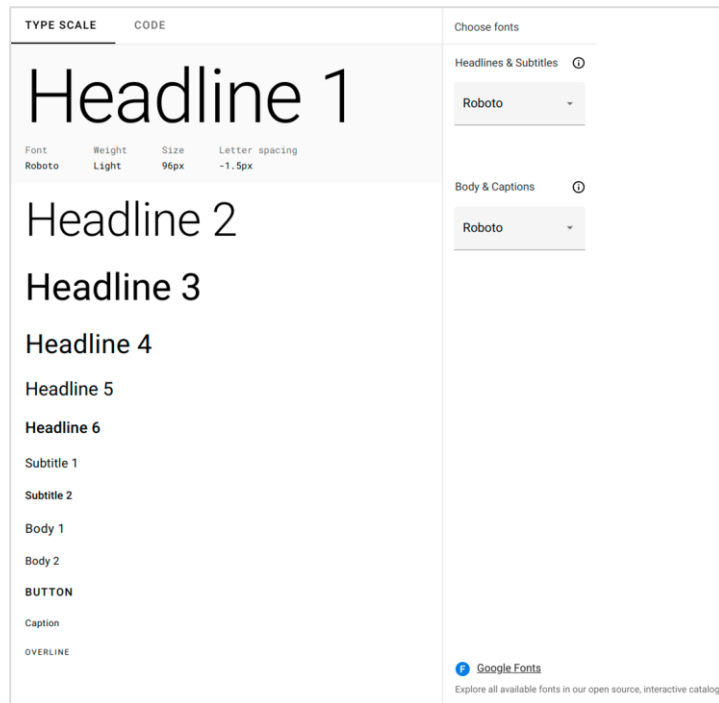
Scale-independent pixels (sp)

- The textual equivalent to density-independent pixels (dp)
- Specify text sizes in sp (takes into account user preferences)
- Users can adjust Font and Display sizes in the Settings app (after Display)



Type scale

- A set of styles designed to work together in a cohesive manner for your app and content
- Contains reusable categories of text with intended purpose for each (for example, headline, subtitle, caption)



TextAppearance

A `TextAppearance` style often alters one or more of these attributes:

- `typeface` (`android:fontFamily`)
- `weight` (`android:textStyle`)
- `text size` (`android:textSize`)
- `capitalization` (`android:textAllCaps`)
- `letter spacing` (`android:letterSpacing`)

Examples using TextAppearance

```
<TextView
```

```
    ...  
    android:textAppearance="@style/TextAppearance.MaterialComponents.Headline1"  
    android:text="@string/title" />
```

```
<TextView
```

```
    ...  
    android:textAppearance="@style/TextAppearance.MaterialComponents.Body1"  
    android:text="@string/body_text" />
```

Customize your own TextAppearance

```
<style name="TextAppearance.MyApp.Headline1"
    parent="TextAppearance.MaterialComponents.Headline1">
    ...
    <item name="android:textStyle">normal</item>
    <item name="android:textAllCaps">false</item>
    <item name="android:textSize">64sp</item>
    <item name="android:letterSpacing">0</item>
    ...
</style>
```


Use a custom TextAppearance in a theme

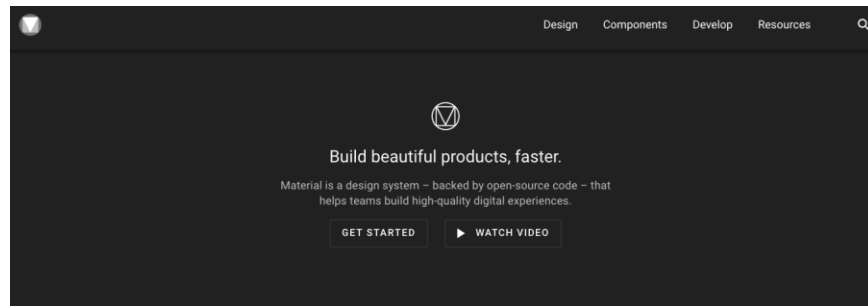
```
<style name="Theme.MyApp" parent="Theme.MaterialComponents.Light">  
    ...  
    <item name="textAppearanceHeadline1">@style/TextAppearance.MyApp.Headline1</item>  
    ...  
</style>
```

Material Design

Intro to Material

Adaptable system of guidelines, components, and tools that support best practices for UI design

[Material Design homepage](#)



Design guidance and code

Use our most popular design and development resources to jumpstart your latest project



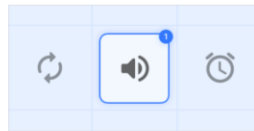
Material Design guidelines

Material Design principles, styles, and best practices



Components

Design guidance and developer documentation for interactive UI building blocks

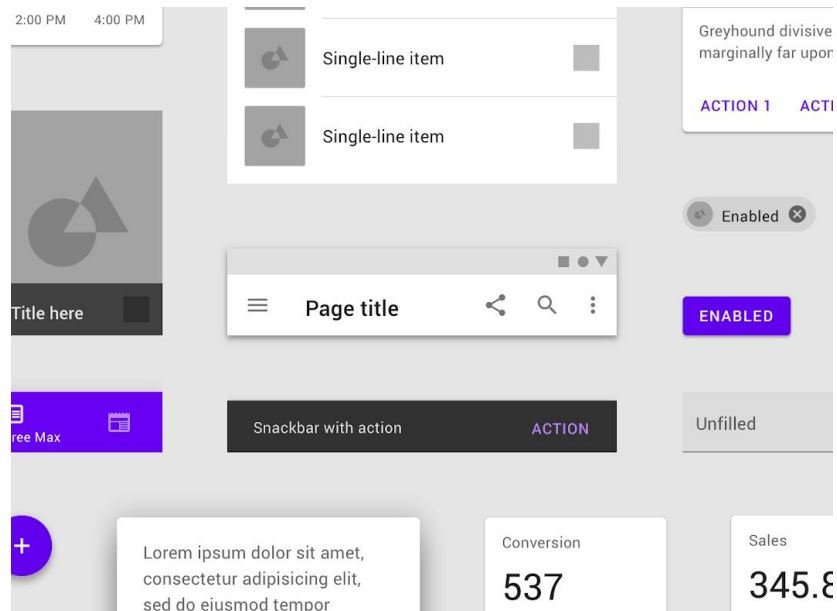


Icons

Access five sets of stylized system icons, available in a range of formats and sizes

Material Components

Interactive building blocks
for creating a user interface



Material color tool

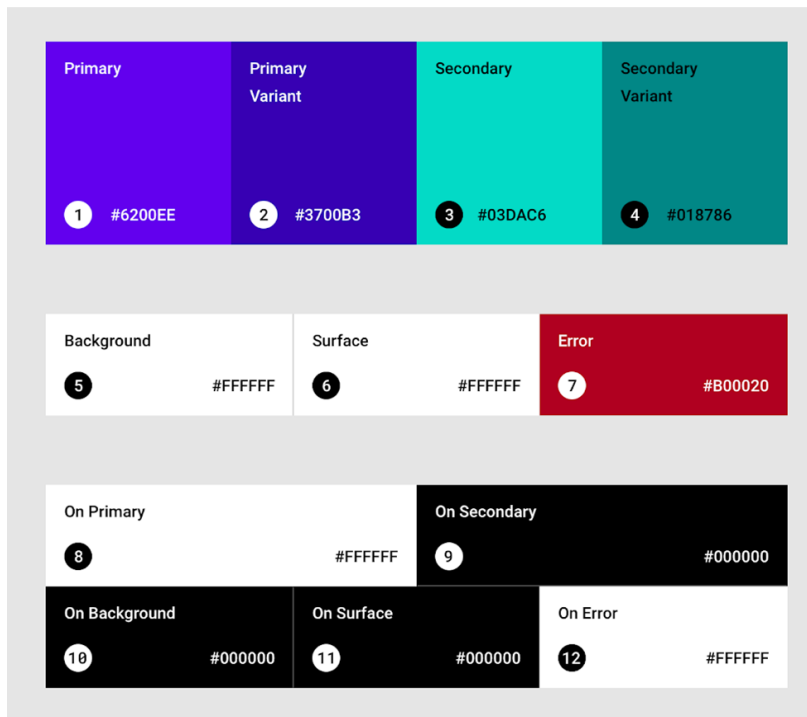
The screenshot displays the Material Color Tool interface. At the top, there's a header with the Google logo, "COLOR TOOL", and links for "EXPORT", "LINK", and "HELP". Below the header, there are two tabs: "USER INTERFACES" and "ACCESSIBILITY". The "ACCESSIBILITY" tab is selected, showing a preview of a user interface with a purple header bar containing the text "Text", a grey body, and a purple button with a white plus sign. A slider is visible at the bottom of the preview.

On the right side, there's a "MATERIAL PALETTE" section with a grid of color swatches. The grid is organized by color family (Red, Pink, Purple, Deep Purple, Indigo, Blue, Light Blue, Cyan, Teal) and by value (50, 100, 200, 300, 400, 500, 600, 700, 800, 900). The "Purple" family is selected, and the "500" value is highlighted.

Below the palette, there's a "CURRENT SCHEME" section with a "RESET ALL" button. It shows the current color scheme with the following values:

- Primary: #5d00ed
- Secondary: #ffffff
- Text on P: #ffffff
- Text on S: #000000
- P - Light: #9994ff
- P - Dark: #0000b9
- S - Light: #ffffff
- S - Dark: #000000

Baseline Material color theme



Material Components for Android Library

```
implementation 'com.google.android.material:material:<version>'
```

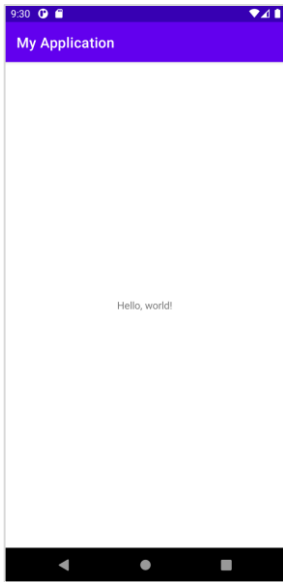
Material Themes

- `Theme.MaterialComponents`
- `Theme.MaterialComponents.NoActionBar`
- `Theme.MaterialComponents.Light`
- `Theme.MaterialComponents.Light.NoActionBar`
- `Theme.MaterialComponents.Light.DarkActionBar`
- `Theme.MaterialComponents.DayNight`
- `Theme.MaterialComponents.DayNight.NoActionBar`
- `Theme.MaterialComponents.DayNight.DarkActionBar`

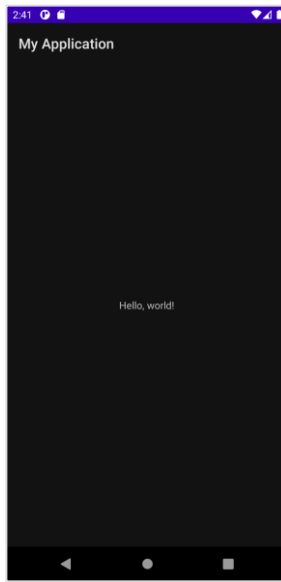
Material theme example

`Theme.MaterialComponents.DayNight.DarkActionBar`

Light mode



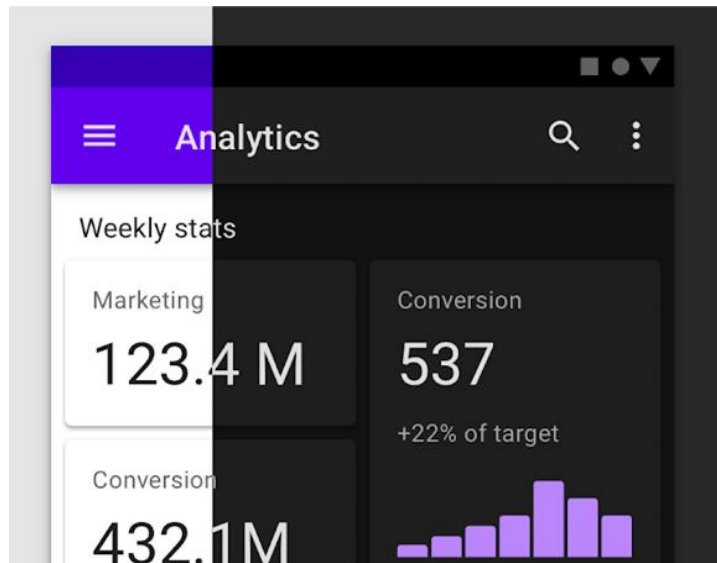
Dark mode



Dark theme

A low-light UI that displays mostly dark surfaces

- Replaces light-tinted surfaces and dark text with dark-tinted surfaces and light text
- Makes it easier for anyone to use a device in lower-light environments
- Improves visibility for users with low vision and those sensitive to bright light
- Can significantly reduce power usage (depending on the device)



Support dark theme

In `values/themes.xml`:

```
<style name="AppTheme" parent="Theme.MaterialComponents.DayNight">  
    <item name="colorPrimary">@color/orange_500</item>  
    ...
```

In `values-night/themes.xml`:

```
<style name="AppTheme" parent="Theme.MaterialComponents.DayNight">  
    <item name="colorPrimary">@color/orange_200</item>  
    ...
```

Material Components

Material Components

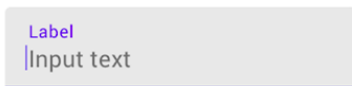
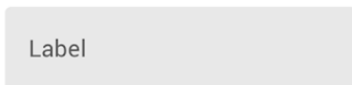
Component library provided for Android and design guidelines

- Text fields
- Buttons
- Menus
- Cards
- Chips
- App bars (top and bottom)
- Floating Action Button (FAB)
- Navigation Drawer
- Bottom navigation
- Snackbar

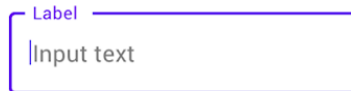
...and more!

Text field

- Composed of `TextInputLayout` with child view `TextInputEditText`
- Shows a floating label or a text hint before the user enters text
- Two types:



Filled text field



Outlined text field

Text field example

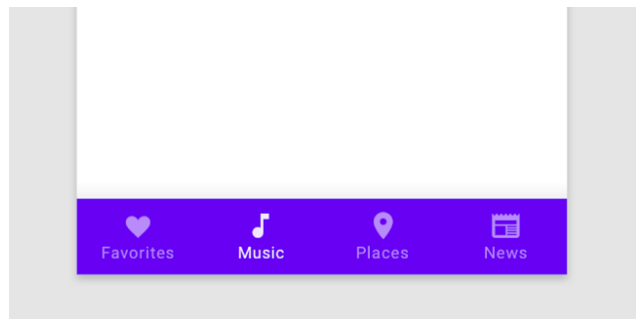
```
<com.google.android.material.textfield.TextInputLayout
    android:id="@+id/textField"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:hint="@string/label"
    style="@style/Widget.MaterialComponents.TextInputLayout.OutlinedBox">

    <com.google.android.material.textfield.TextInputEditText
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />

</com.google.android.material.textfield.TextInputLayout>
```

Bottom navigation

- Allows movement between top level destinations in your app
- Alternate design pattern to a navigation drawer
- Limited to 5 locations max



Bottom navigation example

```
<LinearLayout ...>
```

```
...
```

```
<com.google.android.material.bottomnavigation.BottomNavigationView  
    android:id="@+id/bottom_navigation"  
    android:layout_width="match_parent"  
    android:layout_height="wrap_content"  
    app:menu="@menu/bottom_navigation_menu" />
```

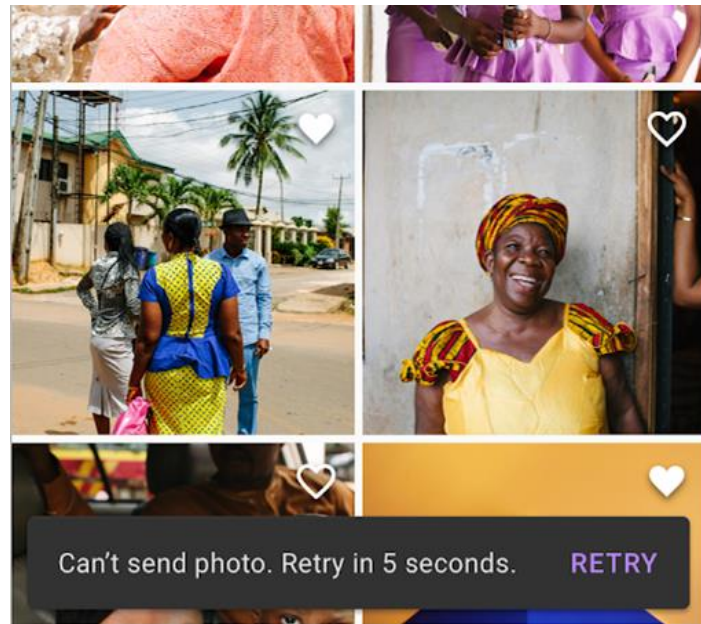
```
</LinearLayout>
```

Bottom navigation listener

```
bottomNav.setOnNavigationItemSelectedListener { item ->
    when(item.itemId) {
        R.id.item1 -> {
            // Respond to navigation item 1 click
            true
        }
        R.id.item2 -> {
            true
        }
        else -> false
    }
}
```

Snackbar

- Display short messages within the app
- Messages have a duration (`SHORT`, `LONG`, or `INDEFINITE`)
- May contain an optional action
- Works best in a `CoordinatorLayout`
- Shown at bottom of enclosing container



Snackbar examples

Show a simple message:

```
Snackbar.make(view, R.string.text_label, Snackbar.LENGTH_SHORT)
    .show()
```

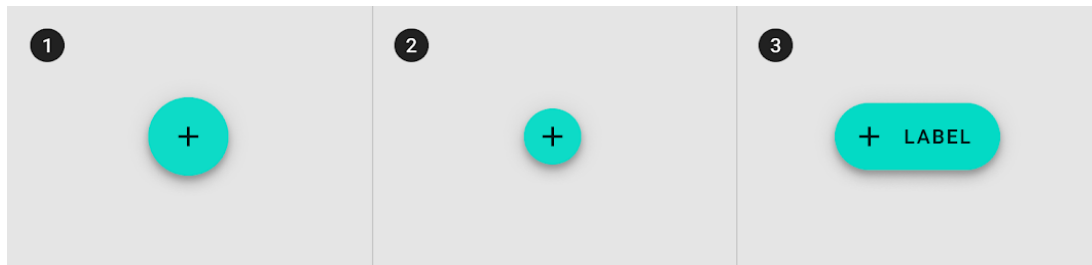
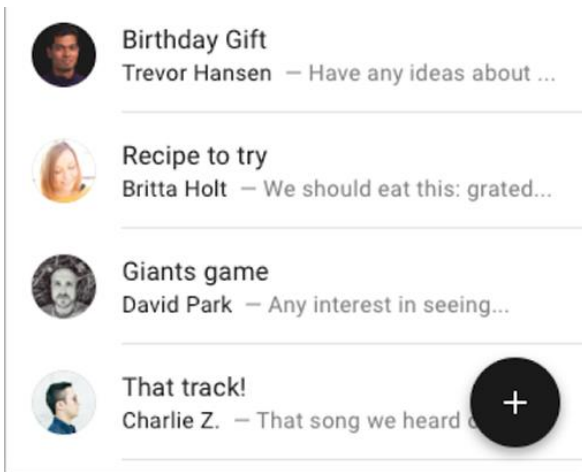
Add an action to a Snackbar:

```
Snackbar.make(view, R.string.text_label, Snackbar.LENGTH_LONG)
    .setAction(R.string.action_text) {
        // Responds to click on the action
    }
    .show()
```



Floating Action Button (FAB)

- Perform the most-common action for a screen (for example, creating a new email)
- Come in multiple sizes (regular, mini, and extended)



CoordinatorLayout

- Acts as top-level container in an app
- Manages interaction of its child views, such as gestures
- Recommended for use with views like a Snackbar or FAB

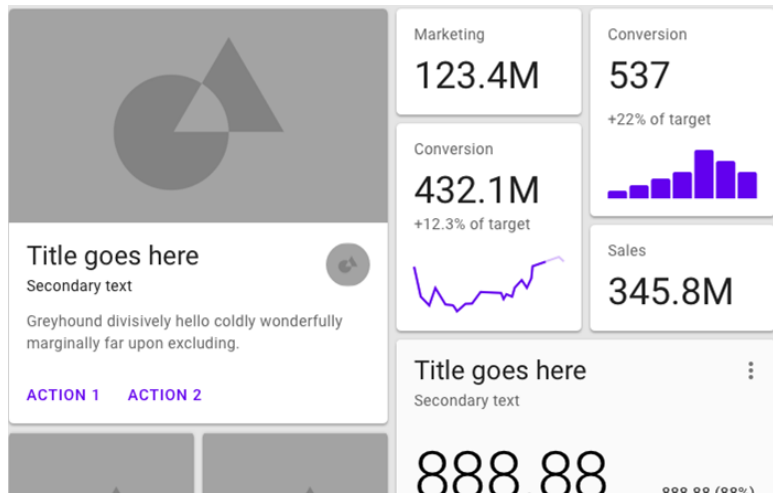
FAB example

```
<androidx.coordinatorlayout.widget.CoordinatorLayout ...>
    ....
    <com.google.android.material.floatingactionbutton.FloatingActionButton
        android:id="@+id/floating_action_button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="bottom|end"
        android:layout_margin="16dp"
        android:contentDescription="@string/fab_content_desc"
        app:fabSize="normal" <!-- or mini or auto -->
        app:srcCompat="@drawable/ic_plus"/>

</androidx.coordinatorlayout.widget.CoordinatorLayout>
```

Cards

- A card holds content and actions for a single item.
- Cards are often arranged in a list, grid, or dashboard.
- Use `MaterialCardView`.



MaterialCardView example

```
<com.google.android.material.card.MaterialCardView
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_margin="8dp">

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical">
        <ImageView .../>
        <TextView .../>
    </LinearLayout>

</com.google.android.material.card.MaterialCardView>
```

Localization

Localize your app

- Separate the localized aspects of your app (for example, text, audio files, currency, and numbers) as much as possible from the core Kotlin functionality of the app.

Example: Extract the user facing strings into `strings.xml`.

- When a user runs your app, the Android system selects which resources to load based on the device's locale.
- If locale-specific resources are not found, Android falls back to default resources you defined.

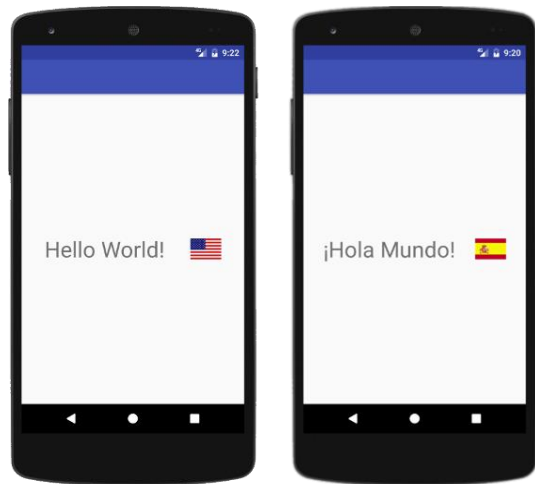
Support different languages and cultures

- Decide which locales to support.
- Create locale-specific directories in `res` directory:

```
<resource type>-b+<language code>  
    [+<country code>]
```

Examples: `layout-b+en+US`
`values-b+es`

- Provide locale-specific resources (such as strings and drawables) in those directories.



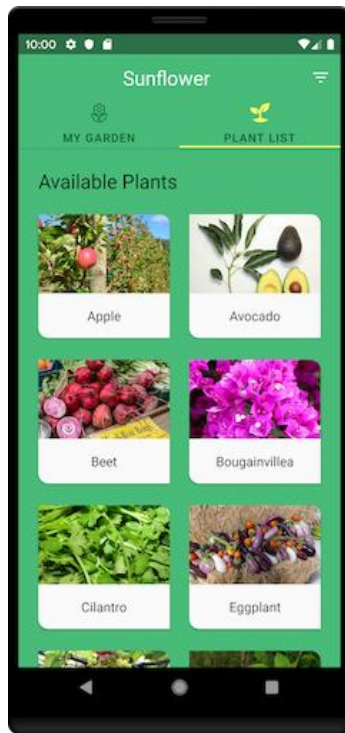
Support languages that use RTL scripts

- Users can choose a language that uses right-to-left (RTL) scripts.
- Add `android:supportsRtl="true"` to app tag in manifest.
- Convert `left` and `right` to `start` and `end`, respectively, in your layout files (change `android:paddingLeft` to `android:paddingStart`).
- Localize strings and format text in messages.
- Optionally, use `-ldrtl` resource qualifier to provide alternate resources.

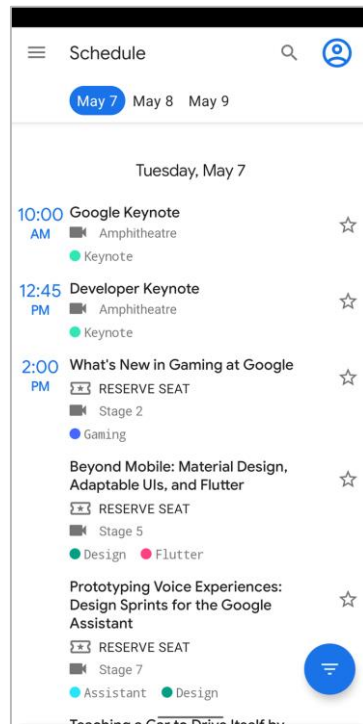
Example apps

Check out other apps

Sunflower
app



Google I/O
app



Summary

Summary

In Lesson 13, you learned how to:

- Customize the visual look of your app using styles and themes
- Choose from predefined type scales for the text in your app (or create your own text appearance)
- Select theme colors for your app using Material color tool
- Use Material Components library to speed up UI development
- Localize your app to support different languages and cultures

Learn more

- [Material Design](#)
- [Material Components](#)
- [Tools for picking colors](#)
- [Dark theme](#)
- [Localize your app](#)
- Blog posts: [Themes vs Styles](#), [Common Theme Attributes](#), [Prefer Theme Attributes](#), [Themes Overlay](#)
- Sample code: [Sunflower app](#), [Google I/O app](#), [Android GitHub repo](#)

Pathway

Practice what you've learned by completing the pathway:

[Lesson 13: App UI Design](#)

