

# Mastering Android's App Resources

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**Digital**  
labs



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# Resources

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res

-- drawable

-- layout

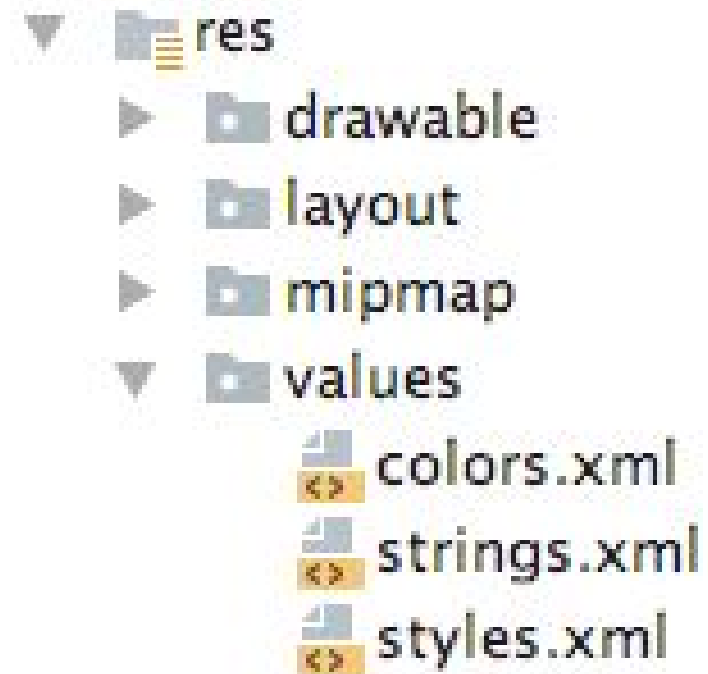
-- mipmap

-- values

-- colors.xml

-- strings.xml

-- styles.xml



# Resource Types

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# Plenty of resource types

res

- drawable
- layout
- mipmap
- values

res

- animator
- anim
- xml
- menu
- raw
- color
- font



# Drawable

```
<selector>
```

```
  <item
```

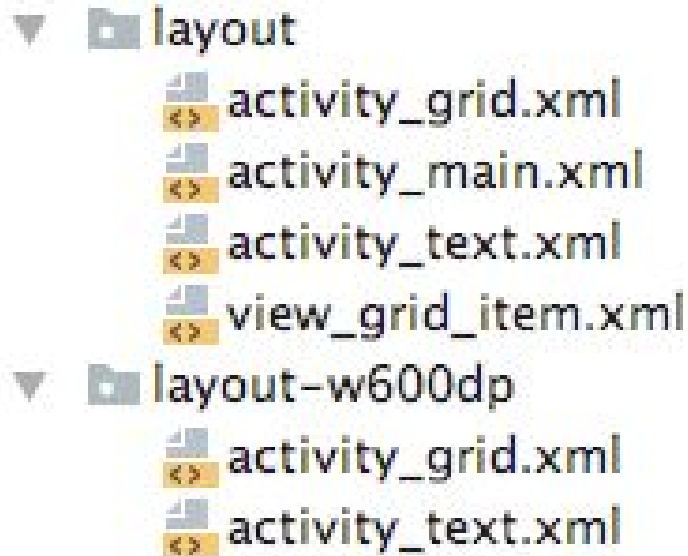
```
    android:state_pressed="true"
```

```
    android:drawable="@drawable/button_pressed"/>
```

```
  <item android:drawable="@drawable/button_normal"/>
```

```
</selector>
```

# Layout














```
<android.support.constraint.ConstraintLayout
    ...
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    ...

</android.support.constraint.ConstraintLayout>
```



# Mipmap

- ▼  mipmap
  - ▼  ic\_launcher.png (5)
    -  ic\_launcher.png (hdpi)
    -  ic\_launcher.png (mdpi)
    -  ic\_launcher.png (xhdpi)
    -  ic\_launcher.png (xxhdpi)
    -  ic\_launcher.png (xxxhdpi)
  -  ic\_launcher.xml (anydpi-v26)
- ▶  ic\_launcher\_foreground.png (5)
- ▶  ic\_launcher\_round.png (5)
  -  ic\_launcher\_round.xml (anydpi-v26)

# Simple values

-- values

-- colors.xml

-- strings.xml

-- styles.xml

-- dims.xml

-- bools.xml

-- integers.xml

-- arrays.xml

```
<resources>
```

```
    <color name="color_primary_dark">#e72743
```

```
  </color>
```

```
</resources>
```

```
<string name="log_in">Log in</string>
```

```
<dimen name="fab_margin_bottom">12dp</dimen>
```

```
<bool name="is_landscape">>false</bool>
```


```
<integer name="number_columns">2</integer>
```



# What are we learning today?



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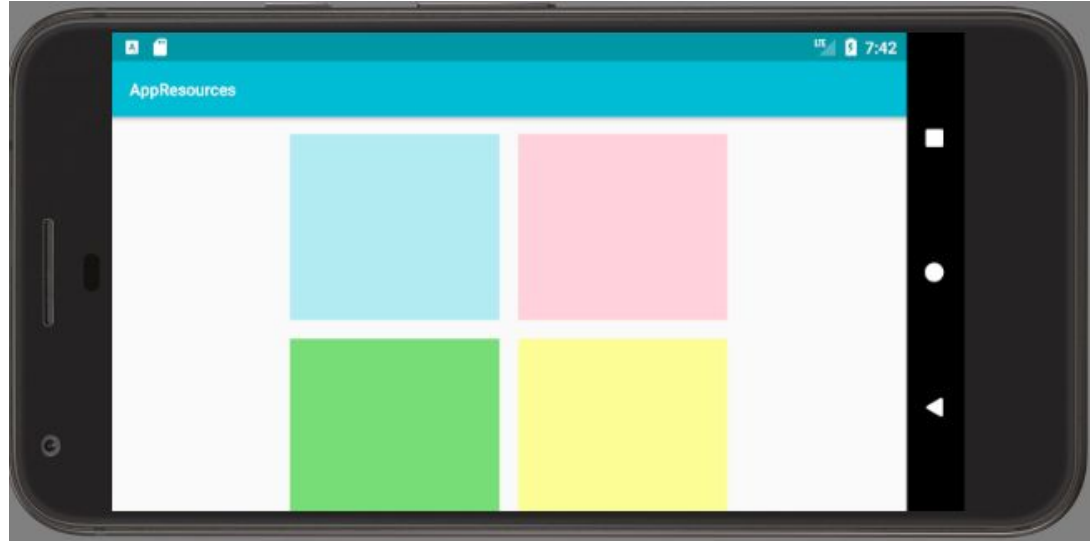
Know your resources  
Design and build for multiple screens  
Make your UI responsive  
Communicate with stakeholders  
Learn by example

# Requirements

Scrollable grid of items

2 columns in phone - portrait & landscape

Pixel XL



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# Accessing Resources in xml

➤ view\_grid\_item.xml

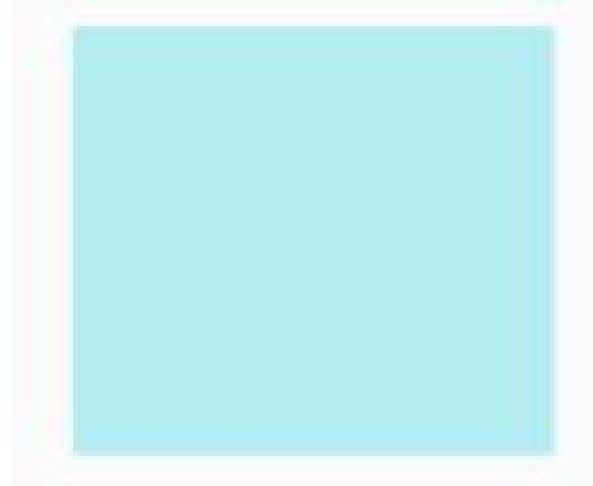
```
<View
```

```
    android:layout_gravity="center"
```

```
    style="@style/Rectangle"
```

```
    android:id="@+id/rectangle"
```

```
    android:background="@color/blue"/>
```



# styles.xml

```
<style name="Rectangle">  
    <item name="android:layout_marginStart">@dimen/spacing_normal</item>  
    <item name="android:layout_marginEnd">@dimen/spacing_normal</item>  
    <item name="android:layout_marginTop">@dimen/spacing_medium</item>  
    <item name="android:layout_width">160dp</item>  
    <item name="android:layout_height">160dp</item>  
</style>
```



# dimens.xml

```
<resources>
```

```
    <dimen name="spacing_nano">2dp</dimen>
```

```
    <dimen name="spacing_micro">4dp</dimen>
```

```
    <dimen name="spacing_normal">8dp</dimen>
```

```
    <dimen name="spacing_medium">16dp</dimen>
```

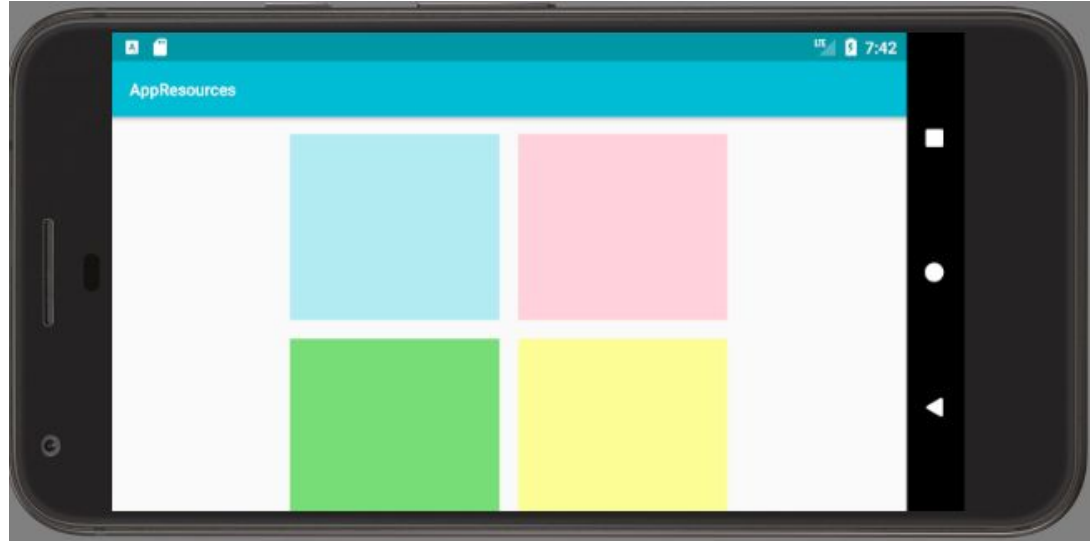
```
</resources>
```

# Accessing Resources in code

## ➤ Activity

```
setContentView(R.layout.activity_grid);  
  
RecyclerView recyclerView =  
findViewById(R.id.recyclerView);  
  
recyclerView.setLayoutManager(  
    new GridLayoutManager(this, GRID_NUM_OF_COLUMNS)  
);
```

Pixel XL



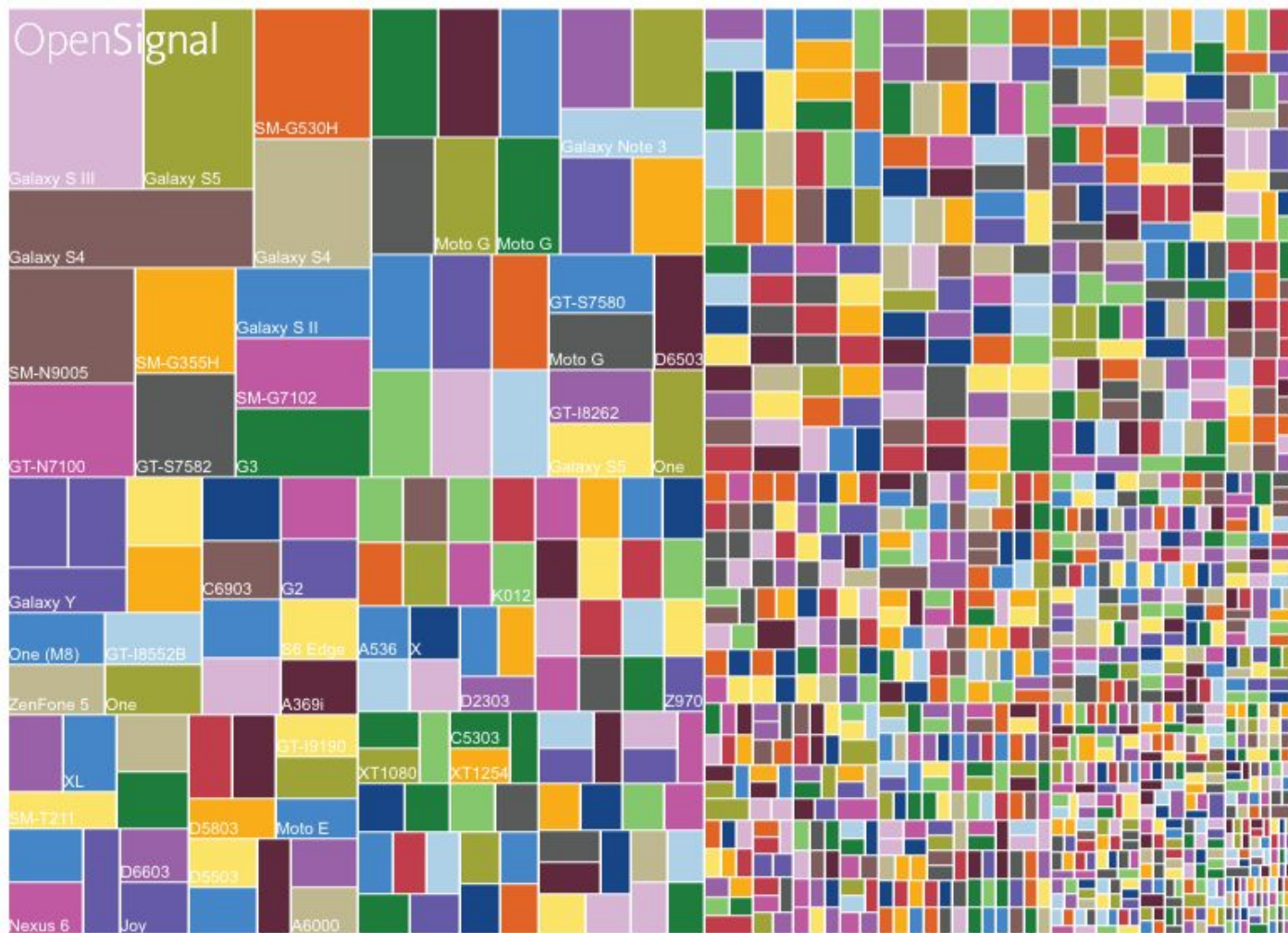
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# Requirements

Scrollable grid of items

2 columns in phone - portrait & landscape

Different layouts for phablets and tablets in portrait and landscape, support for different locales...



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24000 devices

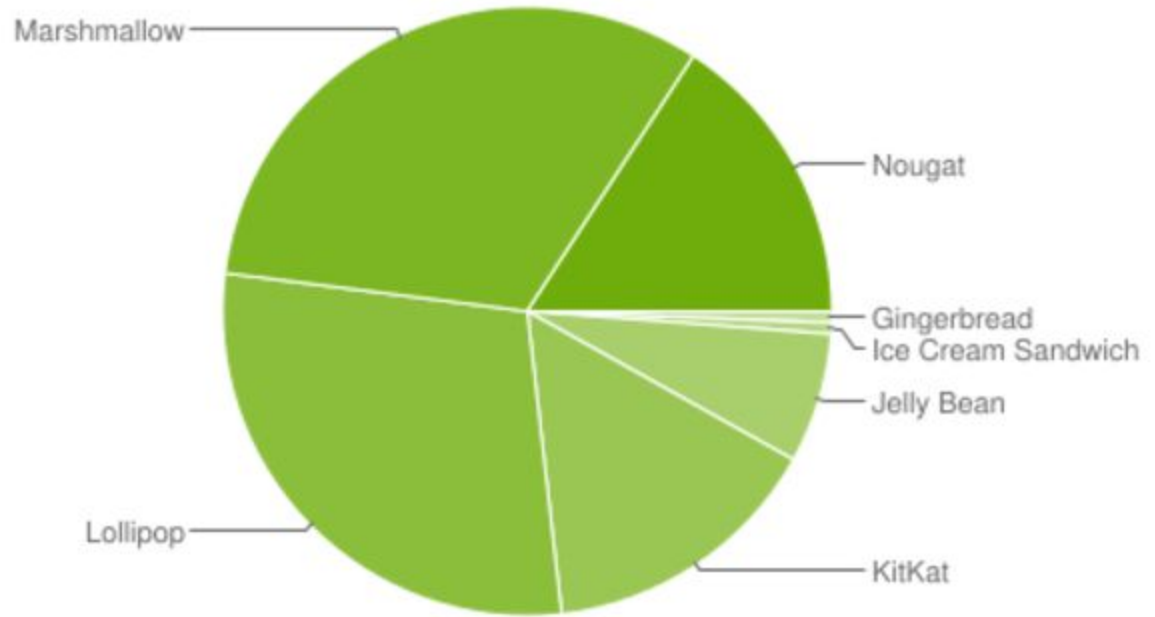
[Open Signal Aug 2015 report](#)

24000 devices

[Open Signal Aug 2015 report](#)

#minSdkVersion21

23%



[Android Dashboard](#)



# Requirements

Scrollable grid of items

2 columns in phone - portrait & landscape

~~Different layouts for phablets and tablets in portrait and landscape, support for different locales...~~

Different layouts for different breakpoints

# Multiple screen support using qualifiers



# Terminology

Orientation - port, land

Screen Size - xsmall, small, normal, large, xlarge

Resolution - physical pixel (px)

Density Independent Pixel - virtual pixel (dp)

Screen density - ldpi, mdpi, hdpi, xhdpi, xxhdpi, xxxhdpi (1:2:3:5:6:8)

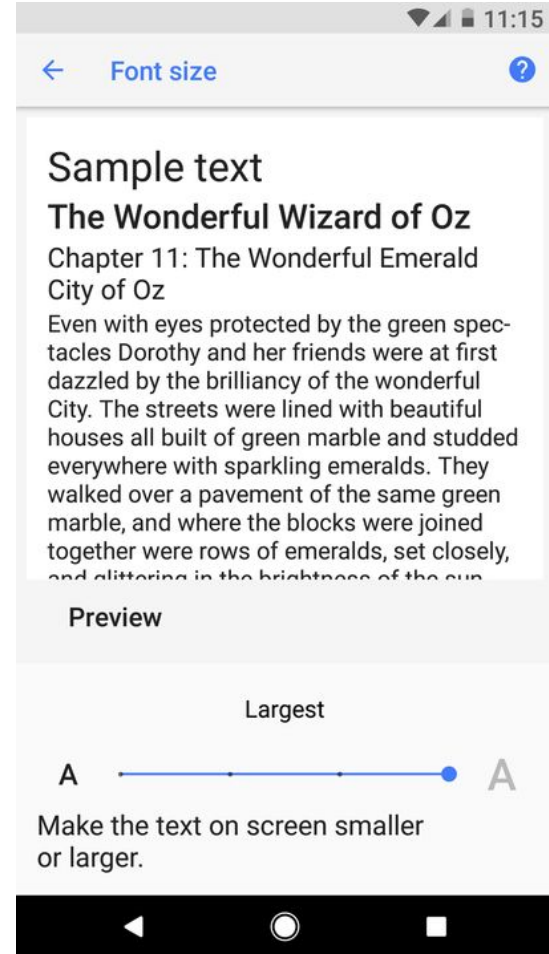
$$\text{px} = \text{dp} * (\text{dpi} / 160)$$

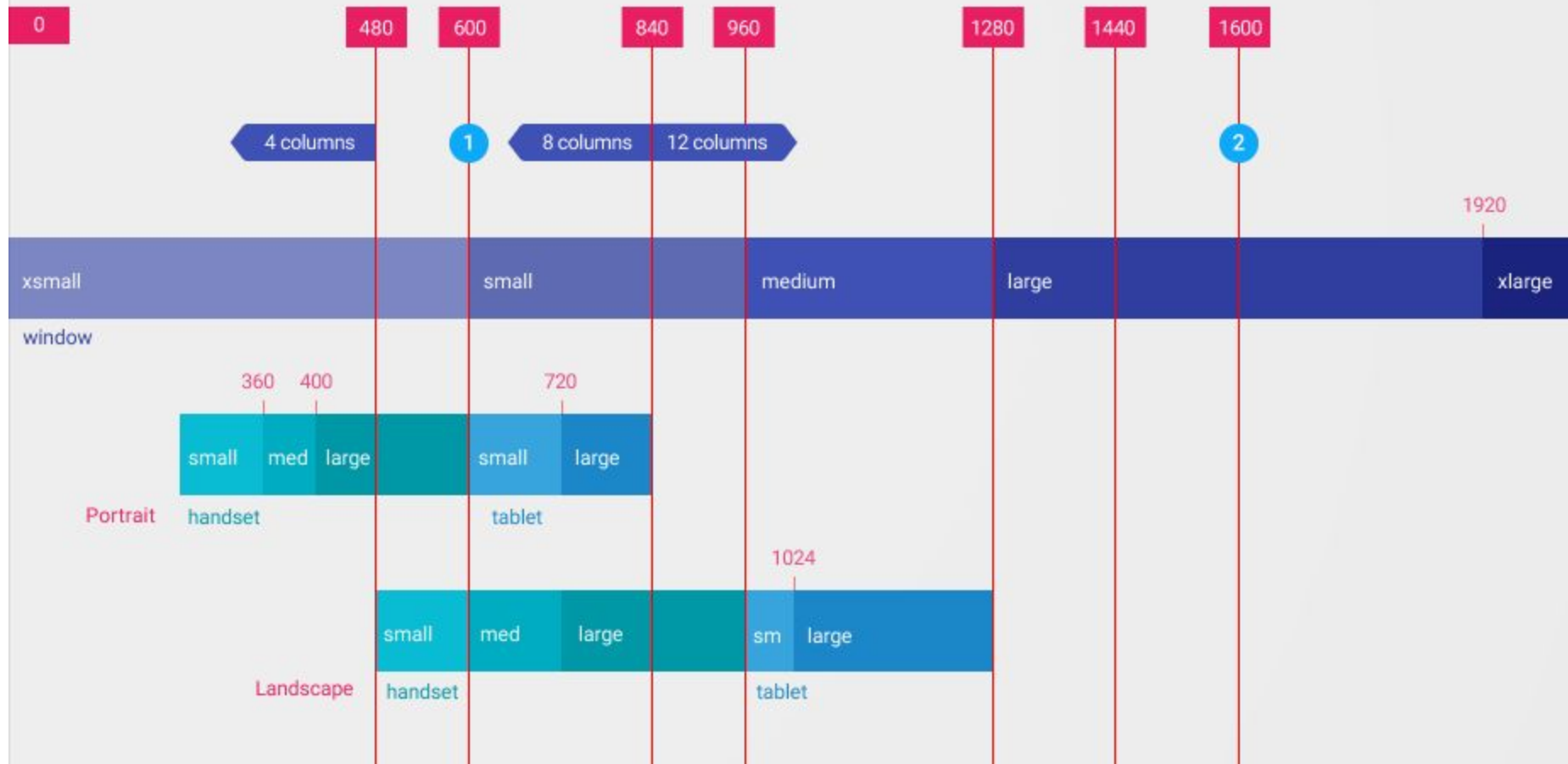
240 dp screen, 1 dp = 1.5 px (hdpi)

# Terminology

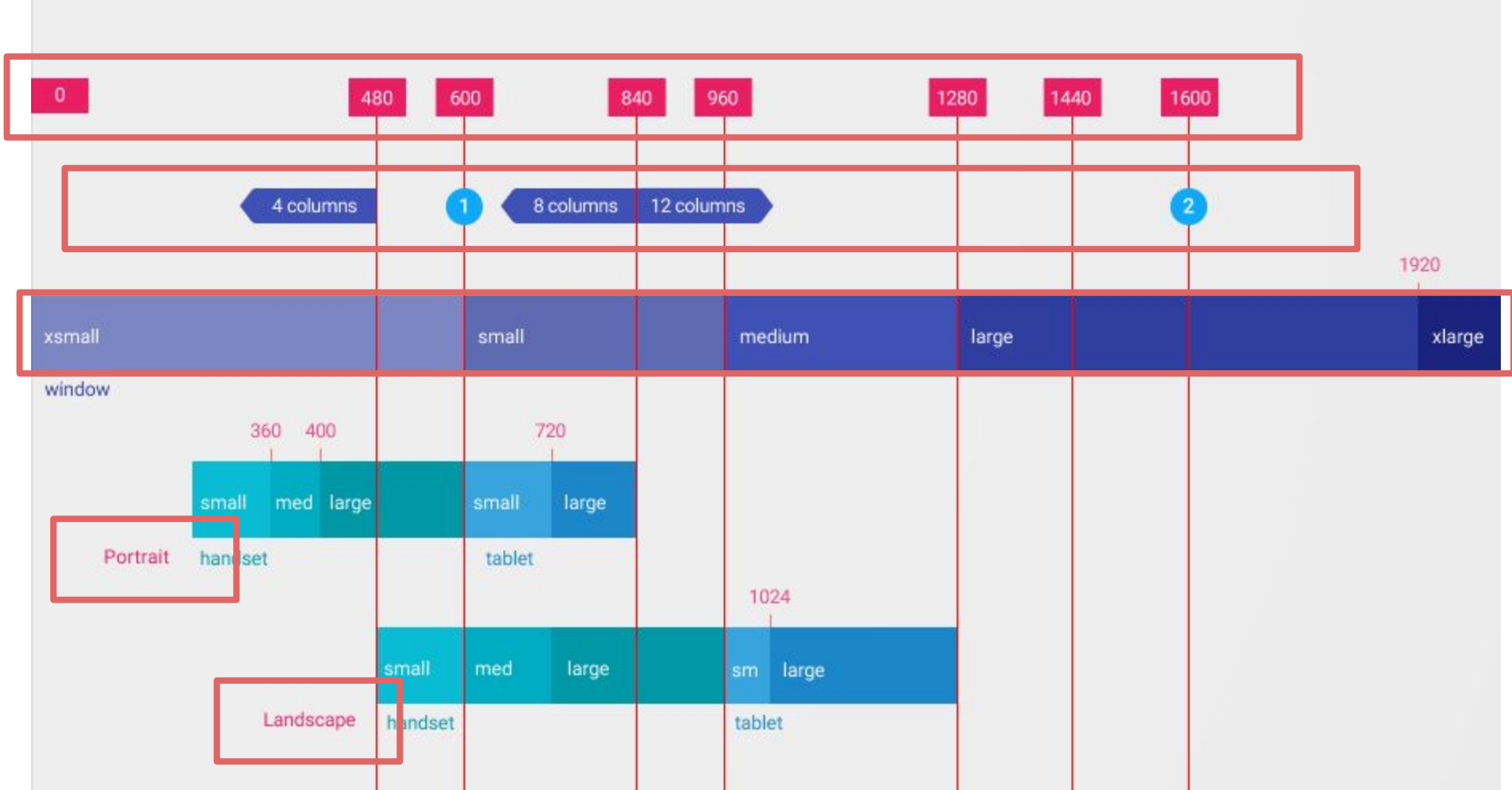
## Scaled Pixel (sp)


- preserves a user's font settings

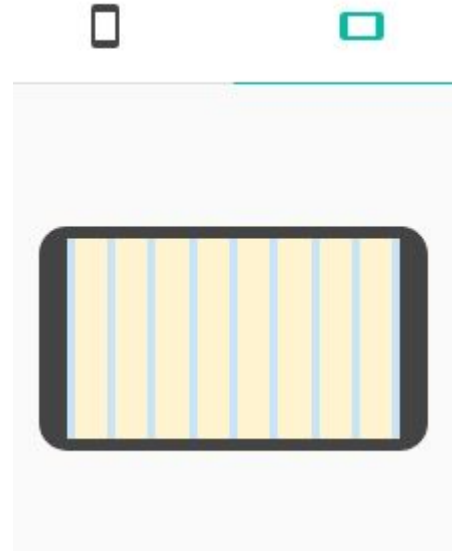
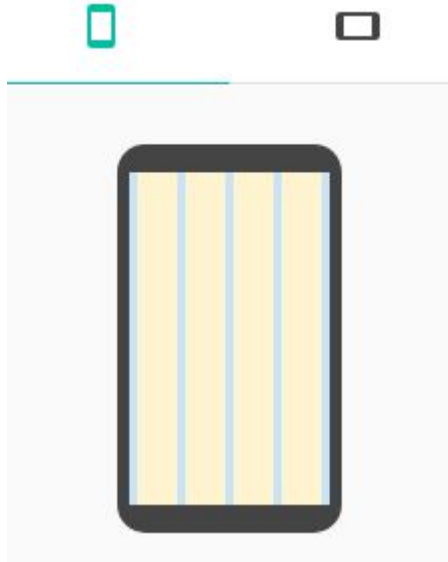





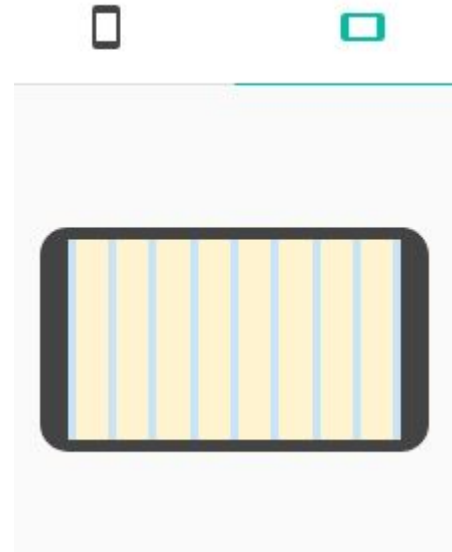
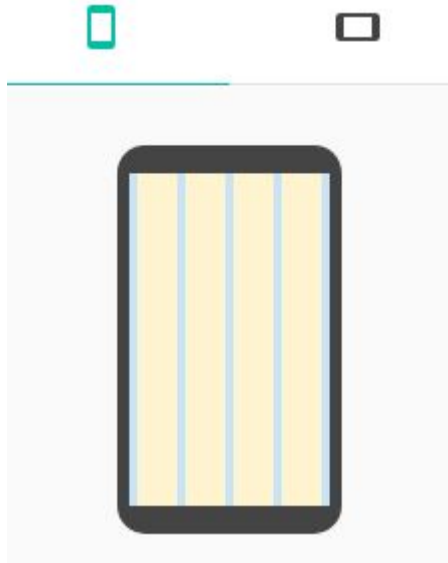
## Material Design - Responsive UI



Type	↓ Device	Platform	Screen dimensions in cm		Aspect Ratio	Width × Height dp	Width × Height px	Density
	Nexus 4	Android	4.7 in	3.2 × 4.0 in	5 : 3	384 × 640 dp	768 × 1280 px	2.0 xhdpi



Type	↓ Device	Platform	Screen dimensions in cm		Aspect Ratio	Width × Height dp	Width × Height px	Density
	Nexus 4	Android	4.7 in	3.2 × 4.0 in	5 : 3	384 × 640 dp	768 × 1280 px	2.0 xhdpi





# Configurations & Qualifiers

res

- <resources\_name>-<config\_qualifier>
- drawable-hdpi
- layout-port-hdpi
- layout-land

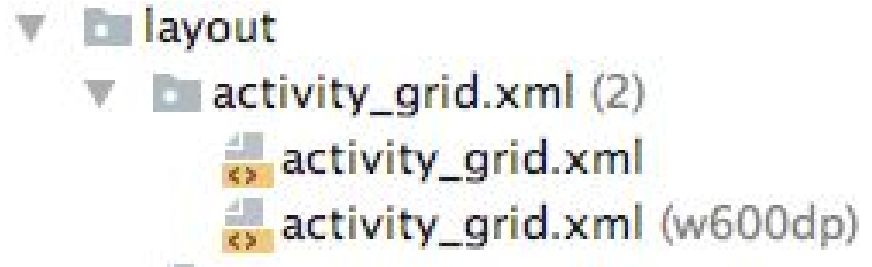
[Config & Qualifiers Table](#)

# Building Responsive UI on multiple screens

res

-- layout

-- layout-w600dp

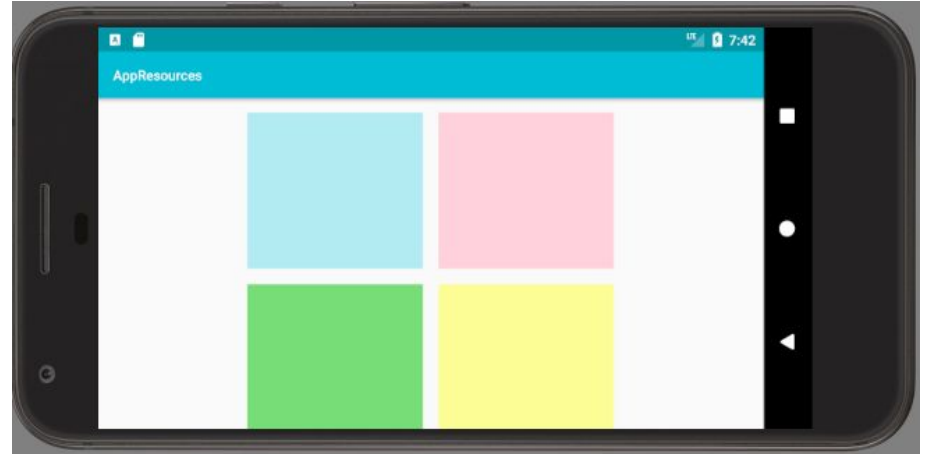


[github.com/yprabhu/AppResources](https://github.com/yprabhu/AppResources)

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Pixel XL - w600dp breakpoint



Pixel XL - sw600dp breakpoint

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# When do I use $w<N>dp$ and $sw<N>dp$ ?

$w<N>dp$  - available width, changes on orientation change (port and land)

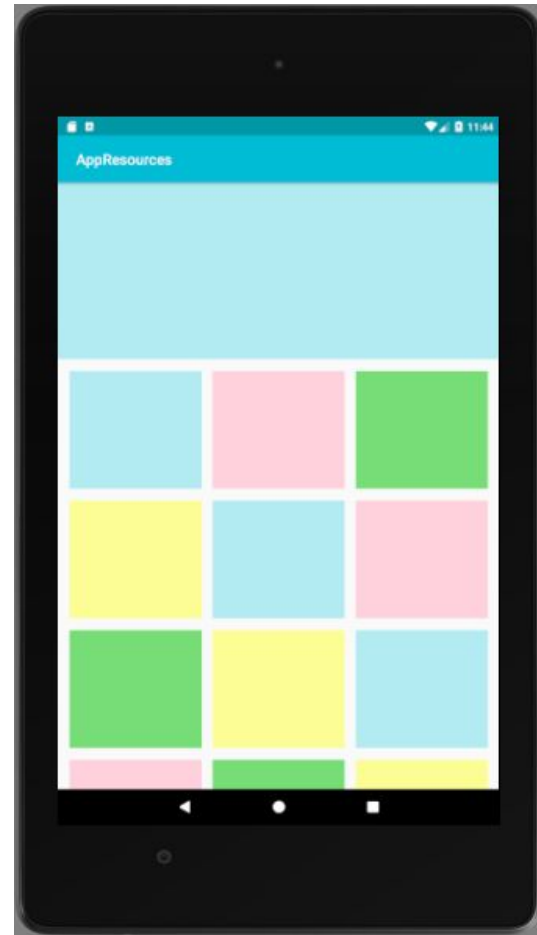
$sw<N>dp$  - smallest width regardless of orientation change



Pixel XL - 411w x 731h dp



Nexus 7 with w600dp and h720dp and integers.xml



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//integers.xml (h720dp)

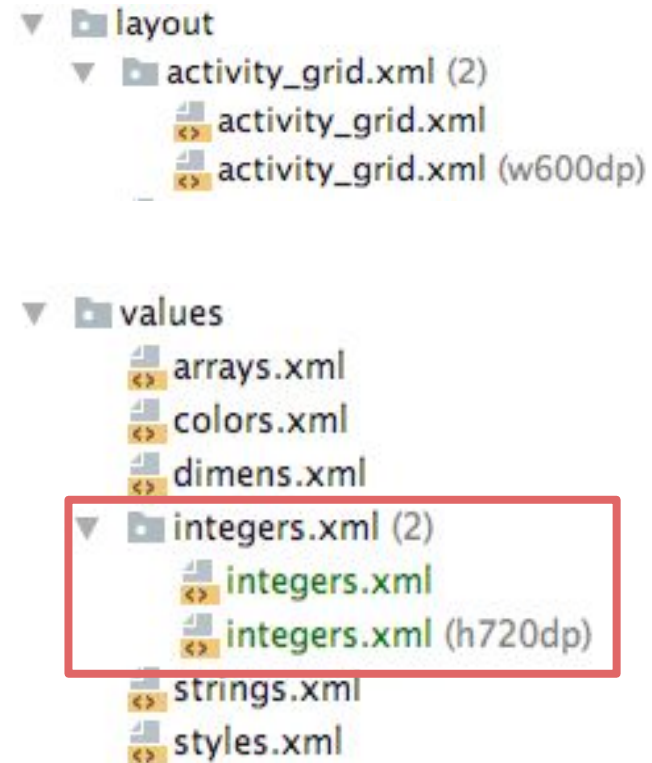
<resources>

<integer

name="grid\_number\_of\_columns">3

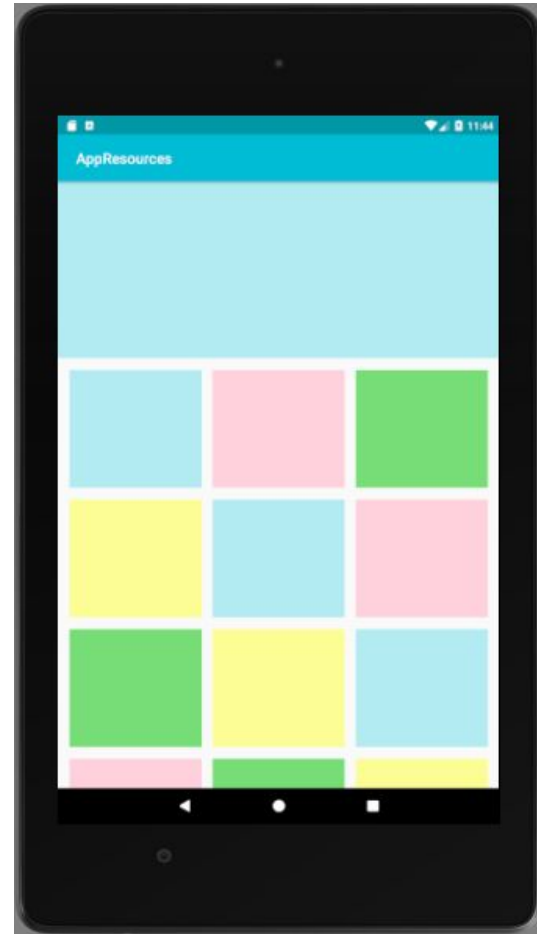
</integer>

</resources>



```
// Activity
```

```
recyclerView.setLayoutManager(  
    new GridLayoutManager(  
        this, getResources()  
            .getInteger(  
                R.integer.grid_number_of_columns  
            )));
```





# Locales



# Locales - strings.xml

```
<resources>
```

```
    <string name="professor">Good news, everyone!</string>
```

```
    <string name="leela">
```

```
        Bender, quit destroying the universe!
```

```
    </string>
```

```
    <string name="go_to_grid">Go to Grid</string>
```

```
</resources>
```

# Locales - strings.xml (hi)

```
<string name="professor">अच्छी खबर है, हर कोई!</string>
```

```
<string name="leela">
```

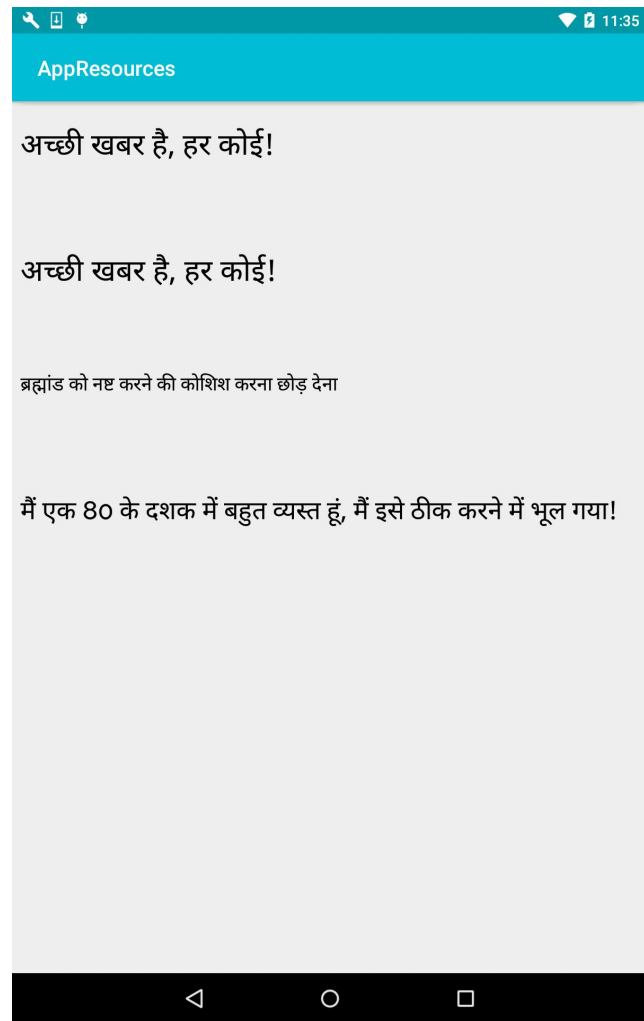
ब्रह्मांड को नष्ट करने की कोशिश करना छोड़ देना

```
</string>
```

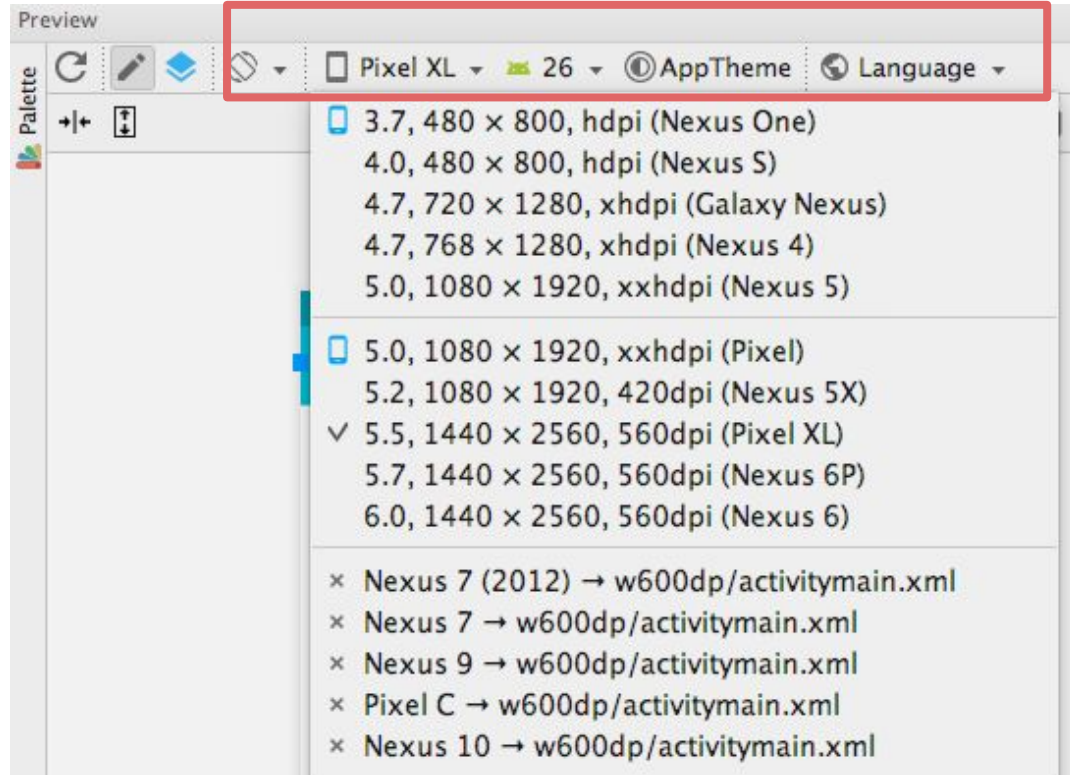
```
<string name="go_to_grid" translatable="false">
```

Go to Grid

```
</string>
```



# Layout Preview



Finding the best match



# Configurations & Qualifiers

res

- <resources\_name>-<config\_qualifier>
- drawable-hdpi
- layout-port-hdpi
- layout-land

[Config & Qualifiers Table](#)

Configuration	Qualifier
MCC and MNC	mcc310, mcc208-mnc00
Language & Region	en, fr, hi, es, en-rUS
Layout Direction	ldrtl, ldltr
Smallest Width	sw<N>dp (sw720dp, sw1024dp)
Available width	w<N>dp (w600dp)
Available height	h<N>dp (h960dp)
Screen Size	small, normal, large, xlarge
Screen Aspect	long, notlong
Round	round, notround
Wide Color Gamut	widecg, nowidecg
High Dynamic Range	highdr, lowdr



Configuration	Qualifier
Screen Orientation	port, land
UI mode	car, desk, television, appliance, watch, vrheadset
Night mode	night, notnight
Screen pixel density	ldpi, mdpi, hdpi, xhdpi, xxhdpi, xxxhdpi, nodpi, anydpi, tvdpi
Touchscreen type	notouch, finger
Keyboard availability	keysexposed, keyshidden, keyssoft
Primary text input method	nokeys, qwerty, 12key
Navigation key availability	navexposed, navhidden
Primary non-touch navigation method	nonav, dpad, trackball, wheel
Platform version	v3, v4, v7

# Qualifier rules

res

- <resources\_name>-<config\_qualifier>
- drawable-hdpi
- drawable-port-hdpi
- layout-small-h600dp (wrong)
- drawable-rES-rEN (wrong)

# How does Android find the best match?

## ➤ Device specifications

Screen orientation - port

Screen pixel density - xhdpi

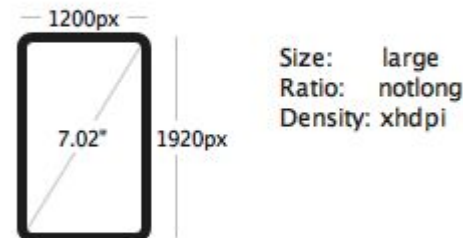
Screen size - large

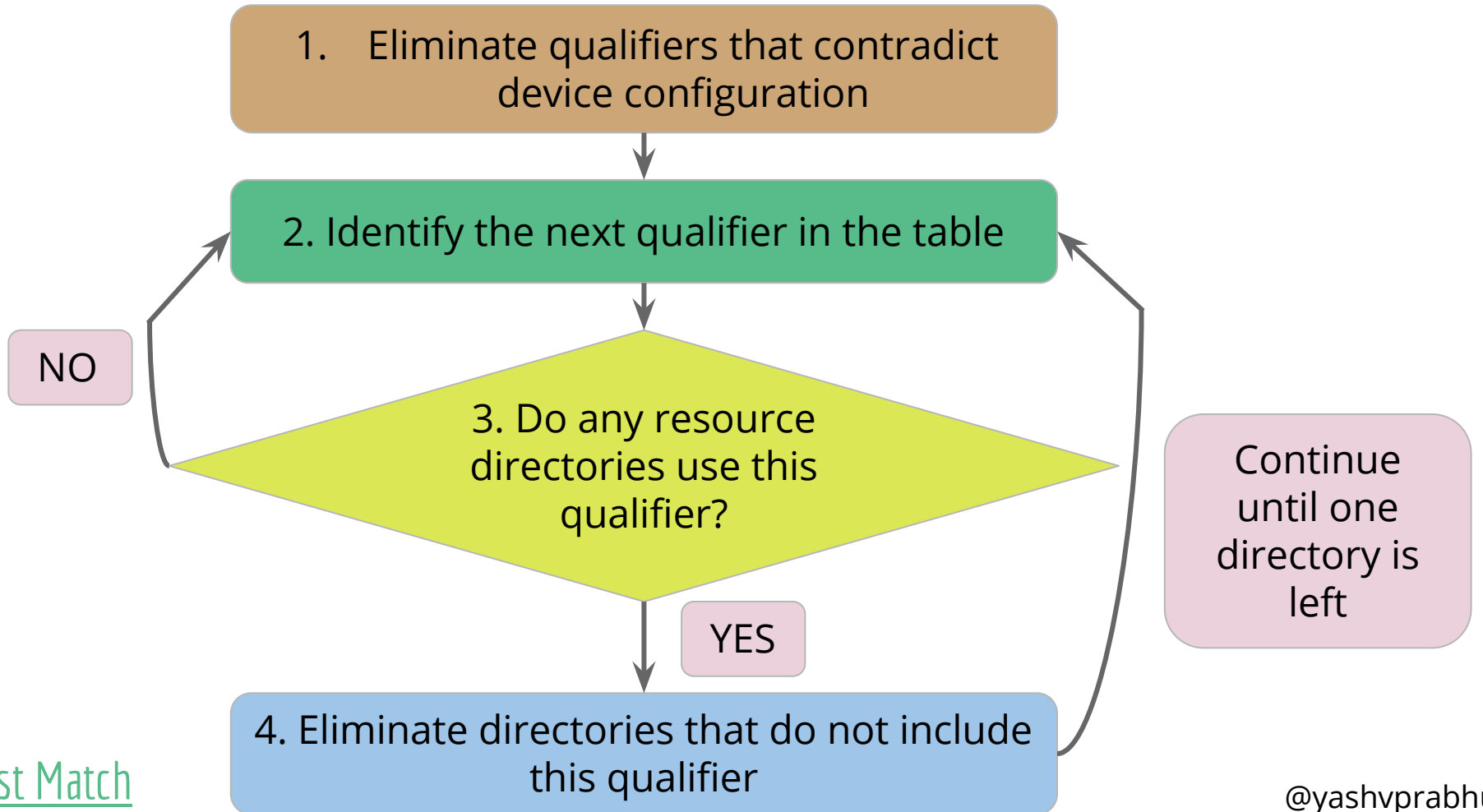
Screen aspect - notlong

Locale - en-rUS

 **Nexus 7**

---





# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp

# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp

# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp

# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp



# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp

# How does Android find the best match?

➤ Device specifications

res

Screen orientation - port

-- layout

Screen pixel density - xhdpi

-- layout-es-large

Screen size - large

-- layout-notlong

Screen aspect - notlong

-- layout-port

Locale - en-rUS

-- layout-w720dp

Identify your breakpoints



# Identify your breakpoints

layout

layout-land

layout-w600dp

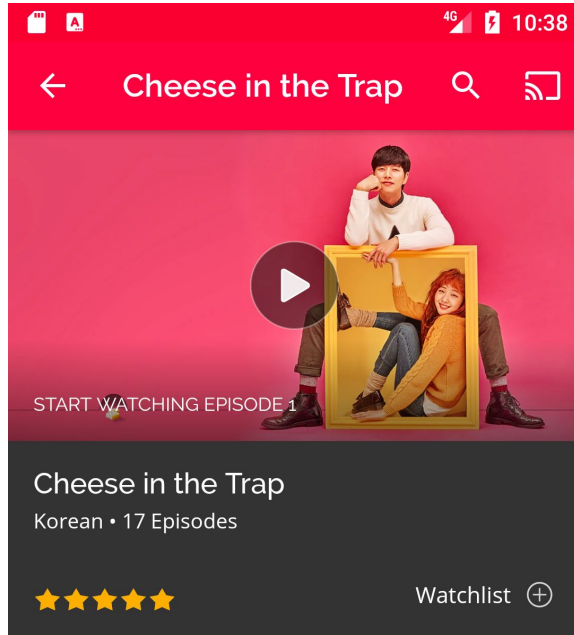
layout-w600dp-land

layout-w1024

layout-w1024dp-land

[material.io/devices](https://material.io/devices), [Material Design - Responsive UI](#)

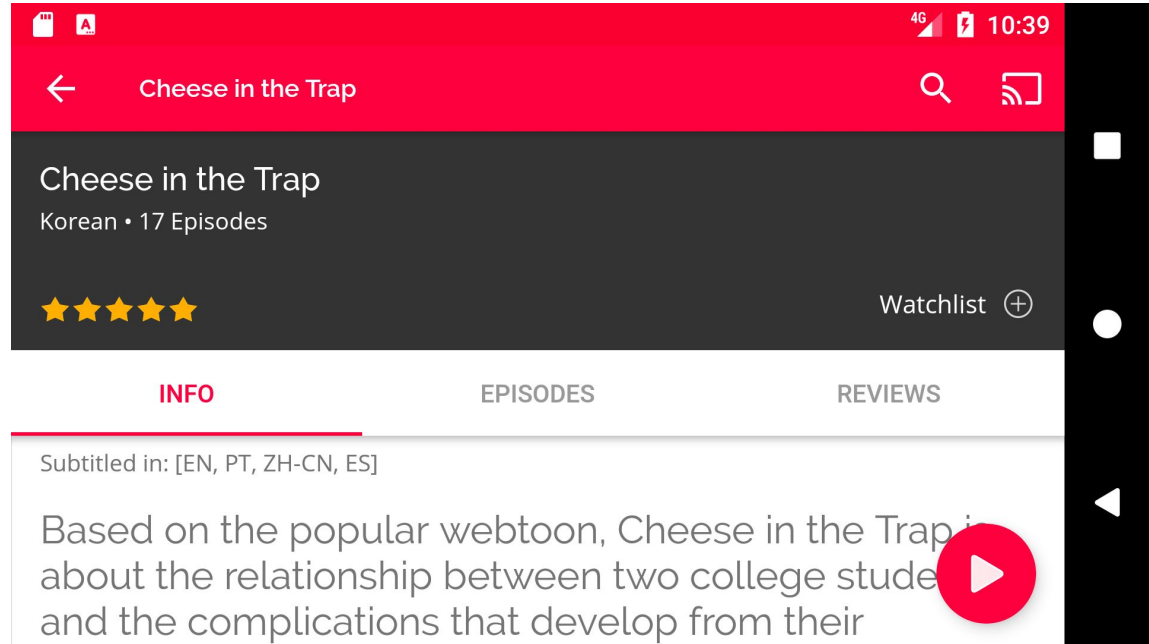
# Breakpoints - default



INFO EPISODES REVIEWS

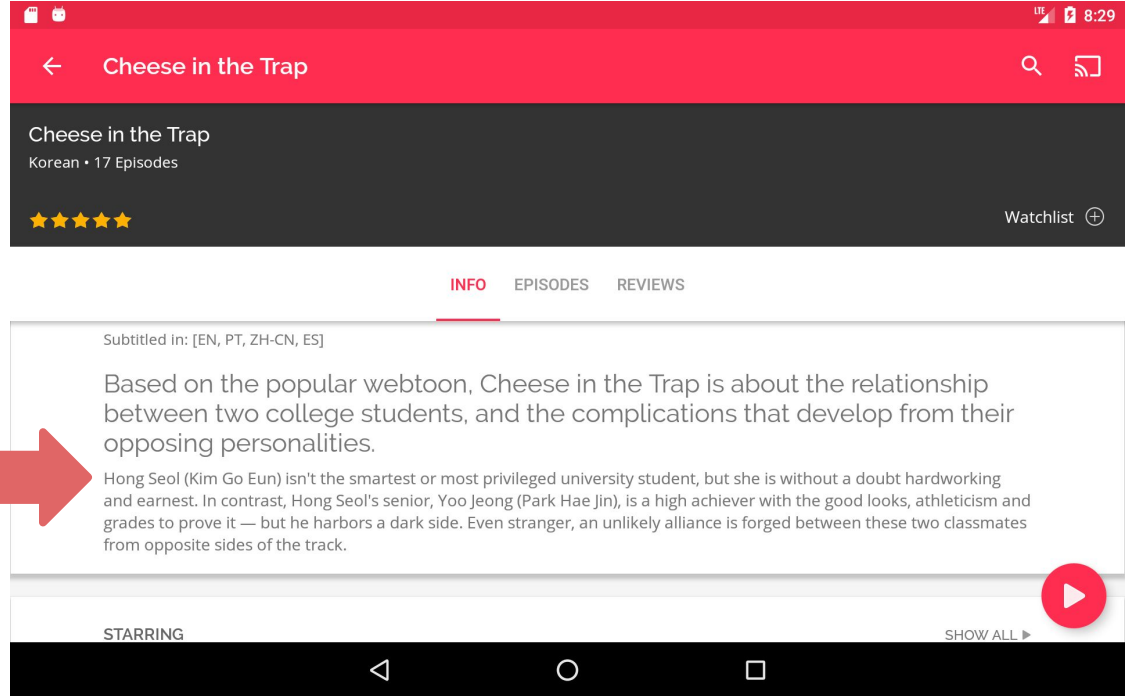
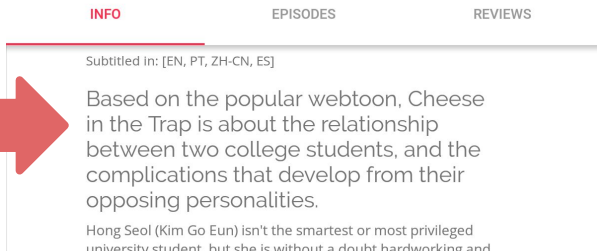
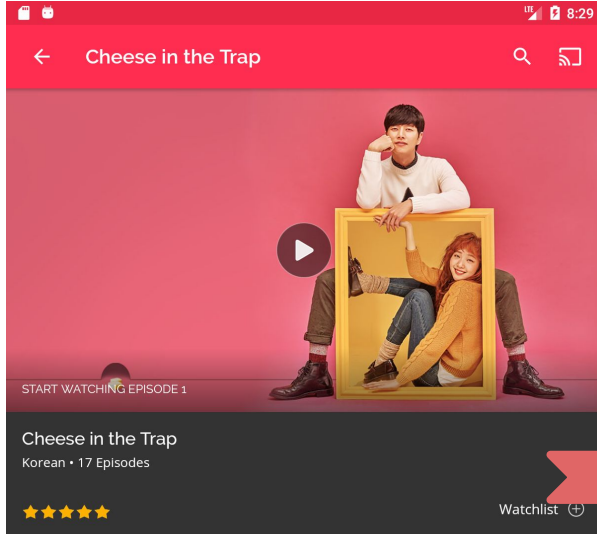
Subtitled in: [EN, PT, ZH-CN, ES]

Based on the popular webtoon

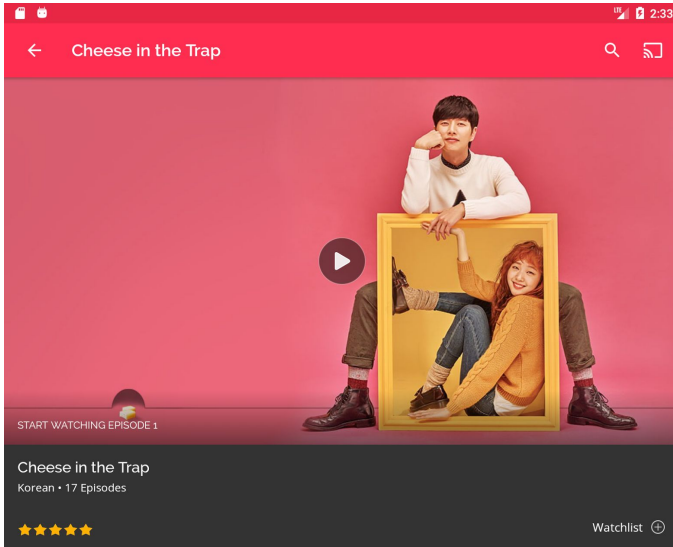


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# Breakpoints - 600



# Breakpoints - 1024

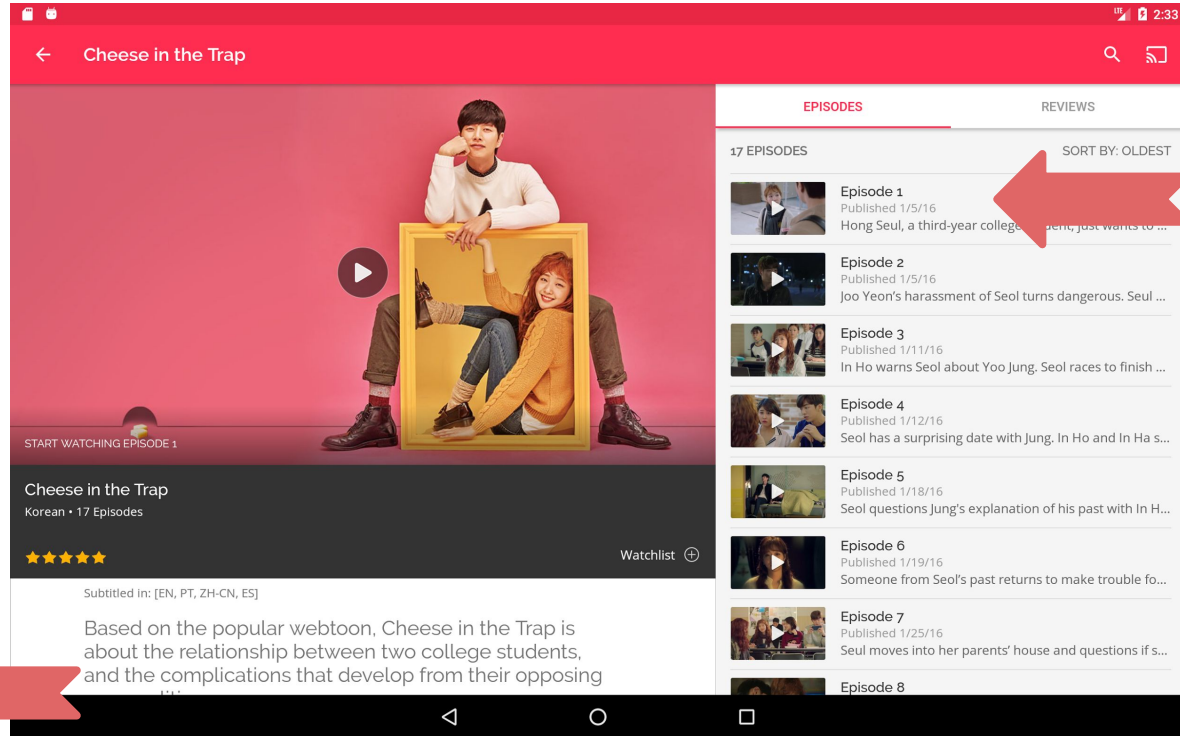


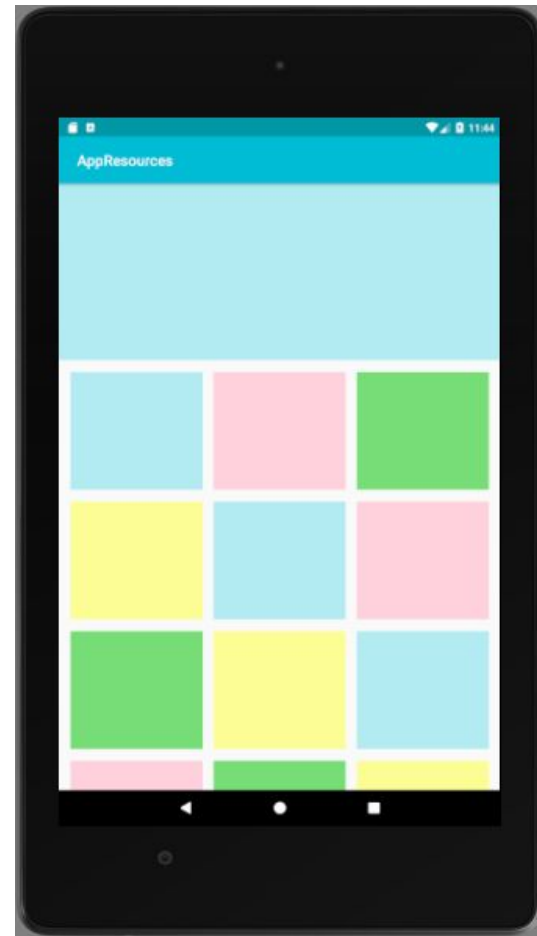
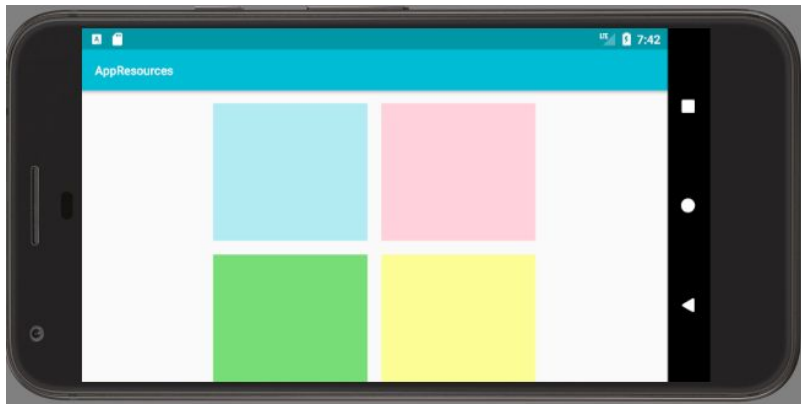
INFO EPISODES REVIEWS

Subtitled in: [EN, PT, ZH-CN, ES]

Based on the popular webtoon, Cheese in the Trap is about the relationship between two college students, and the complications that develop from their opposing personalities.

Hong Seol (Kim Go Eun) isn't the smartest or most privileged university student, but she is without a doubt hardworking and earnest. In contrast, Hong Seol's senior, Yoo Jeong (Park Hae Jin), is a high achiever with the good looks, athleticism and grades to prove it — but he harbors a dark side. Even stranger, an unlikely alliance is forged between these two classmates from opposite sides of the track.





Supporting multiple screens!

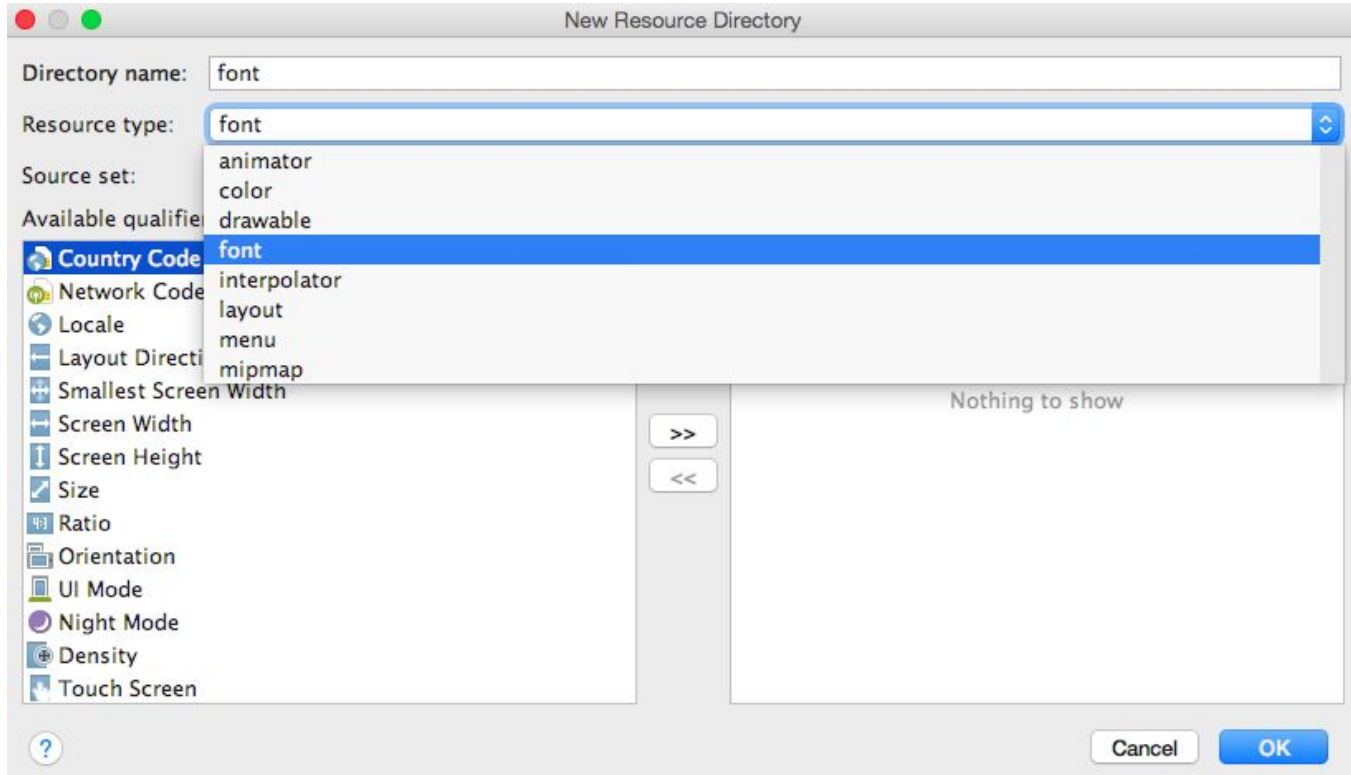


# What's new in Android O



# Fonts in Xml

# Create new resource directory



# Providing Font Resources

Download your .ttf file from  
[github.com/google/fonts](https://github.com/google/fonts)

Add it to fonts resource directory

Create a new font family via New →  
Font resource file

Directly add fonts in xml



# raleway.xml

```
<font-family xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    xmlns:app="http://schemas.android.com/apk/res-auto">
```

```
    <font
```

```
        android:fontStyle="medium"
```

```
        android:fontWeight="400" android:font="@font/raleway_medium"
```

```
        app:fontStyle="medium"
```

```
        app:fontWeight="400" app:font="@font/raleway_medium"/>
```

```
    <font
```

```
        android:fontStyle="italic" .../>
```

```
</font-family>
```

# Add font to xml

```
<TextView  
    android:fontFamily="@font/raleway"  
    android:text="@string/lorem_ipsum"  
    android:textColor="@android:color/black"  
    android:textSize="48sp" />
```

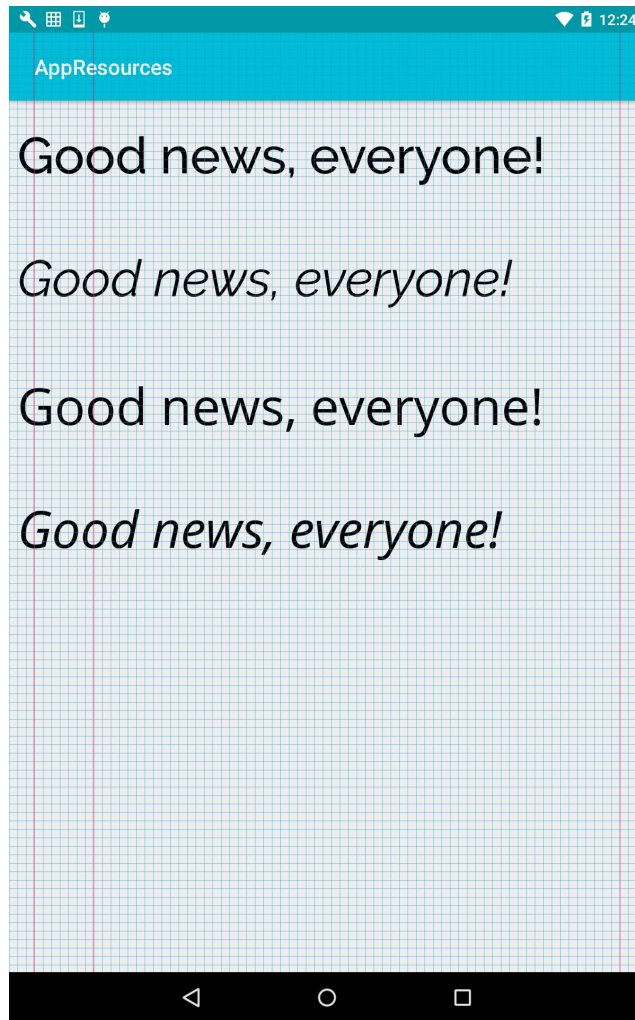
# Add font to style

```
<style name="HeaderText"
    parent="@android:style/TextAppearance.Small">
    <item name="android:fontFamily">@font/raleway</item>
</style>
```

# Add font to code

```
Typeface typeface = getResources().getFont(R.font.raleway);  
view.setTypeface(typeface);
```



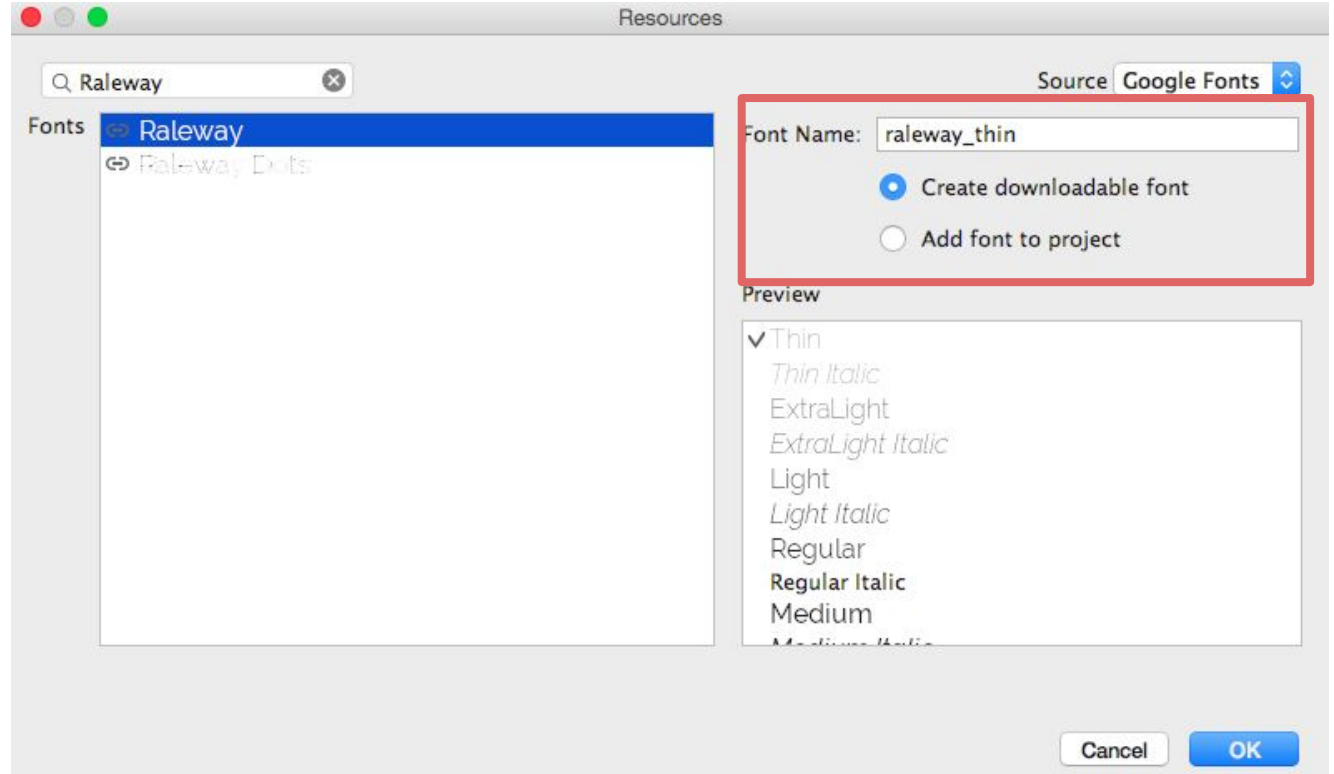
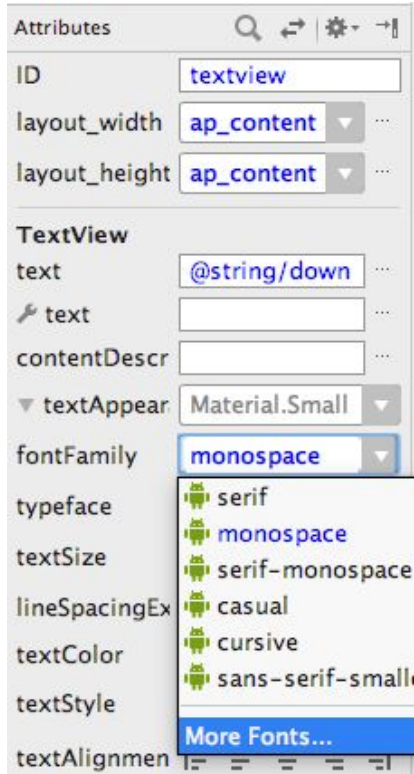




# Downloadable Fonts



# Downloadable Fonts



# AutoSizing TextViews

# Default

- Scales uniformly on horizontal and vertical axes

```
android:autoSizeTextType="uniform"
```

- Support library

```
app:autoSizeTextType="uniform"
```

Default dimensions for uniform scaling are minTextSize = 12sp, maxTextSize = 112sp and granularity = 1px

# Granularity

➤ Beware of wrap\_content!

```
android:layout_height="160dp"
```

```
android:autoSizeMinTextSize="48sp"
```

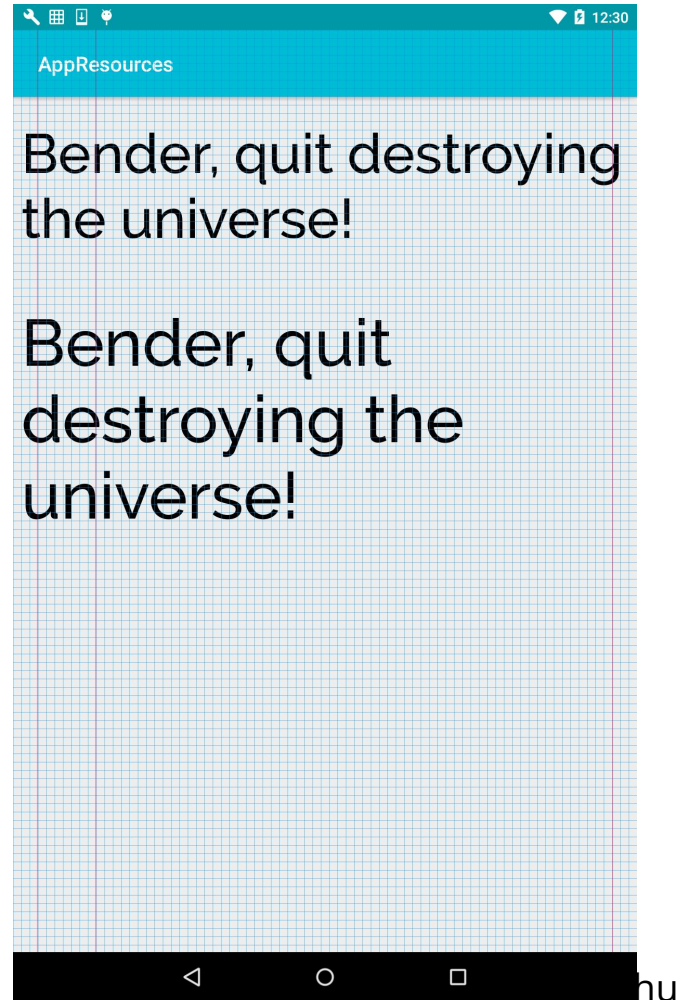
```
android:autoSizeMaxTextSize="112sp"
```

```
android:autoSizeStepGranularity="1sp"
```

```
app:autoSizeMinTextSize="48sp"
```

```
app:autoSizeMaxTextSize="112sp"
```

```
app:autoSizeStepGranularity="1sp"
```



# Preset

```
android:autoSizePresetSizes="@array/autosize_text_sizes"
```

```
android:autoSizeTextType="uniform"
```

```
android:layout_height="160dp"
```

# Preset

➤ arrays.xml

```
<array name="autosize_text_sizes">
```

```
    <item>48sp</item>
```

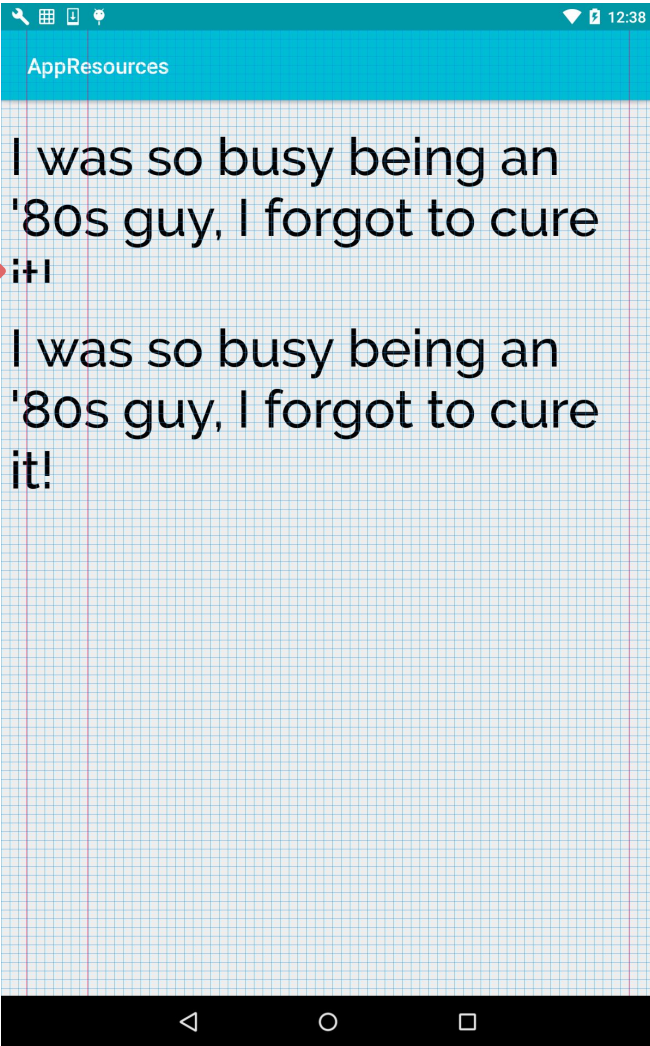
```
    <item>64sp</item>
```

```
    <item>80sp</item>
```


```
    <item>96sp</item>
```

```
    <item>112sp</item>
```

```
</array>
```







Resources & Resource Types

Multiple screen support using qualifiers

Finding the best match

Identify your breakpoints

What's new in 0

# References

[Android App Resources](#)

[TextView Autosizing](#)

[Using Fonts in Android](#)

[Device metrics](#)

[Material Design guidelines](#)

[Downloadable Fonts](#)

# Q&A



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[yprabhu.com](mailto:yprabhu.com)



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