



Efficient Sad Puppy Layouts

Dan Lew

Image: <https://commons.wikimedia.org/wiki/File:Sad-pug.jpg>

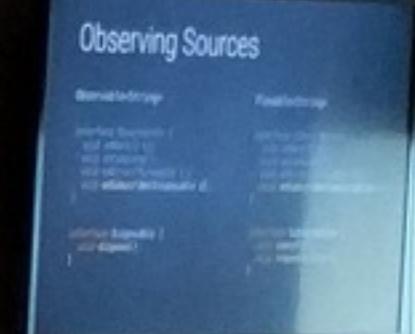
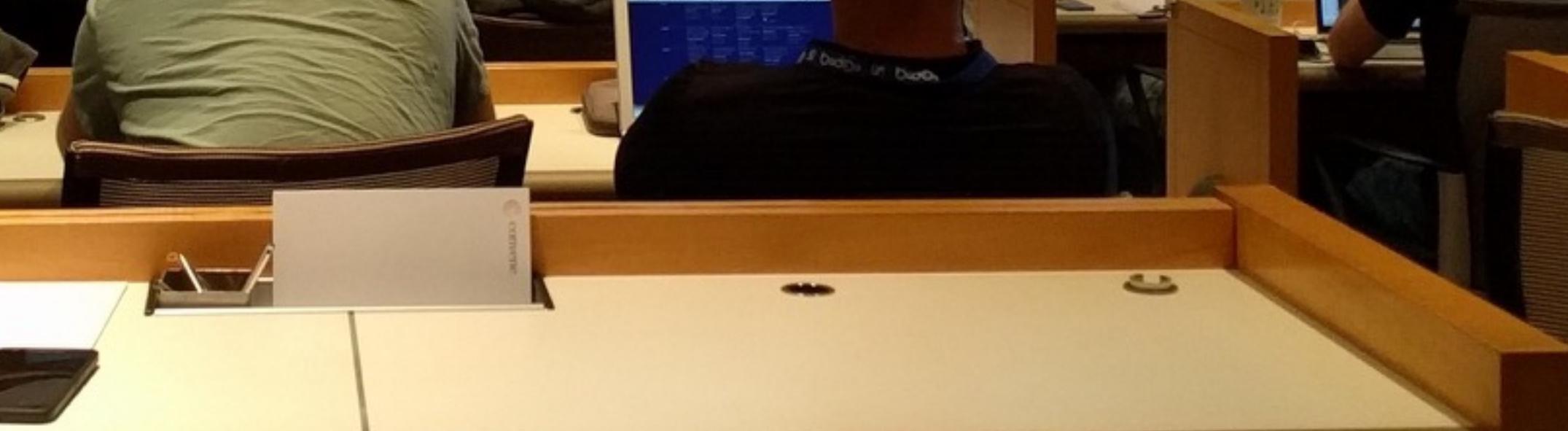
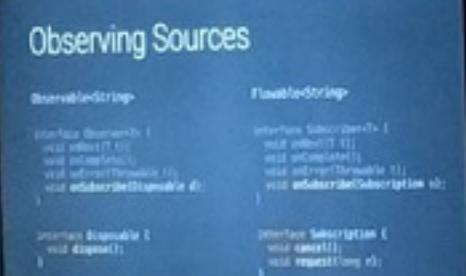
Observing Sources

Observable<String>

```
interface Observer<T> {  
    void onNext(T t);  
    void onComplete();  
    void onError(Throwable t);  
    void onSubscribe(Disposable d);  
}  
  
interface Disposable {  
    void dispose();  
}
```

Flowable<String>

```
interface Subscriber<T> {  
    void onNext(T t);  
    void onComplete();  
    void onError(Throwable t);  
    void onSubscribe(Subscription s);  
}  
  
interface Subscription {  
    void cancel();  
    void request(long r);  
}
```



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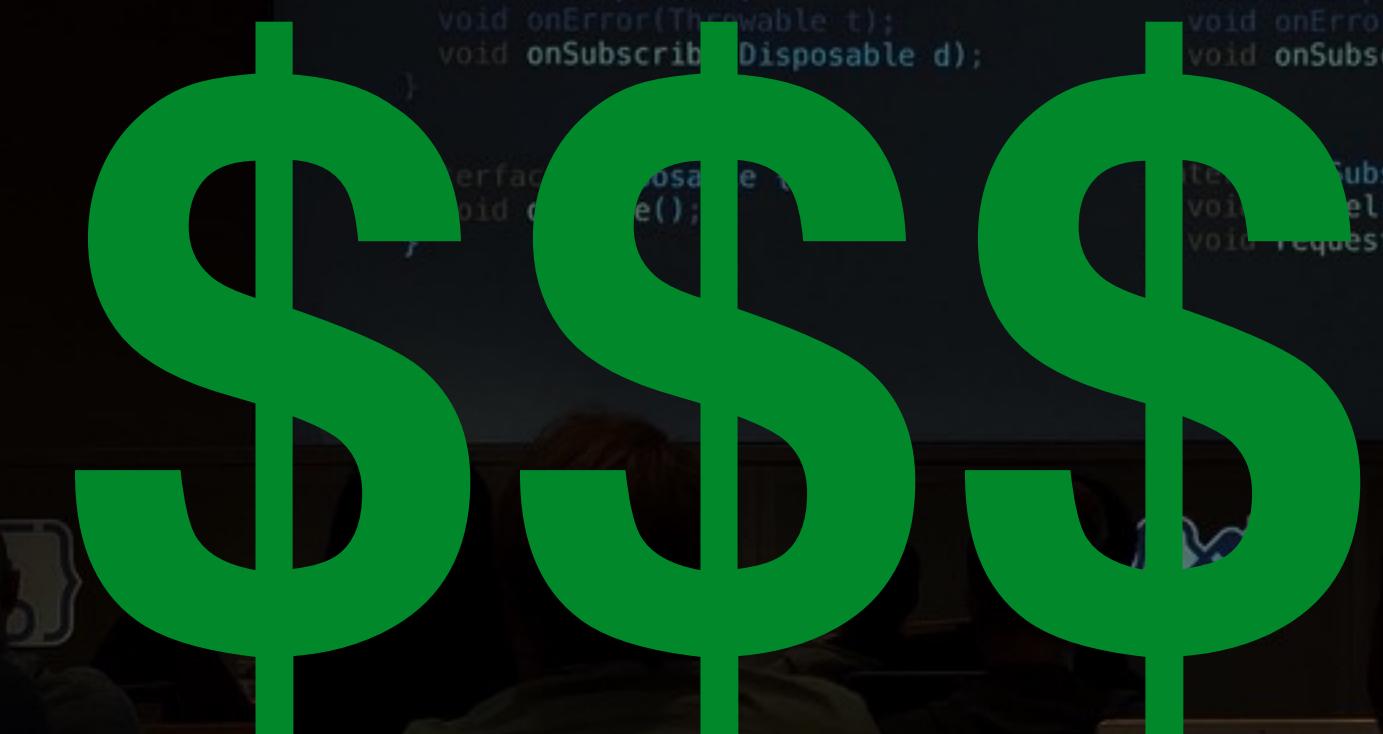
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ViewGroups

Complex



Simple

Complex



RelativeLayout

Simple

ConstraintLayout

Complex



RelativeLayout

Simple

ConstraintLayout

Complex



RelativeLayout

LinearLayout

Simple

ConstraintLayout

Complex



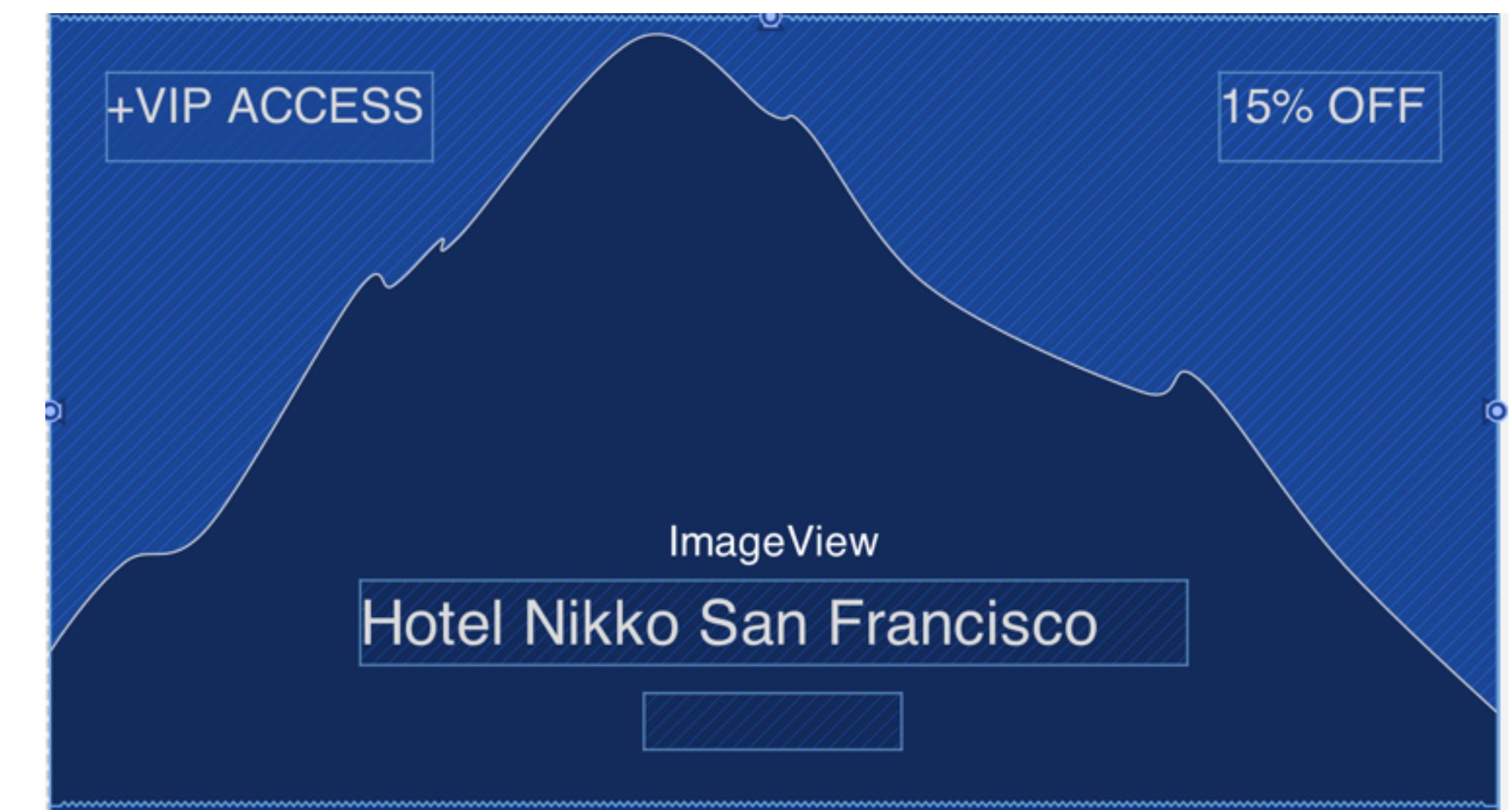
RelativeLayout

LinearLayout

FrameLayout

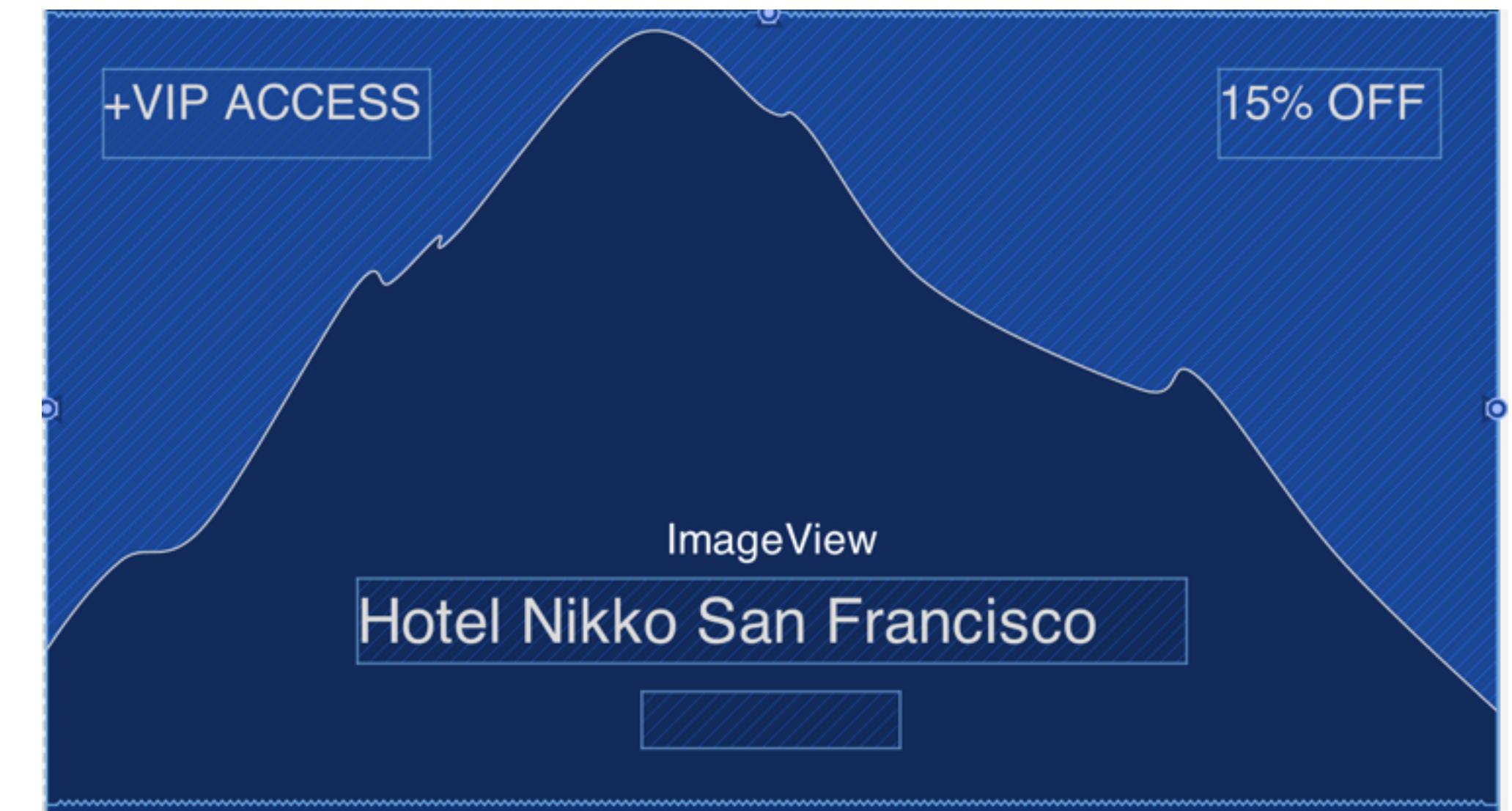
Simple

RelativeLayout / ConstraintLayout



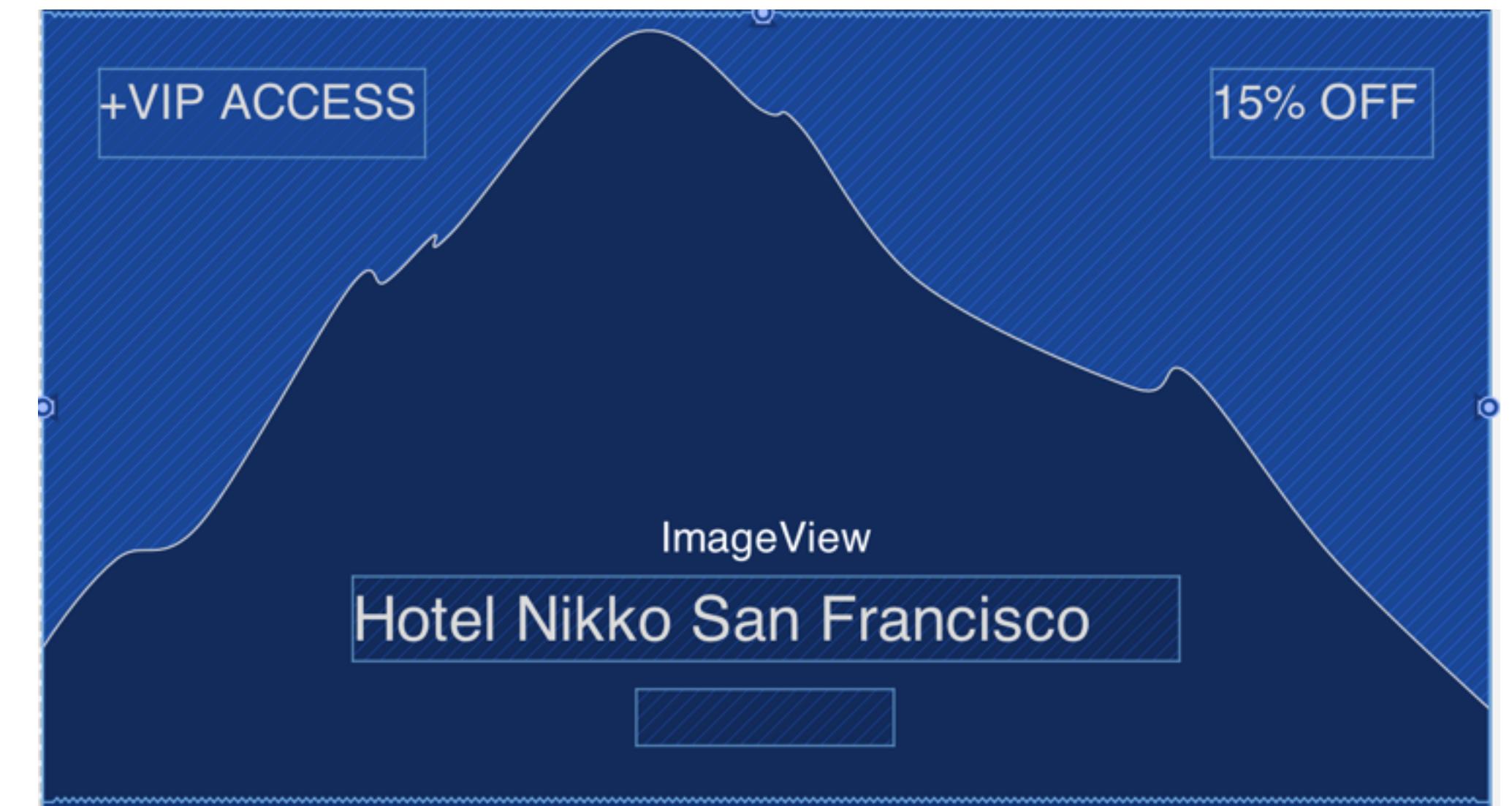
RelativeLayout / ConstraintLayout

- Position views relative to each other



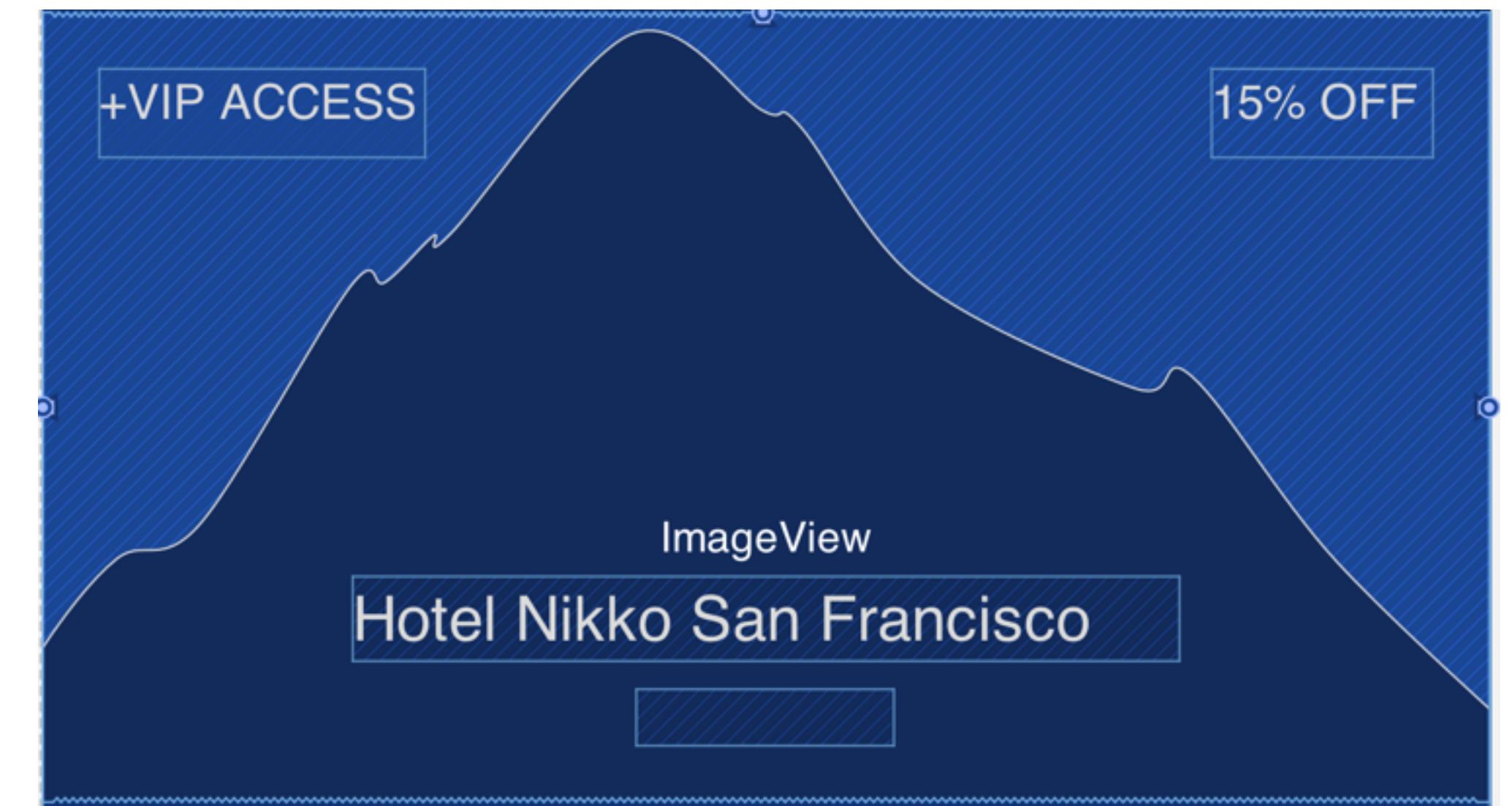
RelativeLayout / ConstraintLayout

- Position views relative to each other
- RelativeLayout: Slow

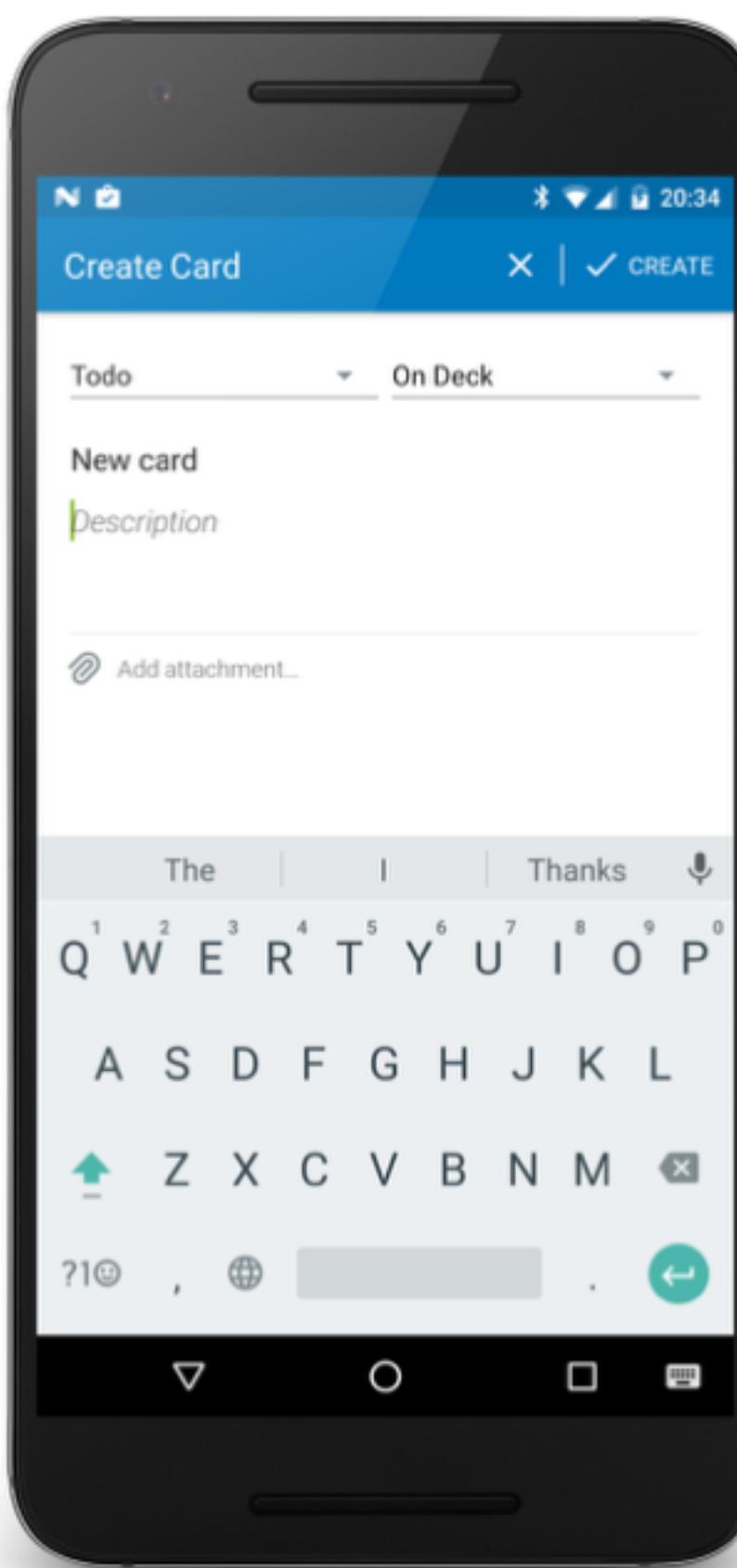


RelativeLayout / ConstraintLayout

- Position views relative to each other
- RelativeLayout: Slow
- ConstraintLayout: Alpha

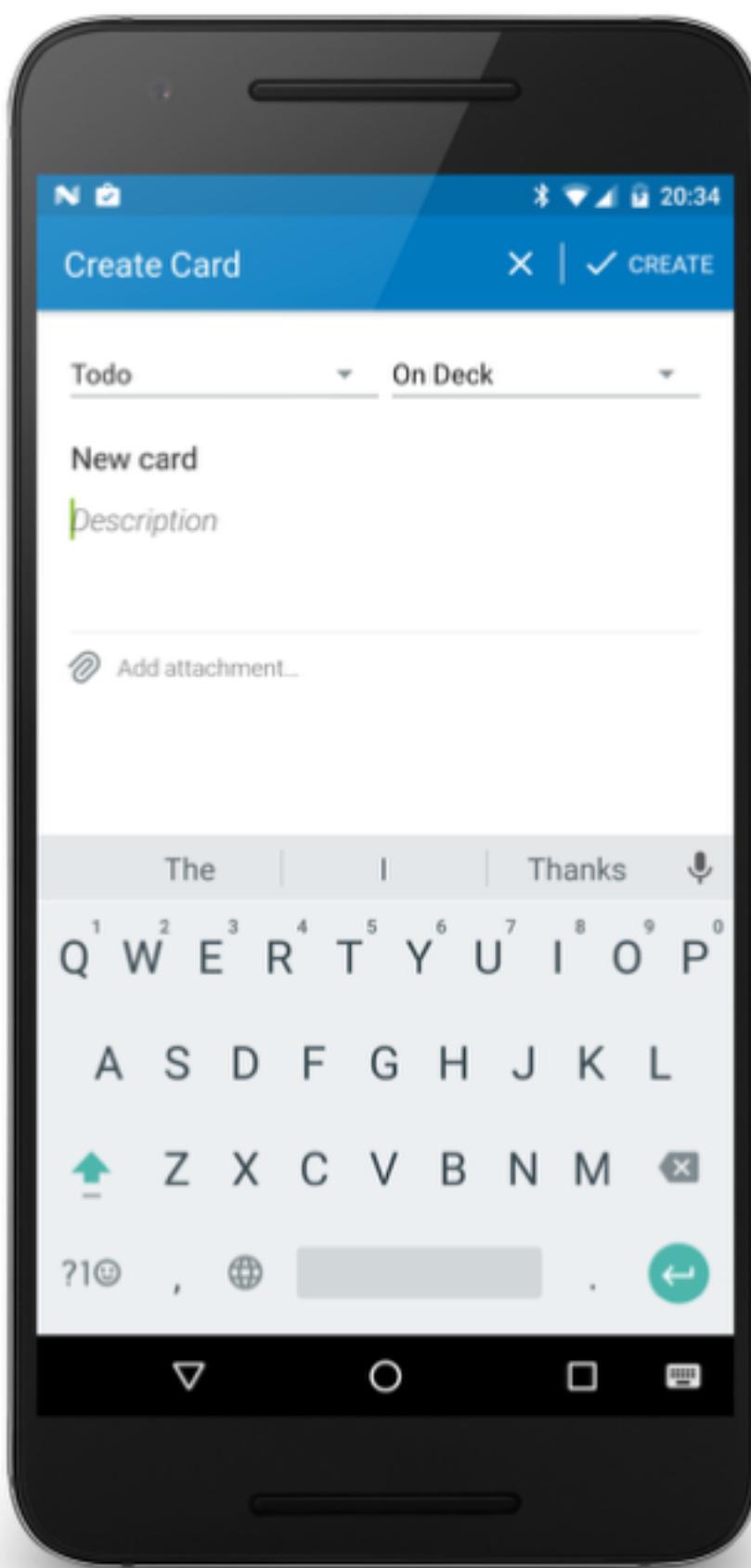


LinearLayout



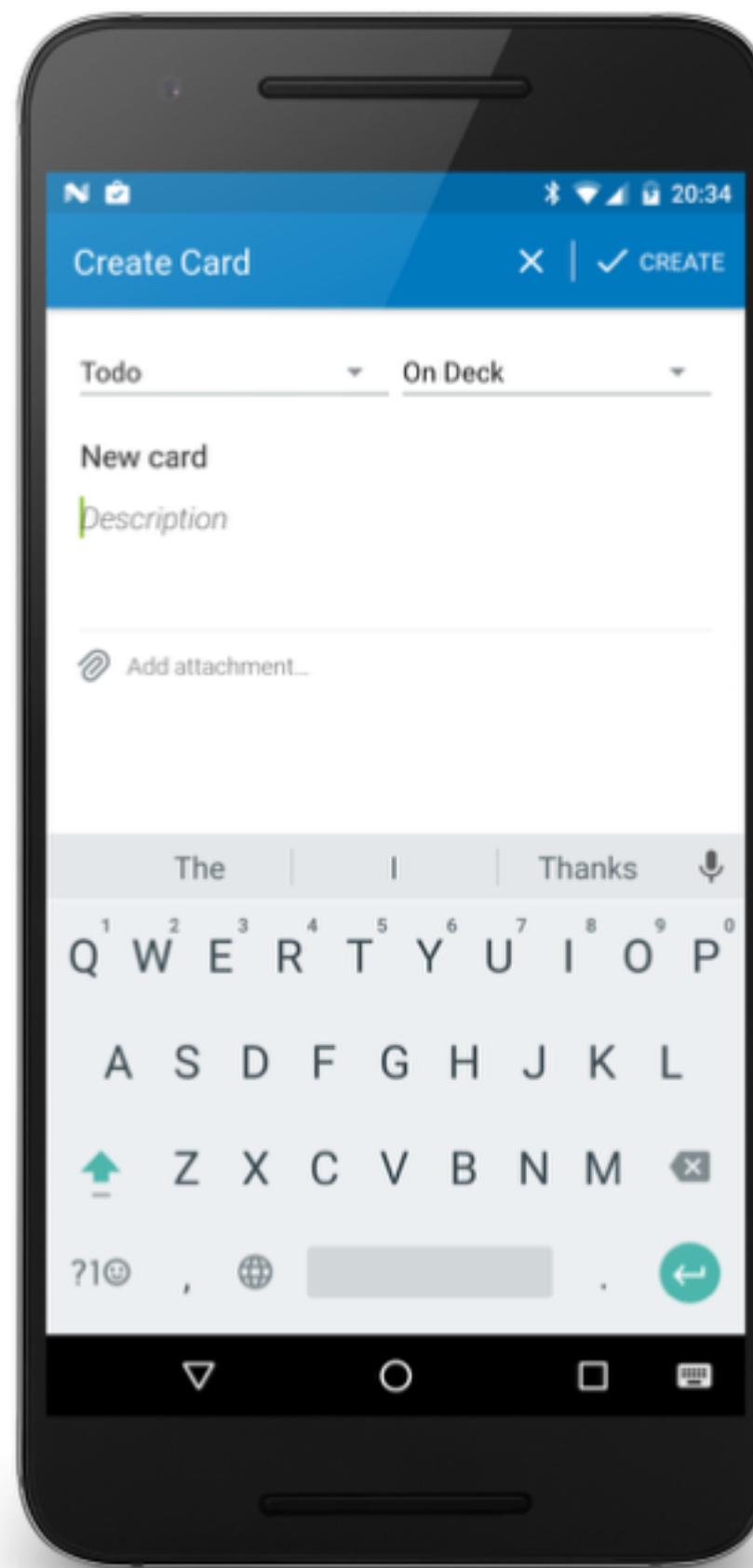
LinearLayout

- Stack views vertically/horizontally



LinearLayout

- Stack views vertically/horizontally
- Weight distribution



FrameLayout

FrameLayout

- Positioning based on parent bounds

FrameLayout

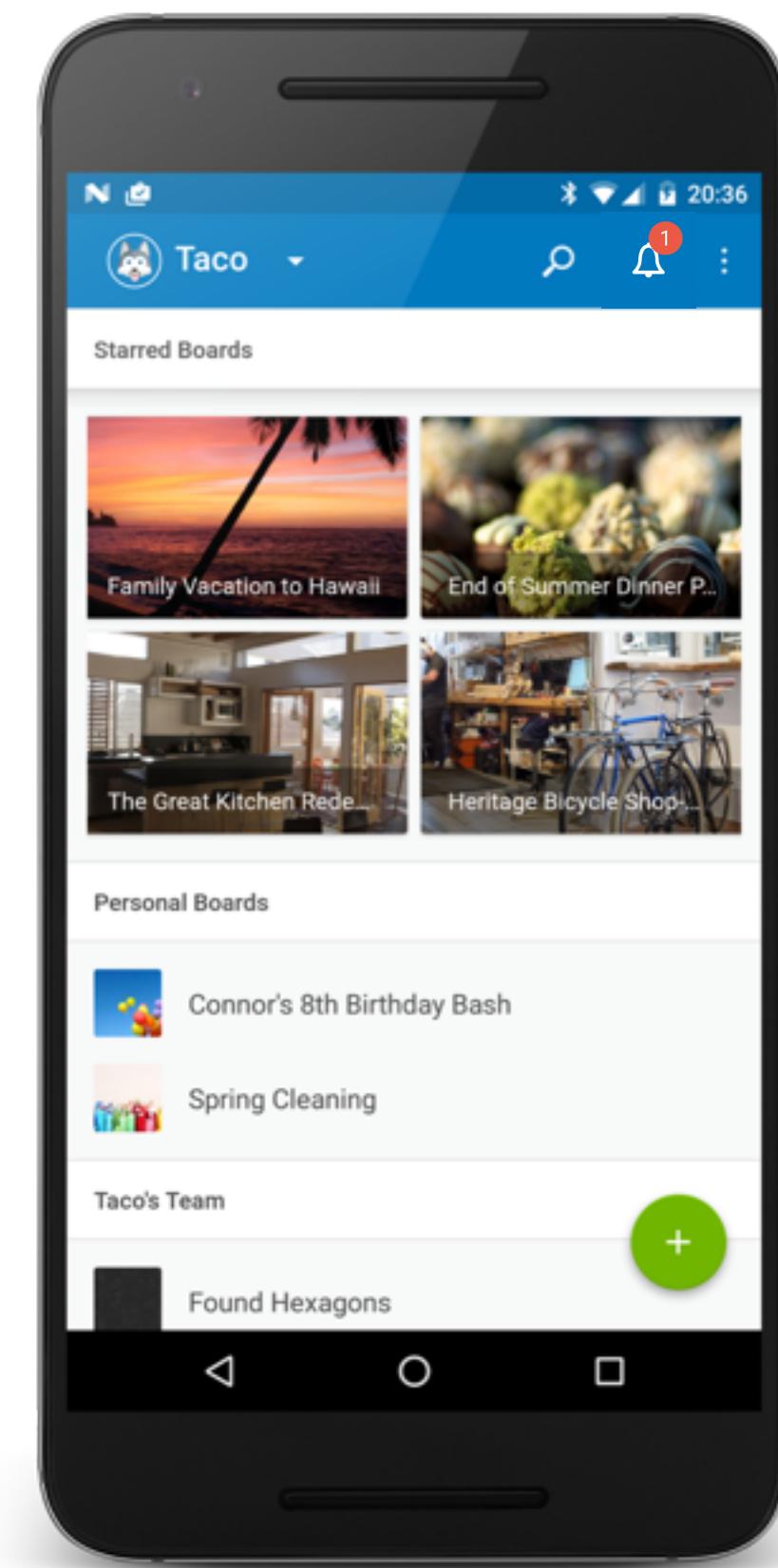
- Positioning based on parent bounds
- Overlapping Views

FrameLayout

- Positioning based on parent bounds
- Overlapping Views
- Clickable item backgrounds

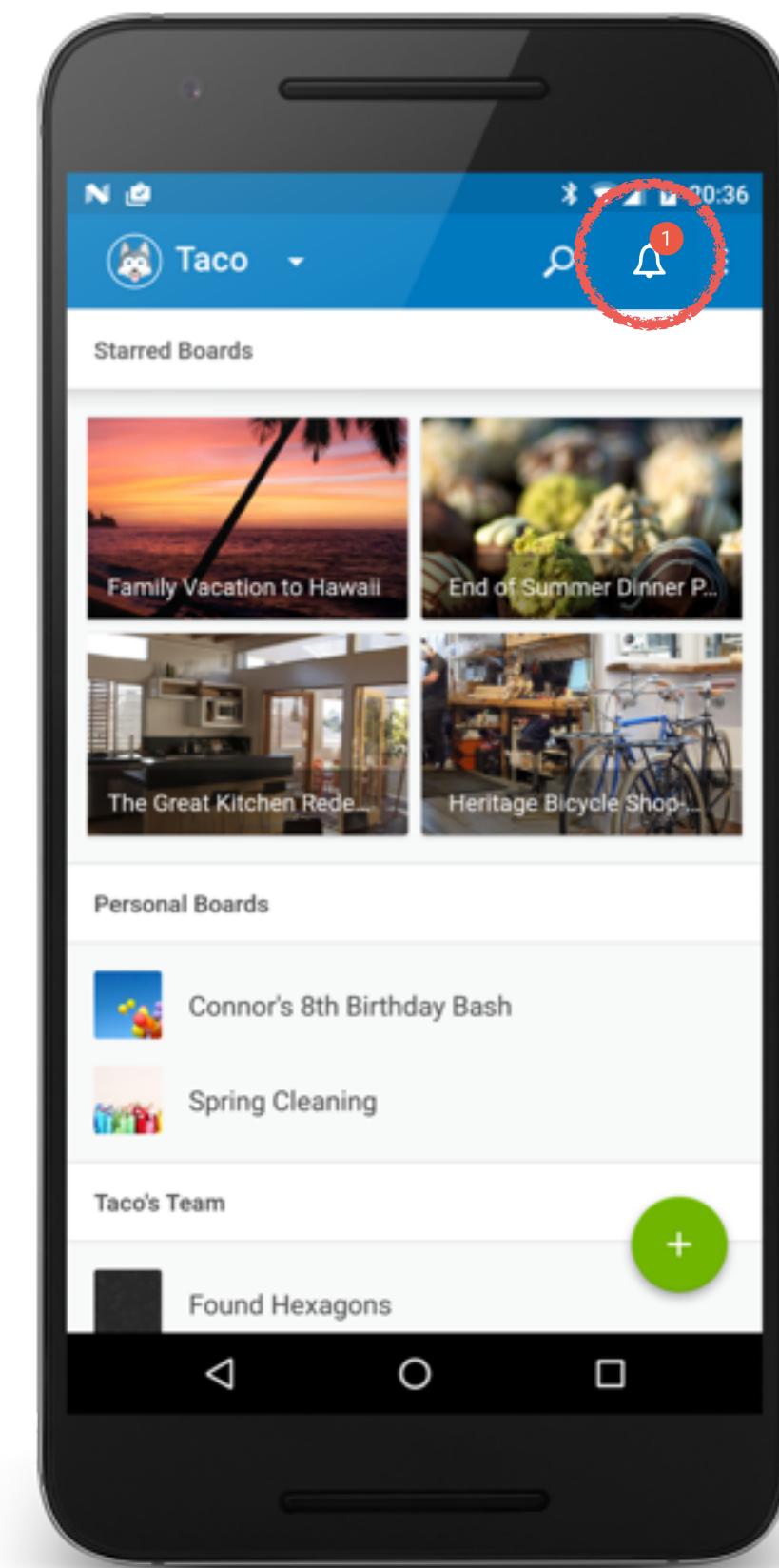
FrameLayout

- Positioning based on parent bounds
- Overlapping Views
- Clickable item backgrounds



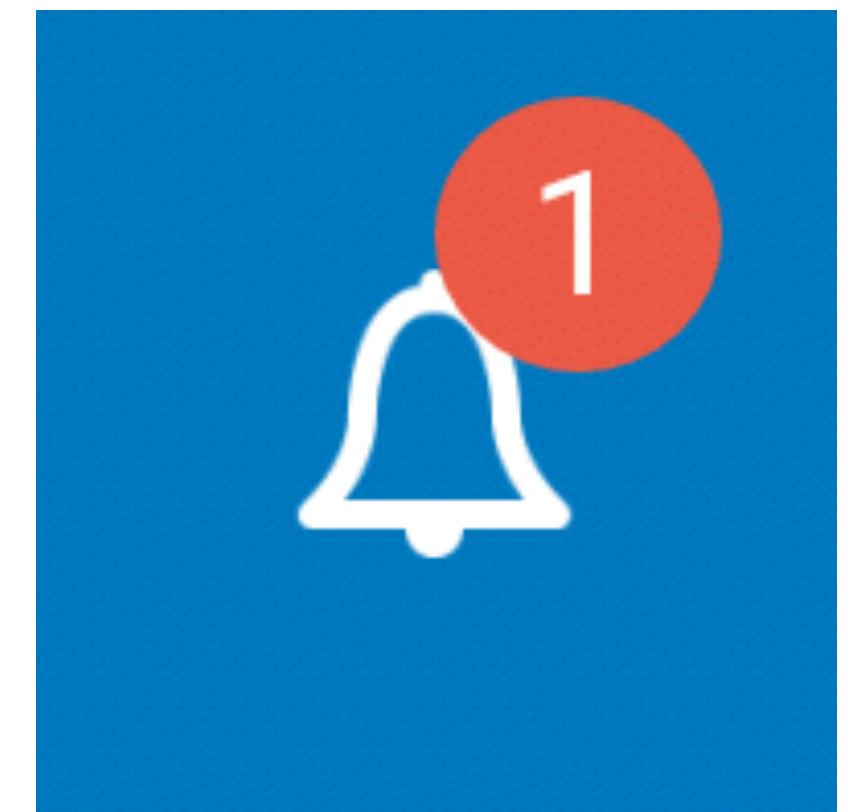
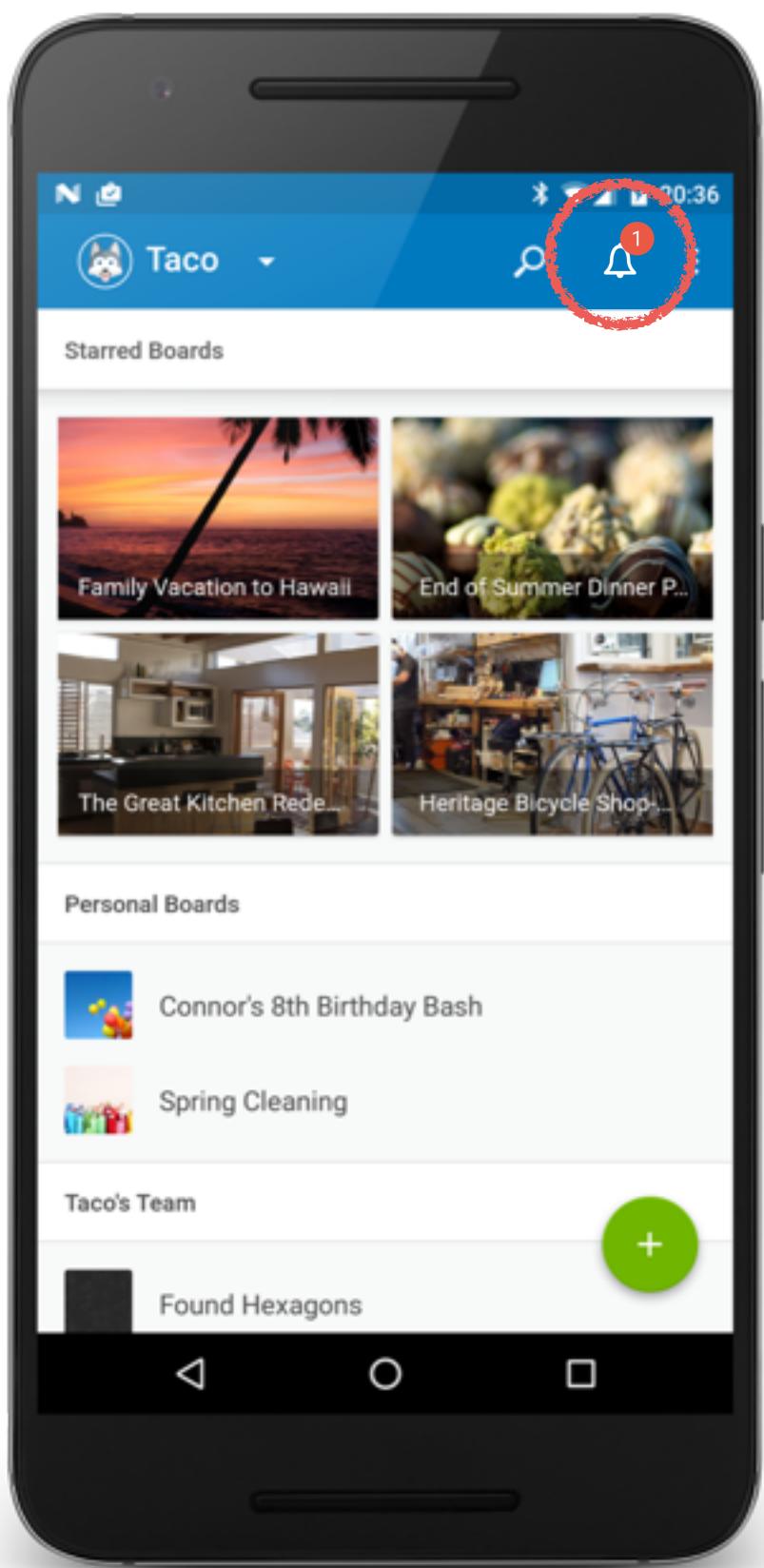
FrameLayout

- Positioning based on parent bounds
- Overlapping Views
- Clickable item backgrounds



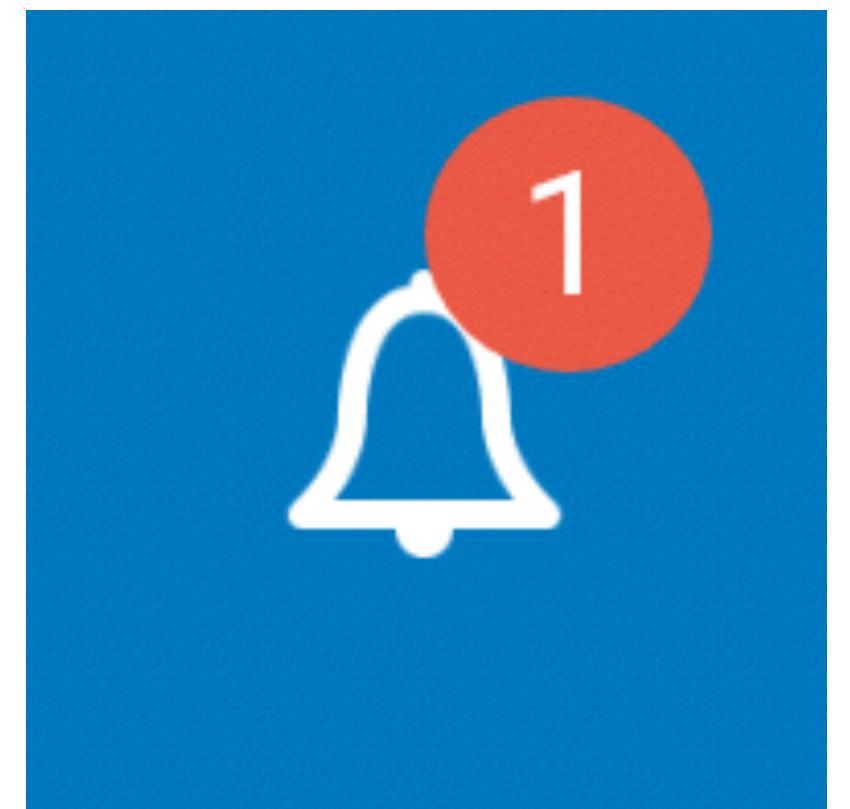
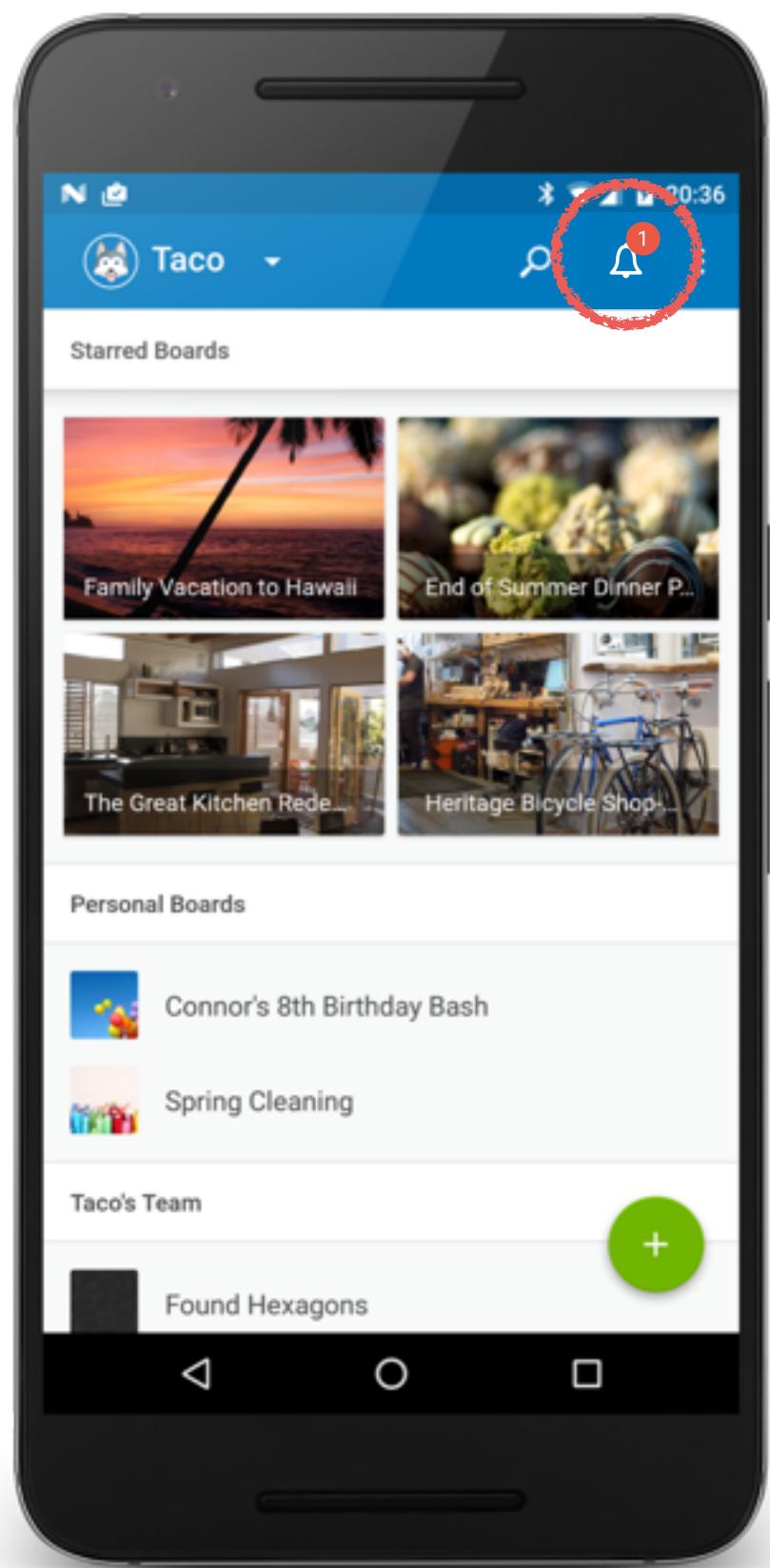
FrameLayout

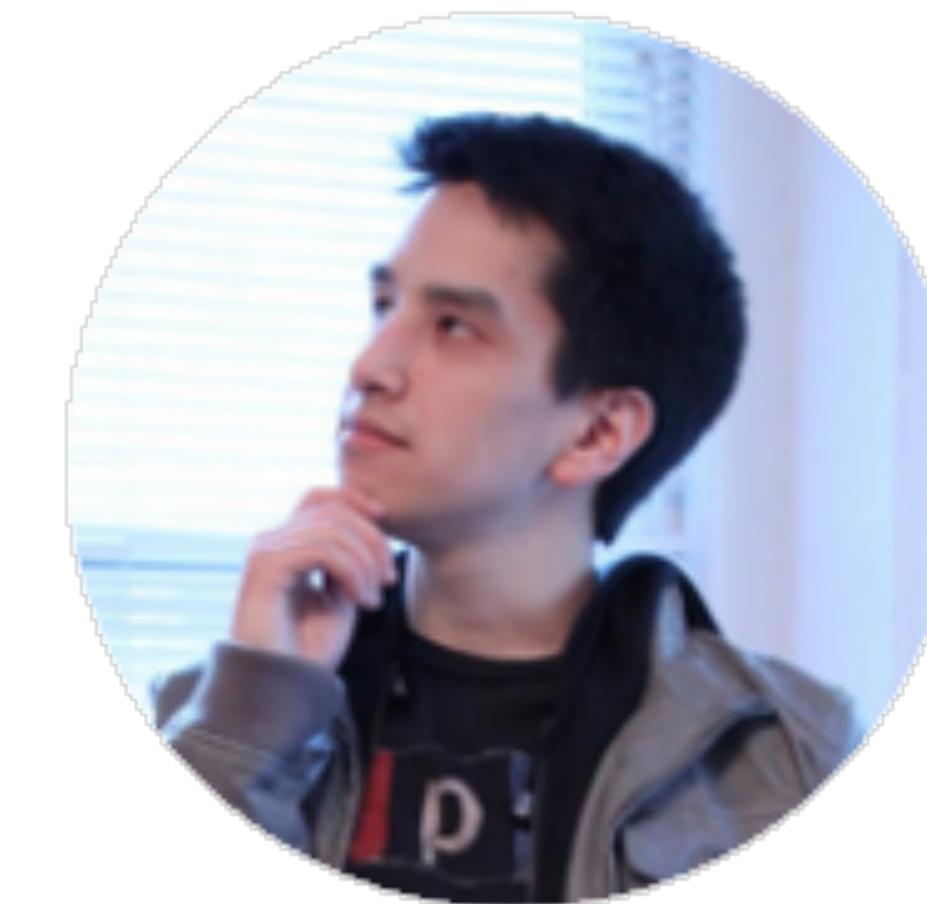
- Positioning based on parent bounds
- Overlapping Views
- Clickable item backgrounds

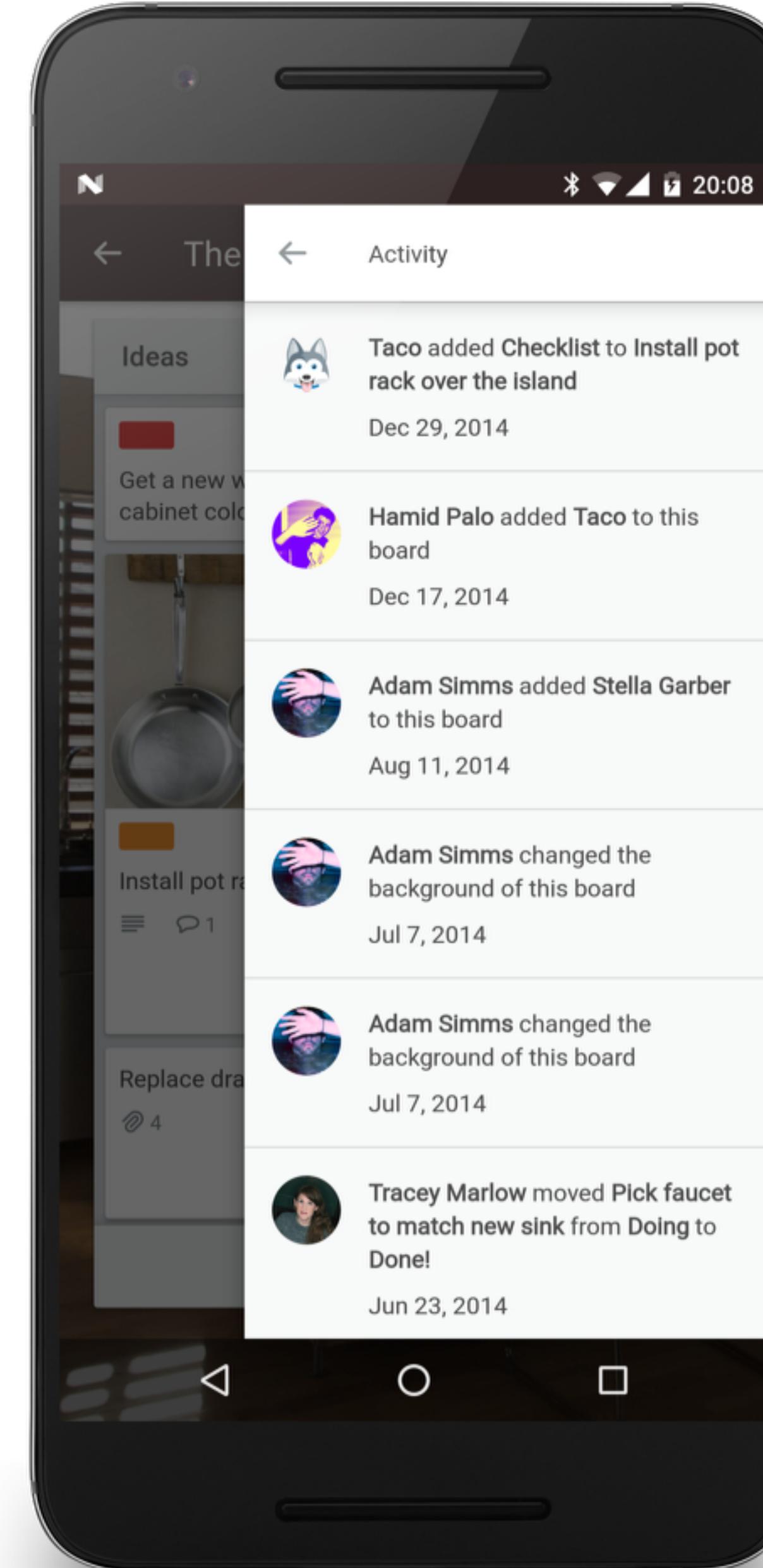
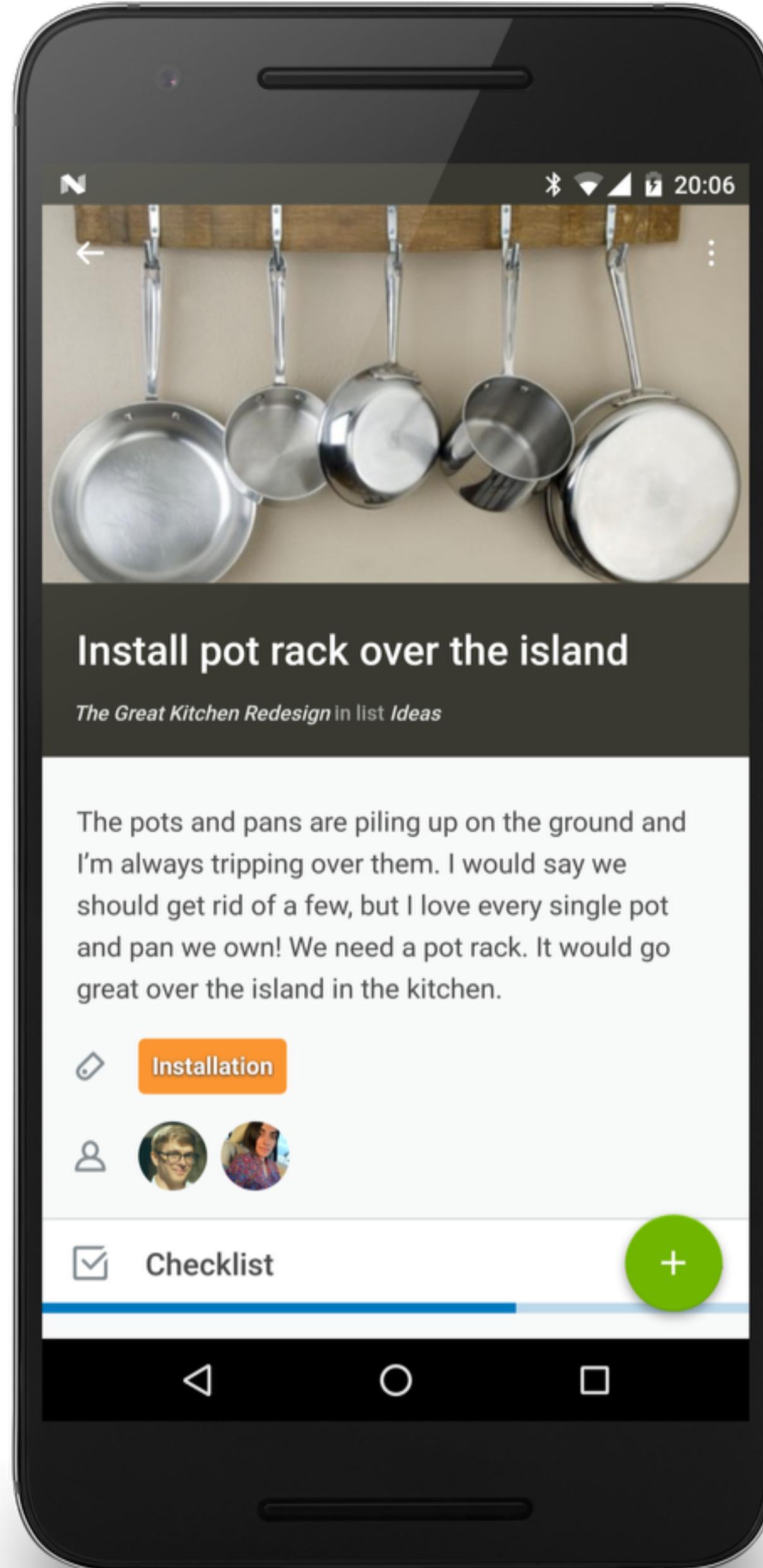
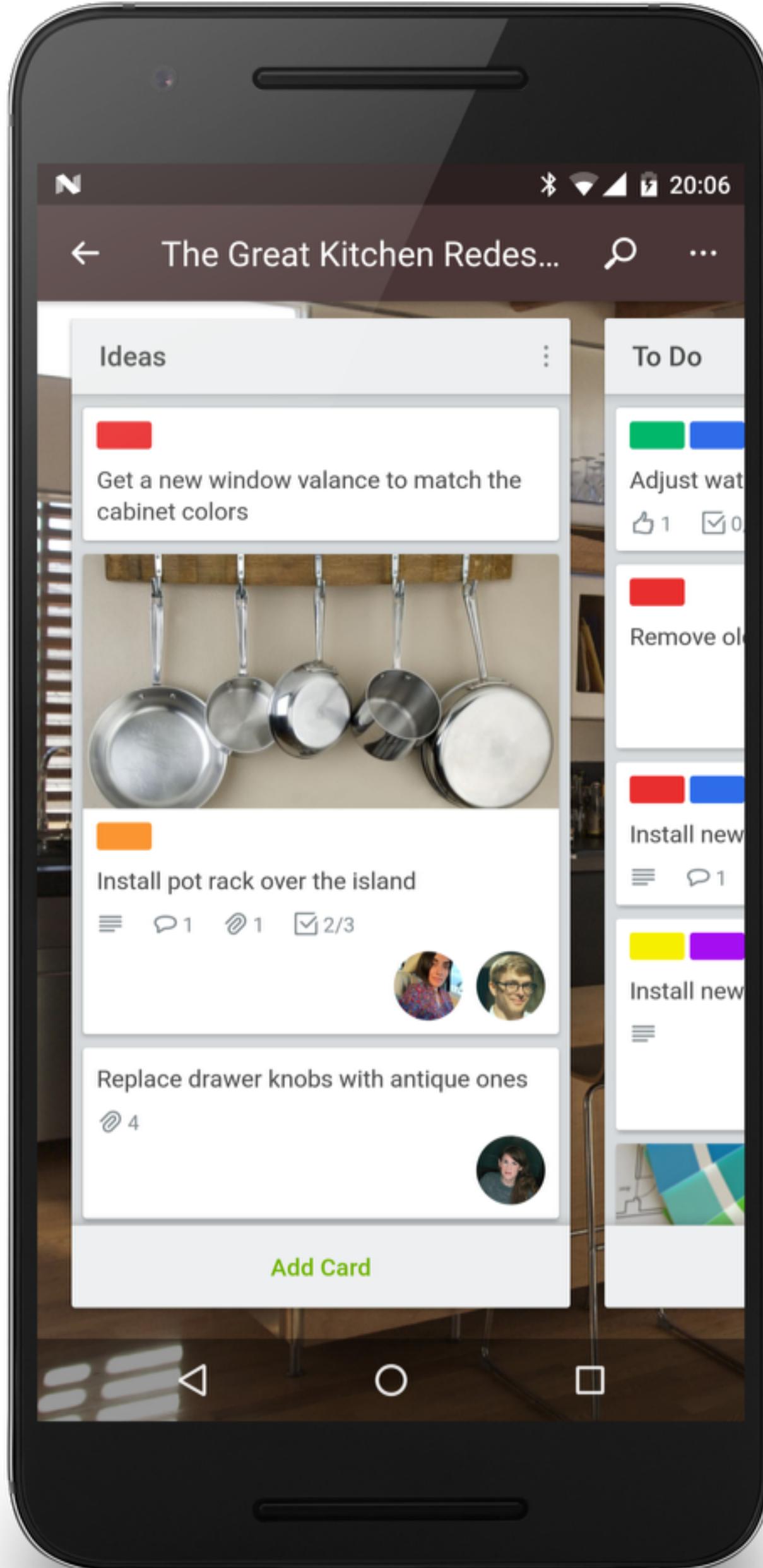


FrameLayout

- Positioning based on parent bounds
- Overlapping Views
- Clickable item backgrounds
- Toggle container







```
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="horizontal"
    >

    <include
        layout="@layout/avatar_view"
        android:layout_width="48dp"
        android:layout_height="48dp"
        />

    <!-- Rest of layout here... -->
</LinearLayout>
```

```
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
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    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="horizontal"
    >

    <com.trello.view.AvatarView
        android:id="@+id/avatar_view"
        android:layout_width="48dp"
        android:layout_height="48dp"
    />

    <!-- Rest of layout here... -->
</LinearLayout>
```

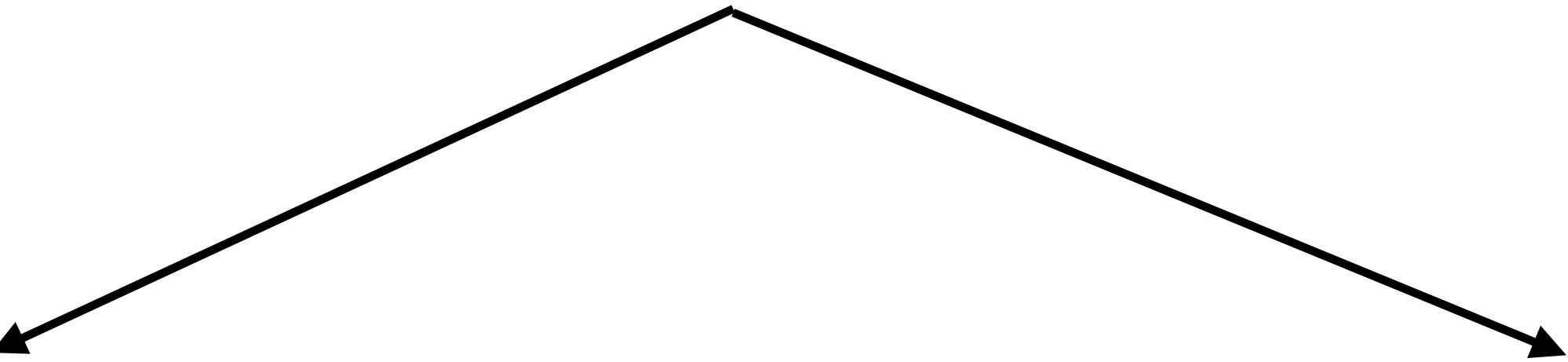
```
public class AvatarView extends FrameLayout {  
  
    ImageView icon;  
    TextView initials;  
  
    public AvatarView(Context context, AttributeSet attrs) {  
        super(context, attrs);  
  
        LayoutInflater.from(context).inflate(R.layout.view_avatar, this);  
  
        icon = (ImageView) findViewById(R.id.icon);  
        initials = (TextView) findViewById(R.id.initials);  
    }  
  
    public void bind(Member member) {  
        // ...Load icon into ImageView...  
        // OR  
        // ...Setup initials in TextView...  
    }  
}
```

```
<FrameLayout xmlns:android="http://schemas.android.com/apk/res/android"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
>  
  
<TextView  
    android:id="@+id/initials"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
/>  
  
<ImageView  
    android:id="@+id/icon"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
/>  
  
</FrameLayout>
```

AvatarView
(FrameLayout)



FrameLayout



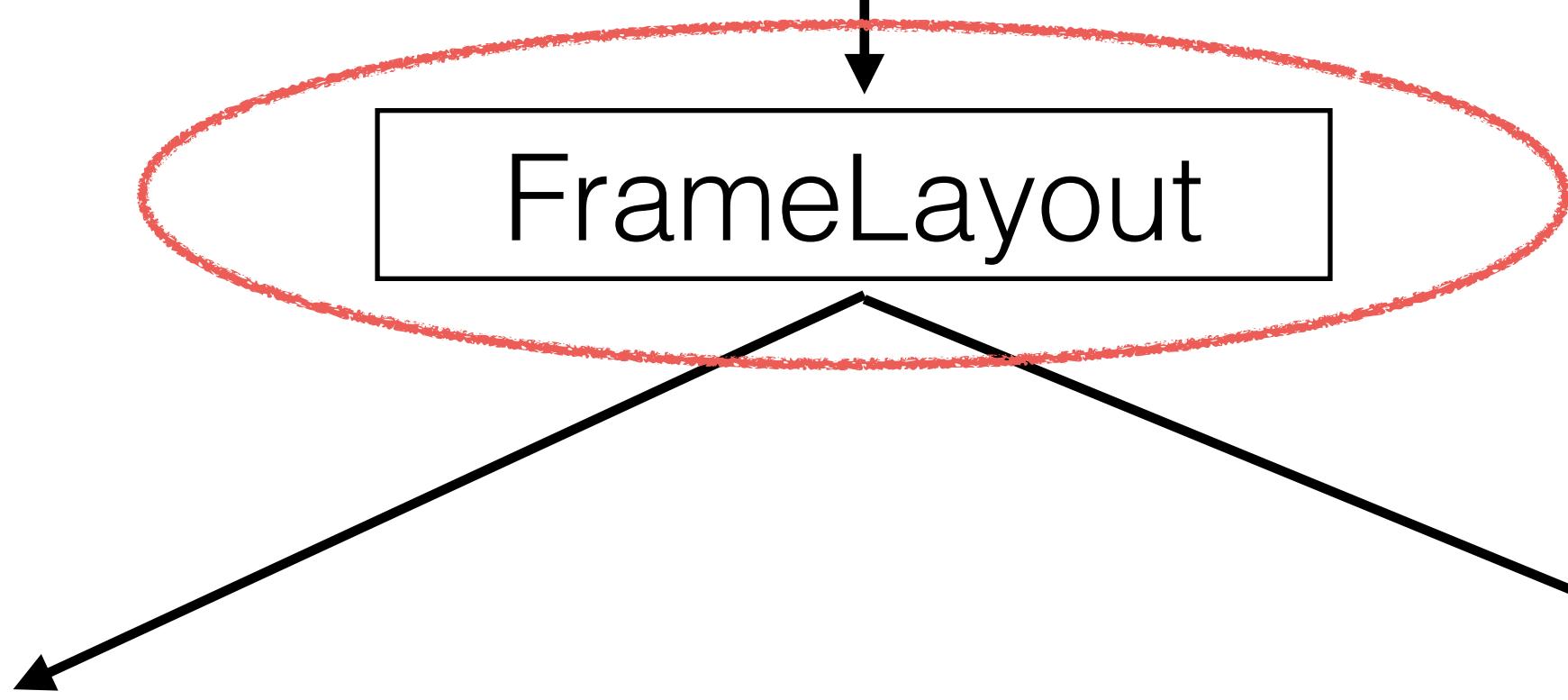
TextView ImageView

AvatarView
(FrameLayout)

FrameLayout

TextView

ImageView



```
public class AvatarView extends FrameLayout {  
  
    ImageView icon;  
    TextView initials;  
  
    public AvatarView(Context context, AttributeSet attrs) {  
        super(context, attrs);  
  
        LayoutInflater.from(context).inflate(R.layout.view_avatar, this);  
  
        icon = (TextView) findViewById(R.id.icon);  
        initials = (TextView) findViewById(R.id.initials);  
    }  
  
    public void bind(Member member) {  
        // ...Load icon into ImageView...  
        // OR  
        // ...Setup initials in TextView...  
    }  
}
```

```
<merge xmlns:android="http://schemas.android.com/apk/res/android"
    >

    <TextView
        android:id="@+id/initials"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
    />

    <ImageView
        android:id="@+id/icon"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
    />

</merge>
```

AvatarView
(FrameLayout)





Styles

Styles

Styles

- No style

```
<View android:background="#FF0000" />
```

Styles

- No style

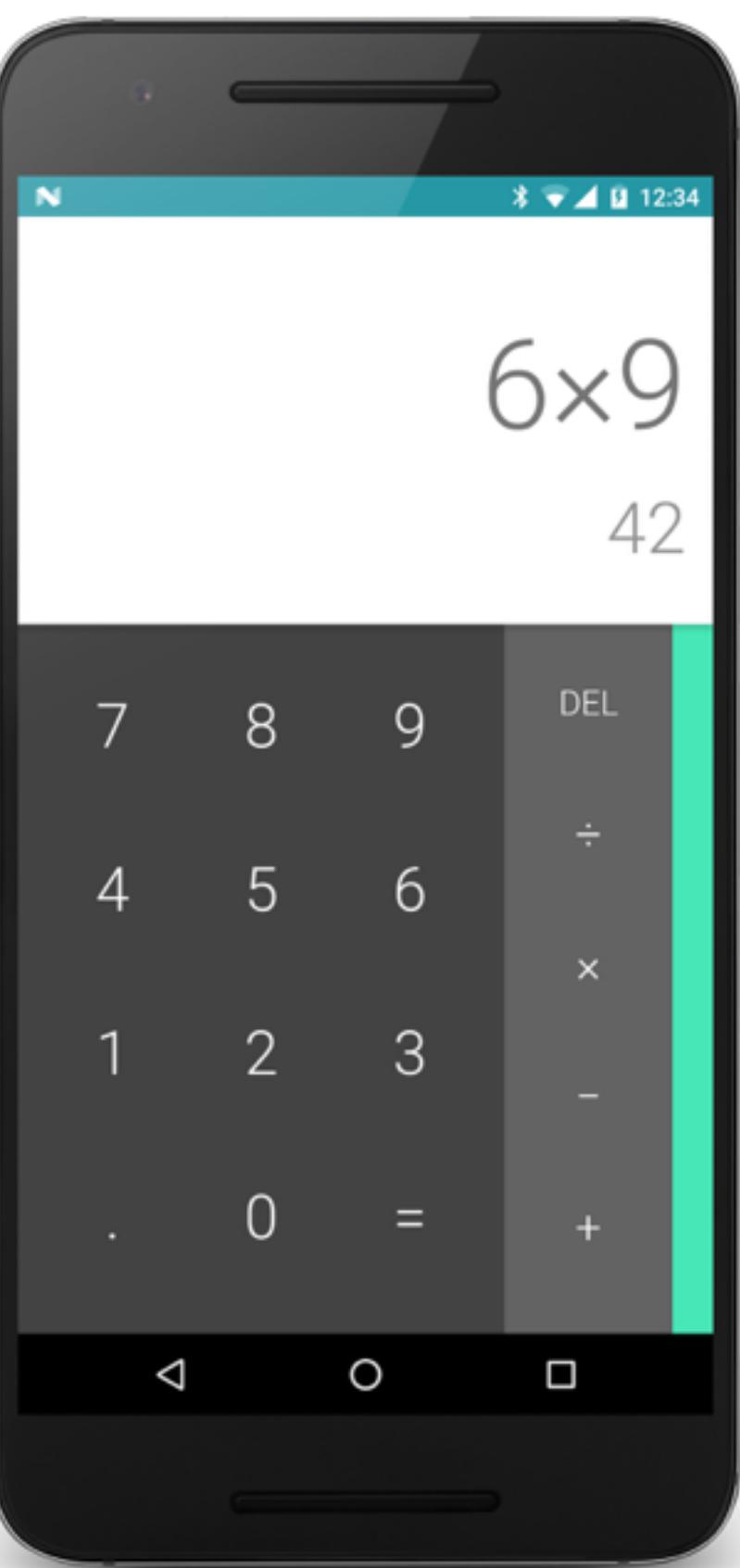
```
<View android:background="#FF0000" />
```

- Style

```
<!-- some_layout.xml -->
<View style="@style/MyStyle" />

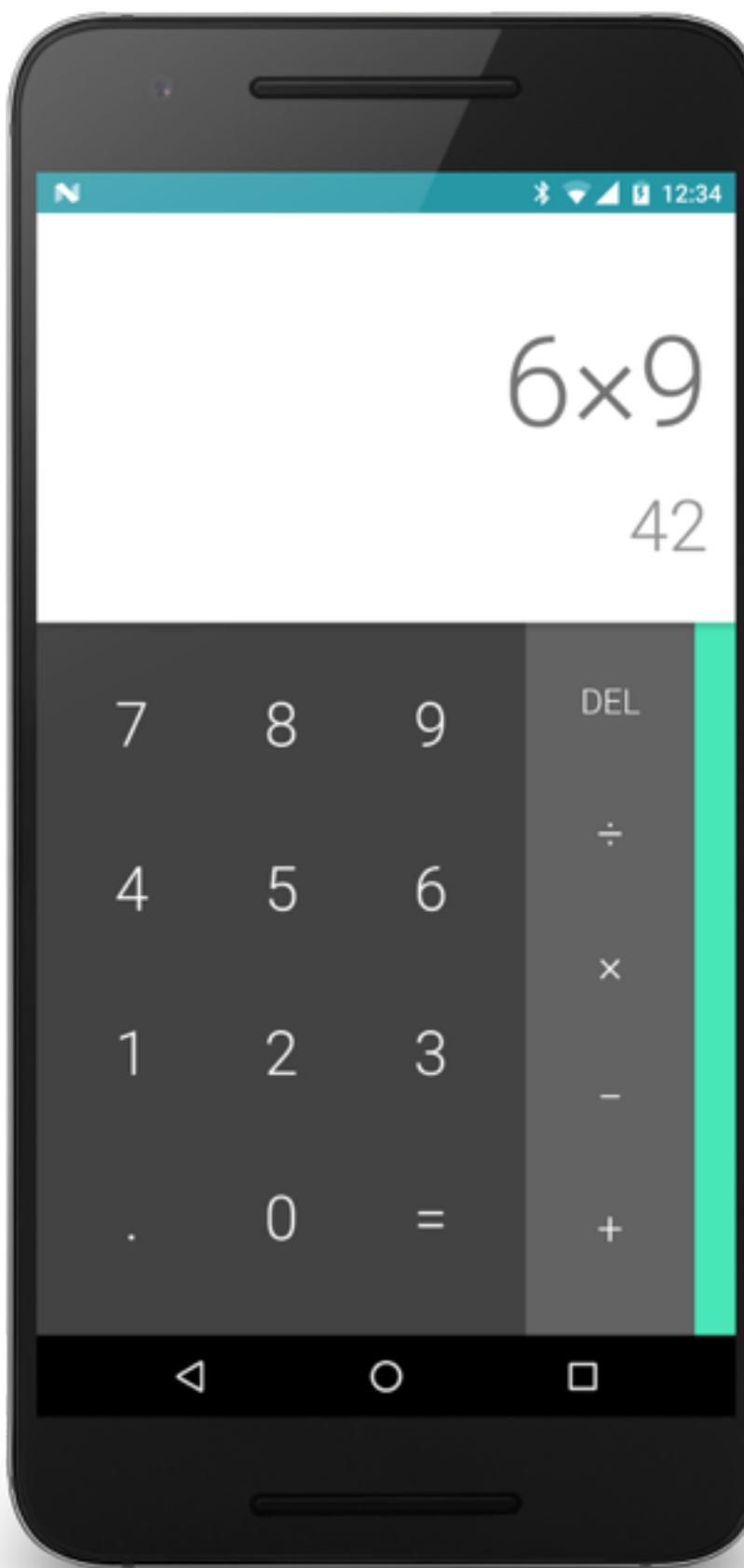
<!-- styles.xml -->
<style name="MyStyle">
    <item name="android:background">#FF0000</item>
</style>
```

Efficient



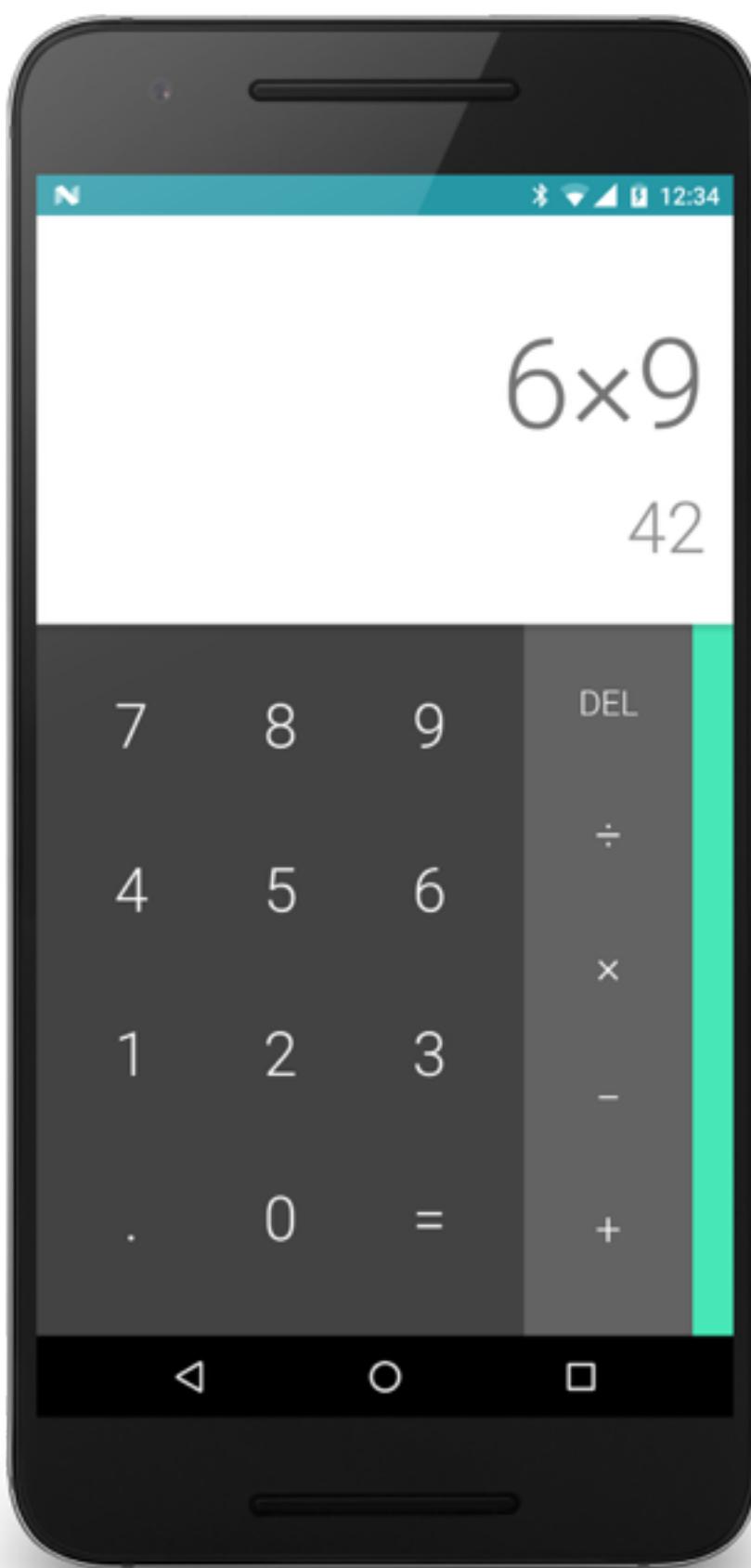
Efficient

- Semantically identical Views



Efficient

- Semantically identical Views
- **All** styled Views should change at once



Not Efficient

Not Efficient

- Single-use styles

Not Efficient

- Single-use styles
- Coincidentally using the same attributes

```
<TextView  
    android:id="@+id/title"  
    android:textColor="@color/blue_200"  
    android:textColorHint="@color/grey_500" />
```

```
<TextView  
    android:id="@+id/body"  
    android:textColor="@color/blue_200"  
    android:textColorHint="@color/grey_500" />
```

Not Efficient

- Single-use styles
- Coincidentally using the same attributes

```
<TextView  
    android:id="@+id/title"  
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    android:textColorHint="@color/grey_500" />
```

```
<TextView  
    android:id="@+id/body"  
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    android:textColorHint="@color/grey_500" />
```

Not Efficient

- Single-use styles
- Coincidentally using the same attributes

```
<TextView  
    android:id="@+id/title"  
    android:textColor="@color/blue_200"  
    android:textColorHint="@color/grey_500" />
```

```
<TextView  
    android:id="@+id/body"  
    android:textColor="@color/blue_200"  
    android:textColorHint="@color/grey_500" />
```

```
static final int NUM_COLUMNS = 3;
```

```
static final int NUM_RETRIES = 3;
```

```
// static final int NUM_COLUMNS = 3;
```

```
// static final int NUM_RETRIES = 3;
```

```
static final int NUM_THREE = 3;
```



Themes

Themes

Themes

- Affect multiple Views at once

Themes

- Affect multiple Views at once
- Default styles

Themes

- Affect multiple Views at once
- Default styles
- Configure system-created Views

- Application

```
<application  
    android:theme="@style/Theme.AppCompat">
```

- Application

```
<application  
    android:theme="@style/Theme.AppCompat">
```

- Activity

```
<activity  
    android:theme="@style/Theme.AppCompat.Light">
```

- Application

```
<application  
    android:theme="@style/Theme.AppCompat">
```

- Activity

```
<activity  
    android:theme="@style/Theme.AppCompat.Light">
```

- View

```
<Toolbar  
    android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"  
    app:popupTheme="@style/ThemeOverlay.AppCompat.Light"  
/>
```

AppCompat

AppCompat

- Material on all devices

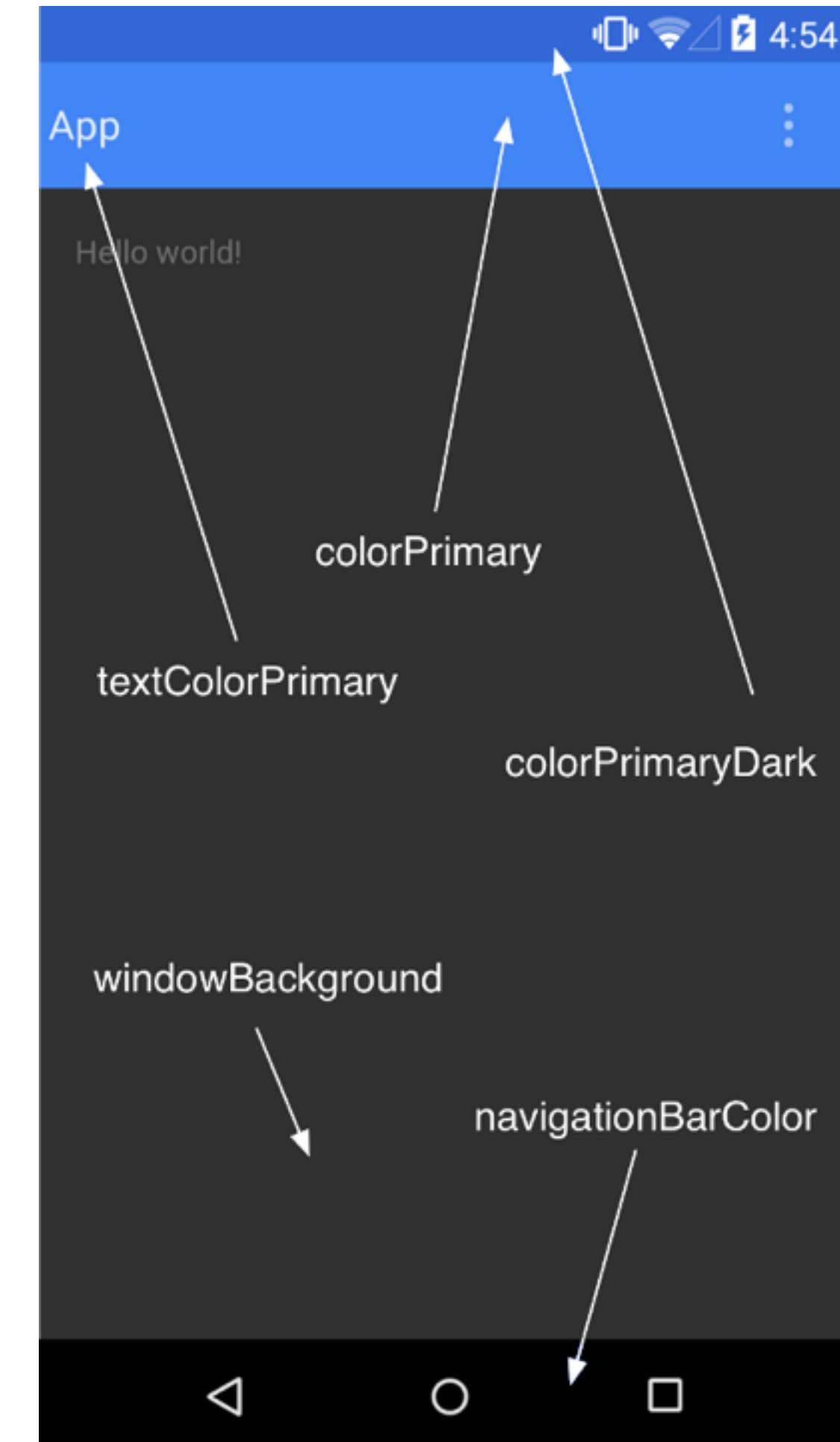
AppCompat

- Material on all devices
- Baseline themes/styles

AppCompat

- Material on all devices
- Baseline themes/styles
- Enables View theming pre-Lollipop

```
<style name="ColorTheme" parent="Theme.AppCompat">
    <item name="colorPrimary">#F00</item>
    <item name="colorPrimaryDark">#0F0</item>
    <item name="colorControlNormal">#00F</item>
</style>
```



```
<style name="AppTheme" parent="Theme.AppCompat">
    <item name="buttonStyle">@style/MyButton</item>
    <item name="android:spinnerItemStyle">@style/MySpinnerItem</item>

    <item name="android:textAppearance">@style/MyText</item>
    <item name="android:textAppearanceInverse">@style/MyTextInverse</item>
</style>
```

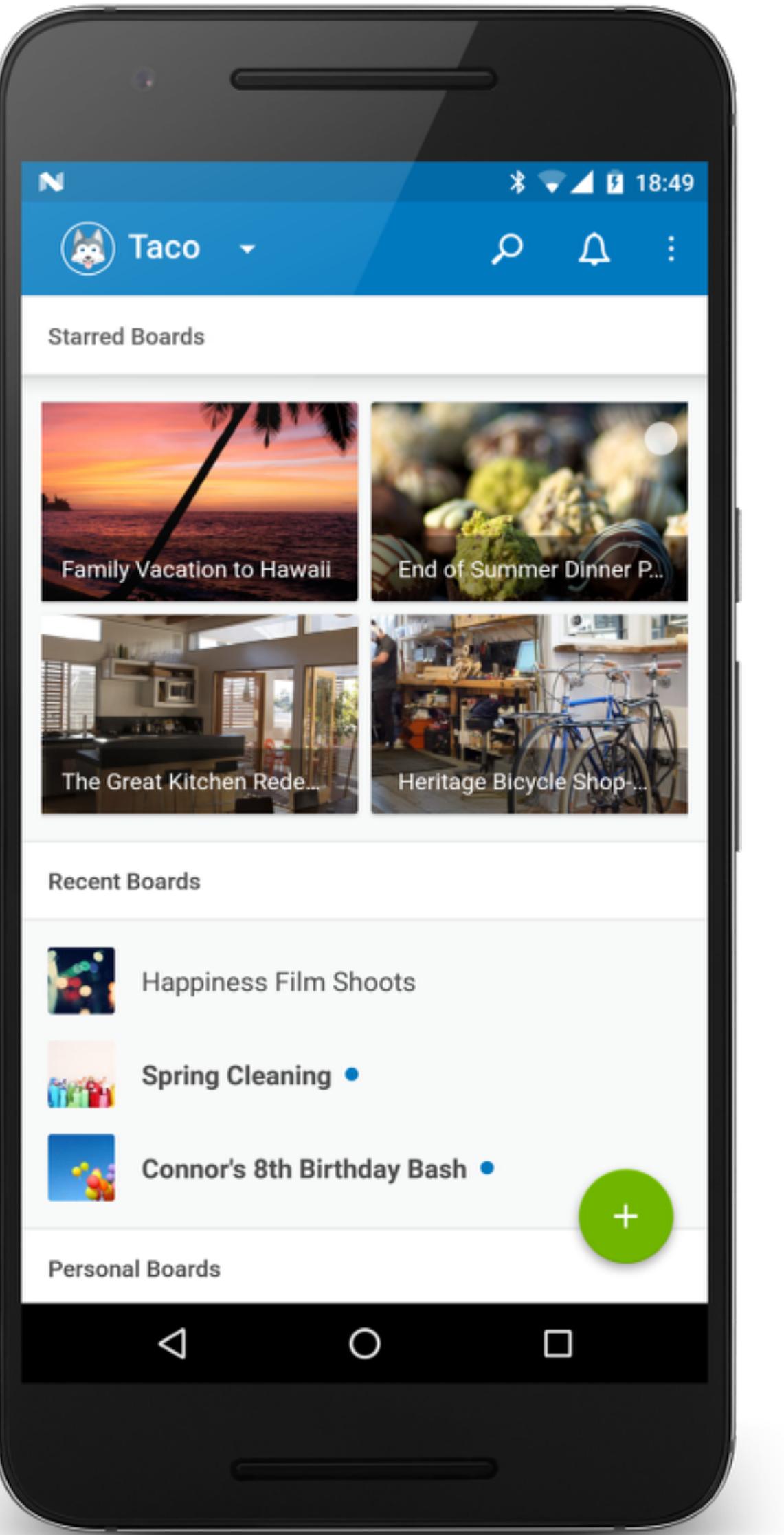
```
<style name="AttrTheme" parent="Theme.AppCompat">
    <item name="selectableItemBackground">@drawable/bg</item>
</style>
```

```
<!-- some_layout.xml -->
<Button android:background="?attr/selectableItemBackground" />
```

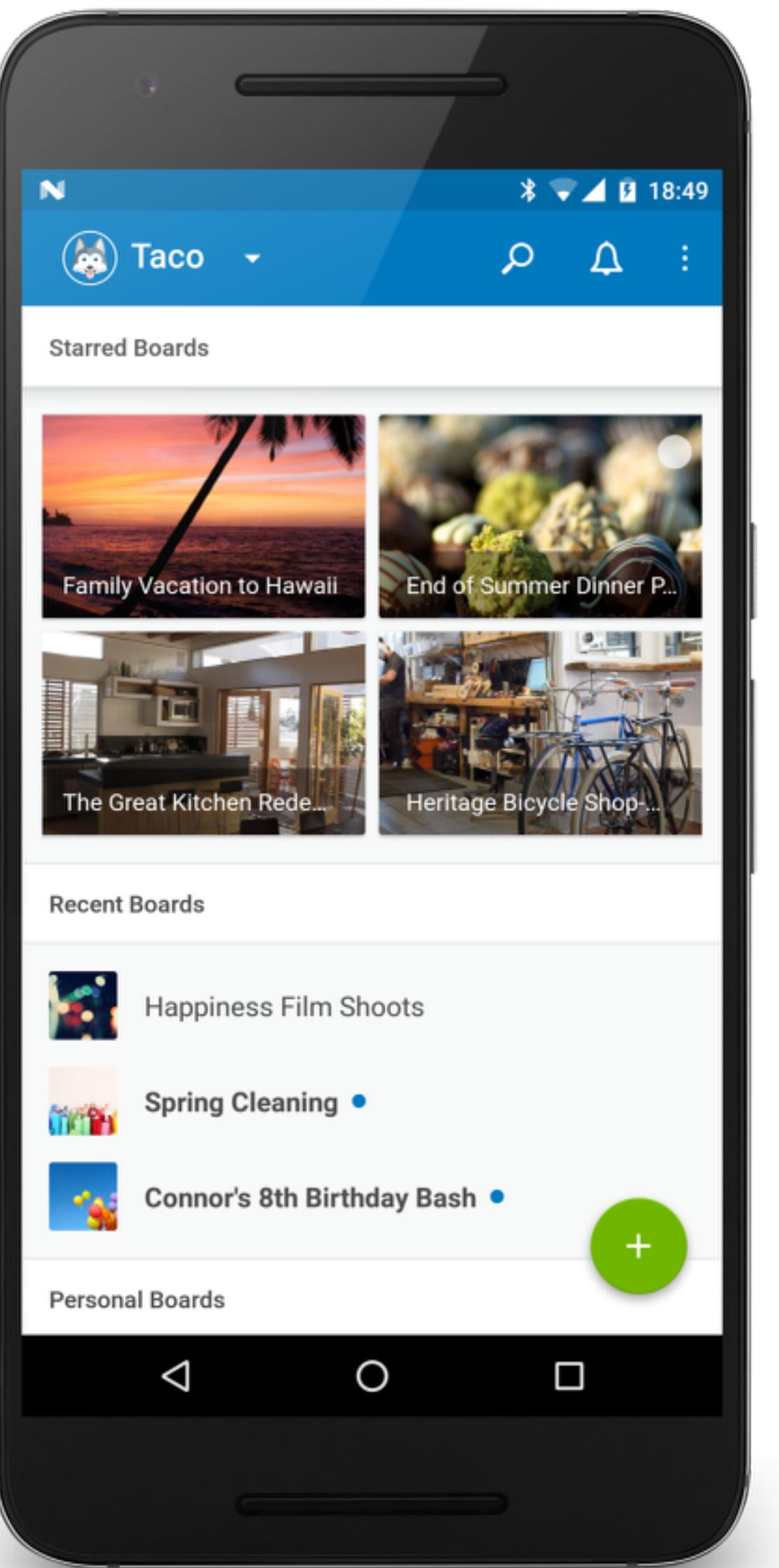


Resources

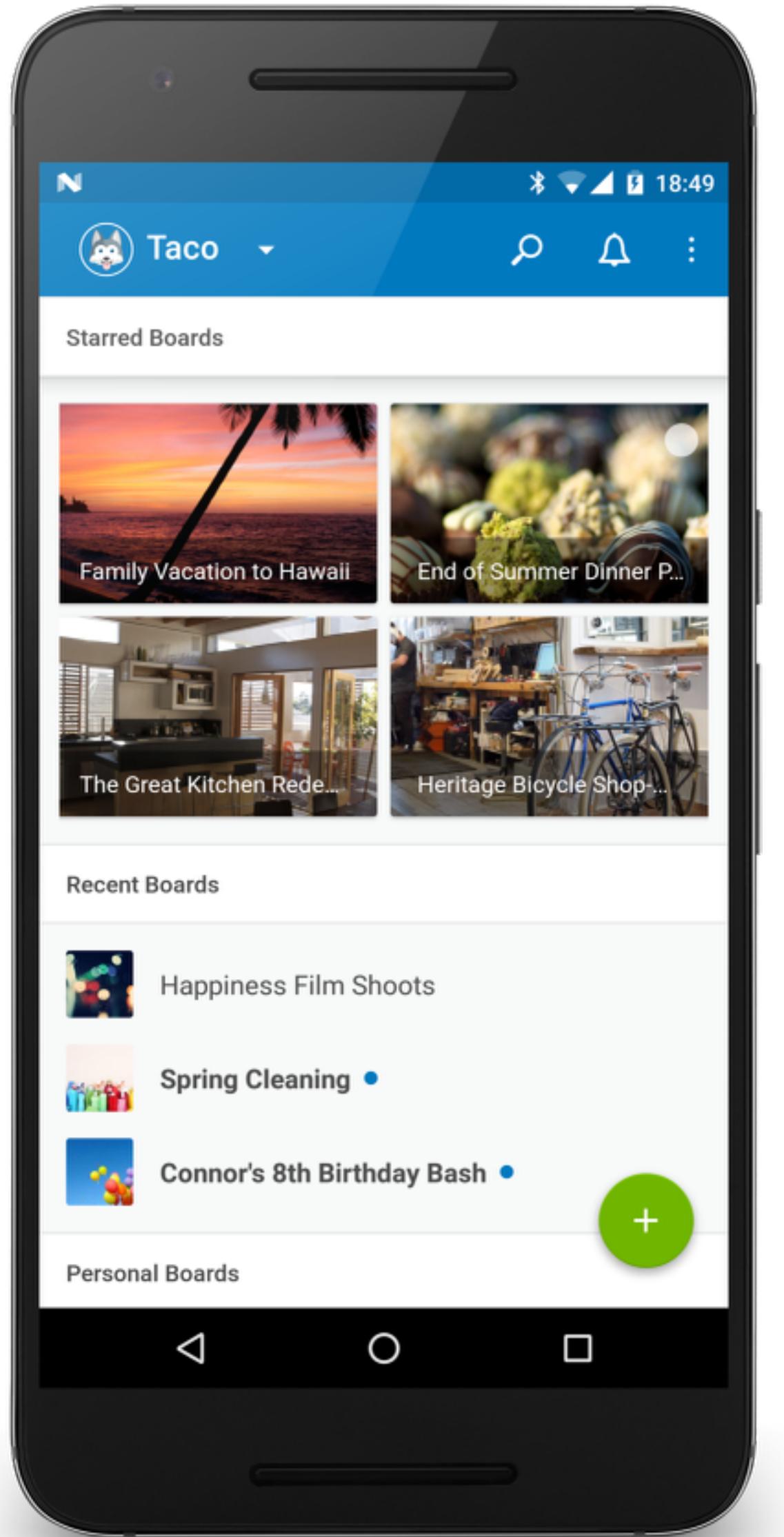
Image: <https://www.flickr.com/photos/mcerasoli/6261957970>



port

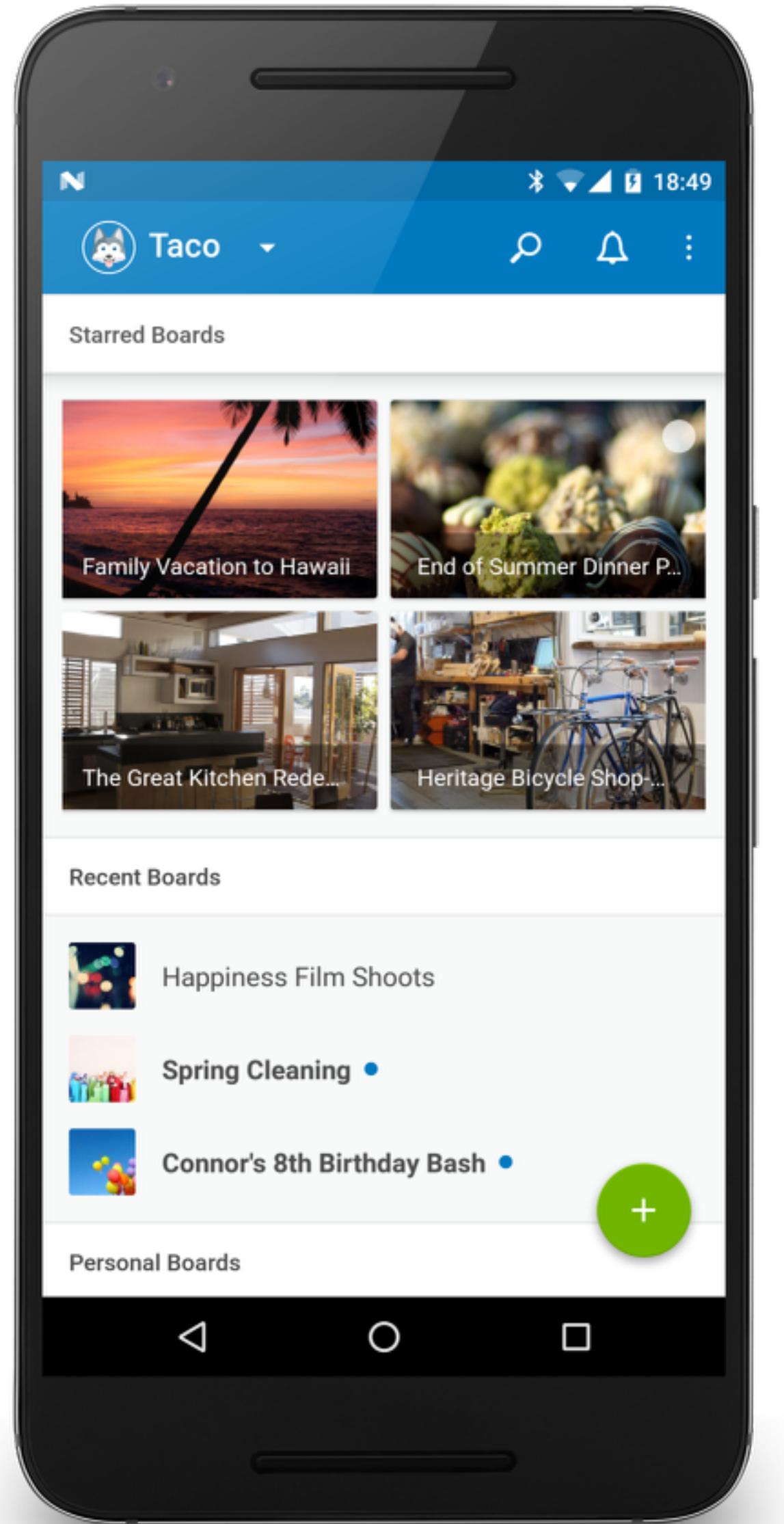


port



h731dp

port

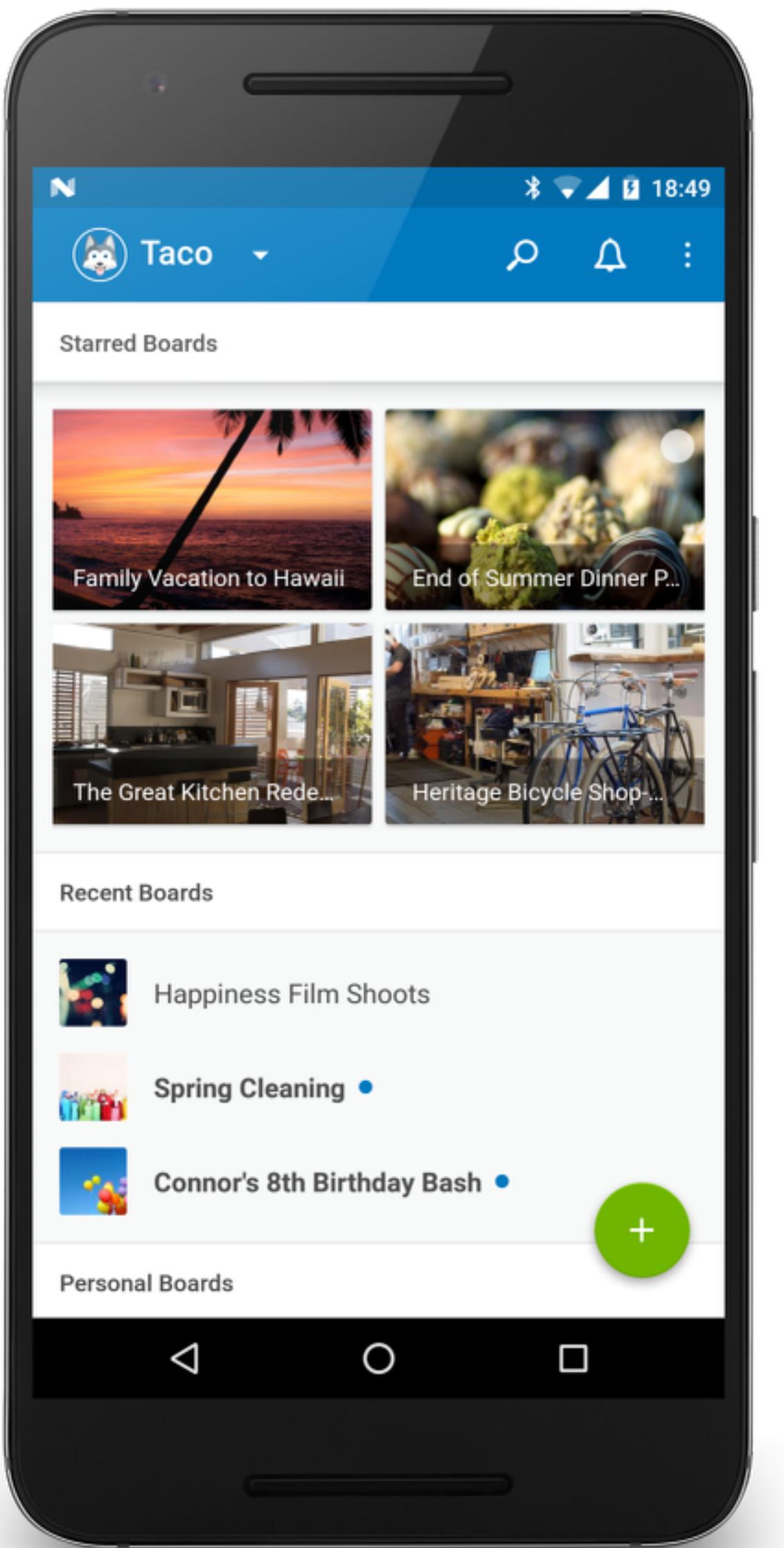


← w411dp →

↑ h731dp ↓

port

xxxhdpi

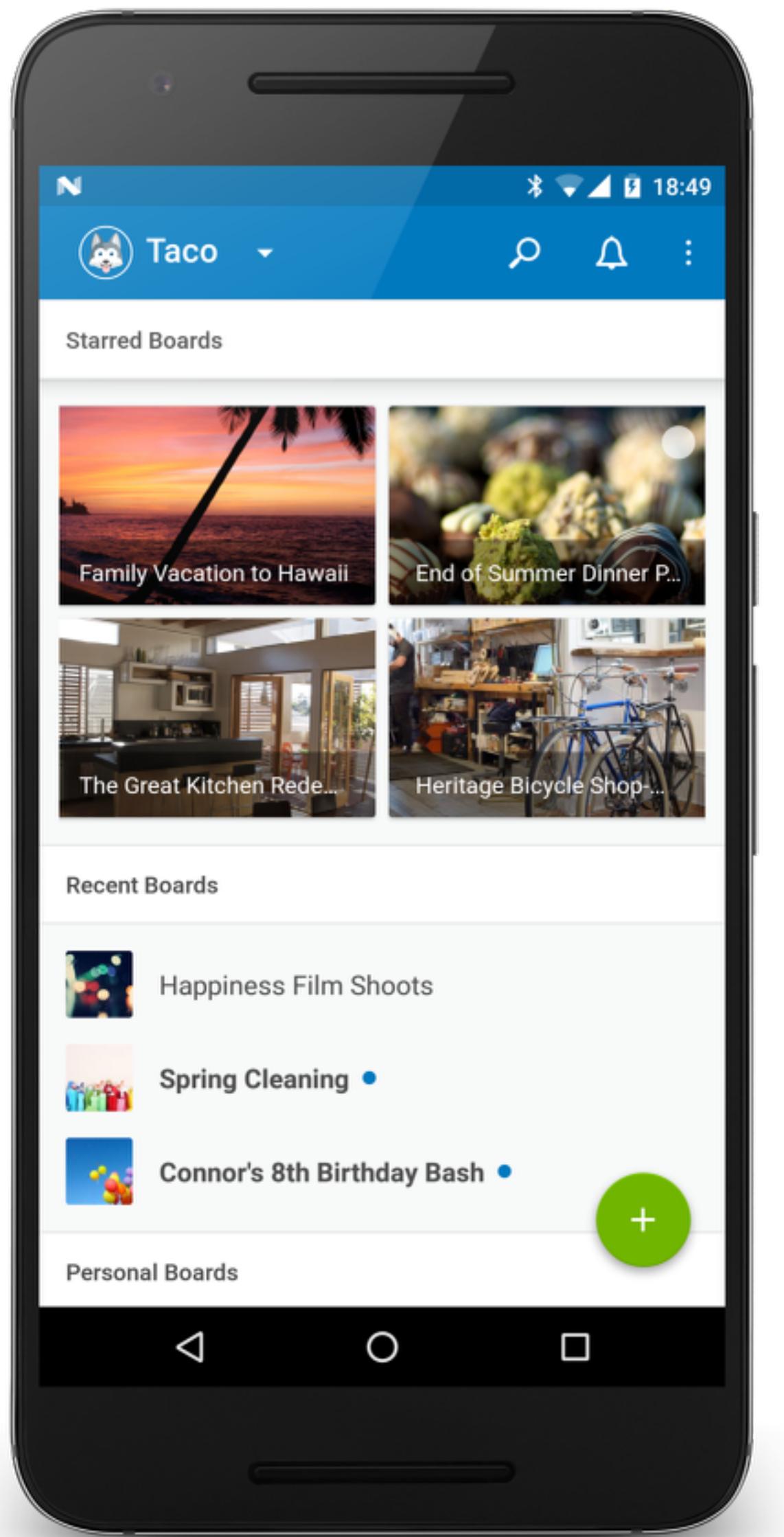


← w411dp →

h731dp

port

xxxhdpi



← w411dp →

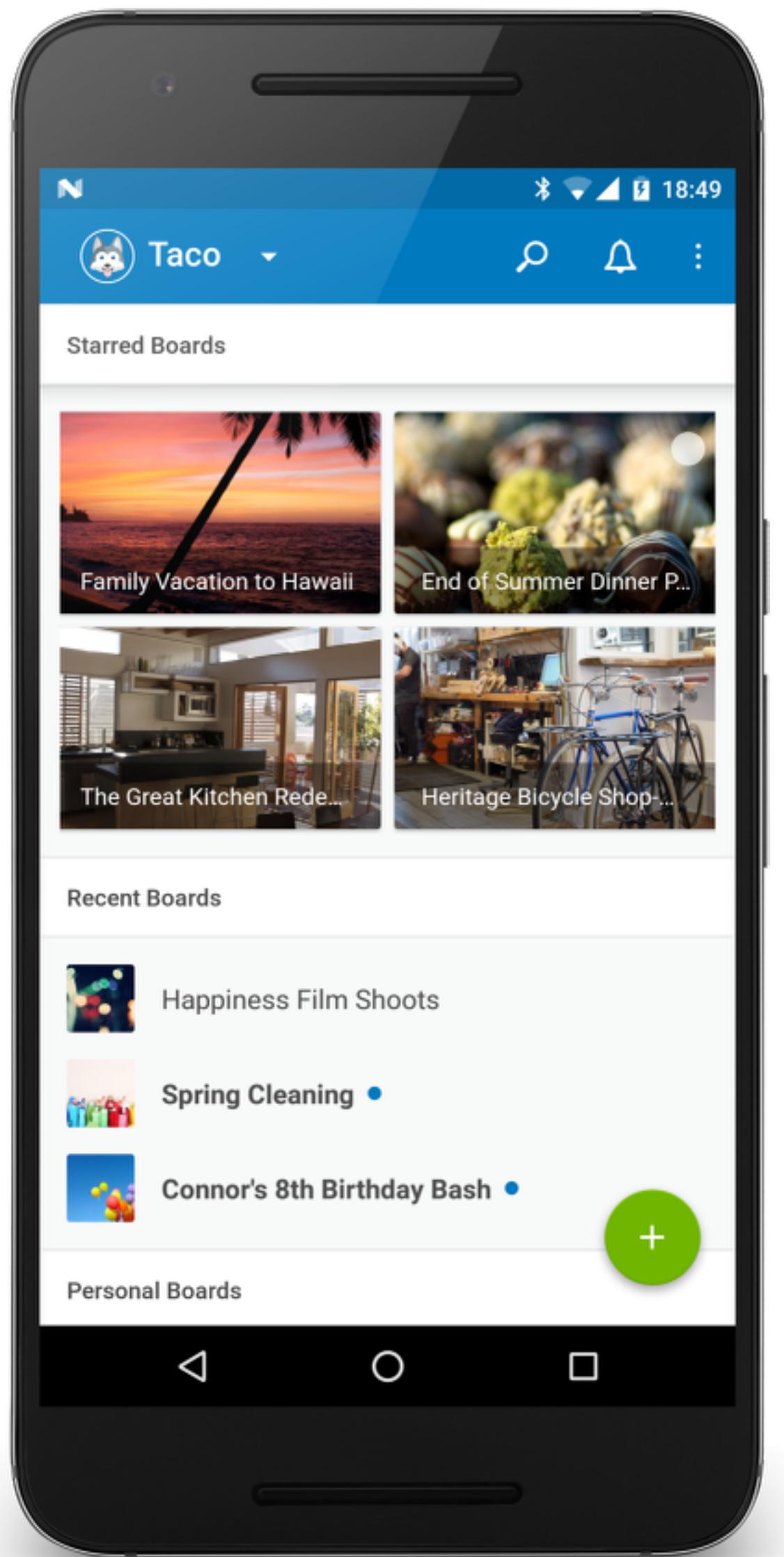
h731dp



en_US

port

xxxhdpi



← w411dp →

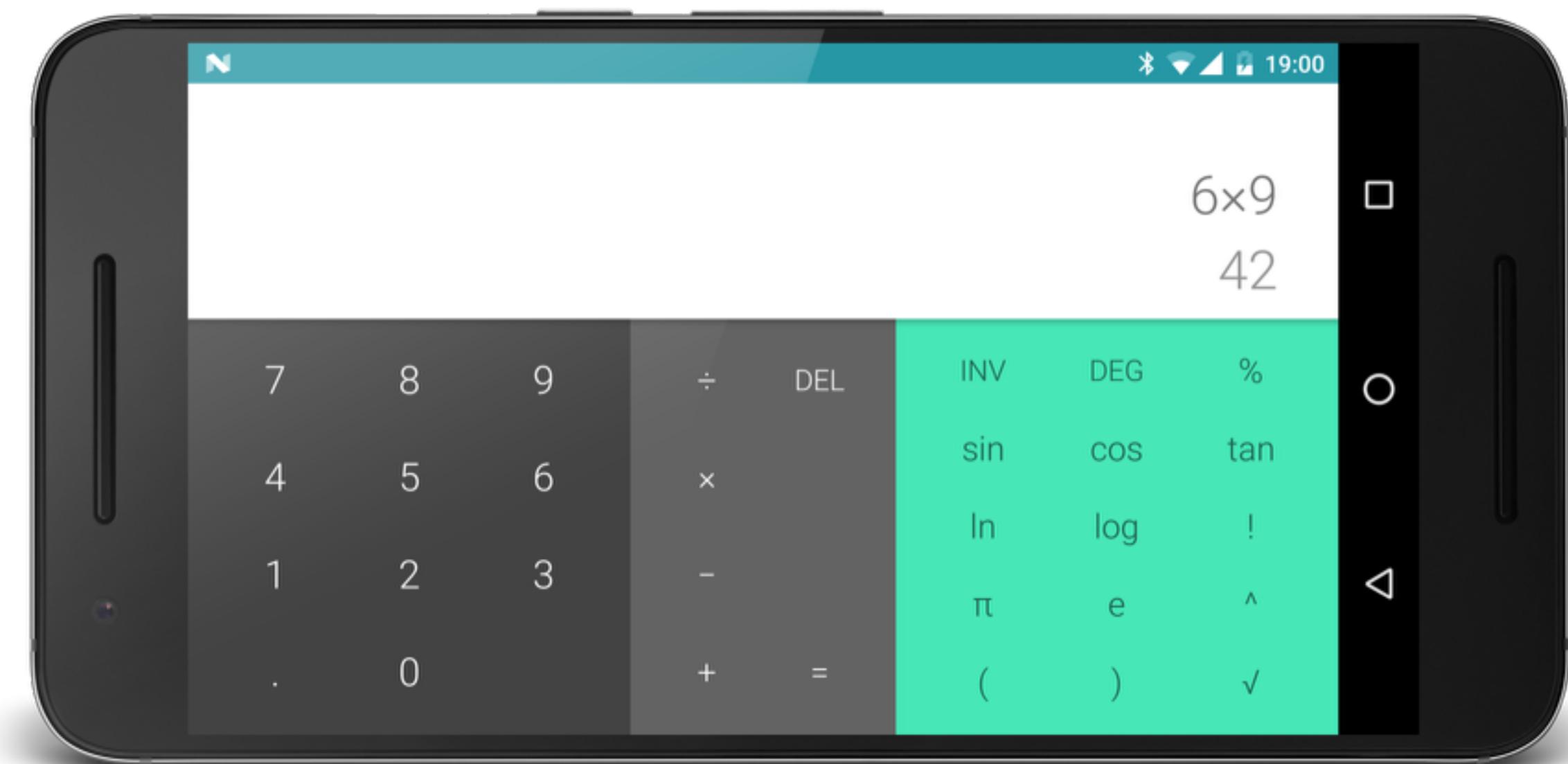
h731dp

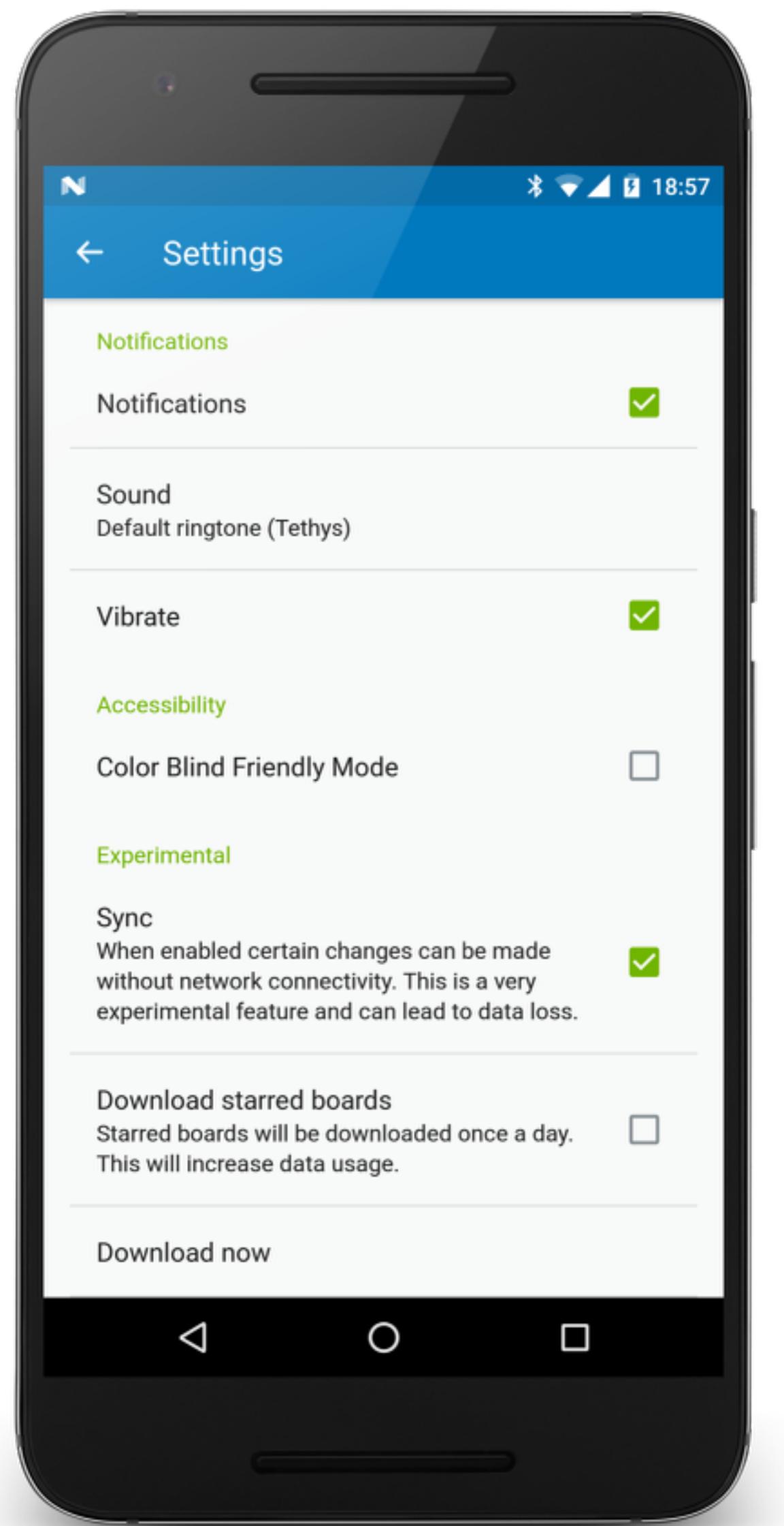


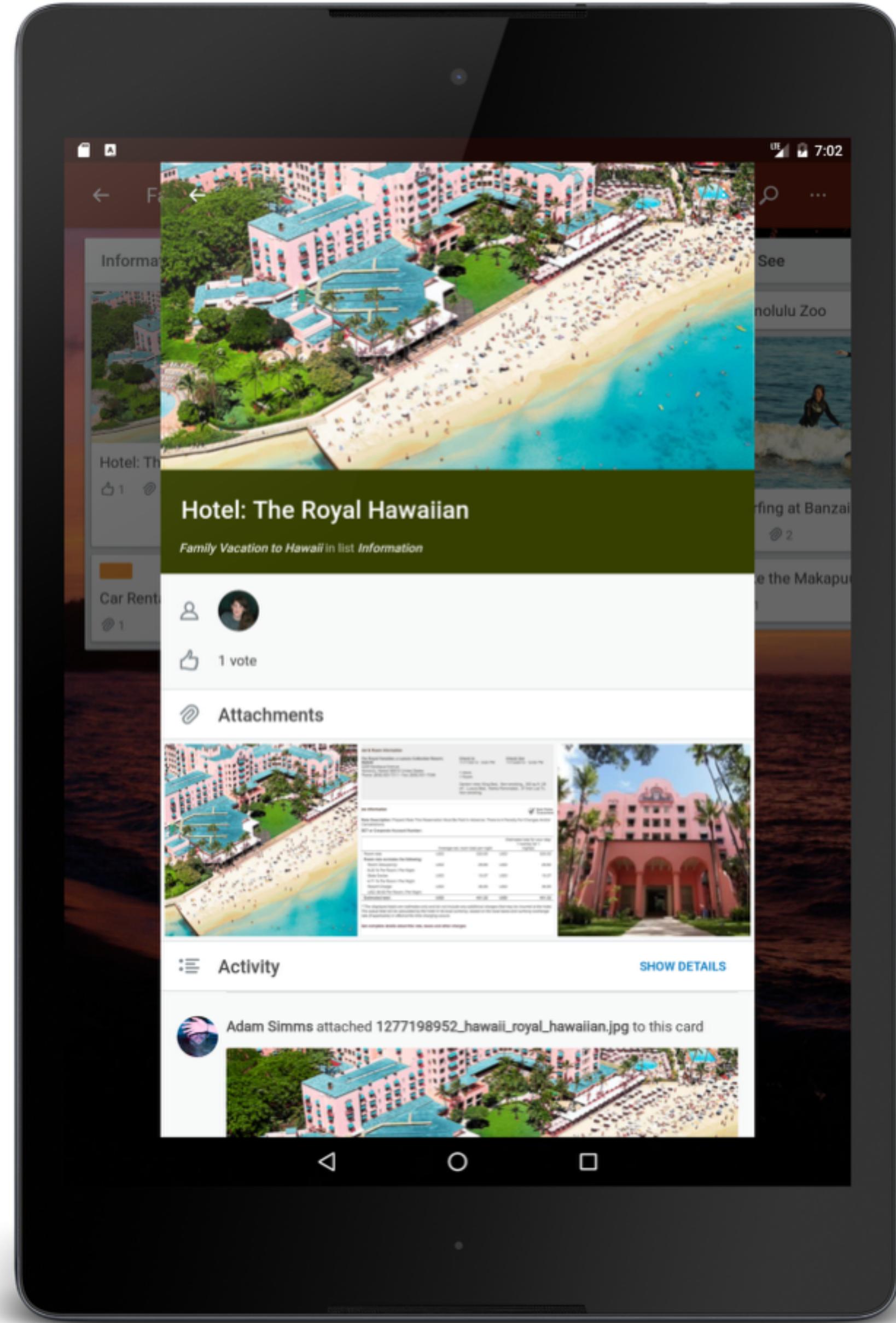
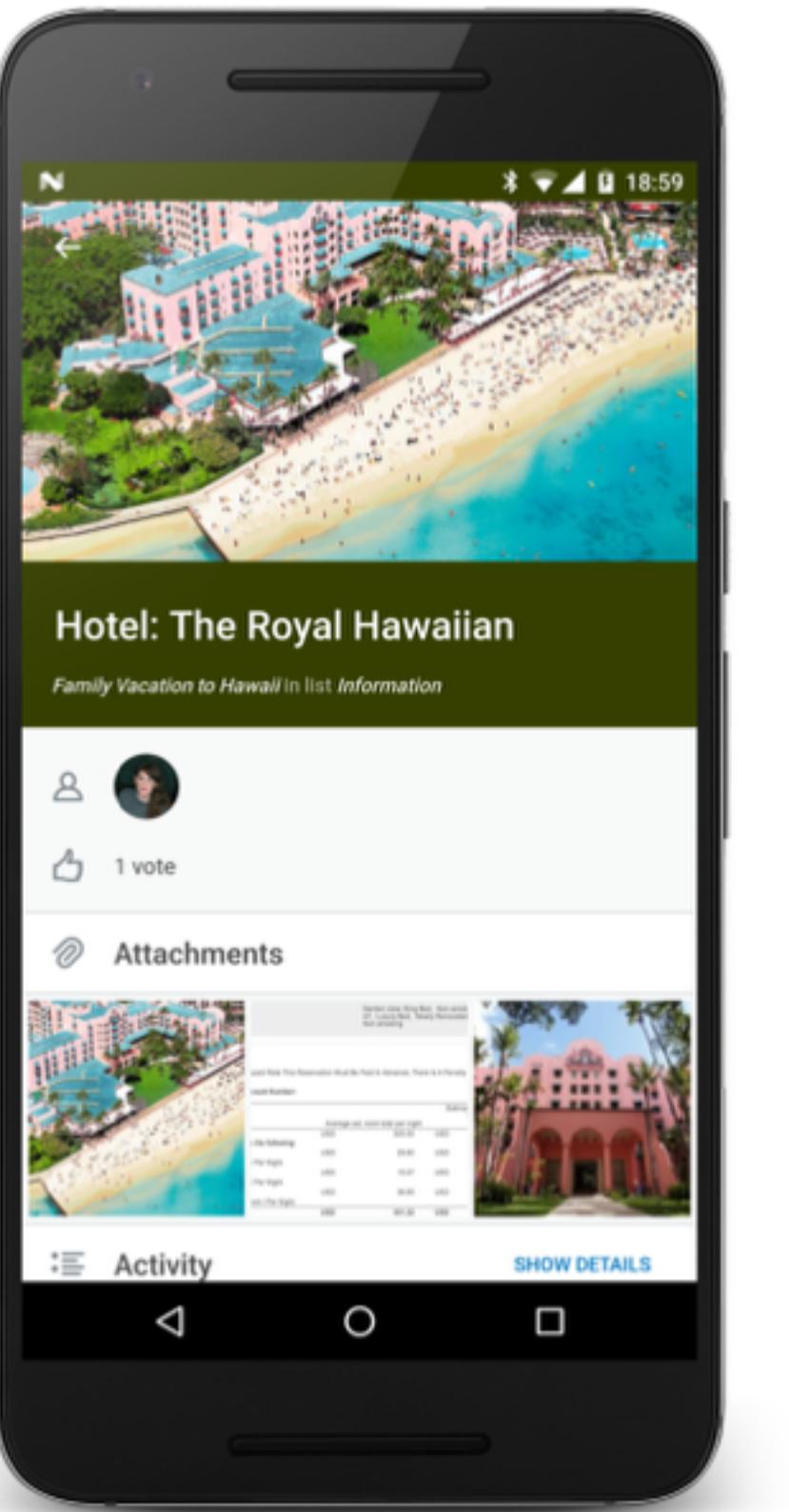
en_US

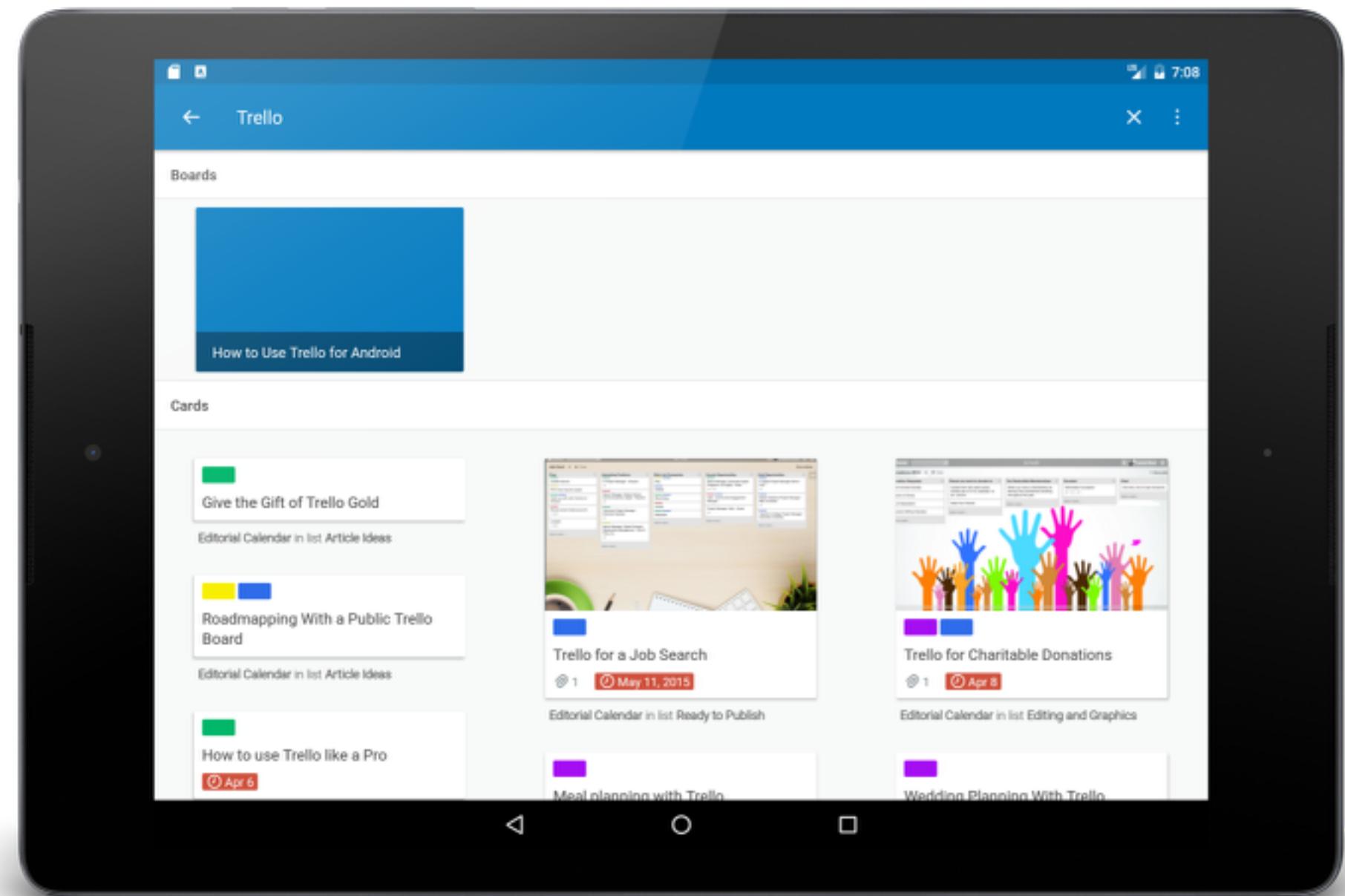
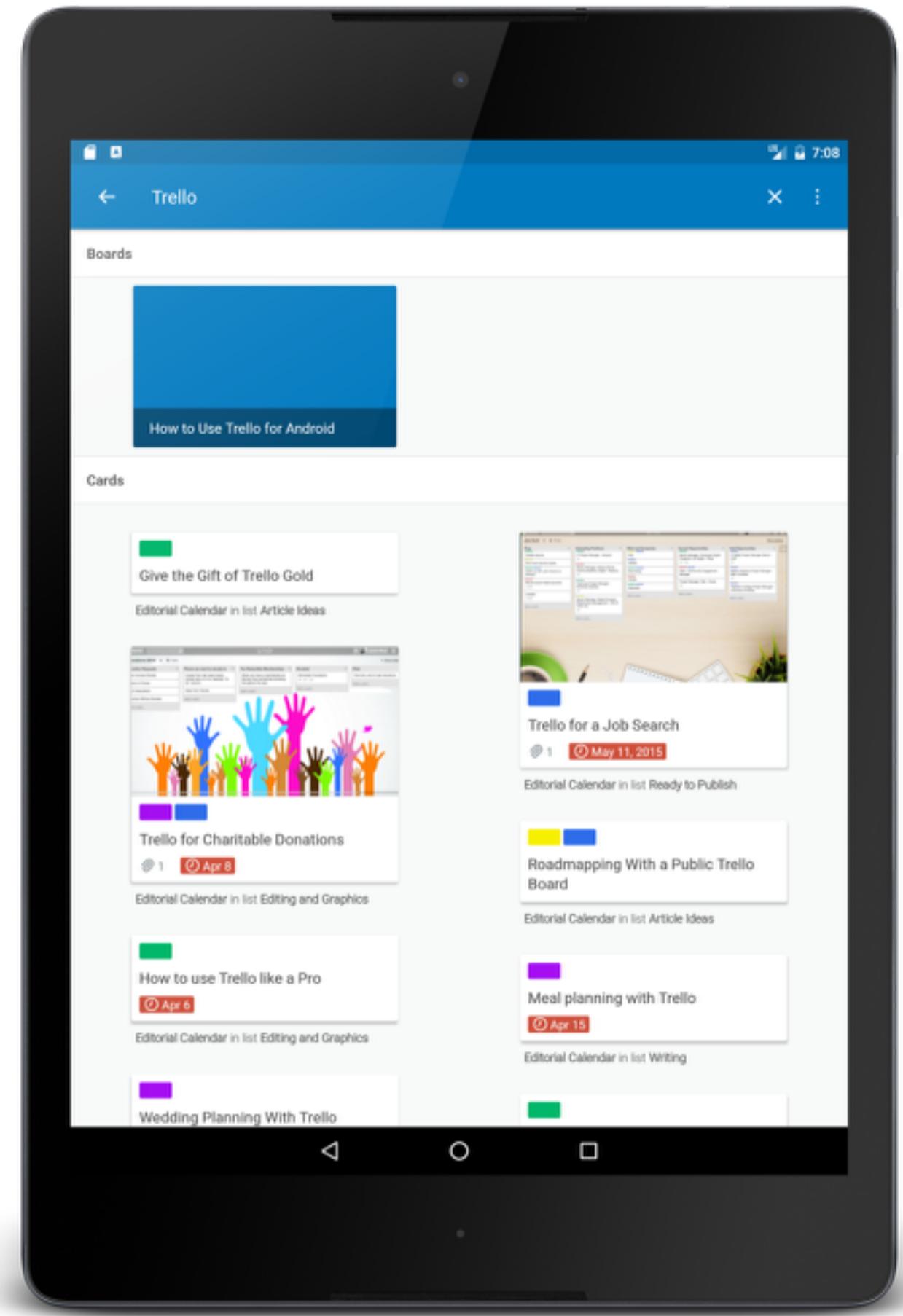
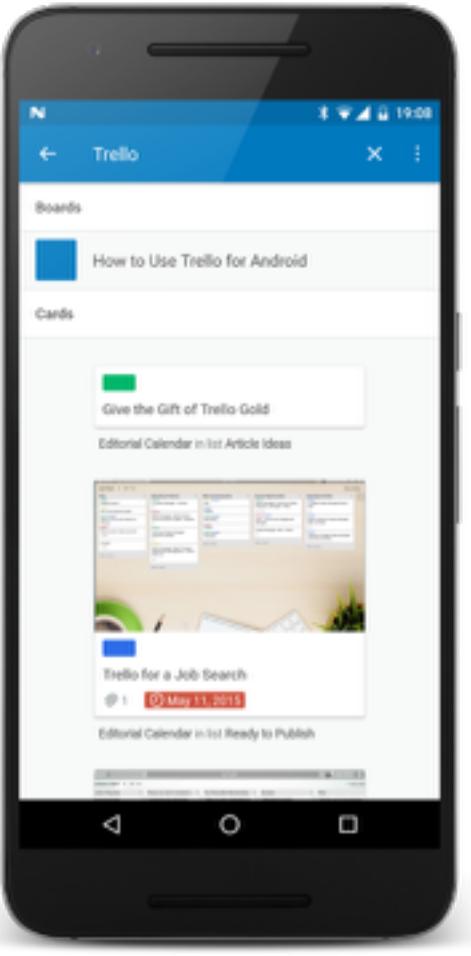


v24









Resource Qualifier System

Resource Qualifier System

- Define alternative resources for device configurations

Resource Qualifier System

- Define alternative resources for device configurations
- Android automatically picks correct resource



 values

►  values

►  drawable-xxxhdpi

- ▶  **values**

- ▶  **drawable-xxxhdpi**

- ▶  **values-sw600dp-port**

values-sw600dp-port

values-sw600dp-port

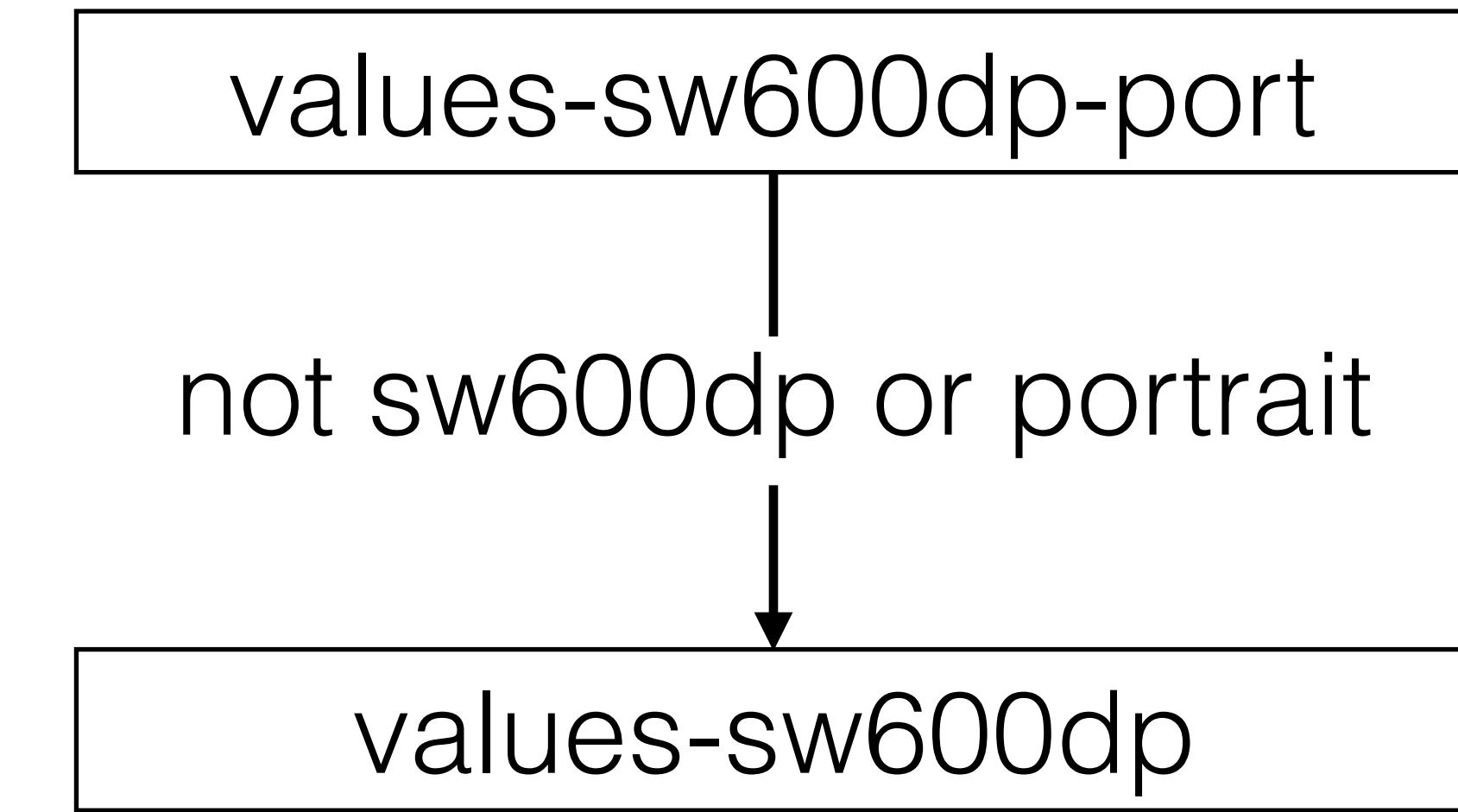
not sw600dp or portrait



values-sw600dp-port

not sw600dp or portrait

values-sw600dp



values-sw600dp-port

not sw600dp or portrait

values-sw600dp

not sw600dp



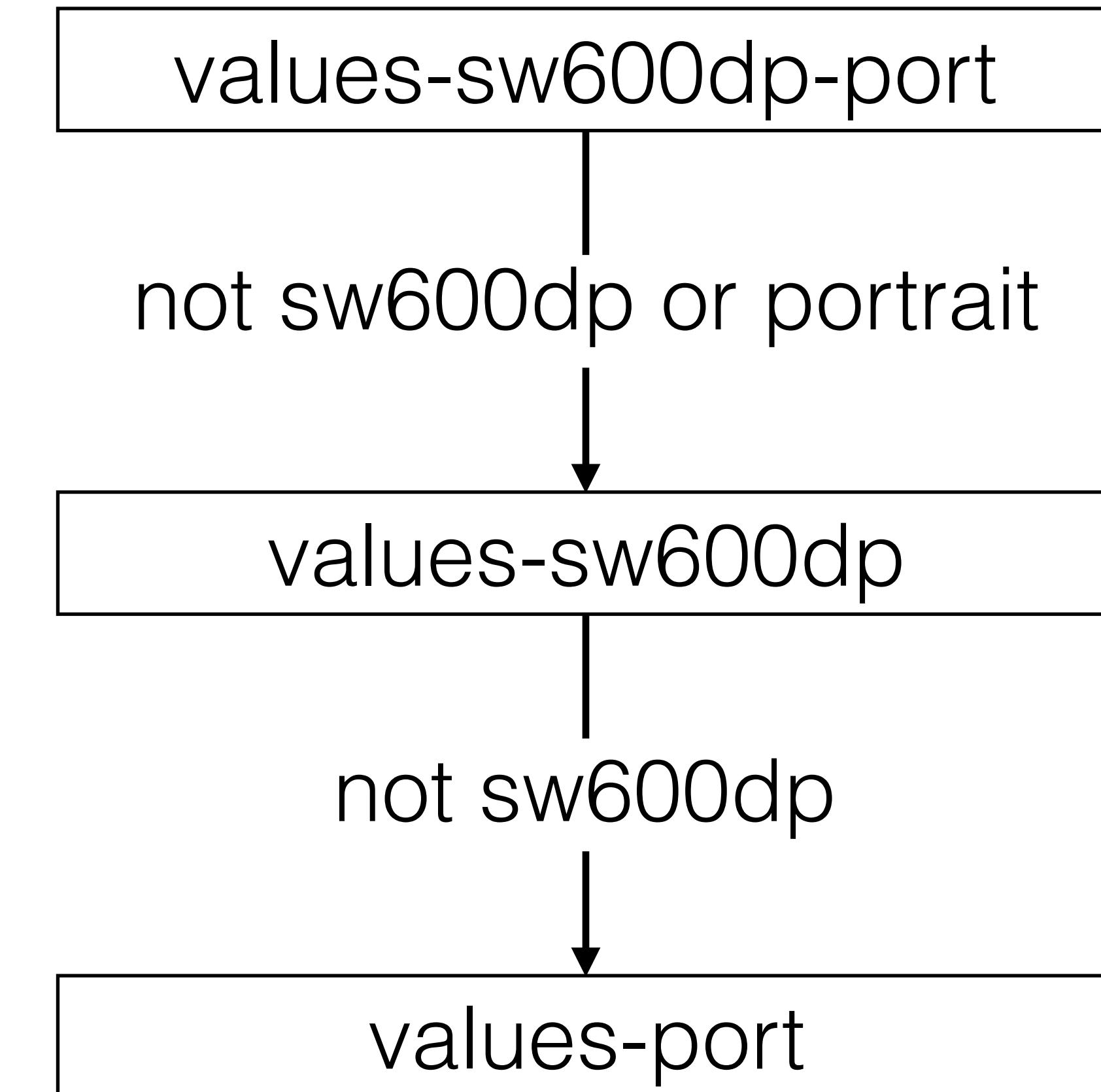
values-sw600dp-port

not sw600dp or portrait

values-sw600dp

not sw600dp

values-port



values-sw600dp-port

not sw600dp or portrait

values-sw600dp

not sw600dp

values-port

not portrait

values-sw600dp-port

not sw600dp or portrait

values-sw600dp

not sw600dp

values-port

not portrait

values

Resources as code

Resources as code

- Resource == parameter

Resources as code

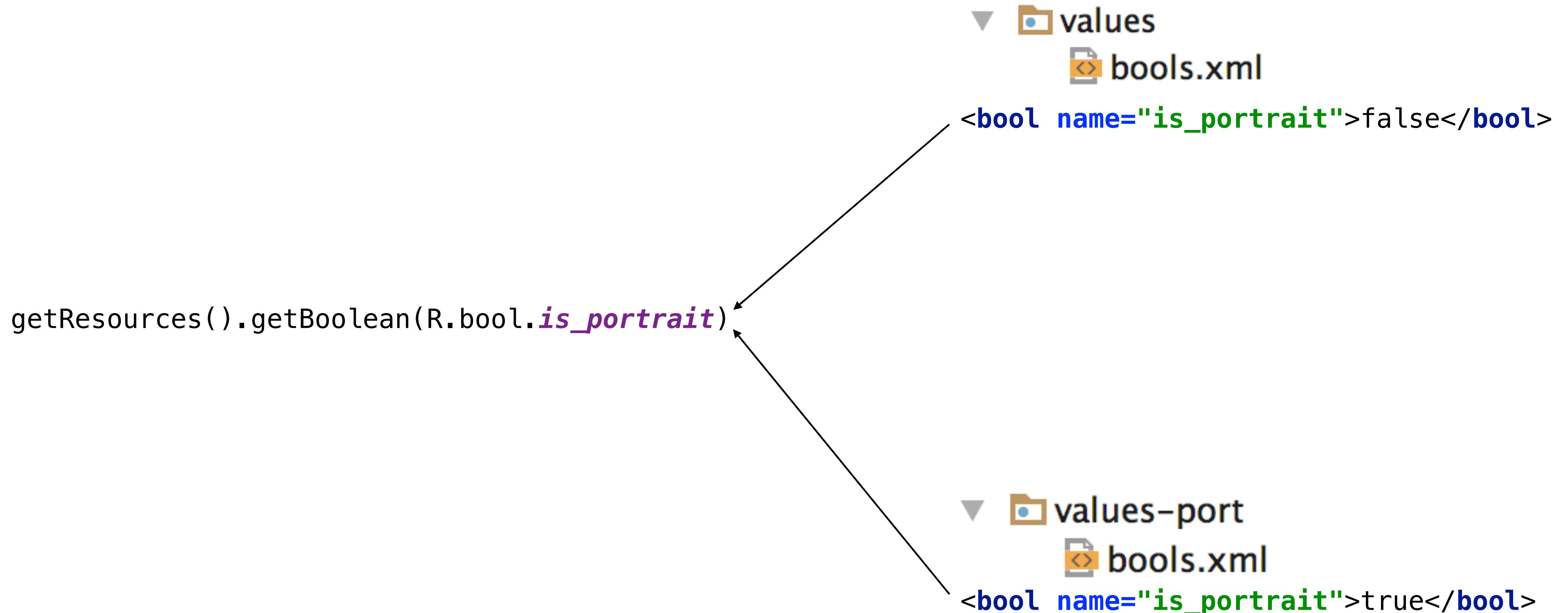
- Resource == parameter
- Parameter <-- device configuration

```
int square() {  
    return 8 * 8;  
}
```

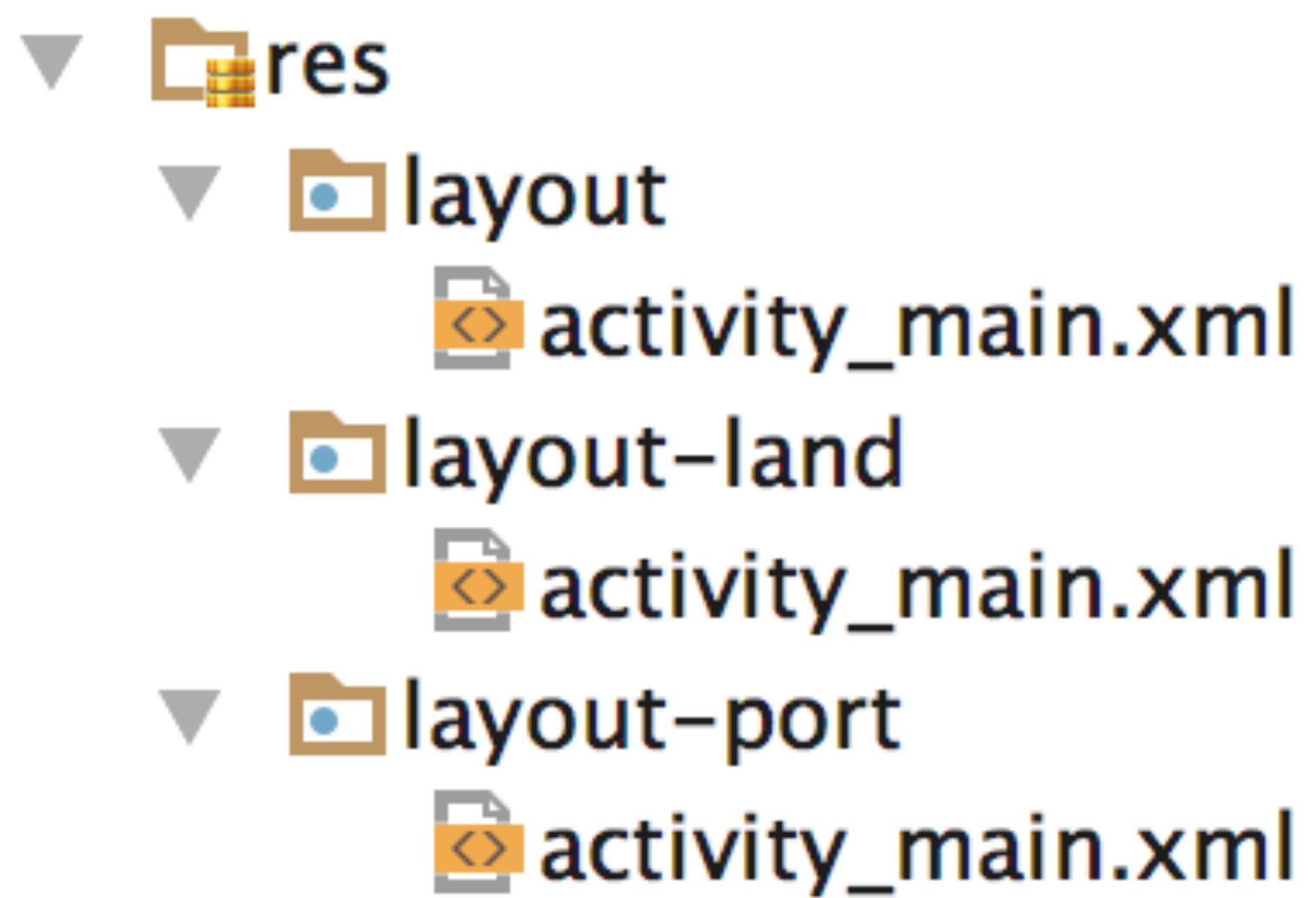
VS

```
int squareLarge() {  
    return 16 * 16;  
}
```

```
int square(int num) {  
    return num * num;  
}
```



```
setContentView(R.layout.activity_main)
```



```
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    >

    <!-- ... -->

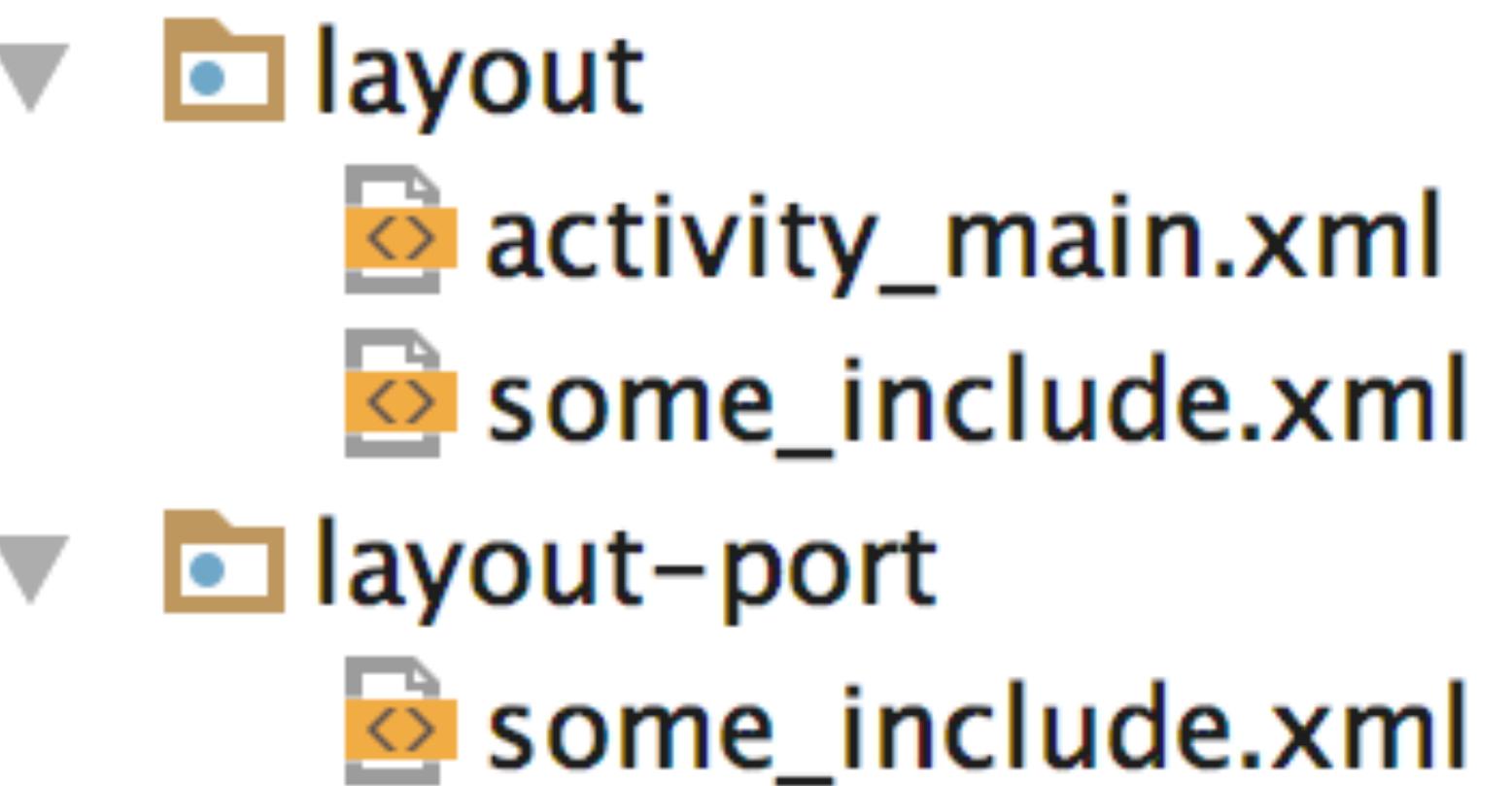
    <include layout="@layout/some_include" />

    <!-- ... -->

</LinearLayout>
```

```
<LinearLayout  
    xmlns:android="http://schemas.android.com/apk/res/android"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
    >  
  
    <!-- ... -->  
  
    <b><include layout="@layout/some_include" />  
    <!-- ... -->  
  
</LinearLayout>
```

```
<LinearLayout  
    xmlns:android="http://schemas.android.com/apk/res/android"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent"  
    >  
    <!-- ... -->  
    <include layout="@layout/some_include" />  
    <!-- ... -->  
</LinearLayout>
```



▼ layout

some_include.xml

<TextView

```
    android:layout_width="wrap_content"
    android:layout_height="match_parent"
    android:textSize="16sp"
    android:textColor="#FF00FF"
    />
```

▼ layout-sw600dp

some_include.xml

<TextView

```
    android:layout_width="wrap_content"
    android:layout_height="match_parent"
    android:textSize="24sp"
    android:textColor="#FF00FF"
    />
```

▼ layout

some_include.xml

```
<TextView  
    android:layout_width="wrap_content"  
    android:layout_height="match_parent"  
    android:textSize="16sp"  
    android:textColor="#FF00FF"  
/>
```

▼ layout-sw600dp

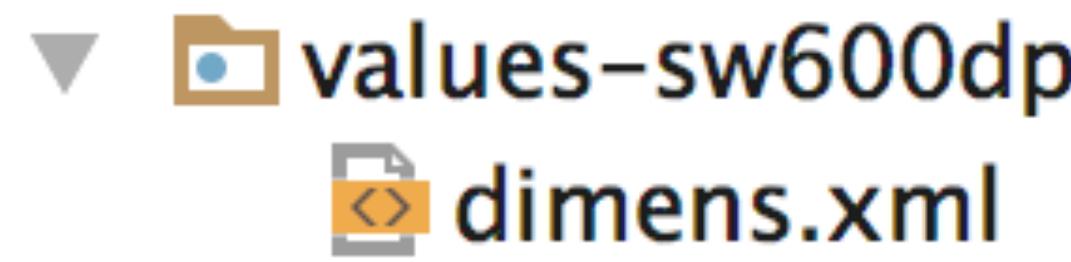
some_include.xml

```
<TextView  
    android:layout_width="wrap_content"  
    android:layout_height="match_parent"  
    android:textSize="24sp"  
    android:textColor="#FF00FF"  
/>
```

```
<TextView  
    android:layout_width="wrap_content"  
    android:layout_height="match_parent"  
    android:textSize="@dimen/welcome_text_size"  
    android:textColor="#FF00FF"  
/>
```



```
<dimen name="welcome_text_size">16sp</dimen>
```



```
<dimen name="welcome_text_size">24sp</dimen>
```

▼  values



```
<style name="WelcomeText" parent="TextAppearance.AppCompat">
    <item name="android:textSize">16sp</item>
    <item name="android:textColor">#FF00FF</item>
</style>
```

▼  values-sw600dp



```
<style name="WelcomeText" parent="TextAppearance.AppCompat">
    <item name="android:textSize">24sp</item>
    <item name="android:textColor">#FF00FF</item>
</style>
```

▼  values

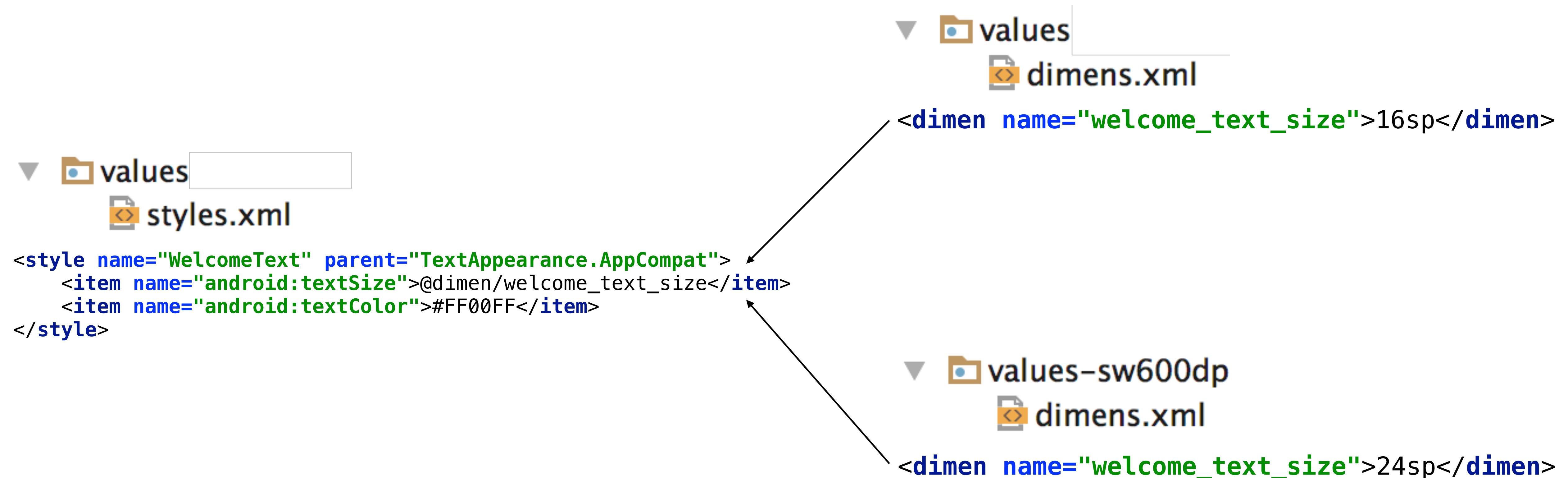


```
<style name="WelcomeText" parent="TextAppearance.AppCompat">
    <item name="android:textSize">16sp</item>
    <item name="android:textColor">#FF00FF</item>
</style>
```

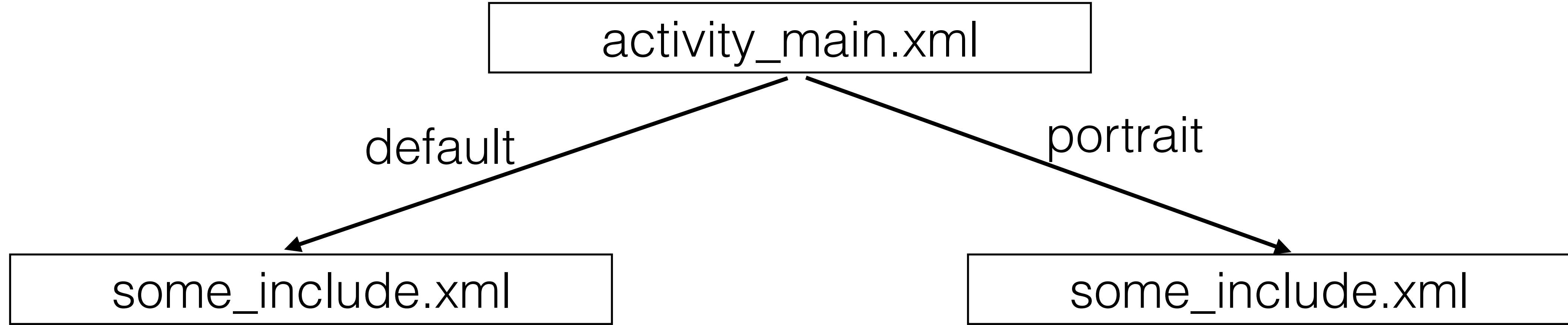
▼  values-sw600dp

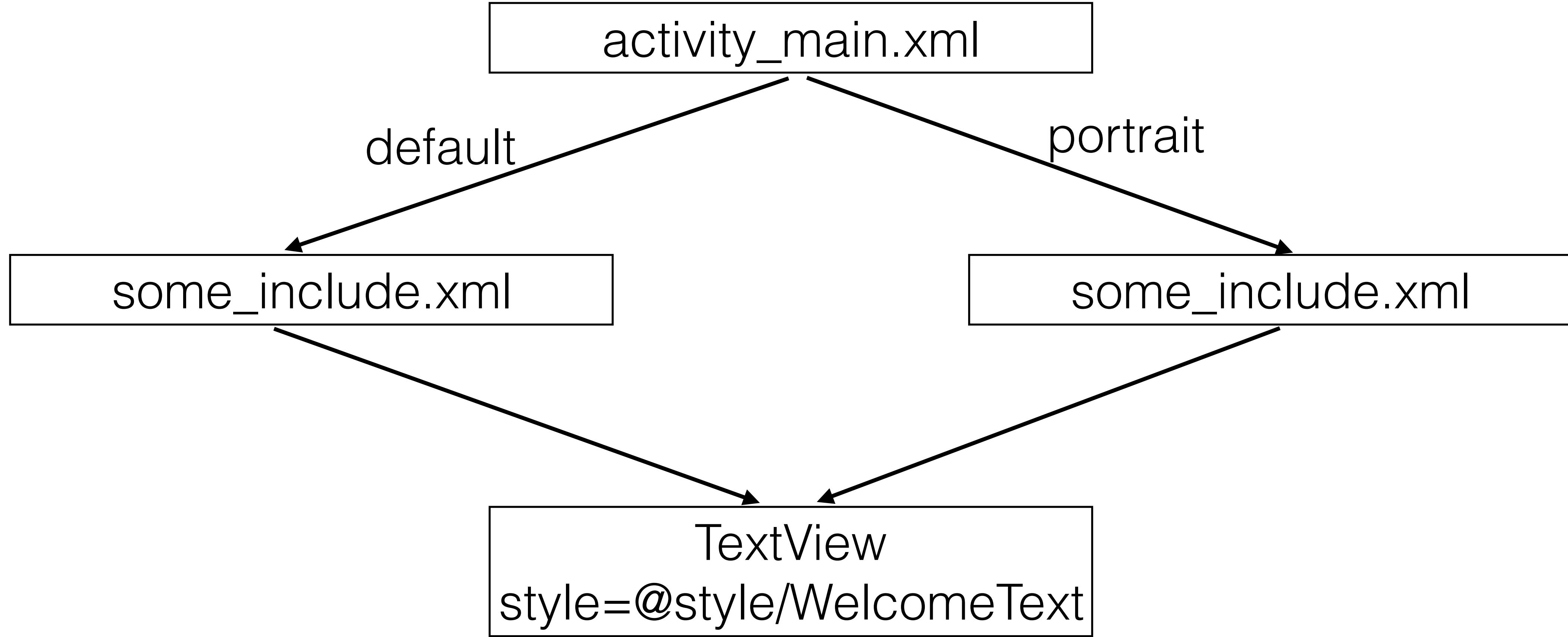


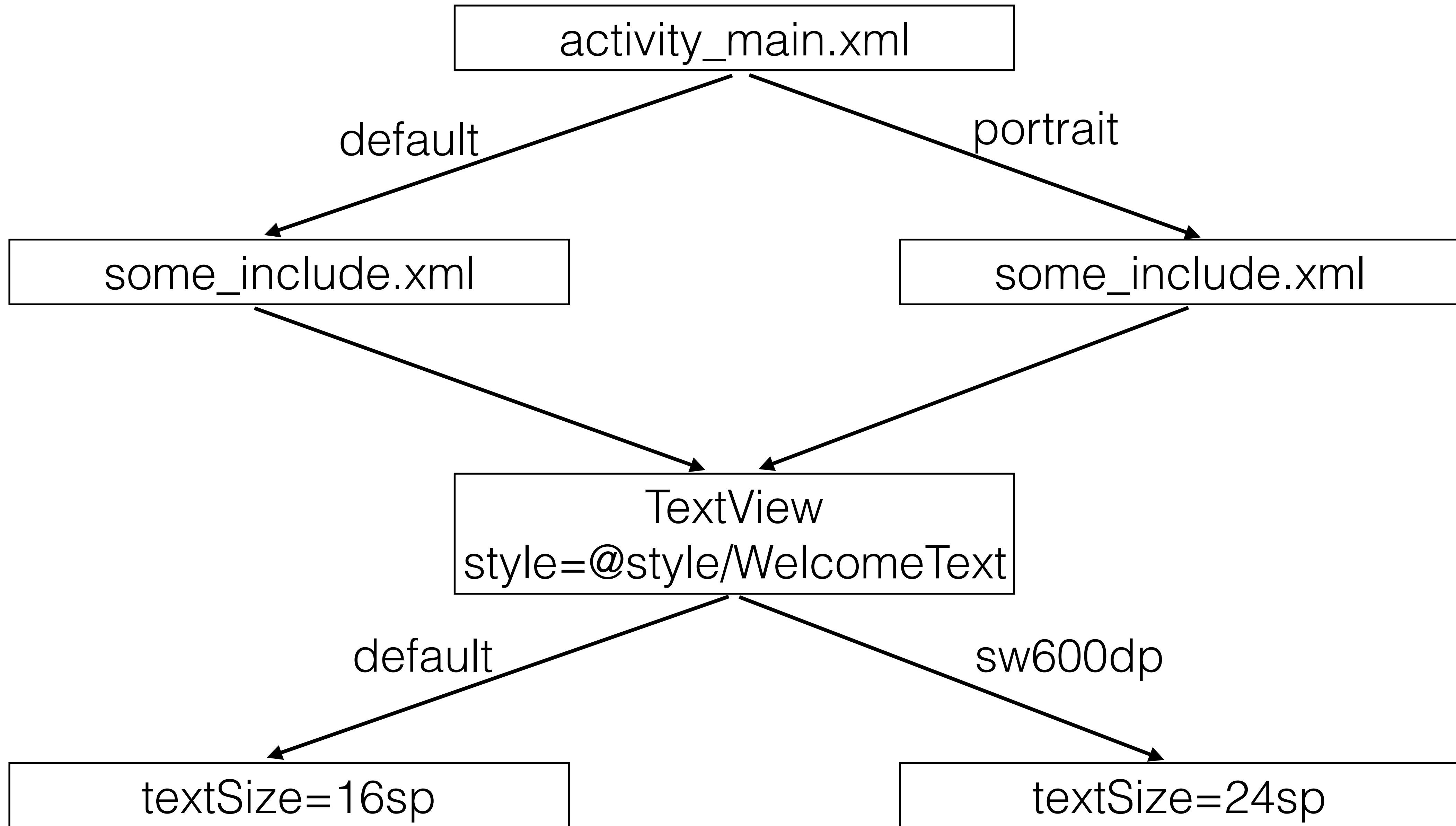
```
<style name="WelcomeText" parent="TextAppearance.AppCompat">
    <item name="android:textSize">24sp</item>
    <item name="android:textColor">#FF00FF</item>
</style>
```



activity_main.xml









Drawables

Image: <https://www.flickr.com/photos/suckamc/3047183157>

Design

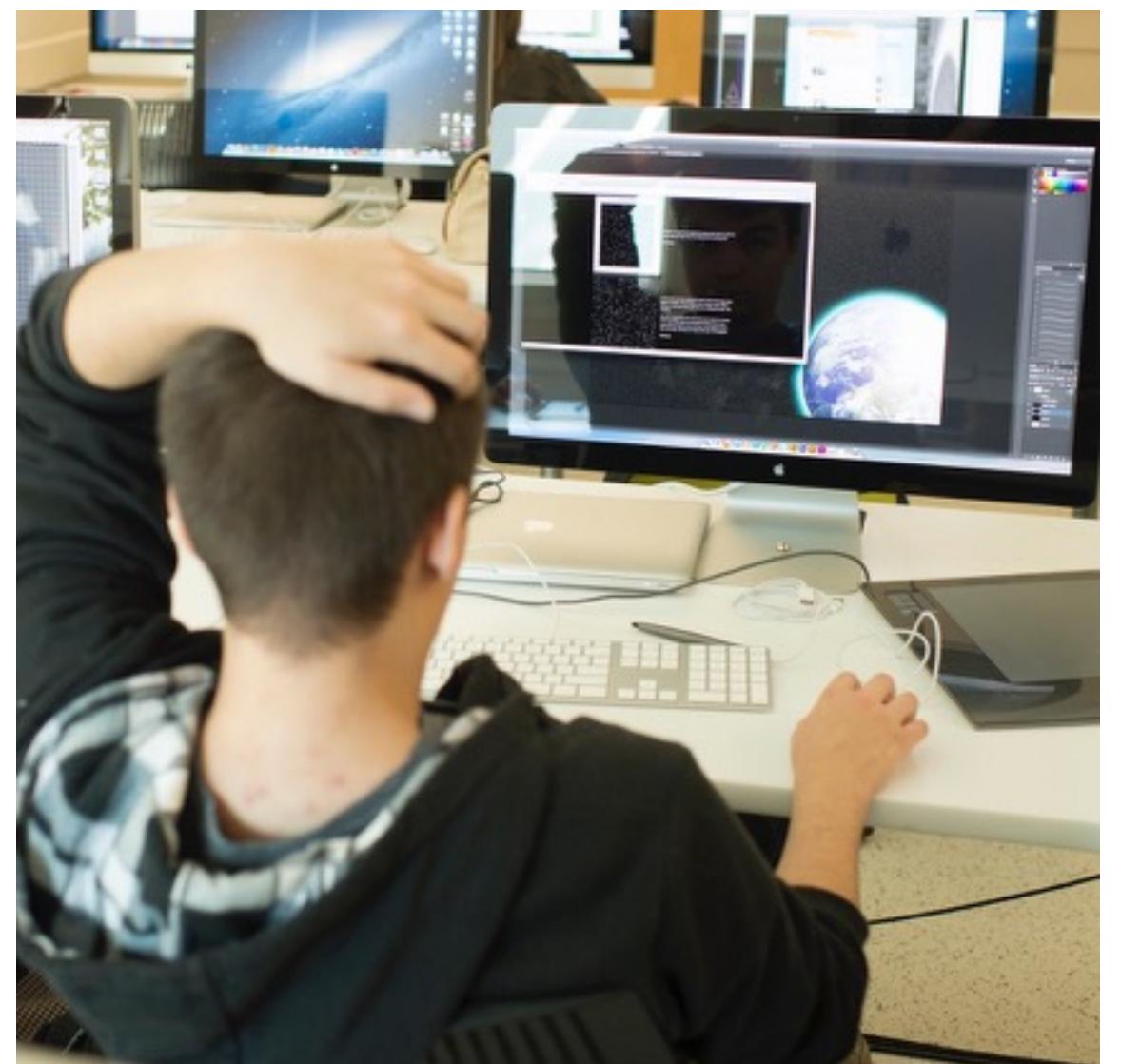


Image: <https://www.flickr.com/photos/ufv/8042499199>

Design

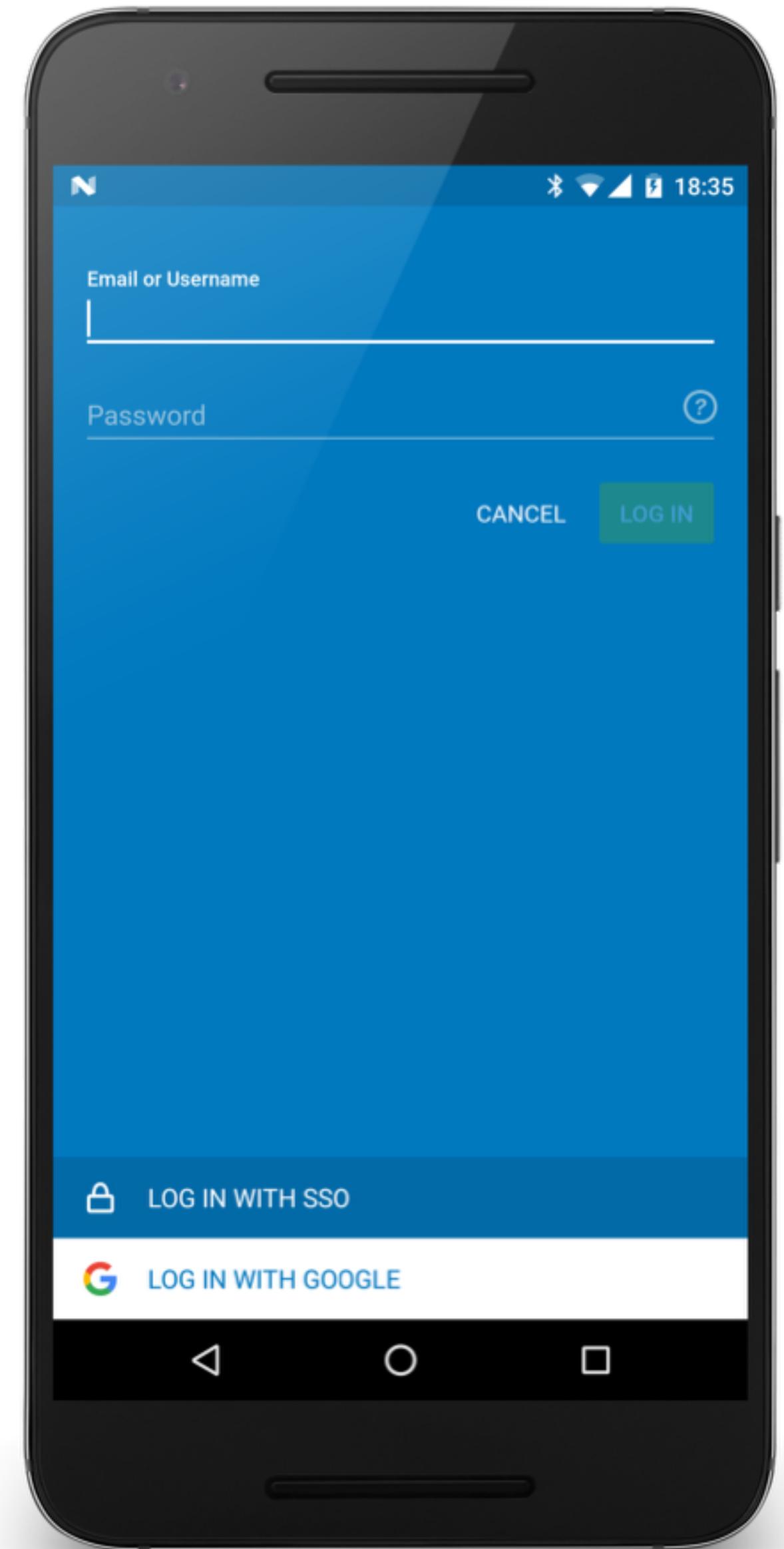
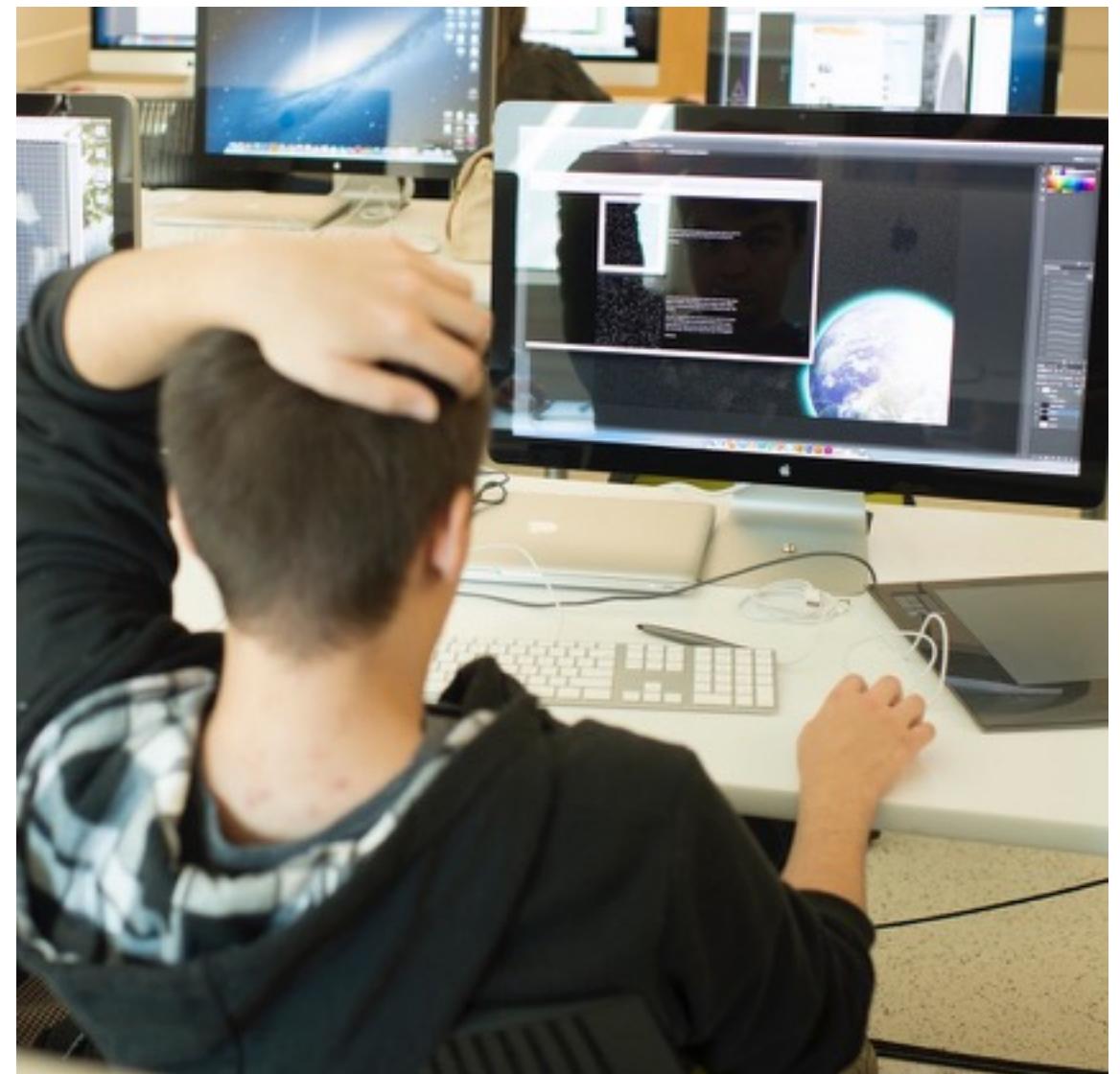
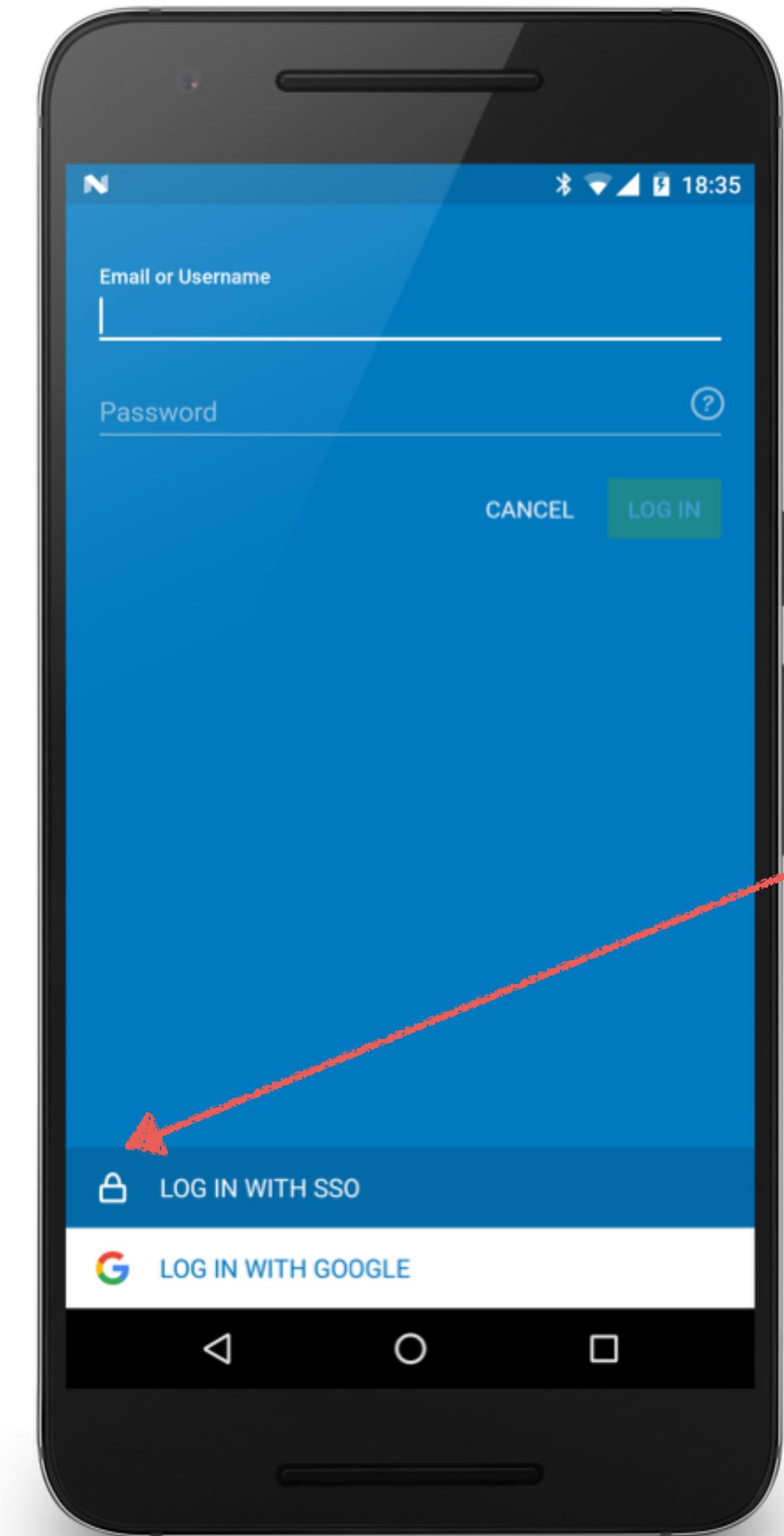
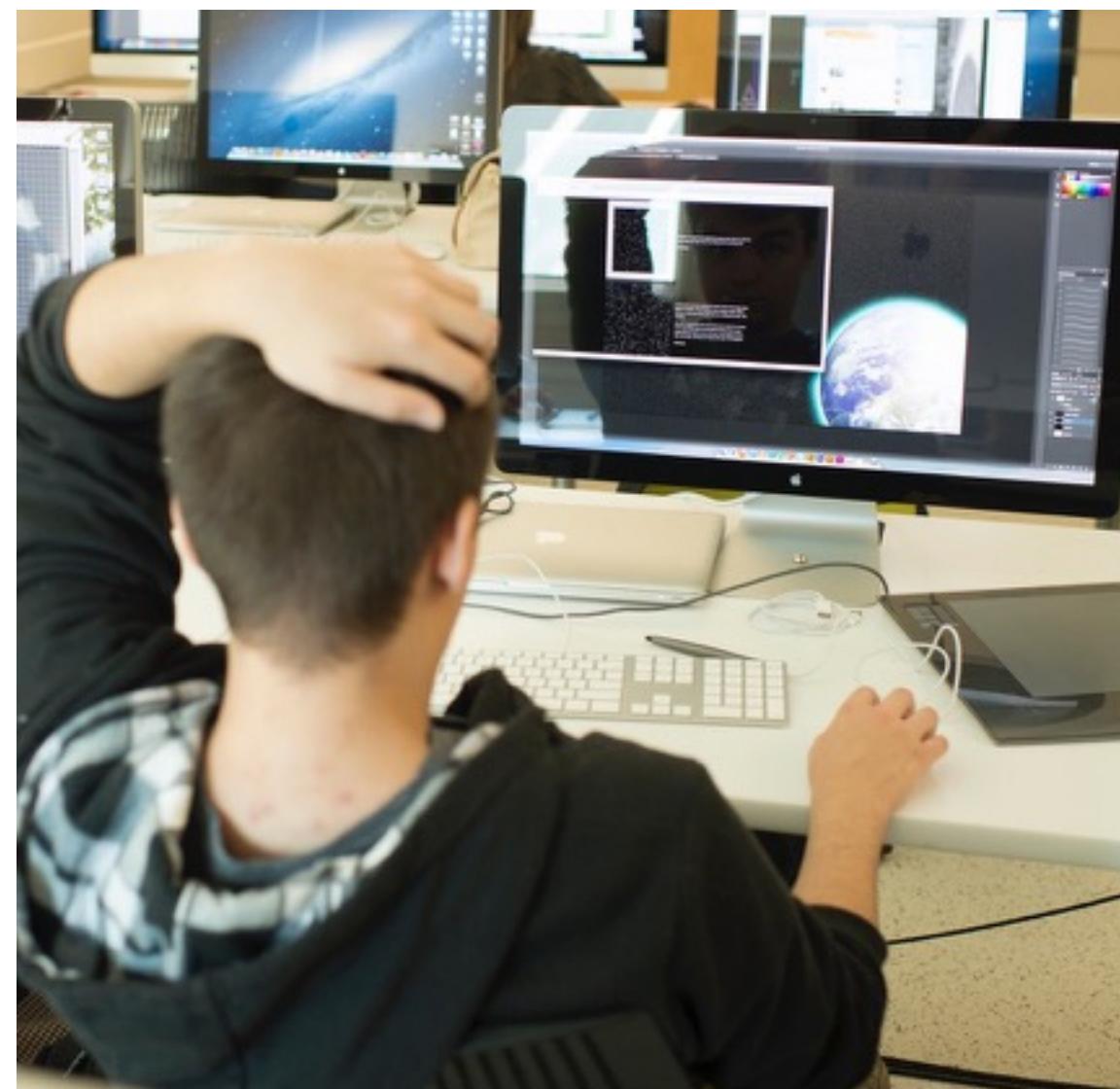


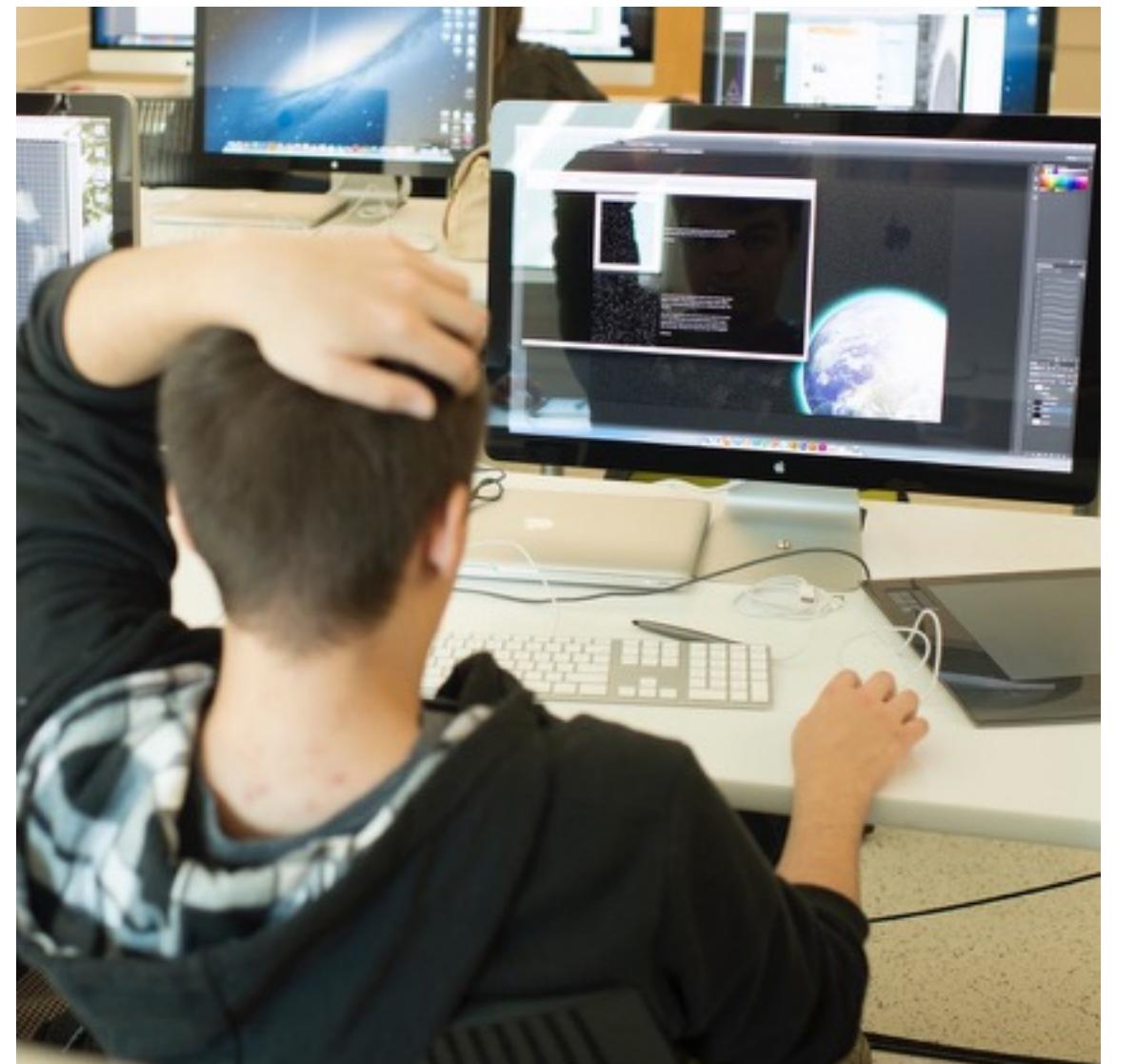
Image: <https://www.flickr.com/photos/ufv/8042499199>

Design



“I need this”

Design



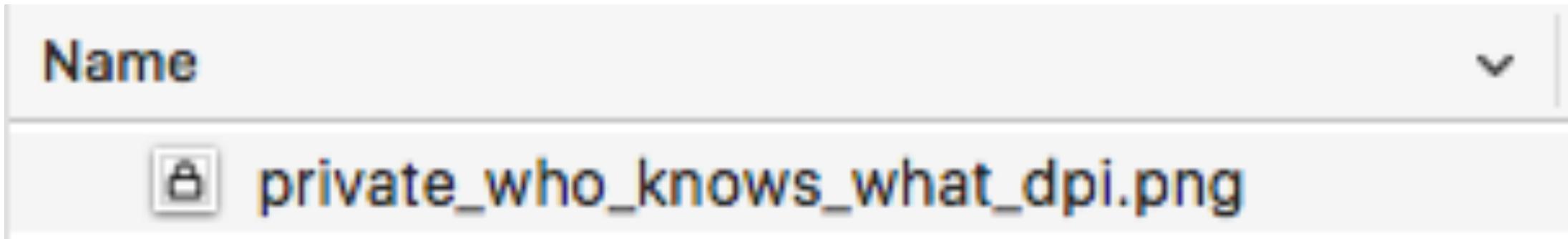
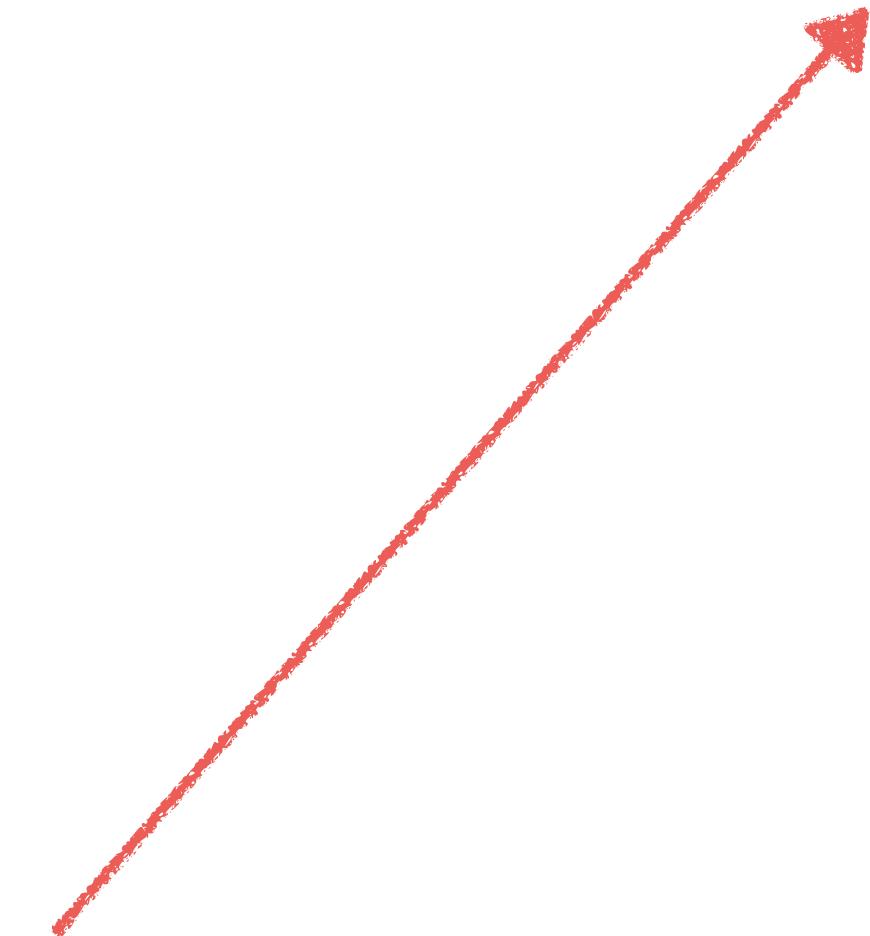
Design



Name

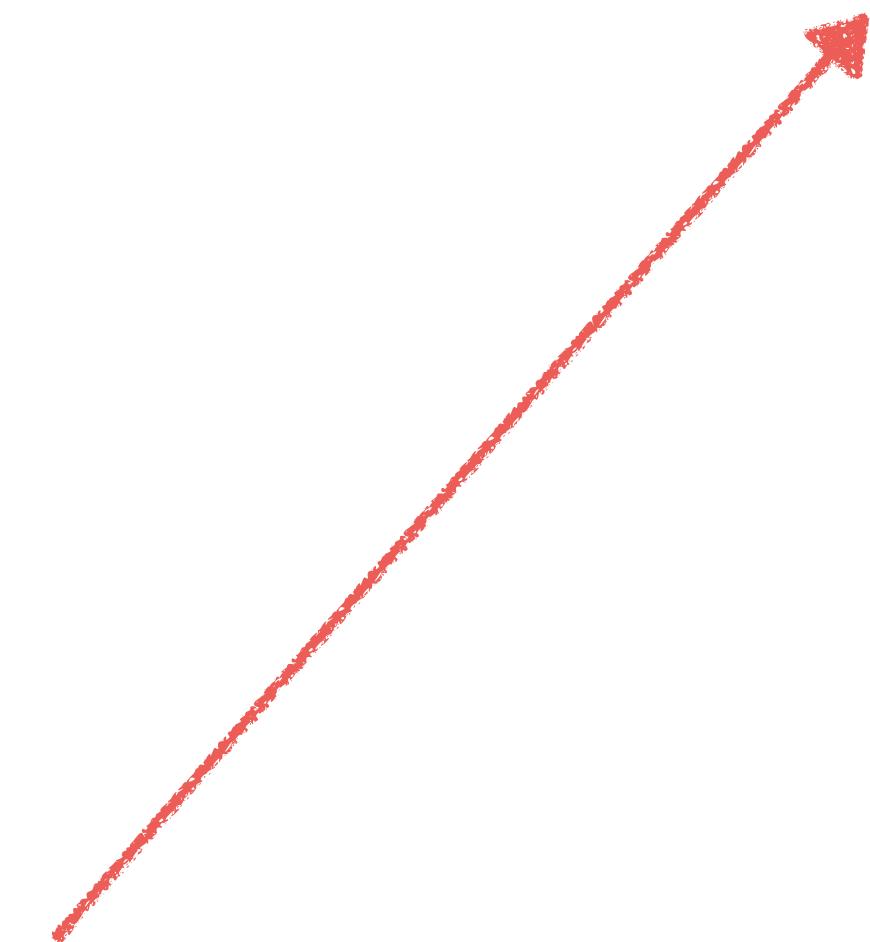
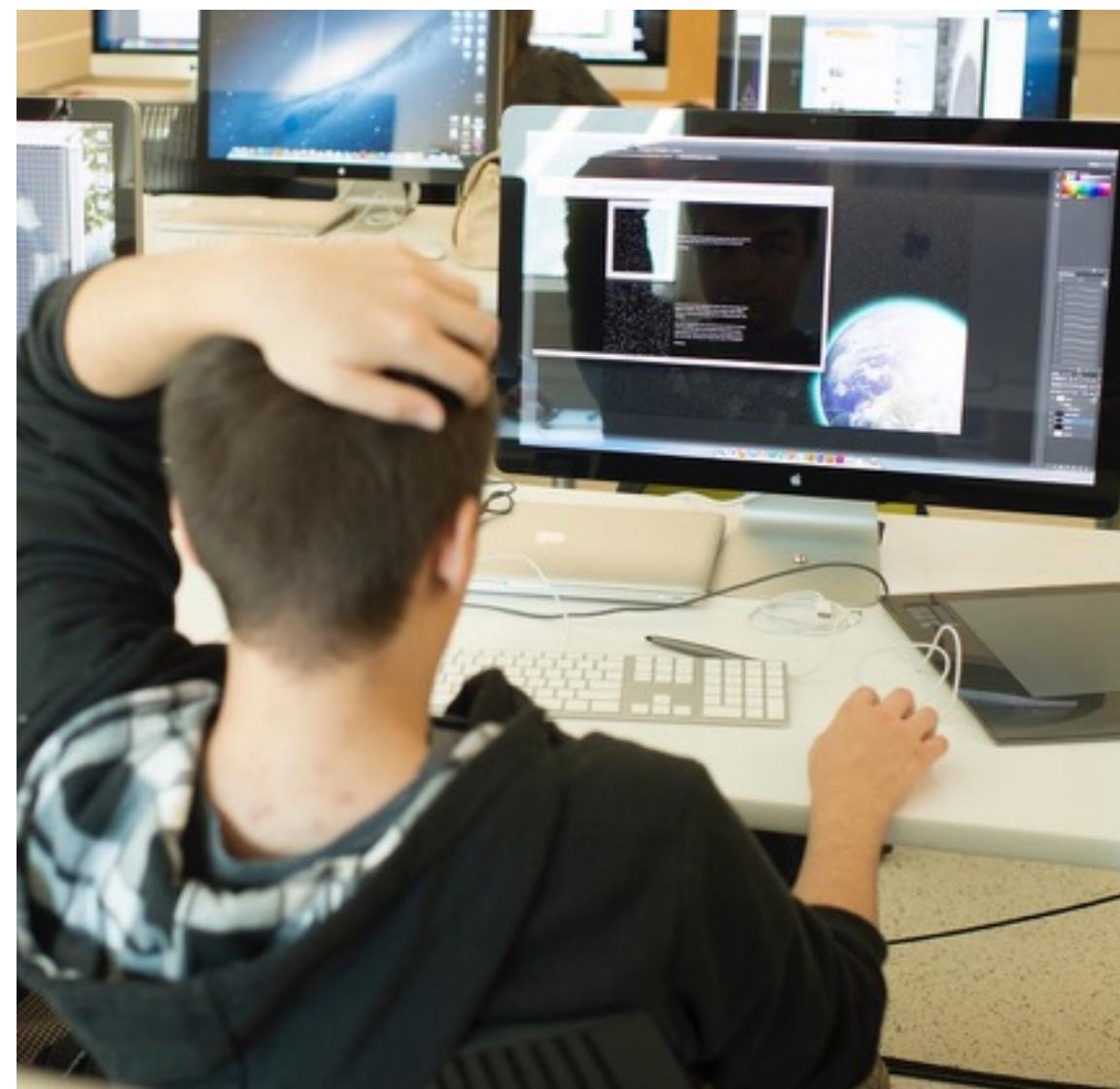
private_who_knows_what_dpi.png

Design



“Not enough”

Design



Name
private_who_knows_what_dpi.png

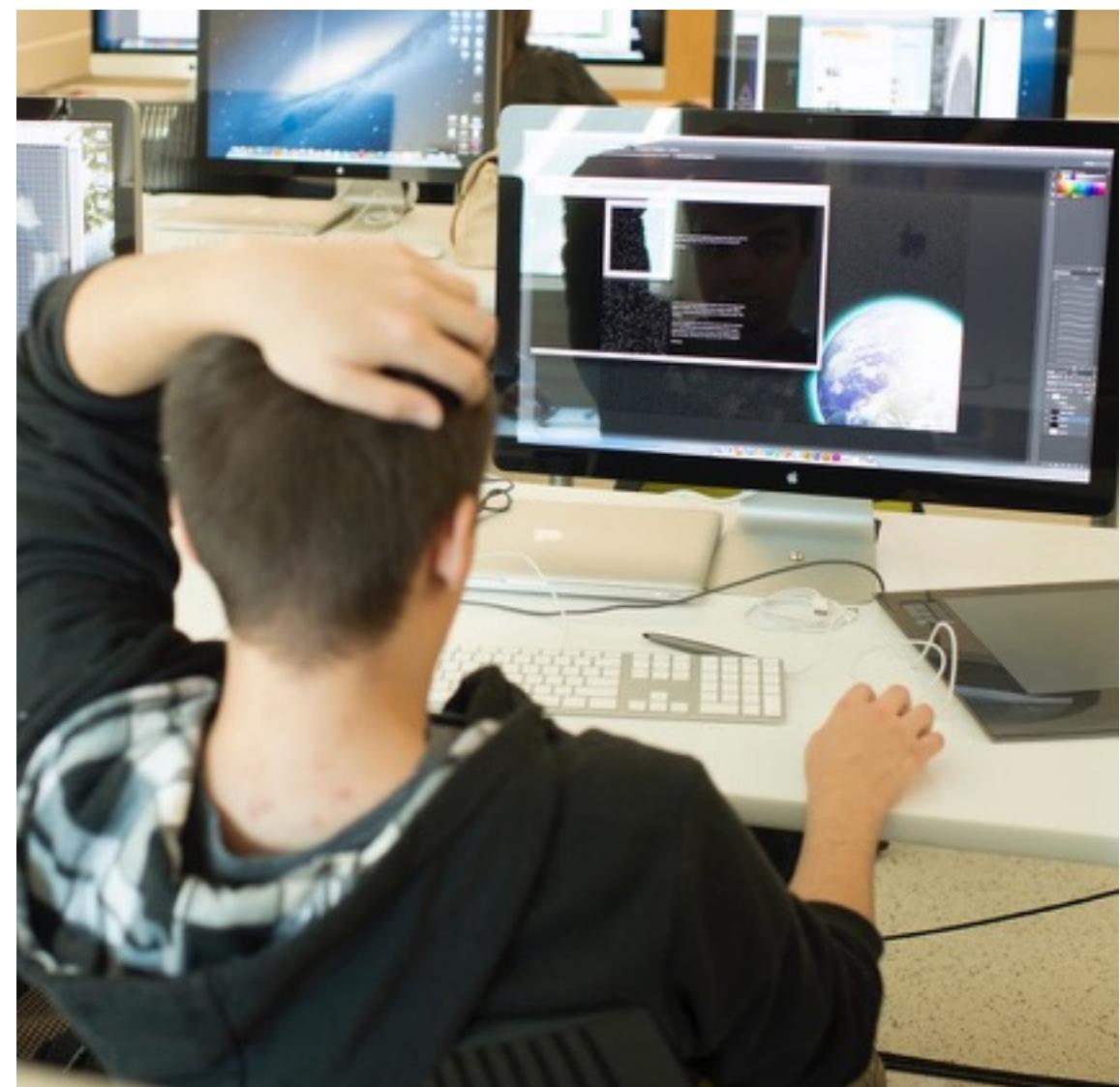
private_who_knows_what_dpi.png



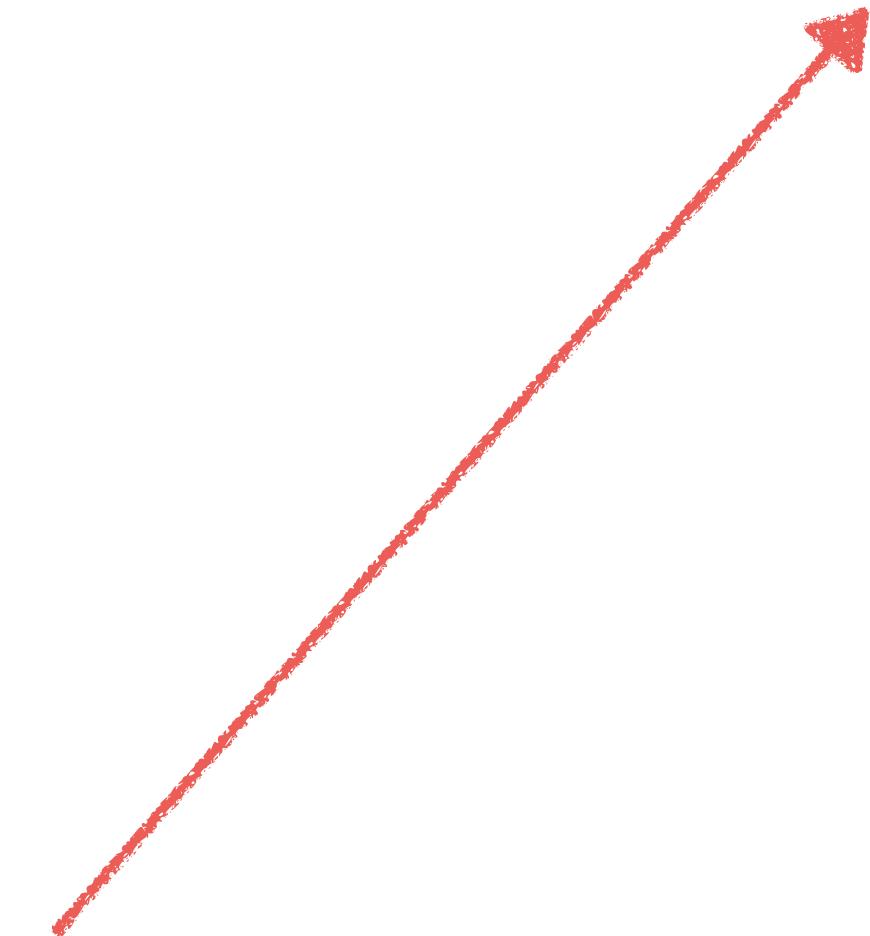
Name
private_xxxhdpi.png
private_xxhdpi.png
private_xhdpi.png
private_mdpi.png
private_ldpi.png
private_hdpi.png

"Not enough"

Design



“I tweaked the color,
here's those assets again.”



Name
private_who_knows_what_dpi.png



“Not enough”

Name
private_xxxhdpi.png
private_xxhdpi.png
private_xhdpi.png
private_mdpi.png
private_ldpi.png
private_hdpi.png

Assets as code

Drawable XML

Drawable XML

- Built into Android

Drawable XML

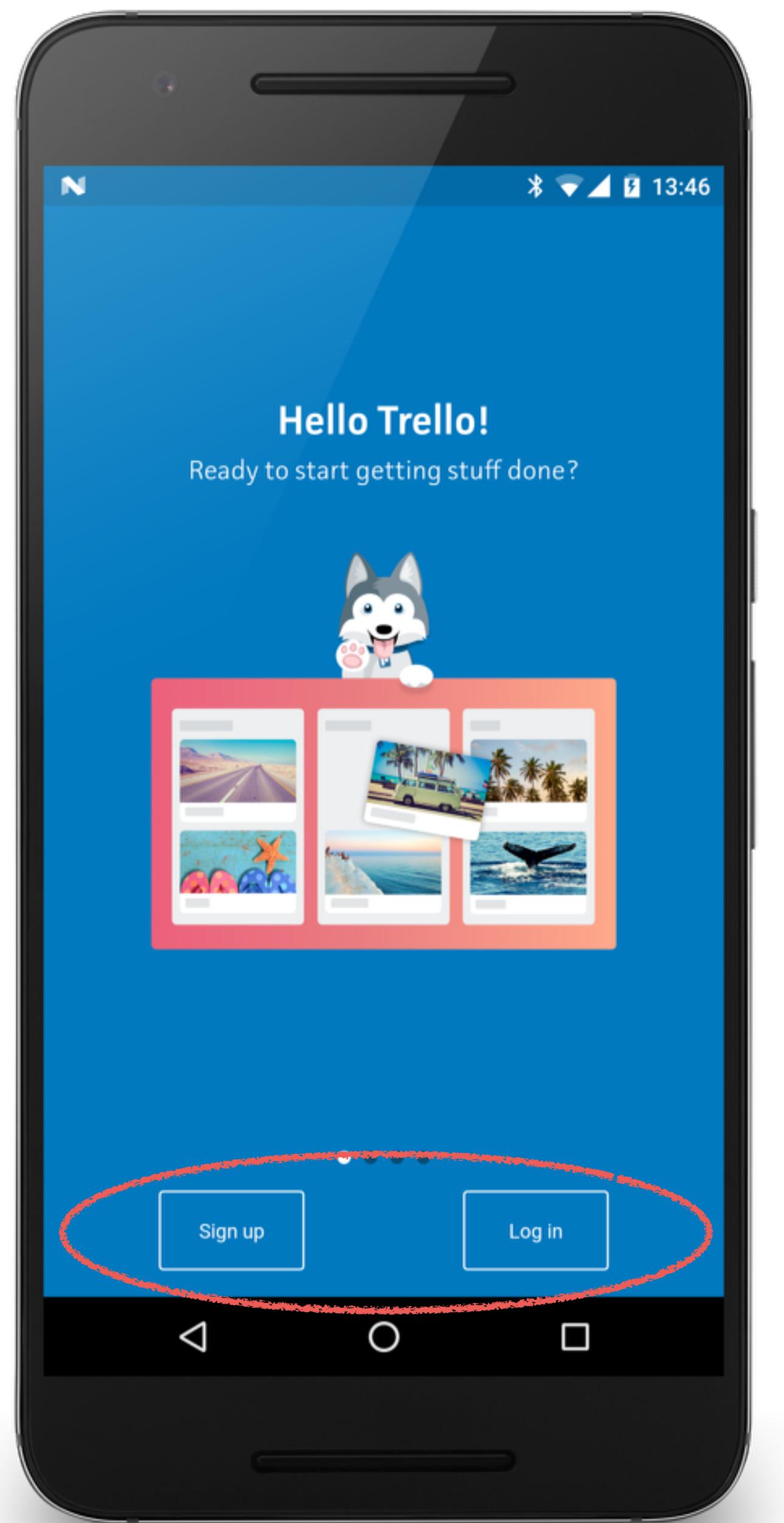
- Built into Android
- Simple shapes

Drawable XML

- Built into Android
- Simple shapes
- State selectors

Drawable XML

- Built into Android
- Simple shapes
- State selectors
- Layer lists



Button Outline

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android"
    android:shape="rectangle"
    >

    <solid android:color="@color/transparent" />

    <stroke
        android:width="1dp"
        android:color="@color/white"
    />

    <corners android:radius="@dimen/corner_radius_tiny" />

</shape>
```



Button Outline

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android"
    android:shape="rectangle"
    >
    <solid android:color="@color/transparent" />
    <stroke
        android:width="1dp"
        android:color="@color/white"
        />
    <corners android:radius="@dimen/corner_radius_tiny" />
</shape>
```



Button Outline

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android"
    android:shape="rectangle"
    >

    <solid android:color="@color/transparent" />

    <stroke
        android:width="1dp"
        android:color="@color/white"
    />

    <corners android:radius="@dimen/corner_radius_tiny" />

</shape>
```



Button Outline

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android"
    android:shape="rectangle"
    >
    <solid android:color="@color/transparent" />
    <stroke
        android:width="1dp"
        android:color="@color/white"
        />
    <corners android:radius="@dimen/corner_radius_tiny" />
</shape>
```



Button Outline

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android"
    android:shape="rectangle"
    >
    <solid android:color="@color/transparent" />
    <stroke
        android:width="1dp"
        android:color="@color/white"
        />
    <corners android:radius="@dimen/corner_radius_tiny" />
</shape>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
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    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />
</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable	btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />
</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />
</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />

</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />
</layer-list>
```



Button Selector

```
<?xml version="1.0" encoding="utf-8"?>
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item>
        <selector>
            <item android:state_pressed="true">
                <shape android:shape="rectangle">
                    <solid android:color="@color/blue_200" />

                    <corners android:radius="@dimen/corner_radius_tiny" />
                </shape>
            </item>

            <item android:drawable="@color/transparent" />
        </selector>
    </item>

    <item android:drawable="@drawable/btn_welcome_outline" />
</layer-list>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable/btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable/btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >
    <item android:drawable="@drawable/btn_welcome_outline" />
    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>
</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable/btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable	btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable	btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable/btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



Button Selector (v21)

```
<?xml version="1.0" encoding="utf-8"?>
<ripple xmlns:android="http://schemas.android.com/apk/res/android"
    android:color="@color/blue_200"
    >

    <item android:drawable="@drawable/btn_welcome_outline" />

    <item android:id="@+id/mask">
        <shape android:shape="rectangle">
            <solid android:color="@color/white" />
            <corners android:radius="@dimen/corner_radius_tiny" />
        </shape>
    </item>

</ripple>
```



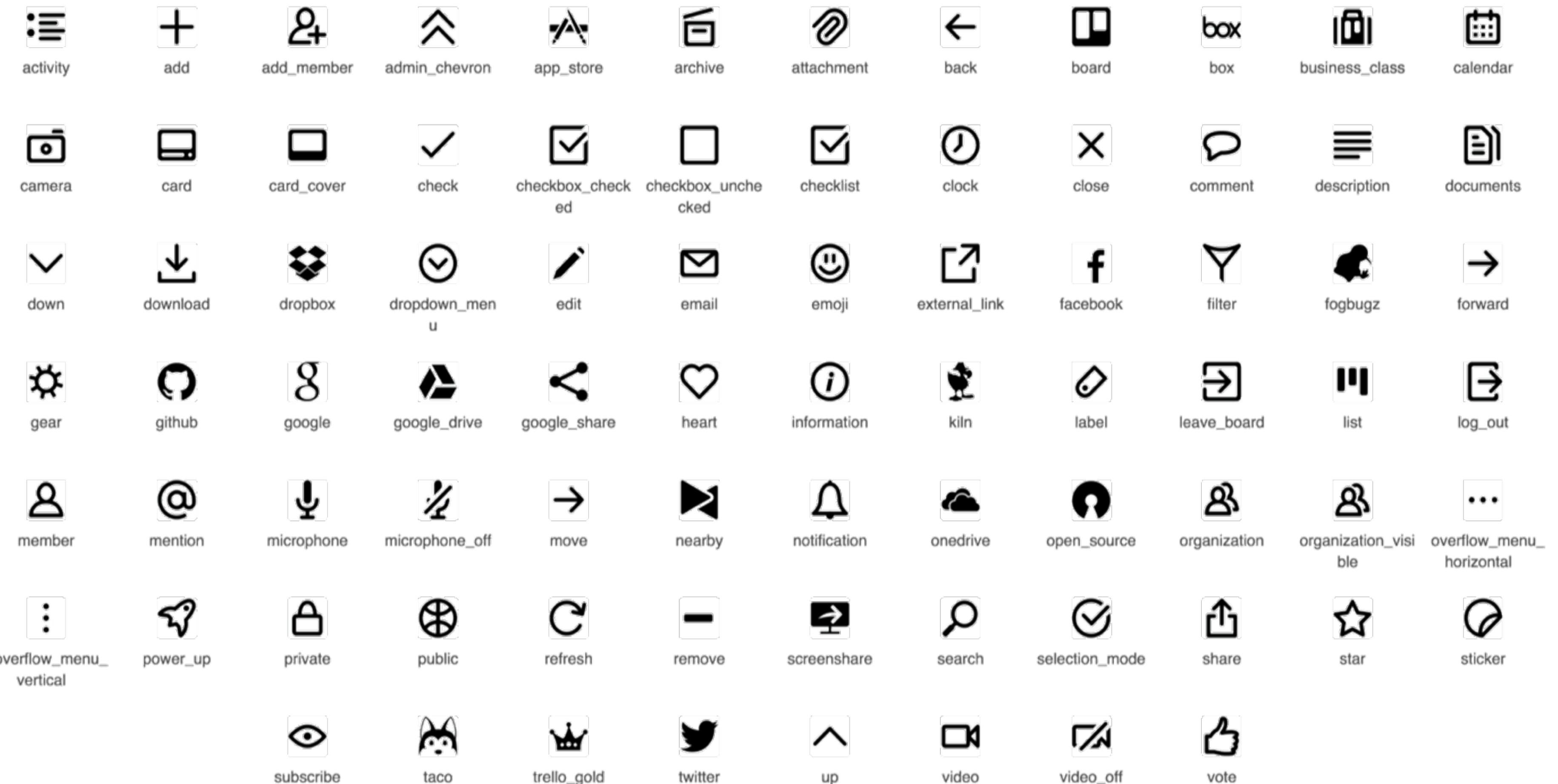
Button Versions

►  **drawable**
button_welcome.xml

►  **drawable-v21**
button_welcome.xml (with ripple)

►  **drawable**
button>Welcome_outline.xml

Vector drawables

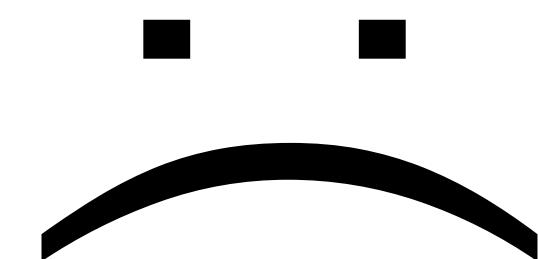
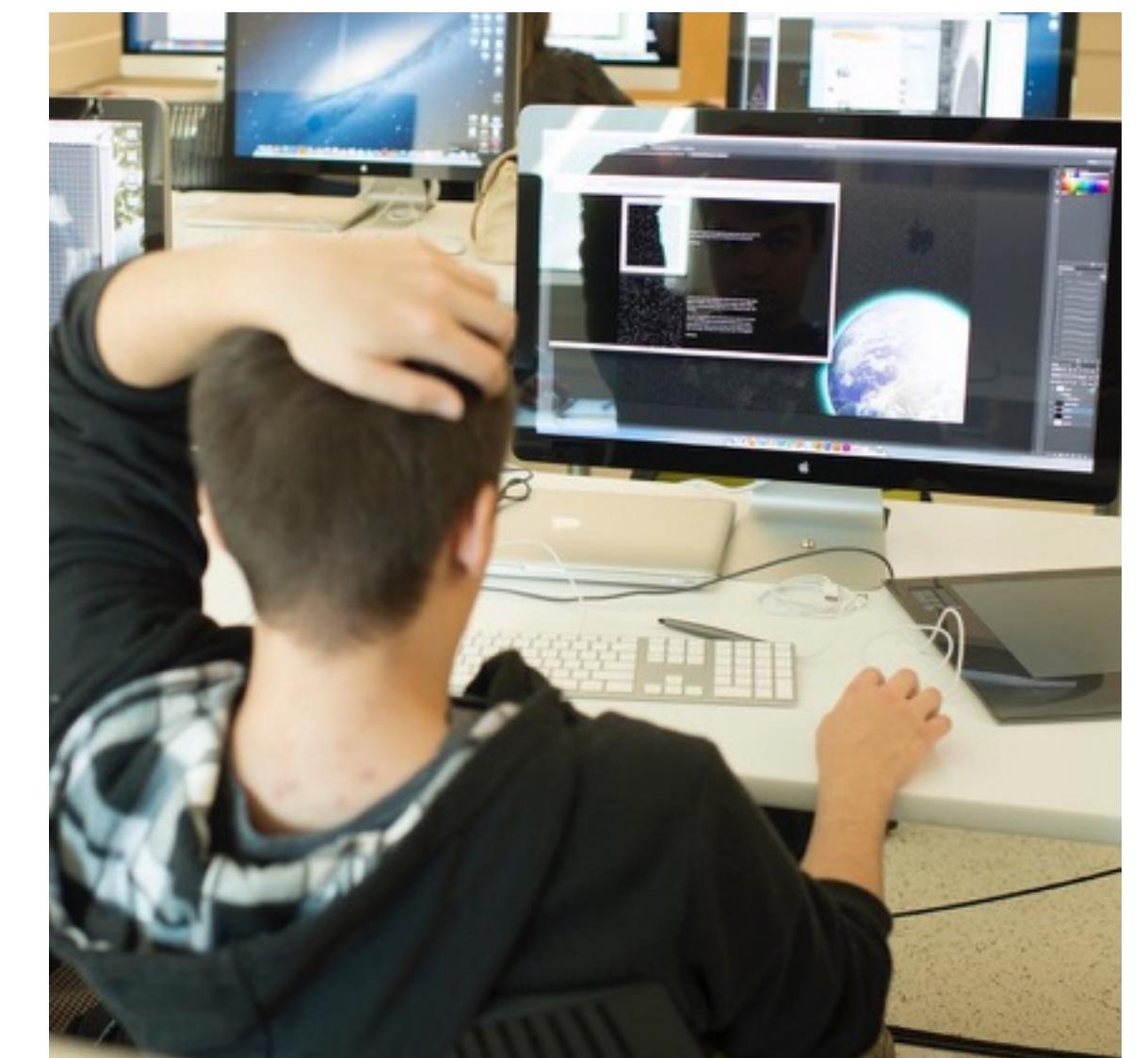


VectorDrawable
!=
SVG

VectorDrawable

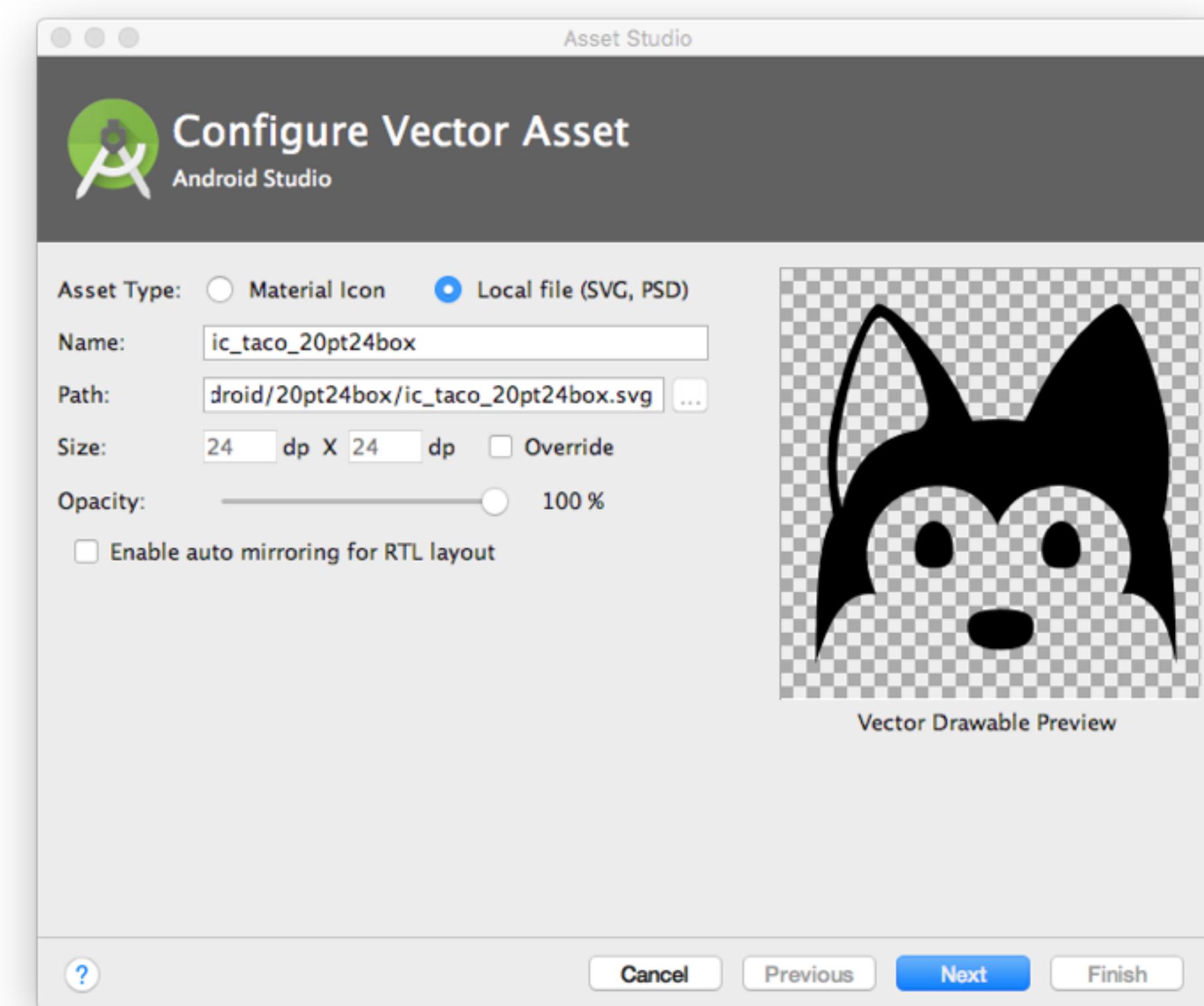
!=
SVG

Design



SVG -> VectorDrawable

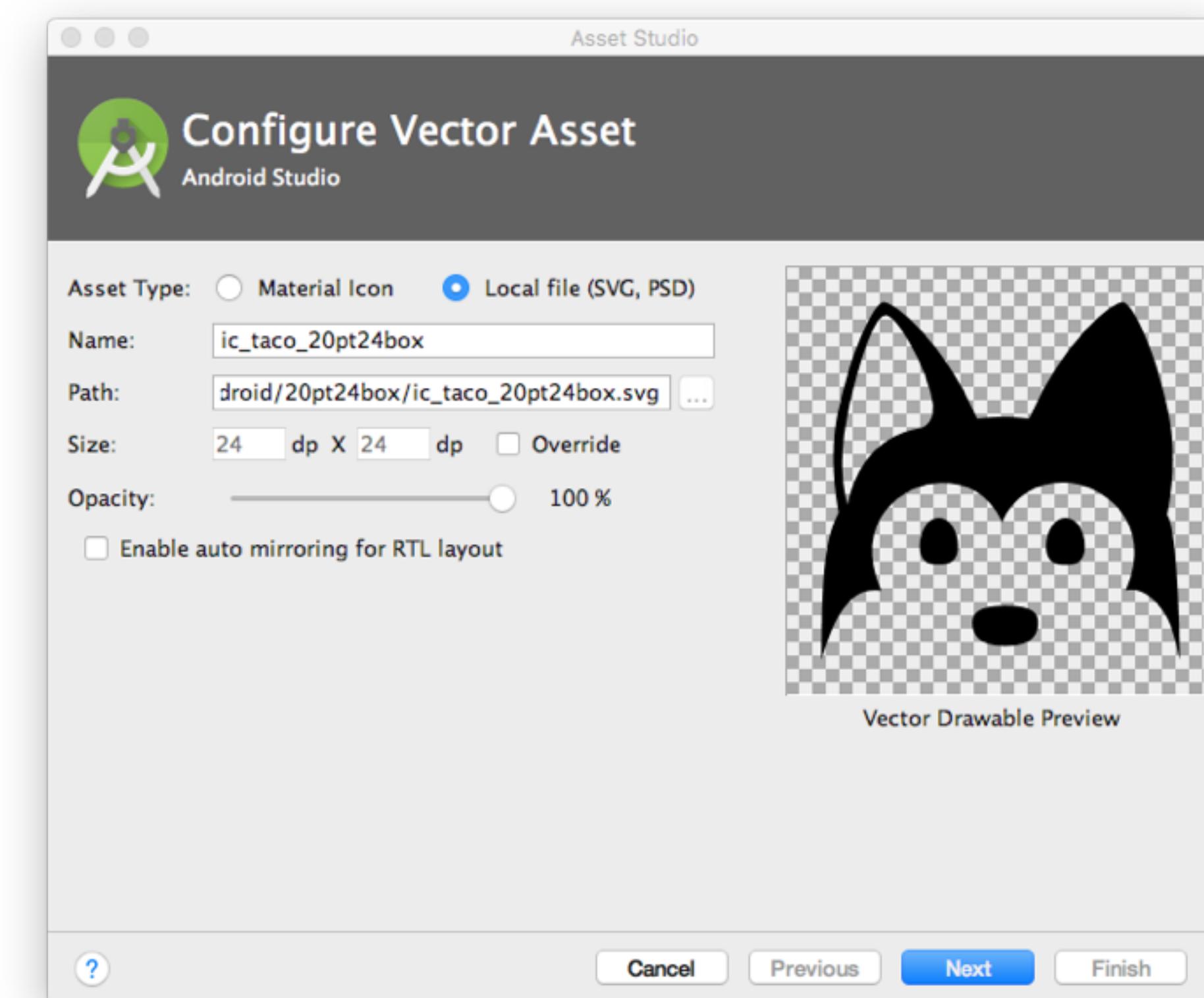
- Android Studio: New Vector Asset



SVG -> VectorDrawable

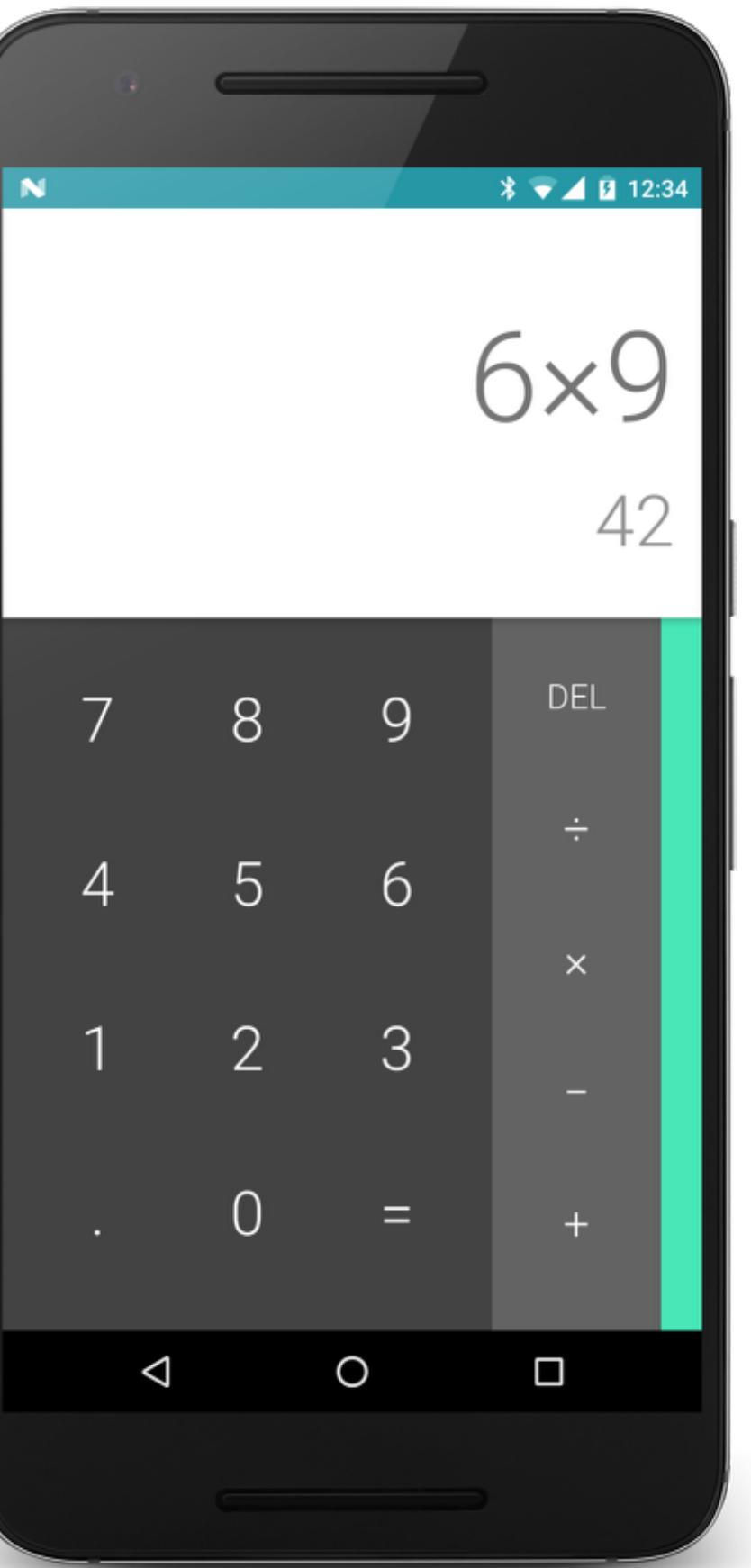
- Android Studio: New Vector Asset
- Victor: github.com/trello/victor

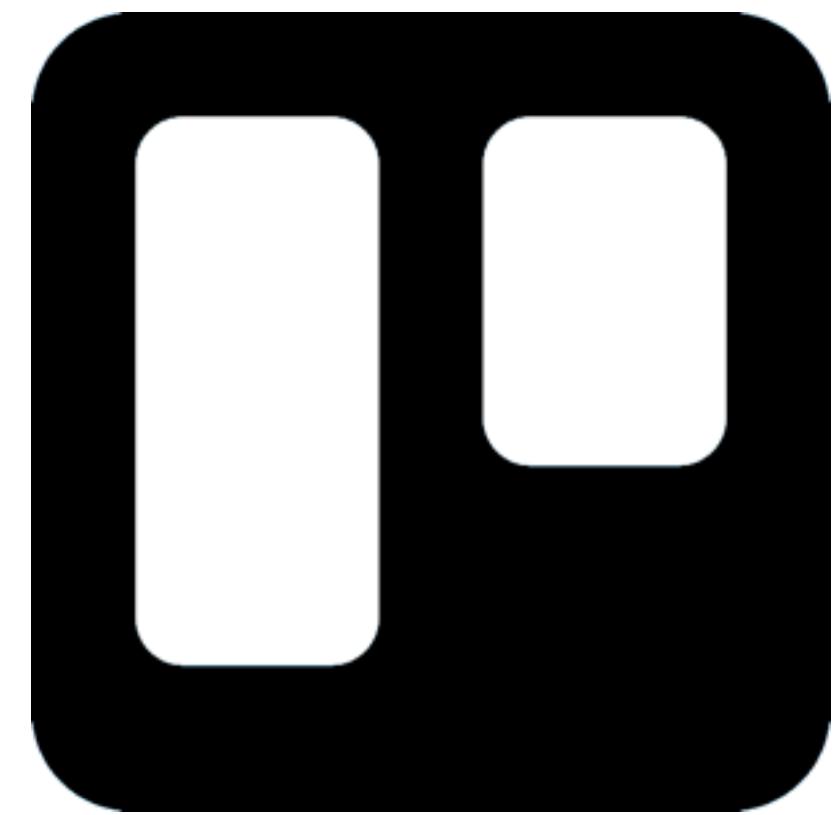
```
android {  
    sourceSets {  
        main {  
            svg.srcDir 'src/main/svg'  
        }  
    }  
}
```

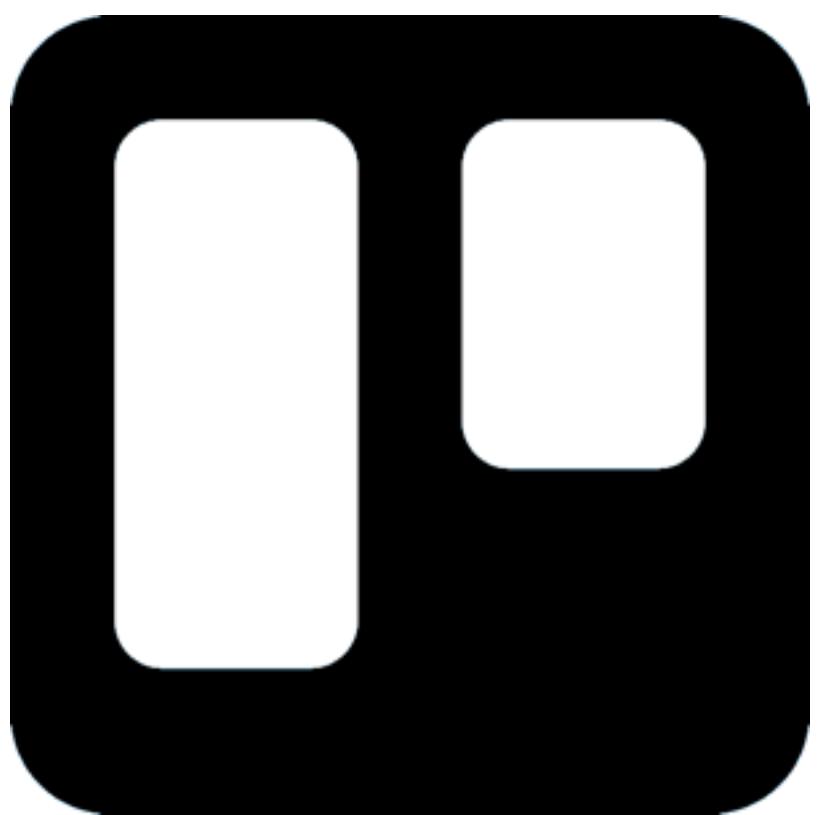




VS







Tinting Images

Tinting Images

- XML

Tinting Images

- ~~XML~~ Not backwards compatible

Tinting Images

- ~~XML~~ **Not backwards compatible**
- Simple

```
drawable.setColorFilter(color, PorterDuff.Mode.SRC_IN);
```

Tinting Images

- ~~XML~~ **Not backwards compatible**

- Simple

```
drawable.setColorFilter(color, PorterDuff.Mode.SRC_IN);
```

- Comprehensive

```
Drawable wrappedDrawable = DrawableCompat.wrap(drawable);
DrawableCompat.setTint(wrappedDrawable, color);
```

Thank You!

- @danlew42
- danlew.net
- speakerdeck.com/dlew
- github.com/dlew